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SEARCH CONTROL NO. 015416

PROJECT DYNASOAR (U)

SATURN HISTORY DOCUMENT
University of Alabama Research Institute
History of Science & Technology Group
Date: 6-9-69 Doc. No. _____

NN.03

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-840 795 22/4 22/2
GENERAL DYNAMICS/ASTRONAUTICS SAN DIEGO CALIF
ATLAS-CENTAUR BOOSTER FOR DYNA SOAR. (U)
DESCRIPTIVE NOTE: SUMMARY REPT.
APR 59 156P
REPT. NO. GDA-AZP-099
CONTRACT: NAS3-8701

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
COMMANDER, SAMSO (SMSDI-STINFO) LOS ANGELES AIR
FORCE STATION, CALIF, 90045.

DESCRIPTORS: (•LAUNCH VEHICLES(AEROSPACE),
LIFTING REENTRY VEHICLES), (•LIFTING REENTRY
VEHICLES, FLIGHT TESTING), DESIGN, CRYOGENIC
PROPELLANTS, AERODYNAMIC CHARACTERISTICS, STABILITY,
FLIGHT CONTROL SYSTEMS, AERODYNAMIC LOADING,
AERODYNAMIC HEATING, ROCKET TRAJECTORIES, FREE
FLIGHT TRAJECTORIES, INTERFACES, PROPELLANT TANKS,
PRESSURIZATION, HYDRAULIC SYSTEMS, ELECTRICAL
EQUIPMENT, TELEMETER SYSTEMS, GROUND SUPPORT
EQUIPMENT, GUIDED MISSILE SAFETY,
RELIABILITY(ELECTRONICS),
PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: X-20 SPACECRAFT, ATLAS, CENTAUR,
•LIFTING BODY REENTRY VEHICLES (U)

THIS REPORT DEFINES THE DESIGN, PERFORMANCE, AND
STABILITY CHARACTERISTICS OF A LAUNCHING SYSTEM
CAPABLE OF INJECTING A MANNED GLIDER INTO AN EARTH
ORBIT. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-829 193 22/2 20/4
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB
OHIO
ASSESSMENT OF THE FACTORS AFFECTING ADVANCED LIFTING
ENTRY VEHICLES, (U)
JAN 68 33P DRAPER, ALFRED C. ;BUCK,
MELVIN L. ;
REPT. NO. AFFOL-TR-67-137
PROJ: AF-1366

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE FLIGHT DYNAMICS LAB., ATTN: FDM.
WRIGHT-PATTERSON AFB, OHIO 45433.

DESCRIPTORS: (*LIFTING REENTRY VEHICLES, DESIGN),
ATMOSPHERE ENTRY, HYPERSONIC FLIGHT, LIFT, DRAG,
PERFORMANCE(ENGINEERING), REVIEWS, AERODYNAMIC
CONFIGURATIONS, COMPATIBILITY, BLUNT BODIES,
ADVANCED WEAPONS, MANEUVERABILITY, ANGLE OF
ATTACK (U)
IDENTIFIERS: SHARP BODIES, *LIFTING BODY REENTRY
VEHICLES, LIFT/DRAG RATIO, SV-5D VEHICLE,
PRIME REENTRY VEHICLE, X-20 SPACECRAFT,
ASSET (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-809 980 20/4 22/2 22/3
BOEING CO SEATTLE WASH
ADVANCED RE-ENTRY SYSTEMS HEAT-TRANSFER MANUAL FOR
HYPERSONIC FLIGHT. (U)
DESCRIPTIVE NOTE: FINAL REPT. OCT 64-AUG 65,
OCT 66 213P THOMAS, ALFRED C. ; PERLBACHS,
ANDREW ; NAGEL, A. L. ;
REPT. NO. D2-84029-1
CONTRACT: AF 33(657)-7132
MONITOR: AFFDL TR-65-195

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE FLIGHT DYNAMICS LAB., ATTN: FDMG.
WRIGHT-PATTERSON AFB, OHIO 45433.

DESCRIPTORS: (•REENTRY VEHICLES, HEAT TRANSFER),
(•AERODYNAMIC HEATING, MATHEMATICAL PREDICTION),
(•AERODYNAMIC CONFIGURATIONS, AERODYNAMIC
HEATING), (•HEAT TRANSFER, HANDBOOKS),
HYPERSONIC FLIGHT, LAMINAR BOUNDARY LAYER,
TURBULENT BOUNDARY LAYER, LIFTING REENTRY VEHICLES,
DESIGN, MANEUVERABILITY, COMPRESSIBLE FLOW,
BOOST-GLIDE VEHICLES, SHOCK WAVES (U)
IDENTIFIERS: BALLISTIC VEHICLES, MANEUVERABLE
VEHICLES, X-20 SPACECRAFT (U)

AN ADVANCED RE-ENTRY SYSTEMS HEAT TRANSFER HANDBOOK
FOR HYPERSONIC FLIGHT HAS BEEN DEVELOPED USING
AEROTHERMODYNAMIC PREDICTION METHODS DEVELOPED DURING
THE X-20A (DYNA SOAR) PROGRAM. IT
CONTAINS (1) DESIGN PROCEDURES FOR COMPUTING
AERODYNAMIC HEATING RATES TO RE-ENTRY VEHICLE
CONFIGURATIONAL ELEMENTS, (2) DISCUSSION ON
DIFFERENCES BETWEEN AERODYNAMIC HEAT TRANSFER AND
PRESSURE DISTRIBUTION OBSERVED IN PRESENT DAY WIND
TUNNELS AND THOSE WHICH WOULD OCCUR IN ACTUAL FREE
FLIGHT, (3) WIND TUNNEL TO FLIGHT EXTRAPOLATION
FACTORS, (4) SIMPLIFIED EXPRESSIONS FOR
ESTIMATING STAGNATION POINT AND SWEEP CYLINDER
TURBULENT STAGNATION LINE HEATING RATES, AND (5)
GRAPHS FOR RAPID CALCULATION OF HEATING RATES AND
EXTRAPOLATION TO FLIGHT FACTORS. THE INFORMATION
PRESENTED IS APPLICABLE TO COMPLEX MANEUVERABLE
VEHICLES AS WELL AS BALLISTIC BODIES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-630 469 22/2 11/2
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB
OHIO
X-20 WINDOW TESTS.
DESCRIPTIVE NOTE: FINAL REPT., FEB-APR 65,
JAN 66 39P ENGLAND, MURRAY No. 1
REPT. NO. AFFDL-TR-65-211,
PROJ: AF-1368,
TASK: 136802,

(U)

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SUPPLEMENTARY NOTE:

DESCRIPTORS: (•WINDSHIELDS, AEROSPACE CRAFT),
(•GLASS, WINDSHIELDS), (•AEROSPACE CRAFT,
WINDSHIELDS), SPACE SIMULATION CHAMBERS, HEAT-
RESISTANT GLASS, MECHANICAL PROPERTIES, TESTS,
LAUNCHING, ATMOSPHERE ENTRY, HIGH-TEMPERATURE
RESEARCH
IDENTIFIERS: X-20 SPACECRAFT, DYNA-SOAR

(U)

(U)

THIS REPORT DESCRIBES TWO STRUCTURAL INTEGRITY
TESTS OF THE X-20A HIGH TEMPERATURE SIDE WINDOW.
ONE TEST SIMULATED THE AIR LEAKAGE FROM THE WINDOW
DURING BOOST AND THE SECOND TEST SIMULATED THE
THERMAL CYCLE EXPERIENCED DURING REENTRY. THE
OUTSIDE WINDOW PANEL FAILED PREMATURELY DURING THE
THERMAL CYCLE. APPARENTLY THE RESULT OF EXCESSIVE
THERMAL GRADIENTS THROUGH THE FRAME AND A STRESS
CONCENTRATION CAUSED BY THERMISTOR INSTRUMENTATION
LEADS PASSING THROUGH THE FRAME AND UNDER THE WINDOW
SEALS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-627 175 5/9
ARMS CONTROL AND DISARMAMENT AGENCY WASHINGTON D C
A CASE STUDY OF THE EFFECTS OF THE DYNASOAR CONTRACT
CANCELLATION UPON EMPLOYEES OF THE BOEING COMPANY IN
SEATTLE, WASHINGTON. (U)

JUL 65 311P NEUSCHWANDER, LEO ; WILLIAMS,
RAY ;

UNCLASSIFIED REPORT
AVAILABILITY: SUPERINTENDENT OF DOCUMENTS, GPO,
WASH., D. C., 20402 HC\$1.50, CFSTI MF\$1.50.

DESCRIPTORS: (*EMPLOYMENT, ASTRONAUTICS),
(*PERSONNEL MANAGEMENT, ASTRONAUTICS), WAGES,
BOOST-GLIDE VEHICLES, PERSONNEL, STATISTICAL
ANALYSIS, AIRCRAFT INDUSTRY (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE OBJECTIVES OF THE STUDY WERE: (1) TO
DETERMINE THE CHARACTERISTICS OF AFFECTED WORKERS;
(2) TO DETERMINE THEIR POST-LAYOFF WORK
EXPERIENCE; (3) TO IDENTIFY THE MAJOR OBSTACLES
THEY ENCOUNTERED IN FINDING ANOTHER JOB; AND (4)
TO EVALUATE THE ASSISTANCE WORKERS RECEIVED IN
SEEKING WORK. (U)

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-616 525

FRANKFORD ARSENAL PHILADELPHIA PA
DYNA-SOAR ESCAPE SYSTEM PROPELLANT ACTUATED DEVICES,

(U)

MAY 65 68P SUTTER, RAYMOND C. I
REPT. NO. R-1757

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SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY
LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF
REQUESTED BY USERS OF ODC. COPY IS AVAILABLE FOR PUBLIC
SALE.

DESCRIPTORS: (•CARTRIDGES(PAD), BOOST-GLIDE
VEHICLES), (•BOOST-GLIDE VEHICLES,
CARTRIDGES(PAD)), (•EJECTION SEATS, BOOST-GLIDE
VEHICLES), SAFETY DEVICES, CATAPULTS, EXPLOSIVES
INITIATORS, ACCELERATION, MANNED SPACECRAFT,
VIBRATION, QUALITY CONTROL, TEST METHODS,
PERFORMANCE(ENGINEERING), TABLES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

PROPELLANT ACTUATED DEVICES, ORIGINALLY DEVELOPED
FOR USE IN CONVENTIONAL AIRCRAFT, WERE SUBJECTED TO
SPECIAL VIBRATION TESTS IN ORDER TO QUALIFY THEM FOR
USE IN THE DYNA-SOAR (X20) ESCAPE SYSTEM.
FOUR INITIATORS WERE DEVELOPED FOR USE IN THE
SYSTEM AND THE EJECTION SEAT CATAPULT WAS TESTED
UNDER HIGH G LOADS TO DETERMINE SAFETY OF THE DEVICE
IF INITIATED DURING HIGH DOWN-LOAD CONDITIONS.
(AUTHOR) (U)

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AD-603 704

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO
THE X-20 FLIGHT CONTROL SYSTEM DEVELOPMENT, (U)

JUN 64 36P MCDONALD, EDWARD H. ; FARRIS,

JOSEPH A. ;

MONITOR: SEG , TDR64 8

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SUPPLEMENTARY NOTE: OUTLINE SUMMARY OF FEATURES DEVELOPED
BY THE BOEING CO. AND THE MINNEAPOLIS-HONEYWELL
REGULATOR CO. UNDER CONTRACT AF33 657 7132.

DESCRIPTORS: (*AEROSPACE PLANES, FLIGHT CONTROL
SYSTEMS), (*FLIGHT CONTROL SYSTEMS, AEROSPACE PLANES),
(*SPACECRAFT, FLIGHT CONTROL SYSTEMS), ADAPTIVE CONTROL
SYSTEMS, REDUNDANT COMPONENTS, DESIGN, OPERATION (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS REPORT ATTEMPTS TO PROVIDE CONTINUITY AND
RATIONALE TO THE DEVELOPMENT OF THE FLIGHT
CONTROL SYSTEM FOR THE X-20 (DYNA-SOAR)
VEHICLE. THE UNIQUE FEATURES ARE NOTED AND THE
DOCUMENTS PROVIDING DETAILS OF THESE FEATURES ARE
REFERENCED. THE MORE SIGNIFICANT PROBLEMS
ENCOUNTERED IN THE DEVELOPMENT ARE DISCUSSED TOGETHER
WITH THE SOLUTION OR THE APPROACHES BEING TAKEN TO
OBTAIN A SOLUTION. (AUTHGR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-603 701

AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
OHIO

X-20A FULL-PRESSURE SUIT QUANTITATIVE PERFORMANCE,

(U)

MAY 64 SOP BOWEN, J. D. ;
PROJ: 6301
TASK: 630104
MONITOR: AMRL , TDR64 36

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SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SPACE MEDICINE, ASTRONAUTS), (*PRESSURE
SUITS, EXPOSURE SUITS), (*EXPOSURE SUITS, PRESSURE
SUITS), MOTOR REACTIONS, HANDS, PERFORMANCE (HUMAN),
SPACE ENVIRONMENTAL CONDITIONS, SPACECRAFT CABINS,
SIMULATION, PHYSICAL PROPERTIES, ACOUSTIC PROPERTIES,
WEIGHT, VISION

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

A SERIES OF EXPERIMENTAL PROCEDURES WAS
ACCOMPLISHED TO DEMONSTRATE AND MEASURE THE
PROTECTION X-20A (DYNASOAR) PILOTS OBTAIN
BY WEARING THEIR CUSTOM FITTED PRESSURE GARMENTS
WHILE EXPOSED TO SIMULATED MISSION CONDITIONS.
MISSION CONDITIONS WERE SIMULATED TO THE EXTENT
POSSIBLE WITH AVAILABLE ALTITUDE AND TEMPERATURE TEST
FACILITIES. PHYSICAL CHARACTERICS OF THE GARMENTS
WERE DETERMINED SUCH AS WEIGHT, PRESSURE DROP WITH
FLOW, DIMENSIONAL STABILITY, VISUAL FIELDS, AND
ACOUSTICAL ATTENUATION. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-603 307

AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
OHIO

PERFORMANCE PARAMETERS OF THE X-20 DYNA-SOAR
PROTOTYPE FULL PRESSURE ASSEMBLY. (U)

DESCRIPTIVE NOTE: REPT. FOR 27 SEP 62-3 JAN 63,
MAY 64 52P ROCK, LEE C. ;

CONTRACT: AF33 657 7897

PROJ: 6301

TASK: 63D104

MONITOR: AMRL , TDR64 27

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SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE SUITS, AEROSPACE CRAFT),
(*AEROSPACE CRAFT, PRESSURE SUITS), HUMAN ENGINEERING,
FLIGHT CLOTHING, PERFORMANCE (ENGINEERING), TEST
METHODS, TESTS, AERONAUTICAL LABORATORIES, SPACE
MEDICINE (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THE X-20 DYNA-SOAR PROTOTYPE MODEL FULL
PRESSURE ASSEMBLY WAS SUBJECTED TO A SERIES OF
TESTS TO DETERMINE THE PERFORMANCE PARAMETERS OF THE
SUIT. THESE TESTS INCLUDE THOSE CONSIDERED TO BE
THE BASIC STANDARD PERFORMANCE TESTS FOR
ANTHROPOMORPHOUS PROTECTIVE ASSEMBLIES IN ADDITION TO
THOSE PARTICULARLY REQUESTED BY THE DYNA-SOAR
PROJECT OFFICE. THIS REPORT PRESENTS ALL THE
DATA OBTAINED FROM THE VARIOUS TESTS AND IS PRESENTED
AS INDICATIVE OF PERFORMANCE PARAMETERS ONLY. NO
ATTEMPT HAS BEEN MADE TO EQUATE THE ASSEMBLY
PERFORMANCE WITH THE X-20 DYNA-SOAR MISSION AND
VEHICLE PERFORMANCE OR WITH THE PERFORMANCE OF ANY
OTHER ANTHROPOMORPHOUS PROTECTIVE ASSEMBLY.
(AUTHOR) (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-490 013
BOEING CO SEATTLE WASH
GENERAL REQUIREMENTS FOR SUBCONTRACTOR MOTION PICTURE
PHOTOGRAPHY REPORTS, (U)
SEP 60 IIP SMITH, CHARLES G. ;
REPT. NO. DN D2 7792
CONTRACT: AF 33(600)41517

UNCLASSIFIED REPORT
DISTRIBUTION: NO FORM.

DESCRIPTORS: (*MOTION PICTURE PHOTOGRAPHY),
(•DOCUMENTATION), SPECIFICATIONS, AIR FORCE
PROCUREMENT, BOOST-GLIDE VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-484 000 22/2
SYSTEMS ENGINEERING GROUP RESEARCH AND TECHNOLOGY DIV
WRIGHT-PATTERSON AFB OHIO
X-20 (DYNA-SOAR) CONTINUATION ITEMS. (U)
DESCRIPTIVE NOTE: TECHNICAL REPT. DEC 63-AUG 65,
DEC 65 57P HUTCHINSON, EDWIN D. ;
REPT. NO. SEG-TR-65-52

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
SYSTEMS ENGINEERING GROUP, RESEARCH AND
TECHNOLOGY DIV., WRIGHT-PATTERSON AFB, OHIO
45433. ATTN: DIRECTORATE OF SYSTEMS ENGINEERING
A, DEPUTY FOR SYSTEMS ENGINEERING.

DESCRIPTORS: (*MANNED SPACECRAFT, DESIGN), BOOST-
GLIDE VEHICLES, RESEARCH PLANES, REENTRY VEHICLES,
PROGRAMMING (COMPUTERS), MODELS (SIMULATIONS),
FLUTTER, FLIGHT TESTING, LAMINAR FLOW,
TURBULENCE, HEAT TRANSFER, NOSE CONES, PILOTS,
INSTRUMENTATION, AERODYNAMICS, CONTROL SYSTEMS,
GUIDANCE, CRYOGENIC STORAGE DEVICES, HYDROGEN,
OXYGEN, TRANSDUCERS, HEAT SHIELDS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS REPORT SUMMARIZES THE OBJECTIVES AND
ACCOMPLISHMENTS OF THE X-20 (DYNA-SOAR)
CONTINUATION PROJECTS. THESE TASKS REPRESENT
SUBSTANTIAL TECHNOLOGICAL ADVANCES IN A WIDE VARIETY
OF AREAS THAT HAVE POTENTIAL VALUE IN FUTURE RESEARCH
AND DEVELOPMENT ACTIVITIES. (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-483 690 1/3 22/2
CORNELL AERONAUTICAL LAB INC BUFFALO N Y
APPLICATION AND EVALUATION OF CERTAIN ADAPTIVE
CONTROL TECHNIQUES IN ADVANCED FLIGHT VEHICLES.
VOLUME I. G. E. SELF-ADAPTIVE FLIGHT CONTROL
SYSTEM.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,
JUL 61 158P SCHULER, JOHN M.; CHALK,
CHARLES R.; SCHELHORN, ARNO E.;
CONTRACT: AF 33(616)-7572
PROJ: AF-8225
TASK: 82181
MONITOR: ASD TR-61-104-VOL-1

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DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
AERONAUTICAL SYSTEMS DIV., WRIGHT-PATTERSON AFB,
OHIO 45433.

DESCRIPTORS: (*ADAPTIVE CONTROL SYSTEMS, *RESEARCH
PLANES), (*MANNED SPACECRAFT, ADAPTIVE CONTROL
SYSTEMS), (*BOOST-GLIDE VEHICLES, ADAPTIVE CONTROL
SYSTEMS), MATHEMATICAL MODELS, ATMOSPHERE ENTRY,
PITCH(MOTION), RESPONSE, GUSTS, STABILITY,
DYNAMICS, ACTUATORS, VALVES, GYROSCOPES,
AIRPLANE MODELS, HYPERSONIC FLIGHT, FEEDBACK,
GAIN, SYSTEMS ENGINEERING, ERRORS, NONLINEAR
SYSTEMS, OPTIMIZATION, AIRSPEED, ACCELERATION,
ANGLE OF ATTACK

(U)

IDENTIFIERS: X-15 AIRCRAFT, X-20 SPACECRAFT

(U)

THE APPLICATION AND EVALUATION OF CERTAIN ADAPTIVE
CONTROL TECHNIQUES WERE STUDIED AS APPLIED TO
ADVANCED VEHICLES OF THE X-15 AND DYNA-SOAR
TYPE. THE GENERAL CONCEPT OF ADAPTIVE CONTROL
THROUGH THE USE OF REFERENCE MODELS IS DISCUSSED, AND
PARTICULAR MODELS ARE EVALUATED BASED ON THE PRESENT
STATUS OF AIRPLANE HANDLING QUALITIES RESEARCH.
THE G. E. SYSTEM IS APPLIED TO THE PROBLEM OF
CONTROLLING THE LONGITUDINAL SHORT-PERIOD MOTIONS OF
THE X-15 AIRPLANE DURING RE-ENTRY. THE FIRST
TREATMENT OF THE PROBLEM IS RATHER GENERAL, AND USES
ESSENTIALLY LINEAR TECHNIQUES TO INVESTIGATE THE
REFERENCE MODEL CONCEPTS, SELECTION OF SYSTEM
PARAMETERS, RESPONSES TO COMMAND INPUTS AND GUSTS,
EFFECT OF BASIC AIRPLANE STATIC AND DYNAMIC
INSTABILITY, EFFECT OF SENSOR DYNAMICS, AND DYNAMICS
OF THE ADAPTIVE LOOP. THEN A MORE DETAILED STUDY
IS MADE OF CERTAIN PROBLEM AREAS, INCLUDING THE
RESPONSE TO INPUTS AT THE ACTUATOR VALVE, EFFECT OF
ACTUATOR NON-LINEARITIES, FREQUENCY SENSOR
CHARACTERISTICS, AND THE EFFECT OF NOISE IN THE

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AD-483 025 13/9

BOEING CO SEATTLE WASH AEROSPACE GROUP
EVALUATION OF STELLITE 19 HIGH TEMPERATURE
BEARINGS.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JAN-15 APR 64,

MAR 65 32P ARMSTRONG, C. S. ;

REPT. NO. D2-20418-1

CONTRACT: AF 33(657)-7132

PROJ: AF-1315

TASK: 131501

MONITOR: AFFDL

TR-64-167

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DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON
AFB, OHIO. 45433. ATTN: FDFM.

DESCRIPTORS: (*BEARINGS, HIGH-TEMPERATURE
RESEARCH), (*COBALT ALLOYS, BEARINGS), BALL
BEARINGS, PERFORMANCE(ENGINEERING), WEAR
RESISTANCE, CHROMIUM ALLOYS, TUNGSTEN ALLOYS,
LOADING(MECHANICS), REENTRY VEHICLES, STEEL,
FRICTION, HALOCARBON PLASTICS, TEST EQUIPMENT,
TABLES, AIRFRAMES, HARDNESS, NICKEL ALLOYS,
ELEVONS, BOOST-GLIDE VEHICLES

(U)

IDENTIFIERS: STELLITE(ALLOY), STAR
J(ALLOY), X-20 SPACECRAFT

(U)

NINETEEN, FOUR-IN. BORE, TORQUE TUBE TYPE, HIGH
TEMPERATURE BALL BEARINGS WERE EVALUATED IN LOAD
SPECTRUM AND LIFE TESTS AT TEMPERATURES RANGING FROM
1000 TO 1700 F. THE BEARINGS, WHICH WERE
DESIGNED FOR THE INBOARD ELEVON HINGE OF THE X-20
VEHICLE, WERE CONSTRUCTED WITH RACES OF HAYNES
STELLITE 19 AND HAD BALLS MADE OF HAYNES STAR
J METAL. THEY WERE PROVIDED WITH ABLATIVE
SEALS CONSTRUCTED OF TEFLON AND STAINLESS STEEL TO
RETAIN OIL AND TO PROTECT THE BEARING FROM DIRT
DURING NORMAL TEMPERATURE HANDLING. SPHERICAL
SECTIONS WERE INCLUDED IN THE BEARING ASSEMBLY TO
ALLOW SELF-ALIGNMENT. THESE BEARINGS WERE
EVALUATED AT RADIAL LOADS FROM 2000 TO 37,000 LBS AND
AN OSCILLATORY MOVEMENT OF PLUS OR MINUS 10 AT 20
CYCLES PER MINUTE. LIMIT LOADS WERE DETERMINED AT
1000, 1200, 1400, 1600, AND 1700 F.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-482 448L 22/2

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
THE X-20 (DYNA-SOAR) PROGRAM.

(U)

DESCRIPTIVE NOTE: LITERATURE SEARCH 1958-SEP 63,
DEC 63 24P EVANS, GEORGE R. ;

REPT. NO. LMSC-LS-16

UNCLASSIFIED REPORT

DISTRIBUTION: USGO; OTHERS TO LOCKHEED MISSILES
AND SPACE CO., SUNNYVALE, CALIF. ATTN:
LITERATURE SEARCH.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES,
•BIBLIOGRAPHIES), MANNED SPACECRAFT, RESEARCH
PLANES, ROCKET MOTORS(SOLID PROPELLANT), LAUNCH
VEHICLES(AEROSPACE), HYPERSONIC TEST VEHICLES,
REENTRY VEHICLES, AERODYNAMIC CHARACTERISTICS,
ABSTRACTS

(U)

IDENTIFIERS: X-20 SPACECRAFT, TITAN 3

(U)

THE X-20 (DYNA-SOAR) PROGRAM.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-480 075 1674
MARTIN CO DENVER COLO
RF SUSCEPTIBILITY OF THE TITAN III ORDNANCE DEVICES.
REVISION A, (U)
JAN 65 183P ASIALA ,C. ;BERRY ,J. ;
LILLIE ,W. ;LOVER,G. ;
REPT. NO. TM-0455/41-64-5-REV-A
CONTRACT: AF 04(695)-150

UNCLASSIFIED REPORT
DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF SPACE
SYSTEMS DIV. (AFSC) LOS ANGELES AIR FORCE
STATION, CALIF. 90045.

DESCRIPTORS: (EXPLOSIVES INITIATORS, HAZARDS),
RADIOFREQUENCY, ELECTROMAGNETIC FIELDS, BOOSTER
MOTORS, LAUNCH VEHICLES(AEROSPACE), WEAPON
SYSTEMS, SIMULATION, TEST METHODS, SENSITIVITY,
EXPLOSIVE ACTUATORS, CIRCUITS,
CARTRIDGES(PAD), PRIMERS, GUIDED MISSILE
COMPONENTS, PROBABILITY, MICROWAVES, ELECTRIC
WIRE, RELIABILITY, FIRING MECHANISMS(WEAPON),
EQUATIONS, MATHEMATICAL MODELS, PAYLOAD,
DETONATORS, COMPUTERS (U)
IDENTIFIERS: TITAN 3, X-20 SPACECRAFT (U)

FROM THE RESULTS OF THE LABORATORY TESTING AND THE
CIRCUIT ANALYSIS, IT IS CONCLUDED THAT THE TITAN
III ORDNANCE DEVICES ARE SAFE WHEN SUBJECTED TO A
FIELD OF 100 WATTS PER SQUARE METER.
(AUTHOR) (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-478 215 22/2 20/4
BOEING CO SEATTLE WASH AEROSPACE GROUP
AERODYNAMIC NOISE TESTS ON X-20 SCALE MODELS. VOLUME
11. SUMMARY AND ANALYSIS REPORT. (U)
DESCRIPTIVE NOTE: FINAL REPT. OCT 64-AUG 65,
NOV 65 58P WILEY ,DAVID R. ISEIDL,
MICHAEL G. I
REPT. NO. D2-23966-2
CONTRACT: AF 33(6571)-7132
PROJ: AF-1471
TASK: 147102
MONITOR: AFFDL TR-65-192-VOL-2

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON
AFB, OHIO 45433. ATTN: FOO.

DESCRIPTORS: (*NOISE, *AERODYNAMICS), (*BOOST-
GLIDE VEHICLES, MODEL TESTS), WIND TUNNEL MODELS,
BOUNDARY LAYER, ACOUSTICS, PRESSURE, TRANSONIC
FLOW (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

SUMMARIES OF FLUCTUATING PRESSURE DATA PRESENTED IN
VOLUME I FOR 1/15TH-SCALE X-20 MODELS ARE MADE
AND DISCUSSED. PARTICULAR EMPHASIS IS GIVEN TO THE
HIGH OVER-ALL RMS PRESSURES MEASURED AFT OF CONVEX
CORNERS DURING TRANSONIC TEST CONDITIONS.
ADDITIONAL INFORMATION RELATING TO THESE PRESSURES
IS PRESENTED IN THE FORM OF PRESSURE HISTORIES, PEAK-
AMPLITUDE DISTRIBUTIONS, AND POWER SPECTRAL
DENSITIES. FLUCTUATING-PRESSURE DATA AND SPACE
CORRELATION MEASUREMENTS FOR THREE CLOSELY SPACED
MICROPHONES ARE PRESENTED, ILLUSTRATING THE LOCAL
NATURE OF THE HIGH-LEVEL PRESSURES. ANALYSES OF
TRENDS FOR THE MAXIMUM OVER-ALL RMS PRESSURE LEVELS
FOR THE X-20 TESTS AND OTHER WIND-TUNNEL TESTS ARE
MADE. DESIGN CHARTS ARE DEVELOPED FOR PREDICTING
MAXIMUM LEVELS AFT OF CONE-CYLINDER TRANSITION
SECTIONS AS FUNCTIONS OF TRANSITION ANGLE AND
DISTANCE DOWNSTREAM OF THE TRANSITION SHOULDER.
RECOMMENDATIONS ARE MADE REGARDING FUTURE
AERODYNAMIC NOISE EXPERIMENTAL PROGRAMS.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-478 051 22/2 20/13
GARRETT CORP LOS ANGELES CALIF AIR RESEARCH MFG DIV
SYSTEM TEST OF THERMAL MANAGEMENT SYSTEM FOR DYNA-
SOAR (X-20). (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT, AUG 64-AUG 65,
DEC 65 111P CHASE, A. B. DURHAM, R. E. I
REPT. NO. DS-274
CONTRACT: AF33(615)-2085
PROJ: AF-6146
TASK: 614617
MONITOR: AFFDL TR-65-201

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC) WRIGHT-
PATTERSON AFB, OHIO. 45433, ATTN: ENVIRONMENTAL
CONTROL BRANCH, VEHICLE EQUIPMENT DIV.
(FDPE).

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, *AIR
CONDITIONING EQUIPMENT), MANNED SPACECRAFT,
AUXILIARY POWER PLANTS, SPACECRAFT CABINS,
TEMPERATURE, TEMPERATURE CONTROL, CRYOGENIC
PROPELLANTS, STORAGE TANKS, PRESSURIZATION,
HYDROGEN, GLYCOLS, HEATING, COOLING +
VENTILATING EQUIPMENT, LIQUID COOLED, HYDRAULIC
FLUIDS, COOLING, TEST EQUIPMENT, INSTRUMENTATION,
ELECTRONIC EQUIPMENT, ENVIRONMENTAL TESTS,
THERMODYNAMIC CYCLES, PERFORMANCE(ENGINEERING) (U)
IDENTIFIERS: X-20 SPACECRAFT, THERMAL (U)
MANAGEMENT (U)

RESULTS ARE DESCRIBED OF A 50-HOUR DEVELOPMENT TEST
OF THE DYNA-SOAR (X-20) INTEGRATED, CRYOGENIC
HYDROGEN, THERMAL MANAGEMENT SYSTEM, THE TEST WAS
PERFORMED TO DEMONSTRATE THE SYSTEM'S PRESENT
TEMPERATURE CONTROL CAPABILITIES. THE FIRST 40
HOURS OF TESTING DEMONSTRATED THE SYSTEM PERFORMANCE
AT DESIGN CONDITIONS AND SINGLE COMPONENT FAILURE
CONDITIONS. THE REMAINING 10 HOURS DEMONSTRATED
SYSTEM PERFORMANCE AT OVER DESIGN AND MULTIPLE
FAILURES CONDITIONS. THE SYSTEM MET REQUIREMENTS
FOR REMOVING THE DYNA-SOAR HEAT LOADS AND
MAINTAINING REQUIRED TEMPERATURE LEVELS. IT ALSO
MAINTAINED HYDROGEN TANK PRESSURE CONSTANT FOR A WIDE
RANGE OF HEAT LOADS AND HYDROGEN USAGE RATES.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-477 773 20/13 22/2
BOEING CO SEATTLE WASH
THERMAL CORRELATION OF HEAT PROTECTION SYSTEM. (U)
DESCRIPTIVE NOTE: FINAL REPT.,
DEC 65 253P CLAWSON, JAMES F. ;
REPT. NO. D2-81280-REV.
CONTRACT: AF33(615)-1788
PROJ: AF-1467
MONITOR: AFFDL TR-65-167

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC), WRIGHT-
PATTERSON AFB, OHIO. ATTN: AFFDL.
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 9 JUL 64,
AD-443 704.

DESCRIPTORS: (THERMAL ANALYSIS, AIRPLANE PANELS),
(AIRPLANE PANELS, BOOST-GLIDE VEHICLES),
MODELS (SIMULATIONS), RESEARCH PLANES, MANNED
SPACECRAFT, HEAT TRANSFER, INSTRUMENTATION,
THERMOCOUPLES, MATHEMATICAL PREDICTION, DESIGN,
THERMAL INSULATION, VACUUM FURNACES, SIMULATION,
THERMAL RADIATION, FUSELAGES, ATMOSPHERE ENTRY,
PRESSURE, TEMPERATURE, THERMAL CONDUCTIVITY,
REFRACTORY METALS, PROGRAMMING (COMPUTERS) (U)
IDENTIFIERS: X-20 SPACECRAFT, HOT STRUCTURES,
BETA PROGRAM (U)

PREDICTION OF DESIGN TEMPERATURES AND OTHER THERMAL
INFORMATION FOR ANY RADIATION-COOLED HOT STRUCTURE
RE-ENTRY VEHICLE IS HIGHLY COMPLEX. LARGE COMPUTER
PROGRAMS, ALONG WITH OTHER COMMON AND UNCOMMON
ANALYTIC HEAT TRANSFER METHODS ARE USUALLY REQUIRED,
BUT LITTLE OR NO VERIFICATION DATA EXIST. THE
BASIC INTENT OF THIS PROGRAM WAS TO ANALYZE, TEST,
AND CORRELATE A PANEL SYSTEM USING X-20 GENERATED
TECHNOLOGY FOR PANEL DESIGN, FABRICATION, AND THERMAL
ANALYSIS METHODS. IN INSULATED PANEL SYSTEMS
SIMILAR TO THAT TESTED, SUCH THERMAL METHODS AS USAGE
OF THE BOEING THERMAL ANALYZER PROGRAM,
VARIOUS THERMAL RADIATION VIEW FACTOR DETERMINATION
METHODS, NEGLECT OF CERTAIN MATERIAL INTERFACE
EFFECTS, USE OF LARGE AREA NODES, NEGLECT OF
TRUSSWORK IN A GENERAL PANEL ANALYSIS AND OTHER
LESSER ITEMS APPEAR VALID. ANALYTIC PREDICTION OF
DESIGN THERMAL INFORMATION BASED ON THESE METHODS
WOULD SEEM QUITE ADEQUATE, ALTHOUGH CAUTION IS URGED
IN EXTENSION OF THIS ADEQUACY TO OTHER LESS SIMILAR
STRUCTURAL ELEMENTS WHERE CORRELATION IS RELATIVELY
NON-EXISTENT AT THIS TIME. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-476 876 22/2
SYSTEMS ENGINEERING GROUP RESEARCH AND TECHNOLOGY DIV
WRIGHT-PATTERSON AFB OHIO
DESCRIPTION AND EVALUATION OF ENVIRONMENTAL CONTROL
AND CRYOGENIC SUPPLY SUBSYSTEMS FOR X-20 (DYNA-
SOAR). (U)
DESCRIPTIVE NOTE: FINAL REPT.,
APR 65 184P FORMAN, ROYCE G.; GILLEN,
RICHARD J.; SZACIK, ROBERT S.;
REPT. NO. SEG-TR-65-5

UNCLASSIFIED REPORT
DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC) WRIGHT-
PATTERSON AFB, OHIO. ATTN: SYSTEM ENGINEERING
GROUP.

DESCRIPTORS: (SPACECRAFT CABINS, ENVIRONMENT),
CLOSED ECOLOGICAL SYSTEMS, CONTROLLED ATMOSPHERES,
PANELS (STRUCTURAL), CRYOGENICS, BOOST-GLIDE
VEHICLES, CONTROL SYSTEMS, HEAT TRANSFER, WATER,
GLYCOLS, NITROGEN, AERODYNAMIC HEATING.
REDUCTION, COOLING, HYDROGEN (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE X-20A (DYNA-SOAR) ENVIRONMENTAL
CONTROL SUBSYSTEM TRANSPORTED HEAT FROM THE PILOT'S
COMPARTMENT, EQUIPMENT COMPARTMENT, AND SECONDARY
POWER SUBSYSTEM HEAT LOADS BY A WATER-GLYCOL MIXTURE
TO THE CENTRAL CRYOGENIC HYDROGEN HEAT SINK. THE
WARMED HYDROGEN WAS SUBSEQUENTLY USED AS FUEL FOR
ACCESSORY POWER UNITS (APU) OR TO MAINTAIN CONSTANT
PRESSURE IN THE SUPERCRITICAL HYDROGEN SUPPLY TANK.
SUPER-CRITICAL STORED OXYGEN WAS FURNISHED TO THE
APU FOR COMBUSTION AND ALSO WAS DILUTED BY NITROGEN
AND SUPPLIED TO THE OPEN-TYPE PILOT'S ATMOSPHERE
CONTROL SUBSYSTEM. PURE NITROGEN WAS USED TO
MAINTAIN PRESSURE IN THE SEPARATE, UNINHABITED
EQUIPMENT COMPARTMENT. AERODYNAMIC HEAT WAS
BLOCKED FROM ENTERING THE THREE COMPARTMENTS BY A
PASSIVE WATER-WALL SUBSYSTEM. GELLED WATER WAS
HELD IN SPONGES AND SECURED BETWEEN APPROPRIATE
AMOUNTS OF INSULATION UNTIL AERODYNAMIC HEAT
PENETRATED TO THE GEL AND BOILED AWAY THE WATER.
THE ENVIRONMENTAL CONTROL AND CRYOGENIC SUPPLY SUB-
SYSTEMS ARE DESCRIBED AND EVALUATED UP TO THE TIME
THE X-20 WAS TERMINATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-471 626

BOEING CO SEATTLE WASH

EXPLOSIVE FORMING OF HEAVY GAUGE HEMISPHERES, (U)

FEB 63 23P LINDSKOG, R. I

REPT. NO. MDR-2-27907

MONITOR: IDEP 347.70.00.00-C6-29

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (HEMISPHERICAL SHELLS, EXPLOSIVE
FORMING), ALUMINUM, MANUFACTURING METHODS (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

EXPLOSIVE FORMING OF HEAVY GAUGE HEMISPHERES.

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-471 609

BOEING CO SEATTLE WASH AEROSPACE GROUP
SHOP-CONTAMINATION EFFECT ON DISILICIDE
COATINGS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

OCT 62 35P FORSHEE, A. G.:

REPT. NO. QCDR-2-1864-2

MONITOR: IDEP 347.15.00.00-C6-01

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (*REFRACTORY COATINGS,
CONTAMINATION), SILICIDES, COMPATIBILITY,
MOLYBDENUM ALLOYS, HEAT TREATMENT, COATINGS,
LUBRICANTS, NIOBIUM ALLOYS

(U)

IDENTIFIERS: X-20 SPACECRAFT, MOLYBDENUM ALLOY
TZM, NIOBIUM ALLOY 10T1 5ZR

(U)

EFFECTS OF CONTAMINANTS ON DISILICIDE COATINGS ON NIOBIUM
AND MOLYBDENUM ALLOYS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-471 602

BOEING CO SEATTLE WASH

LOW THRUST TREPANNING RENE' 41.

(U)

DESCRIPTIVE NOTE: MANUFACTURING DEVELOPMENT REPT.

NOV 62 19P

REPT. NO. MDR-2-12234

MONITOR: IDEP 347.70.00.00-C6-06

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: (•DRILLING MACHINES, DESIGN), NICKEL
ALLOYS, DRILLS, MATERIAL REMOVAL, GRINDING WHEELS,
CUTTING TOOLS, CARBIDE TOOLS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

LOW THRUST TREPANNING RENE 41.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-467 931

BOEING CO SEATTLE WASH

SUMMARY REPORT - ASSEMBLY AND TEST OF CRYOGENIC
OXYGEN TANKS, (U)

OCT 64 25P KELSOE, R. C. ;

REPT. NO. D2-81290

CONTRACT: AF33 615 1897

MONITOR: IDEP 805.10.20.80-C6-01,

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (STORAGE TANKS, OXYGEN EQUIPMENT),
TESTS, PRESSURE, VACUUM, GAS LEAKS, HEAT
TRANSFER, THERMAL INSULATION, DESIGN,
CONFIGURATION, CONSTRUCTION, BOOST-GLIDE VEHICLES,
MANNED SPACECRAFT, RESEARCH PLANES,
PERFORMANCE (ENGINEERING), CRYOGENICS, LIQUEFIED
GASES, OXYGEN (U)

IDENTIFIERS: X-20 SPACECRAFT, ASSEMBLING,
BOILOFF (U)

TWO OXYGEN STORAGE TANK ASSEMBLIES WERE FABRICATED,
THE SUPER INSULATION EVACUATED, VACUUM JACKET LEAK
CHECKED, TANK VESSEL PROOF PRESSURE TESTED, AND THE
TANK HEAT INLEAK MEASURED. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-465 290

AIR FORCE FLIGHT TEST CENTER EDWARDS AFB CALIF
DATA COLLECTION DESIGN CONCEPTS AND AFFTC RANGE
PLANNING TO SUPPORT THE DYNA-SOAR X-20 PROGRAM. (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,
JUN 65 35P KNAUSDORF, HAROLD A. I
REPT. NO. FTC-TR-64-32

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, RESEARCH
PROGRAM ADMINISTRATION), MANNED SPACECRAFT, GUIDED
MISSILE RANGES, SYSTEMS ENGINEERING, GROUND SUPPORT
EQUIPMENT, DATA PROCESSING SYSTEMS,
INSTRUMENTATION, RADIO COMMUNICATION SYSTEMS,
TELEMETER SYSTEMS, RADAR TRACKING, COMMAND +
CONTROL SYSTEMS, MANAGEMENT PLANNING, FLIGHT
INSTRUMENTS, MANEUVERABILITY, REMOTE CONTROL
SYSTEMS, RECOVERY (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS REPORT DESCRIBES THE RANGE INSTRUMENTATION
PLAN IMPLEMENTED AT THE AIR FORCE FLIGHT TEST
CENTER IN SUPPORT OF THE X-20 (DYNA-SOAR)
PROGRAM. THE DYNA-SOAR GLIDER WAS BEING
DEVELOPED TO EXPLORE THE RIGOROUS ENVIRONMENT OF
MANEUVERABLE REENTRY. ACCORDINGLY, MANY OF ITS
SUBSYSTEMS REQUIRED DEVELOPMENT TO MEET PROGRAM
OBJECTIVES AND THE STRINGENT OPERATIONAL
REQUIREMENTS. ADDITIONALLY, GROUND INSTRUMENTATION
EQUIPMENT WAS BEING DEVELOPED TO MEET COMPATIBILITY
REQUIREMENTS OF UNIQUE X-20 INSTRUMENTATION. THIS
REPORT ALSO DESCRIBES THE FUNCTIONAL DESIGN OF THESE
SUBSYSTEMS AND PRESENTS THE AFFTC SUPPORT PLAN.
THIS REPORT CONTAINS FUNCTIONAL SUBSYSTEMS DESIGN
CONCEPTS AND THE INTEGRATION OF THESE SUBSYSTEMS INTO
AN OVERALL RANGE SUPPORT PLAN. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-462 018

BOEING CO SEATTLE WASH

EVALUATION OF TIC EMISSIONS IMPROVEMENT TOPCOAT ON

DISIL COATED TZM (MO-D.5TI-O.1ZR),

(U)

OCT 64 78P

GUNDERSON, J. W.; LINDH, D. V.

; STRATTON, W. K.;

REPT. NO. D2-36145-1

CONTRACT: AF33 615 1624

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (REFRACTORY COATINGS, EMISSIVITY),
(REENTRY VEHICLES, REFRACTORY COATINGS), COATINGS,
SILICON COMPOUNDS, SILICONE PLASTICS, AERODYNAMIC
HEATING, MOLYBDENUM ALLOYS, TITANIUM COMPOUNDS,
CARBIDES, ADHESION, MECHANICAL PROPERTIES,
WEATHERPROOFING, HIGH TEMPERATURE RESEARCH, VIBRATION,
OXIDATION, SPACE ENVIRONMENTAL CONDITIONS, SIMULATION,
TESTS, MANNED SPACECRAFT (U)
IDENTIFIERS: MOLYBDENUM ALLOY TZM, X-20
SPACECRAFT (U)

EVALUATION OF THE ADHESION, WEATHERING RESISTANCE
AND ALLOWABLE TOTAL NORMAL EMISSIONS FOR THE TIC
TOPCOAT ON DISIL COATED TZM WAS REQUIRED TO
CHARACTERIZE THE SYSTEM'S PERFORMANCE POTENTIAL FOR
AEROSPACE APPLICATIONS SUCH AS PASSIVELY COOLED GLIDE
ENTRY. SPECIMENS OF 20 MIL SHEET TZM WERE COATED
AND EVALUATED. THE TIC TOPCOAT RESULTED IN
TOTAL NORMAL EMISSIONS HIGHER THAN THOSE OBTAINED FOR
STRAIGHT DISIL COATING ON TZM. THERE WAS NO
LOSS OF ADHESION IN BEND TESTING IN SPITE OF SEVERE
CRACKING OF THE DISIL COATING AND EVEN BASE METAL
FRACTURE. LIKEWISE THERE WAS NO LOSS OF ADHESION
IN VIBRATION TESTING. WEATHERING EXPOSURES
PRODUCED NO DETECTABLE EFFECTS ON EMISSIONS OR
OXIDATION LIFE IN SUBSEQUENT SIMULATED GLIDE ENTRY
PROFILE TESTS. ISOTHERMAL-ISOBARIC TESTING
VERIFIED THAT THE EMISSIONS OF THE COATING SYSTEM WAS
STABLE FOR EXTENDED EXPOSURE TIMES IN AERO-SPACE TYPE
ENVIRONMENTS, AT TEMPERATURES UP TO 3000 F.
ALLOWABLE TOTAL NORMAL EMISSIONS VALUES WERE
CALCULATED FOR A SPECIFIC TYPICAL ENTRY FLIGHT.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-461 523

SUNDSTRAND AVIATION-DENVER COLO
MODEL 876C AUXILIARY POWER UNIT AND AUXILIARY POWER
UNIT TEMPERATURE PROBE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT., 1 JUN-31 DEC 64.

APR 65 201P

CONTRACT: AF33 615 1896

PROJ: 3145

TASK: 314501

MONITOR: APL TR-65-30

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GAS TURBINES, AUXILIARY POWER PLANTS),
(*TEMPERATURE SENSITIVE ELEMENTS, DESIGN), CRYOGENICS,
LIQUID ROCKET PROPELLANTS, FUEL SYSTEMS, VALVES,
HYDROGEN, OXYGEN, COMBUSTION CHAMBERS, HEAT EXCHANGERS,
BEARINGS, LUBRICATION, GAS LEAKS, POWER, FUEL
CONSUMPTION, GAS TURBINE NOZZLES, TEMPERATURE, PLATINUM,
RESISTANCE (ELECTRICAL), ELECTRIC INSULATION, TESTS,
LIFE EXPECTANCY (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

A STUDY WAS MADE OF THE ACCESSORY POWER UNIT (APU), WHICH IS A CRYOGENIC-FUELED TURBINE-DRIVEN POWER SYSTEM, ORIGINALLY DESIGNED TO FURNISH ALL ELECTRICAL AND HYDRAULIC POWER REQUIREMENTS FOR THE X-20 (DYNA-SOAR) GLIDER VEHICLE. RECOGNIZING THE ADVANTAGES OF CONSERVING THE TECHNOLOGY ADVANCED DURING DEVELOPMENT AND EARLY STAGES OF QUALIFICATION TESTING OF THE APU, THE AIR FORCE CONTRACTED FOR CONTINUATION OF TESTING OF THE APU AND ADDITIONAL LIFE AND FEASIBILITY TESTING OF TEMPERATURE SENSORS. LIFE TESTING OF MODEL 876 C TEMPERATURE PROBES WAS CONTINUED ON TEN PLATINUM-ELEMENT PROBES, THE RESULTS OF WHICH INDICATED THAT THE DRIFT IN CHARACTERISTICS OF THESE CONFIGURATIONS AND THE INABILITY TO STABILIZE THEM WITH A RUN-IN CYCLE RENDERED THEM UNSUITABLE FOR THIS APPLICATION. SEVEN ALTERNATE PROBE CONFIGURATIONS WERE TESTED, SHOWING THAT: VARIOUS ENCAPSULATION METHODS DID NOT IMPROVE PLATINUM PROBES; INCREASING THE WIRE DIAMETER OF THE ELEMENT IMPROVED DRIFT CHARACTERISTICS; HIGH TEMPERATURE THERMOCOUPLES WERE DRIFT FREE, BUT INTRODUCED OTHER COMPLICATIONS; MOLYBDENUM ELEMENT PROBES APPEAR TO BE DRIFT FREE AND WILL PROVIDE A GOOD SOLUTION TO THE PROBLEM. SATISFACTORY METHODS WERE DEVELOPED FOR SPLICING AND SEALING TEMPERATURE PROBE LEADS. (AUTHOR)

(U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-461 376

MARTIN CO BALTIMORE MD

DYNA SOAR STEP-1. ACTIVATION PLAN FOR LAUNCH
COMPLEX 19 AND THE BOOSTER SUPPORT AREA, VOLUME I,

(U)

DEC 61 42P ENEY, L. A. I
REPT. NO. ER-11923-1
CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LAUNCHING SITES),
(•MANNED SPACECRAFT, GROUND SUPPORT EQUIPMENT),
(•LAUNCHING SITES, MANAGEMENT ENGINEERING), HANDLING,
MILITARY REQUIREMENTS, CONSTRUCTION, STRUCTURES,
MANAGEMENT PLANNING, RESEARCH PROGRAM ADMINISTRATION,
OPERATION, MATERIAL SUPPORT, LOGISTICS, INSTALLATION,
DESIGN, QUALITY CONTROL (U)
IDENTIFIERS: X-20 SPACECRAFT, TITAN (U)

THIS REPORT OFFERS AN INTEGRATED PLAN FOR
CONVERTING LAUNCH COMPLEX 19 FROM A TITAN I
TO A DYNA-SOAR STEP I CONFIGURATION AND FOR
ACTIVATING THE BOOSTER INDUSTRIAL AREA IN A TIMELY,
ORDERLY AND MOST ECONOMICAL MANNER. THE PLAN
ESTABLISHES THE TOTAL WORK REQUIREMENTS AND
RESPONSIBILITIES (E.G., THE SCHEDULING OF ALL
FUNCTIONAL ELEMENTS OF ACTIVATION, EQUIPMENT
DELIVERIES AND MANAGERIAL PROCEDURES). (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-460 430
BOEING CO SEATTLE WASH
O2 SERVICING SYSTEM CRYOGENIC DEMONSTRATION
TEST.
DESCRIPTIVE NOTE: SUMMARY REPT.,
APR 65 125P BANGSUND, E. L. ;
REPT. NO. D2-81305-1
CONTRACT: AF33 615 1897

(U)

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), LIQUEFIED GASES, OXYGEN, CRYOGENICS,
HANDLING, STORAGE TANKS, FLUID FLOW, TEMPERATURE
CONTROL, HYDRAULIC SYSTEMS, HYDRAULIC VALVES, HEAT
EXCHANGERS, PRESSURE, CONTROL SYSTEMS, TESTS,
PERFORMANCE (ENGINEERING), THERMAL INSULATION, MANNED
SPACECRAFT
IDENTIFIERS: X-20 SPACECRAFT

(U)

(U)

THE X-20A OXYGEN SERVICING SYSTEM WAS TESTED AT
THE BOEING TULALIP TEST SITE. A COMPLETE
SERIES OF TESTS WERE CONDUCTED DURING THE PERIOD OF
DECEMBER 11, 1964 TO JANUARY 22, 1965. FIVE
NITROGEN RUNS WERE REQUIRED TO DEMONSTRATE THE SYSTEM
TEMPERATURE VERSUS FLOW PERFORMANCE ENVELOPE. THE
FLOW LIMITS (ESTABLISHED BY PRESSURE
CHARACTERISTICS) AND TEMPERATURE LIMITS
(ESTABLISHED BY COOLER PERFORMANCE) WERE
DETERMINED. TWO OXYGEN RUNS VERIFIED THE ABILITY
OF THE SYSTEM TO ESTABLISH AND MAINTAIN A SPECIAL
TEMPERATURE AND PRESSURE AT THE INLET OF THE VEHICLE
TANK. IMPROPER VALVE SIZING RESULTED IN POOR
RESPONSE OF THE VALVE TO TEMPERATURE CHANGE RESULTING
IN UNSTABLE TEMPERATURE CONTROL. IT WAS CONCLUDED
THAT BY SIGNIFICANTLY REDUCING THE VALVE TRIM,
SATISFACTORY CONTROL CAN BE OBTAINED. FUNCTIONAL
TESTING OF THE OXYGEN SERVICING SYSTEM DEMONSTRATED
THAT THE SYSTEM IS CAPABLE OF SERVICING A GLIDER TANK
AT A PREDETERMINED TEMPERATURE (-162 ± 5 F) AND
PRESSURE (2215 ± 50 PSIA) WITH OXYGEN FOR A
SUSTAINED PERIOD. TESTING ALSO VERIFIED THAT THE
SERVICING SYSTEM IS CAPABLE OF REMOTELY CONDITIONING
NITROGEN OR OXYGEN GAS TO ANY TEMPERATURE AND FLOW
WITHIN AN ESTABLISHED PERFORMANCE ENVELOPE AT
PRESSURES FROM 25 TO 2800 PSIA. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-459 184
BOEING CO SEATTLE WASH
HYDRAULIC LEAK DETECTION BY RADIOACTIVE TRACERS, (U)
FEB 63 40P PAPADOPULOS, EMMANUEL ;
REPT. NO. D2-90373
CONTRACT: AF33 657 7132
MONITOR: IDEP 347 65 00 00C6 D7

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MANNED SPACECRAFT, HYDRAULIC SYSTEMS),
(*HYDRAULIC SYSTEMS, MALFUNCTIONS), (*MALFUNCTIONS,
TRACER STUDIES), RADIOACTIVE ISOTOPES, PHOSPHORUS,
FEASIBILITY STUDIES (U)
IDENTIFIERS: IDEP, X-20 SPACECRAFT, LEAKS
(FLUIDS) (U)

THE FEASIBILITY OF USING TRACER TECHNIQUES FOR THE
DETECTION OF LEAKS IN THE DYNA SOAR GLIDER
HYDRAULIC SYSTEM HAS BEEN DEMONSTRATED. THIS
EXPERIMENTAL STUDY WAS PERFORMED IN THE NUCLEAR
LABORATORY AT THE DEVELOPMENTAL CENTER AND AT A
HYDRAULIC LINE MOCK-UP. LEAKS WERE STARTED BY
LOOSENING THE COUPLING UNION IN THE MOCK-UP. THE
INCREASE IN THE COUNTING RATE DUE TO THE ESCAPING
RADIOACTIVE HYDRAULIC OIL GAVE EVIDENCE OF THE LEAK.
THE LABORATORY SECTION OF THIS STUDY YIELDED
INFORMATION WHICH ESTABLISHED THE REQUIREMENTS FOR
THE MOCK-UP SECTION. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-457 792

NORTH AMERICAN AVIATION INC DOWNEY CALIF
SPACE FLIGHT TRAINING PROGRAMS, (U)

JAN 63 22P AMORELLI, D. ; CAME, B. J. ;
WOLFE, D. L. ;

REPT. NO. 543 E/3 63

MONITOR: IDEP 347 90 00 DDFI 07

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TRAINING, SPACE FLIGHT), (*SPACE CREWS,
TRAINING), (*TRAINING DEVICES, SPACE CREWS), MANNED
SPACECRAFT, SATELLITES (ARTIFICIAL), HUMAN ENGINEERING,
PARASITE PLANES, RESEARCH PLANES, ROCKET PLANES,
ASTRONAUTS, SIMULATORS, SPACE STATIONS (U)

IDENTIFIERS: MERCURY PROJECT, X-20 SPACECRAFT, X-15
AIRCRAFT, SELF-DEPLOYING SPACE STATIONS, IDEP (U)

HIGHLIGHTS OF SPACE FLIGHT TRAINING PROGRAMS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-455 329

BOEING CO SEATTLE WASH

STRENGTH EVALUATION OF THERMAL STRESS RESISTANT

ZIRCONIA.

(U)

DESCRIPTIVE NOTE: FINAL REPT. 1 APR-15 AUG 64,

SEP 64 8P CLARK, H. R. I

REPT. NO. D2 81288

CONTRACT: AF33 615 1624

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ZIRCONIUM COMPOUNDS, OXIDES), PHYSICAL PROPERTIES, MECHANICAL PROPERTIES, THERMAL PROPERTIES, NOSE CONES. THERMAL CONDUCTIVITY, THERMAL EXPANSION, EMISSIVITY, HIGH-TEMPERATURE RESEARCH, TEST METHODS, EXPERIMENTAL DATA, COMPRESSIVE PROPERTIES, BOOSTGLIDE VEHICLES, MANNED SPACECRAFT, RESEARCH PLANES, DESIGN (U)
IDENTIFIERS: X-20 SPACECRAFT, NOSE CAPS, ZIRCONIA (U)

THIS REPORT IS THE RESULT OF WORK ACCOMPLISHED IN SUPPORT OF THE X-20 VEHICLE NOSE CAP DEVELOPMENT PROGRAM. FLEXURE AND COMPRESSION STRESS AND COMPRESSION MODULUS FOR TWO SELECTED ZIRCONIA MIXES WERE EVALUATED FROM ROOM TEMPERATURE TO 3000 F AND DESIGN ALLOWABLES ESTABLISHED OVER THIS TEMPERATURE RANGE. DETERMINATION OF THERMAL PROPERTIES, INCLUDING, THERMAL CONDUCTIVITY, THERMAL EXPANSION, AND TOTAL NORMAL EMISSIVITY WERE SUBCONTRACTED TO SOUTHERN RESEARCH INSTITUTE, BIRMINGHAM, ALABAMA. EMITTANCE EVALUATIONS WERE ALSO CONDUCTED AT NATIONAL RESEARCH CORPORATION, CAMBRIDGE, MASSACHUSETTS. REPORTS FROM THESE ORGANIZATIONS ARE INCLUDED IN THE APPENDIX.
(AUTHOR)

(U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-455 325

BOEING CO SEATTLE WASH

STRENGTH EVALUATION OF SUPERALLOY FASTENERS, RENE'41
JOINTS AND MOLYBDENUM ALLOY BOLTS. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 APR-15 AUG 64,

AUG 64 1V RICH. BRUCE P. 1

REPT. NO. D2 81282

CONTRACT: AF33 615 1624

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (NICKEL ALLOYS, MECHANICAL FASTENERS),
(MOLYBDENUM ALLOYS, BOLTS), BOLTED JOINTS, RIVETED
JOINTS, FASTENINGS, MECHANICAL PROPERTIES, SHEETS,
TENSILE PROPERTIES, SHEAR STRESSES, RIVETS, TEST
METHODS, EXPERIMENTAL DATA, TABLES, BOOST-GLIDE
VEHICLES, MANNED SPACECRAFT, RESEARCH PLANES, DESIGN,
JOINTS, METAL JOINTS (U)
IDENTIFIERS: X-20 SPACECRAFT, RENE'41 (ALLOY),
MOLYBDENUM ALLOY TZM, HASTELLOY (ALLOY) (U)

TEST AND ANALYSIS WORK WAS CONDUCTED TO DETERMINE
ALLOWABLE MECHANICAL PROPERTIES OF SUPERALLOY
FASTENERS, MOLYBDENUM ALLOY FASTENERS AND
MECHANICALLY FASTENED SUPERALLOY JOINTS FOR USE IN
THE DESIGN AND DEVELOPMENT OF THE X-20 RE-ENTRY
VEHICLE. THE TESTS CONDUCTED TO DETERMINE THESE
ALLOWABLES INCLUDED DOUBLE SHEAR TESTS OF FASTENERS,
TENSION TESTS OF FASTENERS, TESTS OF SHEAR JOINTS,
TESTS OF TENSION JOINTS AND TESTS OF SHEET TENSION
EFFICIENCY SPECIMENS. SHEET BEARING AND SHEET
TENSION TESTS WERE ALSO CONDUCTED TO PROVIDE DATA FOR
CONTROL AND CORRECTION PURPOSES. THE TEST
SPECIMENS WERE SUBJECTED TO A VARIETY OF THERMAL
EXPOSURE CONDITIONS SIMULATING ENVIRONMENTAL AND
FLIGHT CONDITIONS EXPECTED DURING THE FLIGHT HISTORY
OF THE X-20 VEHICLE. THE MOLYBDENUM ALLOY
FASTENERS WERE PROVIDED WITH A DISILICIDE COATING TO
RESIST THE ELEVATED TEMPERATURE CONDITIONS. THE
TESTS WERE CONDUCTED USING STANDARD PROCEDURES AND
FIXTURES ADJUSTED ONLY AS NECESSARY TO ACCOMODATE THE
MATERIALS TESTED AND THE NECESSARY THERMAL
CONDITIONS. TEMPERATURES, HEATING RATES AND
LOADING RATES ALSO SIMULATED EXPECTED X-20 FLIGHT
CONDITIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-455 312

BOEING CO SEATTLE WASH

MECHANICAL PROPERTY AND FRACTURE TOUGHNESS EVALUATION.

OF 2219-T6E46 FOR CRYOGENIC APPLICATIONS.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 1 APR-15 AUG 64,

JUL 64 101P EICHENBERGER, T. W. ;

REPT. NO. D2 81287

CONTRACT: AF33 615 1624

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ALUMINUM ALLOYS, CRYOGENICS),
(*CRYOGENICS, ALUMINUM ALLOYS), TOUGHNESS, MECHANICAL
PROPERTIES, FRACTURE (MECHANICS), FATIGUE (MECHANICS),
CREEP, TENSILE PROPERTIES, METAL PLATES, RINGS, WELDS,
FORGING, STORAGE TANKS, TEST METHODS, TABLES, NOMOGRAMS
IDENTIFIERS: ALUMINUM ALLOY 2219, X-20 SPACECRAFT (U)

MECHANICAL PROPERTIES AND FRACTURE TOUGHNESS
CHARACTERISTICS WERE DETERMINED FOR 2219-T6E46
ALUMINUM ALLOY PLATE AND FORGED RING MATERIAL FROM
ROOM TEMPERATURE TO -423 F. STATIC TENSION TESTS;
NOTCHED TENSION, FATIGUE AND CREEP TESTS; AND CENTER
CRACKED TEAR RESISTANCE TESTS WERE CONDUCTED AT ROOM
TEMPERATURE, -109, -320, AND -423 F. DESIGN
ALLOWABLE TENSILE STRENGTHS, PLANE STRAIN FRACTURE
TOUGHNESS AND FLAW GROWTH CHARACTERISTICS, AND PLANE
STRESS TEAR RESISTANCE CHARACTERISTICS WERE
DETERMINED FOR CRYOGENIC APPLICATIONS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-452 904

MARTIN CO BALTIMORE MD

WIND INDUCED OSCILLATION RESPONSE OF CYLINDER AND

FLAT PLATE LIFTING SURFACE, (U)

APR 61

1V

BARSAKIAN, V. ; YOUNG, J. P. ;

REPT. NO. ER11365

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (AERODYNAMIC CONFIGURATIONS, OSCILLATION),
(BOOST-GLIDE VEHICLES, WIND), FLAT PLATE MODELS,
CYLINDRICAL BODIES, INSTRUMENTATION, CALIBRATION, WIND
TUNNEL MODELS, ANGLE OF ATTACK, MOMENTS, FINS, WIND
TUNNELS, DRAG, REYNOLDS NUMBER (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

A WIND TUNNEL TEST PROGRAM WAS CONDUCTED TO INVESTIGATE THE RESPONSE OF A CANTILEVERED CYLINDER AND SIMPLIFIED DYNA-SOAR CONFIGURATION IN STEADY WINDS. THE MASS AND FREQUENCY OF THE CYLINDER WERE VARIED INDEPENDENTLY TO INVESTIGATE THE EFFECTS ON THE OSCILLATORY BENDING MOMENTS. THE OSCILLATORY LATERAL AND DRAG MOMENTS EXHIBITED A RANDOM RESPONSE WHICH IS TYPICAL OF CYLINDERS SUBJECTED TO FLOWS AT SUPERCRITICAL REYNOLDS NUMBERS. IN GENERAL, THE BENDING MOMENTS INCREASED CONTINUOUSLY WITH VELOCITY, THERE BEING NO CRITICAL VELOCITY ASSOCIATED WITH THE MAXIMUM MOMENT. IN ORDER TO SIMULATE THE EFFECTS OF GROUND WINDS ON THE DYNA-SOAR, A FLAT TRIANGULAR PLATE WAS ATTACHED TO A LONG SLENDER ROD AND SUBJECTED TO STEADY WINDS. THE PLATE ANGLE OF ATTACK, TORSIONAL FREQUENCY AND INERTIA OF THE SYSTEM WERE VARIED INDEPENDENTLY TO DETERMINE THE EFFECT ON THE RESPONSE. THE ADDITION OF FINS TO THE FLAT PLATE WERE ALSO STUDIED. IT WAS FOUND THAT THE TORSIONAL OSCILLATORY AND STEADY STATE MOMENTS WERE A FUNCTION OF THE PLATE ANGLE OF ATTACK. THE CRITICAL ANGLE BEING APPROXIMATELY 20 DEGREES. IN ADDITION, IT WAS ALSO DETERMINED THAT EFFECT OF FINS AND INCREASED INERTIA TEND TO SUBSTANTIALLY REDUCE THE TORSIONAL RESPONSE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-452 53D

BOEING CO SEATTLE WASH

PRELIMINARY FLIGHT RATING TEST (PFRT) EVENT

ACCOMPLISHMENT SUMMARY, (U)

SEP 63 1V TOZER, C. W. ;

REPT. NO. DN D2 8200

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 27 MAY 63.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, TESTS), QUALITY CONTROL, DATA, TABLES, MANNED SPACECRAFT, STRUCTURES, AIRFRAMES, FLIGHT CONTROL SYSTEMS, GUIDED MISSILE

COMPONENTS (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THE PURPOSE OF THIS DOCUMENT IS TO RECORD EVENT MILESTONES WITH RESPECT TO ACCOMPLISHMENT OF PRELIMINARY FLIGHT RATING TESTING (PFRT) OF X-20 AIRBORNE SYSTEM HARDWARE. THE PRELIMINARY FLIGHT RATING TESTING (PFRT) PROGRAM IS COMPRISED OF THOSE QUALIFICATION TYPE AND INTEGRATION TYPE TESTS DONE TO DEMONSTRATE DESIGN COMPLIANCE OF THE HARDWARE UNDER GROUND SIMULATED ENVIRONMENTAL CONDITIONS. ACCOMPLISHMENT OF PFRT ON FLIGHT HARDWARE IS GENERALLY PREREQUISITE TO FLIGHT TEST IN THE SYSTEM DEVELOPMENT (FLIGHT) TEST PROGRAM. SPECIFIC CRITICALITY OF PFRT ACCOMPLISHMENTS WILL VARY WITH THE PARTICULAR APPLICATION OR SIGNIFICANCE OF EACH HARDWARE ITEM AND WITH THE PARTICULAR FLIGHT TEST PHASE OR MISSION. THE RECORDING OF THE INDIVIDUAL EVENT MILESTONES IN ACCOMPLISHING PFRT ON EACH HARDWARE ITEM IS THEREFORE REQUIRED FOR SUMMARIZATION OF THE ACCUMULATED PFRT STATUS FOR THE OVERALL GLIDER/ TRANSITION. PFRT EVENT ACCOMPLISHMENT RECORDS WILL INDICATE THE APPLICABLE WRITTEN TRANSMITTAL WHICH ACCOMPANIES THE PARTICULAR EVENT AND WILL INDICATE THE DATE OF THAT TRANSMITTAL, FOR SUCH TRANSMITTALS AS ARE REQUIRED BY THE CONTRACT. PFRT START AND FINISH DATES WILL ALSO BE RECORDED AS HISTORICAL DATA. TWELVE SIGNIFICANT EVENTS HAVE BEEN USED AS THE BASIS FOR REPORTING. ALL OR PART OF THE EVENTS WILL BE REPORTED AS APPLICABLE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-450 D21

BOEING CO SEATTLE WASH
TEST PLAN - LIQUID HYDROGEN SERVICING SYSTEM, (U)
APR 64 12P BANGSUND, E. L. ; HARDING, L. ;
HUGHES, J. R. ;
REPT. NO. DN D2 81273
CONTRACT: AF33 615 1897

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PROPELLANT TANKS),
(•PROPELLANT TANKS, LIQUEFIED GASES), CHECKOUT
PROCEDURES, HYDROGEN, COOLING + VENTILATING EQUIPMENT,
PUMPS, VACUUM PUMPS, HEAT EXCHANGERS, MANAGEMENT
PLANNING, DESIGN, DATA PROCESSING SYSTEMS, MANNED
SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

AT THE TIME THE X-20 CONTRACT WAS TERMINATED, A
PROTOTYPE LIQUID HYDROGEN SERVICING SYSTEM
WAS BEING READIED TO UNDERGO CHECKOUT TESTING. ONE
RUN WITH LIQUID NITROGEN HAS BEEN MADE WHICH
INDICATED THAT THE SYSTEM OPERATED ESSENTIALLY AS
DESIGNED. THESE TESTS WERE BEING CONDUCTED TO
GATHER EMPIRICAL DATA IN ORDER TO SUBSTANTIATE
THEORETICAL CALCULATIONS AND COMPUTER STUDIES. AN
EVALUATION OF THE TEST DATA GATHERED IS DOCUMENTED
IN D2-81070, HYDROGEN SERVICING SYSTEM
DEVELOPMENT TESTING. A NUMBER OF MODIFICATIONS
HAVE BEEN INITIATED TO IMPROVE OR CORRECT THE SYSTEM
AND THE FOLLOWING TEST HAS BEEN ORIGINATED TO
DEMONSTRATE ITS CAPABILITIES WITHIN THE SCOPE OF THE
REINSTATEMENT CONTRACT. SECTION I OF THIS
DOCUMENT DESCRIBES THE VARIOUS EQUIPMENTS WHICH
COMPRISE THE LIQUID HYDROGEN SERVICING
SYSTEM. SECTION II OF THIS DOCUMENT DELINEATES
THE TEST OPERATION PROCEDURE WHICH WILL BE USED
IN THE RUNNING OF THE LH2 SERVICING SYSTEM
TESTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-450 019

BOEING CO SEATTLE WASH
ASSEMBLY AND TEST OF CRYOGENIC HYDROGEN TANK. (U)
DESCRIPTIVE NOTE: SUMMARY REPT.,
OCT 64 8P KELSOE, R. C. I
REPT. NO. DN D2 81289
CONTRACT: AF33 615 1897
MONITOR: IDEP 805.10.20.70-C6-01

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CRYOGENIC STORAGE DEVICES, HYDROGEN),
(•HYDROGEN, STORAGE TANKS), (•PRESSURE VESSELS,
HYDROGEN), BOOST-GLIDE VEHICLES, TESTS, PRESSURE, GAS
LEAKS, CONFIGURATION, MANNED SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

ONE HYDROGEN STORAGE TANK ASSEMBLY WAS FABRICATED,
THE VACUUM JACKETS LEAK-CHECKED, THE INSULATION
EVACUATED, THE TANK ASSEMBLY PROOF-PRESSURE TESTED,
AND THE TANK ASSEMBLY HEAT-LEAK MEASURED.
FABRICATION AND ASSEMBLY OPERATIONS EXPOSED ONLY
MINOR PROBLEMS NOT ANTICIPATED BY EXPERIENCE GAINED
DURING THE X-20A PROGRAM. EVACUATION OF THE
SUPER INSULATION TO BELOW 0.0002 MM OF HG WAS
ACCOMPLISHED QUICKLY AND WAS MAINTAINED BY THE LEAK-
FREE VACUUM SHELL. EXAMINATION OF THE TANK AFTER
PROOF PRESSURE TESTS AT 555 + OR 10 PSIG DISCLOSED
NO DEFORMATION OR DAMAGE. HEAT LEAK INTO THE TANK
ASSEMBLY WAS FOUND TO BE 406 BTU/HOUR.
{AUTHOR} (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-450 017

BOEING CO SEATTLE WASH
EQUIPMENT LIST - X-20A CRYOGENIC SUPPLY, TANKAGE AND
SERVICING EQUIPMENT, (U)
44 1V BANGSUND, E. L. I

REPT. NO. DN D2 81270
CONTRACT: AF33 615 1897

UNCLASSIFIED REPORT

NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PROPELLANT TANKS),
(•LIQUEFIED GASES, COOLING + VENTILATING EQUIPMENT),
HYDROGEN, OXYGEN, MANNED SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

AT THE TIME OF X-20A CONTRACT TERMINATION A
PROTOTYPE HYDROGEN SERVICING SYSTEM HAD BEEN
ASSEMBLED, AND AN OXYGEN COOLER ASSEMBLY, HYDROGEN
TANK, AND TWO OXYGEN TANKS PARTIALLY FABRICATED.
UNDER THE AUSPICES OF THE AIR FORCE AERO
PROPULSION LABORATORY, RESEARCH AND
TECHNOLOGY DIVISION, A CONTRACT WAS NEGOTIATED TO
COMPLETE FABRICATION AND TESTING OF THESE ITEMS.
THIS DOCUMENT LISTS THE EQUIPMENT ASSEMBLIES
FABRICATED, THEIR SPARE PARTS, SPECIAL TOOLS USED FOR
NORMAL MAINTENANCE AND OPERATION, AND ASSOCIATED
CRYOGENIC CONTRACT RESIDUE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-449 926

BOEING CO SEATTLE WASH

GENERAL ASSEMBLY AND OPERATING INSTRUCTIONS OXYGEN
SERVICING SYSTEM, (U)

SEP 64 IV BANGSUND, E. L. ; HARDING, L. ;

REPT. NO. DN D2 81276

CONTRACT: AF33 615 1897

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NOFORN

SUPPLEMENTARY NOTE: ORIGINAL COPY IS OF POOR QUALITY.
REPRODUCTION MAY NOT BE ENTIRELY LEGIBLE.

DESCRIPTORS: (BOOST-GLIDE VEHICLES, TANKS
(CONTAINERS)), LIQUEFIED GASES, OXYGEN, GROUND SUPPORT
EQUIPMENT, CRYOGENICS, HANDLING, REFRIGERATION SYSTEMS,
CONTROL SYSTEMS, DESIGN, CONSTRUCTION, INSTALLATION,
PRESSURE VESSELS, TEMPERATURE CONTROL, INSTRUMENTATION,
FUEL SYSTEMS, PROPELLANT TANKS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT OUTLINES THE INFORMATION NEEDED FOR
SET-UP OF A LABORATORY OXYGEN SERVICING SYSTEM
COMPRISING THE OXYGEN COOLER ASSEMBLY, THE OXYGEN
TANK, THE OXYGEN CONTROL RACK, AND ASSOCIATED
TRANSFER LINES AND EQUIPMENT. IT INCLUDES A GENERAL
DESCRIPTION OF THE EQUIPMENT, INSTALLATION
INSTRUCTIONS, FABRICATION REQUIREMENTS, OPERATION
PRINCIPLES, AND INSTRUCTION CALIBRATION REQUIREMENTS,
AND BLOCK AND FLOW DIAGRAMS AND SCHEMATICS.
CONTAINED IN THE APPENDIX ARE MANUFACTURERS
INDIVIDUAL COMPONENT MAINTENANCE AND OPERATING
INSTRUCTIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-448 891

RAYTHEON CO WALTHAM MASS

X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING
SUBSYSTEM. (U)

OCT 62 IV

REPT. NO. CR62 408 4 4 3 REV.

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REPORT ON RELIABILITY PROGRAM PLAN.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, RELIABILITY
(ELECTRONICS)), (*MANAGEMENT PLANNING, BOOST-GLIDE
VEHICLES), MANNED SPACECRAFT, AIRBORNE, GROUND SUPPORT
EQUIPMENT, GUIDED MISSILE TRACKING SYSTEMS,
COMMUNICATION SYSTEMS, MANAGEMENT CONTROL SYSTEMS,
QUALITY CONTROL (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS RELIABILITY PROGRAM PLAN IS SUBMITTED
FOR THE X-20 (DYNA-SOAR) PHASE I PROGRAM.

THE PLAN COVERS THE RELIABILITY ASPECTS OF THE
COMMUNICATIONS AND TRACKING SUBSYSTEM AIRBORNE
AND SURFACE ELEMENTS AND ASSOCIATED AGE. THIS
DOCUMENT DESCRIBES THE MANAGEMENT ORGANIZATION WHICH
WAS ESTABLISHED TO DIRECT THE RELIABILITY PROGRAM;
DEFINES THE DETAILED RELIABILITY TASKS; ESTABLISHES
PROGRAM MILESTONE; AND DESCRIBES THE CONTROLS WHICH
ARE USED TO ENSURE SATISFACTORY COMPLETION OF EACH
TASK ON SCHEDULE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-448 225L

AIR FORCE SYSTEMS COMMAND WASHINGTON D C
MONTHLY TECHNICAL DOCUMENTARY REPORT LISTING. (U)
AUG 64 130P

UNCLASSIFIED REPORT

NOTICE: RELEASE ONLY TO U.S. GOVERNMENT AGEN-CIES
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RELEASE APPROVAL FROM AIR FORCE SYSTEMS COMMAND,
ANDREWS AFB, WASHINGTON, D. C.ATTN: SCAP.
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (AIR FORCE SYSTEMS COMMAND, REPORTS),
WASTES (SANITARY ENGINEERING), ACCELERATION, PERFORMANCE
(HUMAN), CHIMPANZEES, HEAT TRANSFER, INDEXES, GRAPHITE,
JET FIGHTERS, CERAMIC MATERIALS, FLIGHT SIMULATORS,
REFRACTORY MATERIALS, TRANSPORT PLANES, SUPERSONIC
PLANES, BERYLLIUM, OPTICAL FILTERS, ADAPTIVE CONTROL
SYSTEMS, ALTIMETERS, DISPOSAL, SPACE STATIONS, HELMETS,
PRESSURE SUITS, SIDELOOKING RADAR, LEARNING, MOTION
SICKNESS, INFRARED EQUIPMENT, ANTIRADAR COATING,
TRANSDUCERS, CRYOGENICS, DATA PROCESSING SYSTEMS,
MICROMINIATURIZATION, RAMJET ENGINES, RADAR ANTENNAS,
COMPUTERS, RADAR INTERFERENCE (U)
IDENTIFIERS: F-4 AIRCRAFT, F-5 AIRCRAFT, X-20
SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-447 971L

PAN AMERICAN WORLD AIRWAYS INC PATRICK AFB FLA
ETR GLOBAL SUPPORT PLAN FOR TITAN III SPACE LAUNCHING
SYSTEM (624A) TEST PROGRAM. PROGRAM SUPPORT PLAN
3700. (U)

SEP 64 IV
REPT. NO. PSP REV 0

UNCLASSIFIED REPORT

NOTICE: ALL RELEASE OF THIS DOCUMENT IS CON-TROLLED.
ALL CERTIFIED REQUESTERS SHALL OBTAINRELEASE APPROVAL
FROM SPACE SYSTEMS DIV., AIRFORCE SYSTEMS
COMMAND, INGLEWOOD, CALIF.

SUPPLEMENTARY NOTE: SUPERSEDES REPT. NO. PSP3700
THROUGH REV. 3, DATED 20 DEC 63, AD-345 997.

DESCRIPTORS; (•LAUNCH VEHICLES (AEROSPACE), RESEARCH
PROGRAM ADMINISTRATION), BOOST-GLIDE VEHICLES, SYSTEMS
ENGINEERING, GUIDED MISSILE RANGES, GLOBAL COMMUNICATION
SYSTEMS, TELEMETERING DATA, NETWORKS, PERFORMANCE
(ENGINEERING), INSTRUMENTATION, GUIDED MISSILE TRACKING
SYSTEMS, COMMAND + CONTROL SYSTEMS, DESTRUCTORS,
LAUNCHING SITES, GROUND SUPPORT EQUIPMENT, TRACKING
CAMERAS, LAUNCHING, MANAGEMENT PLANNING, ORBITAL
TRAJECTORIES, RADAR TRACKING, MANAGEMENT ENGINEERING,
DATA PROCESSING SYSTEMS, GUIDED MISSILE SAFETY,
RECOVERY, LOGISTICS, COSTS (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-447 937

MARTIN CO BALTIMORE MD
DYNA SOAR STEP-1. BOOSTER PROPULSION SYSTEM, (U)
AUG 61 1V MACDONALD, J. A. ;
REPT. NO. DS27 61 REV. A
CONTRACT: AFD4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), (*LAUNCH VEHICLES (AEROSPACE), BOOST-
GLIDE VEHICLES), FEASIBILITY STUDIES, DESIGN, ANALYSIS,
BOOSTER MOTORS, MALFUNCTIONS, DETECTORS, ROCKET MOTORS
(LIQUID PROPELLANT), FIRE SAFETY, EXPLOSIONS, PRESSURE
GAGES, EFFECTIVENESS, MANNED SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT, TITAN (U)

THE PURPOSE OF THIS REPORT IS TO DOCUMENT SOME OF
THE ANALYSIS THAT HAS BEEN THE BASIS OF DYNA-SOAR
PROPULSION DESIGN CRITERIA, PARTICULARLY IN
AREAS OF DIFFERENCE BETWEEN TITAN II AND DYNA-
SOAR. MUCH OF THE ANALYSIS DISCUSSED IS OF A
PRELIMINARY NATURE AND HAS SUCCEEDED IN UNCOVERING
SUBJECTS FOR FURTHER INVESTIGATION. SOME OF THESE
INVESTIGATIONS ARE NOW UNDERWAY. MANY PROBLEM
AREAS STILL EXIST AND SOME REMAIN UNDISCOVERED.
THE TITAN II DEVELOPMENT PROGRAM IS EXPECTED TO
RESOLVE MANY OF OUR KNOWN AND UNKNOWN PROBLEMS, BUT
DESIGN REQUIREMENTS UNIQUE TO DYNA-SOAR WILL
REMAIN TO BE SOLVED. THIS REPORT PRESENTS OUR
APPROACH TO PROBLEMS IN THE LATTER CATEGORY.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-447 772

MARTIN CO BALTIMORE MD

GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION
PLAN), PART II, MAINTENANCE ANALYSIS SPECIFICATION
(TEST OPERATION PLAN), VOLUME II, AGE REQUIREMENTS,
DYNA SOAR STEP-I, (U)

IV WILLIAMS, S. I

REPT. NO. ER11345 VOL. 2 PT. 2 REV.

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REVISION OF REPT. DATED 8 DEC 60.

DESCRIPTORS: (GROUND SUPPORT EQUIPMENT,
SPECIFICATIONS), BOOST-GLIDE VEHICLES, GUIDED MISSILE
LAUNCHERS, CHECKOUT EQUIPMENT, MAINTENANCE, HANDLING,
TEST EQUIPMENT, TELEMETER SYSTEMS, TRANSPORTATION (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

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015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 983
BOEING CO SEATTLE WASH
DYNA-SOAR MASTER DATA MEASUREMENTS LIST - VOLUME 1,
TABULATION, (U)
MAY 62 IV HOWARD, J. R. ;
REPT. NO. DN D2 7342 VOL. I
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 20 OCT 61.

DESCRIPTORS: (#BOOST-GLIDE VEHICLES, CHECKOUT
PROCEDURES), FLIGHT TESTING, LAUNCHING, DATA,
MEASUREMENT, SCHEDULING, TABLES, AERODYNAMIC
CHARACTERISTICS, TELEMETERING DATA, AUXILIARY POWER
PLANTS, FLIGHT CONTROL SYSTEMS, GUIDANCE, HYDRAULIC
SYSTEMS, ELECTRICAL EQUIPMENT, LANDING GEAR, ROCKET
MOTORS (LIQUID PROPELLANT), CONTROL JETS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

AN ADVANCED CONCEPT SUCH AS DYNA-SOAR REQUIRES
LARGE AMOUNTS OF DATA TO MEET THE PROGRAM OBJECTIVES.
ACCORDINGLY, A LARGE AMOUNT OF DATA ARE REQUIRED
FROM THE AIR LAUNCH AND GROUND LAUNCH
PROGRAMS. THIS DOCUMENT IS A MASTER LIST OF ALL
MEASUREMENTS TO BE MADE IN OR ON THE GLIDER DURING
THE AIR LAUNCH AND GROUND LAUNCH PROGRAMS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 981

BOEING CO SEATTLE WASH
GENERAL REQUIREMENTS DOCUMENT FOR DYNA-SOAR SOURCE
CONTROL DRAWINGS AND DESIGN PROCUREMENT
SPECIFICATIONS. (U)

NOV 61 IV TURENO, K. J. I

REPT. NO. ON D2 80396

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, DESIGN), MECHANICAL
DRAWINGS, CONSTRUCTION, MILITARY REQUIREMENTS,
SPECIFICATIONS, RESEARCH PROGRAM ADMINISTRATION, TESTS,
PERFORMANCE (ENGINEERING), ACCEPTABILITY, LOGISTICS,
SPARE PARTS, MAINTENANCE, RELIABILITY, TEST METHODS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT CONTAINS THE GENERAL REQUIREMENTS
APPLICABLE TO ALL DYNA-SOAR AIRBORNE AND GROUND
ARTICLES DESIGNED, DEVELOPED, OR FURNISHED BY A
SUPPLIER IN ACCORDANCE WITH A BOEING PROCUREMENT
SPECIFICATION. THE REQUIREMENTS OF THIS DOCUMENT
APPLY EXCEPT WHERE CHANGES, DELETIONS, OR ADDITIONS
TO SUCH REQUIREMENTS ARE STATED IN THE PROCUREMENT
SPECIFICATION. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 607

BOEING CO SEATTLE WASH

MERIT SYSTEM - A SPECIAL PURPOSE PROGRAM FOR
STRUCTURAL DYNAMIC ANALYSIS, (U)

AUG 64 268P KAYLOR, R. B. ; GOLDEN, C. T. ;

REPT. NO. D2 23571

CONTRACT: AF33 615 1791

PROJ: 620A

TASK: 620A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PROGRAMMING (COMPUTERS), DIGITAL
COMPUTERS), (*MANNED SPACECRAFT, STRUCTURAL PROPERTIES),
DYNAMICS, DYNAMIC PROGRAMMING, MATRIX ALGEBRA,
TOUGHNESS, INSTRUCTION MANUALS, CONTROL SEQUENCES,
PROGRAMMING LANGUAGES (U)

IDENTIFIERS: MERIT PROGRAM, X-20 SPACECRAFT, FORTRAN,
IBM 7094 (U)

THE DYNAMIC ANALYSIS OF LARGE COMPLEX STRUCTURES,
IN THIS CASE THE X-20 GLIDER, REQUIRES SOLUTION OF
A LARGE SYSTEM OF NUMERICAL EQUATIONS WHICH RELATE
FORCES, DISPLACEMENTS, STIFFNESS, AND MASS OF THE
STRUCTURE. THE MERIT SYSTEM, A DIGITAL COMPUTER
PROGRAM, WAS DEVELOPED TO PROVIDE A SOLUTION TO THIS
PROBLEM. THIS DOCUMENT IS A GUIDE FOR ENGINEERING
USERS, PROGRAM SERVICERS, AND PROGRAMMERS OF THE
MERIT SYSTEM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 016416

AD-446 582

BOEING CO SEATTLE WASH

TURBULENT STAGNATION LINE HEAT TRANSFER PROGRAM DECK

AS 1704.

(U)

AUG 64 189P

WATTS, H. A. HALL, P. H. ;

REPT. NO. D2 81298

CONTRACT: AF33 615 1791

PROJ: 620A

TASK: 620A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AERODYNAMIC HEATING), MANNED SPACECRAFT, HYPERSONIC CHARACTERISTICS, PROGRAMMING (COMPUTERS), DIGITAL COMPUTERS, SIMULATION, AERODYNAMIC CHARACTERISTICS, TURBULENCE, STAGNATION POINT, HEAT TRANSFER, ANGLE OF ATTACK, SWEEP-BACK WINGS, HIGH ALTITUDE, VELOCITY, TURBULENT BOUNDARY LAYER, COMPRESSIBLE FLOW, MATHEMATICAL PREDICTION (U)
IDENTIFIERS: X-20 SPACECRAFT, LEADING EDGE (U)

THIS DOCUMENT DESCRIBES A COMPUTER PROGRAM, DEVELOPED ON THE X-20 PROJECT, THAT HAS GENERAL APPLICATION TO THE PREDICTION OF AERODYNAMIC HEATING TO WING LEADING EDGES IN TURBULENT FLOW. GIVEN A SET OF (1) WIND TUNNEL INPUTS CONSISTING OF WALL AND FREE STREAM TEMPERATURES, PRESSURE, MACH NUMBER, LEADING EDGE RADIUS, ANGLE OF ATTACK AND GEOMETRIC SWEEP ANGLE OR (2) FLIGHT CONDITIONS CONSISTING OF WALL TEMPERATURE, ALTITUDE, VELOCITY, LEADING EDGE RADIUS, AND GEOMETRIC SWEEP ANGLE, THE PROGRAM CALCULATES HEATING RATES AND HEAT TRANSFER COEFFICIENTS. IT IS INTENDED THAT THIS DOCUMENT FURNISH THE READER WITH ENOUGH INFORMATION THAT HE CAN APPLY THE PROGRAM TO HIS OWN PROBLEMS.
(AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 484

BOEING CO SEATTLE WASH

STEEL TO ALUMINUM BRAZING, (U)

JAN 64 18P CRANE, C. H. I

REPT. NO. D2 61106

MONITOR: IDEP 085 20 00 ODC6 04

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ALUMINUM ALLOYS, BRAZING), (*STAINLESS
STEEL, BRAZING), (*BRAZING, PIPES), MANNED SPACECRAFT,
CRYOGENICS, WELDING, THERMAL JOINING, FATIGUE
(MECHANICS), LIQUEFIED GASES, NITROGEN, HYDROGEN, OXY(U)
IDENTIFIERS: X-20 SPACECRAFT, IDEP, ALUMINUM ALLOY
6061 (U)

THIS REPORT DESCRIBES PROCEDURES FOR JOINING
STAINLESS STEEL TUBING TO 6061 ALUMINUM ALLOY. THIS
JOINT WAS REQUIRED ON THE X-20 GLIDER CRYOGENIC
SYSTEM FOR A CONNECTION BETWEEN THE ALUMINUM PRESSURE
VESSELS AND THE STEEL TRANSFER LINES. THE STEEL TO
ALUMINUM JOINT WAS REQUIRED ON PRESSURE LINES WHICH
CARRIED LO2, LH2 AND LN2 GASES AND WAS ALSO
REQUIRED ON THE OUTER VACUUM JACKET LINES FOR ALL
THREE GASES. THE DEMAND FOR ABSOLUTE ZERO LEAKAGE
IN THESE LINES REQUIRED THAT THE JOINT BE BRAZED OR
WELDED. PROCEDURES AND SPECIFICATIONS WERE
DEVELOPED FOR THE SUCCESSFUL BRAZING AND WELDING OF
ALUMINUM TO STEEL AND WHICH WOULD BE SUITABLE TO A
CRYOGENIC ENVIRONMENT. (AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-445 617

AEROJET-GENERAL CORP AZUSA CALIF
MAINTENANCE ANALYSIS SPECIFICATION (PLAN) MASP (TEST
PLAN). PART II, VOLUME I. REVISION A. ROCKET ENGINE
SUBSYSTEMS DYNA SOAR BOOSTER. (U)

171P

REPT. NO. AGC DS 1302
CONTRACT: AFD4 647 613

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MAINTENANCE, SPECIFICATIONS),
(*SPECIFICATIONS, MAINTENANCE), (*GROUND SUPPORT
EQUIPMENT, MAINTENANCE), BOOST-GLIDE VEHICLES, BOOSTER
MOTORS, LAUNCH VEHICLES (AEROSPACE), TEST FACILITIES,
MAINTENANCE EQUIPMENT, HANDLING (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION PRESENTS THE MAINTENANCE
ANALYSIS OF THE ROCKET ENGINE SUBSYSTEMS AND
SUPPORTING AGE OF THE DYNA SOAR STEP 1 (DS-
1) PROGRAM. THE FUNCTIONAL REQUIREMENTS PRESENTED
ARE BASED ON THE PROGRAMMED MAINTENANCE REQUIREMENTS
OF THE TITAN II MISSILE WEAPON SYSTEM.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-445 543

MARTIN CO BALTIMORE MD
AIR FORCE MISSILE TEST CENTER FACILITIES (TITAN II),
DYNA SOAR STEP-I. (U)
AUG 61 72P
REPT. NO. ER11363A
CONTRACT: AFD4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LAUNCHING SITES),
(•LAUNCHING SITES, SYSTEMS ENGINEERING), RESEARCH
PROGRAM ADMINISTRATION, MANNED SPACECRAFT, TEST
FACILITIES, TEST METHODS, CHECKOUT PROCEDURES, LAUNCH
VEHICLES (AEROSPACE), STORAGE, GROUND SUPPORT EQUIPMENT,
SCHEDULING, COSTS, LOGISTICS (U)
IDENTIFIERS: TITAN, X-20 SPACECRAFT (U)

THIS REPORT PRESENTS THE UTILIZATION, DESCRIPTION,
COSTS, IMPLEMENTATION AND SCHEDULING OF THE
FACILITIES REQUIRED BY THE SYSTEMS CONTRACTOR AND
ASSOCIATE CONTRACTORS AT THE CAPE CANAVERAL
MISSILE TEST ANNEX, AIR FORCE MISSILE
TEST CENTER, FLORIDA, TO ACCOMPLISH
CONFIRMATION AND GROUND LAUNCH TEST OPERATIONS
ASSOCIATED WITH THE DYNASOAR STEP I PROGRAM.
THIS DOCUMENT COVERS THE SYSTEMS CONTRACTOR
REQUIREMENTS AT THE COMPLEX ONLY. THE GROUND LAUNCH
TEST PROGRAM TO BE CONDUCTED AT CAPE CANAVERAL IS
OUTLINED, BUILDINGS ARE DESCRIBED, AND SPACE
UTILIZATION IS DEPICTED AND PROGRAMMED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-445 143

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
SEPARATION AND EJECTION SYSTEMS OF FLIGHT VEHICLES:
BIBLIOGRAPHY, (U)

47P ABBOTT, HELEN M. ;

REPT. NO. SB64 14 ,2 60 64 14

CONTRACT: NOW63 0050C

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BIBLIOGRAPHIES, RELEASE MECHANISMS),
(•RELEASE MECHANISMS, SPACECRAFT), EJECTION, SEPARATION,
DECOYS, GUIDED MISSILE WARHEADS, STAGING, REENTRY
VEHICLES, CARTRIDGES (PAD), EXPLOSIVES INITIATORS,
FAIRINGS, SHAPED CHARGES, LAUNCH VEHICLES (AEROSPACE),
GUIDED MISSILES (SURFACE-TOSURFACE) (U)
IDENTIFIERS: ATLAS, TITAN, MERCURY, DISCOVERER,
MINUTEMAN, TIROS, MARINER, SCOUT, VANGUARD, POLARIS,
THOR, X-20 SPACECRAFT, SKIRTS, REDSTONE, SERGEANT (U)

ONE HUNDRED FIFTY-FIVE REFERENCES WERE COMPILED TO
PROVIDE A COVERAGE OF MATERIAL TO BE USED IN THE
EVALUATION OF SEPARATION AND EJECTION SYSTEMS OF
FLIGHT VEHICLES. THE REFERENCES ARE ARRANGED
ALPHABETICALLY BY CORPORATE SOURCE. ABSTRACTS ARE
GIVEN WHERE POSSIBLE, BUT ELIMINATED IN CASES THAT
WOULD RESULT IN THE BIBLIOGRAPHY BECOMING CLASSIFIED.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 215

BOEING CO SEATTLE WASH

SUBSYSTEM DESCRIPTION FOR GLIDER LAUNCH CONTROL
EQUIPMENT. (U)

OCT 61 42P

REPT. NO. D2 8199

CONTRACT; AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, LAUNCHING),
(*LAUNCHING, CONTROL SYSTEMS), (*AIR, LAUNCHING), MANNED
SPACECRAFT, GROUND SUPPORT EQUIPMENT, MAINTENANCE
EQUIPMENT, MANAGEMENT PLANNING, ELECTRICAL EQUIPMENT,
DISPLAY SYSTEMS, COMMAND AND CONTROL SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 213

BOEING CO SEATTLE WASH

GLIDER TECHNICAL/FUNCTIONAL LAUNCH AREA SUPPORT
REQUIREMENTS. (U)

MAR 63 123P

REPT. NO. ON D2 80566

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LAUNCHING SITES),
GROUND SUPPORT EQUIPMENT, LAUNCHING, REMOTE CONTROL
SYSTEMS, CHECKOUT PROCEDURES, ADAPTERS, DATA, SAFETY,
VEHICLES, TRAILERS, MANNED SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

DYNA-SOAR TECHNICAL/FUNCTIONAL REQUIREMENTS ARE
PRESENTED FOR BOTH THE 624A SYSTEM LAUNCH COMPLEX
AND THE REMOTELY LOCATED CONTROL CENTER. THE
INFORMATION IS PRESENTED IN SUFFICIENT DETAIL TO
SUPPORT THE DEVELOPMENT OF FACILITY DESIGN CRITERIA.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416.

AD-444 211
BOEING CO SEATTLE WASH
GLIDER TEST SEQUENCE - GROUND LAUNCH, (U)
AUG 62 1V MARTIN, A. ;
REPT. NO. D2 80168
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, CHECKOUT PROCEDURES), (*CHECKOUT PROCEDURES, MANNED SPACECRAFT), TEST FACILITIES, LAUNCH VEHICLES (AEROSPACE), COMPATIBILITY, LAUNCHING, SIMULATION, INSTRUCTION MANUALS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE CHECKLIST PERFORMS THE FOLLOWING FUNCTIONS:
(1) AUTHORIZE AND SEQUENCE THE TESTS AND OPERATIONS TO BE PERFORMED, (2) BY REFERENCE, EMPLOY AND CREATE SPECIFIC EFFECTIVITY FOR STANDARD PROCEDURES, (3) PROVIDE ENGINEERING AND TEST OPERATIONS CONTROL PROCEDURAL DIRECTION WHERE NO STANDARD PROCEDURE COVERAGE EXISTS, (4) ASSIGN ORGANIZATIONAL RESPONSIBILITY FOR SPECIFIC TEST AND PROCESSING ACTIVITIES. WHERE WARRANTED BY CRITICAL TIMING AND CORRELATION REQUIREMENTS, THESE ASSIGNMENTS MAY EXTEND TO PARTICULAR PERSONNEL (ALWAYS TO BE IDENTIFIED BY JOB FUNCTION ONLY) FOR A SPECIFIC ACT AT A REQUIRED TIME, AND (5) SUPPLEMENT OR TAKE EXCEPTION TO ANY REFERENCED PROCEDURE WITH ADDITIONAL INSTRUCTION TO MAKE THE PROCEDURE OPTIMUM FOR USE IN THE PARTICULAR CIRCUMSTANCE (OF SEQUENTIAL ORDER OF OPERATIONS, LOCATION, ETC.). (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 199

BOEING CO SEATTLE WASH

GENERAL REQUIREMENTS SUPPLEMENT TO THE SOURCE CONTROL

DRAWING FOR DYNA SOAR,

(U)

AUG 60 7DP HARRIS, R. E. ;

REPT. NO. D2 6558

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, RESEARCH
PROGRAM ADMINISTRATION), (*AIRCRAFT EQUIPMENT,
STANDARDS), DESIGN, MAINTAINABILITY,

LOGISTICS, MILITARY REQUIREMENTS

(U)

IDENTIFIERS: X20 SPACECRAFT

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 187

BOEING CO SEATTLE WASH
DYNA-SOAR PROGRAM PLAN,

(U)

1V

REPT. NO. D2 5697 4

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), RELIABILITY, MANAGEMENT PLANNING,
SYSTEMS ENGINEERING, SAFETY, MILITARY REQUIREMENTS,
MANNED SPACECRAFT

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 182

BOEING CO SEATTLE WASH
GOVERNMENT FURNISHED PROPERTY GFP AND GFAE-DYNA-SOAR,
(U)

NOV 63 1V SAMPLES, W. ;
REPT. NO. DN D2 80489
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), (*AIRCRAFT EQUIPMENT, TABLES), MILITARY
REQUIREMENTS, ROCKET PROPELLANTS, CATALOGS (U)
IDENTIFIERS: X- 20 SPACECRAFT (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 157L

BOEING CO SEATTLE WASH
SHOCK ENVIRONMENT AND SHOCK TEST ANALYSIS REPORT, X-
20 GLIDER/TRANSITION EQUIPMENT, (U)
63 1V FURLONG, JAMES ISUTHERLAND,

LOUIS :
REPT. NO. D2 80917
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOTICE: RELEASE ONLY TO DEPARTMENT OF
DEFENSE AGENCIES IS AUTHORIZED. OTHER CERTIFIED
REQUESTERS SHALL OBTAIN RELEASE APPROVAL FROM AERONAU-
TICAL SYSTEMS DIV., AIR FORCE SYSTEMS COMMAND,
WRIGHT-PATTERSON AFB, OHIO.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, SHOCK (MECHANICS),
ENVIRONMENTAL TESTS, TEST EQUIPMENT, TEST METHOD,
MATHEMATICAL PREDICTION, MATHEMATICAL ANALYSIS,
HANDLING, TRANSPORTATION, LANDING, ACCELERATION (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 155

BOEING CO SEATTLE WASH

X-20 GLIDER REFURBISHMENT PLAN, (U)

JAN 63 21P SIMPSON, D. M. I

REPT. NO. 02 80796

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MAINTAINABILITY),
LAUNCHING, SCHEDULING, RESEARCH PROGRAM ADMINISTRATION,
MANAGEMENT ENGINEERING, AIR TRANSPORTATION, VISUAL
INSPECTION, AIRFRAMES (U)

THIS DOCUMENT PRESENTS THE CONTRACTOR'S
REFURBISHMENT PLAN FOR THE GROUND LAUNCH FLIGHT TEST
GLIDERS. THE PLAN DEFINES THE INTERPRETATION OF
'REFURBISHMENT' AS USED IN THIS DOCUMENT,
PROVIDES FOR REFURBISHMENT LISTS, STATES THE
REFURBISHMENT POLICIES, AND PROVIDES THE PLANNING FOR
REFURBISHMENT ACTIVITIES. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 705

BOEING CO SEATTLE WASH

X-20 ELEVON HEAT AND LOAD TEST. (U)

MAY 64

1V

MCCARTY, JOHN E. I

REPT. NO. D2 81279

CONTRACT: AF33 615 1786

PROJ: 620A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, ELEVONS), MANUAL SPACECRAFT, RESEARCH PROGRAM ADMINISTRATION, TEST METHODS, DESIGN, THERMAL STRESSES, LOADING MECHANICS, AERODYNAMIC CONTROL SYSTEMS, FLIGHT CONTROL SYSTEMS, STRUCTURES, REENTRY VEHICLES, STRESSES, ANALYSIS, DEFLECTION, LOAD DISTRIBUTION, SCHEDULING, TESTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE TEST SPECIMEN WILL BE AS DEFINED BY X-20 ELEVON ENGINEERING DRAWINGS. MINOR MODIFICATIONS HAVE BEEN INCORPORATED TO FACILITATE MANUFACTURING WHERE THE TEST OBJECTIVES ARE NOT COMPROMISED. REFRACTORY LEADING EDGES AND EXTERNAL SKIN PANELS WITH THE ASSOCIATED SUPPORT PARTS AND INSULATION ARE NOT INCLUDED. THE ELEVON IS TO BE TESTED IN THE AIR FORCE WRIGHT-PATTERSON FIELD STRUCTURAL TEST FACILITY. BOEING TECHNICAL SUPPORT SHALL BE AVAILABLE ON A CONSULTATION BASIS DURING THE TEST. BOEING SHALL PREPARE THE FINAL TEST REPORT. SECTION 1 OF THIS DOCUMENT DEFINES THE LOAD, TEMPERATURE AND COMBINED LOAD-TEMPERATURE TEST CONDITIONS, TEST INSTRUMENTATION AND DATA REQUIREMENTS. THE PROGRAMMED TESTS COVER THE ELEVON CRITICAL DESIGN CONDITIONS. SECTION 2 OF THE DOCUMENT DEFINES THE BOEING RECOMMENDATIONS FOR TEST SETUP AND TEST PROCEDURES. (AUTHOR) AD-443 705 (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 535

BOEING CO SEATTLE WASH

WEIGHT ANALYSIS REPORT, MODEL X-20, (U)

JUL 64 1V RANKIN, C. W. ;

REPT. NO. D2 81264 2

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, WEIGHT), GUIDED
MISSILE COMPONENTS, WINGS, DESIGN, CONFIGURATION, PANELS
(STRUCTURAL), AERODYNAMIC CONTROL SURFACES, LANDING GEAR
DOORS, AIRFRAMES, GUIDED MISSILE ANTENNAS, AERODYNAMIC
LOADING, TABLES (U)

IDENTIFIERS: X-20 SPACECRAFT, LEADING EDGES (U)

CONTENTS: WING; LOWER SURFACE PANELS;
UPPER SURFACE PANELS; LEADING EDGES; MAIN
GEAR DOORS; ANTENNA PROVISIONS; WING IN-
STRUCTURE; AND DETAILED WEIGHT STATEMENT. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 533

BOEING CO SEATTLE WASH
WEIGHT ANALYSIS REPORT, MODEL X-20, (U)
JUL 64 116P RANKIN, C. W. ;
REPT. NO. D2 81264 6
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, WEIGHT), GUIDED
MISSILE COMPONENTS, TABLES, SYSTEMS ENGINEERING,
COOLANTS, COOLING + VENTILATING EQUIPMENT, CONTROL
SYSTEMS, ENVIRONMENTAL TESTS, WATER, HYDROGEN, THERMAL
INSULATION, SHIELDING, PANELS (STRUCTURAL), HEAT
EXCHANGERS, GLYCOLS, NITROGEN, HYDROGEN PEROXIDE,
ATTITUDE CONTROL SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 388L

BOEING CO SEATTLE WASH

COMPUTER UTILIZATION IN PRODUCT DEVELOPMENT, (U)

MAR 63

47P

MERRITT, R. G. I

REPT. NO. D2 3516D

UNCLASSIFIED REPORT

NOTICE: RELEASE ONLY TO DEPARTMENT OF

DEFENSE AGENCIES IS AUTHORIZED. OTHER CERTIFIED

REQUESTERS SHALL OBTAIN RELEASE APPROVAL FROM BOEING

CO., SEATTLE, WASH.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (DIGITAL COMPUTERS, RESEARCH PROGRAM

ADMINISTRATION), ANALOG COMPUTERS, DATA PROCESSING

SYSTEMS, PRODUCTION, COMPUTERS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 040

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
FUNCTIONAL EVALUATION TEST PLAN DYNA SOAR DATA TAPE
RECORDING SYSTEM, (U)

FEB 62 9P HARDMAN, W. E. ;

REPT. NO. 7660 44

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•RECORDING SYSTEMS, MANNED SPACECRAFT),
DESIGN, FREQUENCY MODULATION, BOOST-GLIDE VEHICLES,
RESEARCH PLANES, SIGNAL-TO-NOISE RATIO, DISCRIMINATORS,
TESTS, SIMULATION, BAND-PASS FILTERS, LOW-PASS FILTERS,
TEST EQUIPMENT, NUMERICAL ANALYSIS, AIRBORNE, MULTIPLEX,
SIGNALS, MAGNETIC TAPE (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-442 214

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
SPECIFICATION FOR DYNA SOAR AIRBORNE DATA TAPE
RECORDER SET AND GROUND RECORDER/REPRODUCER SET, (U)
IV MARESCA,T. ;HARDMAN,W. ;

REPT. NO. 7660 5

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (MAGNETIC RECORDING SYSTEMS,
SPECIFICATIONS), MANNED SPACECRAFT, BOOSTGLIDE VEHICLES,
GROUND SUPPORT EQUIPMENT, AIRBORNE, MAGNETIC TAPE,
REPRODUCTION, MILITARY REQUIREMENTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 962

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST REPORT FOR TIMING SUBSYSTEM, AMR
VAN. (U)

JUN 63 1V

REPT. NO. 7660 67 03

CONTRACT: AF33 647 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TIMING DEVICES, BOOST-GLIDE VEHICLES),
(•CHECKOUT PROCEDURES, MANNED SPACECRAFT), ELECTRONIC
EQUIPMENT, TIMING CIRCUITS, OSCILLATORS, ELECTRONIC
RELAYS, VOLTAGE, RADIOFREQUENCY POWER, TRAILERS,
ACCEPTABILITY (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THE PRIMARY OBJECTIVE OF THIS FINAL ACCEPTANCE TEST
WAS TO DEMONSTRATE THAT THE TESTS WERE ADEQUATE TO
DETERMINE SUBSYSTEM ACCEPTABILITY AND APPROVAL.
THE TESTING OF THIS SUBSYSTEM PRIMARILY CONSISTS OF
STARTING THE TIME CODE GENERATOR AND APPLYING THE
SIGNALS TO THE TIME CODE TRANSLATOR, TIME INTERVAL
PANEL AND TIME DISTRIBUTION PANEL FOR SUBSEQUENT
ANALYSIS OF THE VARIOUS OUTPUTS ON AN OSCILLOSCOPE OR
OSCILLOGRAPH. THE TESTING CAN BE CLASSIFIED INTO
FOUR BASIC GROUPS OR CATEGORIES: (1) OUTPUTS F
TIME CODE GENERATOR, (2) INPUTS TO TIME CODE
GENERATOR, (3) OUTPUTS OF TIME CODE TRANSLATOR,
AND (4) ENVIRONMENTAL MONITORING TESTS.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 949

HONEYWELL INC MINNEAPOLIS MINN

RELIABILITY PROGRAM FOR THE MH-132 DYNA SOAR FLIGHT CONTROL SYSTEM ELECTRONICS. (U)

OCT 61 37P

REPT. NO. 2546TR6 1

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, FLIGHT CONTROL SYSTEMS), RESEARCH PROGRAM ADMINISTRATION, RELIABILITY, QUALITY CONTROL, DESIGN, MANUFACTURING METHODS, ELECTRONIC EQUIPMENT, CHECKOUT PROCEDURES, DATA PROCESSING SYSTEMS (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THE RELIABILITY PROGRAM SET FORTH IN THIS DOCUMENT DESCRIBES THE CONTROL MEASURES TO BE IMPLEMENTED BY HONEYWELL IN ORDER TO MEET RELIABILITY REQUIREMENTS FOR THE MH-132 DYNASOAR FLIGHT CONTROL SUBSYSTEM ELECTRONICS. A RESUME OF THE RELIABILITY EFFORT FROM THE CONCEPT AND DESIGN STAGES THROUGH THE FIELD SERVICE IS PROVIDED. INFORMATION NOT AVAILABLE AT THE PRESENT TIME, SUCH AS RELIABILITY DIAGRAMS OF THE SPECIFIC SYSTEM TO BE USED, WILL BE INCLUDED IN THE QUARTERLY RELIABILITY REPORTS. THIS PROGRAM HAS BEEN DESIGNED TO INTEGRATE RELIABILITY INTO THE DESIGN, DEVELOPMENT, AND PRODUCTION OF THE MH-132 FLIGHT CONTROL SUBSYSTEM ELECTRONICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 915

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR VARIABLE
ATTENUATOR. (U)

APR 62 8P

REPT. NO. TDS 2546 03 45

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (ATTENUATORS, FLIGHT CONTROL SYSTEMS),
MANNED SPACECRAFT, BOOST GLIDE VEHICLES, SPECIFICATIONS,
MILITARY REQUIREMENTS, TEST METHODS, ENVIRONMENTAL
TESTS, CIRCUITS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE REQUIREMENTS FOR A
VARIABLE ATTENUATOR. THESE REQUIREMENTS
REFLECT THE FINDINGS OF DESIGN STUDIES CONDUCTED
UNDER THE BOEING COMPANY LETTER ORDER NO.
2-043004-9552. NECESSARY ENGINEERING RECORDS,
DRAWINGS, SPECIFICATIONS, TESTS, ETC. SHALL BE
INITIATED TO PROVIDE FOR A PRODUCTION (F.C.A.)
RELEASE. THE VARIABLE ATTENUATOR SHALL BE
DESIGNED TO RECEIVE A SIGNAL FROM THE NON-LINEAR
OUTPUT OF THE GAIN COMPUTER AND TO CHANGE THE
ATTENUATION FACTOR OF THE VARIABLE ATTENUATOR AS A
FUNCTION OF THIS INPUT SIGNAL. THE VARIABLE
ATTENUATOR IS A SERIES ELEMENT IN THE FORWARD PATH
OF THE FCSE WHICH CHANGES THE GAIN OF THE SYSTEM
BY OPERATING ON THE FCSE ERROR SIGNAL IN A MANNER
DESCRIBED ABOVE. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 913

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR AMPLIFIER
DEMODULATOR, HIGH LEVEL - LOW GAIN. (U)

APR 62 2P

REPT. NO. TDS 2546 03 41

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•AMPLIFIERS, DEMODULATORS),
(•DEMODULATORS; AMPLIFIERS), (•SPECIFICATIONS,
AMPLIFIERS), FLIGHT CONTROL SYSTEMS, COMPUTERS, BOOST-
GLIDE VEHICLES, MANNED SPACECRAFT, GAIN, ALTERNATING
CURRENT, PRINTED CIRCUITS, DESIGN (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR A HIGH LEVEL - LOW GAIN AMPLIFIER
DEMODULATOR. THOSE REQUIREMENTS REFLECT THE
FINDINGS OF DESIGN STUDIES CONDUCTED UNDER THE
BOEING COMPANY LETTER ORDER NO. 2-043004-
9552. NECESSARY ENGINEERING RECORDS, DRAWINGS,
SPECIFICATIONS, TESTS, ETC. SHALL BE INITIATED TO
PROVIDE FOR A PRODUCTION RELEASE. THE AMPLIFIER
DEMODULATOR IS FOR USE IN THE BG197 COMPUTER FOR
THE MH 132 DYNA SOAR FLIGHT CONTROL SUBSYSTEM
ELECTRONICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 910
HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR COMMAND
SIGNAL LIMITER MONITOR. (U)
FEB 62 7P
REPT. NO. TDS2546 C3 38

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MONITORS, SIGNALS), (*LIMITERS,
MONITORS), COMPUTERS, FLIGHT CONTROL SYSTEMS, MANNED
SPACECRAFT, BOOST GLIDE VEHICLES, SPECIFICATIONS,
ENVIRONMENTAL TESTS, MILITARY REQUIREMENTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR A COMMAND SIGNAL LIMITER MONITOR MOUNTED
AS A COMPONENT PART IN THE BG197 COMPUTER FOR THE
DYNA-SOAR FLIGHT CONTROL SYSTEM
ELECTRONICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 908

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR SWITCHING
AMPLIFIER - AUTO TJIM. (U)

JAN 62 10P

REPT. NO. TDS2546 03 35

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•AMPLIFIERS, SPECIFICATIONS), SWITCHING
CIRCUITS, FLIGHT CONTROL SYSTEMS, MANNED SPACECRAFT,
BOOST-GLIDE VEHICLES, DESIGN, COMPUTERS, TRANSISTOR
AMPLIFIERS, MAGNETIC AMPLIFIERS, PRINTED CIRCUITS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 903

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR LEAD NETWORK
AMPLIFIER. (U)

APR 62 9P

REPT. NO. TDS2546 03 12

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE;

DESCRIPTORS: (*AMPLIFIERS, SPECIFICATIONS),
(*SPECIFICATIONS, AMPLIFIERS), ENVIRONMENTAL TESTS,
FLIGHT CONTROL SYSTEMS, COMPUTERS, BOOSTGLIDE VEHICLES,
MANNED SPACECRAFT, DESIGN, MILITARY REQUIREMENTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR A LEAD NETWORK AMPLIFIER. THESE
REQUIREMENTS REFLECT THE FINDINGS OF DESIGN STUDIES
CONDUCTED UNDER THE BOEING COMPANY LETTER
ORDER NO. 2-043004-9552. NECESSARY ENGINEERING
RECORDS, DRAWINGS, SPECIFICATIONS, TESTS, ETC. SHALL
BE INITIATED TO PROVIDE FOR A PRODUCTION RELEASE.
THE AMPLIFIER IS FOR USE IN THE BG197 COMPUTER
FOR THE MH-132 DYNA-SOAR FLIGHT CONTROL
SUBSYSTEM ELECTRONICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 900

SUNDSTRAND AVIATION-DENVER COLO

X-20 TURBINE FAILURE REPORT, (U)

NOV 63 45P CLARK, W. M. ;

REPT. NO. 62 DER 63

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TURBINE WHEELS, TURBINE BLADES),
(•TURBINE BLADES, FRACTURE (MECHANICS)), (•BOOST-GLIDE
VEHICLES, AUXILIARY POWER PLANTS), DESIGN, VIBRATION,
STRESSES, TITANIUM, BRAZING (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE RESULTS ARE PRESENTED OF THE BLADE CRACKING PROBLEM ON THE X-20 TURBINE WHEEL. ALSO PRESENTED IS ACCUMULATED DATA, UP TO THE REPORT DATE, ON THE TURBINE WHEEL BURST SPEED AS A RESULT OF CHANGES NECESSITATED BY REQUIREMENTS TO SOLVE THE BLADE CRACKING PROBLEM. THE IMPORTANCE OF SEVERAL DESIGN CONSIDERATIONS SUCH AS VIBRATION, RESIDUAL STRESSES, AND MATERIAL PROPERTIES ARE PRESENTED. MANY OTHER DESIGN PARAMETERS OF EQUAL IMPORTANCE WERE CONSIDERED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 898

GARRETT CORP LOS ANGELES CALIF
DEVELOPMENT ENDURANCE TEST GLYCOL PUMP AND
ACCUMULATOR 680430 USED ON GLYCOL DUAL PUMP UNIT
178310 BOEING DYNA-SOAR PART 10-20917-7, (U)

JAN 64 5P FISHER, R. | DURHAM, R. E. |
REPT. NO. DS247

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COOLANT PUMPS, PERFORMANCE
(ENGINEERING)), (*BOOST-GLIDE VEHICLES, COOLANT PUMPS),
GLYCOLS, BEARINGS, ACCEPTABILITY, PRESSURE,
CONFIGURATION, LIFE EXPECTANCY, TESTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 896

GARRETT CORP LOS ANGELES CALIF
DEVELOPMENT 500-HOUR ENDURANCE TEST PILOT COMPARTMENT
FAN 207763 USED ON PILOT COMPARTMENT COOLING UNIT
178380 BOEING X-20 (DYNA-SOAR) PART 10-20917-1, (U)
JAN 64 4P KITAGUCHI, S. S. BILLS, R. T.

REPT. NO. DS256

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (AIR CONDITIONING EQUIPMENT, FANS),
(VENTILATION FANS, PERFORMANCE (ENGINEERING),
OPERATION, TEST EQUIPMENT, VISUAL INSPECTION, TESTS,
TEMPERATURE, PILOTS, AIRCRAFT EQUIPMENT, SPACECRAFT
CABINS, DESIGN, ELECTRIC MOTORS, SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS REPORT DESCRIBES A DEVELOPMENT 500-HOUR
ENDURANCE TEST OF PILOT COMPARTMENT FAN. THE
TEST WAS PART OF THE DEVELOPMENT PROGRAM FOR THE
HYDROGEN COOLING EQUIPMENTS FOR THE BOEING
X-20 (DYNA-SOAR). THE OBJECTIVE OF THIS TEST
WAS TO VERIFY THE ENDURANCE CAPABILITY OF THE FAN
WITH PARTICULAR REFERENCE TO THE BEARINGS AND MOTOR
ELECTRICAL COMPONENTS. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 893
ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
POWER REQUIREMENTS DATA. X-20 TEST INSTRUMENTATION
SUBSYSTEM. (U)
NOV 63 4P
REPT. NO. EMR 7660 214

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, INSTRUMENTATION),
TESTS, POWER SUPPLIES, DATA PROCESSING SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE POWER REQUIREMENTS DATA FOR THE X20 TEST
INSTRUMENTATION SUBSYSTEM IS PRESENTED ALONG WITH
THE LATEST ESTIMATED POWER REQUIREMENTS FOR EACH SET
OF THE GLIDER CONVERSION AND STORAGE
EQUIPMENT. THE POWER DATA IS GIVEN FOR THE
GROUND DATA RECOVERY AND DATA PROCESSOR
ELEMENTS. THE LATTER ARE PRESENTED IN TABULAR
FORM, SO THAT THE POWER FOR EACH EQUIPMENT ITEM IN A
PARTICULAR STATION, AND THE TOTAL POWER REQUIREMENTS
FOR EACH KIND OF STATION MAY BE READILY FOUND.
(AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 891

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
PROCUREMENT SPECIFICATION TRAILER X-20 TEST
INSTRUMENTATION SUBSYSTEM.

(U)

MAR 63 28P

REPT. NO. EMR7660 89REV.

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (SPACECRAFT, SPECIFICATIONS), DESIGN,
INSTRUMENTATION, ELECTRONIC EQUIPMENT, QUALITY CONTROL,
INTERFERENCE ANALYZERS, INTERFERENCE, CONTROL SYSTEMS,
GROUND SUPPORT EQUIPMENT, RELIABILITY, MILITARY
REQUIREMENTS, MAINTAINABILITY, SAFETY, PRODUCTION,
OPERATION, MAINTENANCE, TEMPERATURE, HUMIDITY, DUST,
ACOUSTICS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

THIS SPECIFICATION ESTABLISHES THE DESIGN
REQUIREMENTS FOR TRAILERS USED TO HOUSE ELECTRONIC
EQUIPMENT USED IN THE X-20 TEST INSTRUMENTATION
SUBSYSTEM. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 886

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
MULTIPLEX SIMULATION OF THE DYNA-SOAR TEST
INSTRUMENTATION SUBSYSTEM, (U)
DESCRIPTIVE NOTE: FINAL REPT.,
FEB 62 . 1V LIND, EARL R. ;
REPT. NO. 7660 42
TASK: 4211 7011

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, RADIO COMMUNICATION
SYSTEMS), (*TEST EQUIPMENT (ELECTRONICS), PULSE
COMMUNICATION SYSTEMS), MANNED SPACECRAFT, COMMUNICATION
SYSTEMS, TELEMETER SYSTEMS, REMOTE CENTRAL SYSTEMS,
MULTIPLEX, SIMULATION, ELECTRONIC EQUIPMENT,
INSTRUMENTATION, FREQUENCY MODULATION, RADIO
INTERFERENCE, SIGNAL-TO-NOISE RATIO, RADIO SIGNALS, DATA
PROCESSING SYSTEMS, RADIO EQUIPMENT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE DYNA-SOAR TEST INSTRUMENTATION SUBSYSTEM IS
A COMPLEX ELECTRONIC SYSTEM SPANNING THE SPECTRUM
FROM 100 CPS TO 700KC AND CONTAINING 42 INDIVIDUAL
FREQUENCY MODULATED SUBCARRIER CHANNELS AS WELL AS A
144 KILO BIT PER SECOND PULSE CODE MODULATION NON-
RETURN TO ZERO (PCM-NRZ) SIGNAL. IT IS INTENDED
TO TRANSMIT SIGNALS IN THIS MULTIPLEX BELOW 400KC,
AND TO RECORD THE ENTIRE MULTIPLEX ON A ROTARY HEAD
VIDEO TAPE RECORDER. A BREADBOARD SIMULATION OF
THIS SYSTEM HAS BEEN CONSTRUCTED AND EXPERIMENTAL
EVIDENCE OF EXPECTED PERFORMANCE HAS BEEN OBTAINED.
THE PRINCIPAL OBJECTIVES OF THESE EXPERIMENTS WERE
TO DETERMINE THE VALIDITY OF THE MULTIPLEX FORMAT AND
ASCERTAIN THE DEGRADATIONS CAUSED BY VARIOUS HARDWARE
COMPONENTS COMPRISING THE SYSTEM. THIS BREADBOARD
EQUIPMENT WAS DESIGNED TO HAVE ELECTRICAL
CHARACTERISTICS VERY SIMILAR TO THE ACTUAL
DYNASOAR OPERATIONAL EQUIPMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 884

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST PROCEDURE FOR RECORDING
SUBSYSTEM, PART I. SIL.

(U)

44 1V

REPT. NO. 7660 69 071

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MAGNETIC RECORDING SYSTEMS, TEST
METHODS), GROUND SUPPORT EQUIPMENT, MANNED SPACECRAFT,
BOOST-GLIDE VEHICLES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT OUTLINES IN STEP-BY-STEP DETAILS THE
ACCEPTANCE TEST PROCEDURES TO BE FOLLOWED
DURING FINAL TEST OF THE S-900 GROUND DATA
RECORDER/REPRODUCER. THE GROUND RECORDER/
REPRODUCER IS A COMPACT, HIGH PERFORMANCE, UNIT
INCORPORATING ALL SOLID-STATE ELECTRONICS, AND
DESIGNED TO THE GENERAL INTENT OF MIL-E-4158,
REVISION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 882

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST PROCEDURE FOR FM SUBSYSTEM, FM
CALIBRATOR, SIL. (U)

44 31P

REPT. NO. 7660 69 DS1

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MULTIPLEX, CALIBRATION), (•TELEMETER
SYSTEMS, CALIBRATION), FREQUENCY MODULATION, MODULES
ELECTRONIC, BOOST-GLIDE VEHICLES, MANNED SPACECRAFT,
TEST METHODS, MEASUREMENT, MILITARY REQUIREMENTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE OBJECTIVE OF THIS TEST IS TO VERIFY THE
PERFORMANCE OF THIS ARTICLE TO BE WITHIN THE
REQUIREMENTS DEFINED IN X-20 ACCEPTANCE TEST
REQUIREMENTS, SIL, DOCUMENT NO. EMR 7660-68,
PARAGRAPH 5.6. THE ARTICLE WILL BE TESTED FOR
INPUTS AND OUTPUTS WHERE PRACTICAL. OUTPUTS WILL
BE TESTED FOR ACCURACY. THE FM CALIBRATOR IS
DESIGNED TO PROVIDE A FREQUENCY MULTIPLEXED OUTPUT OF
FROM ONE TO FORTY-TWO CHANNELS. IT IS A THREE-
POINT CALIBRATOR, PROVIDING EITHER HIGH BAND EDGE,
CENTER, OR LOW BAND EDGE FREQUENCIES WHICH ARE USED
TO CALIBRATE THE FM SUBSYSTEM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 88D
ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST PROCEDURE FOR IG DATA PROCESSOR
SUBSYSTEM, SIL. (U)
44 63P
REPT. NO. 7660 69 10

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, INERTIAL GUIDANCE),
DATA PROCESSING SYSTEMS, DIGITAL SYSTEMS, DIGITAL
COMPUTERS, TESTS METHODS, ACCEPTABILITY (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE IG DATA PROCESSOR SUBSYSTEM CONSISTS OF
EQUIPMENT REQUIRED TO PREPARE HIGH DENSITY COMPUTER
INPUT TAPES FOR ENTRY INTO AN IBM 7090 COMPUTER.
THE IG DATA PROCESSOR WILL BE TESTED BY
SUPPLYING ITS INPUTS FROM THE APPROPRIATE GROUND
STATION EQUIPMENT. THE IG DIGITAL DECOMMUTATOR
WILL ACCEPT ITS INPUT FROM A SIGNAL SIMULATOR TO
PROVIDE IG DATA. IT WILL BE PROGRAMMED TO
SUPPLY A KNOWN DATA INPUT TO THE DATA PROCESSOR.
THE TIMING SUBSYSTEM WILL FURNISH VARIOUS
TIMING SIGNALS INCLUDING TIME EDITING START-STOP
SIGNALS. THE OUTPUT OF THE FORMAT CONVERTER
WILL BE RECORDED ON A DIGITAL TAPE IN THE SPECIFIED
FORMAT WHICH WILL BE COMPATIBLE FOR PLAY BACK ON AN
IBM 729 TAPE TRANSPORT FOR SUBSEQUENT ANALYSIS.
(AUTHOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 805

BOEING CO SEATTLE WASH
X-20 DOCUMENTATION INDEX,

(U)

MAR 64 308P COLBERT, J. :

REPT. NO. D2 81268

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, DOCUMENTATION),
(•DOCUMENTATION, BOOST-GLIDE VEHICLES), MANNED
SPACECRAFT

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

THIS DOCUMENT LISTS THE BOEING COMPANY AND ITS MAJOR SUBCONTRACTOR DOCUMENTATION RELEASED SINCE APRIL 1960 ON THE X-20 PROGRAM. BOEING DOCUMENTS ARE ENUMERATED BY FUNCTIONAL ORGANIZATION IN NUMERICAL ORDER. SUBCONTRACTOR DOCUMENTS ARE LISTED BY COMPANY IN NUMERICAL ORDER EXCEPT FOR SUNDSTRAND CORPORATION DOCUMENTATION WHICH IS LISTED BY SUBJECT WITH PERTINENT DOCUMENTS INDICATED FOR EACH. NO REFERENCE IS INCLUDED TO DOCUMENTATION PREPARED BY SUPPLIERS OTHER THAN THOSE LISTED ABOVE. DOCUMENT STATUS INFORMATION PROVIDED ON BOEING DOCUMENTS CAN BE USED TO DETERMINE IF THE CONTENTS ARE CURRENTLY VALID; WHEREAS CONTRACTUAL USAGE INFORMATION INDICATED GENERALLY SPECIFIES THE LEVEL AND TYPE OF DOCUMENT COORDINATION REQUIRED WITH THE SPO. THOSE DOCUMENTS THAT ARE TO BE SUBMITTED OR MAINTAINED IN FULFILLMENT OF A CURRENT CONTRACT REQUIREMENT, AND REVISIONS THERETO, REQUIRE SPO APPROVAL. DOCUMENTS INCORPORATED INTO THE CONTRACT FOR COMPLIANCE REQUIRE CONTRACT COVERAGE OF REVISIONS. THOSE THAT ARE NOT INDICATED AS HAVING CONTRACTUAL USAGE GENERALLY DO NOT REQUIRE SPO OFFICIAL APPROVAL. LISTED DOCUMENTS ARE AVAILABLE FROM THE ORIGINATING COMPANY. (AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 775

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
OPERATION AND MAINTENANCE MANUAL X-20 SIL STATION
VOLUME IV FM SUBSYSTEM. (U)

JAN 64 IV

REPT. NO. 7660 203

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TELEMETER SYSTEMS, INSTRUCTION MANUALS),
(*DATA PROCESSING SYSTEMS, INSTRUCTION MANUALS),
(*INSTRUCTION MANUALS, TELEMETER SYSTEMS), FREQUENCY
MODULATION, ELECTRONIC EQUIPMENT, MODULES (ELECTRONIC),
WIRING DIAGRAMS, CIRCUITS, MECHANICAL DRAWINGS, POWER
SUPPLIES, MANNED SPACECRAFT, OPERATION, MAINTENANCE (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS MANUAL PROVIDES THE REQUIRED INFORMATION FOR
THE OPERATION AND MAINTENANCE OF THE FM SUBSYSTEM
FOR THE X-20 GROUND DATA RECOVERY ELEMENTS
SYSTEM INTEGRATION LABORATORIES (SIL)
STATION. THE FM SUBSYSTEM IS COMPOSED OF THE
FOLLOWING EQUIPMENT: DISCRIMINATOR, CHANNEL
SELECTOR, LOW PASS OUTPUT FILTER, LOW
PASS OUTPUT FILTER, TRANSLATOR, POWER
SUPPLY, FM CALIBRATOR, FM WORK DRAWER, TEST
ADAPTERS, BLANK MODULE, RACK ADAPTER.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 744

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
OPERATION AND MAINTENANCE MANUAL. X-20 SIL STATION.
VOLUME VI. RECORDING SUBSYSTEM. (U)

JAN 64 1V

REPT. NO. EMR7660 205

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (•MAGNETIC RECORDING SYSTEMS, GROUND SUPPORT
BANDWIDTHS), OPERATIONAL MAGNETIC RECORDING SYSTEMS,
PROCESSING SYSTEMS, TELEMETRY SYSTEMS, RADIO
COMMUNICATION SYSTEMS (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

INSTRUCTIONS ARE PRESENTED FOR THE OPERATION AND
MAINTENANCE OF THE TAPE RECORDER SUBSYSTEMS.
THE TAPE RECORDER SUBSYSTEM IS PART OF THE
X-20 GROUND DATA RECOVERY ELEMENTS.
THIS SUBSYSTEM IS ONE OF SEVERAL TELEMETRY TO
RECOVER AND PROCESS TEST INSTRUMENTATION DATA
TRANSMITTED BY X-20 GLIDER. THE INFORMATION
DESCRIBES THE EQUIPMENT ON A SUBSYSTEM LEVEL AND IS
INTENDED TO SUPPORT OVER-ALL SYSTEM OPERATION.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 741

BOEING CO SEATTLE WASH

TRANSONIC, SUPERSONIC PANEL FLUTTER TEST, (U)

JAN 64 1V MORTVEDT, R. L. WAGNER, R. T.

;

REPT. NO. D2 81095

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, PANELS
(STRUCTURAL), AIRPLANE PANELS, MANNED SPACECRAFT,
DESIGN, SUPERSONIC CHARACTERISTICS, FLUTTER, WIND TUNNEL
MODELS, MODEL TEST, VIBRATION, PRESSURE, THERMAL
INSULATION, SUPERSONIC FLOW (U)

IDENTIFIERS: X-20 SPACECRAFT, SPACECRAFT SKIN (U)

THE PURPOSE OF THE TEST WAS TO VERIFY THE FLUTTER
FREE CAPABILITY OF A GROUP OF BOEING X-20 UPPER
SURFACE SKIN PANELS. DATA FOR ESTABLISHING
FURTHER PANEL DESIGN REQUIREMENTS WERE ALSO OBTAINED.
LENGTH, WIDTH, SKIN THICKNESS, PANEL SUPPORT
VARIATIONS, SIDE-BY-SIDE COUPLING, MANUFACTURING
TOLERANCE, AND INTERNAL HEATING EFFECTS WERE
INVESTIGATED. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 739

BOEING CO SEATTLE WASH

INSTALLATION PROCEDURES FOR CONSTANTAN FOIL BAKELITE
BACKED STRAIN GAGES ON X-20 (DYNA-SOAR) GLIDERS, (U)

MAY 63 IV CHASE, L. I.; DIONNE, J. B. I

REPT. NO. 02 80742

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, STRAIN GAGES),
(*STRAIN GAGES, <OOST-GLIDE VEHICLES), MANNED
SPACECRAFT, INSTALLATION, SPECIFICATIONS, TESTS, TEST
EQUIPMENT, INSTRUMENTATION, AIRFRAMES, AIRFOILS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE OBJECTIVE OF THIS DOCUMENT IS TO PROVIDE THE
REQUIRED PROCEDURES FOR INSTALLATION OF STRAIN GAGES
ON DYNA-SOAR GLIDERS. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DGC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 737

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
OPERATION AND MAINTENANCE MANUAL. X-20 SIL STATION.
VOLUME X. INTERFACE, INTERCOM AND ASSOCIATED
EQUIPMENT SUBSYSTEM. (U)

JAN 64 1V

REPT. NO. EMR7660 209

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (*TELEMETER SYSTEMS, BOOSTGLIDE VEHICLES),
MANNED SPACECRAFT, COMMUNICATION EQUIPMENT, FLIGHT
CONTROL SYSTEMS, REMOTE CONTROL SYSTEMS, ELECTRONIC
EQUIPMENT, DATA PROCESSING SYSTEMS, COMMAND GUIDANCE,
OPERATION, MAINTENANCE (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS MANUAL PROVIDES INSTRUCTIONS FOR OPERATION AND
MAINTENANCE OF THE INTERFACE EQUIPMENT,
SUBSYSTEM, PART OF THE X-20 GROUND DATA
RECOVERY ELEMENTS, SYSTEM INTEGRATION
LABORATORIES (SIL) STATION. SECTION I
CONTAINS PHYSICAL DESCRIPTION, PURPOSE, AND
SPECIFICATIONS OF THE EQUIPMENTS. UNITS OF THE
SUBSYSTEM DISCUSSED WITHIN SEPARATELY SUPPLIED
PUBLICATIONS ARE NOT DISCUSSED IN DETAIL WITHIN THIS
PUBLICATION. VENDOR MANUALS APPLICABLE TO THE
INTERFACE EQUIPMENT AND INTERCOMMUNICATION
SYSTEM ARE LISTED AS REFERENCED PUBLICATIONS.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 735

BOEING CO SEATTLE WASH

PERTURBATION SOLUTION OF THE EQUATIONS OF INVISCID

HYPERSONIC FLOW ABOUT A LIFTING DELTA WING, (U)

JUN 61 87P KAFKA, PAUL G. ;

REPT. NO. D2 80265

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, DELTA WINGS),
(*DELTA WINGS, HYPERSONIC FLOW), HYPERSONIC
CHARACTERISTICS, LIFT, MANNED SPACECRAFT, VISCOSITY,
DIFFERENTIAL EQUATIONS, BOUNDARY LAYER, PERTURBATION
THEORY (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

A PRACTICAL METHOD IS PRESENTED FOR SOLVING THE
NONLINEAR DIFFERENTIAL EQUATIONS WHICH DESCRIBE THE
INVISCID FLOW ON A DELTA WING, UNDER THE ASSUMPTION
THAT THE FLOW IS CONICAL. A SET OF FIVE LINEAR
DIFFERENTIAL EQUATIONS AND PERTINENT BOUNDARY
CONDITIONS FOR THE PERTURBATION FUNCTIONS HAS BEEN
DERIVED. THE METHOD IS EMINENTLY SUITABLE FOR
MACHINE CALCULATION, SINCE ALL DIFFICULTIES CAUSED BY
THE PRESENCE OF MATHEMATICAL SINGULARITIES HAVE BEEN
ELIMINATED. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 733

BOEING CO SEATTLE WASH

MANUFACTURING DOCUMENT FOR THE CHEMICAL MILLING OF

ALUMINUM ALLOYS IN SHOP 2-3340, (U)

DEC 62 51P PHELAN, R. E. I

REPT. NO. D2 80744

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MANUFACTURING
METHODS), (*ALUMINUM ALLOYS, CHEMICAL MILLING),
(*CHEMICAL MILLING, ALUMINUM ALLOYS), MATERIAL REMOVAL,
TEMPLATES, PRODUCTION CONTROL, MANNED SPACECRAFT,
RESEARCH PLANES, SCHEDULING (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

IT IS THE PURPOSE OF THIS DOCUMENT TO PROVIDE A
TABULATION OF THE PROCESSING DATA FOR EACH PART
CHEMICALLY MILLED IN THE BOEING AERO-SPACE
DIVISION CHEMICAL MILLING SHOP, ORGN. 2-
3340. THIS DOCUMENT SHALL BE USED AS A STANDARD FOR
ALL SCRIBING AND MILLING OPERATIONS CONDUCTED WITHIN
THIS SHOP FOR THE X-20 PROGRAM. (AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AO-441 730
BOEING CO SEATTLE WASH
DYNA-SOAR SYSTEM DRAWING LIST, (U)
SEP 62 1V SAGE, R. W. I
REPT. NO. D2 80735
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MECHANICAL DRAWINGS, BOOST GLIDE
VEHICLES), (•GUIDED MISSILE COMPONENTS, MECHANICAL
DRAWINGS), (•BOOST GLIDE VEHICLES, MECHANICAL DRAWINGS),
DOCUMENTATION, TABLES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT CONTAINS A DETAILED TABULATION OF ALL
ENGINEERING PRODUCTION DRAWING RELEASES MADE TO
DATE ON THE X-20 (DYNA-SOAR) PROGRAM.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 696

BOEING CO SEATTLE WASH

X-20 ENGINEERING SUMMARY REPORT STRUCTURES AND
MATERIALS TECHNOLOGY, (U)

MAR 64 40P COLBERT, L. B. ;

REPT. NO. D2 81261

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, STRUCTURES),
(*MATERIALS, BOOST-GLIDE VEHICLES), MANNED SPACECRAFT,
RESEARCH PLANES, HEAT TRANSFER, AERODYNAMIC HEATING,
THEORY, MODEL TESTING, TEST FACILITIES, HYPERSONIC WIND
TUNNELS, HYPERSONIC FLOW, PERTURBATION THEORY, NOSE
CONES, DELTA WINGS, SURFACE PROPERTIES, MATHEMATICAL
ANALYSIS, DESIGN, THERMAL INSULATION, PANELS
(STRUCTURAL), AIRFRAMES, ALLOYS, REFRACTORY ALLOYS,
REFRACTORY COATINGS, CERAMIC MATERIALS, HIGH-
TEMPERATURE RESEARCH, CRYOGENICS, BEARINGS, LUBRICANTS,
HEAT-RESISTANT METALS + ALLOYS, MECHANICAL PROPERTIES (U)
IDENTIFIERS: X-20 SPACECRAFT, SUPERALLOYS (M)

THIS DOCUMENT PRESENTS A GENERAL SUMMATION OF THE
STRUCTURES, MATERIALS, AND PROCESSES IN TECHNOLOGICAL
DEVELOPMENTS ACCUMULATED THROUGHOUT THE DURATION OF
THE X-20 PROGRAM. ANALYTICAL STUDIES, TEST
PROGRAMS, AND PROBLEM AREAS ARE BRIEFLY OUTLINED.
IT IS INTENDED THAT THIS DOCUMENT SERVE AS A
REFERENCE FOR DESIGNERS OF FUTURE SPACE SYSTEM
STRUCTURES REGARDING TECHNICAL PROBLEM AREAS AND/OR
DATA AVAILABLE FROM THE X-20 PROGRAM.
STRUCTURAL ENVIRONMENTS ARE DISCUSSED FOR THE AREAS
OF ANALYSIS AND TEST FOR AERODYNAMIC HEAT TRANSFER,
AIRLOADS, DYNAMIC LOADS, FLUTTER AND STRUCTURAL
TEMPERATURES. DEVELOPMENT OF MECHANICAL AND
PHYSICAL PROPERTIES IS DESCRIBED FOR MATERIALS UNIQUE
TO THE X-20 PROGRAM, INCLUDING REFRACTORY AND
SUPERALLOY METALS, CERAMICS, INSULATION, ELECTRONIC
MATERIALS, AND CERTAIN MISCELLANEOUS FLUIDS,
COATINGS, AND STANDARDS. STRUCTURAL ANALYSIS
METHODS, VERIFICATION TESTING, AND CRITICAL COMPONENT
DEVELOPMENT TESTING ARE OUTLINED. (AUTHOR). (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-440 741

LEAR SIEGLER INC GRAND RAPIDS MICH
SIZE 8 SERVO MOTOR FOR 4060L INDICATOR AS USED ON
DYNA-SOAR PROGRAM, (U)

DEC 63 30P ZYLSTRA, J. I

REPT. NO. 910 JIF

MONITOR: IDEP

532.29.40.06-F0-02

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (SERVOMOTORS, MINIATURE ELECTRICAL
EQUIPMENT), BOOST-GLIDE VEHICLES, MOTOR GENERATORS,
ENVIRONMENTAL TESTS, TEMPERATURE, SHOCK (MECHANICS),
VIBRATION, ACCELERATION, LIFE EXPECTANCY (U)
IDENTIFIERS: IDEP, X-20 SPACECRAFT (U)

ALL FOUR UNITS WERE GIVEN ROOM TEMPERATURE, SHOCK,
VIBRATION, AND ACCELERATION TESTS. TWO UNITS WERE
GIVEN AN ENDURANCE TEST AND TWO UNITS WERE GIVEN LOW
AND HIGH TEMPERATURE TESTS. FINALLY, ALL FOUR
UNITS WERE SUBJECTED TO A TEMPERATURE SHOCK TEST.
ALL UNITS MET THE ENTIRE REQUIREMENTS OF THE
SPECIFICATION. (AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-439 782

LEAR SIEGLER INC GRAND RAPIDS MICH
POWER-OFF WARNING INDICATOR FOR 4060L INDICATOR USED
ON X20, (U)

JAN 64 1SP VERKAIK, A. ;
REPT. NO. 100DEIF
MONITOR: IDEP 771.40.14.40-FO-01

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (SOLENOIDS, DIRECT CURRENT), TEMPERATURE,
SHOCK (MECHANICS), VIBRATION, ACCELERATION, HIGH-
TEMPERATURE RESEARCH, LOWTEMPERATURE RESEARCH, LIFE
EXPECTANCY, POWER, PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: IDEP, X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-439 261

LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
BIBLIOGRAPHY OF LMSC BIBLIOGRAPHIES.

(U)

JAN 64 70P

REPT. NO. 5 10 64 2 ,SB64 7

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BIBLIOGRAPHIES, *SCIENTIFIC RESEARCH), POWER SUPPLIES, CODING, INDEXES, CLASSIFICATION, CHEMICALS, MATERIALS, METALS, INFRARED RESEARCH, AIRCRAFT ATMOSPHERE, PSYCHOLOGY, AUTOMATION, BIOLOGY, COMPUTERS, SEMICONDUCTORS, PROPELLANTS, ELECTRONICS, COATINGS, CRYSTALS, DETECTION, ELECTRICAL EQUIPMENT, ELECTROMAGNETIC WAVES, DIGITAL SYSTEMS, ENGINEERING, ENVIRONMENTAL TESTS, HIGH TEMPERATURE RESEARCH, INSTRUMENTATION, MANAGEMENT ENGINEERING, HUMANS, GUIDED MISSILES

(U)

IDENTIFIERS: BIOASTRONAUTICS, POWER SOURCES, WAR GAMES, X-20 SPACECRAFT

(U)

THIS PUBLICATION IS A LISTING OF ALL BIBLIOGRAPHIES GENERATED BY THE LMSC TECHNICAL INFORMATION CENTER DURING THE PERIOD 1958-1963. ENTRIES ARE ARRANGED ALPHA-NUMERICALLY BY REPORT CODING. SUBJECT AND PERSONAL AUTHOR INDEXES ARE INCLUDED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-435 892

SUNDSTRAND AVIATION-DENVER COLO
DYNA-SOAR A. P. U. THERMODYNAMIC SYSTEM.
DESCRIPTIVE NOTE: DESIGN ANALYSIS REPT.

(U)

APR 63 1V

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,
SEATTLE, WASH.

DESCRIPTORS: (BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), GAS GENERATING SYSTEMS, MANNED SPACECRAFT,
ROCKET MOTORS (LIQUID PROPELLANT), OXYGEN, HYDROGEN,
COMBUSTION CHAMBERS, DESIGN, COMBUSTION CHAMBER GASES,
DEFLECTION, EXHAUST GASES, HEAT TRANSFER, REGENERATIVE
COOLING, THERMAL STRESSES, STRUCTURES, STRESSES,
ANALYSIS, GAS TURBINES

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-435 130

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
HYDROGEN COOLING EQUIPMENTS BOEING X-20 (DYNASOAR)
SPACE GLIDER. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 15 FOR DEC
62.

FEB 63 IV BUSCH, E. F. I
REPT. NO. DS 139 R

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COOLING), (•COOLING
+ VENTILATING EQUIPMENT, HYDROGEN), GLYCOLS, HEAT
EXCHANGERS, CRYOGENIC, HYDRAULIC, HYDRAULIC SYSTEMS,
PUMPS, PRESSURE, COOLING FANS, PNEUMATIC VALVES, SAFETY
VALVES, SCHEDULING, SPACECRAFT CABINS, TESTS, LIQUID
COOLED (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 797

RESEARCH AND TECHNOLOGY DIV BOLLING AFB D C
PROCEEDINGS OF SYMPOSIUM ON AEROELASTIC AND DYNAMIC
MODELING TECHNOLOGY, 23 24 25 SEPTEMBER 1963, DAYTON,
OHIO. (U)

MAR 64 78SP

REPT. NO. RTD-TDR-63-4197-PT-1

UNCLASSIFIED REPORT

DESCRIPTORS: (WIND TUNNEL MODELS, SYMPOSIA),
(AEROELASTICITY, SYMPOSIA), AEROTHERMOELASTICITY,
FLUTTER, BUFFETING, THERMAL STRESSES, SIMULATION,
AIRFRAMES, AERODYNAMIC LOADING, SPACECRAFT, INFLATABLE
STRUCTURES, SLOSHING, ROTOR BLADES, TRANSONIC
CHARACTERISTICS, SUPERSONIC CHARACTERISTICS, AIRCRAFT,
LAUNCH VEHICLES (AEROSPACE), INSTRUMENTATION,
PHOTOELASTICITY, VIBRATION, AIRPLANE MODELS, WIND (U)
IDENTIFIERS: 1963, GEMINI, AGENA, C-142 AIRCRAFT, X-20
SPACECRAFT (U)

THE UNCLASSIFIED PROCEEDINGS OF THE AIR FORCE
FLIGHT DYNAMICS LABORATORY AND AEROSPACE
INDUSTRIES ASSOCIATION SYMPOSIUM ON
AEROELASTIC AND DYNAMIC MODELING TECHNOLOGY
ARE PRESENTED. THE PAPERS ARE DIVIDED INTO
APPROPRIATE TECHNICAL AREA SUB-GROUPS AND INDIVIDUAL
SESSIONS WERE DEVOTED TO EACH. THESE SUB-GROUPS
WERE: THEORY AND DESIGN, MODEL TESTING
TECHNIQUES, DYNAMIC LOADS AND AEROELASTIC
APPLICATIONS, AND STRUCTURAL DESIGN
APPLICATIONS. TWO CLASSIFIED SESSIONS WERE HELD
ON AEROSPACE VEHICLE APPLICATIONS AND
AIRCRAFT APPLICATIONS. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 342

BOEING CO SEATTLE WASH

X-20A TERMINATION DATA PACKAGE FOR THE GLIDER
SERVICING CONTROL EQUIPMENT AND SERVICING CONTROL
VAN.

(U)

MAR 64 41P COLBERT, L. B. ;

REPT. NO. D2 81013

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GROUND SUPPORT EQUIPMENT, LIQUEFIED
GASES), BOOST-GLIDE VEHICLES, CRYOGENICS, NITROGEN,
OXYGEN, HYDROGEN, CIRCUITS, TEMPERATURE, PRESSURE,
HYDRAULIC VALVES, PHOTOGRAPHS, TRAILERS

(U)

IDENTIFIERS: 1964, X-20 SPACECRAFT

(U)

BREADBOARDS WERE FABRICATED TO DEVELOP DETAIL
CIRCUITRY FOR THE PRODUCTION CRYOGENIC SERVICING
EQUIPMENT. TESTING OF THE CRYOGENIC SERVICING
CONTROL EQUIPMENT FOR COMPATIBILITY WITH CRYOGENIC
SERVICING AND GLIDER SYSTEMS WAS NOT ACCOMPLISHED DUE
TO TERMINATION OF THE X-20 CONTRACT. (AUTHOR)

(U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 152
BOEING CO SEATTLE WASH
X-20 MANUFACTURING STATUS THROUGH 12-15-63. (U)
MAR 64 1V
REPT. NO. D2 81257

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, MANUFACTURING
METHODS), (*LAUNCH VEHICLES (AEROSPACE), MANUFACTURING
METHODS), RESEARCH PROGRAM ADMINISTRATION, MANAGEMENT
ENGINEERING, COSTS, CONTROL, SCHEDULING, PRODUCTION,
MACHINE SHOP PRACTICE, FIRE SAFETY, COOLING,
RELIABILITY, INDUSTRIAL PRODUCTION, PNEUMATIC SYSTEMS,
HYDRAULIC SYSTEMS, LIQUIFIED GASES, CRYOGENICS,
ELECTRICAL EQUIPMENT, GUIDED MISSILE COMPONENTS,
PROCESSING, PERFORMANCE (ENGINEERING), QUALITY CONTROL,
DESIGN (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 102

RAYTHEON CO WALTHAM MASS

ACQUISITION AND TRACKING ANALYSIS FOR X-20 (DYNA-
SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM. (U)

MAR 64 IV

REPT. NO. CR64 408 2B 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COMMUNICATION
SYSTEMS), (•DATA TRANSMISSION SYSTEMS, BOOST-GLIDE
VEHICLES), SURFACE-TOAIR, TRACKING, DETECTION,
PROBABILITY, MULTIPATH TRANSMISSION, ERRORS, SHIPBORNE,
AIRBORNE, ATMOSPHERE ENTRY, VOICE COMMUNICATION SYSTEMS,
RADAR TRACKING, C BAND (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 032
BOEING CO SEATTLE WASH
HYDROGEN SERVICING SYSTEM DEVELOPMENT TESTING, (U)
MAR 64 22P RORDEN, A. W. ;
REPT. NO. D2 81070
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GROUND SUPPORT EQUIPMENT, LIQUEFIED
GASES), (*HYDROGEN, GROUND SUPPORT EQUIPMENT),
MAINTENANCE, CHECKOUT PROCEDURES, NITROGEN, BOOST-GLIDE
VEHICLES, TEST METHODS, TEST EQUIPMENT (U)
IDENTIFIERS: 1964, SERVICING SYSTEMS, X-20
SPACECRAFT (U)

THE TEST CONFIGURATION OF THE LIQUID HYDROGEN
SERVICING SYSTEM WAS ASSEMBLED AT THE TULALIP
TEST FACILITY AND A CHECKOUT TEST CONDUCTED WITH
LIQUID NITROGEN. THE SYSTEM WAS TIGHT, AND WITH
THE EXCEPTION OF AN IMPROPERLY INSTALLED RELIEF
VALVE, ALL EQUIPMENT OPERATED SATISFACTORILY. THE
PUMP UNIT AND THE RECOOLER HAD BEEN PREVIOUSLY
TESTED. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 026

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT, (U)

FEB 63 177P

REPT. NO. DSR16

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), GAS TURBINES, GEARS, CONTAINERS, LUBRICATION,
COMBUSTION CHAMBER, HYDRAULIC PRESSURE PUMP, VALVES,
ELECTRONIC EQUIPMENT, OXYGEN, HYDROGEN, GENERATORS,
TACHOMETERS, VOLTAGE REGULATORS, ELECTRIC POTENTIAL,
SERVOMECHANISMS, TEMPERATURE, RELIABILITY,
THERMODYNAMICS, TURBINES, PNEUMATIC VALVES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 013
BOEING CO SEATTLE WASH
NITROGEN SERVICING SYSTEM DEVELOPMENT TEST, (U)
MAR 64 19P COLBERT, L. ;
REPT. NO. D2 81072
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (#BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), MANNED SPACECRAFT, LIQUIFIED GASES, (U)
NITROGEN, DESIGN, TEST METHODS (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

THIS DOCUMENT DIFINES THE STATUS OF THE X-20
NITROGEN SERVICING SYSTEM DEVELOPMENT TEST.
NITROGEN SERVICING SYSTEM DEVELOPMENT TESTING WAS A
PROGRAM REQUIREMENT TO VERIFY SYSTEM DESIGN CONCEPTS
BY DEMONSTRATING THAT THE GLIDER SERVICING
REQUIREMENTS COULD BE SATISFIED. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 DD6
ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
DYNA-SOAR ACCEPTANCE TEST REQUIREMENTS AMR VAN. (U)
JUL 62 60p
REPT. NO. EMR 7660 65

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,
SEATTLE, WASH.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), MANNED SPACECRAFT, ELECTRONIC EQUIPMENT,
TIME SIGNALS, REMOTE CONTROL SYSTEMS, DATA PROCESSING
SYSTEMS, RADIO COMMUNICATION SYSTEMS, INSTRUMENTATION,
SPECIFICATIONS, TEST METHODS, PULSE COMMUNICATION
SYSTEMS, TRAILERS, MOBILE (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 004

THIOKOL CHEMICAL CORP ELKTON MD

FAILURE ANALYSIS REPORT OF HI-SHEAR SQUIBS SERIAL NO.

04534 AND 04272 DURING QUALIFICATION TESTING OF HIGH-

SHEAR, OCTOBER 19 AND 21, 1963,

(U)

DESCRIPTIVE NOTE: Y A. R.

NOV 63

IV

RUGGIERI, A. R.; TAYLOR, G.

F. I

REPT. NO. DS220

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,

SEATTLE, WASH.

DESCRIPTORS: (EXPLOSIVES INITIATORS, FAILURE
(MECHANICS)), DIELECTRIC PROPERTIES, QUALITY CONTROL,
ROCKET MOTORS, TESTS, VIBRATION, HIGH TEMPERATURE
RESEARCH, TEMPERATURE, SHOCK (MECHANICS), RESISTANCE
(ELECTRICAL), ELECTRIC INSULATION, BOOST GLIDE VEHICLES,
MANNED SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 994

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT. STATUS REPT.

1-31 MAY 63.

(U)

209P

REPT. NO. DSR20

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AUXILIARY POWER PLANTS), GAS TURBINES, GAS TURBINE NOZZLES, GEARS, CONTAINERS, COMBUSTION CHAMBERS, GAS TURBINE REGENERATORS, HYDROGEN, VALVES, BY-PASS VALVES, PNEUMATIC VALVES, ELECTRONIC EQUIPMENT, CONTROL SYSTEMS, GENERATORS, TACHOMETERS, HYDRAULIC PRESSURE PUMPS, RELIABILITY, OXYGEN, TESTS, PRESSURE, HEAT EXCHANGERS(U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 991

BOEING CO SEATTLE WASH
DESIGN REQUIREMENTS FOR COATED REFRACTORY ALLOYS,

(U)

DEC 63 IV DREISBACH, W. GLEN I
REPT. NO. D2 81113 1
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, REFRACTORY METALS +
ALLOYS), (*REFRACTORY METALS + ALLOYS, PROTECTIVE
TREATMENTS), REFRACTORY COATINGS, SILICIDES, MOLYBDENUM
ALLOYS, TITANIUM ALLOYS, ZIRCONIUM ALLOYS, NIOBIUM
ALLOYS, COMPATIBILITY, NYLON, EMISSIVITY, CLEANING,
MANNED SPACECRAFT, RESEARCH PLANES, MATERIALS, THERMAL
INSULATION (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, MOLYBDENUM ALLOY
TZM, NIOBIUM ALLOY D-36 (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 989

BOEING CO SEATTLE WASH
OXYGEN SERVICING SYSTEM DEVELOPMENT TEST, (U)
MAR 64 17P COLBERT, L. B. ;
REPT. NO. D2 81071
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MANNED SPACECRAFT, GROUND SUPPORT
EQUIPMENT), (*GROUND SUPPORT EQUIPMENT, OXYGEN),
(*OXYGEN, GROUND SUPPORT EQUIPMENT), LIQUEFIED GASES,
CHECKOUT EQUIPMENT, PERFORMANCE (ENGINEERING), PRESSURE,
VALVES, TEMPERATURE, OXYGEN EQUIPMENT (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

EFFORT FOR THE OXYGEN SERVICING SYSTEM
DEVELOPMENT TEST WAS COMMITTED. TEST PLANNING WAS
SUBSTANTIALLY COMPLETE AND ALL TEST HARDWARE WAS
AVAILABLE OR ON ORDER. INITIAL TESTS WERE
SCHEDULED AFTER CONTRACT TERMINATION UPON COMPLETION
OF THE HYDROGEN SERVICING SYSTEM DEVELOPMENT
TESTS. THE OXYGEN SERVICING SYSTEM HAS THE
CAPABILITY OF ACCURATELY CONTROLLING TO A FRACTION OF
A DEGREE THE TEMPERATURE OF OXYGEN FLOWS TO THE
GLIDER TANK OF 3 TO 15 LB/MIN. CONTROLLED
TEMPERATURE RANGE IS FROM - 315 F TO AMBIENT.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 942

BELL AEROSYSTEMS CO BUFFALO N Y

STRESS ANALYSIS AND MATERIAL SELECTION REPORT, (U)

67P KING, G.R. ;

REPT. NO. 8233 939001 REV. B

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,

SEATTLE, WASH., CONTRACT AF33 657 7132.

DESCRIPTORS: (•MANNED SPACECRAFT, STRUCTURAL PARTS),
(•STRESSES, MANNED SPACECRAFT), ANALYSIS, MECHANICAL
PROPERTIES, PRESSURE VESSELS, MATERIALS, BOLTS, MOUNTING
BRACKETS (U)

IDENTIFIERS: X-20 SPACECRAFT, 1963 (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 938
LING-TEMCO-VOUGHT INC DALLAS TEX
X-20 (DYNA SOAR) NOSE CAP. (U)
DESCRIPTIVE NOTE: QUARTERLY TECHNICAL PROGRESS REPT., 15
SEP 15 DEC 63,
DEC 63 26P WILE, D. M. ;
REPT. NO. 311 27

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,
SEATTLE, WASH., CONTRACT AF33 657 7132.

DESCRIPTORS: (*NOSE CONES, BOOST-GLIDE VEHICLES), HIGH
TEMPERATURE RESEARCH, DESIGN, THERMAL RADIATION,
ATMOSPHERE ENTRY, VIBRATION, AERODYNAMIC HEATING, ABORT,
SPECIFICATIONS, CALIBRATION, INSTRUMENTATION,
SCHEDULING, REFRACTORY MATERIALS, TESTS, GRAPHITE,
ZIRCONIUM COMPOUNDS, OXIDES, PRODUCTION, WEIGHT, HEAT
SHIELDS, RELIABILITY, COSTS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, NOSE CAPS (U)

THE VERIFICATION NO. L NOSE CAP COMPLETED
ONE BOOST VIBRATION TEST WHICH UNCOVERED A PROBLEM
WITH THE BOND OF THE ALUMINA FLAME SPRAY CAPS TO THE
PINS. THE NOSE CAP WAS MODIFIED TO INCORPORATE A
FIX AND RETESTED. TESTING HAS NOW PROGRESSED THRU
RE-ENTRY HEATING WHERE AN ABORT WAS NECESSITATED DUE
TO FAILURE OF THE FAIRINGS AFT OF THE NOSE CAP.
THE NOSE CAP COLLAR AND SEVERAL TENTH ROW TILE WERE
DAMAGED BY THE FAIRING FAILURE BUT TESTING COULD BE
RESUMED WITHOUT REPLACEMENT. CONDITION OF THE NOSE
CAP IS EXCELLENT AND THERE ARE NO TILE CRACKS OR
OTHER DAMAGE APPARENT. (AUTHOR) (U)

UNCLASSIFIED

D15416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 936

LING-TEMCO-VOUGHT INC DALLAS TEX

X-20 (DYNA SOAR) NOSE CAP.

(U)

DESCRIPTIVE NOTE: MONTHLY TECHNICAL PROGRESS REPT., 15
OCT 15 NOV 63,

JAN 64 10P WHILE, D. M. I

REPT. NO. 311 25

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,
SEATTLE, WASHINGTON, CONTRACT AF33 657 7132.

DESCRIPTORS: (•MANNED SPACECRAFT, NOSE CONES), (•NOSE
CONES, MANNED SPACECRAFT), REENTRY VEHICLES, SURFACE
PROPERTIES, PRODUCTION, HEATERS, INSTRUMENTATION, TEST
FACILITIES, BONDING, PERFORMANCE (ENGINEERING), MOLDING,
CASTING (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

INCREASED SURFACE ROUGHNESS OF THE PIN TAILS
APPARENTLY SOLVED THE BOND FAILURE PROBLEM
ENCOUNTERED ON THE VERIFICATION NOSE CAP. FULL
SCALE TESTS WILL VERIFY THIS. FINAL CHECKOUT OF
THE INDUCTION HEATER FOR RE-ENTRY HEAT/ VIBRATION
TESTING WAS MADE. INSTRUMENTATION AND HEATER
ATMOSPHERE ARE ACCEPTABLE FOR NOSE CAP TESTS.
REFURBISHMENT OF THE VERIFICATION NOSE CAP IS
NEARLY COMPLETE AND TESTING WILL RESUME. (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 933

SUNSTRAND AVIATION-DENVER COLO

ADDENDUM TO DESIGN ANALYSIS REPORT DYNA-SOAR APU
THERMODYNAMIC SYSTEM.

(U)

NOV 63 13P

REPT. NO. 24DER63 ADD

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMBUSTION CHAMBERS, AUXILIARY POWER
PLANTS), (*AUXILIARY POWER PLANTS, BOOST-GLIDE
VEHICLES), (*BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), ENVIRONMENTAL TESTS, HYDROGEN, OXYGEN,
REFRACTORY MATERIALS, DEGRADATION, INJECTORS, BORON
COMPOUNDS, NITRIDES, ZIRCONIUM COMPOUNDS, OXIDES,
DESIGN, REFRACTORY COATINGS, HEAT EXCHANGERS,
REGENERATIVE COATING (ROCKETS)

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, BURN-THROUGH

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 931

SUNDSTRAND AVIATION-DENVER COLO

ACCESSORY POWER UNIT FOR X-20 (DYNA-SOAR).

(U)

DESCRIPTIVE NOTE: MONTHLY STATUS REPT. FOR 1-31 OCT

62.

NOV 62 87P RAND, L. T. I

REPT. NO. DSR13

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AUXILIARY POWER PLANTS), (*AUXILIARY POWER PLANTS, BOOST-GLIDE VEHICLES), (*ELECTRIC POWER PRODUCTION, BOOST-GLIDE VEHICLES), MANNED SPACECRAFT, RESEARCH PLANES, BEARINGS, GEARS, COMBUSTION CHAMBERS, VALVES, CIRCUITS, CONTROL SYSTEMS, HYDRAULIC PRESSURE PUMPS, TURBINE WHEELS, HEATERS, HEAT EXCHANGERS, CATALYSTS, HYDROGEN, OXYGEN(U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 929

WESTINGHOUSE ELECTRIC CORP EAST PITTSBURGH PA

X-20 (DYNASOAR) GLIDER GENERATOR AND CONTROLS

UNIT.

(U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 23, 1 NOV
6312 DEC 63.

DEC 63 9P

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MANNED SPACECRAFT, ELECTRICAL EQUIPMENT),
GENERATORS, VOLTAGE REGULATORS, CONTROL PANELS, CIRCUIT
BREAKERS, PERFORMANCE (ENGINEERING), MILITARY
REQUIREMENTS

(U)

IDENTIFIERS: 1964, X-20 SPACECRAFT

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 926

SUNDSTRAND AVIATION-DENVER COLO

ACCESSORY POWER UNIT FOR X-20 (DYNA-SOAR).

(U)

DESCRIPTIVE NOTE: MONTHLY STATUS REPT., 1-30 SEP 62,

OCT 62 81P RAND, L. T. ?

REPT. NO. DSR12

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), (*AUXILIARY POWER PLANTS, BOOSTGLIDE VEHICLES),
(*ELECTRIC POWER PRODUCTION, BOOST-GLIDE VEHICLES),
MANNED SPACECRAFT, RESEARCH PLANES, BEARINGS, GEARS,
COMBUSTION CHAMBERS, VALVES, CIRCUITS, CONTROL SYSTEMS,
HYDRAULIC PRESSURE PUMPS, TURBINE WHEELS, HEATERS,
CATALYSTS, HYDROGEN, HEAT EXCHANGERS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 924

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT DEVELOPMENT

STATUS REPORT.

(U)

DESCRIPTIVE NOTE: MONTHLY REPT., 1-31 JULY 63.

68P

REPT. NO. DSR21

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•AUXILIARY POWER PLANTS, MANNED
SPACECRAFT), BOOST-GLIDE VEHICLES, TESTS, HYDRAULIC
PRESSURE PUMPS, VALVES, ELECTRONIC EQUIPMENT,
INSTRUMENTATION, RELIABILITY, PERFORMANCE (ENGINEERING)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 922

BOEING CO SEATTLE WASH

DYNA SOAR NOSE CAP MECHANICAL PROPERTIES TESTING FOR
DESIGN ALLOWABLES AND MATERIAL DATA, (U)

DEC 61 14P EDWARDS, R. G. ;

REPT. NO. AST311 3

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*800ST-GLIDE VEHICLES, NOSE CONES), (*NOSE
CONES, MANNED SPACECRAFT), OXIDES, ZIRCONIUM COMPOUNDS,
MOLYBDENUM, SHEETS, FORGING, BOLTS, RIVETS, MECHANICAL
PROPERTIES (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT, NOSE CAPS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 825

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT. (U)

DESCRIPTIVE NOTE: MONTHLY DEVELOPMENT STATUS REPT. 1-28
FEB 63,

MAR 63 178P

REPT. NO. DSR17

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (#BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), MANNED SPACECRAFT, GAS TURBINES, TURBINE
WHEELS, DESIGN, MANUFACTURING METHODS, COMBUSTION
CHAMBERS, GAS GENERATING SYSTEMS, CATALYSTS, PELLETS,
PALLADIUM, HYDRAULIC VALVES, HYDRAULIC SERVOMECHANISMS,
HYDROGEN, OXYGEN, CONTROL SYSTEMS, ELECTRONIC EQUIPMENT,
THERMODYNAMICS, ANALYSIS, PERFORMANCE (ENGINEERING),
HEAT TRANSFER, PRESSURE (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 823

WESTINGHOUSE ELECTRIC CORP LIMA OHIO
REPORT OF QUALIFICATION TEST ON X-20 (DYNA SOAR)
GLIDER ELECTRIC SYSTEM SECTION 5 CURRENT TRANSFORMER
ASSEMBLY. (U)

MAR 63 1V

REPT. NO. LY15506

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (TRANSFORMERS, MANNED SPACECRAFT), TESTS,
BOOST-GLIDE VEHICLES, ELECTRIC CURRENTS, SHOCK
RESISTANCE, DIELECTRIC PROPERTIES, TEMPERATURE,
VIBRATION, THERMAL STRESSES, POWER TRANSFORMERS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

FOUR AVT 97A CURRENT TRANSFORMERS, WERE USED IN
THE QUALIFICATION TESTS. THE TESTS WERE CONDUCTED
IN COMPLIANCE WITH BAC SPECIFICATION D10-20902,
REVISION J. THE RESULTS OF THE TESTS ON THE
CURRENT TRANSFORMER ARE DESCRIBED IN THIS REPORT.
THE CURRENT TRANSFORMER MET THE REQUIREMENTS OF
BAC SPECIFICATION D10-20902, REVISION J.
(AUTHOR) (U)

UNCLASSIFIED

D15416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 604

BOEING CO SEATTLE WASH

TESTING WORKING AGREEMENT P.F.R.T. STATUS SUMMARY,

(U)

JAN 64 279P LONGLEY, W. I. ;
REPT. NO. D2 81094
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDED MISSILE
COMPONENTS), (*TESTS, DOCUMENTATION), MANNED SPACECRAFT,
RESEARCH PLANES, TABLES, INDEXES (U)
IDENTIFIERS: 1964. X-20 SPACECRAFT (U)

THIS DOCUMENT WAS PREPARED TO RECORD THE
STATISTICAL AND HISTORICAL STATUS OF PRELIMINARY
FLIGHT READINESS TESTING (P.F.R.T.) APPROVAL
COORDINATION WITH THE CUSTOMER (X-20 SPO/AFPR)
PERFORMED IN COMPLIANCE WITH THE TESTING WORKING
AGREEMENT AT THE TIME OF X-20 (DYNA-SOAR)
CONTRACT CANCELLATION. THE MATERIAL CONTAINED
HEREIN WAS FURNISHED FOR USE IN THE PREPARATION OF
D2-8200 PRELIMINARY FLIGHT RATING TEST
(P.F.R.T.) EVENT ACCOMPLISHMENT SUMMARY.
(AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 570

BOEING CO SEATTLE WASH
DEVELOPMENT OF INSULATED HYDRAULIC TUBING + SERVO
WIRING ASSEMBLIES, (U)
DEC 63 393P HOSEY, E. C. ;
REPT. NO. D2 81096
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, THERMAL
INSULATION), MANNED SPACECRAFT, HYDRAULIC SYSTEMS,
PIPES, SERVOMECHANISMS, WIRE, LAMINATES, HEAT TRANSFER,
CONSTRUCTION, EFFECTIVENESS, PERFORMANCE ENGINEERING,
MODEL TESTS, ENVIRONMENTAL TESTS, HIGH ALTITUDE,
TEMPERATURE, VIBRATION, EXPERIMENTAL DATA, TABLES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE DEVELOPMENT TESTING OF INSULATED HYDRAULIC
TUBING AND SERVO WIRING ASSEMBLIES INCLUDED TWO
DISTINCT INVESTIGATIONS. THE MAJOR PURPOSE OF THESE
INVESTIGATIONS WAS TO ESTABLISH THE EFFECTIVENESS OF
VARIOUS INSULATED TUBING CONFIGURATIONS TO LIMIT THE
EXTERNAL HEAT INPUT TO THE HYDRAULIC SYSTEM. THE
PRIMARY OBJECTIVE OF THE FIRST TEST SERIES WAS TO
COMPARE THE EFFECTIVENESS OF MULTI-LAYER RADIATION
TYPE INSULATION AGAINST A MICRO-QUARTZ (Q-FELT)
INSULATING BLANKET. THE GENERAL CONFIGURATION FOR
THE FIRST TEST SERIES CONSISTED OF TWO 3/8-INCH
DIAMETER HYDRAULIC TUBES, A SERVO WIRE BUNDLE LOCATED
BETWEEN THE TUBES, TUBING SUPPORTS AND MULTI-LAYER
RADIATION TYPE OR THERMAL BLANKET TYPE INSULATION AS
APPROPRIATE. THE PRIMARY OBJECTIVE OF THE SECOND
SERIES WAS TO DETERMINE THE EFFECTIVENESS OF
INSULATING TWO SEPARATE HYDRAULIC SYSTEMS AND
ASSOCIATED SERVO VALVE WIRING IN SINGLE PACKAGE.
TWO SERIES OF TESTS WERE CONDUCTED WITH THIS
CONFIGURATION AND INCLUDED TESTS WITH FLUID FLOW IN
BOTH SYSTEMS AND A SINGLE SYSTEM. VIBRATION TESTS
WERE ALSO CONDUCTED AT BOTH ROOM AND EXTREME HIGH
TEMPERATURE ENVIRONMENTS. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 568

BOEING CO SEATTLE WASH
CRYOGENIC TUBE FITTING.

(U)

DESCRIPTIVE NOTE: DEVELOPMENT TEST REPT.,
APR 63 IV PRESTRIOGE, F. L. i
REPT. NO. D2 80708
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CRYOGENIC STORAGE DEVICES, DESIGN),
(•FITTINGS, CRYOGENIC STORAGE DEVICES), MILITARY
REQUIREMENTS, SPECIFICATIONS, ANALYSIS, EFFECTIVENESS,
TESTS, SEALS (STOPPERS), LOW-TEMPERATURE RESEARCH,
THERMAL STRESSES, STORAGE, ENVIRONMENTAL TESTS,
ALUMINIUM ALLOYS (U)
IDENTIFIERS: DYNA SOAR, 1963, 6061-T6 TUBING, MIL-FLO
FITTINGS (U)

MIL-FLO FITTINGS AND NATORQ SEALS WERE TESTED
WITH 304L CRS TUBING AND 6061-T6 TUBING.
THESE ITEMS WERE FOUND TO BE SATISFACTORY FOR USE
IN CRYOGENIC SYSTEMS. LEAKAGE RATES WERE VERY
LOW, AND ALL SAMPLES SHOWED A HIGH RESISTANCE TO
THERMAL SHOCK. FATIGUE LIFE WAS VERY GOOD WHEN THE
BENDING STRESS LEVEL DID NOT EXCEED 10,000 PSI FOR
6061-T6 TUBING NOR 30,000 PSI FOR 304L CRS
TUBING. THE FITTINGS AND SEALS SHOWED NO
DETRIMENTAL EFFECTS FROM 15 RECONNECTIONS. A
SUMMARY OF THE TEST DATA COLLECTED ON TUBING, MIL-
FLO FITTINGS AND NATORQ SEALS IS PRESENTED. A
SMALL AMOUNT OF DATA WAS COLLECTED ON OTHER TYPES OF
HARDWARE AND THIS DATA IS IN THE TEST RESULTS. THE
MIL-FLO FITTINGS TESTED WERE MADE OF 2024-T6
ALUMINUM ALLOY, 6061-T6 ALUMINUM ALLOY, AND 17-4
PH STEEL. (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 564

BOEING CO SEATTLE WASH

ANALOG COMPUTER SIMULATION OF THE DYNA-SOAR GLIDER
INTEGRATED ENVIRONMENTAL CONTROL AND SECONDARY POWER
SUBSYSTEMS, (U)

MAR 63 145P CRAVENS, E. W. ;

REPT. NO. D2 80001 3 VOL 2

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, MODELS
(SIMULATIONS)), MANNED SPACECRAFT, CLOSED CYCLE
ECOLOGICAL SYSTEMS, SPACE ENVIRONMENTAL CONDITIONS,
CONTROLLED ATMOSPHERES, CONTROL SYSTEMS, TEMPERATURE
CONTROL, AUXILIARY POWER PLANTS, MATHEMATICAL MODELS,
MATHEMATICAL PREDICTION, LAUNCHING, SPACE FLIGHT,
ATMOSPHERE ENTRY, LANDINGS, ANALOG SYSTEMS, ANALOG
COMPUTERS, ANALYSIS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, GRAPHS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 562

BOEING CO SEATTLE WASH

TEST REPORT - FIRST ELEVON PROTOTYPE SERVO ACTUATOR, (U)

DEC 63 47P MALCOM, L. G. ;

REPT. NO. D2 81020

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, FLIGHT CONTROL SYSTEMS), MANNED SPACECRAFT, SERVOMECHANISMS, ACTUATORS, ELEVONS, HYDRAULIC SERVOMECHANISMS, MODEL TESTS, ADAPTIVE CONTROL SYSTEMS, MALFUNCTIONS, DETECTORS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 307

HONEYWELL INC HOPKINS MINN

THERMISTOR QUALIFICATION. (U)

APR 63 16P

REPT. NO. AEX38111

MONITOR: IDEP 651.75.00.16-F5-01

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (FIXED RESISTORS, THERMISTORS), RESISTANCE
(ELECTRICAL), THERMAL STRESSES, LIFE EXPECTANCY,
TEMPERATURE, VIBRATION, SHOCK (MECHANICS), HUMIDITY (U)
IDENTIFIERS: IDEP, X-20 SPACECRAFT, 1963 (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 277

BOEING CO SEATTLE WASH

DUAL SEAL DEVELOPMENT TEST REPORT,
DEC 63 49P DUNHAM, V. C. }

(U)

REPT. NO. D2 8119D

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SEALS (STOPPERS), CRYOGENICS), HIGH-
PRESSURE RESEARCH, BOOST-GLIDE VEHICLES, MANNED
SPACECRAFT, ADAPTERS, SCREW THREADS, RINGS, HALOCARBON
PLASTICS, SPRINGS, STAINLESS STEEL, PERFORMANCE
(ENGINEERING)

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, TEFLON, LEAKS

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 271

BOEING CO SEATTLE WASH

INFORMAL TRADE STUDY DATA REACTION CONTROL
SYSTEM.

(U)

JUL 62 143P

REPT. NO. D2 80617

CONTRACT: AF657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, CONTROL SYSTEMS),
MANNED SPACECRAFT, CONTROL JETS, VERNIER ROCKET MOTORS,
ALTITUDE CONTROL SYSTEMS, ROCKET MOTORS (LIQUID
PROPELLANT), OXYGEN, HYDROGEN, MONOPROPELLANTS, HYDROGEN
PEROXIDE, HYDRAZINE DERIVATIVES, NITROGEN COMPOUNDS,
TETROXIDES, FEASIBILITY STUDIES, DESIGN, RESEARCH

PROGRESS ADMINISTRATION, GAS GENERATING SYSTEMS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, REACTION CONTROL
SYSTEMS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 268

BOEING CO SEATTLE WASH

QUENCH RATE REQUIREMENTS FOR 2219-T6E46, (U)

JAN 64 13P CRANE, C. H. ;

REPT. NO. D2 81107

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (ALUMINUM ALLOYS, QUENCHING (COOLING)),
(HEAT TREATMENT, ALUMINUM ALLOYS), COPPER ALLOYS,
PRESSURE VESSELS, LIQUEFIED GASES, HYDROGEN, BOOST-GLIDE
VEHICLES, MANNED SPACECRAFT, RESEARCH PLANES, PROPELLANT
TANKS, TENSILE PROPERTIES (U)

IDENTIFIERS: 1964, ALUMINUM ALLOY 2219-T6E46, X-20
SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 266

BOEING CO SEATTLE WASH
EMERGENCY RE-ENTRY SUBSYSTEM TWO-GYRD REFERENCE.

(U)

AUG 62 IV
REPT. NO. DWGID 81159
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, ATTITUDE
INDICATORS), MANNED SPACECRAFT, RE-ENTRY VEHICLES,
GYROSCOPES, PITCH (MOTION), ROLL, YAW, SPECIFICATIONS,
TEST METHODS, INSTRUMENTATION, INSTALLATION, PERFORMANCE
(ENGINEERING), RESEARCH PROGRAM ADMINISTRATION (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DCC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 264

BOEING CO SEATTLE WASH

TESTING OF PROTOTYPE DYNA-SOAR COOLED ACTUATOR, (U)

JAN 64 1V JOHNSON, H. ;

REPT. NO. T22630

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, HYDRAULIC
ACTUATORS), MANNED SPACECRAFT, CONSTRUCTION, HYDRAULIC
SEALS, ATTACHMENT, ENVIRONMENTAL TESTS, TEST METHODS,
TEST EQUIPMENT, SPACE ENVIRONMENTAL CONDITIONS,
PERFORMANCE (ENGINEERING), TEMPERATURE CONTROL, THERMAL
INSULATION, COOLING AND VENTILATING EQUIPMENT (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 261

BOEING CO SEATTLE WASH

FABRICATION OF COLUMBIUM ALLOY ANTENNAS FOR X-20A.

(U)

54P

BRYDAES, R. ; ELROD, S. D. ;

REPT. NO. D2 80670

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MANNED SPACECRAFT, ANTENNAS), (*ANTENNAS, MANNED SPACECRAFT), (*REFRACTORY METALS + ALLOYS, ANTENNAS), BOOST-GLIDE VEHICLES, RESEARCH PLANES, NIOBIUM ALLOYS, BRAZING, MANUFACTURING METHODS, PROCESSING, X-BAND, C BAND, K BAND, MOUNTING BRACKETS, INSTALLATION, TABLES, INDUCTION HEATING, TITANIUM ALLOYS, ZIRCONIUM ALLOYS, WELDING (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, D36 (U)

A DESCRIPTION IS PRESENTED OF THE FACILITIES, MATERIALS, PROCESSES AND PROCEDURES FOR THE FABRICATION OF THE X-20A REFRACTORY ALLOY ANTENNAS. FOUR DIFFERENT ANTENNAS, DESIGNATED AS: X-BAND, C-BAND, KU-BAND AND, XS-BAND ARE UTILIZED. EACH TYPE OF ANTENNA IS MOUNTED ON BOTH THE WING AND THE FUSELAGE. EACH DIFFERENT TYPE ANTENNA IS DIFFERENT IN DETAIL DIMENSION BUT THE SAME IN CONCEPT. THE WING OR FUSELAGE MOUNTING REQUIRE DIFFERENT MOUNTING BRACKETS BUT ARE FUNDAMENTALLY IDENTICAL. THE DETAIL AND ASSEMBLY DRAWINGS PERTINENT TO FABRICATION ARE PRESENTED IN TABULAR FORM. THE GENERAL REQUIREMENTS APPLICABLE TO ALL ANTENNAS ARE PRESENTED. DETAIL PROCEDURES ARE GIVEN FOR THE FABRICATION OF ONE TYPICAL ANTENNA (X-BAND FUSELAGE). FABRICATION OF OTHER ANTENNAS IS ESSENTIALLY IDENTICAL EXCEPT FOR THE DIFFERENCE IN DETAIL GEOMETRY. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 258

BOEING CO SEATTLE WASH

FURNACE BRAZING DEVELOPMENT, (U)

JAN 64 23P

CRANE, C. H. :

REPT. NO. D2 81105

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, HYDRAULIC ACTUATORS), (•HYDRAULIC ACTUATORS, HYDRAULIC SEALS), (•HYDRAULIC SEALS, BRAZING), STEEL, TITANIUM ALLOYS, ALUMINUM ALLOYS, VANADIUM ALLOYS, SILVER SOLDERS, SILVER ALLOYS, LITHIUM ALLOYS, NICKEL ALLOYS, MANNED SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT, STEEL NITRALLOY 135, TITANIUM ALLOY 6AL 4V, BRAZING ALLOYS (U)

A FURNACE BRAZING PROGRAM WAS REQUIRED TO DEVELOP PROCEDURES FOR FABRICATING COMPONENTS OF THE X-20 HYDRAULIC ACTUATOR. THE ACTUATOR WAS EXPECTED TO OPERATE AT TEMPERATURES FROM 400 TO 700 F. THIS ENVIRONMENT MADE THE DESIGN AND PROCUREMENT OF HYDRAULIC SEALS A DIFFICULT PROBLEM. BRAZING WAS SELECTED FOR SEALING BECAUSE IT OFFERED THE HIGHEST RELIABILITY AND AT A CONSIDERABLE WEIGHT SAVING. THE ACTUATOR CYLINDER ASSEMBLY WAS FABRICATED FROM NITRALLOY 135 STEEL AND END CAPS WERE FROM 6AL-4V TITANIUM. INITIALLY SILVER BRAZING WAS USED FOR THE CYLINDER ASSEMBLY, HOWEVER, LATER IN THE PROGRAM NICKEL BRAZING WAS SUBSTITUTED BECAUSE IT GAVE HIGHER STRENGTH IN THE ASSEMBLY AND BECAUSE BRAZING COULD BE ACCOMPLISHED WITHOUT FLUX. THE TITANIUM END CAPS WERE BRAZED WITH 97% SILVER + 3% LITHIUM ALLOY. (AUTHOR) (U)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 090

RAYTHEON CO WALTHAM MASS

DEVELOPMENT FLIGHT TEST PROGRAM IMPLEMENTATION. X-20
(DYNA-SOAR) COMMUNICATIONS AND TRACKING

SUBSYSTEM.

(U)

MAR 64 1V

REPT. NO. CR64 408 33 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, COMMUNICATION SYSTEMS), TRACKING, MANNED SPACECRAFT, RESEARCH PLANES, FLIGHT TESTING, GROUND SUPPORT EQUIPMENT, INSTALLATION, CHECKOUT PROCEDURES, INSTRUMENTATION, DESIGN, AIRBORNE, RADAR ANTENNAS, DATA PROCESSING SYSTEMS, AIRPORTS, TEST METHODS, TESTS, DOCUMENTATION, MAINTENANCE EQUIPMENT, ERRORS, K-BAND, X-BAND, PHOTOGRAPHS, VOICE COMMUNICATION SYSTEMS, SUPERHIGH FREQUENCY, P-BAND, C-BAND, ULTRA HIGH FREQUENCY, BORESIGHTING, CAMERAS, FILMS, FILM READERS(U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 983

HONEYWELL INC ST PETERSBURG FLA

X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, (U)

MAR 64 1V PENNINGTON, J. ;

REPT. NO. 1179SR36

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (#BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), MANNED SPACECRAFT, RESEARCH PLANES,
MANAGEMENT ENGINEERING, QUALITY CONTROL, VISUAL
INSPECTION, MANUFACTURING METHODS, PRODUCTION,
ELECTRONIC EQUIPMENT, TEST METHODS, PROCUREMENT,
GUIDANCE, SCHEDULING, DOCUMENTATION, TABLES (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

THE OVER-ALL PERCENT COMPLETE FOR THE QUALITY
CONTROL DEPARTMENT WAS COMPUTED TO BE 56.20.
THE INSPECTION DEPARTMENT COMPOSED 50.8 OF THE
TOTAL ACTIVITY AND WAS 72.28 COMPLETE. QUALITY
ENGINEERING WAS 24.48 OF THE TOTAL ACTIVITY AND
WAS 23.48 COMPLETE. PROCUREMENT QUALITY
CONTROL WAS 19.68 OF THE TOTAL ACTIVITY AND WAS
64.758 COMPLETE. PROGRAM QUALITY ENGINEERING
WAS 5.28 OF THE TOTAL AND WAS 248 COMPLETE.
FOR A CONVENIENT, QUICK REFERENCE, THE CHART AND
PROJECTION GRAPH OF THIS INFORMATION IS PROVIDED.
(AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 961

BOEING CO SEATTLE WASH

ELEVON AND RUDDER SERVO DEVELOPMENT TEST PROGRAM,

(U)

DEC 63

1V

MARTIN, R. H. :

REPT. NO. T2 2628

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (=BOOST-GLIDE VEHICLES, FLIGHT CONTROL SYSTEMS), MANNED SPACECRAFT, SERVOMECHANISMS, ELEVONS, AERIAL RUDDERS, CONTROL SYSTEMS, CIRCUITS, MODELS (SIMULATION), AERODYNAMIC LOADING, MODEL TESTS, PERFORMANCE (ENGINEERING), EFFECTIVENESS
IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

(U)

AN ELEVON SIMULATOR, SIMULATING THE SPRING-MASS OF THE DS-1 ELEVON, WAS DESIGNED, BUILT AND TESTED FOR ITS RESPONSE CHARACTERISTICS IN ACCORDANCE THE EWA 3-110, ELEVON AND RUDDER SERVO DEVELOPMENT TEST PROGRAM. THE TEST PROGRAM CONSISTED OF TWO MAIN PARTS. PART I OF THE REPORT DEALS WITH THE LINEAR AND NONLINEAR RESPONSE CHARACTERISTICS OF THE SINGLE SYSTEM WITH ADDED FRICTION AND BACKLASH. THE SINGLE SYSTEM CONTROL CIRCUIT CONSISTED OF BAC AND COMMERCIAL TYPE HARDWARE. PART II REPORTS UPON THE LINEAR AND NONLINEAR RESPONSE CHARACTERISTICS OF THE BREADBOARD SYSTEM WITH ADDED FRICTION, BACKLASH AND SERO-DYNAMIC LOADS. THE TEST RESULTS ON THE LINEAR RESPONSE CHARACTERISTICS OF THE SYSTEM CLOSELY CORRELATED WITH THE DESIGN ANALYSIS OF THE SYSTEM. (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 952

BOEING CO SEATTLE WASH

REFRACTORY COATING REPAIR PROCESSES, (U)

DEC 63 1V WYCKOFF, L. G. ;

REPT. NO. D2 8116

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (#BOOST-GLIDE VEHICLES, REFRACTORY COATINGS), (#REFRACTORY COATINGS, MAINTENANCE), SILICIDES, MANNED SPACECRAFT, RESEARCH PLANES, MOLYBDENUM ALLOYS, TITANIUM ALLOYS, ZIRCONIUM ALLOYS, NIOBIUM ALLOYS, PROTECTIVE TREATMENTS, COATINGS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, MOLYBDENUM ALLOY TZM, NIOBIUM ALLOY D-36, FLUIDIZED BED (U)

BOTH TZM AND D-36 DISILICIDE COATINGS CAN BE EFFECTIVELY REPAIRED BY REPROCESSING IN THE FLUIDIZED BED. A MOSI2-SYNAR BINDER COMBINATION WAS DEVELOPED AS A SUPPLEMENTAL FIELD REPAIR COATING FOR DISILICIDE COATED TZM AND D-36. REPAIRED COATINGS SHOWED NO APPARENT OXIDATION WHEN SUBJECTED TO X-20 RE-ENTRY CONDITIONS. THE OPTIMUM APPLICATION PARAMETERS INCLUDING CONCENTRATION, THICKNESS AND MAXIMUM AND MINIMUM AREAS WHICH CAN BE PROTECTED BY THE FIELD REPAIR METHOD CAN BE FOUND IN BAC 5923-5 (TZM) AND BAC 5924-5 (D-36).
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 950

BOEING CO SEATTLE WASH

AIR VEHICLE FLIGHT TERMINATION SYSTEM

DESCRIPTION.

(U)

DEC 63 117P

ALLEN, DON R. ;

REPT. NO. D2 80860

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, DESTRUCTORS),
MANNED SPACECRAFT, REMOTE CONTROL SYSTEMS, SAFETY,
ABORT, MALFUNCTION, DETECTORS, RADIO COMMUNICATION
SYSTEMS, ULTRAHIGH-FREQUENCY, SUPERHIGH FREQUENCY,
TRANSMITTER-RECEIVERS, ANTENNAS, COMMAND GUIDANCE,
GROUND SUPPORT EQUIPMENT, ELECTRICAL EQUIPMENT,
ELECTRONIC EQUIPMENT, SEPARATION, DESIGN, OPERATION,
RANGES (ESTABLISHMENTS), LAUNCH VEHICLES (AEROSPACE) (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, FLIGHT TERMINATION
SYSTEMS, SPACECRAFT SAFETY, TITAN 3, ESCAPE SYSTEMS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 948

BOEING CO SEATTLE WASH

TOXICITY STUDY OF X-20 CREW COMPARTMENT MATERIALS,

(U)

FEB 63 25P

CANTWELL, J. R. ;

REPT. NO. D2 80825

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, SPACECRAFT CABINS),

(*SPACECRAFT CABINS, MATERIALS), TOXICITY, FLAMMABILITY,

MANNED SPACECRAFT, RESEARCH PLANES, PLASTICS,

ELASTOMERS, DECOMPOSITION, VAPORS

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-432 939

BOEING CO SEATTLE WASH

ROUGH WIND-UP DOCUMENTATION OF X-20 GLIDER INTEGRATED ENVIRONMENTAL CONTROL/SECONDARY POWER ANALOG COMPUTER SIMULATION, (U)

DEC 63 174P CALDWELL, CHARLES R. ;

REPT. NO. D2 80001 4 VOL. 4

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, FEASIBILITY STUDIES), MANNED SPACECRAFT, SPACECRAFT CABINS, SPACE ENVIRONMENTAL CONDITIONS, CONTROLLED ATMOSPHERES, CONTROL SYSTEMS, AUXILIARY, POWER PLANTS, OPERATIONS RESEARCH, MATHEMATICAL MODELS, MODELS (SIMULATION), ANALOG COMPUTERS, COOLING AND VENTILATING SYSTEMS, TEMPERATURE CONTROL, PERFORMANCE (ENGINEERING), FAILURE (MECHANICS), HYDROGEN, LIQUEFIED GASES, GLYCOLS, FUEL TANKS, PROGRAMMING (COMPUTERS) (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 937

BOEING CO SEATTLE WASH

INSTALLATION PROCEDURE -- BAC P11Y (BAL SEAL), (U)

OCT 63 19P MCCANN, D. R. ;

REPT. NO. D2 80971

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, SEALS (STOPPERS)),
MANNED SPACECRAFT, INSTALLATION, SPECIFICATIONS,
HALOCARBON PLASTICS, CONTAMINATION, CLEANING, COUPLINGS,
CRYOGENICS, HYDROGEN, LIQUEFIED GASES, PLASTIC SEALS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, TEFLON (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 935

BOEING CO SEATTLE WASH

DYNA-SOAR FLIGHT TERMINATION SYSTEM PERFORMANCE
SPECIFICATION;

(U)

MAY 62 67P

ADAMS, L. D. ;

REPT. NO. D2 80069

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, DESTRUCTORS),
MANNED SPACECRAFT, PERFORMANCE (ENGINEERING),
SPECIFICATIONS, RANGES (ESTABLISHMENTS), PILOTS, SAFETY,
LAUNCH VEHICLES (AEROSPACE), BOOSTER MOTORS, GROUND
SUPPORT EQUIPMENT, COMMAND GUIDANCE, COMMUNICATION
SYSTEMS, REMOTE CONTROL SYSTEMS, MALFUNCTIONS,
DETECTION, RESEARCH PROGRAM ADMINISTRATION (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT, SPACECRAFT SAFETY,
TITAN 3, FLIGHT TERMINATION SYSTEMS (U)

THIS SPECIFICATION REVISION DEFINES THE CURRENT
GLIDER FLIGHT TERMINATION SYSTEM UNDER DEVELOPMENT,
AND THE MAJOR INTERFACE REQUIREMENTS PERTAINING TO
THIS SYSTEM. THE SYSTEM REQUIREMENTS DEFINED
HEREIN WERE DETERMINED BY CONSIDERING EXISTING AMR
AND PMR SAFETY REGULATION. CONSIDERATIONS WERE
ALSO MADE FOR THE REQUIREMENTS AND CRITERIA ITERATED
BY RANGE SAFETY PERSONNEL DURING COORDINATION
MEETINGS ON THE DYNA-SOAR SYSTEM. DATA FOR THE
BOOSTER FLIGHT TERMINATION SYSTEM WERE INITIALLY
PROVIDED BY THE MARTIN COMPANY FOR RELEASE IN
THE PREVIOUS REVISION OF THIS SPECIFICATION.
CHANGES HAVE BEEN INCLUDED BY THE BOEING
COMPANY IN THE BOOSTER-GLIDER INTERFACE
REQUIREMENTS AS NECESSARY TO INTEGRATE THE BOOSTER
AND GLIDER DESTRUCT SYSTEMS IN THE UNMANNED FLIGHTS.
CONSIDERATIONS ARE ALSO MADE FOR THE ADDITION OF A
DESTRUCTOR ON THE SOLID FUEL BOOSTER STAGE.
(AUTHOR)

(U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 933

BOEING CO SEATTLE WASH

QUALIFICATION TEST REPORT FOR WATER WALL, (U)

DEC 63 9P MILLER, CHARLES B. ;

REPT. NO. D2 80803 3

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), MANNED SPACECRAFT, AIRPLANE PANELS,
HEAT SHIELDS, THERMAL INSULATION, WATER, CONSTRUCTION,
MODEL TESTS, ENVIRONMENTAL TESTS, ACCELERATION,
PRESSURE, NON-DESTRUCTIVE TESTING (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, WATER WALL (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 925
BOEING CO SEATTLE WASH
ERROR ANALYSIS OF SPACE-FIXED INERTIAL NAVIGATION
SYSTEMS, (U)
DEC 63 71P SIMENKOFF, PETER ;
REPT. NO. D2 80685
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INERTIAL NAVIGATION, ERRORS), ANALYSIS,
STABILIZED PLATFORMS, STABILIZATION, ACCELEROMETERS,
MISALIGNMENT, EQUATIONS, PROGRAMMING (COMPUTERS),
TRAJECTORIES, TABLES, CONTROL, INERTIAL GUIDANCE,
MEASUREMENT, GYROSCOPES, BOOST-GLIDE VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

THE DOCUMENT DESCRIBES TWO PROGRAMS (AS 2056 AND
AS 0535) WRITTEN FOR 7090 IBM COMPUTER IN
CONNECTION WITH THE ERROR ANALYSIS WORK DONE FOR THE
X-20 PROGRAM. THE ERROR ANALYSIS TECHNIQUE AND
ITS APPLICATION ARE GIVEN IN SECTIONS 2.0 AND 3.0.
DESCRIPTION OF AS 1056 PROGRAM IN GENERAL,
EQUATIONS, DATA DECK ASSEMBLY, DEFINITIONS OF ALL
INPUT-TO-PROGRAM PARAMETERS AND AN EXAMPLE ARE GIVEN
IN SECTION 6.0. SECTION 7.0 DESCRIBES AS 0535
PROGRAM (AN EARLIER VERSION OF AS 1056), ITS
DATA DECK ASSEMBLY AND AN EXAMPLE. THE DERIVATION
OF FORCING FUNCTIONS WHICH WERE USED IN THE
ANALYSIS IS GIVEN IN SECTION 5.0. IN THIS
DERIVATION THE PLATFORM WAS ASSUMED TO BE A SPACE-
FIXED WITH THREE ACCELEROMETERS AND THREE SINGLE-
DEGREE-OF-FREEDOM GYROS. THE ERROR EQUATIONS ARE
DEFINED AND DERIVED IN SECTIONS 4.0 AND 8.0.
(AUTHOR) (U)

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015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 922
BOEING CO SEATTLE WASH
ENGINEERING-DEVELOPMENT TEMPERATURE-PRESSURE TESTS OF
FLEXIBLE NICKEL WAVEGUIDE, (U)
AUG 63 30p MORECHIN, W. C. I
REPT. NO. T2 2646
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•WAVEGUIDES, ENVIRONMENTAL TESTS),
PRESSURE, FAILURE (MECHANICS), HIGH TEMPERATURE
RESEARCH, ELECTRICAL PROPERTIES, TESTS, WAVEGUIDE BENDS,
MANNED SPACECRAFT, BOOST-GLIDE VEHICLES, NICKEL (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE DEVELOPMENT TESTS PERFORMED AS REPORTED HEREIN ON WR159 A NICKEL FLEXIBLE WAVEGUIDE WERE USED TO CONFIRM THE DESIGN AND FABRICATION ADEQUACY OF THE WAVEGUIDE TO WITHSTAND AN ENVIRONMENT OF 1550 F WHILE PRESSURIZED TO 12.7 PSIG. FOUR SECTIONS OF 12-IN. FLEXIBLE WAVEGUIDE WERE TESTED. THREE SECTIONS WERE TESTED IN A STRAIGHT CONFIGURATION, THE REMAINING ONE HAD 5/8-IN. RADIUS E-PLANE 90 DEGREES BEND. NO RUPTURES OF THE FIRST TWO WAVEGUIDE SECTIONS TESTED OCCURRED. THE FIRST TEST PIECE ATTAINED A TEMPERATURE OF 1380 F WHILE PRESSURIZED TO 21.2 PSIG, THE SECOND PIECE REACHED A TEMPERATURE OF 1550 F. THE PRESSURE IN THE SECOND PIECE WAS INCREASED FROM 10.6 PSIG (INITIAL PRESSURE LEVEL) TO 12.7 PSIG FOR A PERIOD OF THREE MINUTES WHILE AT A TEMPERATURE OF 1550 F, THE THIRD TEST PIECE RUPTURED, HOWEVER, NOT UNTIL A TEMPERATURE OF 2130 F WAS REACHED WHILE SUBJECTED TO A PRESSURE LEVEL OF 21.2 PSIG. THE RUPTURE THAT OCCURRED WAS ON THE CORNER OF THE COMPRESSION SIDE OF THE SAG. THE RUPTURE WAS EQUIVALENT TO A HOLE OF 0.011-IN. DIAMETER ACCORDING TO GAS FLOW MEASUREMENTS. THE TESTS INDICATED SATISFACTORY DESIGN AND FABRICATION BY SUCCESSFULLY SURVIVING THE TEMPERATURE-PRESSURE TESTS FOR THE SPECIFIED TWO MINUTE TIME. HOWEVER, THE ABILITY OF A MAXIMUM RADIUS BEND TO SUCCESSFULLY WITHSTAND THE TEMPERATURE-PRESSURE ENVIRONMENT IS MARGINAL. (AUTHOR) (U)

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015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 920

BOEING CO SEATTLE WASH
INDICATOR - VELOCITY.

(U)

43 22P

REPT. NO. 10 20929 REV. D

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, VELOCITY), (•FLIGHT
SPEED INDICATORS, DISPLAY SYSTEMS), (•FLIGHT
INSTRUMENTS), MANUFACTURING METHODS, OPERATION,
CIRCUITS, PERFORMANCE (ENGINEERING), POWER, DIGITAL
SYSTEMS

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

THIS SPECIFICATION COVERS THE DESIGN, FABRICATION,
PERFORMANCE AND TESTING REQUIREMENTS FOR ONE TYPE OF
EQUIPMENT DESIGNATED AS VELOCITY INDICATOR.

(U)

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015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 918

SUNDSTRAND AVIATION-DENVER COLO

DESIGN ANALYSIS REPORT DYNA-SOAR 876C CONTROL SYSTEM.

VOLUME 3

(U)

DEC 63 IV

REPT. NO. 31DER62 REV. C

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REPT. NO. 31DER62, VOL. 3, REV. C

SUPERSEDES REPT. NO. 31DER62, VOL. 3, REV. B.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), MANNED SPACECRAFT, ELECTRICAL EQUIPMENT,
CONTROL SYSTEMS, TACHOMETERS, GENERATORS, VOLTAGE
REGULATORS, DESIGN, CONSTRUCTION, PROBES
(ELECTROMAGNETIC), SERVOMECHANISMS, TESTS, PERFORMANCE
(ENGINEERING)

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 916

SUNDSTRAND AVIATION-DENVER COLO

X-20 ACCESSORY POWER UNIT DEVELOPMENT STATUS
REPORT.

(U)

AUG 62 83P

REPT. NO. DSR10

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), MANNED SPACECRAFT, DESIGN, ELECTRICAL
EQUIPMENT, GAS TURBINES, GAS GENERATING SYSTEMS,
RESEARCH PROGRAM ADMINISTRATION, ANALYSIS, CONSTRUCTION,
MANUFACTURING METHODS, COMBUSTION CHAMBERS, GEARS,
VALVES, CONTROL SYSTEMS, HYDRAULIC PRESSURE PUMPS, HEAT
EXCHANGERS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 914

SUNDSTRAND AVIATION-DENVER COLO
DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT STATUS
REPORT.

(U)

90P

REPT. NO. DSR 9

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), SCHEDULING, TURBINE WHEELS, TEMPERATURE,
TURBINE BLADES, GEARS, CONTAINERS, SEALS (STOPPERS),
HYDROGEN, COMBUSTION CHAMBERS, CATALYST, CERAMIC
MATERIALS, VALVES, HYDRAULIC PRESSURE PUMPS,
RELIABILITY, HEAT EXCHANGERS, PRESSURE, TESTS, NICKEL
ALLOYS, CHROMIUM ALLOYS (U)
IDENTIFIERS: 1962, INCONEL, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 912

SUNDSTRAND AVIATION-DENVER COLO

DESIGN ANALYSIS REPORT X-20 (DYNA-SOAR) 876C CONTROL
SYSTEM, (U)

DEC 63 7P

REPT. NO. 31DER62 REV. C

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE; ADDENDUM TO VOL. 1.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), GAS TURBINES, TESTS, PERFORMANCE (ENGINEERING),
CHECKOUT PROCEDURES, CONTROL SYSTEMS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 910

FAIRCHILD STRATOS CORP HAGERSTOWN MD
STRESS ANALYSIS. LANDING GEAR EXTENSION SYSTEM BAC
10-81130. HEAT SHIELD JETTISON ACTUATOR SYSTEM - BAC
10-81131'E'. (U)

OCT 63 IV

REPT. NO. SR370

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, PNEUMATIC DEVICES),
(*ACTUATORS), MANNED SPACECRAFT, TESTS, STRESSES,
ANALYSIS, LANDING GEAR, EXTENDABLE STRUCTURES, PNEUMATIC
SYSTEMS, PRESSURE VESSELS, SPHERES, STEEL, WINDSHIELDS,
HEAT SHIELDS, JETTISONABLE EQUIPMENT, MECHANICAL
PROPERTIES, LOADING (MECHANICS), DEFLECTION, COMPRESSIVE
PROPERTIES, TENSILE PROPERTIES, PRESSURE, PNEUMATIC
VALVES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 908

FAIRCHILD STRATOS CORP HAGERSTOWN MD

QUALIFICATION TEST PROCEDURE FOR LANDING GEAR

EXTENSION SYSTEM - BAC SPEC. 10-81130. HEAT SHIELD

JETTISON ACTUATOR - BAC SPEC. 10-81131 'E'.

(U)

SEP 63 69P

REPT. NO. SR367

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PNEUMATIC DEVICES),
ACTUATORS, MANNED SPACECRAFT, ACCEPTABILITY, TEST
METHODS, RESEARCH PROGRAM ADMINISTRATION, DESIGN,
LANDING GEAR, EXTENDABLE STRUCTURES, WINDSHIELDS, HEAT
SHIELDS, JETTISONABLE EQUIPMENT, OPERATION,
EFFECTIVENESS, ENVIRONMENTAL TESTS, VIBRATION, IMPACT
SHOCK, TEST EQUIPMENT (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 906

FAIRCHILD STRATOS CORP HAGERSTOWN MD

QUALIFICATION TEST PLAN FOR LANDING GEAR EXTENSION
SYSTEM -- BAC SPEC. 10-81130. HEAT SHIELD JETTISON

ACTUATOR -- BAC SPEC. 10-81131'E'. (U)

OCT 63 38P

REPT. NO. SR335A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AIRFRAMES), MANNED
SPACECRAFT, LANDING GEAR, EXTENDABLE STRUCTURES,
WINDSHIELDS, HEAT SHIELDS, JETTISONABLE EQUIPMENT, TEST
METHODS, TEST EQUIPMENT, SPECIFICATIONS, ACCEPTABILITY,
ACTUATORS, PNEUMATIC DEVICES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 888

BOEING CO SEATTLE WASH

WINDOW HEAT SHIELD JETTISON SYSTEM.

(U)

FEB 63 64P

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, WINDSHIELDS),
MANNED SPACECRAFT, HEAT SHIELDS, JETTISONABLE EQUIPMENT,
ACTUATORS, PNEUMATIC DEVICES, NITROGEN, DESIGN,
SPECIFICATIONS, CONSTRUCTION, TEST METHODS, VIBRATION,
PRESSURE, TEMPERATURE, IMPACT SHOCK (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 851
BOEING CO SEATTLE WASH
LANDING GEAR EXTENSION SYSTEM, (U)
FEB 63 62P
REPT. NO. 10 81130
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LANDING GEAR),
(•LANDING GEAR, ACTUATORS), DESIGN, PERFORMANCE
(ENGINEERING), NOSE WHEELS, VIBRATION, PNEUMATIC
SYSTEMS, TIME, TESTS, EXTENDABLE STRUCTURES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

LANDING GEAR EXTENSIONSYSTEM.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 839

RAYTHEON CO WALTHAM MASS
DEVELOPMENT TEST PROCEDURES X-20 (DYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM. VOLUME 2.
SURFACE EQUIPMENT. (U)

MAR 64 1V

REPT. NO. CR 64 408 31 2 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (S MANNED SPACECRAFT, COMMUNICATION
EQUIPMENT), (C COMMUNICATION EQUIPMENT, GROUND SUPPORT
EQUIPMENT), (G GROUND SUPPORT EQUIPMENT, TEST METHODS),
(T TEST METHODS, GROUND SUPPORT EQUIPMENT), TEST
FACILITIES, BOOST-GLIDE VEHICLES, TRACKING, RADAR
ANTENNAS, COMMAND AND CONTROL SYSTEMS, RADIO
TRANSMITTERS, RADIO RECEIVERS, ELECTRICAL PROPERTIES,
PHYSICAL PROPERTIES, PERFORMANCE (ENGINEERING),
SPECIFICATIONS, MILITARY REQUIREMENTS (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

THIS DOCUMENT IS VOLUME 2 OF THE DEVELOPMENT
TEST PROCEDURES FOR THE SURFACE UNITS OF THE X-
20 COMMUNICATIONS AND TRACKING SUBSYSTEM.
THE COMPLETE SET OF PROCEDURES IS CONTAINED IN
THREE VOLUMES, AS FOLLOWS: VOLUME 1 - AIRBORNE
EQUIPMENT; VOLUME 2 - SURFACE EQUIPMENT;
VOLUME 3 AEROSPACE GROUND EQUIPMENT. (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 782

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT DEVELOPMENT

STATUS REPORT.

(U)

DESCRIPTIVE NOTE: MONTHLY STATUS REPT., 1-31 AUG 62.

SEP 62 121P

REPT. NO. DSR11

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), GAS TURBINES, TURBINE WHEELS, HEAT RESISTANT
MATERIALS, GEARS, CONTAINERS, LUBRICANTS, OILS, SEALS
(STOPPERS), TESTS, COMBUSTION CHAMBERS, CATALYSTS,
TEMPERATURE, ELECTRONIC EQUIPMENT, CONTROL SYSTEMS,
HYDRAULIC PRESSURE PUMPS, RELIABILITY, VIBRATION,
SCHEDULING, HEAT EXCHANGERS, VALVES

(U)

IDENTIFIERS: 1962, X-20 SPACECRAFT

(U)

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT DEVELOPMENT
STATUS REPORT.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 671

RAYTHEON CO WALTHAM MASS

RFI DEVELOPMENT DATA REPORT. X-20 (DYNA-SOAR)

COMMUNICATIONS AND TRACKING SUBSYSTEM. (U)

MAR 64 1V

REPT. NO. CR64 408 30 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MANNED SPACECRAFT),
(*MANNED SPACECRAFT, COMMUNICATION EQUIPMENT),
(*COMMUNICATION EQUIPMENT, RADIOFREQUENCY INTERFERENCE),
(*RADIOFREQUENCY INTERFERENCE, COMMUNICATION EQUIPMENT),
SUPERHIGH FREQUENCY, TRACKING, RADIO RECEIVERS,
SENSITIVITY, POWER, SIGNAL-TO-NOISE RATIO, FOURIER
ANALYSIS, MILITARY REQUIREMENTS, TEST METHODS, ANTENNAS,
GAIN, BANDWIDTH, COMPATIBILITY (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, SYSTEMS

ANALYSIS (U)

THIS REPORT DISCUSSES THE PRINCIPLES OF SYSTEM
ANALYSIS AS APPLIED TO THE X-20 SYSTEM. THE
REPORT OUTLINES HOW ELECTROMAGNETIC COMPATIBILITY
STANDARDS AND LIMITS PERTINENT TO THAT PARTICULAR
SYSTEM WERE ACHIEVED. SPECIFIC TECHNIQUES AND
COMPONENTS WHICH WERE CHOSEN TO BRING THE AIRBORNE
RECEIVER INTO COMPLIANCE WITH THE SYSTEM
SPECIFICATIONS ARE DESCRIBED AND ILLUSTRATED.

(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 650
BOEING CO SEATTLE WASH
NOSE CAP DEVELOPMENT TESTS, ROCKET ENGINE TESTS,
DYNA-SOAR, (U)
APR 63 69P EASTER, R. D. I
REPT. NO. D2 80083 SECT. 5

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NOSE CONES, TEST FACILITIES), (*BOOST-
GLIDE VEHICLES, NOSE CONES), EROSION, EXHAUST GASES,
GRAPHITE, ZIRCONIUM COMPOUNDS, OXIDES, CALIBRATION, TEST
METHODS, INSTRUMENTATION, MODEL TESTS, SPACE
ENVIRONMENTAL CONDITIONS, MONITORS, SURFACE TEMPERATURE,
TEST EQUIPMENT, STAGNATION POINT, PRESSURE, VIBRATION,
ACOUSTIC PROPERTIES, OXYGEN, SIMULATION, AERODYNAMIC
HEATING, AERODYNAMIC LOADING, TRANSONIC CHARACTERISTICS,
ATMOSPHERE ENTRY, DISTRIBUTION (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, NOSE CAPS (U)

A NUMBER OF ROCKET CALIBRATION TESTS WERE CONDUCTED
USING FULL SIZE ZIRCONIA NOSE CAPS AS TEST SPECIMENS.
IN GENERAL THE TEST POINTED OUT THAT: (A)
AMBIENT PRESSURE IN THE FACILITY MUST BE RIGIDLY
CONTROLLED IN ORDER TO ATTAIN HEATING RATES
SIMULATING FLIGHT; (2) STARTING HEAT FLUX IS TOO
HIGH; (3) MODIFICATIONS ARE REQUIRED TO THE CART
AND CAP SUPPORT STRUCTURE TO KEEP THE VIBRATION
ENVIRONMENT TO ACCEPTABLE LEVELS; (4) AIRLOADS
DURING TEST WERE COMPATIBLE WITH FLIGHT ENVIRONMENT
FOR TRANSONIC RE-ENTRY; AND (5) TEMPERATURE
DISTRIBUTION AROUND THE NOSE CAP WAS SYMMETRICAL AND
ALSO COMPATIBLE WITH FLIGHT REQUIREMENTS.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-432 648

SUNDSTRAND AVIATION-DENVER COLO

DESIGN DEVELOPMENT TEST STATUS.

(U)

DESCRIPTIVE NOTE: MONTHLY REPT. NO. 1 FOR 31 OCT 61,

NOV 61 11P BROOKS, G. S. ;

REPT. NO. DSR1

UNCLASSIFIED REPORT

AVAILABILITY: MICROFILM ONLY AFTER ORIGINAL COPIES
EXHAUSTED.

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,
SEATTLE, WASH.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, PUMPS), HYDRAULIC
SEALS, DIAPHRAGMS (MECHANICS), TURBINE WHEELS, HYDROGEN,
INJECTORS, VALVES, TESTS, MATERIALS (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

DEVELOPMENT TESTS OF VARIOUS DYNA-SOAR EQUIPMENT.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 646

CHANCE VOUGHT CORP DALLAS TEX
DYNA SOAR NOSE CAP ZIRCONIA DEVELOPMENT TEST PLAN,

(U)

17P EDWARDS, R. G. ;
REPT. NO. AST EIR13434

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, NOSE CONES), (*NOSE
CONES, REFRACTORY COATINGS), MANNED SPACECRAFT,
ZIRCONIUM COMPOUNDS, OXIDES, GRAPHITE, PERFORMANCE
(ENGINEERING), QUALITY CONTROL (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT, NOSE CAPS,
ZIRCONIUM OXIDE (U)

THE OBJECTIVE OF THIS PROGRAM IS TO DEVELOP A
ZIRCONIA OUTER LAYER FOR THE DYNA SOAR NOSE
CAP FROM CEMENT, PINS, AND/OR TILES WHICH IS
CAPABLE OF MEETING THE FOLLOWING REQUIREMENTS: (A)
SUFFICIENTLY INSULATE THE GRAPHITE SHELL FROM THE
BOUNDARY LAYER HEATING TO PREVENT THE GRAPHITE
TEMPERATURE FROM EXCEEDING 3000 F DURING ANY
DYNA-SOAR RE-ENTRY TRAJECTORY. (B) WITHSTAND
THE MAXIMUM TEMPERATURE ENCOUNTERED ON THE DYNA-
SOAR NOSE CAP DURING ANY RE-ENTRY WITHOUT
MELTING THE ZIRCONIA; (C) WITHSTAND THE MAXIMUM
RATES OF HEATING DURING THE DYNA-SOAR BOOST AND
RE-ENTRY WITHOUT THERMAL SHOCK FAILURE WHICH WOULD
PRECIPITATE LOSS OF SUFFICIENT ZIRCONIA MATERIAL FROM
THE NOSE CAP TO JEOPARDIZE THE STRUCTURAL INTEGRITY
OF THE GRAPHITE SHELL OR CAUSE INSTRUMENTATION
(PRESSURE PORTS AND TEMPERATURE SENSORS)
MALFUNCTIONS; (D) WITHSTAND THE EROSION, ACOUSTICAL
NOISE, VIBRATION, INERTIA AND AIR LOADS, AND THERMAL
STRESSES IMPOSED BY THE DYNASOAR BOOST AND RE-
ENTRY ENVIRONMENTS WITHOUT (1) LOSS OF SUFFICIENT
MATERIAL FROM THE NOSE CAP TO JEOPARDIZE THE
STRUCTURAL INTEGRITY OF THE GRAPHITE SHELL (2)
IMPOSING STRESSES OF SUFFICIENT MAGNITUDE IN THE
GRAPHITE SHELL TO CAUSE FAILURE OF THE GRAPHITE SHELL
(3) CAUSING MALFUNCTION OF THE INSTRUMENTATION
(PRESSURE PORTS AND TEMPERATURE SENSORS).
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 643

GARRETT CORP LOS ANGELES CALIF AIRRESEARCH MFG DIV
NUMERICAL RELIABILITY ANALYSIS. HYDROGEN COOLING
EQUIPMENT AND HYDROGEN TANK PRESSURE CONTROLS. BOEING
DYNA-SOAR, (U)

22P SAWYER, T. IBUSCH, E. F. I
REPT. NO. DS43 REV. 3

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, COOLING), (*COOLING
+ VENTILATING EQUIPMENT, BOOST-GLIDE VEHICLES),
RELIABILITY, HEAT EXCHANGERS, SPACECRAFT CABINS,
GLYCOLS, HYDROGEN, CRYOGENICS, NITROGEN, OXYGEN,
HYDRAULIC FLUIDS, COOLANT PUMPS, COOLANTS, LIQUEFIED
GASES, COOLING (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 641
BOEING CO SEATTLE WASH
NOSE CAP DEVELOPMENT - ROCKET ENGINE - MATERIAL
EVALUATION - SECTION 3, (U)
AUG 63 91P MAKI, D. A. ;
REPT. NO. D2 80083
CONTRACT: AF657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NOSE CONES, BOOST-GLIDE VEHICLES),
(*MANNED SPACECRAFT, NOSE CONES), RESEARCH PLANES,
REFRACTORY MATERIALS, ZIRCONIUM COMPOUNDS, OXIDES, HEAT,
EROSION (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, ZIRCONIUM DIOXIDE,
NOSE CAPS (U)

NOSE CAP DEVELOPMENT - ROCKET ENGINE MATERIAL EVALUATION.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 639

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
DESIGN CONCEPTS FOR RELIABILITY HYDROGEN COOLING
EQUIPMENTS AND HYDROGEN TANK PRESSURE CONTROLS BOEING
DYNA-SOAR. (U)

115P SAWYER, T. E. ; BUSCH, E. F. ;
REPT. NO. D554R REV. 4

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, COOLING AND
VENTILATING EQUIPMENT), (*COOLING AND VENTILATING
EQUIPMENT, BOOST-GLIDE VEHICLES), SPACECRAFT CABINS,
HEAT EXCHANGERS, GLYCOLS, CRYOGENICS, TEMPERATURE
CONTROL, HYDRAULIC FLUIDS, COOLANT PUMPS, COOLANTS,
VALVES, RELIABILITY, PRESSURE REGULATORS, HYDROGEN,
LIQUEFIED GASES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 637

SUNDSTRAND AVIATION-DENVER COLO

DESIGN DEVELOPMENT TEST STATUS.

(U)

DESCRIPTIVE NOTE: MONTHLY REPT., NO. 2 FOR 30 NOV 61,

DEC 61 16P WERNER, R. O. I

REPT. NO. 2

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,

SEATTLE, WASH. SEE AD-432 648.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS, MANNED SPACECRAFT, RESEARCH PROGRAM
ADMINISTRATION, DESIGN, HYDRAULIC PRESSURE PUMPS,
HYDRAULIC SEALS, GEARS, PLASTIC SEALS, HALOCARBON
PLASTICS, TITANIUM ALLOYS, METAL PLATES, GAS GENERATING
SYSTEMS, COMBUSTION CHAMBERS (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

DESIGN DEVELOPMENT TEST STATUS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 634

BOEING CO SEATTLE WASH
INSULATED PANEL DEVELOPMENT DYNA-SOAR - RADIANT HEAT,
STATIC STRENGTH AND ACOUSTIC VIBRATION TESTING, (U)
OCT 63 208P DARCY, KENNETH E. ;
REPT. NO. D2 80080 SECTION 1
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HEAT SHIELDS, BOOST-GLIDE VEHICLES),
(•REFRACTORY METALS + ALLOYS, PROTECTIVE TREATMENTS),
(•STRUCTURAL PARTS, MANNED SPACECRAFT), RESEARCH PLANES,
THERMAL INSULATION, REENTRY VEHICLES, MOLYBDENUM
ALLOYS, NICKEL ALLOYS, NIOBIUM ALLOYS, ALUMINUM ALLOYS,
NOISE, VIBRATION, AERODYNAMIC HEATING, ATMOSPHERE ENTRY,
SIMULATION, ACCELERATION, LOADING (MECHANICS), COATINGS,
SILICIDES, EROSION, OXIDATION, CERAMIC FIBERS,
MECHANICAL FASTENERS, EXPERIMENTAL DATA, ENVIRONMENTAL
DATA, ENVIRONMENTAL TESTS, SONIC FATIGUE, AERODYNAMIC
LOADING (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, MOLYBDENUM ALLOY
Q.5 T1, NIOBIUM ALLOY D-36, ALUMINUM ALLOY 5052,
EROSION SHIELD (U)

THERMAL, SONIC, AND LOAD TEST DATA ON EROSION SHIELD AND
INSULATED PANEL ASSEMBLIES OF THE DYNA-SOAR GLIDER TO
EVALUATE THE EFFECTS OF BOOST AND RE-ENTRY ENVIRONMENTS.
VOL. 1, SEC 1.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 632

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST REQUIREMENTS FOR SIL.

(U)

MAY 63 97P

REPT. NO. EMR7660 68

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GROUND SUPPORT EQUIPMENT, BOOST-GLIDE
VEHICLES), (*BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), SPECIFICATIONS, TEST METHODS, TEST EQUIPMENT
(ELECTRONICS), MANNED SPACECRAFT, MILITARY
REQUIREMENTS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, INTEGRATED
SYSTEMS (U)

THESE TEST REQUIREMENTS WILL FULFILL SPECIFICATIONS
AS STATED IN THE BOEING DOCUMENT NO. D2-
80396, PARAGRAPH 11.1 AS REQUIRED BY D28055-1 AND
D2-8055-D, INsofar AS THEY PERTAIN TO SUBSYSTEM AND
SYSTEM ACCEPTANCE TESTING OF THE X-20 SEATTLE
SYSTEM INTEGRATION LABORATORY (SIL) ROUND
STATION. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 630

TRW INC CLEVELAND OHIO

FAILURE MODE AND EFFECT ANALYSIS - REACTION CONTROL

POWER COMPONENT. DYNA SOAR NO. 1, (U)

FEB 62 IV BEATTY, H. W., JR.:

REPT. NO. ER4770

PROJ: 516 808950 08

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, CONTROL SYSTEMS),
CONTROL JETS, RELIABILITY, GAS GENERATING SYSTEMS, CHECK
VALVES, VALVES, INJECTORS, TRANSDUCERS, PRESSURE
REGULATORS, CIRCUITS, RELIABILITY (ELECTRONICS),
ELECTRONIC EQUIPMENT, LIQUEFIED GASES, HYDROGEN, OXYGEN,
MALFUNCTIONS, PROPELLANT CONTROL (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, REACTION CONTROL
SYSTEMS (U)

FAILURE MODE AND EFFECT ANALYSIS REACTION CONTROL POWER
COMPONENT. DYNA SOA9 NO. 1.

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 628

SUNDSTRAND AVIATION-DENVER COLO

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST

STATUS.

(U)

MAY 62 93P

RAND, L. T. ;

REPT. NO. DSR 7

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), FAILURE (MECHANICS), BOOSTGLIDE VEHICLES,
MANNED SPACECRAFT, SCHEDULING, VIBRATION, GEARS,
CONTAINERS, CATALYSTS, QUENCHING, INJECTORS, FUEL
INJECTORS, VALVES, SERVOMECHANISMS, CONTROL SYSTEMS,
TURBINE WHEELS, FUEL SYSTEMS, TEMPERATURE, COMBUSTION
CHAMBERS, HYDRAULIC PRESSURE PUMPS (U)
IDENTIFIERS: 1962, GEAR BOXES, X-20 SPACECRAFT (U)

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST STATUS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 626

BOEING CO SEATTLE WASH

X-20 TERMINATION ENGINEERING DOCUMENTATION, VOLUME
III. (U)

DEC 63 1V

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NDFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), MANNED SPACECRAFT, GROUND SUPPORT
EQUIPMENT, INSTRUMENTATION, ELECTRONIC EQUIPMENT,
AIRBORNE, PROCUREMENT, SPECIFICATIONS, CORRECTIONS, DATA
PROCESSING SYSTEMS, QUALITY CONTROL, MAGNETIC TAPE,
RECORDING SYSTEMS, MAGNETIC RECORDING SYSTEMS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

X-20 TERMINATION ENGINEERING DOCUMENTATION, VOLUME
III.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 622

BOEING CO SEATTLE WASH

NOSE CAP DEVELOPMENT - DYNA-SOAR PLASMA JET TESTS -
SECTION 4. (U)

114P

OAKES, W. G. ; NAMATAME, T. ;

JOHNSON, C. R. ;

REPT. NO. D2 80083

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (NOSE CONES, BOOST-GLIDE VEHICLES),
MANNED SPACECRAFT, AIRPLANE NOSES, HEAT SHIELDS,
ZIRCONIUM COMPOUNDS, OXIDES, CERAMIC MATERIALS, MODELS
(SIMULATIONS), ATMOSPHERE ENTRY, AERODYNAMIC HEATING,
THERMAL STRESSES, MODEL TESTS, PLASMA JETS,
HEMISPHERICAL SHELLS, HIGH TEMPERATURE RESEARCH (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, NOSE CAPS (U)

A SUBSONIC-SPLASH ARC-PLASMA TEST FACILITY WAS
UTILIZED TO PERFORM FIFTEEN X-20 NOSE CAP SPECIMEN
TESTS. THE SPECIMENS WERE SUBJECTED TO A
SIMULATED RE-ENTRY HEAT-FLUX. NOSE CAP SPECIMENS
ARE BEING TESTED FOR TWO PRIMARY REASONS: (1) TO
OBTAIN THERMAL GRADIENT DATA IN THE NOSE CAP
STRUCTURE TO CORRELATE ANALYTICAL PREDICTIONS; AND
(2) TO DEMONSTRATE THE ABILITY OF THOSE
STRUCTURAL CONCEPTS SELECTED TO WITHSTAND A
SIMULATED RE-ENTRY THERMAL ENVIRONMENT. THREE
BASIC STRUCTURAL CONCEPTS, DESIGNATED CONCEPTS A, B,
AND C OF THE REINFORCED - ZIRCONIA NOSE CAP
DESIGN WERE SUBJECTED TO TEST. STRUCTURAL
CONCEPT A SPECIMENS WERE FABRICATED IN BOTH 3 IN.
AND 8 IN. DIAMETER SIZES. CONCEPTS B AND C
WERE FABRICATED FOR TEST IN THE THREE INCH SIZE ONLY.
UPON COMPLETION OF THE CONCEPT A, B, AND C
TEST SERIES, AND TWO FULL-SCALE MODEL TESTS IN THE
BOEING JET LAB ROCKET FACILITY, DATA AND
SPECIMEN ANALYSIS INDICATED A NEED FOR ADDITIONAL
STRUCTURAL AND MATERIAL DEVELOPMENT TESTS. A
POST-TEST INSPECTION OF VARIOUS SPECIMENS REVEALED
EVIDENCE OF MODERATE MATERIAL DELAMINATION AND
THERMAL CRACKING. ADDITIONAL MATERIAL AND
STRUCTURAL DEVELOPMENT TESTS WAS UNDERTAKEN ON
CONCEPT A. THESE SPECIMENS ARE NOTED FOR
IDENTIFICATION PURPOSES AS CONCEPT A-M, BUT STILL
INVOLVE ONLY MINOR VARIATIONS OF THE CONCEPT A
MATERIALS AND CONFIGURATION. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 619
BOEING CO SEATTLE WASH
FUSION WELDING OF SUPER ALLOYS, (U)
JAN 64 85P CRANE, C. H. ;
REPT. NO. D2 80279
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, STRUCTURAL PARTS),
(*STRUCTURAL PARTS, NICKEL ALLOYS), (*NICKEL ALLOYS,
ARC WELDING), ARC WELDS, HEAT TREATMENT, TENSILE
PROPERTIES, SHEAR STRESSES, WELDING RODS, CHROMIUM
ALLOYS, COBALT ALLOYS, FRACTURE (MECHANICS), MANNED (U)
SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT

FUSION WELDING OF SUPER ALLOYS, RENE FOR THE DYNA-
SOAR.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 617

BOEING CO SEATTLE WASH

MISCELLANEOUS COATING DATA, (U)

DEC 63 44P LEGAN, D. J. ;

REPT. NO. D2 81118

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, REFRACTORY METALS + ALLOYS), (*REFRACTORY METALS + ALLOYS, COATINGS), MOLYBDENUM ALLOYS, NIOBIUM ALLOYS, OXIDATION, SILICIDES, MANNED SPACECRAFT, RESEARCH PLANES, EMISSIVITY, ATMOSPHERE ENTRY, SIMULATION, TIME, TEMPERATURE, AERODYNAMIC HEATING (U)

IDENTIFIERS: (*BOOST-GLIDE VEHICLES, REFRACTORY METAL ALLOYS), (*REFRACTORY METAL ALLOYS, COATINGS), MOLYBDENUM ALLOYS, NIOBIUM ALLOYS, OXIDATION, SILICIDES, MANNED SPACECRAFT, RESEARCH PLANES, EMISSIVITY, ATMOSPHERE ENTRY, SIMULATION, TIME, TEMPERATURE, AERODYNAMIC HEATING (U)

MISCELLANEOUS COATING DATA ON COATED REFRACTORY ALLOYS FOR THE DYNA-SOAR.

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 615
BOEING CO SEATTLE WASH
INSULATED PANEL DEVELOPMENT DYNA-SOAR, (U)
OCT 63 290P DARCY, KENNETH E. ;
REPT. NO. D2 80080 SEC. I
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NGFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HEAT SHIELDS, BOOST-GLIDE VEHICLES),
(*STRUCTURAL PARTS, MANNED SPACECRAFT), RESEARCH PLANES,
ENVIRONMENTAL TESTS, ATMOSPHERE ENTRY, SIMULATION, (U)
AERODYNAMIC HEATING, EXPERIMENTAL DATA (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

DYNA-SOAR INSULATED PANEL DEVELOPMENT. TEMPERATURE
DATA. VO. II, SEC. I.

UNCLASSIFIED

015416

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 613

BOEING CO SEATTLE WASH

MATERIAL DEVELOPMENT PROGRAMS, CERAMICS, X-20, (U)

DEC 63 2DP BRESLICH, F. N., JR.!

REPT. NO. D2 80282

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (RESEARCH PLANES, CERAMIC MATERIALS), CERAMIC COATINGS, EMBEDDING SUBSTANCES, LANDING GEAR, ANTENNA COMPONENTS, CEMENTS, CHROMIUM COMPOUNDS, CHROMIUM (III) OXIDE, OXIDES, MAGNESIUM OXIDES, ALUMINA, SILICON DIOXIDE (U)

IDENTIFIERS: X-20 SPACECRAFT, CHROMIUM 3 OXIDE (U)

CONTENTS: CERAMIC LEADING EDGES; ANTENNA WINDOWS; FABRICATION OF MAGNESIUM OXIDE; AND POTTING OF MAIN LANDING GEAR SKID. (U)

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015416

SUNDSTRAND AVIATION-DENVER COLO
MODEL 871 APU AND COMPONENT TESTING.
JAN 62 24P
REPT. NO. DSR 3

(U)

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, AUXILIARY POWER
PLANTS), MANNED SPACECRAFT, PERFORMANCE (ENGINEERING),
HYDRAULIC PRESSURE PUMPS, SERVOMECHANISMS, VALVES,
TITANIUM ALLOYS, VANADIUM ALLOYS, CHROMIUM ALLOYS,
ALUMINUM ALLOYS, HYDROGENATION, AGING (MATERIALS),
HARDNESS, TENSILE PROPERTIES, CONTROL SYSTEMS,
TEMPERATURE, SPEED REGULATORS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT, TITANIUM ALLOY (U)
B120 VCA

MODEL 871 APU AND COMPONENT TESTING.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 607

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT - DYNA SOAR, (U)

JUN 63 1V BOWERS, D. A. I

REPT. NO. D2 80085

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LEADING EDGE),
MANNED SPACECRAFT, WINGS, HEAT SHIELDS, MOLYBDENUM
ALLOYS, HEAT RESISTANT METALS + ALLOYS, AIRPLANE PANELS,
MODEL TESTS, MODELS (SIMULATION), AERODYNAMIC LOADING,
ASCENT TRAJECTORY, ACOUSTICS, ATMOSPHERE ENTRY,
AERODYNAMIC HEATING, THERMAL STRESSES, VIBRATIONS,
PRESSURE, TEST METHODS, PLASMA JETS, HEAT TRANSFER,
BOUNDARY LAYER, GAS FLOW, STRUCTURES, ANALYSIS,
SILICIDES, AIRFRAMES, DELTA WINGS, ATTACHMENT, HIGH
TEMPERATURE RESEARCH, MOLYBDENUM COMPOUNDS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, LEADING EDGE (U)

LEADING EDGE DEVELOPMENT - DYNA SOAR.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 585

BOEING CO SEATTLE WASH

MISCELLANEOUS NON-METALS DATA;

(U)

DEC 63 79P LEGAN, D. J. :

REPT. NO. D2 81119

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, MATERIALS),
(•TRANSPARENT PANELS, GLASS); (•GLASS, SILICON
COMPOUNDS), OXIDES, MANNED SPACECRAFT, RESEARCH PLANES,
JOINTS, GASKETS, GLASS TEXTILES, METALLIC TEXTILES,
COATINGS, BONDING, SEALS (STOPPERS), FUNGUSPROOFING,
EXPANDED PLASTICS, ISOCYANATE PLASTICS, CERAMIC
COATINGS, THERMAL INSULATION, GLASS SEALS, METAL SEALS,
PLASTIC SEALS, CORROSION, WAVEGUIDES, RUBBER SEALS,
NICKEL ALLOYS, SPRINGS, CHROMIUM ALLOYS, COBALT ALLOY(U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, RENE 41
(ALLOY) (U)

MISCELLANEOUS NON-METALS DATA, DYNA-SOAR,

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 546

BOEING CO SEATTLE WASH

DEVELOPMENT OF OXIDATION RESISTANT COATINGS FOR
COLUMBIUM ALLOYS-VACUUM PACK PROCESS,

(U)

DEC 63 1V DRIESBACH,W, GLEN ;

REPT. NO. D2-81108-2

CONTRACT: AF 33(657)-7132

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•)NI0BIUM ALLOYS, PROTECTIVE TREATMENTS,
(•)COATINGS, OXIDATION, BOOSTGLIDE VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES, TIME, TEMPERATURE,
EMISSIVITY, ADDITIVES, NICKEL, TUNGSTEN, ALUMINUM,
MANGANESE, TITANIUM, THICKNESS, MANUFACTURING METHODS,
SILICIDES, TITANIUM ALLOYS, ZIRCONIUM ALLOYS, TANTALUM
ALLOYS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, NI0BIUM ALLOY D-
36, NI0BIUM ALLOY FS-B2 (U)

DEVELOPMENT OF OXIDATION RESISTANT COATINGS FOR NI0BIUM
ALLOYS: VACUUM PACK PROCESS, VOL. II.

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 544

BOEING CO SEATTLE WASH

RESISTANCE WELDING SUPER ALLOYS, (U)

JAN 64 165P CRANE, C. H. :

REPT. NO. D2 8027B

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, STRUCTURAL PARTS),
(•STRUCTURAL PARTS, NICKEL ALLOYS), (•NICKEL ALLOYS,
RESISTANCE WELDING), MANNED SPACECRAFT, RESEARCH PLANES,
SPOT WELDING, CHROMIUM ALLOYS, COBALT ALLOYS,
ELECTRODES, PRESSURE, ELECTRIC CURRENTS, HEATING, HEAT
TREATMENT, SPOT WELDS, MECHANICAL PROPERTIES, INDUSTRIAL
EQUIPMENT, DIGITAL COMPUTERS, AUTOMATION, FOILS, WELDING
RODS, FATIGUE (MECHANICS), VIBRATION, METALLOGRAPHY,
TENSILE PROPERTIES, SHEAR STRESSES, STRESSES, GRAIN
BOUNDARIES, MELTING, FRACTURE (MECHANICS) (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT, RENE 41
(ALLOY) (U)

RESISTANCE WELDING SUPER ALLOYS, RENE' 41, FOR THE
DYNA-SOAR.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 542
BOEING CO SEATTLE WASH
STRUCTURAL RELIABILITY OF COMPONENTS USING BRITTLE
MATERIALS - STRENGTH ANALYSIS. (U)
DEC 63 IV SPRUILL, C. E. †
REPT. NO. AST EIR13431 REV. A

UNCLASSIFIED REPORT
DISTRIBUTION: NO FOREIGN,
SUPPLEMENTARY NOTE: MICROFILM ONLY.

DESCRIPTORS: (•BRITTLINESS, STRUCTURES), (•STRESSES,
MATHEMATICAL ANALYSIS), STRUCTURAL PARTS, NOSE CONES,
REENTRY VEHICLES, BOOSTGLIDE VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES, STATISTICAL ANALYSIS,
PROGRAMMING (COMPUTERS), FAILURE (MECHANICS), THEORY,
DISTRIBUTION THEORY (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, WEIBULL
THEORY (U)

STRUCTURAL RELIABILITY OF COMPONENTS USING BRITTLE
MATERIALS STRENGTH ANALYSIS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 540

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
DYNAMIC ANALYSIS DATA BOEING DYNA SOAR COOLING
EQUIPMENTS. (U)

DEC 63 1V CHESSMORE, G. J
REPT. NO. DS 74RREV, 3

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COOLING +
VENTILATING EQUIPMENT), CHECK VALVES, HYDROGEN, GLYCOLS,
PRESSURE REGULATORS, TRANSDUCERS, PNEUMATIC VALVES, HEAT
EXCHANGERS, COOLANT PUMPS, TEMPERATURE CONTROL, COOLING
FANS, HYDRAULIC FLUIDS, PERFORMANCE (ENGINEERING),
SPECIFICATIONS, DESIGN, SPACECRAFT CABINS, COOLING,
COOLANTS, WATER (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

DYNAMIC ANALYSIS DATA BOEING DYNA SOAR COOLING
EQUIPMENTS,

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 538

BOEING CO SEATTLE WASH

DUCTILITY OF SILICIDE-COATED TZM MOLYBDENUM ALLOY,

(U)

DEC 63 IV STACY, J. T. I

REPT. NO. D2 80275

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MOLYBDENUM ALLOYS, DUCTILITY); (RESEARCH PLANES, MOLYBDENUM ALLOYS), CERAMIC COATINGS, SILICIDES, MANNED SPACECRAFT, BOOSTGLIDE VEHICLES, TITANIUM ALLOYS, TENSILE PROPERTIES, STRESSES, STRAIN (MECHANICS), IMPACT SHOCK, DEFORMATION, REPORTS, SHEETS, HEAT TREATMENT, FRACTURE (MECHANICS), MECHANICAL PROPERTIES, PLASTIC COATINGS, ACRYLIC RESINS, EPOXY PLASTICS, CONTROLLED ATMOSPHERES (U)

IDENTIFIERS: MOLYBDENUM ALLOY TZM, MOLYBDENUM ALLOY MO-.5T1, X-20 SPACECRAFT, 1963, BEND TESTS (U)

THIS DOCUMENT CONTAINS 21 INFORMAL INTERNAL REPORTS ISSUED BY THE X-20 MATERIALS AND PROCESSES STAFF CONCERNING THE ROOM-TEMPERATURE DUCTILITY OF SILICIDE COATED MOLYBDENUM, ESPECIALLY THE TZM ALLOY. THE PROBLEM OF THE DUCTILITY OF SILICIDE-COATED MO-.5T1 AND TZM MOLYBDENUM ALLOYS HAS BEEN THE OBJECT OF NUMEROUS INVESTIGATIONS SINCE EARLY IN THE X-20 PROGRAM. THE INFORMAL REPORTS SUMMARIZED HEREIN EITHER PRESENT OR REFER TO MOST OF THE WORK DONE EXCEPT FOR THE MOST RECENT AND, APPARENTLY, THE MOST SUCCESSFUL. ONE OF THE PROBLEMS WHICH CONTINUED TO PLAGUE THIS WORK WAS A DEFINITION OF DUCTILITY AND HOW MUCH OF WHAT KIND OF DUCTILITY WAS NEEDED. THE CONCEPT OF THE DUCTILE-BRITTLE TRANSITION TEMPERATURE WAS A NEW ONE IN THE DESIGN OF AIRFRAME STRUCTURE. ALSO, THE FACT THAT MOLYBDENUM ALLOYS ARE STRAIN-RATE SENSITIVE, I.E. THE DUCTILE-BRITTLE TRANSITION TEMPERATURE IS DEPENDENT ON THE SPEED OF TESTING, WAS NEW TO DESIGN, ALSO. CONSEQUENTLY, THREE DIFFERENT TESTS WERE EMPLOYED IN MOST OF THE WORK REPRESENTED IN THIS REPORT: TENSILE TESTS FOR THE SLOWEST STRAIN RATES, BEND TESTS FOR SOMEWHAT HIGHER STRAIN RATES, AND IMPACT TESTS FOR THE HIGHEST STRAIN RATES. IT WAS EVENTUALLY DETERMINED BY A STRESS GROUP THAT THE LOADING RATE COULD BE SUCH THAT THE YIELD STRENGTH MIGHT BE REACHED IN ONE-HALF A SECOND; THEREFORE, THE STRAIN RATE WOULD BE ABOUT 0.21 IN./IN./MIN. AT ROOM TEMPERATURE FOR TZM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 371

BOEING CO SEATTLE WASH

A TECHNICAL DESCRIPTION OF ADVANCED CRYOGENICS
SERVICING SYSTEMS, (U)

JAN 64 IV FLASH, P. N. CARTER, M. I

FITCH, J. I

REPT. NO. D2 81025

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CRYOGENICS, HANDLING), LIQUEFIED GASES,
HYDROGEN, OXYGEN, NITROGEN, TRANSPORTATION, STORAGE
TANKS, PUMPS, FUEL PUMPS, HEAT EXCHANGERS, CONTROL
SYSTEMS, PIPES, CRYOGENIC STORAGE DEVICES, LIQUID ROCKET
FUELS, LIQUID ROCKET OXIDIZERS, OXYGEN EQUIPMENT (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

NEWLY DEVELOPED SYSTEMS FOR HANDLING CRYOGENS ARE
AVAILABLE FROM THE X-2 (DYNA-SOAR) PROGRAM,
THESE SYSTEMS ARE DESIGNED FOR SERVICING SPACE
CRAFT WITH LIQUID HYDROGEN, NITROGEN, AND OXYGEN
DURING COUNTDOWN, THEIR CAPABILITIES SHOULD MEET
THE REQUIREMENTS IN MANY AREAS WHERE CRYOGENS ARE
USED. THE X-20 GLIDER USED CRYOGENIC HYDROGEN,
OXYGEN AND NITROGEN IN ITS ENVIRONMENTAL CONTROL AND
POWER GENERATION SUBSYSTEMS, PRECISE CRYOGEN
CONDITIONS OR PRESSURE AND TEMPERATURE WERE
ESTABLISHED AND SUSTAINED IN THE TANKS OVER LONG
PERIODS OF TIME FROM A REMOTE LOCATION TO ENABLE
SATISFACTORY OPERATION OF THE SUBSYSTEMS THROUGHOUT
THE SPACE FLIGHT MISSION. THE SERVICING SYSTEMS
FOR THE 3 CRYOGENS ARE SIMILAR IN THEIR OVERALL
CONFIGURATION; THEREFORE, EACH SYSTEM HAS THE
FLEXIBILITY TO HANDLE MORE THAN ONE CRYOGEN. THE
SERVICING SYSTEMS PRESENTED ARE THOSE USED TO SUPPORT
THE BOOSTER-LAUNCHED X-20 GLIDER AT AFMTC, THE
SAME EQUIPMENTS ARE USED FOR THE B-52 LAUNCHED
GLIDER AT AFTTC, BUT HAVE PHYSICAL INSTALLATION
DIFFERENCES. THESE SYSTEMS HAVE THE FOLLOWING
SPECIAL FEATURES WHICH INCREASE THEIR POSSIBLE AREAS
OF USE: (1) MOBILITY, (2) RELIABILITY
ENGINEERED; (3) MANUAL OR AUTOMATIC ELECTRICAL
CONTROL; AND (4) FLEXIBILITY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 201

RAYTHEON CO WALTHAM MASS

X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING
SUBSYSTEM.

(U)

MAR 64 1V

REPT. NO. CR64 408 27 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•GROUND SUPPORT EQUIPMENT, PERFORMANCE
(ENGINEERING)), (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), MANNED SPACECRAFT, SUPERHIGH FREQUENCY,
ULTRAHIGH FREQUENCY, C BAND, TRANSPONDERS, TESTS, RADIO
RECEIVERS, RADIOFREQUENCY INTERFERENCE, MILITARY
REQUIREMENTS

(U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, COMMAND
DECODER

(U)

THE QUALIFICATION AND ELECTROMAGNETIC INTERFERENCE
(RFI) TEST DATA ARE PRESENTED ON THE FOLLOWING
SUBCONTRACT AIRBORNE UNITS OF THE X-20
COMMUNICATIONS AND TRACKING SUBSYSTEM: SHF
COMMAND DECODER SET, UHF COMMAND RECEIVING SET,
C-BAND TRANSPONDER, THE QUALIFICATION AND RFI
TEST PROCEDURES ARE ALSO INCLUDED. DEVELOPMENT
TEST PROCEDURES ARE FURNISHED SEPARATELY (RCA
DOCUMENT NO. CR-64-408-31-1), QUALIFICATION
TESTS WERE PERFORMED ON MODELS WHICH WERE OF THE
PROTOTYPE CONFIGURATION; TESTING WAS DONE BY THE
EQUIPMENT MANUFACTURER. RFI TESTING TO MIL-
I26600 WAS ALSO PERFORMED BY THE EQUIPMENT
MANUFACTURER; THE ADDITIONAL TESTS REQUIRED BY
ASNR-62-12 TO COVER THE EXTENDED FREQUENCY RANGE
FOR THE CTS WERE PERFORMED BY RCA. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 008

BOEING CO SEATTLE WASH

PERFORMANCE OF OXIDATION RESISTANT COATINGS FOR
COLUMBIUM ALLOYS, (U)

DEC 63 1V DREISBACH, W. GLEN ;

REPT. NO. D2 81111 1

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•REFRACTORY METALS + ALLOYS, PROTECTIVE
TREATMENT), (•COATINGS, OXIDATION), MOLYBDENUM ALLOYS,
TITANIUM ALLOYS, ZIRCONIUM ALLOYS, NIOBIUM ALLOYS,
TANTALUM ALLOYS, HIGHTEMPERATURE RESEARCH, DUCTILITY,
STRAIN (MECHANICS), SALT SPRAY TESTS, WATER VAPOR,
SILICIDES, BOOST-GLIDE VEHICLES, MANNED SPACECRAFT,
RESEARCH PLANES, EMISSIVITY, TEMPERATURE (U)
IDENTIFIERS: 1963, MOLYBDENUM ALLOY TZM, NIOBIUM ALLOY
D-36, NIOBIUM ALLOY FS-82, X-20 SPACECRAFT (U)

AN ANALYSIS WAS MADE OF THE MODE OF FAILURE OF
COATED D-36 AND FS-82 RELATIVE TO THAT OF TZM
FOR ATMOSPHERIC PRESSURE TESTING IN AN OXY-ACETYLENE
TORCH FLAME, IT WAS SHOWN THAT OXIDATION FAILURE
OF COLUMBIUM WAS MUCH MORE SEVERE THAN FAILURE OF
MOLYBDENUM AND THE MODES OF FAILURE ARE PRESENTED AND
DISCUSSED, GAS ANALYSIS OF THE TORCH FLAME SHOWED
THAT THE TEST ENVIRONMENT WAS OXIDIZING IN NATURE AND
THAT AIR ENTRAINMENT IS THE MAJOR FACTOR IN
DETERMINING THE NATURE OF THE COMBUSTION FLAME.
BEND DUCTILITY EVALUATIONS FOR TZM AND D-36
WERE PERFORMED TO DETERMINE WHAT MINIMUM RADIUS
COATED MATERIAL COULD BE BENT TO WITHOUT DEGRADATION
OF ATMOSPHERIC PRESSURE OXIDATION RESISTANCE, THE
FOLLOWING MINIMUM BEND RADII WERE DETERMINED: 1.5
IN. FOR LOW TEMPERATURE CYCLE TZM, (0.001 IN.
COATING) 2 IN. FOR DUPLEX, 4 HOURS AT 1850 F
COATED TZM (0.001 IN. COATING), AND COAT D-36
(0.0012 IN. COATING, 6 HOURS AT 1850 F).
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 911

MARTIN CO BALTIMORE MD

(NO TITLE),

(U)

DESCRIPTIVE NOTE: INTERIM PROGRESS REPT,

AUG 60 73P

REPT. NO. TN DS7 60

CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, COMPATIBILITY),
(•LAUNCH VEHICLES (AEROSPACE), COMPATIBILITY),
(•LAUNCHING SITES, BOOST GLIDE VEHICLES), ATTACHMENT,
RESEARCH PROGRAM ADMINISTRATION, WINDS, RELEASE
MECHANISMS, INSTALLATION, CHECKOUT PROCEDURES, DESIGN,
COSTS, CONFIGURATION, GROUND SUPPORT EQUIPMENT, BLAST,
SPECIFICATIONS, SCHEDULING, EXPLOSION EFFECTS,
FEASIBILITY STUDIES, EFFECTIVENESS, MILITARY
REQUIREMENTS, TEST FACILITIES (U)
IDENTIFIERS: 1960, TITAN, X-20 SPACECRAFT (U)

THE DYNA-SOAR I CONSISTS OF A TITAN STAGE
I BOOSTER, PITCH FINS, YAW FINS, AN EXTENDED
TRANSITION SECTION, A TITAN STAGE II, A
TRANSITION SECTION AND A GLIDER, TO UTILIZE A
TITAN R+D COMPLEX FOR TESTING AND LAUNCHING THE
DYNA-SOAR. SEVERAL AREAS OF INCOMPATIBILITY MUST
BE RESOLVED: (1) BOTH PITCH AND YAW FINS EXTEND
WELL BEYOND THE LIMITS OF THE CURRENT ERECTOR,
(2) THE DYNASOAR CONFIGURATION IS
APPROXIMATELY 25 FEET HIGHER THAN THE CURRENT
ERECTOR, (3) THE DYNA-SOAR LAUNCH CLEARANCE
ENVELOPE IS SUBSTANTIALLY LARGER THAN THE TITAN DUE
TO THE FIN AND GLIDER AREAS, (4) THE UMBILICAL
TOWER IS TOO SHORT TO SERVICE THE DYNA-SOAR
CONFIGURATION AND IS LOCATED WITHIN THE LAUNCH
CLEARANCE ENVELOPE, (5) BOTH THE MISSILE
RELEASE SYSTEM AND UMBILICAL DISCONNECT SYSTEM MUST
BE REDESIGNED BECAUSE OF LAUNCH CLEARANCE PROBLEMS.
ANY COMPLEX MODIFICATION MUST MEET CONFIGURATION AS
WELL AS SYSTEM REQUIREMENTS: (1) EQUIPMENT
WILL WITHSTAND 125-MPH WINDS IN A SECURED CONDITION,
(2) EQUIPMENT WITH ENVIRONMENTAL PROTECTION
(CURTAINS) IN PLACE MUST PROTECT THE MISSILE IN
60-MPH WINDS, (3) EQUIPMENT MUST BE
OPERATIONALLY CAPABLE OF HANDLING THE GLIDER IN 60-
MPH WINDS AND MAINTAIN STRUCTURAL INTEGRITY IN GUSTS
TO 90 MPH, (4) OPERATING POWER AND TIME WILL
BE DESIGNED FOR MAXIMUM LAUNCH CONDITIONS,
(AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 908

MARTIN CO BALTIMORE MD

PRELIMINARY DYNA-SOAR PROPULSION SUB-SYSTEM TEST
PROGRAM (DEVELOPMENT)

(U)

42 11P GREENAWALD, W. J

REPT. NO. ER11374

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), ROCKET MOTORS, MANNED SPACECRAFT,
LAUNCH VEHICLES (AEROSPACE), SECOND STAGE MOTORS,
SEPARATION, MALFUNCTIONS, DETECTORS, TEST METHODS, BASE
FLOW, EXHAUST GASES, ROCKET MOTORS, (LIQUID
PROPELLANTS), ROCKET MOTORS (SOLID PROPELLANTS), CAPTIVE
TESTS, HEAT SHIELDS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE TESTS DESCRIBED FALL INTO TWO GENERAL
CATEGORIES: DEVELOPMENT TESTS AND VERIFICATION
TESTS. THE DEVELOPMENT TESTING EFFORT IS AIMED AT
SOLVING PROBLEMS AND GATHERING INFORMATION ASSOCIATED
WITH: STAGE I BASE HOT GAS CIRCULATION, STAGE
II ROCKET EXHAUST EFFECTS ON THE STAGE I
OXIDIZER TANK DOME, THE MALFUNCTION DETECTION SYSTEM,
PREVALVES AND ASSOCIATED CONTROL SYSTEM, LOW PRESSURE
PROPELLANT DUCTING, PROPELLANT COMPATIBILITY, STAGE
II HEAT SHIELD, AND THE PROPELLANT PRESSURIZATION
SYSTEMS. VERIFICATION TESTING INCLUDES GLIDER
SOLID PROPELLANT ROCKET BLAST ON THE STAGE II
HEAT SHIELD, AND TEMPERATURE CONDITIONING OF THE
EQUIPMENT COMPARTMENTS DURING THE PRE-LAUNCH PERIOD
OF THE COUNTDOWN AND IN VERTICAL TEST. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 906

MARTIN CO BALTIMORE MD

DYNA SOAR STEP I BOOSTER SYSTEM DEVELOPMENT
SPECIFICATION,

(U)

24P

REPT. NO. MB550

CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), (•LAUNCH VEHICLES (AEROSPACE),
SPECIFICATIONS), RESEARCH PROGRAM ADMINISTRATION,
CONFIGURATION, OPERATIONS RESEARCH, RELIABILITY,
MAINTENANCE, QUALITY CONTROL

(U)

IDENTIFIERS: 1961, X-20 SPACECRAFT

(U)

THE BOOSTER SYSTEM, INCLUDING BOTH AIRBORNE AND
GROUND ELEMENTS, TO BE UTILIZED OR DEVELOPED AS A
PART OF THE DYNA SOAR (DS) STEP I SYSTEM.
ALSO INCLUDED ARE THE CONCEPTS, PERFORMANCE
REQUIREMENTS FOR THE BOOSTER DEVELOPMENT.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 008

BOEING CO SEATTLE WASH

PERFORMANCE OF OXIDATION RESISTANT COATINGS FOR
COLUMBIUM ALLOYS.

(U)

DEC 63 IV DREISBACH, W. GLEN ;

REPT. NO. D2 8111 1

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•REFRACTORY METALS + ALLOYS, PROTECTIVE
TREATMENT), (•COATINGS, OXIDATION), MOLYBDENUM ALLOYS,
TITANIUM ALLOYS, ZIRCONIUM ALLOYS, NIOBIUM ALLOYS,
TANTALUM ALLOYS, HIGHTEMPERATURE RESEARCH, DUCTILITY,
STRAIN (MECHANICS), SALT SPRAY TESTS, WATER VAPOR,
SILICIDES, BOOST-GLIDE VEHICLES, MANNED SPACECRAFT,
RESEARCH PLANES. EMISSIVITY, TEMPERATURE (U)
IDENTIFIERS: 1963, MOLYBDENUM ALLOY TZM, NIOBIUM ALLOY
D-36, NIOBIUM ALLOY FS-82, X-20 SPACECRAFT (U)

AN ANALYSIS WAS MADE OF THE MODE OF FAILURE OF
COATED D-36 AND FS-82 RELATIVE TO THAT OF TZM
FOR ATMOSPHERIC PRESSURE TESTING IN AN OXY-ACETYLENE
TORCH FLAME. IT WAS SHOWN THAT OXIDATION FAILURE
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MOLYBDENUM AND THE MODES OF FAILURE ARE PRESENTED AND
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THAT THE TEST ENVIRONMENT WAS OXIDIZING IN NATURE AND
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DETERMINING THE NATURE OF THE COMBUSTION FLAME.
BEND DUCTILITY EVALUATIONS FOR TZM AND D-36
WERE PERFORMED TO DETERMINE WHAT MINIMUM RADIUS
COATED MATERIAL COULD BE BENT TO WITHOUT DEGRADATION
OF ATMOSPHERIC PRESSURE OXIDATION RESISTANCE. THE
FOLLOWING MINIMUM BEND RADII WERE DETERMINED: 1.5
IN. FOR LOW TEMPERATURE CYCLE TZM, (0.001 IN.
COATING) 2 IN. FOR DUPLEX, 4 HOURS AT 1850 F
COATED TZM (0.001 IN. COATING), AND COAT D-36
(0.0012 IN. COATING, 6 HOURS AT 1850 F).

(AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 911

MARTIN CO BALTIMORE MD

(NO TITLE).

(U)

DESCRIPTIVE NOTE: INTERIM PROGRESS REPT,

AUG 60 73P

REPT. NO. TN D57 60

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, COMPATIBILITY),
(*LAUNCH VEHICLES (AEROSPACE), COMPATIBILITY),
(*LAUNCHING SITES, BOOST GLIDE VEHICLES), ATTACHMENT,
RESEARCH PROGRAM ADMINISTRATION, WINDS, RELEASE
MECHANISMS, INSTALLATION, CHECKOUT PROCEDURES, DESIGN,
COSTS, CONFIGURATION, GROUND SUPPORT EQUIPMENT, BLAST,
SPECIFICATIONS, SCHEDULING, EXPLOSION EFFECTS,
FEASIBILITY STUDIES, EFFECTIVENESS, MILITARY
REQUIREMENTS, TEST FACILITIES

(U)

IDENTIFIERS: 1960, TITAN, X-20 SPACECRAFT

(U)

THE DYNA-SOAR I CONSISTS OF A TITAN STAGE
I BOOSTER, PITCH FINS, YAW FINS, AN EXTENDED
TRANSITION SECTION, A TITAN STAGE II, A
TRANSITION SECTION AND A GLIDER. TO UTILIZE A
TITAN R+D COMPLEX FOR TESTING AND LAUNCHING THE
DYNA-SOAR, SEVERAL AREAS OF INCOMPATIBILITY MUST
BE RESOLVED: (1) BOTH PITCH AND YAW FINS EXTEND
WELL BEYOND THE LIMITS OF THE CURRENT ERECTOR,
(2) THE DYNASOAR CONFIGURATION IS
APPROXIMATELY 25 FEET HIGHER THAN THE CURRENT
ERECTOR, (3) THE DYNA-SOAR LAUNCH CLEARANCE
ENVELOPE IS SUBSTANTIALLY LARGER THAN THE TITAN DUE
TO THE FIN AND GLIDER AREAS, (4) THE UMBILICAL
TOWER IS TOO SHORT TO SERVICE THE DYNA-SOAR
CONFIGURATION AND IS LOCATED WITHIN THE LAUNCH
CLEARANCE ENVELOPE, (5) BOTH THE MISSILE
RELEASE SYSTEM AND UMBILICAL DISCONNECT SYSTEM MUST
BE REDESIGNED BECAUSE OF LAUNCH CLEARANCE PROBLEMS.
ANY COMPLEX MODIFICATION MUST MEET CONFIGURATION AS
WELL AS SYSTEM REQUIREMENTS: (1) EQUIPMENT
WILL WITHSTAND 125-MRH WINDS IN A SECURED CONDITION,
(2) EQUIPMENT WITH ENVIRONMENTAL PROTECTION
(CURTAINS) IN PLACE MUST PROTECT THE MISSILE IN
60-MPH WINDS, (3) EQUIPMENT MUST BE
OPERATIONALLY CAPABLE OF HANDLING THE GLIDER IN 60-
MPH WINDS AND MAINTAIN STRUCTURAL INTEGRITY IN GUSTS
TO 90 MPH, (4) OPERATING POWER AND TIME WILL
BE DESIGNED FOR MAXIMUM LAUNCH CONDITIONS,
(AUTHOR)

(U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 908

MARTIN CO BALTIMORE MD

PRELIMINARY DYNA-SOAR PROPULSION SUB-SYSTEM TEST
PROGRAM (DEVELOPMENT)

(U)

42 11P GREENAWALD, W. J

REPT. NO. ER11374

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), ROCKET MOTORS, MANNED SPACECRAFT,
LAUNCH VEHICLES (AEROSPACE), SECOND STAGE MOTORS,
SEPARATION, MALFUNCTIONS, DETECTORS, TEST METHODS, BASE
FLOW, EXHAUST GASES, ROCKET MOTORS, (LIQUID
PROPELLANTS), ROCKET MOTORS (SOLID PROPELLANTS), CAPTIVE
TESTS, HEAT SHIELDS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE TESTS DESCRIBED FALL INTO TWO GENERAL
CATEGORIES: DEVELOPMENT TESTS AND VERIFICATION
TESTS. THE DEVELOPMENT TESTING EFFORT IS AIMED AT
SOLVING PROBLEMS AND GATHERING INFORMATION ASSOCIATED
WITH: STAGE I BASE HOT GAS CIRCULATION, STAGE
II ROCKET EXHAUST EFFECTS ON THE STAGE I
OXIDIZER TANK DOME, THE MALFUNCTION DETECTION SYSTEM,
PREVALVES AND ASSOCIATED CONTROL SYSTEM, LOW PRESSURE
PROPELLANT DUCTING, PROPELLANT COMPATIBILITY, STAGE
II HEAT SHIELD, AND THE PROPELLANT PRESSURIZATION
SYSTEMS. VERIFICATION TESTING INCLUDES GLIDER
SOLID PROPELLANT ROCKET BLAST ON THE STAGE II
HEAT SHIELD, AND TEMPERATURE CONDITIONING OF THE
EQUIPMENT COMPARTMENTS DURING THE PRE-LAUNCH PERIOD
OF THE COUNTDOWN AND IN VERTICAL TEST, (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 906

MARTIN CO BALTIMORE MD
DYNA SOAR STEP I BOOSTER SYSTEM DEVELOPMENT
SPECIFICATION.

(U)

24p

REPT. NO. MB550

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), (*LAUNCH VEHICLES (AEROSPACE),
SPECIFICATIONS), RESEARCH PROGRAM ADMINISTRATION,
CONFIGURATION, OPERATIONS RESEARCH, RELIABILITY,
MAINTENANCE, QUALITY CONTROL

(U)

IDENTIFIERS: 1961, X-20 SPACECRAFT

(U)

THE BOOSTER SYSTEM, INCLUDING BOTH AIRBORNE AND
GROUND ELEMENTS, TO BE UTILIZED OR DEVELOPED AS A
PART OF THE DYNA SOAR (DS) STEP I SYSTEM.
ALSO INCLUDED ARE THE CONCEPTS, PERFORMANCE
REQUIREMENTS FOR THE BOOSTER DEVELOPMENT.
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 903

MARTIN CO BALTIMORE MD

DYNA SOAR STEP-I, BIBLIOGRAPHY OF RESEARCH AND
DEVELOPMENT REPORTS. (U)

APR 61 11P ALLEN, J. H. 1

REPT. NO. ER11349 2

CONTRACT: AFO4 647 610

TASK: 18

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BIBLIOGRAPHIES, BOOST-GLIDE VEHICLES),
(•LAUNCH VEHICLES (AEROSPACE), BIBLIOGRAPHIES), RESEARCH
PROGRAM ADMINISTRATION, MANAGEMENT ENGINEERING, WEIGHT,
CONFIGURATION, PERFORMANCE (ENGINEERING), REPORTS (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

DYNA SOAR STEP I, BIBLIOGRAPHY OF RESEARCH AND
DEVELOPMENT REPORTS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 901

MARTIN CO BALTIMORE MD
DYNA SOAR STEP-1 BOOSTER INSTRUMENTATION SYSTEM
CONFIGURATION DESIGN STUDY, (U)
AUG 61 IV MANNER, C. E. I
REPT. NO. DS25 61 REV. A
CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCH VEHICLES (AEROSPACE),
INSTRUMENTATION), BOOSTER MOTORS, TELEMETRY SYSTEMS,
CONFIGURATION, ANTENNA CONFIGURATIONS, GROUND SUPPORT
EQUIPMENT, RANGE (ESTABLISHMENTS), MEASUREMENTS,
AIRBORNE, TABLES, DATA, PERFORMANCE (ENGINEERING),
RESEARCH PROGRAM ADMINISTRATION, DESIGN, BOOST-GLIDE
VEHICLES (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

FLIGHT TESTING OF THE DYNA-SOAR VEHICLE
REQUIRES SPECIALIZED INSTRUMENTATION CAPABLE OF
PROVIDING DATA TO DEMONSTRATE THE ABILITY OF THE
BOOSTER AND ITS SUBSYSTEMS TO OPERATE IN THE FLIGHT
ENVIRONMENT, TO EVALUATE THE OVERALL SUBSYSTEM
PERFORMANCE AND LOCALIZE MALFUNCTIONS IN THE BOOSTER
SUBSYSTEMS. DATA FROM THE AIRBORNE INSTRUMENTATION
SYSTEM IS NOT USED TO DETERMINE BOOSTER PERFORMANCE
DURING PRELAUNCH COUNTDOWN NOR USED TO CONTROL THE
PERFORMANCE OF OPERATION OF THE BOOSTER DURING
FLIGHT. THE INSTRUMENTATION SYSTEM IS SHOWN TO
REPRESENT THE DESIGN GOAL BEING SOUGHT FOR A TYPICAL
DYNA-SOAR STEP I BOOSTER SYSTEM. THE
INSTRUMENTATION SYSTEM CAPACITY WILL BE INCREASED
SLIGHTLY FOR THE EARLIER DS-1 LAUNCHES TO PROVIDE
ENVIRONMENTAL AND STRUCTURAL DESIGN DATA. THE
STUDY OF THESE PARAMETERS IS REQUIRED BECAUSE OF THE
STRINGENT FLIGHT PROFILE. THE ADDITION OF THE
BOOSTER FINS, AND THE IRREGULAR SHAPED GLIDER,
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 884

SPERRY PHOENIX CO ARIZ

REMOTE CONTROL RECOVERY SYSTEM (RCRS) FLIGHT TEST
PLAN FOR AIR FORCE FLIGHT TEST CENTER (AFFTC), (U)

NOV 63 36P

REPT. NO. 1273 0278

CONTRACT: AF33 657 9614

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, REMOTE CONTROL SYSTEMS), MANNED SPACECRAFT, RECOVERY, TERMINAL FLIGHT FACILITIES, MODELS (SIMULATION), FLIGHT CONTROL SYSTEMS, RESEARCH PROGRAM ADMINISTRATION, TEST METHODS, FLIGHT TESTING, JET FIGHTERS, SIMULATION, COMMAND GUIDANCE, DESCENT TRAJECTORIES, RADAR TRACKING, RADAR BEACONS, TRANSPONDERS, SPECIFICATIONS, LANDINGS, FLIGHT PATHS, TERMINAL GUIDANCE (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, F-104 AIRCRAFT (U)

THE SYSTEM DEVELOPMENT TEST PLAN TO BE CONDUCTED AT EDWARDS AIR FORCE BASE ON THE X-20 REMOTE CONTROL RECOVERY SYSTEM (RCRS) IS OUTLINED. THE RCRS HAS AN INTEGRATED TRACKING, COMMAND AND DATA LINK CAPABILITY AND IS TO BE USED FOR TERMINAL CONTROL AND RECOVERY OF THE X-20 UNMANNED FLIGHTS. FOR THE PURPOSES OF THIS FLIGHT TEST PLAN, THE RCRS FUNCTIONS AND PHYSICAL CHARACTERISTICS REMAIN UNCHANGED, EXCEPT THAT A QF-104 IS SUBSTITUTED AS A TEST BED VEHICLE IN LIEU OF THE X-20. THE SYSTEM CONFIGURATION CONSISTS OF AN AIRBORNE RADAR TRANSPONDER, FLIGHT CONTROL COUPLER, AND AIRSPEED SENSITIVE UNIT INSTALLED IN THE VEHICLE TO BE CONTROLLED, AND TWO GROUND CONTROL STATIONS. THE FLIGHT TEST PROGRAM IS DESIGNED TO CHECK OUT THE RCRS, SIMULATE X-20 RECOVERY, AND PROVIDE CONTROLLER FAMILIARIZATION. THIS SYSTEM TEST PLAN IS THE BASIC PLANNING DOCUMENT TO ACCOMPLISH THE AIMS STATED ABOVE. DETAILED BRIEFINGS CONDUCTED PRIOR TO EACH MISSION SHOULD INCLUDE THE APPLICABLE INFORMATION IN THIS DOCUMENT. MISSION PROFILES ARE PROVIDED FOLLOWING EACH PHASE OF THE TEST PLAN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 879

RADIO CORP OF AMERICA CAMDEN N J INDUSTRIAL ELECTRONIC PRODUCTS

RCA 8540725 SPECIFICATION FOR X-20 (DYNA-SOAR) COMMUNICATION AND TRACKING SUBSYSTEM, VAN SITE EQUIPMENT.

(U)

NOV 62 1v

REPT. NO. RCA8540725

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT EQUIPMENT), (•GROUND SUPPORT EQUIPMENT, BOOST-GLIDE VEHICLES), MOBILE, ANTENNAS, TELEMETER SYSTEMS, VERY HIGH FREQUENCY, SPECIFICATIONS, TRAILERS, ELECTRIC CABLES, WAVEGUIDES, ELECTRONIC EQUIPMENT, X BAND, ELECTROMAGNETIC SHIELDING, ELECTRIC CONNECTORS, TRACKING, SHELTERS, CONTAINERS, RADIO RECEIVERS, RADIO TRANSMITTERS, HIGH ALTITUDE, BORESIGHTING, RADIO COMMUNICATION SYSTEMS, RADAR STATIONS

(U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, AN/GRO-8

(U)

THIS SPECIFICATION DESCRIBES THOSE ELEMENTS OF THE COMMUNICATIONS AND TRACKING SUBSYSTEM COMPOSITE SITE CONFIGURATION WHICH SHALL ACCOMPLISH THE FOLLOWING FUNCTIONS: (1) PROVIDE ANTENNAS CAPABLE OF ACQUIRING, TRACKING, AND RECEIVING SIGNALS RADIATED BY THE DYNA-SOAR VEHICLE AND TRANSMITTING SIGNALS TO THE VEHICLE, (2) PROVIDE THE GROUND EQUIPMENTS CAPABLE OF EXCITING THE TRANSMITTING ANTENNA ELEMENTS WITH THE CORRECT INTELLIGENCE AND POWER LEVELS SUCH THAT COMMUNICATIONS CAN BE ESTABLISHED FROM THE GROUND EQUIPMENT TO THE DYNA-SOAR VEHICLE, (3) PROVIDE THE GROUND EQUIPMENT CAPABLE OF ACCEPTING THE RECEIVED ENERGY FROM THE ANTENNA ELEMENTS AND CONVERTING THIS ENERGY TO SIGNALS AT STANDARD VHF TELEMETRY FREQUENCIES, (4) PROVIDE THE NECESSARY CONTROLS, DISPLAYS, AND MONITORING FUNCTIONS, (5) PROVIDE THE NECESSARY AGE BASE AND RANGE EQUIPMENT, FOR CHECKOUT OF THE PRIME CTS EQUIPMENT, (6) PROVIDE THE NECESSARY CONTAINERS, ENCLOSURES, AND SHELTERS FOR SHIPMENT OF A COMPLETE X-20 CTS GROUND SITE CONFIGURATION AND OTHER FUNCTIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-43: 877

RAYTHEON CO WALTHAM MASS

X-20 (DYNA SOAR) COMMUNICATIONS AND TRACKING
SUBSYSTEM, (U)

DESCRIPTIVE NOTE: FAILURE REPORT TABULATION, 1 JAN-31
MAR 63.

MAR 63 21P

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, COMMUNICATION
EQUIPMENT), MALFUNCTIONS, FAILURE (MECHANICS), TRACKING,
TABLES, MANNED SPACECRAFT (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

FAILURE REPORT TABULATION X-20 (DYNA SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM - 1 JAN-31 MAR
63.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 875

RAYTHEON CO WALTHAM MASS

X-20 (DYNA SOAR) COMMUNICATIONS AND TRACKING
SUBSYSTEM.

(U)

DESCRIPTIVE NOTE: FAILURE REPT. TABULATION, 1 APR-30
JUNE 63.

37P

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, COMMUNICATION
EQUIPMENT), MALFUNCTIONS, FAILURE (MECHANICS), TRACKING,
TABLES, MANNED SPACECRAFT (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

FAILURE REPORT TABULATION X-20 (DYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM-APRIL 1-JUNE
30-1963.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 767

RAYTHEON CO WALTHAM MASS

TEST REPORT DE: MODEL TMR-5A TELEMETRY RECEIVER
(PRELIMINARY) X-20 (DYNA-SOAR) COMMUNICATIONS AND
TRACKING SUBSYSTEM, (U)

SEP 62 IV

REPT. NO. 4 CR62 408 7 41

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (TELEMETERING RECEIVERS, BOOSTGLIDE
VEHICLES), COMMUNICATION SYSTEMS, TRACKING, DISTORTION,
TESTS, PULSE DISCRIMINATORS, MODULATION, MANNED
SPACECRAFT, VIDEO SIGNALS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

TEST REPORT, DE: MODEL TMR-5A TELEMETRY RECEIVER
X-20 (DYNASOAR) COMMUNICATION AND TRACKING SUBSYSTEM,
SPECIAL REPORT NO. 4.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 694

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO

X-20A SITE ACTIVATION MANAGEMENT PLAN, (U)

APR 63 20P

MONITOR: ASD EXHIBIT NO. 620A 6313

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCHING SITES, RESEARCH PROGRAM
ADMINISTRATION), INSTALLATION, CHECKOUT PROCEDURES,
BUILDINGS, MANAGEMENT ENGINEERING, BOOST-GLIDE VEHICLES,
CONSTRUCTION (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

AN OVER-ALL PERSPECTIVE IS PROVIDED FOR THE X-
20A SITE ACTIVATION EFFORT IN SUPPORT OF THE SYSTEM
DEVELOPMENT TESTS. THE SCOPE AND NATURE OF THE
ACTIVATION EFFORT ARE DEFINED AND THE MANAGEMENT
ORGANIZATION RESPONSIBLE FOR ITS CONDUCT IS
OUTLINED. THE SITE ACTIVATION MANAGEMENT
PLAN SERVES DUAL PURPOSES IN (1) COMBINING AND
CORRELATING THE ACTIVATION INFORMATION CONTAINED IN
THE TOP LEVEL PROGRAM DOCUMENTS INTO AN INTEGRAL
BASELINE PLAN AND (2) PROVIDING THE NECESSARY
BRIDGE BETWEEN THE SPP, SOW'S, SYSTEM
SPECIFICATIONS, AND THE DETAILED SITE ACTIVATION
DOCUMENTATION. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 539

RAYTHEON CO WALTHAM MASS

NEW PROCESSES AND TECHNIQUES X-20 (DYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM.

(U)

MAR 64 16P

REPT. NO. CR64 408 32 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*RADIO COMMUNICATION SYSTEMS, BOOST-GLIDE
VEHICLES), (*FREQUENCY CONVERTERS, MANUFACTURING
METHODS), MANNED SPACECRAFT, SUPER HIGH FREQUENCY, ULTRA
HIGH FREQUENCY, GROUND SUPPORT EQUIPMENT, WAVEGUIDES,
NICKEL ALLOYS, STEEL, ELECTROPLATING, CASTING,
MACHINING, BRAZING, WAVEGUIDE COUPLERS (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT, INVAR (U)

THE USE OF INVAR 36 FOR THE E/H SIGNAL TUNER OF
THE AMPLIFIER-FREQUENCY CONVERTER PRESENTED A
NUMBER OF MAJOR MANUFACTURING PROBLEMS DURING THE
EARLY DEVELOPMENT PHASE OF THE PROGRAM, SINCE
CONVENTIONAL FABRICATION TECHNIQUES COULD NOT BE
USED. INITIAL APPROACHES INVOLVING MACHINING AND
BRAZING OPERATIONS FOR THE BREADBOARD MODELS PROVED
TO BE COSTLY AND INEFFECTIVE. THE PROBLEMS
ASSOCIATED WITH THE MANUFACTURE OF THE E/H SIGNAL
TUNER WERE RESOLVED BY DEVELOPING NEW CASTING AND
PLATING TECHNIQUES. INITIAL E/H TUNER UNITS MADE
FROM A PRECISION INVESTMENT CASTING WORKED WELL IN
THE A-FC SYSTEM, AND HAD LESS INSERTION LOSS THAN
THE ORIGINAL BREADBOARD MODELS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-431 335

MARTIN CO DENVER COLO
INTERFACE SPECIFICATION, MANNED SPACECRAFT (X-20) TO
STANDARDIZED SPACE LAUNCHING SYSTEM IFS-T11121000
PROGRAM 624A. (U)

1v

MONITOR: UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, STANDARDIZATION),
(*LAUNCH VEHICLES (AEROSPACE), STANDARDIZATION),
(*GUIDED MISSILE COMPONENTS, STANDARDIZATION), DESIGN,
AERODYNAMIC CHARACTERISTICS, ELECTRICAL EQUIPMENT,
LAUNCHING, CONTROL SYSTEMS, CHECKOUT EQUIPMENT,
MAINTENANCE EQUIPMENT, COMPATIBILITY, MANNED SPACECRAFT,
JOINTS, ATTACHMENT (U)
IDENTIFIERS: 1963, TITAN 3, X-20 SPACECRAFT,
INTERFACES (U)

THIS INTERFACE SPECIFICATION (IFS) AND
ASSOCIATED INTERFACE CONTROL DRAWINGS
(ICD'S) DEFINE AND DELINEATE IN A CONSOLIDATED
SOURCE, ALL INTERFACES BETWEEN THE 620A PROGRAM
EQUIPMENT AND SYSTEMS, AND THE EQUIPMENT AND SYSTEMS
PROVIDED BY THE MARTIN COMPANY (MC) FOR USE IN
THE 624A PROGRAM STANDARDIZED SPACE LAUNCHING
SYSTEM (SSLS). THE INTERFACE REQUIREMENTS
SPECIFIED SHALL BE THOSE PHYSICAL, ELECTRICAL, FLUID,
ENVELOPE, INSTALLATION, TOOLING, PARAMETERIC AND TEST
PROVISION INTERFACES REQUIRED BY EACH AFFECTED
CONTRACTOR TO DESIGN AND TEST HIS RESPECTIVE
EQUIPMENT AND SYSTEMS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 221

BOEING CO SEATTLE WASH

DYNA-SOAR DATA REDUCTION PLAN,

(U)

APR 62

1V

STADLER, W. J. I

REPT. NO. D2 80153

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, TEST METHODS),
MANNED SPACECRAFT, TESTS, DATA PROCESSING SYSTEMS,
SPECIFICATIONS, CORRECTIONS, CHECKOUT PROCEDURES, DATA
STORAGE SYSTEMS, METEOROLOGICAL PARAMETERS, RADAR
TRACKING, INERTIAL GUIDANCE, OPTICAL TRACKING,
CALIBRATION, OPERATIONS RESEARCH, RESEARCH PROGRAM
ADMINISTRATION, EXPERIMENTAL DATA (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE SCOPE OF THIS DOCUMENT INCLUDES THE COLLECTION,
REDUCTION, AND DISTRIBUTION OF DYNA-SOAR TEST
DATA. THE PURPOSE OF THIS DOCUMENT IS TO OUTLINE
THE TYPES AND FLOW OF DATA AS WELL AS THE PROCEDURES,
ORGANIZATIONS, AND FUNCTIONS DIRECTLY INVOLVED IN
REDUCING DYNA-SOAR TEST INFORMATION. THIS PLAN
WILL BE REVISED AND UPDATED TO REFLECT CHANGES IN THE
DYNA-SOAR PROGRAM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-431 217

BOEING CO SEATTLE WASH

QUALIFICATION TEST REQUIREMENTS MIL-FLO TUBE
FITTINGS, REACTION CONTROL SYSTEM, (U)

DEC 62 13P SHERWOOD, C. M. :

REPT, NO. D2 80792

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, FLIGHT CONTROL
SYSTEMS), (•PIPE FITTINGS, FUEL SYSTEMS), TESTS, VISUAL
INSPECTION, COMPATIBILITY, HYDROGEN PEROXIDE, GAS LEAKS,
DEFLECTION, RUPTURE, MILITARY REQUIREMENTS, CONTROL
JETS (U)

IDENTIFIERS: 1962, REACTION CONTROL SYSTEMS, X-20
SPACECRAFT (U)

TESTS CONDUCTED IN COMPLIANCE WITH THE REQUIREMENTS
ARE A QUALIFICATION DEMONSTRATION OF THE ADEQUACY OF
MIL-FLO FITTINGS FOR USE IN THE REACTION CONTROL
SYSTEM. THESE TESTS CHRONOLOGICALLY FOLLOW THE
DEVELOPMENT TESTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 212

BOEING CO SEATTLE WASH

GENERATOR AND CONTROLS UNIT ALTERNATING CURRENT. (U)

AUG 60 1V

REPT. NO. 10 20902

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLE, GENERATORS),

(*GENERATORS, ALTERNATING CURRENT), CORRECTIONS, WIRING
DIAGRAMS, DESIGN, TESTS, TEST METHODS (U)

IDENTIFIERS: 1960, X-20 SPACECRAFT (U)

THESE REVISIONS COVER DESIGN FABRICATION,
PERFORMANCE AND TESTING REQUIREMENTS FOR AN
ENVIRONMENT FREE GENERATOR AND CONTROLS UNIT.

(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 137

HONEYWELL INC ST PETERSBURG FLA

DYNA-SOAR (STEP 1) PRIMARY GUIDANCE SUBSYSTEM, RADIO
FREQUENCY INTERFERENCE CONTROL PLAN, (U)

NOV 61 10P SCHMIDT, A. P. :

REPT. NO. 1179SR11

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), TEST METHODS,
RADIOFREQUENCY INTERFERENCE, TESTS, MATERIALS,
SHIELDING, BONDING, GROUND (ELECTRICAL), DESIGN,
ELECTROMAGNETIC FIELDS, AIRBORNE, FILTERS
(ELECTROMAGNETIC WAVE), MEASUREMENT, CALIBRATION,
SPECIFICATIONS, MILITARY REQUIREMENTS, ELECTRICAL
EQUIPMENT, ELECTRONIC EQUIPMENT, MANNED SPACECRAFT,
RESEARCH PLANES, CONTROL (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THIS DOCUMENT IS AN ELECTRICAL AND MAGNETIC
INTERFERENCE CONTROL PLAN TO BE EMPLOYED DURING
SUBSYSTEM AND COMPONENT DESIGN AND TEST TO ASSURE
SATISFACTORY REDUCTION OF INTERFERENCE TO A LEVEL
COMPATIBLE WITH SYSTEM OPERATION. IT IS SUBMITTED
IN COMPLIANCE WITH SPECIFICATION MIL-126600,
PARAGRAPH 3.4 (INTERFERENCE CONTROL PLAN)
AND THE DYNA SOAR STATEMENT OF WORK EXHIBIT
620A-61-30. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 135

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM,
LOGISTICS PLAN, REVISION C.

(U)

20P

REPT. NO. 1179SR2D
CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GUIDANCE),
(•GUIDANCE, BOOST-GLIDE VEHICLES), LOGISTICS,
MAINTENANCE, DOCUMENTATION, PERSONNEL, TRAINING,
CONTAINERS, TRANSPORTATION, INERTIAL GUIDANCE, GROUND
SUPPORT EQUIPMENT, TEST EQUIPMENT, INSTRUCTION MANUALS,
MALFUNCTIONS, REPORTS, RESEARCH PLANES, MANNED
SPACECRAFT, MANAGEMENT ENGINEERING (U)
IDENTIFIERS: 1963, SPARE PARTS, AEROSPACE GROUND
EQUIPMENT (AGE), X-20 SPACECRAFT (U)

THE STATED OBJECTIVE OF MAKING THE PGS AVAILABLE
ON A MAXIMUM AVAILABILITY BASIS REQUIRES THAT DOWN
TIME BE HELD TO A MINIMUM. TO ACHIEVE THIS MINIMUM
DOWN TIME HONEYWELL HAS ADOPTED A THREELEVEL
MAINTENANCE CONCEPT WHICH IS IMPLEMENTED BY TRAINED
AND EXPERIENCED PERSONNEL. THESE CONCEPTS COVER A
BROAD RANGE OF FAULT ISOLATION, EITHER DOWN TO THE
PGS OR AEROSPACE GROUND EQUIPMENT LEVEL OR
DOWN TO THE DISCREPANT PIECE PART LEVEL, IN
GENERAL, THE FACTORS WHICH DETERMINE MAINTENANCE
LEVEL ASSIGNMENT ARE: (1) ACCESSIBILITY OF THE
REPLACEABLE SUBASSEMBLY AND (2) CAPABILITY OF THE
AEROSPACE GROUND EQUIPMENT (AGE) TO DETECT
THE DISCREPANCY. THE ASSIGNED MAINTENANCE LEVELS
FOR THE PGS AND ASSOCIATED AGE ARE DEFINED AND
DESCRIBED IN THIS REPORT. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 133

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, DATA
REDUCTION PLAN FOR PRIMARY GUIDANCE SUBSYSTEM SLED
TEST PROGRAM. (U)

19P

REPT. NO. 1179SR20
CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), TELEMETERING DATA,
ERRORS, MATHEMATICAL ANALYSIS, SLEDS, DATA PROCESSING
SYSTEMS, TRAJECTORIES, TIME, DATA, GEODESICS, EARTH
MODELS, EQUATIONS, VELOCITY, MAGNETIC TAPE, MANNED
SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE PURPOSE OF THIS DOCUMENT IS TO PRESENT A PLAN
FOR THE REDUCTION OF THE SERIAL BINARY TELEMETRY DATA
FROM X-20A (DYNA-SOAR) PRIMARY GUIDANCE
SUBSYSTEM (PGS) SLED TEST PROGRAM.
PARAMETER DEFINITIONS AND MATHEMATICAL EXPRESSIONS
ARE GIVEN WHICH OUTLINE THE NECESSARY COMPUTATIONS ON
RANGE AND TELEMETRY DATA WHICH ARE REQUIRED TO
PROVIDE ENGINEERING DATA FOR EVALUATION OF THE
OPERATIONAL CAPABILITY OF THE PGS UNDER HIGH-G SLED
ENVIRONMENT. HONEYWELL AERO REPORT 1179SR-
13, PRIMARY GUIDANCE SUBSYSTEM SLED TEST
OPERATION PLAN, DESCRIBES IN DETAIL THE GENERAL
SCOPE AND CONDUCT OF THE SLED TEST PROGRAM,
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-431 040

HONEYWELL INC ST PETERSBURG FLA

DATA REDUCTION PLAN FOR PRIMARY GUIDANCE SUBSYSTEM
FLIGHT TEST PROGRAM. (U)

OCT 62 24P

REPT. NO. 1179SR20

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REPORT ON X-20 (DYNA-SOAR) PRIMARY
GUIDANCE SUBSYSTEM.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GUIDANCE),
(•GUIDANCE, BOOST-GLIDE VEHICLES), MANNED SPACECRAFT,
RESEARCH PLANES, TELEMETERING DATA, RANGES (DISTANCE),
DATA, INERTIAL GUIDANCE, FLIGHT TESTING, DATA PROCESSING
SYSTEMS, PERFORMANCE (ENGINEERING), MATHEMATICAL MODELS,
EQUATIONS, MATHEMATICAL ANALYSIS, ERRORS, MATRIX
ALGEBRA, PROGRAMMING (COMPUTERS), GEODESICS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE PURPOSE OF THIS DOCUMENT IS TO PRESENT A PLAN
FOR THE REDUCTION OF THE X-20 (DYNA-SOAR)
INERTIAL GUIDANCE SUBSYSTEM (IGS) FLIGHT TEST
DATA. DEFINITIONS AND MATHEMATICAL EXPRESSIONS ARE
GIVEN WHICH DELINEATE THE NECESSARY COMPUTATIONS ON
TELEMETRY AND RANGE DATA IN ORDER THAT APPROPRIATE
ENGINEERING DATA IS SUPPLIED TO THE TEST TEAM TO
PERMIT EVALUATION OF THE NAVIGATIONAL CAPABILITY OF
THE IGS UNDER FLIGHT TEST CONDITIONS. MH AERO
REPORT 1179-SR-12, 'INERTIAL GUIDANCE
SUBSYSTEM FLIGHT TEST OPERATION PLAN',
DESCRIBES THE SCOPE AND CONDUCT OF THE FLIGHT TEST
OPERATIONS. SUBSEQUENT REVISIONS TO THIS PLAN WILL
BE ISSUED AS REQUIRED BY TEST RESULTS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 037

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, AIR LAUNCH TEST OPERATION PLAN, (U)
OCT 63 IV REDMOND, J. P. I
REPT. NO. 1179SR32
CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BROOST-GLIDE VEHICLES, GUIDANCE), (•GUIDANCE, BOOST-GLIDE VEHICLES), MANNED SPACECRAFT, RESEARCH PLANES, LAUNCHING, AIRBORNE, TRAINING, TEST METHODS, MAINTENANCE, DATA, DATA PROCESSING SYSTEMS, ANALYSIS, MEASUREMENT, INERTIAL GUIDANCE, FLIGHT TESTING, DIGITAL COMPUTERS, CHECKOUT PROCEDURES, GYROCOMPASSES, ACCELEROMETERS, STABILIZED PLATFORMS, RADIO INTERFERENCE, TELEMETERING DATA, RADAR TRACKING, OPTICAL TRACKING, VOICE COMMUNICATION SYSTEMS, PERSONNEL, NAVIGATION, PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE AIR LAUNCH PHASE OF THE X-20A (DYNA-SOAR) PROGRAM IS THE FIRST PLANNED TEST OF THE COMPLETE DYNA-SOAR GLIDER SYSTEM IN A FLIGHT ENVIRONMENT. AMONG THE OVER-ALL OBJECTIVES OF AIR LAUNCH ARE: (1) VERIFY MAN-MACHINE RELATIONSHIPS AND (2) VALIDATE THE OPERATION OF THE SUBSYSTEMS IN A FLYING GLIDER. THE PLANNING, OBJECTIVES, AND REQUIREMENTS ARE DERIVED FROM OBJECTIVES (1) AND (2) AS STATED ABOVE. HARDWARE MECHANIZATION OF THE PRIMARY GUIDANCE SYSTEM (PGS) DURING AIR LAUNCH WILL BE ESSENTIALLY THE SAME AS THAT OF THE GROUND LAUNCH SYSTEMS. TO ADAPT THE PGS TO AIR LAUNCH CONDITIONS, IT IS NECESSARY TO ADD LIMITED SWITCHING CAPABILITY WITHIN THE GLIDER COCKPIT WHICH WILL BE ACCESSIBLE TO THE PILOT. COUNTDOWN PROCEDURES WILL FOLLOW THOSE TO BE USED DURING GROUND LAUNCH AS CLOSELY AS POSSIBLE, AND ARE BASED ON PROCEDURES WHICH HAVE PREVIOUSLY BEEN USED THROUGHOUT PGS AND SIL TESTING. PGS DATA OBTAINED FROM AIR LAUNCH WILL BE CORRELATED, WHERE COMPATIBLE, WITH DATA OBTAINED FROM ALL OTHER PGS TEST PHASES TO PROVIDE A CONTINUOUS RECORD OF PGS PERFORMANCE UNDER A WIDE VARIETY OF OPERATING CONDITIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 034

MARTIN CO BALTIMORE MD
BOOSTER HYDRAULIC SYSTEM DESIGN STUDY, (U)
AUG 61 30P MITCHELL, E. J. I
REPT. NO. OS 60 61 REV. A
CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•LAUNCH VEHICLES (AEROSPACE), HYDRAULIC
SYSTEMS), (•HYDRAULIC SYSTEMS, DESIGN), BOOST-GLIDE
VEHICLES, SECOND STAGE MOTORS, BOOSTER MOTORS, PUMPS,
ELECTRIC MOTORS, HYDRAULIC SERVOMECHANISMS, ACTUATORS,
ROLL, ROCKET MOTOR NOZZLES, MOVABLE NOZZLES,
CONFIGURATION, ROCKET MOTORS (LIQUID PROPELLANT) (U)
IDENTIFIERS: 1961, TITAN, TITAN 2, X-20 (U)
SPACECRAFT

THREE HYDRAULIC SYSTEM CONFIGURATIONS WERE
CONSIDERED FOR EACH BOOSTER STAGE OF DYNA-SOAR.
THE CHOSEN CONFIGURATION FOR EACH STAGE WAS THAT
PRESENTLY USED ON TITAN II. IN REGARD TO
STAGE II ENGINE PUMP STARTUP, CONSIDERATION WAS
GIVEN TO THE POSSIBILITY OF PUMP STARVATION CAUSED
BY ZERO INITIAL SUCTION PRESSURE AT THE PUMP. IF
TITAN II TEST RESULTS INDICATE THIS TO BE A
PROBLEM, THE ELECTRIC MOTOR PUMP CAN BE OPERATED FROM
TIME OF LAUNCH, THUS PRESSURIZING THE HYDRAULIC
SYSTEM. THE STAGE II ENGINE ACTUATOR STROKE
WILL BE INCREASED TO PROVIDE ≈ 3.5 DEGREES TRAVEL OF
THE ENGINE NOZZLE. THE STAGE II ROLL NOZZLE
ACTUATION GEOMETRY WILL BE REVISED TO PROVIDE ≈ 45
DEGREES TRAVEL OF THE ROLL CONTROL NOZZLE. THE
PRESENT TITAN II ACTUATOR WILL BE RETAINED,
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 032

HONEYWELL INC ST PETERSBURG FLA

GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION
PLAN) VOLUME I, PART II, MAINTENANCE ANALYSIS
SPECIFICATION (TEST OPERATION PLAN),

(U)

209P ROHLFS, I. G. I

CONTRACT: AF33 600 42569

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES (AEROSPACE),
INERTIAL GUIDANCE), (*GROUND SUPPORT EQUIPMENT,
SPECIFICATIONS), (*INERTIAL GUIDANCE, MAINTENANCE),
LOGISTICS, DESIGN, MAINTENANCE EQUIPMENT, MAINTENANCE
PERSONNEL, TESTS, TEST METHODS, CHECKOUT PROCEDURES,
CHECKOUT EQUIPMENT, GUIDANCE, TRANSPORTATION, HANDLING,
OPERATION, ACCEPTABILITY (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THIS MAINTENANCE ANALYSIS SPECIFICATION
(TEST OPERATION PLAN), VOLUME I, PART
II OF THE DYNA SOAR (STEP I) PROGRAM,
'GROUND SUPPORT SYSTEM SPECIFICATION (TEST
OPERATION PLAN)', PRESENTS THE MAINTENANCE
REQUIREMENTS OF THE DYNA SOAR (STEP I)
PRIMARY GUIDANCE SUBSYSTEM (PGS). THE
OPERATIONAL SUPPORT REQUIREMENTS OF THE PGS ARE
PRESENTED IN THE OPERATIONAL GROUND SUPPORT
EQUIPMENT SYSTEM SPECIFICATION (TEST
OPERATION PLAN) (OGSESS), VOLUME I, PART
I OF THIS DOCUMENT. THE MAINTENANCE REQUIREMENTS
PRESENTED ARE BASED ON THE SUPPORT NEEDS OF THE
PRIMARY GUIDANCE SUBSYSTEM (PGS) AND THE
OPERATIONAL SUPPORT EQUIPMENT. THE ELEMENTS OF THE
PGS SHALL INCLUDE THE INERTIAL GUIDANCE
SUBSYSTEM (IGS), THE SECONDARY ATTITUDE
REFERENCE SUBSYSTEM (SARS), AND THE GUIDANCE
MALFUNCTION DETECTION SUBSYSTEM (GMOS). THE
PRIMARY GUIDANCE SUBSYSTEM ASSOCIATE
CONTRACTOR (PGSAC) WILL FURNISH ALL THE ELEMENTS
OF THE PGS AND THE ASSOCIATED AEROSPACE
GROUND EQUIPMENT (AGE) (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-430 955

RADIO CORP OF AMERICA CAMDEN N J DEFENSE ELECTRONIC
PRODUCTS

X-20 CTS DESCRIPTION, X-20 (OYNA-SOAR) COMMUNICATIONS
AND TRACKING SUBSYSTEM. (U)

IV

REPT. NO. 6A CR63 4087 6 2 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•COMMUNICATION SYSTEMS, SPECIFICATIONS),
(•TRACKING, SPECIFICATIONS, AEROSPACE CRAFT, GROUND
SUPPORT EQUIPMENT, SUPERHIGH FREQUENCY, C BAND, ULTRAHIGH
FREQUENCY, ANTENNAS, INSTRUMENTATION, EFFECTIVENESS,
TELEMETRY SYSTEMS, COMMAND AND CONTROL SYSTEMS, TEST
EQUIPMENT (ELECTRONICS) (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

CONTENTS: COMMUNICATIONS AND TRACKING
SUBSYSTEM DESCRIPTION; CTS GLIDER EQUIPMENT;
CTS SURFACE EQUIPMENT; AEROSPACE GROUND
EQUIPMENT; APPENDIX; TEST INSTRUMENTATION
SUBSYSTEM GLIDER COMPONENTS; SLANT-RANGING
ACCURACY. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 883

BOEING CO SEATTLE WASH

DATA SENSOR INSTRUMENTATION INSTALLATION AND
MAINTENANCE MANUAL - GLIDER/TRANSITION STATIC TEST
PROGRAM. (U)

44 1V

REPT. NO. D2 80873

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, INSTRUMENTATION),
INSTRUCTION MANUALS, INSTALLATION, MAINTENANCE, CAPTIVE
TESTS, GUIDED MISSILE COMPONENTS, TRANSDUCERS, WIRING
DIAGRAMS, THERMOCOUPLES, STRAIN GAGES, SAFETY, HAZARDS,
MATERIALS (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

THIS DOCUMENT HAS BEEN PREPARED TO BE USED AS A
MANUAL TO ESTABLISH PROCEDURES FOR INSTALLATION AND
MAINTENANCE OF DATA SENSOR INSTRUMENTATION REQUIRED
ON THE X-20 GLIDER/TRANSITION AND STRUCTURAL
COMPONENTS STATIC TEST PROGRAM. THIS PUBLICATION
WILL BE FURTHER USED AS THE AUTHORITY TO DOCUMENT
LOCATIONS FOR ALL DATA SENSOR TRANSDUCERS AND WILL
PROVIDE SPECIAL INSTRUCTIONS FOR THE DESIGN OF AND
ROUTING OF WIRE BUNDLES. THIS DOCUMENT HAS BEEN
PREPARED IN SECTIONS TO FACILITATE RELEASE OF
PACKAGES OF INFORMATION TO ORGANIZATIONS SUPPORTING
THE X-20 AIRFRAME VERIFICATION TEST
PROGRAM. LISTED BELOW ARE THE SECTIONS OF THE
PUBLICATION PROGRAMMED FOR RELEASE: (1) DATA
SENSOR MAINTENANCE AND INSTALLATION PROCEDURES AND
(2) TRANSDUCER LOCATIONS AND WIRE ROUTING -
GLIDER/TRANSITION SECTION. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 851

RAYTHEON CO WALTHAM MASS

DYNA SOAR (STEP 1) COMMUNICATIONS AND TRACKING
SUBSYSTEM. (U)

DESCRIPTIVE NOTE: RELIABILITY ANALYSIS REPT,

JAN 62 JV

REPT. NO. CR62 408 13 1 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RELIABILITY
(ELECTRONICS)), (•RELIABILITY (ELECTRONICS),
COMMUNICATION SYSTEMS), (•COMMUNICATION SYSTEMS,
RELIABILITY (ELECTRONICS)), (•TRACKING, RELIABILITY
(ELECTRONICS)), (•MANNED SPACECRAFT, BOOST-GLIDE
VEHICLES), FAILURE (MECHANICS), AIRBORNE, GROUND SUPPORT
EQUIPMENT, SUPERHIGH FREQUENCY, DETECTION, AIR-TO-
SURFACE, SURFACE-TO-AIR, COMMAND AND CONTROL SYSTEMS,
CODING, TEMPERATURE, TABLES, RADAR EQUIPMENT, RADIO
EQUIPMENT (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, FAILURE
(ELECTRONICS) (U)

THIS REPORT PRESENTS A DETAILED RELIABILITY
ANALYSIS OF THE DYNA SOAR (STEP 1)
COMMUNICATIONS AND TRACKING SUBSYSTEM (C +
TS). THE ANALYSIS IS BASED ON THE EQUIPMENT
CONFIGURATION AT THE TIME OF THE MOCKUP
INSPECTION. THE MEAN-TIME-BETWEENFAILURE
(MTBF) REQUIREMENTS AND GOALS ARE ESTABLISHED IN
THE APPROVED RELIABILITY PROGRAM PLAN.
RELIABILITY GOALS ARE APPORTIONED TO THE SUBSYSTEM
AND ASSEMBLY LEVELS FOR EACH FUNCTION TO PROVIDE
GUIDANCE TO BOTH THE CONTRACTOR AND THE PURCHASING
ACTIVITY. THIS EFFORT, AS REPORTED IN THE
FOLLOWING SECTIONS, CONSISTS OF DEFINING THE
SUBSYSTEM RELIABILITY REQUIREMENTS IN TERMS OF
SUBSYSTEM COMPONENTS AND MISSION PROFILE. POSSIBLE
EFFECTS OF HUMAN FACTORS UPON EQUIPMENT RELIABILITY
THROUGHOUT THE TEST, MAINTENANCE, AND OPERATIONAL
PHASES OF THE DYNA SOAR PROGRAM AND THE
DETRIMENTAL EFFECTS OF STORAGE, HANDLING, SHIPPING,
MAINTENANCE, ETC., ARE CONSIDERED. CIRCUIT PART
STRESS ANALYSIS AND RELIABILITY PREDICTIONS ARE BEING
OBTAINED FOR THE PRIME EQUIPMENT AT VARIOUS STAGES OF
DEVELOPMENT. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 849

HONEYWELL INC ST PETERSBURG FLA

X-20 DYNA-SOAR PRIMARY GUIDANCE SUBSYSTEM, INERTIAL
GUIDANCE SUBSYSTEM, FLIGHT TEST OPERATION PLAN, (U)

NOV 62 1V STEPHENSON, S. K. :

REPT. NO. 1179SR12 REV. A

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GUIDANCE),
(•GUIDANCE, BOOST-GLIDE VEHICLES), MANNED SPACECRAFT,
RESEARCH PLANES, FLIGHT TESTING, INERTIAL GUIDANCE,
CHECKOUT PROCEDURES, INSTALLATION, TESTS, TEST METHODS,
DATA, DATA PROCESSING SYSTEMS, REPORTS, GROUND SUPPORT
EQUIPMENT, TRACKING, TEST VEHICLES, TELEMETERING DATA,
OSCILLOGRAPHS, TEST FACILITIES, RANGES (ESTABLISHMENTS),
TESTS EQUIPMENT, ENVIRONMENTAL TEST, STABILIZED
PLATFORMS, NAVIGATION, RELIABILITY, PERFORMANCE
(ENGINEERING), RADAR TRACKING, C BAND, JET FIGHTERS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT, F-101
AIRCRAFT (U)

THE X-20 (DYNA-SOAR) FLIGHT TEST
PROGRAM IS THE FIRST OUT-OF-PLANT PHASE IN AN OVER-
ALL DEVELOPMENT TEST PROGRAM INTENDED TO
DEMONSTRATE PERFORMANCE OF THE INERTIAL GUIDANCE
SUBSYSTEM (IGS), FLIGHT TESTS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 793

RAYTHEON CO WALTHAM MASS

ELECTROMAGNETIC COMPATIBILITY TEST PLAN X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM, (U)

NOV 62 1V

REPT. NO. CR62 408 15 5 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RADIOFREQUENCY INTERFERENCE), (•RADIOFREQUENCY INTERFERENCE, BOOST-GLIDE VEHICLES), TESTS, TEST METHODS, AIRBORNE, GROUND SUPPORT EQUIPMENT, RADIO COMMUNICATION SYSTEMS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE GENERAL TEST PLAN FOR THE ELECTROMAGNETIC COMPATIBILITY INTEGRATION TESTS TO BE PERFORMED DURING THE FLIGHT TEST PROGRAM OF THE X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM AT THE RCA NEW CASTLE ENGINEERING FACILITY, DELAWARE IS DESCRIBED. THE TESTS DESCRIBED ARE DIVIDED INTO TWO BASIC GROUPS. THE FIRST GROUP IS ASSIGNED TO AIRBORNE EQUIPMENTS; THE SECOND GROUP IS ASSIGNED TO SURFACE EQUIPMENTS. EACH GROUP IS FURTHER DIVIDED INTO SPECIFIC TEST ITEMS. EACH TEST ITEM IS DESIGNED TO PRESENT A PORTION OF THE INFORMATION REQUIRED TO DETERMINE THE OVER-ALL ELECTROMAGNETIC COMPATIBILITY STATUS OF THE CTS. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 791

RADIO CORP OF AMERICA CAMDEN N J DEFENSE ELECTRONIC
PRODUCTS
AIRBORNE INSTRUMENTATION PLAN FOR DEVELOPMENT TEST
PROGRAM, X-20 (DYNA-SOAR), COMMUNICATIONS AND
TRACKING SUBSYSTEM. (U)

NOV 63 1V

REPT. NO. CR63 408 15 1 4 1

CONTRACT: AF33 657 134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•INSTRUMENTATION, AIRBORNE), (•BOOST GLIDE
VEHICLE, INSTRUMENTATION), MAGNETIC TAPE, MAGNETIC
RECORDING SYSTEMS, SUPER HIGH FREQUENCY, ULTRA HIGH
FREQUENCY, PHOTOGRAPHIC RECORDING SYSTEMS, DATA
TRANSMISSION SYSTEMS, PULSE MODULATION, FREQUENCY
MODULATION, TELEMETER SYSTEMS, DATA PROCESSING SYSTEMS,
CODING, MULTIPLEX (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

IN ORDER TO EVALUTE THE COMMUNICATION AND
TRACKING SUBSYSTEM FOR THE DEVELOPMENT FLIGHT
TEST PROGRAM, IT WILL BE NECESSARY TO ACQUIRE
TEST DATA BOTH IN THE C-97 TEST AIRCRAFT AND AT THE
GROUND SITE. THIS DOCUMENT DETAILS THE TECHNICAL
APPROACH IN THE DESIGN OF THE AIRBORNE
INSTRUMENTATION SYSTEM FOR THE DEVELOPMENTAL
EVALUATION OF THE GLIDER PORTION OF THE X-20 CTS
AND FURNISHES A TECHNICAL DESCRIPTION OF THE
EQUIPMENT. THE SYSTEM USES TWO 14-TRACK MAGNETIC
TAPE RECORDERS AND A 16-MM CINE CAMERA TO PROVIDE
PERMANENT TEST DATA RECORDS. THE AIRBORNE
INSTRUMENTATION IS ALSO USED TO SIMULATE CERTAIN
GLIDER SIGNALS NECESSARY TO EVALUATE THE CTS.
(AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 789

RAYTHEON CO WALTHAM MASS
DEVELOPMENT TEST PLAN DYNA-SOAR COMMUNICATIONS AND
TRACKING SUBSYSTEM. (U)

1V

REPT. NO. CR62 408 15 0

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*RESEARCH PROGRAM ADMINISTRATION, BOOST-
GLIDE VEHICLES), (*BOOST-GLIDE VEHICLES, RESEARCH
PROGRAM ADMINISTRATION), SCHEDULING, TESTS, TEST
FACILITIES, INSTRUMENTATION, TEST METHODS, TELEMETER
SYSTEMS, RADIO COMMUNICATION SYSTEMS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, AN/GRQB, AN/ARO-
22 (U)

THIS PRELIMINARY DEVELOPMENT TEST PLAN FOR
THE DYNA-SOAR COMMUNICATIONS AND TRACKING
SUBSYSTEM IS INTENDED AS A DEFINITION OF THE THE
OVERALL SCOPE OF THE PROGRAM, AND MAY BE USED TO
ASSIST IN THE PLANNING AND IMPLEMENTATION OF THE
SUPPORT REQUIRED FROM CONTRIBUTING ORGANIZATIONS.
THE DOCUMENT INCLUDES SCHEDULES, OBJECTIVES,
INSTALLATION DATA, AND DESCRIPTIONS OF TEST
CATEGORIES WHICH ARE COVERED IN A GENERAL MANNER.
DETAIL DESCRIPTIONS AND PLANS ARE CONTAINED IN
OTHER SOURCES WHICH ARE REFERENCED IN THIS DOCUMENT.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 787

RAYTHEON CO WALTHAM MASS

QUALITY ASSURANCE CHECK LISTS AIRBORNE RADIO SET

PROTOTYPE EQUIPMENT, X-20 (DYNA-SOAR),

COMMUNICATIONS AND TRACKING SUBSYSTEM,

(U)

SEP 63 1V

REPT. NO. CR63 40816 3 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•QUALITY CONTROL, TESTS), (•RADIO COMMUNICATION SYSTEMS, AIRBORNE), (•CHECKOUT PROCEDURES, RADIO COMMUNICATION SYSTEMS), TEST METHODS, BOOST-GLIDE VEHICLES, COUPLING CIRCUITS, RADIO TRANSMITTERS, RADIO RECEIVERS, INTERCOMMUNICATION SYSTEMS, ULTRAHIGH FREQUENCY, DATA TRANSMISSION SYSTEMS, MANNED SPACECRAFT (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE QUALITY ASSURANCE CHECK LISTS FOR THE COMMUNICATION-TRACKING SUBSYSTEM AIRBORNE RADIO SET PROTOTYPE EQUIPMENT ARE DISCLOSED. THE FOLLOWING UNITS ARE DISCUSSED: TRANSMITTER, TEST-DATA VOICE, MULTICOUPLER, TRANSMITTER ANTENNA, RECEIVER, COMMAND, CONTROL/INTERCOM, UHF RECEIVER/TRANSMITTER, VOICE, UHF RECEIVER TRANSMITTER, SEARCH AND RESCUE. (AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 774

BOEING CO SEATTLE WASH

TEST PLAN FOR LAUNCH CONTROL EQUIPMENT SYSTEM
EVALUATION.

(U)

DEC 63 17P AVOLIO, J. A. I

REPT. NO. D2 80965 1

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), CHECKOUT PROCEDURES, TEST METHODS, TEST
EQUIPMENT, TEST FACILITIES, SCHEDULES, PERFORMANCE
(ENGINEERING), LIQUEFIED GASES, NITROGEN, HYDROGEN,
OXYGEN, ELECTRICAL EQUIPMENT, HANDLING, CHECKOUT
EQUIPMENT, MODEL TESTS, MODELS (SIMULATIONS), RECORDING
SYSTEMS, LAUNCHING, LIQUID ROCKET PROPELLANTS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, LAUNCH CONTROL
EQUIPMENT (U)

THIS DOCUMENT PROVIDES A TEST PLAN FOR EVALUATION
OF THE LAUNCH CONTROL EQUIPMENT (LCE) SYSTEM
AS PERFORMED BY THE LAUNCH CONTROL EQUIPMENT
GROUP. THIS TEST PLAN DOCUMENT DESCRIBES THE
EQUIPMENT, TEST REQUIREMENTS, SCHEDULES, FACILITIES
AND TEST EQUIPMENT REQUIRED FOR EVALUATION OF THE
LCE SYSTEM. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 747

BOEING CO SEATTLE WASH

SEAL INSTALLATION REQUIREMENTS AND PROCEDURES FOR X-
20 HYDRAULIC COMPONENTS, (U)

AUG 63 23P HOSEY, E. C. ; HULL, J. W. ;

REPT. NO. D2 80822

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, HYDRAULIC SYSTEMS),
(•HYDRAULIC SEALS, BOOST-GLIDE VEHICLES), HYDRAULIC
SEALS, SPECIFICATIONS, SMALL TOOLS, CLEANING, HANDLING,
INSTALLATION, STORAGE, MILITARY REQUIREMENTS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

GENERAL DIRECTIONS ARE GIVEN FOR THE ASSEMBLY OF
X-20 HYDRAULIC COMPONENT PARTS AND SEALS. THE
REQUIREMENTS OF CLEANLINESS AND CARE OF HANDLING ARE
DEFINED FOR THE OPERATIONS OF CLEANING, PACKAGING,
STORING AND ASSEMBLY. DESIGN REQUIREMENTS ARE
OUTLINED FOR USE IN DESIGNING SPECIAL TOOLS USED IN
THE ASSEMBLY OF HYDRAULIC PARTS. (AUTHOR) (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 471

BOEING CO SEATTLE WASH
INDICATOR - ALTITUDE,

APR 61 21P

REPT. NO. 10 20928

(U)

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (ALTIMETERS, SPECIFICATIONS), MECHANICAL
DRAWINGS, BOOST-GLIDE VEHICLES, DIGITAL SYSTEMS,
DESIGN

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

SPECIFICATION FOR ALTITUDE INDICATOR FOR THE X-20
SPACECRAFT.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 469

BOEING CO SEATTLE WASH

INDICATOR - ENERGY MANAGEMENT DISPLAY. (U)

FEB 61 25P

REPT. NO. 10 20925

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, ENERGY MANAGEMENT),
(•FLIGHT INSTRUMENTS, ENERGY MANAGEMENT),
SPECIFICATIONS, MECHANICAL DRAWINGS, THRUST, DISPLAY
SYSTEMS, CATHODE RAY TUBES, CONSTRUCTION, INSTALLATION,
ILLUMINATION, INSTRUMENT PANELS, QUALITY CONTROL,
ACCEPTABILITY, RELIABILITY, ENVIRONMENTAL TESTS, VIEWING
SCREENS, PERFORMANCE (ENGINEERING), DESIGN,
MANUFACTURING METHODS (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THIS DRAWING COVERS THE DESIGN, FABRICATION,
PERFORMANCE, AND TESTING REQUIREMENTS FOR ONE TYPE OF
EQUIPMENT DESIGNATED AS ENERGY MANAGEMENT
DISPLAY INDICATOR. THIS INDICATOR WILL DISPLAY
ENERGY MANAGEMENT AND/OR OTHER TYPES OF X-Y
COORDINATE INFORMATION TO THE PILOT. (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 467

BOEING CO SEATTLE WASH

INDICATOR- ATTITUDE-DIRECTOR.

(U)

43 29P

REPT. NO. 10 20926

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (ATTITUDE INDICATORS, SPECIFICATIONS),
(FLIGHT INSTRUMENTS, ATTITUDE INDICATORS), DESIGN,
DISPLAY SYSTEMS, MECHANICAL DRAWINGS, OPTICAL COATINGS,
CONSTRUCTION, PERFORMANCE (ENGINEERING), ACCEPTABILITY,
RELIABILITY, BOOST-GLIDE VEHICLES, MANUFACTURING
METHODS, MAINTENANCE, INSTALLATION, PITCH (MOTION),
ROLL, AZIMUTH

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

THIS DRAWING COVERS THE DESIGN, FABRICATION,
PERFORMANCE, AND TESTING REQUIREMENTS FOR ONE TYPE OF
REMOTE ATTITUDE-DIRECTOR INDICATOR. THE
INDICATION DISPLAYS PITCH, ROLL AND AZIMUTH ATTITUDE
INFORMATION WITH FULL FREEDOM ABOUT EACH AXIS AND
FLIGHT-DIRECTOR INFORMATION PRESENTED BY MEANS OF
METER MOVEMENTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 432

RADIO CORP OF AMERICA CAMDEN N J DEFENSE ELECTRONIC
PRODUCTS

LIGHTNING STRIKE PROTECTION, X-20 (OYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM.

(U)

FEB 64 26P

REPT. NO. CR64 408 26 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•LIGHTNING, ELECTRONIC EQUIPMENT),
(•ELECTRONIC EQUIPMENT, LIGHTNING), STRUCTURES,
COMMUNICATIONS EQUIPMENT, MANNED SPACECRAFT, WIND,
STORMS, DAMAGE

(U)

IDENTIFIERS: 1964, X-20 SPACECRAFT

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 176

RAYTHEON CO WALTHAM MASS

ANALYSIS OF AIRBORNE ANTENNA LOBING X-20 (DYNASOAR)

COMMUNICATIONS AND TRACKING SUBSYSTEM, (U)

FEB 64 1V

REPT. NO. CR64 408 25 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (ANTENNA LOBES, SUPERHIGH FREQUENCY),
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, RESEARCH
PLANES, TRACKING, AIRPLANE ANTENNAS, COMMAND + CONTROL
SYSTEMS, VOICE COMMUNICATION SYSTEMS, POSITION FINDING,
ULTRAHIGH FREQUENCY, C BAND, MATHEMATICAL ANALYSIS,
ANTENNA RADIATION PATTERNS, COMMUNICATION SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT, 1964, CTS (U)

THE X-20 COMMUNICATIONS AND TRACKING
SUBSYSTEM (CTS) REPRESENTED THE FIRST DEVELOPMENT
EFFORT TO OBTAIN AN OPERATIONAL RE-ENTRY
COMMUNICATION SUBSYSTEM. IT WAS TO PROVIDE FOR
(1) VOICE COMMUNICATION WITH THE X-20 PILOT FOR
THE SEVERAL MISSION PHASES; (2) TRANSMISSION OF
TEST DATA DURING BOOST AND RE-ENTRY CONDITIONS; AND
(3) SURFACE-DERIVED POSITION INFORMATION IN THREE
COORDINATES. TO ACCOMPLISH THESE FUNCTIONS, THE
CTS WAS TO PROVIDE THE FOLLOWING RADIO LINKS:
GLIDER-TO-SURFACE TEST-DATA/VOICE ON SHF;
SURFACE-TO-GLIDER COMMAND ON SHF, GLIDER-TO-
SURFACE VOICE (225 - 400 MC), SURFACE-TO-GLIDER
COMMAND (UHF), RADAR TRACKING (C-BAND), AND
PILOT-TO-SEARCH CRAFT-TO-PILOT (240 - 250 MC).
(AUTHOR) (U)

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-429 195

HONEYWELL INC BOSTON MASS

DYNA-SOAR (STEP 1) PRIMARY GUIDANCE SUBSYSTEM, (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT., 1 OCT-31
DEC 61.

JAN 62 21P

REPT. NO. 11790R1

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ALL-INERTIAL GUIDANCE, BOOSTGLIDE
VEHICLES), (•BOOST-GLIDE VEHICLES, INERTIAL GUIDANCE),
MANNED SPACECRAFT, DESIGN, STABILIZED PLATFORMS,
GIMBALS, TEST EQUIPMENT (ELECTRONICS), SCHEDULING (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THE INERTIAL GUIDANCE SYSTEM DESIGN IS PROGRESSING,
RESULTING IN A HIGH PERCENTAGE OF RELEASES OF
SPECIFICATIONS AND DRAWINGS, FABRICATION OF THESE
RELEASED ITEMS IS PROCEEDING ON SCHEDULE.
SUBASSEMBLY TEST EQUIPMENT IS ALSO PROCEEDING WELL,
WITH MINOR CHANGES IN THE TESTING PLAN, THE NEW
STATEMENT OF WORK WAS PRICED OUT IN DETAIL,
(AUTHOR) (U)

UNCLASSIFIED

015416

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-429 192

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM. (U)
DESCRIPTIVE NOTE: INTERIM VIBRATION TEST REPT.,
OCT 63 1V DUBENDORFF, H. H. I
REPT. NO. AERO 1179SR34A
CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, INERTIAL GUIDANCE),
(*ALL-INERTIAL GUIDANCE, BOOSTGLIDE VEHICLES), MANNED
SPACECRAFT, VIBRATION, ENVIRONMENTAL TESTS,
MALFUNCTIONS, INSTRUMENTATION (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE FIRST PHASE OF VIBRATION TESTING WAS PERFORMED ON THE X-20A INERTIAL MEASURING UNIT AND COUPLER ELECTRONICS UNIT (IMU AND CEU) AS PART OF THE X-20A ENVIRONMENTAL TEST PROGRAM. THE PURPOSE OF THE FIRST PHASE OF TESTING WAS TO LOCATE POTENTIAL PROBLEM AREAS, PERMITTING DESIGN CHANGES PRIOR TO THE FINAL PHASE OF VIBRATION TESTING. FULL LEVEL RANDOM VIBRATION TESTING WAS PERFORMED ALONG TWO AXES OF THE CEU (THE VERTICAL AXIS, AND THE HORIZONTAL LINE OF FLIGHT AXIS). FAILURES DUE TO VIBRATION OCCURRED IN A CHOPPER MODULE OF THE PULSE REBALANCE ELECTRONICS, AND A FREQUENCY STANDARD IN THE PRECISION VOLTAGE AND TIMING ASSEMBLY. A DC SUPPLY DIODE BRACKET SHORT AND A STRUCTURAL FAILURE OF THE CEU BASE PLATE WERE ALSO EXPERIENCED. FULL LEVEL RANDOM VIBRATION TESTING WAS PERFORMED ALONG TWO AXES OF THE IMU (THE HORIZONTAL AXES, ALONG AND PERPENDICULAR TO THE LINE OF FLIGHT), TWO BROKEN WIRES IN THE PLATFORM ELECTRONICS WERE ATTRIBUTED TO VIBRATION FATIGUE. DESIGN CHANGES WERE PERFORMED TO CORRECT THE PROBLEMS DISCOVERED DURING THE TESTS, (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-427 445

BELL AEROSYSTEMS CO BUFFALO N Y
EVALUATION OF WATER RELIEF VALVE, J, PND, CLRK P/N P21-
673, AND WATER FILL VALVES, J, PND, CLRK P/N P42-
228. (U)

MAY 63 5P

REPT. NO. 82332 19 2

MONITOR: IDEP 925.70.61.47-C4-02

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (VALVES, PERFORMANCE (ENGINEERING)),
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, RESEARCH
PLANES, SEALS (STOPPERS), PRESSURE, CHECK VALVES, SAFETY
VALVES (U)
IDENTIFIERS: 1963, IDEP, X-20 SPACECRAFT, LEAKAGE (U)

EVALUATION OF WATER RELIEF VALVE JAMES, POND, CLARK
P/N P21-673, AND WATER FILL VALVES, JAMES, POND,
CLARK P/N P42-228; EXTERNAL LEAKAGE, CRACKING PRESSURE,
RESEAT PRESSURE, INTERNAL LEAKAGE AND FLOW RATE VS, PRESSURE
DROP.

UNCLASSIFIED

015416

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-428 990

RAYTHEON CO WALTHAM MASS

X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING
SUBSYSTEM, SAFETY CHECK LIST. (U)

FEB 64 14P

REPT. NO. CR64-408 24 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, SAFETY), MANNED
SPACECRAFT, RESEARCH PLANES, MAINTENANCE PERSONNEL,
ELECTRICAL EQUIPMENT, ELECTRONIC EQUIPMENT,
COMMUNICATION SYSTEMS, PROTECTIVE CLOTHING, SAFETY
DEVICES, CHECKOUT PROCEDURES, TRACKING (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

THE SAFETY PLAN FOR THE X-20 (DYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM (CTS)
ESTABLISHES THE CONTRACTUAL REQUIREMENTS FOR THE CTS
SAFETY PROGRAM, AND ATTEMPTS, WITHIN CONTRACTUAL
LIMITATIONS, TO COMPLY WITH THE INTENT OF THE
NONCONTRACTUAL SAFETY SPECIFICATION, ASNR-3
(DYNA-SOAR), 25 JANUARY 1962. THE SAFETY
PLAN REQUIRES ESTABLISHMENT OF SAFETY DESIGN
CRITERIA TO ACCOMPLISH THE FOLLOWING: (A) DEFINE
SAFETY REQUIREMENTS TO BE USED IN THE DESIGN OF
EQUIPMENT, (B) PROVIDE SOURCE INFORMATION FOR
DESIGNERS, TO AVOID THE NECESSITY FOR EACH DESIGNER
TO SEARCH ALL EXISTING CONTRACTOR AND AIR FORCE
SAFETY DOCUMENTATION, (C) PROVIDE THE BASIS FOR
DESIGN REVIEW CHECKLISTS TO ENSURE THAT THE DESIGN
HAS, IN FACT, COMPLIED WITH ALL SAFETY DESIGN
REQUIREMENTS, AND THAT THE EQUIPMENT DESIGN PROVIDES
SAFETY COMPATIBLE WITH SUPPORT EQUIPMENT AND THE
AREAS OF OPERATION, (D) PROVIDE SOURCE
INFORMATION TO MONITOR ALL DESIGN CHANGES, TO ENSURE
COMPLIANCE WITH ESTABLISHED SAFETY DESIGN
REQUIREMENTS, AND (E) IDENTIFY AREAS OF CONFLICT
BETWEEN DYNA-SOAR PROGRAM SAFETY REQUIREMENTS AND
THOSE REQUIREMENTS ESTABLISHED BY AMR AND PMR
RANGE SAFETY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-427 130

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
APPLICATION OF AERODYNAMIC LIFT IN ACCOMPLISHING
ORBITAL PLANE CHANGE. (U)

SEP 63 42P BELL, ROLAND N. ; HANKEY,

WILBUR L. , JR. ;

MONITOR: ASD TDR63 693

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE ASD 1963 SCIENCE
AND ENGINEERING SYMPOSIUM, 18-19 SEP 63,

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AERODYNAMIC
CHARACTERISTICS), MANEUVERABILITY, MANNED SPACECRAFT,
HYPERSONIC CHARACTERISTICS, OPTIMIZATION, ORBITAL
TRAJECTORIES, ANALYSIS, ATMOSPHERE ENTRY, DESCENT
TRAJECTORIES, PROPULSION, HYPERSOUND FLOW, ANGLE-OF-
ATTACK, ATTITUDE CONTROL SYSTEMS, THRUST VECTOR CONTROL
SYSTEMS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THIS STUDY CONSIDERS THE CONCEPT OF A HYPERSOUND
GLIDER-TYPE SPACECRAFT UTILIZING ITS AERODYNAMIC
MANEUVERING CAPABILITY IN PERFORMING ORBITAL PLANE
CHANGE. FOR LIFTING VEHICLES AN OPTIMIZATION
PROCEDURE IS DEVELOPED WHICH DEFINES THE PROPER
VEHICLE ATTITUDE, PROPULSION UTILIZATION AND SEQUENCE
OF OPERATIONS TO PRODUCE THE MAXIMUM PLANE CHANGE FOR
A GIVEN FUEL EXPENDITURE. THE RESULTS OBTAINED ARE
COMPARED WITH THE FUEL REQUIREMENTS FOR A PURE
PROPULSION (NONLIFTING) PLANE CHANGE WHILE
REMAINING IN ORBIT. SPECIFICALLY, THE OPTIMUM BANK
ANGLE, ANGLE OF ATTACK, ENTRY ANGLE, THRUST ALIGNMENT
AND THRUSTING PROCEDURES ARE DEFINED. IN ADDITION,
THE ADVANTAGES OF HIGH L/D VEHICLES ARE GRAPHICALLY
ILLUSTRATED. THE METHOD IS SEEN TO BE MORE
EFFICIENT THAN THE PURE PROPULSION METHOD, BUT IS
FOUND TO BE FAR MORE COMPLEX AND REQUIRES LONGER
TIMES TO EXECUTE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-425 931

BOEING CO SEATTLE WASH

EXTERNAL SURFACE PANELS (NON-INSULATED) DEVELOPMENT -
DYNA-SOAR, (U)

JUL 63 233P SCHNEIDER, R. D. I

REPT. NO. D2 80084 VOL. 1

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: •BOOST-GLIDE VEHICLES , AIRFRAMES ,
ATMOSPHERE ENTRY , BONOEO JOINTS , ENVIRONMENTAL TESTS ,
INSTRUMENTATION , MATERIALS , MECHANICAL PROPERTIES ,
PRESSURE , SHEAR STRESSES , SIMULATION , SONIC FATIGUE ,
SPACE ENVIRONMENTAL CONDITIONS , SURFACE PROPERTIES ,
SURFACE TEMPERATURES , TEST METHODS , THERMAL INSULATION ,
THERMAL STRESSES (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-425 040

DEFENSE DOCUMENTATION CENTER ALEXANDRIA VA
ORBITAL SPACE STATION SYSTEM STUDY. AEROSPACE
PLANES.

(U)

DESCRIPTIVE NOTE: BIBLIOGRAPHY FOR JAN 58-NOV 63,
NOV 63 18P

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BIBLIOGRAPHIES, SPACECRAFT),
(•SPACECRAFT, BIBLIOGRAPHIES), LAUNCH VEHICLES,
(AEROSPACE), MANNED SPACECRAFT, SPACE CAPSULES,
RENDEZVOUS SPACECRAFT, AEROSPACE PLANES, LUNAR BASES,
LUNAR SURFACE VEHICLE, RECOVERABLE BOOSTERS, ROCKET
PLANES, BOOST-GLIDE VEHICLES, SPACE FLIGHT, ORBITAL
TRAJECTORIES, RENDEZVOUS TRAJECTORIES, LUNAR
TRAJECTORIES, CIRCUMLUNAR TRAJECTORIES, LAUNCHING,
LANDINGS, SPACE STATIONS

(U)

IDENTIFIERS: 1963, AGENA, APOLLO, CENTAUR, X-20
SPACECRAFT, X-15 AIRCRAFT, TITAN 3, GEMINI, MERCURY
PROJECT, SATURN, TITAN

(U)

THIS BIBLIOGRAPHY CONTAINS APPROXIMATELY
60 REFERENCES CONCERNED WITH THE DESIGN, LAUNCH,
FLIGHT, AND LANDING ASPECTS OF SPECIFIC LAUNCH
VEHICLES, BOOST-GLIDE VEHICLES, MANNED SPACE
CAPSULES, ROCKET PLANES, AND AEROSPACE PLANES.
LUNAR BASES, AND LUNAR SURFACE VEHICLES ARE ALSO
CITED. (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-423 012

NORTH AMERICAN AVIATION INC DOWNEY CALIF
FLIGHT VEHICLE STRUCTURAL DESIGN CRITERIA, RECOVERY
PHASE.

DESCRIPTIVE NOTE: REPT. FOR 1 JULY 62-30 JUNE 63.

SEP 63 230P

REPT. NO. SID63 378

CONTRACT: AF33 657 9020

PROJ: 1367

TASK: 136702

MONITOR: ASD TDR63 453

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MANNED SPACECRAFT, RECOVERY), (REENTRY
VEHICLES, AERODYNAMIC LOADING), STRUCTURES, DESIGN,
RESEARCH PLANES, ROCKET PLANES, SPACE CAPSULES,
ATMOSPHERE ENTRY, AERODYNAMIC HEATING, HEAT SHIELDS,
STRESS (PSYCHOLOGY), TOLERANCES (PHYSIOLOGY), DESCENT
TRAJECTORIES, DECELERATION, DRAG, INFLATABLE STRUCTURES,
BALLOONS, ROTOR BLADES, DRAG PARACHUTES, PARAWINGS,
LANDING GEAR, WATER ENTRY, RETRO ROCKETS, LOAD
DISTRIBUTION, REVIEWS (U)
IDENTIFIERS: 1963, X-15 AIRCRAFT, X-20 AIRCRAFT (U)

STRUCTURAL LOADING AND HEATING CONDITIONS FOR THE
RECOVERY PHASE OF FLIGHT ARE PRESENTED FOR CURRENTLY
FEASIBLE RECOVERY TECHNIQUES. REQUIREMENTS FOR
PROTECTION OF CREW MEMBERS ARE DISCUSSED. CRITICAL
CONDITIONS USED AS THE BASIS OF STRUCTURAL DESIGN
CRITERIA ARE OUTLINED FOR EACH RECOVERY TECHNIQUE.
EFFECTS OF PERTURBATIONS FROM NOMINAL CONDITIONS
ARE ANALYZED. FUNDAMENTAL CONCEPTS OF STRUCTURAL
DESIGN CRITERIA ARE DISCUSSED RELATIVE TO STRUCTURAL
AND MISSION RELIABILITY. (AUTHOR) (U)

UNCLASSIFIED

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-421 694

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT-DYNA SOAR,

(U)

SEP 63 392P BOWERS, D. A. IESCH, P. G. I

REPT. NO. D2 80085

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AERODYNAMIC CHARACTERISTICS), WIND TUNNEL MODELS, MODEL TESTS, AERODYNAMIC HEATING, LEADING EDGE FLAPS, TEMPERATURE, MEASUREMENT, TABLES, EXPERIMENTAL DATA, HEAT TRANSFER

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-420 951

SPERRY PHOENIX CO ARIZ

ELECTRO-INTERFERENCE CONTROL PLAN FOR GLIDERBORNE
EQUIPMENT.

(U)

9P

REPT. NO. 273 113

CONTRACT: AF33 657 9614

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REPORT ON X-20 RCRS PROJECT.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RADIOFREQUENCY
INTERFERENCE), MANNED SPACECRAFT, RESEARCH PLANES,
ELECTRONIC EQUIPMENT, GUIDANCE, FLIGHT CONTROL SYSTEMS,
AIRSPEED INDICATORS, ELECTROMAGNETIC SHIELDING, GROUND
(ELECTRICAL), TEST METHODS, ANALYSES, FEASIBILITY
STUDIES, RADAR BEACONS

(U)

IDENTIFIERS: X-20 SPACECRAFT, 1963, AN/APW-22

(U)

A DESCRIPTION IS PRESENTED OF A PLAN TO TEST FOR
AND CONTROL ELECTRO-INTERFERENCE IN THE RCRS
EQUIPMENT TO BE INSTALLED IN THE X-20 GLIDER,
(AUTHOR)

(U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-418 873

BELL AEROSYSTEMS CO BUFFALO N Y

EVALUATION OF PROPELLANT CHECK VALVES. (U)

JAN 63 6P

REPT. NO. 82332 5 1

MONITOR: IDEP

925,20,71.47-C4-03

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (HIGH PRESSURE VALVES, HYDROGEN
PEROXIDE), PROPELLANTS, PRESSURE, FAILURE
(MECHANICS), PERFORMANCE (ENGINEERING), (U)

IDENTIFIERS: X-20 SPACECRAFT, 1963, IDEP. (U)

EVALUATION OF FUEL PRESSURE VALVES TO DETERMINE
APPLICABILITY FOR H2O2 USE.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-418 549

BOEING CO SEATTLE WASH

NOSE CAP DEVELOPMENT TESTS, (U)

SEP 63 1V LANDRY, B.E. IESCH, P.G.;

REPT. NO. DOC. NO. D2 80083

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, NOSE CONES),
(•NOSE CONES, REFRACTORY METALS AND ALLOYS),
TESTS, REFRACTORY MATERIALS, PLATINUM ALLOYS,
HONEYCOMB CORES, THERMAL RADIATION, REINFORCING
MATERIALS, WIRE, INSTRUMENTATION, THERMOCOUPLES,
AIRPLANE NOSES, CERAMIC MATERIALS, ZIRCONIUM
OXIDES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, (U)

MATERIALS INVESTIGATIONS AT BOEING DURING 1958 -
1960 DISCLOSED THAT USE OF A ZIRCONIA SHELL FOR THE
NOSE CAP OF THE X-20 GLIDER WOULD BE FEASIBLE.
THREE CONCEPTS WERE INVESTIGATED: (1)
MONOLITHIC ZIRCONIA SHELL REINFORCED WITH PLATINUM
ALLOY WIRE; (2) MONOLITHIC ZIRCONIA SHELL
REINFORCED WITH PLATINUM ALLOY HONEYCOMB; (3)
SEGMENTED ZIRCONIA SHELL REINFORCED WITH PLATINUM
ALLOY WIRE AND ATTACHED TO A SUPER ALLOY SHELL.
DEVELOPMENT AND CALIBRATION OF TEST FACILITIES AND
INSTRUMENTATION WERE REQUIRED THROUGHOUT THE PROGRAM
TO PRODUCE AND RECORD THE EXTREME TEMPERATURES OF
APPROXIMATELY 4000 F. AND THE TEMPERATURE DIS-
TRIBUTION AND HEATING RATES TO BE ENCOUNTERED IN
FLIGHT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-416 730

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
CENTRIFUGE DESIGN EVALUATION OF THE X-20 (DYNA-
SOAR) CREW STATION.

(U)

JUL 63 29P SNYDER, CHARLES J.

PROJ: 620A

MONITOR: ASD TDR63 338

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (RESEARCH PLANES, FLIGHT
SIMULATORS); (CENTRIFUGES, FLIGHT SIMULATORS);
MANNED SPACECRAFT, BOOST-GLIDE VEHICLES, TEST
EQUIPMENT, APPACECRAFT CABINS, DESIGN, TEST
METHOD, DATA, TABLES.

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT.

(U)

CENTRIFUGE SIMULATION TESTS OF THE X-20 CREW
STATION WERE CONDUCTED TO EVALUATE THE DESIGN AND
DETERMINE MAN'S ABILITY TO FLY THE VEHICLE UNDER
ANTICIPATED STRESSES. THE SIMULATOR BUILT FOR THIS
PROGRAM CONSISTED OF 1 INSTRUMENT PANEL AND CONTROLS
THAT WERE, IN MOST RESPECTS, PHYSICALLY IDENTICAL TO
THOSE OF THE X-20. AND A PROTOTYPE EJECTION SEAT
THAT WAS INSTALLED IN THE SAME POSITION RELATIVE TO
THE INSTRUMENT PANEL AS IN THE ACTUAL X-20
VEHICLE. TEST SUBJECTS WORE THE FULL PRESSURE SUIT AND
THE RESTRAINT SYSTEM WAS THAT DEVELOPED FOR THE X-
20. THE SIX X-20 PILOTS SERVED AS TEST SUBJECTS,
TESTS WERE CONDUCTED UNDER STATIC AND DYNAMIC
CONDITIONS WITH THE SUIT UNPRESSURIZED AND
PRESSURIZED. RESULTS OF TESTS WERE RECORDED ON
ANALOG STRIP CHARTS AND MOTION PICTURES, AND PILOT
OPINIONS WERE RECORDED ON MAGNETIC TAPE AND
DEBRIEFING QUESTIONNAIRES. A DEVELOPMENT
ENGINEERING INSPECTION HELD AT THE CONCLUSION OF
THE TEST PROGRAM RESULTED IN SEVERAL MINOR
MODIFICATIONS TO THE CREW STATION. AN ANALYSIS OF
THE TEST RESULTS INDICATED, HOWEVER, THAT MAN COULD
PERFORM NECESSARY CONTROL FUNCTIONS IN THE CREW
STATION OF THE X-20 VEHICLE UNDER CONDITIONS OF
MAXIMUM G-FORCES ANTICIPATED DURING BOOST, AS
SIMULATED ON THE CENTRIFUGE. (AUTHOR)

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-414 487

MARTIN CO DENVER COLO

PROGRAM 624A 0.888 SCALE FORCE TEST POST-TEST REPORT
AT NASA AMES RESEARCH CENTER, (U)

1V HART, P. M. I

MONITOR: SSD CR63 101

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), AERODYNAMIC CONTROL SURFACES, AERODYNAMIC
CONFIGURATIONS, BODIES OF REVOLUTION, CONICAL BODIES,
CYLINDRICAL BODIES, WINGS, FINS, AERODYNAMIC
CHARACTERISTICS, SUPERSONIC CHARACTERISTICS, TRANSONIC
CHARACTERISTICS, PAYLOAD, ANGLE OF ATTACK, PITCH
(MOTION), YAW, MOMENTS, ROLL, EXPERIMENTAL DATA, WIND
TUNNEL MODELS, MODEL TESTS (U)

IDENTIFIERS: 1963, GAP EFFECT, 624 A PROGRAM, X-20
SPACECRAFT (U)

AN 0.8888 MODEL OF THE PROGRAM 624A AIR
VEHICLE WAS TESTED BY THE FLUID MECHANICS BRANCH OF
THE NASA AMES RESEARCH CENTER. THE MODEL WAS
TESTED AT MACH NUMBERS OF 0.60, 0.90, 1.10 AND 1.40
IN THE 2X2-FT TRANSONIC WIND TUNNEL.
TESTING WAS CONDUCTED DURING THE FIRST HALF OF
1962. CONFIGURATION VARIABLES INCLUDED LIFTING AND
NONLIFTING PAYLOADS, NUMBER AND ORIENTATION OF THE
BODIES, FIN SIZE, AND SPACING BETWEEN BODIES. FORCE
AND MOMENT DATA WERE OBTAINED AT VARIOUS ANGLES OF
ATTACK AND SIDESLIP FOR THE MACH NUMBERS LISTED.
(AUTHOR) (U)

UNCLASSIFIED

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-413 282

BOEING CO SEATTLE WASH
GROUND SUPPORT EQUIPMENT RECOMMENDATION DATA,

(U)

FEB 61 IV
REPT. NO. DOCUMENT NO. D2 7784, VOL. 2
CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT
NOTICE: ONLY MILITARY OFFICES MAY REQUEST FROM DDC.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND
SUPPORT EQUIPMENT), TEST EQUIPMENT, MILITARY
REQUIREMENTS, CATALOGS,
IDENTIFIERS: 1961, X-20 SPACECRAFT,

(U)

(U)

THIS DOCUMENT CONTAINS ALL OF THE GROUND
SUPPORT EQUIPMENT GSE RECOMMENDATION DATA
GENERATED BY THE SYSTEMS CONTRACTOR, ALL
ASSOCIATE CONTRACTORS AND TO THE DEGREE
APPLICABLE, SUBCONTRACTORS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-411 823

BOEING CO SEATTLE WASH

DATA REPORT AEDC-8-BC-24, A MACH 8 HEAT TRANSFER
AND PRESSURE TEST TO INVESTIGATE SHOCK BOUNDARY LAYER
INTERACTION ON A FLAT PLATE MODEL, AR-500M-2,

SPO 188.

(U)

JUL 63 1V

REPT. NO. D2 22491, VOL. 3

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: (•FLAT PLATE MODELS, TURBULENT
BOUNDARY LAYER), (•HYPERSONIC PLATE MODELS),
DATA, HEAT TRANSFER, PRESSURE, BOOSTER GLIDE
VEHICLES, MODELS (SIMULATION), BOUNDARY LAYER,
ATTITUDE INDICATORS, HEAT-RESISTANT MATERIALS,
SPACECRAFT, BOOST-GLIDE VEHICLES.

(U)

IDENTIFIERS: X-20 SPACECRAFT, 1963.

(U)

TESTS ON SHOCK BOUNDARY-LAYER INTERACTION PHENOMENON
INHERENT WITH BASIC DYNA-SOAR TYPE WINGBODY AND WING-
BODY-FIN CONFIGURATION.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-411 821

BOEING CO SEATTLE WASH

DATA REPORT AEDC-8-BC-24, A MACH 8 HEAT TRANSFER
AND PRESSURE TEST TO INVESTIGATE SHOCK BOUNDARY-
LAYER INTERACTION ON A FLAT PLATE MODEL, AR 500M-

2, SPO 188.

(U)

JUL 63 521P TRUSSELL, D.R.;

REPT. NO. DOCUMENT NO. D2 22491 VOL. I

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: (•FLAT PLATE MODELS, TURBULENT
BOUNDARY LAYER), (•HYPERSONIC FLOW, FLAT PLATE
MODELS), DATA, HEAT TRANSFER, PRESSURE, HEAT
RESISTANT MATERIALS, MODELS (SIMULATION),
BOUNDARY LAYER, ATTITUDE INDICATORS, TESTS,
BOOST-GLIDE VEHICLES, SPACECRAFT,

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT,

(U)

MACH 8 HEAT TRANSFER AND PRESSURE TEST TO INVESTIGATE
SHOCK BOUNDARY LAYER INTERACTION ON A FLAT PLATE MODEL,

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-411 662

BELL AEROSYSTEMS CO BUFFALO N Y

EVALUATION OF HIGH PRESSURE NITROGEN SERVICE (FILL)
VALVES. (U)

DEC 62 3P

REPT. NO. B2332-17-1

MONITOR: IDEP

925.50.81.47-C4-03

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (HIGH PRESSURE VALVES, GAS CYLINDERS), GAS
LEAKS, NITROGEN (U)

IDENTIFIERS: IDEP, DYNA-SOAR, 1962 (U)

EVALUATION OF HIGH-PRESSURE NITROGEN SERVICE (FILL)
VALVES.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-409 321

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT - DYNA SOAR, (U)

JUN 63 1V BOWERS, D.A.:

REPT. NO. D2 80085

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LEADING EDGE
FLAPS); (•MANNED SPACECRAFT, LEADING EDGE

FLAPS); AERODYNAMIC CONFIGURATIONS, TESTS, (U)

IDENTIFIERS: X-20 SPACECRAFT, 1963. (U)

THIS DOCUMENT REPORTS ON THE FACILITIES DEVELOPMENT AND TEST RESULTS FROM THE DYNA SOAR LEADING EDGE DEVELOPMENT PROGRAM. THE LEADING EDGE DEVELOPMENT PROGRAM WAS UNDERTAKEN: (1) TO EVALUATE EXPERIMENTALLY FIVE LEADING EDGE AND ATTACHMENT SCHEME DESIGNS PROPOSED FOR USE ON THE GLIDER AND (2) TO ESTABLISH THE RELIABILITY AND STRUCTURAL INTEGRITY OF THE MOST PROMISING DESIGN. ALL DESIGNS TESTED WERE EVOLVED FROM THE THIN SHELL, COATED MOLYBDENUM ALLOY LEADING EDGE CONCEPT WHICH WAS PROVED FEASIBLE DURING PHASE I OF THE DYNA SOAR PROGRAM. ALL TESTED LEADING EDGE DESIGNS PERFORMED SATISFACTORILY FROM THE STRENGTH STANDPOINT. NO STRUCTURAL FAILURES WERE CAUSED BY SONIC TESTING, THERMAL STRESSES RESULTING FROM THERMAL GRADIENTS AND HEATING RATES, OR PLASMA TESTING OF THE DOUBLE SHELL DESIGN. ALL DESIGNS SUPPORTED SIGNIFICANTLY HIGHER LOADS THAN PREDICTED DURING STATIC TESTS. ALTHOUGH OXIDATION FAILURES OCCURRED THROUGH THE MOLYBDENUM DISILICIDE COATINGS DURING THE RADIANT HEAT AND PLASMA JET TESTS, THE EXTENT OF THESE FAILURES DID NOT PREVENT THE SPECIMENS FROM MEETING THE DESIGN REQUIREMENTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-406 535

BOEING CO SEATTLE WASH

DIRECT ELECTROLESS NICKEL PLATING ON ALUMINUM, (U)

OCT 62 9P SHIMIZU, M. I.

REPT. NO. MDR2 15143

MONITOR: IDEP 331.60.00.00-C6-02

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: ALUMINUM, NICKEL, PLATING,
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, RE
SEARCH PLANES, HEAT TREATMENT, DIFFUSION,
CLEANING, METAL COATINGS. (U)

IDENTIFIERS: IDEP, X-20 SPACECRAFT, ELECTROLESS
PLATING. (U)

DEVELOPMENT TEST RESULTS ON DIRECT ELECTROLESS NICKEL
PLATING ON ALUMINUM WITHOUT USING AN UNDER PLATE;
ACTIVATION OF THE ALUMINUM SURFACE; BAKING TO IMPROVE
ADHESION BY DIFFUSION OF THE WITH THE ALUMINUM.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-403 936

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
OPTIMIZATION OF LIFTING RE-ENTRY VEHICLES, (U)
MAR 63 80P HANKEY, WILBUR L.;
MONITOR: ASD TDR62 1102

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON WEAPON SYSTEM
620A.

DESCRIPTORS: BOOST-GLIDE VEHICLES, AIRPLANE
LANDINGS, DRAG, DECELERATION, REENTRY VEHICLES,
AERODYNAMIC HEATING, STABILITY, EQUATIONS,
DESCENT TRAJECTORIES, AERODYNAMIC LOADING, LIFT,
ATMOSPHERE ENTRY, AERODYNAMIC CONFIGURATIONS, (U)
IDENTIFIERS: X-20 SPACECRAFT. (U)

AERODYNAMIC LIFT IS USED DURING RE-ENTRY TO PROVIDE RANGE MANEUVERABILITY SO THAT A PRECISE SITE CAN BE SELECTED AND A HORIZONTAL LANDING CAPABILITY CAN BE PROVIDED. MAXIMUM MANEUVERABILITY MAY BE ACHIEVED BY MODULATING THE HYPERSONIC LIFT-TO DRAG RATIO (L/D). IN THIS STUDY THE LIFTING RE-ENTRY CONFIGURATION WAS OPTIMIZED TO MAXIMIZE HYPERSONIC L/D WITHIN THE HEATING, STABILITY, AND LANDING CONSTRAINTS. ELEVEN PERTINENT CONSTRAINT EQUATIONS WERE FORMULATED, AND NUMERICAL CALCULATIONS OF THE COMPLETE AERODYNAMIC CHARACTERISTICS AND CONFIGURATIONAL GEOMETRY WERE DETERMINED. THE IBM 7090 COMPUTER WAS USED TO SOLVE THE 11 CONSTRAINT EQUATIONS THROUGH AN ITERATION TECHNIQUE AND TO PERFORM THE MAXIMIZATION PROCESS. OPTIMUM CONFIGURATIONAL GEOMETRIES WERE EVALUATED FOR THREE WING LOADINGS AT VEHICLE WEIGHTS OF 10,000 AND 100,000 POUNDS. RESULTS SHOW THAT HIGHER L/D VALUES CAN BE ACHIEVED WITH LOW ASPECT RATIO, LOW WING LOADINGS, AND LARGE SCALE VEHICLES. THE COMPLETE GEOMETRY FOR ONE OF THE TYPICAL OPTIMUMS IS SHOWN AS AN EXAMPLE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-337 373

MARTIN CO DENVER COLO

28 MODEL SCALE 624A STATIC STAGING AERODYNAMIC FORCE
TEST POST-TEST REPORT, NASA-LANGLEY UNITARY PLAN WIND
TUNNEL (U)

JUN 63 133P ILGEN, P. I

CONTRACT: AF 04(695)-150

MONITOR: SSD CR63 105

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCH VEHICLES (AEROSPACE), SUPERSONIC
CHARACTERISTICS), MODEL TESTS, WIND TUNNEL MODELS,
STAGING, BOOSTER MOTORS, EXHAUST FLAMES, ANGLE OF
ATTACK, ROLL, STABILITY, NOSE CONES, BOOST-GLIDE
VEHICLES, FINS, AERODYNAMIC CHARACTERISTICS, PAYLOAD,
MOMENTS, THRUST VECTOR CONTROL SYSTEMS, EXHAUST GASES,
AERODYNAMIC CONFIGURATIONS, BLUNT BODIES, EXPERIMENTAL
DATA, TEST METHODS (U)
IDENTIFIERS: TITAN 3, X-20 SPACECRAFT, 1963 (U)

WIND TUNNEL TESTS OF A 28-SCALE 624A MODEL
HAVING COLD-JET CORE ENGINES WERE CONDUCTED TO OBTAIN
AERODYNAMIC INPUTS FOR STAGING MOTION STUDIES. THE
PROGRAM WAS PLANNED TO EVALUATE CORE AERODYNAMIC
CHARACTERISTICS IN THE PRESENCE OF SEPARATING SOLID
ROCKET MOTORS (SRM), AND SRM AERODYNAMIC
CHARACTERISTICS IN THE PRESENCE OF THE CORE AND THE
CORE ROCKET MOTOR EXHAUST PLUMES. PARAMETER
VARIATIONS INCLUDED CORE ANGLES OF ATTACK AND
SIDESLIP, AND SRM ANGLE OF ATTACK, SIDESLIP, AND
ROLL, LATERAL TRANSLATION, LONGITUDINAL TRANSLATION,
AND VERTICAL TRANSLATION, THREE PAYLOADS (DYNA-
SOAR, BULBOUS, AND CONE), FINS, AND SEVERAL
THRUST VECTOR CONTROL (TVC) TANK CONFIGURATIONS
WERE EVALUATED. TEST MACH NUMBERS WERE 3.71 AND
4.65. RESULTS INDICATED THAT SRM AERODYNAMIC
CHARACTERISTICS WERE NOT AFFECTED SIGNIFICANTLY BY
THE PAYLOAD CHANGES. THE CORE JET PLUMES HAD A
GREAT INFLUENCE ON SRM FORCES AND MOMENTS, AND
TVC TANK CONFIGURATIONS SIGNIFICANTLY AFFECTED ALL
SIX SRM FORCE COEFFICIENTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-298 353

BOEING CO SEATTLE WASH

FORMABILITY TESTS ON MO - .STI (TENSILE TESTS ON MO -
.STI) (U)

JUN 61 1V MARR, F.G.I

REPT. NO. T-2-2404-58

MONITOR: IDEP 502.30.00.80-C6-08

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •MATERIALS, HIGH-TEMPERATURE RESEARCH,
MECHANICAL PROPERTIES, QUALITY CONTROL, TENSILE
PROPERTIES (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

MECHANICAL PROPERTIES OF 0.012 AND 0.030 GAGE
MOLYBDENUM.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-298 351

BOEING CO SEATTLE WASH
FORMABILITY TESTS ON MO - .5T1 (HYDROPRESS TESTS, MO-
.5T1) (U)

JUN 61 JV MARR, F.G.1

REPT. NO. T-2-2404-54

MONITOR: IDEP 502.30.00.80-C6-04

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: HYDROFORMING (MECHANICAL), HYDRAULIC
PRESSES, MOLYBDENUM ALLOYS, SHEETS, TITANIUM ALLOYS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE FORMABILITY OF MO .5T1 BY MEANS OF HYDROFORMING,

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 679

BOEING CO SEATTLE WASH.

FORMABILITY TEST ON MO. -0.5Ti (CUP TESTS MO-
0.5Ti) (U)

JUN 61 IV HARR, F.G. I

REPT. NO. TR-2404

MONITOR: IDEP 502.30.00.80-C6-02

UNCLASSIFIED

NOFORN

DESCRIPTORS: •MATERIAL FORMING, •MOLYBDENUM ALLOYS,
DEFORMATION, DUCTILITY, FAILURE (MECHANICS), FRACTURE
(MECHANICS), LOADING (MECHANICS), MECHANICAL PROPERTIES,
PENETRATION, TITANIUM ALLOYS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

CUP FORMABILITY OF MOLYBDENUM -0.5 TITANIUM ALLOY UNDER
BIAXIAL LOADING TO FAILURE.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 661

BOEING CO SEATTLE WASH

FORMABILITY TESTS ON MO-0.5Ti

(U)

MAR 61 IV HARR, F.G.:

REPT. NO. T-2-2404-56

MONITOR: IDEP 502.30.00.80-C6-06

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: MOLYBDENUM ALLOYS, MACHINE SHOP PRACTICE,
MACHINING, MATERIAL REMOVAL, MICROSTRUCTURE, SHEETS,
TEST METHODS, TITANIUM ALLOYS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

VARIOUS METHODS OF CUTTING, INCLUDING SHEARING, ABRASIVE
SAWING, HANDSAWING, FRACTION SAWING, PUNCHING AND GRINDING
OF MOLYBDENUM 0,5 TITANIUM SHEETS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 659

BOEING CO SEATTLE WASH

FORMABILITY TESTS ON MO-.5TI. (U)

FEB 61 IV MARR, F.G.:

REPT. NO. T-2-2404-51

MONITOR: IDEP 502,30,00,80-C6-01

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: DUCTILITY, HIGH-TEMPERATURE RESEARCH,
MOLYBDENUM ALLOYS, SHEETS, TESTS, TITANIUM ALLOYS (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

FORMABILITY TESTS (BEND TESTS) ON MO-.5TI.

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 199

AIR FORCE FLIGHT TEST CENTER EDWARDS AFB CALIF
COCKPIT DISPLAYS FOR PILOT CONTROL DURING HYPERSONIC
LIFTING RE-ENTRY (U)

FEB 63 1v SCHOFIELD, LYLE B.; HOEY, ROBERT G.
REPT. NO. TDR62 38

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: DISPLAY SYSTEMS, ATMOSPHERE ENTRY, BOOST-
GLIDE VEHICLES, COCKPITS, DESCENT TRAJECTORIES, FLIGHT
INSTRUMENTS, HUMAN ENGINEERING (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

DESIGN AND DEVELOPMENT IS REPORTED OF A DISPLAY
TECHNIQUE TO AID IN CONTROLLING THE RE-ENTRY PHASE OF
HYPERSONIC LIFTING RE-ENTRY VEHICLES, SPECIFICALLY
THE X-20. THE STUDY RESULTED IN A DISPLAY SCHEME
WHICH CAN BE SIMPLY AND EFFECTIVELY INTEGRATED WITH
CONVENTIONAL FLIGHT DISPLAYS. EVALUATION RESULTS
OF THE PROPOSED DISPLAY DEMONSTRATE ITS UTILITY IN
QUICKLY ESTABLISHING DESIRED FLIGHT CONDITIONS
WITHOUT UNDUE PILOT ATTENTION. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-296 635

HONEYWELL INC ST PETERSBURG FLA

RADIO FREQUENCY SHIELDING EFFECTIVENESS OF CONDUCTIVE
GLASS (U)

SEP 62 IV

REPT. NO. 7142

MONITOR: IDEP 761.00.10.10-G2-01

UNCLASSIFIED REPORT
NOFORM

DESCRIPTORS: *GLASS, EFFECTIVENESS, ELECTRICAL
CONDUCTANCE, ELECTROMAGNETIC SHIELDING, RADIO WAVES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

RADIOFREQUENCY INTERFERENCE SHIELDING EFFECTIVENESS OF
CONDUCTIVE GLASS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-293 284

CHANCE VOUGHT CORP DALLAS TEX
RESEARCH AND DEVELOPMENT ON HIGH ALTITUDE, HIGH SPEED
CREW ESCAPE SYSTEMS TESTING CONCEPTS, VOLUME I -
SUBSYSTEM AND SIMULATION INVESTIGATIONS (U)

NOV 62 1V LYON, W.M.:

REPT. NO. TDR62 471 V1

CONTRACT: AF33 616 B360

MONITOR: ASD TDR62 471 V1

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •HYPERVELOCITY VEHICLES, •RESEARCH TEST
VEHICLES, •SPACE CAPSULES, AIR BRAKE FLAPS, ATMOSPHERE
ENTRY, BALLOONS, BOOST-GLIDE VEHICLES, BOOSTER MOTORS,
CAMPFORS, CONTROL SYSTEMS, COSTS, DRAG, FEASIBILITY
STUDIES, GROUND SUPPORT EQUIPMENT, GUIDANCE, GUIDED
MISSILE TRAJECTORIES, HIGH ALTITUDE, INSTRUMENTATION,
JETTISONABLE COCKPITS, PARACHUTES, RECOVERY, RETRO
ROCKETS, ROTORCHUTES, SIMULATION, STABILIZATION SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

HIGH ALTITUDE, HIGH SPEED CREW ESCAPE SYSTEMS TESTING
CONCEPTS, SUBSYSTEM AND SIMULATION INVESTIGATION.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-293 277

CHANCE VOUGHT CORP DALLAS TEX
RESEARCH AND DEVELOPMENT ON HIGH ALTITUDE, HIGH SPEED
CREW ESCAPE SYSTEMS TESTING CONCEPTS, VOLUME II -
TEST VEHICLE INVESTIGATION (U)

NOV 62 1V HUANG, R.S.

REPT. NO. TDR62 471 V2
CONTRACT: AF33 616 8360
MONITOR: ASD TDR62 471 V2

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •HYPERVELOCITY VEHICLES, •RESEARCH TEST
VEHICLES, •SPACE CAPSULES, AERODYNAMIC CONFIGURATIONS,
AIRFRAMES, ASCENT TRAJECTORIES, BOOST-GLIDE VEHICLES,
BOOSTER MOTORS, DESCENT TRAJECTORIES, DESIGN, DRAG,
FEASIBILITY STUDIES, GUIDED MISSILE TRAJECTORIES, HIGH
ALTITUDE, JETTISONABLE COCKPITS, ORBITAL TRAJECTORIES,
SIMULATION, STAGING, THRUST (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

HIGH ALTITUDE, HIGH SPEED CREW ESCAPE SYSTEMS TESTING
CONCEPTS TEST VEHICLE INVESTIGATIONS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-288 576

REPUBLIC AVIATION CORP FARMINGDALE N Y
THE MINIMUM WEIGHT DESIGN OF STRUCTURES OPERATING IN
AN AEROSPACE ENVIRONMENT (U)

1V SWITZKY, H.;

REPT. NO. TDR62 763

CONTRACT: AF33 657 7872

MONITOR: ASD TDR62 763

UNCLASSIFIED REPORT

DESCRIPTORS: •HYPERVELOCITY VEHICLES, AEROSPACE CRAFT,
AIRFRAMES, BEAMS (ELECTROMAGNETIC), BEAMS (STRUCTURAL),
BOOST-GLIDE VEHICLES, DEFORMATION, DESIGN, GEOMETRY,
LOAD DISTRIBUTION, MATHEMATICAL ANALYSIS, METAL PLATES,
PRESSURE, SANDWICH PANELS, SPACE FLIGHT, STRESSES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

A NONDIMENSIONAL DESIGN TECHNIQUE IS DEVELOPED TO
OBTAIN THE MINIMUM WEIGHT OF STRUCTURAL COMPONENTS
(COLUMNS, PLATES, AND BEAMS) SUBJECTED TO AN
AEROSPACE ENVIRONMENT. DESIGN CURVES ARE DEVELOPED
AND PRESENTED FOR VARIOUS STRUCTURAL CONFIGURATIONS
IN TERMS OF THE APPLIED LOADS AND GEOMETRIC MATERIAL
PARAMETERS WHICH CAN BE READILY EVALUATED. THE
DESIGN TECHNIQUE CAN BE EMPLOYED TO OBTAIN, IN A
RELATIVELY SIMPLE AND RAPID MANNER, PRELIMINARY
ESTIMATES OF THE STRUCTURAL DESIGN WEIGHT AS WELL AS
A GOOD APPROXIMATION TO THE FINAL DESIGN. THE
DESIGN PROCEDURE FOR MINIMUM WEIGHT IS ILLUSTRATED
FOR A TRUSS-LIKE SPAR AND A WING SECTION WHICH ARE
TYPICAL OF AEROSPACE STRUCTURES, (AUTHOR) (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-287 957

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
PROCEDURES FOR THE DESIGN OF THERMAL PROTECTION
SYSTEMS FOR MANEUVERABLE RE-ENTRY VEHICLES (U)
IV TURRENTINE, DONALD

REPT. NO. TDR62 625
MONITOR: ASD TDR62 625

UNCLASSIFIED REPORT

DESCRIPTORS: *AERODYNAMIC HEATING, *HYPERVELOCITY
VEHICLES, AIRFRAMES, COMPUTERS, CONTROLLED ATMOSPHERES,
COOLING, DIFFERENTIAL EQUATIONS, DIGITAL COMPUTERS,
GLIDERS, LEAST SQUARES METHOD, MANEUVERABILITY,
MATHEMATICAL ANALYSIS, RADIATORS, REENTRY VEHICLES,
SATELLITES (ARTIFICIAL), SPACECRAFT CABINS, TEMPERATURE,
TEMPERATURE CONTROL, THEORY, THERMAL DIFFUSION, THERMAL
RADIATION (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

ATMOSPHERIC RE-ENTRY OF EARTH-ORBITAL, HYPERSONIC
GLIDE VEHICLES CREATES THERMAL PROBLEMS. THE HEAT
AFFECTS NOT ONLY THE MATERIALS AND CONSTRUCTION OF
THE AIRFRAME BUT ALSO THE CREW AND VARIOUS SUBSYSTEMS
OF THE VEHICLE. SUCCESSFUL SOLUTION OF THESE
PROBLEMS DEPENDS UPON THE DEVELOPMENT OF AN EFFECTIVE
THERMAL PROTECTIVE CONCEPT, WHICH WILL ALSO GIVE THE
DESIGNER SOME LATITUDE IN HIS DESIGN PHILOSOPHY.
THE ROLE OF THE PROTECTIVE SYSTEM IS TO
SIGNIFICANTLY ATTENUATE THE INFLUX OF HEAT THAT IS
AERODYNAMICALLY GENERATED WITHIN THE SURROUNDING
BOUNDARY LAYER. ATTENUATION IS ACCOMPLISHED BY
COMBINING EXTERNAL RADIATION SHIELDING ELEMENTS WITH
BACKUP INSULATION MATERIALS AND AN APPROPRIATE
COOLING SYSTEM. ANALYTICAL PROCEDURES ARE PRESENTED
FOR DETERMINING SIGNIFICANT SYSTEM PARAMETERS BY
TRANSFORMING THE DIFFERENTIAL HEAT CONDUCTION OR
DIFFUSION EQUATION INTO AN ALGEBRAIC EXPRESSION BY
EMPLOYING THE CALCULUS OF FINITE DIFFERENCES. THE
ADAPTATION OF THE RESULTING EQUATION TO DIGITAL
COMPUTER PROGRAMMING IS DISCUSSED, AND NUMERICAL
RESULTS ARE PRESENTED TO INDICATE SYSTEMS OF MINIMUM
WEIGHT. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-286 552

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
PROCEEDINGS OF THE ASD-OSU SYMPOSIUM ON
ELECTROMAGNETIC WINDOWS, VOLUME I (U)

JUL 62 1V FOUTY, ROBERT A.; COLLIER, J. ROBERT;

REPT. NO. TDR62 676 V1

CONTRACT: AF33 616 7614

MONITOR: ASD TDR62 676 V1

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •RADOMES, •SYMPOSIA, ALUMINUM COMPOUNDS,
CERAMIC MATERIALS, DIOXIDES, EXTREMELY HIGH FREQUENCY,
HYPERSONIC CHARACTERISTICS, MANUFACTURING METHODS,
MICROWAVES, OXIDES, RADIO INTERFEROMETERS, SILICON
COMPOUNDS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-281 775

SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
LECTURES IN AEROSPACE MEDICINE. 8-12 JANUARY
1962.

(U)

JAN 62 447P

UNCLASSIFIED REPORT

DESCRIPTORS: •ASTRONAUTICS, •COSMIC RAYS,
•INSTRUMENTATION, •LUNAR PROBES, •SPACE MEDICINE,
•SYMPOSIA, •WEIGHTLESSNESS, ASTRONAUTS, AVIATION
PERSONNEL, CHROMATOGRAPHIC ANALYSIS, CLOSED-CYCLE
ECOLOGICAL SYSTEMS, ECOLOGY, EXTRATERRESTRIAL BASES,
MONITORS, MOON, PHOTOSYNTHESIS, PLANTS (BOTANY),
PROPELLANTS, RADIOLOGICAL DOSAGE, SELECTION, SPACECRAFT
CABINS, TOXICITY, TRAINING (U)
IDENTIFIERS: X-15 AIRCRAFT, X-20 SPACECRAFT (U)

CONTENTS: HISTORY AND BACKGROUND OF
ASTRONAUTICS; OCCUPATIONAL MEDICINE AT THE
LAUNCH SITE; SELECTION AND STRESS TESTING
OF ASTRONAUTS; BIOLOGIC EFFECTS OF HIGH
ENERGY PRACTICES IN SPACE; PHYSIOLOGIC
NECESSITIES IN SIMULATED LUNAR FLIGHTS;
BIOMEDICAL MONITORING IN-FLIGHT;
WEIGHTLESSNESS; A PHYSIOLOGICAL PROBLEM IN
SPACE; NEWER ASPECTS OF SUBCELLULAR
PHOTOSYNTHESIS; BIO-INSTRUMENTATION FOR
SPACE FLIGHT; WHAT CAN MAN CONTRIBUTE TO
OPERATIONS IN SPACE; X-15 OPERATIONS IN
PRE-LUNAR STUDIES; RESPONSE OF MAMMALIAN
SYSTEMS TO NON-UNIFORM SPACE RADIATION
DOSE; BIO-ASTRONAUTIC SUPPORT OF THE X-15
AND DYNA-SOAR; INTERPLANETARY ENVIRONMENT;
EXTRATERRESTRIAL LIFE; PROPULSION SYSTEMS
FOR LUNAR OPERATION; OCULAR EFFECTS OF
PARTICULATE SPACE RADIATION; MONITORING OF
MOON BASE ATMOSPHERES BY GAS
CHROMATOGRAPHY; THE ECOLOGIC PROFILE OF THE
MOON; SOIL-LESS GARDENING ON THE MOON;
THE LUNAR CRUST FOR LIFE SUPPORT; WHO
OWNS THE MOON; THE LOGISTICS OF RE-
LAUNCH FROM THE MOON (M)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-275 759

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO
AN INITIAL STUDY OF A YAW-ORIENTATIONAL AUTOPILOT IN
A BEAM-GUIDANCE APPROACH SYSTEM FOR A BOOST-GLIDE
VEHICLE (U)

MAR 62 IV ROBERTSON, CHARLES WILLIAM;
REPT. NO. GGC EE 62 10

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •AUTOMATIC PILOTS, •GLIDE PATH SYSTEMS,
•HYPERVELOCITY VEHICLES, ANALOG SYSTEMS, CONTROL
SYSTEMS, GUIDANCE, INSTRUMENT LANDINGS, MATHEMATICAL
ANALYSIS, RADIO BEAMS, SIMULATION, STABILIZATION
SYSTEMS, YAW (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

AN AUTOMATIC SYSTEM INCREASES THE ACCURACY
REQUIRED FOR A POWER-OFF DESCENT TO THE FIELD BY A
MANNED, BOOST-GLIDE SPACE VEHICLE. AFTER REENTRY,
THE OPTIMUM GLIDE SLOPE IS DICTATED BY ENERGY
MANAGEMENT; THE LATERAL PROBLEMS ARE MAXIMUM INITIAL
DISPLACEMENT FROM, AND MAXIMUM INTERCEPTION ANGLE TO,
THE CENTERLINE. A BEAMGUIDANCE SYSTEM, COUPLED TO
A YAW-ORIENTATIONAL AUTOPILOT, IS ANALYZED BY ROOT
LOCUS TECHNIQUES AND ANALOG SIMULATION. THE
RESULTS PROVIDE FOR THE AUTOPILOT A SCHEDULE OF
SERVO GAINS, POSSIBLY PROGRAMMED BY AN AIR DATA
COMPUTER, AND ESTIMATE FOR THE SYSTEM THE MINIMUM
STABLE HORIZONTAL RANGE TO THE STATION. CROSSWIND
EFFECTS ARE CONSIDERED. LIMITED TO A PIECEWISE
LINEAR, FLIGHT SIMULATION AND A SINGLE-DEGREE-OF-
FREEDOM ROLLING VEHICLE APPROXIMATION, THE STUDY
SUGGESTS FUTURE CONSIDERATION OF A ROLL-ANGLE-CONTROL
AUTOPILOT AND A CONTINUOUS, THREE-DEGREE-OF-FREEDOM
SIMULATION OF THE VEHICLE. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-275 020

JET PROPULSION LAB PASADENA CALIF

ASTRONAUTICS INFORMATION, ABSTRACTS VOLUME V, NO. 4

ABSTRACTS 5.331-5.455 (U)

APR 62 1V HARDGROVE, B.J.; WARREN, F.L.;

CONTRACT: NAS7 100

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: *BIBLIOGRAPHIES, *SPACE FLIGHT,
ASTRONAUTICS, ATMOSPHERE ENTRY, COMMUNICATION SYSTEMS,
COMPUTERS, CONTROL SYSTEMS, GUIDANCE,
MAGNETOHYDRODYNAMICS, MANNED, MATERIALS, MOON,
PROPULSION, RADIATION INJURIES, REENTRY VEHICLES,
SATELLITES (ARTIFICIAL), SPACE MEDICINE, SPACECRAFT, VAN
ALLEN RADIATION BELT, WEIGHTLESSNESS (U)
IDENTIFIERS: ECHO, RANGER SPACECRAFT, SATURN, X-15
AIRCRAFT, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-274 351

MARTIN CO BALTIMORE MD

TITAN II, DYNA SOAR.

(U)

MAR 62

IV

HUNTER, H.; LARSH, E.;

REPT. NO. ER12269

CONTRACT: AFO4 695 54

UNCLASSIFIED REPORT

DESCRIPTORS: •BOOSTER MOTORS, •DESTRUCTORS,
•HYPERVELOCITY VEHICLES, •LIQUID ROCKET PROPELLANTS,
•ROCKET OXIDIZERS, COMBUSTION, DEMOLITIONS, DESIGN,
EXHAUST GASES, HYDRAZINES, MEASUREMENT, METHYL
HYDRAZINES, MODEL TESTS, NITROGEN COMPOUNDS, PROPELLANT
TANKS, ROCKET FUELS, TETROXIDES, TOXICITY (U)
IDENTIFIERS: TITAN, X-20 SPACECRAFT (U)

THE USE OF STORABLE, HIGH ENERGY AND HYPERGOLIC PROPELLANTS, UNSYMMETRICAL DIMETHYL HYDRAZINE (UDMH), HYDRAZINE AND NITROGEN TETROXIDE (N2O4), IN TITAN II AND TITAN III IS AN ADVANCEMENT IN WEAPON AND SPACE SYSTEMS. HOWEVER, THE INTERMIXING REACTION AND TOXICOLOGICAL PROPERTIES OF THESE PROPELLANTS INTRODUCED A PROBLEM IN THE DESIGN OF THE DESTRUCT SYSTEM FOR THE BOOSTER. TESTS WERE CONDUCTED TO DEVELOP AND VERIFY A BOOSTER DESTRUCT SYSTEM FOR USE WITH THESE PROPELLANTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-274 053

CORNELL AERONAUTICAL LAB INC BUFFALO N Y
A SURVEY OF BIOASTRONAUTICS 1961-1962 RESOURCES FOR
RESEARCH AND DEVELOPMENT (U)

BY WHITE, WILLIAM J.:

REPT. NO. TDR62 2
CONTRACT: AF18 600 1916
MONITOR: AFSC TDR62 2

UNCLASSIFIED REPORT

DESCRIPTORS: *COMPUTERS, *HUMAN ENGINEERING, *MANNED,
*PERSONNEL, *SCIENTIFIC RESEARCH, *SPACE FLIGHT,
BEHAVIOR, COSTS, ENGINEERING PERSONNEL, LOGISTICS,
SCIENTIFIC PERSONNEL, SIMULATION, SPACE ENVIRONMENTAL
CONDITIONS, SPACE MEDICINE, STRESS (PHYSIOLOGY), STRESS
(PSYCHOLOGY), TRAINING (U)

IDENTIFIERS: APOLLO, MERCURY PROJECT, X-20
SPACECRAFT (U)

FOREMOST AMONG THE QUESTIONS TO BE ANSWERED BY
FUTURE EXPLORATION OF SPACE ARE THOSE CONCERNED WITH
BIOASTRONAUTICS. A RESEARCH AND DEVELOPMENT
PROGRAM FOR MANNED SPACE FLIGHT DURING THE NEXT TWO
DECADES WILL SERVE BOTH TO ESTABLISH HUMAN
PRODUCTIVITY IN SPACE-BASED SYSTEMS AND TO STIMULATE
THE ADVANCEMENT OF CONCEPTS OF MILITARY ACTION FOR
EXPLOITING HUMAN CAPABILITIES. INFORMATION AND
IDEAS WHICH MUST BE CONSIDERED IN THE FORMULATION OF
A LONG RANGE PROGRAM AIMED AT MANNED EXPLORATION AND
USE OF OUTER SPACE ARE DISCUSSED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-273 195

AEROSPACE CORP. EL SEGUNDO CALIF.
 BIBLIOGRAPHY OF REPORTS PREPARED UNDER CONTRACT AF
 04(647)594 (PERIOD ENDING 31 DECEMBER 1961) (U)
 JAN 62 IV TRIPOLI, BARBARA H. I
 CONTRACT: AF04 647 594

UNCLASSIFIED REPORT

DESCRIPTORS: *BIBLIOGRAPHIES, *GUIDED MISSILES,
 ELECTRONICS, ENERGY, MAINTENANCE, MANNED, POWER
 SUPPLIES, PROPULSION, RADIATION DAMAGE (U)
 IDENTIFIERS: MERCURY PROJECT, NIKE-ZEUS, X-20
 SPACECRAFT (U)

AD-2 3 1953NS AD-273 1940IV, 1 U (TISTA/
 AW F LIGHT CONTROL B., AERONAUTICAL
 YST MS DIV., WRIGHT-PATTERSON AIR FORCE
 BASE, OHIO, A METHOD TO IMPROVE THE RELIABILITY
 OF A DUAL FLIGHT-CONTROL SYSTEM, REPT, ON FLIGHT
 CONTROL EQUIPMENT TECHNIQUE, BY VERNON R,
 SC MITT, DEC 61, 12P INCL, ILLUS, TABLES
 (PROJ. 8225) (ASD TR 61-581) UNCLASSIFIED
 REPORT DESCRIPTORS: *HYDRAULIC SERVO ELECTRIC NI
 MS, RELIABILITY, DESIGN REDUCTION OF
 FAILURE (MECHANICS), ELECTRONIC CIRCUITS,
 (FLIGHT, *CONTROL SYSTEMS, SERVO SYSTEMS,
 IDENTIFIERS: REDUNDANT CIRCUITS, NORMALLY THE
 COMPONENTS OF THE SERVO ACTUATING SUBSYSTEMS OF
 DUAL FLIGHT-CONTROL SYSTEM ARE CONNECTED IN SERIES
 SIMILAR TO A CHAIN, IF ONE COMPONENT OR LINK IN
 EACH CHAIN FAILS, THE SYSTEM FAILS. AN IN-THE-
 HOUSE STUDY WAS MADE TO DETERMINE A METHOD OF
 AUTOMATICALLY SWITCHING AND CROSS-FEEDING THE
 CONTROL FUNCTIONS OF SERVO ACTUATING SUBSYSTEMS
 OF DUAL FLIGHTCONTROL SYSTEM SO THAT THE SYSTEM
 WOULD CONTINUE TO OPERATE AS LONG AS ONE UNLIK
 COMPONENT OF EACH CHANNEL WAS OPERATING, THEREFORE
 AS COMPONENT FAILURES OCCUR, THE METHOD DESCRIBED IN
 THIS REPORT WOULD, BY USING THE OPERABLE COMPONENTS
 REMAINING OF THE CHANNEL THEY ARE IN, PERMIT AN
 INCREASE IN THE OVER-ALL RELIABILITY OF THE SYSTEM.
 (AUTHOR (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-268 018

AIR WEATHER SERVICE SCOTT AFB ILL

WIND VARIABILITY AT 150,000 FEET

(U)

OCT 61

1V

APPLEMAN, HERBERT S.;

REPT. NO. TRI60

UNCLASSIFIED REPORT

DESCRIPTORS: •WIND, AIR MASS ANALYSIS, CLIMATOLOGY,
RADIOSONDES, SPACE FLIGHT, SPACE PROBES, STRATOSPHERE,
UPPER ATMOSPHERE, WEATHER FORECASTING (U)

IDENTIFIERS: X-15 AIRCRAFT, X-20 SPACECRAFT (U)

THE ADVENT OF THE X-15, DYNA-SOAR, AND OTHER
VEHICLES OPERATING AT VERY HIGH ALTITUDES REQUIRE
INCREASED FAMILIARITY WITH WINDS ABOVE THE NORMAL
RADIOSONDE LEVELS. A NUMBER OF ARTICLES HAVE
ALREADY BEEN PUBLISHED ON THE SUBJECT OF HIGH-LEVEL
CIRCULATION PATTERNS. THE PRESENT REPORT MAKES USE
OF THE AVAILABLE ROCKETSONDE DATA TO DETERMINE THE
ACCURACY OF CLIMATOLOGICAL AND PERSISTENCE FORECASTS
AT 150,000 FEET. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-263 763

ARMED FORCES-NRC COMMITTEE ON BIO-ASTRONAUTICS WASHINGTON
D C

THE TRAINING OF ASTRONAUTS. REPORT OF A WORKING GROUP
CONFERENCE (U)

DEC 61 1V

REPT. NO. P873

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •AVIATION PERSONNEL, •SPACE FLIGHT,
•TRAINING, ASTRONAUTS, PHYSICAL FITNESS, SIMULATION,
STRESS (PHYSIOLOGY), STRESS (PSYCHOLOGY), SYMPOSIA,
TRAINING DEVICES (U)

IDENTIFIERS: MERCURY PROJECT, X-15 AIRCRAFT, X-20
SPACECRAFT (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-263 448

BOEING CO SEATTLE WASH

STRESS ANALYSIS APPROACH DYNA-SOAR GLIDER (U)

SEP 61 1V BREEZE, B.G.:

REPT. NO. D2 8112

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: •GLIDERS, •HYPERVELOCITY VEHICLES,
•SATELLITES (ARTIFICIAL), AIRFRAMES, AIRPLANE PANELS,
COCKPITS, DEFORMATION, DELTA WINGS, DESIGN, FUEL TANKS,
FUSELAGES, LANDING GEAR, LOAD DISTRIBUTION, MANNED,
MATERIALS, MATHEMATICAL ANALYSIS, ROCKET MOTORS,
STRESSES, THERMAL STRESSES, WINGS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

METHODS USED IN THE STRUCTURAL ANALYSIS OF THE
DYNA-SOAR GLIDER ARE PRESENTED. EACH OF THE
MAJOR STRUCTURAL COMPONENTS IS TREATED IN AN
INDEPENDANT SECTION OF THE DOCUMENT. EACH SECTION
IS DIVIDED INTO TWO HEADINGS: (1) STRUCTURAL
CONCEPT AND (2) METHOD OF ANALYSIS. THE
STRUCTURAL CONCEPT SECTIONS INCLUDE A DESCRIPTION OF
THE COMPONENT STRUCTURE, DESCRIPTION OF LOADING AND
INTERNAL LOAD PATHS, DISCUSSION OF THERMAL
CONDITIONS, AND SUPPORTING SKETCHES. THE METHODS
OF ANALYSIS SECTIONS INCLUDE THE ANALYTICAL
PROCEDURES AND ASSUMPTIONS MADE IN THE ANALYSIS,
DESIGN CRITERIA AND MATERIAL ALLOWABLES ARE
DISCUSSED WHEN THEY CLARIFY THE ANALYSIS METHOD.
(AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-262 976

BOEING CO SEATTLE WASH

DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM

(U)

DEC 6; IV

REPT. NO. 10 81000

UNCLASSIFIED REPORT

DESCRIPTORS: •EJECTION SEATS, •JETTISONABLE EQUIPMENT,
•SURVIVAL KITS, •TRACKS (AERODYNAMICS), CATAPULTS,
CONTAINERS, DESIGN, EFFECTIVENESS, PARACHUTES,
RELIABILITY, TEMPERATURE, TEST METHODS, TESTS,
VIBRATION

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

A STUDY WAS MADE OF THE DESIGN, FABRICATION,
PERFORMANCE AND TESTING REQUIREMENTS FOR AN EJECTION
SEAT AND SURVIVAL SYSTEM, THE EQUIPMENT WAS
DESIGNED TO PROVIDE FOR PILOT ESCAPE AND SURVIVAL
FROM THE DYNA-SOAR GLIDER. PREPRODUCTION
EFFECTIVENESS, TEST METHODS, •TRACKS
(AERODYNAMICS), PACKAGING, •JETTISONABLE
EQUIPMENT, PARACHUTES, CATAPULTS, TESTS,
TEMPERATURE, VIBRATION, RELIABILITY,
PRODUCTION. OPEN-ENDED TERMS: DYNA-SOAR,
A STUDY WAS MADE OF THE DESIGN, FABRICATION,
PERFORMANCE AND TESTING REQUIREMENTS FOR AN EJECTION
SEAT AND SURVIVAL SYSTEM, THE EQUIPMENT WAS
DESIGNED TO PROVIDE FOR PILOT ESCAPE AND SURVIVAL
FROM THE DYNA-SOAR GLIDER. PREPRODUCTION TESTS
WERE MADE OF EJECTION SEAT AND RAIL ASSEMBLIES,
ROCKET CATAPULT AND PARACHUTE ASSEMBLIES, RESERVE
AND SURVIVAL KITS, AND PACKAGING FOR RELIABILITY, AND
FOR COMPLIANCE WITH MILITARY SPECIFICATIONS,
TEMPERATURE AND VIBRATION AND ENVIRONMENTAL TESTS
WERE ALSO MADE.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-262 055

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WASHINGTON D
C

PROCEEDINGS OF FIRST NATIONAL CONFERENCE ON THE
PEACEFUL USES OF SPACE, TULSA, OKLAHOMA, MAY 26-27,

1961

(U)

DEC 61 IV

UNCLASSIFIED REPORT

AVAILABILITY: FROM GPO, WASHINGTON, D. C.

\$1.25.

DESCRIPTORS: *ASTROPHYSICS, *SPACE FLIGHT, COMMUNICATION
SYSTEMS, FACSIMILE TRANSMISSION, MANNED, METEOROLOGY,
MOON, PLASMA PHYSICS, SATELLITES (ARTIFICIAL), SOLAR
SYSTEMS, SPACE PROBES, SYMPOSIA (U)

IDENTIFIERS: TIROS, X-15 AIRCRAFT, X-20
SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-258 309

JET PROPULSION LAB PASADENA CALIF
ASTRONAUTICS INFORMATION, OPEN LITERATURE SURVEY,
VOLUME III, NUMBER 5 (ENTRIES 30,845-31,145) (U)
MAY 61 IV CARRINGER, E.M.; HOPPE, M.G.; NICHOLS,
B.H.;

CONTRACT: NASW6

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: *ASTRONAUTICS, *BIBLIOGRAPHIES, ABLATION,
ATMOSPHERE, AURORAE, COMMUNICATION SYSTEMS, COSMIC RAYS,
GUIDANCE, IONOSPHERE, MARS, METEORITES, MOON, NUCLEAR
PROPULSION, PLANETARY ATMOSPHERES, PLANETS, REENTRY
VEHICLES, SPACE FLIGHT, SPACE MEDICINE, VAN ALLEN
RADIATION BELT, VENUS, WEIGHTLESSNESS (U)
IDENTIFIERS: AGENA, ARGUS AIRCRAFT, ATLAS, DISCOVERER,
EXPLORER, KIWI, LITTLE JOE, MERCURY PROJECT, NOVA,
PIONEER, PROSPECTOR, RANGER SPACECRAFT, SATURN, SNAP,
X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-244 545

ARNOLD ENGINEERING DEVELOPMENT CENTER ARNOLD AIR FORCE
STATION TENN

FORCE TESTS ON A HETS THIRD-STAGE CONFIGURATION AT
MACH NUMBER 8 (U)

OCT 60 1V CLARK, E. L.; MALLARD, S. R.;
REPT. NO. TN60 190
CONTRACT: AF40 600 800

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: AERODYNAMIC CHARACTERISTICS, AERODYNAMIC
CONFIGURATIONS, ATMOSPHERE ENTRY, BOOSTER MOTORS,
CONTROL, HYPERSONIC CHARACTERISTICS, HYPERSONIC FLOW,
HYPERSONIC TEST VEHICLES, HYPERSONIC WIND TUNNELS,
HYPERVELOCITY VEHICLES, REENTRY VEHICLES, RESEARCH TEST
VEHICLES, ROCKET CASES, ROLL, TESTS, WIND TUNNEL
MODELS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-236 404

MOTOROLA INC PHOENIX ARIZ

INDUSTRIAL PREPAREDNESS MEASURE ON 1 WATT 70 MC

GERMANIUM MESA TRANSISTOR

(U)

JAN 60 IV PHILLIPS, A.B.;

CONTRACT: DA36 0395C81296

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: DESIGN, DIFFUSION, ELECTRICAL PROPERTIES,
EVAPORATION, GERMANIUM, MANUFACTURING METHODS,
MECHANICAL PROPERTIES, TESTS

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-224 596

BOEING CO SEATTLE WASH

IV

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (FLAT PLATE MODELS, HYPERSONIC CHARACTERISTICS), ROUGHNESS, REENTRY VEHICLES, BOOST-GLIDE VEHICLES, WIND TUNNEL MODELS, AERODYNAMIC HEATING, HEAT TRANSFER, TESTS, SHOCK TUBES, HYPERSONIC WIND TUNNELS, SCHLIEREN PHOTOGRAPHY, EXPERIMENTAL DATA, MACH NUMBER, REYNOLDS NUMBER, ANGLE OF ATTACK, TABLES
IDENTIFIERS: X-20 SPACECRAFT

(U)

(U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-120 053L

THIokol CHEMICAL CORP DENVILLE N J REACTION MOTORS
DIV

FEASIBILITY STUDY OF PROPULSION SYSTEM FOR
SR-126.

(U)

DESCRIPTIVE NOTE: FINAL REPT.

NOV 56 89P HARRISON, W.T.:

REPT. NO. RMI-136-F

CONTRACT: DAC-56-418

UNCLASSIFIED REPORT

DISTRIBUTION: DOD ONLY; OTHERS TO WADC,
ATTN: RDZPT-SR126. WRIGHT-PATTERSON AFB,
OHIO 45433.

DESCRIPTORS: •HYPERVELOCITY VEHICLES; •ROCKET MOTORS;
•ROCKET PROPULSION, AUXILIARY POWER PLANTS, DESIGN,
MILITARY REQUIREMENTS, PROPELLANTS

(U)

UNCLASSIFIED

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-830 983 11/4 11/6 22/2
ROCKETDYNE CANOGA PARK CALIF
EVALUATION OF TUNGSTEN COMPOSITES FOR HYPERSONIC
VEHICLES. (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 6 JUL 66-30
JUN 67,
JUL 67 B6P SCHWARZKOPF, PETER I
REPT. NO. R-7145
CONTRACT: AF 33(615)-5305
PROJ: AF-7351
TASK: 735101
MONITOR: AFML TR-67-252

UNCLASSIFIED REPORT
DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE MATERIALS LAB., ATTN: MAM. WRIGHT-
PATTERSON AFB, OHIO 45433.

DESCRIPTORS: (*REENTRY VEHICLES, *HEAT SHIELDS),
(*TUNGSTEN, *COMPOSITE MATERIALS), HYPERSONIC
CHARACTERISTICS, AERODYNAMIC HEATING, SIMULATION,
LIFTING REENTRY VEHICLES, BOOST-GLIDE VEHICLES,
AEROSPACE PLANES, HYPERSONIC PLANES, SUPERSONIC
COMBUSTION RAMJET ENGINES, TRAJECTORIES, POWDER
METALLURGY, POROUS METALS, ADDITIVES, COPPER
ALLOYS, ZIRCONIUM ALLOYS, SILVER ALLOYS (U)
IDENTIFIERS: *METAL-MATRIX COMPOSITES, HL-10
LIFTING REENTRY VEHICLES, HTOL (HORIZONTAL TAKE-
OFF AND LANDING), X-20 SPACECRAFT, LIFTING
BODY REENTRY VEHICLES (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-810 650 6/17 20/1

CBS LABS STAMFORD CONN

ACOUSTIC NOISE REDUCTION IN HELMET-TO-SUIT
MATING.

(U)

DESCRIPTIVE NOTE: FINAL REPT. JAN-DEC 66,
JAN 67 62P ABBAGNARO, LOUIS A. ;
ROSENHECK, ALLAN J. ; DIMATTIA, ALFRED L. ;
REPT. NO. CLD-1770
CONTRACT: AF 33(615)-3312
PROJ: AF-4335
TASK: 433506
MONITOR: AFAL TR-67-18

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE AVIONICS LAB., ATTN: COMMUNICATIONS
BRANCH. WRIGHT-PATTERSON AFB, OHIO 45433.

DESCRIPTORS: (*HELMETS, *PRESSURE SUITS),
ASTRONAUTS, FLIGHT CLOTHING, PROTECTIVE CLOTHING,
ACOUSTIC PROPERTIES, SOUND TRANSMISSION, ACOUSTIC
INSULATION, SEALS, EXPANDED PLASTICS, ISOCYANATE
PLASTICS, DESIGN, EFFICIENCY, ATTENUATION
IDENTIFIERS: X-20 SPACECRAFT

(U)

(U)

THIS PROGRAM STUDIED THE HELMET-TO-SUIT MATING
PROBLEM AND DEVELOPED TECHNIQUES FOR PREVENTING
TRANSMISSION OF ACOUSTIC NOISE FROM A SPACE SUIT TO
THE PILOT/ASTRONAUT HELMET. A LITERATURE SURVEY
REVEALED NATURE OF EXPECTED NOISE ENVIRONMENT AND
DEGRADATION OF EARLY HELMET-SUIT SEALS, WHICH WAS
SUPPLEMENTED BY MEASUREMENTS OF A DYNA-SOAR
HELMET AND SUIT. THE POTENTIAL NOISE ATTENUATION
OF THE DYNA-SOAR HELMET IS SUBSTANTIALLY REDUCED
BY TRANSMISSION BETWEEN SUIT AND HELMET. A STUDY
UNCOVERED PROMISING MATERIALS AND TECHNIQUES FOR
INCREASING ISOLATION BETWEEN SPACE SUIT AND HELMET.
THREE PROMISING METHODS ARE DESCRIBED. ONE OF
THESE, EMPLOYING A SMALL-AREA FOAM SEAL, WAS
DEVELOPED INTO AN EXPERIMENTAL HELMET-SUIT JUNCTURE.
IT GAVE A MARKED REDUCTION IN SUIT-HELMET SOUND
TRANSMISSION COMPARED TO PRESENT SEALS.
ARTICULATION INDEX TECHNIQUES EXPLORED THE EFFECTS
OF NEW, AS WELL AS PRESENT, HELMET-TO-SUIT
SOUNDPROOFING SEALS ON SPEECH INTELLIGIBILITY IN A
ROCKET NOISE ENVIRONMENT. CONCLUSIONS ARE GIVEN.
AREAS WHICH NEED FURTHER STUDY ARE SUGGESTED.
(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-807 805 14/2
BOEING CO SEATTLE WASH
DESIGN AND DEVELOPMENT OF 3000 F TEMPERATURE-
TRANSDUCER SYSTEM.
DESCRIPTIVE NOTE: FINAL REPT.,
AUG 62 135P RALL, D. L. ;
CONTRACT: AF 33(657)-7132, AF 33(600)-41517.

(U)

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
AERONAUTICAL SYSTEMS DIV., WRIGHT-PATTERSON
AFB, OHIO 45433.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
AMERICAN-STANDARD, MOUNTAIN VIEW, CALIF.
ADVANCED TECHNOLOGY LABS. REPT. NO. ATL-D-
861.

DESCRIPTORS: (*TRANSUCERS, THERMOCOUPLES),
(*THERMOCOUPLES, *HIGH-TEMPERATURE RESEARCH),
BOOST-GLIDE VEHICLES, RESEARCH PLANES, MANNED
SPACECRAFT, ATMOSPHERE ENTRY, AERODYNAMIC HEATING,
WINGS, TEMPERATURE, MEASUREMENT, TUNGSTEN
ALLOYS, RHENIUM ALLOYS
IDENTIFIERS: X-20 SPACECRAFT

(U)

(U)

THE PURPOSE OF THIS PROGRAM WAS TO DESIGN, DEVELOP,
AND FABRICATE A TRANSDUCER SYSTEM, AND METHOD OF
INSTALLATION, FOR MEASURING THE SKIN TEMPERATURE OF
THE WING PANEL AND LEADING EDGE OF THE DYNA SOAR
VEHICLE DURING RE-ENTRY INTO THE EARTH'S ATMOSPHERE.
THIS SYSTEM WAS INTENDED FOR USE IN MAKING
TEMPERATURE MEASUREMENTS DURING ACTUAL FLIGHT, AS A
MEANS OF DEVELOPING A BETTER UNDERSTANDING OF THE
EFFECT OF DESCENT RATE, ATTACK ANGLE AND PITCHUP ON
AERODYNAMIC HEATING DURING RE-ENTRY. THE ULTIMATE
GOAL IS TO ESTABLISH RELIABLE CRITERIA FOR FUTURE
DESIGNS OR MODIFICATIONS TO THE EXISTING VEHICLE.
THE SPECIFICATIONS GOVERNING THIS SYSTEM DESIGN ARE
GIVEN IN BOEING DOCUMENT D2-8015-1 AND, IN
GENERAL, REQUIRE THAT THE SYSTEM BE ABLE TO WITHSTAND
SKIN TEMPERATURES UP TO 3000 F AND LEAD-WIRE
TEMPERATURES OF UP TO 2000 F. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-630 463 22/2 14/2
AIR FORCE FLIGHT DYNAMICS LAB WRIGHT-PATTERSON AFB
OHIO
DEVELOPMENT TEST SUMMARY IN SUPPORT OF X-20 ELEVON
STRUCTURAL TEST PROGRAM. (U)
DESCRIPTIVE NOTE: FINAL REPT., JAN-JUL 64,
JAN 66 31P GROGAN, JOHN C. ;
REPT. NO. AFFDL-TR-65-191,
PROJ: AF-1368,
TASK: 136804,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ELEVONS, SPACECRAFT), (*TEST
METHODS, ELEVONS), HIGH-TEMPERATURE RESEARCH,
TEST FACILITIES, FURNACES, STRUCTURE,
ENVIRONMENTAL TESTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE CONTENTS OF THIS REPORT ARE ORIENTED
EXCLUSIVELY TOWARD TEST PROCEDURES, TEST HARDWARE AND
TEST TECHNIQUES INVOLVING ADVANCED TYPE STRUCTURES.
IT CONTAINS A GENERAL SUMMARY OF SIGNIFICANT
RESULTS OBTAINED DURING THE DEVELOPMENT TEST PROGRAM
CONDUCTED IN PREPARATION FOR THE X-20 ELEVON
STRUCTURAL TEST PROGRAM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-618 715

AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
OHIO

ACOUSTICAL EVALUATION OF X-20A DYNA-SOAR FULL-
PRESSURE SUIT ASSEMBLIES. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

MAY 65 3DP SOMMER, HENRY C. ; HILLE,

HARALD K. ;

REPT. NO. AMRL-TR-65-86

PROJ: 7231

TASK: 723103

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•PRESSURE SUITS, ACOUSTIC PROPERTIES),
(•ASTRONAUTS, AUDITORY PERCEPTION), HELMETS,
NOISE, SOUND TRANSMISSION, ATTENUATION,
TRAINING, FLIGHT CLOTHING, EXPOSURE SUITS,
AUDITORY SIGNALS, SPACECRAFT CABINS, EARPHONES,
MICROPHONES, COMMUNICATION EQUIPMENT, BOOST-GLIDE
VEHICLES (U)

IDENTIFIERS: X-20 SPACECRAFT, EVALUATION (U)

DATA ON THE SUBJECTIVE REAL-EAR ATTENUATION
AT THRESHOLD (REAT) AND NOISE TRANSMISSION
MEASUREMENTS AT THE HELMET MICROPHONE AND EAR CUP
WERE OBTAINED FOR TWO MODELS OF THE SUIT ASSEMBLY.
THE FIRST MODELS TESTED AND EVALUATED WERE CALLED
THE 'TRAINING' MODELS AND WERE CUSTOM FITTED FOR EACH
OF THE DYNA-SOAR PILOTS. DURING THE TEST
PROGRAM, IN WHICH THE PILOTS WERE ACTING AS
EXPERIMENTAL SUBJECTS, THE X-20A PROGRAM WAS
CANCELLED AND ONLY FOUR OF THE SIX PILOTS COMPLETED
THE TESTS. THE RESULTS OF THIS EVALUATION REVEALED
THAT VARIOUS FEATURES OF THE ASSEMBLY WERE
UNSATISFACTORY; THEREFORE, AN IMPROVED VERSION WAS
FABRICATED TO CORRECT THE UNDESIRABLE DEFICIENCIES.
FROM THE ACOUSTICAL STANDPOINT, THE ASSEMBLY WAS
REDESIGNED TO ELIMINATE A RESONANCE AT 250 CPS WITH
THE VISOR OPEN. THIS IMPROVED SECOND MODEL WAS
CALLED THE 'FLIGHT READY' MODEL. THE REPORT
DESCRIBES A COMPARATIVE ACOUSTICAL EVALUATION OF THE
TRAINING MODELS AND FLIGHT-READY MODELS OF THE SUIT
ASSEMBLIES. EVALUATION CONSISTED OF (1) THE
SUBJECTIVE MEASUREMENT OF REALEAR ATTENUATION
AT THRESHOLD (REAT) AND (2) THE MEASUREMENT
OF TRANSMISSION LOSS THROUGH THE HELMET AT THE HELMET
MICROPHONE AND EAR CUP POSITION. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-609 169

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO
UTILIZATION OF REFRACTORY METALS ON THE X-20A (DYNA-
SOAR). (U)

DESCRIPTIVE NOTE: REPT. FOR MAY 60-10 DEC 63,

JUN 64 53P COWIE, WILLIAM ;

MONITOR: SEG . TDR64 19

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART
UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM THE BEST
AVAILABLE COPY.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, REFRACTORY METAL
ALLOYS), (*REFRACTORY METAL ALLOYS, AEROSPACE CRAFT),
(*HEAT SHIELDS, REFRACTORY METAL ALLOYS), (*REENTRY
VEHICLES, REFRACTORY COATINGS), CERAMIC MATERIALS,
AIRFOILS, SILICIDES, MOLYBDENUM ALLOYS, TITANIUM ALLOYS,
ZIRCONIUM ALLOYS, NIOBIUM ALLOYS, REFRACTORY METALS,
THERMAL INSULATION, PANELS (STRUCTURAL), ABLATION,
PLASMA JETS, TEST FACILITIES (U)

IDENTIFIERS: X-20 SPACECRAFT, MOLYBDENUM ALLOY 0.5 TI,
MOLYBDENUM ALLOY 0.5 TI 0.072R, NIOBIUM ALLOY D-36 (U)

THE UTILIZATION OF COATED REFRACTORY METALS AS HEAT
SHIELDS AND LEADING EDGES ON THE X-20 IS DISCUSSED.
PECULIARITIES AND HISTORY OF THE MATERIALS USED,
DESIGNS, DEVELOPMENTAL TESTS, AND PROBLEMS ARE
EMPHASIZED IN THIS RESUME. MOLYBDENUM ALLOYS MO-
.5TI AND MO-.5TI.072R, COLUMBIUM ALLOY D-
36, AND SILICIDE COATINGS ARE DISCUSSED IN RELATION
TO THEIR APPLICABILITY AND EFFECTIVENESS IN AN X-20
RE-ENTRY ENVIRONMENT. THE PRACTICALITY OF A HEAT-
PROTECTION SYSTEM CAPABLE OF RESISTING 3000F FOR
LONG PERIODS OF TIME IS DEMONSTRATED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-603 703

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO
X-20 (DYNA-SOAR) LANDING GEAR DEVELOPMENT AND
QUALIFICATION PROGRAM, (U)

JUN 64 41P HOWARD, H. W. ;
MONITOR: SEG , TDR64 17

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUMMARY OF WORK ACCOMPLISHED BY THE
BOEING CO. UNDER CONTRACT AF33 657 7132, BY THE
AIR FORCE MISSILE DEVELOPMENT CENTER, AND BY THE
AIR FORCE FLIGHT TEST CENTER.

DESCRIPTORS: (*AEROSPACE PLANES, LANDING GEAR),
(*LANDING GEAR, AEROSPACE PLANES), SKIS, METAL PLATES,
NICKEL ALLOYS, WEAR RESISTANCE, LANDING IMPACT, ENERGY,
ABSORPTION, TEST METHODS, TESTS, PERFORMANCE
(ENGINEERING) (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

A DESCRIPTION OF THE X-20 LANDING GEAR AND
PERFORMANCE REQUIREMENTS ARE PRESENTED. THE
YIELDING METAL ENERGY ABSORPTION SYSTEM AND THE ALL
SKID CONCEPT IS DISCUSSED. A SUMMARY IS PRESENTED
OF THE 'ENERGY STRAP' AND SKID DEVELOPMENT PROGRAMS.
THE QUALIFICATION PROGRAM, WHICH HAD NOT BEEN
INITIATED AT THE TIME OF PROGRAM TERMINATION, IS
DISCUSSED, AND CONCLUSIONS AND RECOMMENDATIONS ARE
PRESENTED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-603 356

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO
STRESS ANALYSIS OF THE EXTERNAL FRONT WINDOW OF THE
X-20A (DYNA-SOAR),

(U)

JUN 64 44P JOHNSON, VERNER J. ;
MONITOR: SEG , TDR64 16

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (RE-ENTRY VEHICLES, WINDSHIELDS),
AERODYNAMIC LOADING, STRESSES, STRAIN (MECHANICS),
GLASS, THICKNESS, TEMPERATURE, MATRIX ALGEBRA,
BOOSTGLIDE VEHICLES

(U)

IDENTIFIERS: X-20 SPACECRAFT, WINDOWS
(SPACECRAFT)

(U)

THE STRUCTURE OF THE EXTERNAL FRONT WINDOW OF THE
X-20A IS ANALYZED. A SOPHISTICATED MATRIX
METHOD OF ANALYSIS, RATHER THAN A CLASSICAL ANALYTIC
METHOD, WAS USED TO DETERMINE THE BEHAVIOR OF A
WINDOW OF THE X-20A RE-ENTRY VEHICLE UNDER LOADS
AND TEMPERATURES. A COMPUTER SOLUTION PROVIDES
RESULTS THAT CAN BE USED FOR FUTURE DEVELOPMENTS OF
RE-ENTRY VEHICLES AND REVEALS AREAS THAT SHOULD BE
GIVEN FURTHER STUDY. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-602 628

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO

X-20A GUIDANCE PHILOSOPHY AND MECHANIZATION. (U)

DESCRIPTIVE NOTE: REPT. FOR NOV 60-DEC 63.

MAY 64 45P

MONITOR: SEG , TDR64 5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MANNED SPACECRAFT, GUIDANCE), (*GUIDANCE,
MANNED SPACECRAFT), (*BOOST-GLIDE VEHICLES, GUIDANCE),
INERTIAL GUIDANCE, CONTROL SYSTEMS, REMOTE CONTROL
SYSTEMS, RECOVERY, TESTS, COMPUTERS, NAVIGATION, ENERGY,
PERFORMANCE (ENGINEERING), DESIGN, ANALYSIS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE REPORT PRESENTS THE TOTAL X-20A GUIDANCE PHILOSOPHY AND METHODS OF MECHANIZATION. THE GENERAL X-20A GUIDANCE REQUIREMENTS, THE PHILOSOPHY OF OPERATION IN THE PRIMARY AND SECONDARY MODES, AND A GENERAL DESCRIPTION OF THE PHYSICAL HARDWARE WHICH MEETS THE ESTABLISHED NAVIGATION AND GUIDANCE REQUIREMENTS ARE PRESENTED. STATUS OF THE VARIOUS GUIDANCE ELEMENTS AND SOME UNIQUE INTEGRATION PROBLEMS AND SOLUTIONS ARE ALSO DISCUSSED. IT IS SHOWN THAT THE REQUIREMENTS FOR THE ONCE-AROUND X-20A MISSION CAN BE MET WITH MATURE STATE-OF-THE-ART SENSORS, TECHNIQUES, AND HARDWARE ELEMENTS. THE QUALIFICATION OF THE GUIDANCE SUBSYSTEMS TO MEET THE X-20A MISSION AND EMERGENCY REQUIREMENTS OF A MANNED SPACECRAFT WAS BEING ASSURED BY A COMPREHENSIVE ANALYTICAL SIMULATION AND TEST PROGRAM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-490 012

BOEING CO SEATTLE WASH

APPROVED STANDARD ELECTRONIC PARTS, (U)

OCT 60 8P MCDONALD, W. A. I

REPT. NO. DN D2 7486

CONTRACT: AF 33(600)41517

UNCLASSIFIED REPORT
DISTRIBUTION: NO FORM.

DESCRIPTORS: (ELECTRONIC EQUIPMENT,
SPECIFICATIONS), DESIGN, SPACECRAFT, MILITARY
REQUIREMENTS, IDENTIFICATION,

RELIABILITY(ELECTRONICS) (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT SPECIFIES THE APPROVED STANDARD
ELECTRONIC PARTS TO BE USED IN ALL DYNA SOAR
ELECTRONICS AND THE REQUIREMENTS FOR DEVIATION
THEREFROM, THE PURPOSE OF THIS DOCUMENT IS TO
EFFECT THE STANDARDIZATION OF ELECTRONIC PARTS
NECESSARY OF DEVELOPING NEW PART SPECIFICATIONS AND
PARTS, TO MINIMIZE DUPLICATION OF EFFORT, AND TO
ESTABLISH A COORDINATED EFFORT IN THE DYNA SOAR
PROGRAM TOWARD ELECTRONIC PARTS CONTROL.

{AUTHOR}

(U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-483 820 20/3 22/2
BOEING CO SEATTLE WASH AEROSPACE GROUP
CORONA ONSET VOLTAGE OF INSULATED AND BARE ELECTRODES
IN RAREFIED AIR AND OTHER GASES. (U)
DESCRIPTIVE NOTE: FINAL REPT. JUL-DEC 65,
JUN 66 182P OUNBAR, WILLIAM G. ;
REPT. NO. D2-B4141-1
CONTRACT: AF 33(615)-3020
PROJ: AF-8128
TASK: 812806
MONITOR: AFAPL TR-65-122

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE AERO PROPULSION LAB., WRIGHT-PATTERSON
AFB, OHIO. 45433. ATTN: AEROSPACE POWER DIV.
(API).

DESCRIPTORS: (*GAS DISCHARGES, *BOOST-GLIDE
VEHICLES), (*GLOW DISCHARGES, VOLTAGE),
(*ELECTRICAL EQUIPMENT, BOOST-GLIDE VEHICLES),
ELECTRIC DISCHARGES, ELECTRICAL CORONA, HIGH
ALTITUDE, NITROGEN, OXYGEN, ELECTRIC TERMINALS,
ELECTRIC INSULATION, ELECTRIC WIRE, DIELECTRIC
PROPERTIES, MOLYBDENUM COMPOUNDS, OXIDES, POWER
EQUIPMENT PARTS, ELECTRIC POWER PRODUCTION,
CONTAMINATION, CONTROLLED ATMOSPHERES, HELIUM,
MANNED SPACECRAFT, PRESSURE (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

ELECTRICAL DISCHARGES CAUSED BY CORONA, GLOW
DISCHARGES, AND VOLTAGE BREAKDOWN WERE MEASURED UNDER
CONDITIONS ENCOUNTERED IN THE X-20A (DYNA-
SOAR) AEROSPACE VEHICLE WHEN OPERATING WITHIN THE
70,000-TO 250,000-FT ALTITUDE ZONE. MOST
MEASUREMENTS WERE MADE AT THE ELECTRIC-POWER-SYSTEM
FREQUENCY (400 HERTZ) IN GASES USED TO PRESSURIZE
X-20A COMPARTMENTS. THESE GASES WERE NITROGEN,
OXYGEN, NOTROGEN-OXYGEN MIXTURES, AND NORMAL SEA
LEVEL AIR AT REDUCED PRESSURE. TEST RESULTS SHOW
THAT: (1) THE CORONA ONSET VOLTAGE (THAT
VOLTAGE AT WHICH THE ELECTRICAL DISCHARGE IS
INITIATED) CAN BE INCREASED BY INSULATING THE
ELECTRICAL TERMINALS AND BY TWISTING OR CABLING THE
INSULATED WIRES; (2) THE CORONA ONSET VOLTAGE
BETWEEN INSULATED WIRES IS INCREASED AS THE
INSULATION IS MADE THICKER AND INSULATION DIELECTRIC
CONSTANT IS MADE LOWER, AND IS DECREASED TO THAT OF
BARE WIRES AS THE WIRE DIAMETER AND WIRE SPACING ARE
INCREASED; AND (3) THE CORONA ONSET VOLTAGE OF
COMPONENTS DEPENDS ON THE TYPE OF COMPONENT, ITS WIRE
CONNECTIONS, ITS INSTALLATION, AND THE GASEOUS (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-483 660L 9/1
BOEING CO SEATTLE WASH
CONVECTIVE HEAT FLUX TRANSDUCER DEVELOPMENT, (U)
APR 65 119P WILHELM, J. K. ;
REPT. NO. D2-81313-1
MONITOR: IDEP 852.74.85.00-C6-D2

UNCLASSIFIED REPORT
DISTRIBUTION: USGO; OTHERS TO HEADQUARTERS, SPACE
SYSTEMS DIV., AIR FORCE IDEP OFFICE, LOS
ANGELES, CALIF. 90045.

DESCRIPTORS: (•TRANSUCERS, HEAT FLUX),
CONVECTION(HEAT TRANSFER), TEMPERATURE CONTROL,
SURFACE TEMPERATURES, THERMOCOUPLES, WIRE, HIGH-
TEMPERATURE RESEARCH, DIFFUSION, EVAPORATION,
ELECTRON BEAMS, BOOST-GLIDE VEHICLES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

A DEVELOPMENT PROGRAM WAS UNDERTAKEN TO COMPLETE
THE WORK BEGUN DURING THE X-20A CONTRACT ON A
SURFACE HEAT FLUX TRANSDUCER. IT WAS TO OPERATE
WITH A CONVECTIVE INPUT UP TO 50 BTU/SQ FT-SEC WITH
A TEMPERATURE UP TO 3000 F. THE CONCEPT OF THE
SENSOR WAS TO GENERATE A TEMPERATURE DIFFERENCE BY
USING TWO SURFACES WHICH EXHIBIT DIFFERENT EMITTANCES
AND CONTROLLING THE TEMPERATURE DIFFERENCE BY
DESIGNING A PROPER CONDUCTIVE PATH BETWEEN THEM.
PREVIOUS ANALYSES INDICATED THAT THIS TEMPERATURE
DIFFERENCE WAS A FUNCTION OF THE INPUT HEAT FLUX.
SAMPLES OF SEVERAL TYPES OF THERMOPILE
CONFIGURATIONS WERE ASSEMBLED AND TESTED. THE THIN
FILM APPROACH WAS TOO PRONE TO DIFFUSION AND
EVAPORATION SO THE FINAL DESIGN WAS A FINE WIRE
DESIGN. A CEMENT WAS DEVELOPED WHICH WOULD ALLOW
USE OF THE THERMOPILE TO 3000 F AND SEAL THE SENSOR
AGAINST CONTAMINATION. AN ELECTRON BEAM HEATING
FACILITY WAS MODIFIED TO PROVIDE A 9 SQ IN UNIFORM
HEATED SURFACE ADJUSTABLE IN HEATING RATE FROM 0 - 50
BTU SQ FT-SEC. THIS SIMULATES THE HIGH EFFECTIVE
GAS TEMPERATURES OF A REENTRY VEHICLE BOUNDARY
LAYER. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-482 451L 22/4
LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
TITAN III BOOSTER. (U)
DESCRIPTIVE NOTE: LITERATURE SEARCH,
DEC 63 11P EVANS, GEORGE R. ;
REPT. NO. LMSC-LS-15

UNCLASSIFIED REPORT
DISTRIBUTION: USGO: OTHERS TO LOCKHEED MISSILES
AND SPACE CO., SUNNYVALE, CALIF. ATTN:
LITERATURE SEARCH.

DESCRIPTORS: (•LAUNCH VEHICLES(AEROSPACE),
•BIBLIOGRAPHIES), STAGING, STARTING, ROCKET
MOTORS(LIQUID PROPELLANT), ROCKET MOTORS(SOLID
PROPELLANT), ABSTRACTS, GUIDED MISSILES(SURFACE-
TO-SURFACE), MANNED SPACECRAFT (U)
IDENTIFIERS: TITAN 3, X-20 SPACECRAFT (U)

TITAN 3 BOOSTER.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-480 138 22/2

BOEING CO SEATTLE WASH AEROSPACE GROUP
HIGH TEMPERATURE BEARING AND RETENTION
DEVELOPMENT.

(U)

DESCRIPTIVE NOTE: FINAL REPT. MAR 64-MAY 65.

JAN 66 133P ARMSTRONG, C. S. ;

CONTRACT: AF 33(615)-1789

PROJ: AF-1315

TASK: 131501

MONITOR: AFFDL

TR-65-84

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF AIR
FORCE FLIGHT DYNAMICS LAB., WRIGHT-PATTERSON
AFB, OHIO 45433.

DESCRIPTORS: (*AIRFRAME BEARINGS, HIGH-TEMPERATURE
RESEARCH), BOOST-GLIDE VEHICLES, RESEARCH PLANES,
MANNED SPACECRAFT, NICKEL ALLOYS, CERMETS,
TITANIUM COMPOUNDS, CARBIDES, METAL COATINGS,
GOLD, TOOL STEEL, LUBRICANTS, LOW-PRESSURE
RESEARCH, BARIUM COMPOUNDS, CALCIUM COMPOUNDS,
FLUORIDES, TEST EQUIPMENT, BALL BEARINGS

(U)

IDENTIFIERS: X-20 SPACECRAFT, RENE'

41 (ALLOY)

(U)

NINETY-THREE ANTIFRICTION AND PLAIN SPHERICAL
BEARINGS INTENDED FOR USE IN THE X-20 GLIDER WERE
EVALUATED AT TEMPERATURES RANGING FROM 70 TO 2000 F.
TO OBTAIN DESIGN DATA FOR FUTURE RE-ENTRY VEHICLES.
EVALUATIONS WERE ALSO MADE IN VACUUMS TO 10 TO THE
-10TH POWER TORR AT TEMPERATURES FROM 40 TO 1000
F. LOAD, TEMPERATURE SPECTRUM AND LIFE TESTS WERE
RUN TO DETERMINE LOAD, LIFE AND TEMPERATURE
CAPABILITIES OF THE VARIOUS TYPES OF BEARINGS.
AFTER EVALUATION, BEARINGS WERE EXAMINED
METALLURGICALLY TO DETERMINE THE CAUSE OF FAILURE.
TESTS TO DETERMINE STATIC LIMIT LOADS OF 1/4-IN.
BORE RENE' 41 PLAIN SPHERICAL BEARINGS WERE
PERFORMED. SEVERAL TYPICAL X-20 FLIGHT CYCLE
EVALUATIONS, CONSISTING OF A VACUUM PHASE AND A HOT
IN-AIR SIMULATED RE-ENTRY, WERE MADE USING M-2
ANTIFRICTION AND GOLD PLATED SPHERICAL BEARINGS.
FOUR TITANIUM CARBIDE CERMET BEARINGS, WITH
REINFORCED, TAPERED RACE SECTIONS FOR USE IN A
DIFFERENTIAL EXPANSION COMPENSATING MOUNT, WERE
DESIGNED, PROCURED AND EVALUATED BY MEANS OF STATIC
AND DYNAMIC TESTS TO DETERMINE LOAD CAPABILITIES FROM
ROOM TEMPERATURE TO 1800 F. (AUTHOR)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-478 430 20/4 22/2 20/1
BOEING CO SEATTLE WASH AEROSPACE GROUP
AERODYNAMIC NOISE TESTS ON X-20 SCALE MODELS. VOLUME
I, DATA REPORT. (U)
DESCRIPTIVE NOTE: FINAL REPT. OCT 64-AUG 65,
NOV 65 490P SEIDL ,MICHAEL G. WILEY,
DAVID R. ;
REPT. NO. D2-23966-1
CONTRACT: AF 33(657)-7132
PROJ: AF-1471
TASK: 147102
MONITOR: AFFDL TR-65-192-VOL-1

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC) WRIGHT-
PATTERSON AFB, OHIO 45433. ATTN: AFFDL.

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, 2D-478 215.

DESCRIPTORS: (+BOOST-GLIDE VEHICLES, NOISE),
WIND TUNNEL MODELS, MODEL TESTS,
PERFORMANCE(ENGINEERING), TRANSONIC
CHARACTERISTICS, SUPERSONIC CHARACTERISTICS, ANGLE
OF ATTACK, YAW, ELEVONS, DEFLECTION, AERIAL
RUDDERS, SOUND, PRESSURE, FREQUENCY,
INSTRUMENTATION, TEST METHODS, ACOUSTICS, FLOW
SEPARATION, SHOCK WAVES, OSCILLATION, BOUNDARY
LAYER, VIBRATION, EXPERIMENTAL DATA (U)
IDENTIFIERS: X-20 SPACECRAFT, AERODYNAMIC
NOISE (U)

AERODYNAMIC NOISE DATA ARE REPORTED FOR TESTS
CONDUCTED ON A 1/15-SCALE X-20 MODEL IN THE 2
TRANSONIC AND SUPERSONIC WIND TUNNELS, AND ON A 1/15-
SCALE X-20/624A MODEL IN ANOTHER TRANSONIC
TUNNEL. MEASUREMENTS ARE REPORTED FOR 16
MICROPHONE POSITIONS ON THE MODEL IN THE TRANSONIC
AND SUPERSONIC TUNNEL TESTS, AND 18 POSITIONS FOR THE
OTHER TRANSONIC TUNNEL TESTS. THE TOTAL MACH
RANGE SPANNED DURING THE TESTS WAS 0.5 TO 3.5.
ANGLE OF ATTACK VARIED FROM -10 TO +18, YAW ANGLE
FROM -4 TO +4 DEG, ELEVON DEFLECTION FROM -30 TO +
10 DEG, AND RUDDER DEFLECTION FROM -30 TO + 35 DEG.
THE DATA ARE REPORTED IN THE FORM OF CURVES SHOWING
OCTAVE-BAND SOUND PRESSURE LEVEL VERSUS FREQUENCY,
OVER THE OCTAVE-BAND-CENTER FREQUENCY RANGE OF 16 TO
2000 CYCLES PER SECOND. BRIEF DESCRIPTIONS OF
INSTRUMENTATION AND BASIC TEST PROCEDURES ARE
PRESENTED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-478 188 22/2 13/1
GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
COMPLETION OF FABRICATION AND ASSEMBLY OF THERMAL
MANAGEMENT SYSTEM FOR DYNA-SOAR (X-20). (U)
DESCRIPTIVE NOTE: FINAL REPT. AUG 64-APR 65,
DEC 65 168P CHASE, A. B. ;
REPT. NO. DS-273
CONTRACT: AF 33(615)-1898
PROJ: AF-3145
TASK: 314501
MONITOR: AFAPL TR-65-91

UNCLASSIFIED REPORT
DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC), WRIGHT-
PATTERSON, AFB, OHIO. ATTN: AFAPL.

DESCRIPTORS: (•AIR CONDITIONING EQUIPMENT, •BOOST-
GLIDE VEHICLES), (•HEAT EXCHANGERS, BOOST-GLIDE
VEHICLES), TEMPERATURE CONTROL, ALKENES, GLYCOLS,
HYDROGEN, HEAT SINKS, LIQUEFIED GASES, AUXILIARY
POWER PLANTS, FANS, VALVES, ASSEMBLING,
PERFORMANCE(ENGINEERING), OPERATION, HEAT
TRANSFER, PRESSURE, HYDRAULIC FLUIDS, HYDRAULIC
PRESSURE PUMPS, PRESSURE REGULATORS, COMPRESSORS,
PRESSURIZATION, SYSTEMS ENGINEERING, CHECK VALVES,
COOLING (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

SEVERAL COMPONENTS FOR THE X-20 (DYNA-SOAR)
THERMAL MANAGEMENT SYSTEM WERE IN FINAL FABRICATION
WHEN THE ORIGINAL DYNA-SOAR CONTRACT WAS
CANCELLED. THE COMPONENTS FOR THREE SYSTEMS WERE
REFURBISHED AND, WHERE NECESSARY, REMANUFACTURED AND
THEN ASSEMBLED, AND ACCEPTANCE TESTED. THE THERMAL
MANAGEMENT SYSTEM IS DESIGNED TO REMOVE HEAT FROM
SEVERAL HEAT-GENERATING SOURCES ON THE X-20 SPACE
VEHICLE, AND TO RETURN A PORTION OF THE HEAT TO THE
HYDROGEN STORAGE TANK TO MAINTAIN TANK PRESSURE.
THE SYSTEM EMPLOYS AN AQUEOUS ETHYLENE GLYCOL HEAT-
TRANSPORT FLUID TO CONNECT THE VARIOUS HEAT SOURCES
TO THE HEAT SINK. THE HEAT SINK IS CRYOGENIC
HYDROGEN, WHICH IS STORED IN THE SUPERCRITICAL STATE
AS FUEL FOR THE AUXILIARY POWER UNIT (APU). THE
DISTINGUISHING FEATURE OF THIS SYSTEM IS ITS ABILITY
TO PROPORTION, AS REQUIRED, THE TOTAL HYDROGEN FLOW
TO THE APU AND THE COOLING LOAD, WHILE MAINTAINING
SYSTEM STABILITY AND LOGIC OVER TANK PRESSURIZATION,
HEAT REJECTION, AND APU FUEL DEMAND. (AUTHOR) (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-477 775 20/13 22/2
BOEING CO SEATTLE WASH
HOT STRUCTURES THERMAL CORRELATION. (U)
DESCRIPTIVE NOTE: FINAL REPT. OCT. 64-MAY 65,
NOV 65 244P CLAWSON, JAMES F. ;
REPT. NO. D2-90709-1
CONTRACT: AF33(657)-7132
PROJ: AF-1467
MONITOR: AFFDL TR-65-142

UNCLASSIFIED REPORT

DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC), WRIGHT-
PATTERSON AFB, OHIO. ATTN: AFFOL.

DESCRIPTORS: (•THERMAL ANALYSIS, •BOOST-GLIDE
VEHICLES), MODELS(SIMULATIONS), RESEARCH
PLANES, MANNED SPACECRAFT,
PROGRAMMING(COMPUTERS), CONVECTION(HEAT
TRANSFER), INSTRUMENTATION, THERMOCOUPLES,
AIRPLANE PANELS, COBALT ALLOYS, NICKEL ALLOYS,
SURFACES, HEAT TRANSFER, SIMULATION,
TEMPERATURE, MATHEMATICAL PREDICTION, THERMAL
RADIATION, THERMAL CONDUCTIVITY, LIQUID COOLED,
REFRACTORY METALS, THERMODYNAMIC CYCLES, HIGH-
TEMPERATURE RESEARCH, BLACKBODY RADIATION (U)
IDENTIFIERS: X-20 SPACECRAFT, HOT STRUCTURES,
BETA PROGRAM (U)

TEST DATA GENERATED DURING THE EARLY X-20
(DYNA-SOAR) PHASES ARE COMPARED WITH THERMA2L
ANALYSIS METHODS EVOLVED THROUGH THE X-20
PROGRAM. DATA ARE TAKEN FROM THE HOT
STRUCTURES CONCEPT MODEL TEST PROGRAM. THIS
MODEL WAS SIMILAR IN SHAPE AND CONCEPT TO THE X-20
DESIGN. THE THERMAL ANALYSIS APPROACH AND METHODS
USED FOLLOW CLOSELY THOSE WHICH CREATED THE X-20
DESIGN TEMPERATURES. GENERALLY GOOD CORRELATION IS
SHOWN FOR TWO-DIMENSIONAL CROSS-SECTIONAL CUTS, A
SIMPLE THREE-DIMENSIONAL NOSE REGION ANALYSIS, SIMPLE
STRUCTURAL JOINT ANALYSES, AND CERTAIN OTHER DETAIL
AREAS. SOME ADDITIONAL LIGHT IS SHED ON JOINT
INTERFACE EFFECTS. THE ONLY MAJOR PROBLEM EVOLVED
WAS CONVECTION CURRENTS IN AND AROUND THE TEST
SPECIMEN. THIS PROGRAM IN COMBINATION WITH AN
EARLIER INSULATED PANEL CORRELATION PROGRAM PROVIDES
GENERAL CONFIDENCE IN THE X-20 THERMAL ANALYSIS
APPROACH AND METHODS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-477 758 11/2 22/2
BOEING CO SEATTLE WASH AEROSPACE GROUP
X-20 HIGH TEMPERATURE SIDE WINDOW TEST
EVALUATION. (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. 27 APR 64-1
AUG 65,
NOV 65 217P MCGINNIS, JOHN C. I
REPT. NO. D2-81310-1
CONTRACT: AF33(615)-2013
PROJ: AF-1368
TASK: 136802
MONITOR: AFFDL TR-65-155

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DISTRIBUTION: NO FOREIGN WITHOUT APPROVAL OF
RESEARCH AND TECHNOLOGY DIV. (AFSC) WRIGHT-
PATTERSON AFB, OHIO 45433. ATTN: AFFDL.
SUPPLEMENTARY NOTE: REPORT ON WINDOW SYSTEMS
CONCEPTS.

DESCRIPTORS: (*HEAT-RESISTANT GLASS, BOOST-GLIDE
VEHICLES), (*BOOST-GLIDE VEHICLES, *TRANSPARENT
PANELS), (*WINDSHIELDS, BOOST-GLIDE VEHICLES),
SILICON COMPOUNDS, SILICONE PLASTICS, ALUMINUM
COMPOUNDS, HIGH-TEMPERATURE RESEARCH, ENVIRONMENTAL
TESTS, DESIGN, VIBRATION, PRESSURE,
FAILURE(MECHANICS), MANUFACTURING METHODS,
SEALS, CHROMIUM ALLOYS, COBALT ALLOYS, NICKEL
ALLOYS, REENTRY VEHICLES (U)
IDENTIFIERS: X-20 SPACECRAFT, WINDOWS, HASTELLOY
(ALLOYS), RENE 41 (ALLOY) (U)

THE PURPOSE OF THIS PROGRAM WAS TO EXPERIMENTALLY
VERIFY THE X-20A SIDE WINDOW ASSEMBLY AND PROVIDE
EXPERIENCE FOR IMPROVED WINDOW DESIGN. THE
OBJECTIVE WAS TO VERIFY THE STRUCTURAL INTEGRITY OF
AN X-20A HIGH TEMPERATURE WINDOW DESIGN IN THE
X-20A FLIGHT ENVIRONMENT AND PROVIDE TEST DATA TO
EVALUATE THE DESIGN ANALYSIS AND DEVELOPMENT
PROCEDURES UTILIZED. THE WINDOW WAS SUBJECTED TO A
LOW-LEVEL BOOST VIBRATION ENVIRONMENT, OUTWARD ACTING
(PARTIAL VACUUM) LIMIT BOOST PRESSURE OF 7.7
PSIA, AND A SIMULATED REENTRY HEATING TIME-
TEMPERATURE HISTORY. THE WINDOW FAILED DURING THE
RE-ENTRY TEMPERATURE CYCLE. THE PRIMARY CAUSE OF
FAILURE WAS THE HIGH TEMPERATURE GRADIENT THROUGH THE
DEPTH OF THE WINDOW FRAME OF APPROXIMATELY 850 F
WHICH EXCEEDED BY A FACTOR OF 2 THE ULTIMATE DESIGN
VALUE. THE EXTREME THERMAL GRADIENT CAUSED THERMAL
CURVATURE OF THE WINDOW FRAME WHICH INDUCED GLASS
CURVATURE IN EXCESS OF ALLOWABLE. MEASURED
TEMPERATURE AND DEFLECTIONS ARE PRESENTED AND (U)

UNCLASSIFIED

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-473 766

BOEING CO SEATTLE WASH AEROSPACE GROUP
AIR PRESSURE MEASUREMENT IN THE RAREFIED GAS
TRANSITION REGION.

(U)

DESCRIPTIVE NOTE: FINAL REPT. APR 64-MAR 65,
AUG 65 87P BRUNSCHWIG, FRED S. I

CONTRACT: AF33 615 1793

PROJ: AF1469

TASK: 146907

MONITOR: FDL TR-65-101

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

DESCRIPTORS: (*TRANSDUCERS, *LOW-PRESSURE
RESEARCH), (*PRESSURE GAGES, SUPERAERODYNAMICS),
AIR, ARGON, VISCOSITY, GAS FLOW, TEMPERATURE,
CREEP, ATMOSPHERE ENTRY, TITANIUM, REFRACTORY
METALS, PIPES, SURFACES, SURFACE TEMPERATURES,
NONEQUILIBRIUM FLOW, HIGH-TEMPERATURE RESEARCH,
DESIGN, PERFORMANCE(ENGINEERING), AIRBORNE,
CALIBRATION, EXPERIMENTAL DATA

(U)

IDENTIFIERS: SLIP FLOW, THERMAL CREEP,
TRANSITION FLOW, X-20 SPACECRAFT, ALPHATRON 718

(U)

PRESENTED ARE PARAMETERS AND PRESSURE CORRECTIONS
FOR A LOW AIR PRESSURE (1-100 P.S.F.A.)
MEASUREMENT SYSTEM CONSISTING OF A PRESSURE
TRANSDUCER AND TUBING PORTED TO A HOT SURFACE AT
TEMPERATURES TO 2800 F. INCLUDED ARE RESULTS OF
LABORATORY MEASUREMENTS WITH ARGON AND AIR UNDER
CONDITIONS OF BOTH THERMAL CREEP AND SLIP FLOW
OCCURRING TOGETHER IN A PRESSURE TRANSMISSION TUBE
UNDER TEMPERATURE GRADIENTS. BOTH TEMPERATURE
FUNCTIONS, THERMAL CREEP AND SLIP FLOW, WERE FOUND TO
AFFECT THE SYSTEM PRESSURE. DYNAMICALLY, THE
TEMPERATURE DEPENDANCE OF SLIP FLOW AFFECTS TIME
RESPONSE FOR TUBES SINCE IT HAS THE TEMPERATURE
DEPENDANCY OF GAS VISCOSITY. INTEGRATION OF THE
TUBULAR TIME CONSTANT, MODIFIED FOR SLIP FLOW ALONG
THE TUBE'S TEMPERATURE GRADIENT, IS CARRIED OUT AND
COMPARED TO MEASUREMENTS; FAIR AGREEMENT IS SHOWN.
WORK REPORTED INCLUDES CALIBRATION OF A COMMERCIAL
AIRBORNE ALPHA EMISSION PRESSURE TRANSDUCER; ALSO
DATA IS PRESENTED ON ADSORPTION/OXIDATION AT
TEMPERATURE FOR PRESSURE TUBING MATERIAL.

(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-471 611

BOEING CO SEATTLE WASH

PARTS RACKING FOR FLUIDIZED BED COATING, (U)

JUL 62 28P COLLINS, M. A. I

REPT. NO. MDR-2-14977

MONITOR: IDEP 347.70.00.00-C6-14

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (SUPPORTS, BOOST-GLIDE VEHICLES),

HEATERS, MANNED SPACECRAFT, COATINGS (U)

IDENTIFIERS: X-20 SPACECRAFT, FLUIDIZED BED

PROCESSES (U)

PARTS RACKING FOR FLUIDIZED BED COATING.

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-471 604

BOEING CO SEATTLE WASH

TAPER CHEMICAL-MILLING OF RENE' 41 TUBES.

(U)

DESCRIPTIVE NOTE: MANUFACTURING DEVELOPMENT REPT.,

MAR 62 24P HOWELLS,EARL;

REPT. NO. MDR-2-14969

MONITOR: IDEP 347.70.00.00-C6-D9

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: (•NICKEL ALLOYS, CHEMICAL MILLING),

(•CHEMICAL MILLING, NICKEL ALLOYS), PIPES, TAPER

(U)

IDENTIFIERS: RENE 41(ALLOY), X-20

SPACECRAFT

(U)

CHEMICAL-MILLING OF RENE 41 TUBES.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-471 601

BOEING CO SEATTLE WASH

METHODS OF TRIMMING AND FINISHING D-36 COLUMBIUM

ALLOY SHEET (PRELIMINARY STUDY),

(U)

AUG 62 5P OLSEN, GEORGE I

REPT. NO. MDR-2-12817

MONITOR: IDEP 347.70.00.00-C6-05

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: (•NIOBIUM ALLOYS, PROCESSING),

SHEETS, MACHINING, MATERIAL REMOVAL, MILLING

MACHINES, SAWS, GRINDING WHEELS, ABRASIVES

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

METHODS OF TRIMMING AND FINISHING D-36 COLUMBIUM ALLOY
SHEET.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-467 366

BOEING CO SEATTLE WASH
AIR PRESSURE MEASUREMENT IN THE RAREFIED GAS
TRANSITION REGION,

(U)

APR 65 101P BRUNSWIG, F. S. ;
REPT. NO. D2-81314-1
CONTRACT: AF33 615 1793

UNCLASSIFIED REPORT

NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PRESSURE GAGES, SUPERAERODYNAMICS),
CORRECTIONS, TRANSDUCERS, PIPES, DESIGN,
SURFACE TEMPERATURES, ARGON, AIR, CREEP,
VISCOSITY, TEMPERATURE, ADSORPTION, OXIDATION,
FLUID DYNAMIC PROPERTIES, ATMOSPHERE ENTRY,
REFRACTORY METALS, REFRACTORY COATINGS, TRANSPORT
PROPERTIES, GAS FLOW, NONEQUILIBRIUM FLOW, ALPHA
PARTICLES, EQUATIONS, EXPERIMENTAL DATA, TABLES,
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, RESEARCH
PLANES, SUPERAERODYNAMICS

(U)

IDENTIFIERS: X-20 SPACECRAFT, THERMAL CREEP,
SLIP FLOW, TRANSITION FLOW, KNUDSEN NUMBER

(U)

PARAMETERS ARE DEFINED AND PRESSURE CORRECTIONS ARE
DETERMINED FOR A LOW AIR PRESSURE (1-100
P.S.F.A.) MEASUREMENT SYSTEM INCLUDING A PRESSURE
TRANSDUCER AND A TUBE PORTED TO A HOT SURFACE. ITS
AIM IS TO IMPLEMENT SYSTEM DESIGN UNDER HOT SURFACE
TEMPERATURE CONDITIONS TO 2800 F. THERE ARE
INCLUDED RESULTS OF LABORATORY MEASUREMENT WITH ARGON
AND AIR UNDER THESE CONDITIONS WHERE BOTH THERMAL
CREEP AND SLIP FLOW OCCUR TOGETHER IN A PRESSURE
TRANSMISSION TUBE UNDER TEMPERATURE GRADIENT. BOTH
TEMPERATURE FUNCTIONS, THERMAL CREEP AND SLIP FLOW,
AFFECT THE SYSTEM PRESSURE. DYNAMICALLY, THE
TEMPERATURE DEPENDANCE OF SLIP FLOW AFFECTS TIME
RESPONSE FOR TUBES SINCE IT HAS THE TEMPERATURE
DEPENDANCY OF GAS VISCOSITY. INTEGRATION OF THE
TUBULAR TIME CONSTANT, MODIFIED FOR SLIP FLOW ALONG
THE TUBE'S TEMPERATURE GRADIENT, IS CARRIED OUT AND
COMPARED TO MEASUREMENTS; FAIR AGREEMENT IS SHOWN.
FOR PRESSURE CORRECTION, THE STATIC (STEADY STATE
PRESSURE AND TEMPERATURE) DIFFERENTIAL PREDICTED BY
KNUDSEN IS FOUND TO HOLD FOR A CLOSED TUBULAR
VOLUME. ADDITIONALLY, THE PLOTTED STATIC RESULTS
ARE SUFFICIENTLY ACCURATE TO CLEARLY SHOW THE EFFECT
OF TEMPERATURE UPON VISCOSITY AS PREDICTED BY
INTEGRATION OF MAXWELL'S VISCOSITY FUNCTION ALONG
THE TUBE. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-465 262

BOEING CO SEATTLE WASH
DEVELOPMENT OF HIGH TEMPERATURE FLUTTER
TRANSDUCER.

(U)

DESCRIPTIVE NOTE: FINAL REPT., AUG 63-SEP 64,

MAR 65 91P DAY, DAVID L. ;

CONTRACT: AF33 615 1793

PROJ: 1469

TASK: 146907

MONITOR: FDL TR-65-21

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RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
ALLEGANY INSTRUMENT CO., INC., CUMBERLAND, MD.

DESCRIPTORS: (*FLUTTER, TRANSDUCERS),
(*TRANSDUCERS, FLUTTER), VIBRATION,
ACCELEROMETERS, BOOST-GLIDE VEHICLES, RESISTORS,
STRAIN GAGES, DAMPING, TESTS, MATERIALS,
TEMPERATURE, TEST METHODS, HIGH-TEMPERATURE
RESEARCH

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

THE DESIGN, DEVELOPMENT, AND TESTING OF TWO
HIGHTEMPERATURE TRANSDUCERS ARE DESCRIBED. ONE
MEASURES VIBRATION AMPLITUDE AND FREQUENCY, AND THE
OTHER MEASURES ACCELERATION. BOTH WERE DESIGNED TO
DETECT AERODYNAMIC PANEL FLUTTER DURING BOOST AND RE-
ENTRY OF THE X-20 DYNASOAR, THEN UNDER
DEVELOPMENT. THESE TRANSDUCERS ARE ELECTRICAL
RESISTANCE STRAIN GAGE TYPES. PART DETAILS
DISCUSSED ARE THE PENDULUM, DAMPER, SEALING, AND CASE
CONFIGURATION. BOTH TRANSDUCERS ARE ALSO DISCUSSED
IN GREATER DETAIL WITH RESPECT TO NATURAL FREQUENCY,
DAMPING, STRAIN GAGE APPLICATION, AND OUTPUT.

{AUTHOR}

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-461 751

BOEING CO SEATTLE WASH

DYNA-SOAR SCALE STAGING TEST - TEST NO. 6262, (U)

JAN 63 282P RIDGEWAY, JOHN J. ;

REPT. NO. D2-90334

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, STAGING), MODEL TESTS, CAPTIVE TESTS, ROCKET MOTORS (SOLID PROPELLANT), HEAT SHIELDS, SIMULATION, SEPARATION, HEAT TRANSFER, TEMPERATURE, PRESSURE, ADAPTERS, STRUCTURAL PROPERTIES, ABLATION, CONFIGURATION, PHENOLIC PLASTICS, GLASS TEXTILES, EPOXY PLASTICS, EXHAUST GASES, NOZZLE GAS FLOW, INSTRUMENTATION, TEST METHODS, TEST EQUIPMENT, ACCELERATION, FORCE (MECHANICS), EROSION, CONICAL BODIES, PRISMATIC BODIES, EXPERIMENTAL DATA, PHOTOGRAPHS, MANNED SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: X-20 SPACECRAFT, BLAST SHIELDS, (U)
REFRASIL (U)

THE DYNA-SOAR SCALE STAGING TEST PROGRAM CONSISTED OF SIMULATING BOOSTER-GLIDER SEPARATION CONDITIONS BY EMPLOYING AN APPROXIMATE 1/7 SCALE MODEL. THE MODEL INCLUDED A FORWARD TRANSITION SECTION WITH ROCKET MOTOR AND PRESSURE BAFFLE, AND AN AFT TRANSITION SECTION WITH ROCKET MOTOR AND PRESSURE BAFFLE, AND AN AFT TRANSITION SECTION WITH BLAST SHIELD AND BLAST PORT AREA WHEN REQUIRED. THE FIRST FIVE TESTS WERE INTENDED TO CHECK OUT THE BOOSTER-GLIDER SEPARATION TECHNIQUE, AND HEAT AND PRESSURE CONDITIONS IN THE TRANSITION SECTION DURING SEPARATION. THE DATA OBTAINED WAS INTENDED FOR USE IN DETERMINING THE STRENGTH REQUIREMENTS OF THE TRANSITION SECTION AND ADJACENT STRUCTURES DURING STAGING, AND PROVIDED VERIFICATION AND/OR REFINEMENT OF ANALYTICAL METHODS AND TESTING TECHNIQUES PRIOR TO FULL SCALE TESTING. DAMAGE TO THE BLAST SHIELD WAS SEVERE IN THE VICINITY DIRECTLY UNDER THE ROCKET NOZZLES AND THE CALORIMETERS WITHIN THIS VICINITY WERE DESTROYED BY THE HEAT AND EROSION EFFECT PRODUCED BY SOLID EXHAUST PRODUCTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-461 392

BOEING CO SEATTLE WASH

AN ANALOG COMPUTER SIMULATION FOR X-20 GLIDE PHASE
GUIDANCE STUDIES, (U)

AUG 62 74P

WISNESKI, MITCHELL ;

REPT. NO. D2-90234

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: {•BOOST-GLIDE VEHICLES, PROGRAMMING
(COMPUTERS)}, {•MANNED SPACECRAFT, PROGRAMMING
(COMPUTERS)}, ANALOG COMPUTERS, ATMOSPHERE ENTRY,
INJECTION, AERODYNAMIC CHARACTERISTICS, EQUATIONS,
MOTION, LANDINGS, ROTATION, VELOCITY, LIFT, DRAG,
TRANSFORMATIONS (MATHEMATICS), MATHEMATICAL ANALYSIS,
MATHEMATICAL PREDICTION, DESCENT TRAJECTORIES, ORBITAL
TRAJECTORIES, GUIDANCE (U)

IDENTIFIERS: X-20 SPACECRAFT, EQUATIONS OF MOTION,
GLIDING (U)

THE COMPUTER SIMULATION OF THE GLIDING TRAJECTORY
IS A HIGH PRECISION REPRESENTATION OF THE FLIGHT
EQUATIONS, ATMOSPHERE AND THE AERODYNAMICS OF THE
VEHICLE. OVERALL AGREEMENT OF THIS SIMULATION WITH
A DIGITAL SIMULATION HAS BEEN WITHIN 1%. THE
OVERALL DAY-TO-DAY REPEATABILITY OF THE SIMULATION
HAS BEEN WITHIN .5%. THE ANALOG COMPUTER ALLOWS
A BROAD FLEXIBILITY IN SCALING AND PROGRAMMING.
THIS PERMITS APPLICATION OF THE SIMULATION TO A
VARIETY OF RELATED PROBLEMS SUCH AS ORBIT INJECTION,
HIGH SPEED RE-ENTRY, AND LANDING. MODIFICATIONS
MUST CONTINUOUSLY BE MADE AS THE APPLICATION
DICTATES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-461 048

HONEYWELL INC ST PETERSBURG FLA

X-20 A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM. (U)

DESCRIPTIVE NOTE: RELIABILITY PLAN.

MAR 63 1V

REPT. NO. 1179-SR-2BREV. C

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•INERTIAL GUIDANCE, BOOST-GLIDE VEHICLES),
RELIABILITY (ELECTRONICS), MANNEO SPACECRAFT (U)

IDENTIFIERS: X-20 SPACECRAFT, FAILURE
(ELECTRICAL) (U)

THE RELIABILITY PROGRAM FOR THE X-20A (DYNA SOAR) PRIMARY GUIDANCE SUBSYSTEM HAS BEEN DEVELOPED UPON THE PREMISE THAT RELIABILITY IS DEPENDENT UPON THE PERFORMANCE OF EVERY INDIVIDUAL INVOLVED IN THE DESIGN, DEVELOPMENT, FABRICATION, TEST AND FIELD USE OF SYSTEM EQUIPMENT. THE TASKS DESCRIBED INCLUDE THOSE OF RELIABILITY MONITORING ESSENTIAL TO INSURING THAT RELIABILITY REQUIREMENTS ARE GIVEN PROPER CONSIDERATION BY ALL PERSONNEL IN THE PERFORMANCE OF THEIR SPECIFIC DUTIES. A PROGRAM MILESTONE CHART DEPICTING THE SCHEDULING AND TIME PHASING OF THE MAJOR TASKS COVERED BY THIS PLAN IS SHOWN. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-459 472

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO
COMMUNICATIONS AND TRACKING FOR THE X-20A (DYNA-
SOAR). (U)

DESCRIPTIVE NOTE: TECHNICAL DOCUMENTARY REPT, MAY 60-
1963,

MAY 64 37P GRIM, H. L. ;
REPT. NO. SEG-TDR-64-21

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RADIO COMMUNICATION
SYSTEMS), (•RADIO COMMUNICATION SYSTEMS, BOOST-GLIDE
VEHICLES), (•TRACKING, BOOST-GLIDE VEHICLES),
CONFIGURATION, PROPAGATION, ELECTROMAGNETIC WAVES,
BLACKOUT (ELECTROMAGNETIC), PLASMA SHEATH, ATMOSPHERE
ENTRY, ANTENNA LOBES, RANGES (DISTANCE), TARGET
ACQUISITION, TELEMETERING RECEIVERS, HIGH-TEMPERATURE
RESEARCH, ANTENNAS, ULTRAHIGH FREQUENCY, MANNED
SPACECRAFT, TRANSMITTER-RECEIVERS, SUPERHIGH FREQUENCY,
RESCUE BEACONS, SLOT ANTENNAS, OMNIDIRECTIONAL ANTENNAS,
VOICE COMMUNICATION SYSTEMS, TRANSPONDERS, RADAR
EQUIPMENT, C BAND (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS REPORT DESCRIBES THE COMMUNICATIONS AND
TRACKING REQUIREMENTS OF THE X-20A, THE SYSTEMS
ENGINEERING ASPECTS, THE FINAL CONFIGURATION OF THE
COMMUNICATIONS AND TRACKING SUBSYSTEM (CTS), AND
THE STATE-OF-THE-ART ADVANCEMENTS ACHIEVED DURING THE
DEVELOPMENT PROGRAM. THE MOST CHALLENGING PROBLEM
AREAS, THOSE OF PROPAGATING RF ENERGY THROUGH THE RE-
ENTRY PLASMA SHEATH, ANTENNA LOBING AND COMMUNICATION
RANGE, THE ACQUISITION, TRACKING AND REACQUISITION OF
A MANEUVERABLE TARGET WITH A NARROW BEAM ANTENNA, THE
REQUIREMENT FOR AN ULTRA-LINEAR TELEMETER RECEIVER TO
ATTAIN THE DESIRED TELEMETER DATA ACCURACY, AND THE
DEVELOPMENT OF HIGH TEMPERATURE ANTENNAS FOR THE RE-
ENTRY VEHICLE, ARE DISCUSSED WITH RESPECT TO THE
ANALYSIS EFFORTS AND TECHNICAL APPROACHES APPLIED TO
THEIR SOLUTION. THE FINAL CTS CONFIGURATION IS
DESCRIBED, AND THE REPORT CONCLUDES WITH THE
SIGNIFICANT TECHNICAL ACHIEVEMENTS. (AUTHOR)

(U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-458 264

BOEING CO SEATTLE WASH

ADVANCES IN THE MATERIALS TECHNOLOGY RESULTING FROM
THE X-20 PROGRAM. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

DEC 64 162P STRATTON, W. K. ; TREPUS,

GEORGE E., JR.;

REPT. NO. 1

CONTRACT: AF33 615 1624

MONITOR: ML TR-64-396

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MATERIALS),
(*REENTRY VEHICLES, MATERIALS), (*REFRACTORY MATERIALS,
HIGH-TEMPERATURE RESEARCH), WIRE, GLASS, MACHINING,
WELDING, DESIGN, WEIGHT, STRUCTURES, AERODYNAMIC
HEATING, HEAT-RESISTANT METALS, ALLOYS, HEAT SHIELDS,
MANNED SPACECRAFT, NOSE CONES, REFRACTORY COATINGS,
FASTENERS, THERMAL INSULATION, CRYOGENICS, BEARINGS,
HYDRAULIC FLUIDS, ALUMINUM ALLOYS, SEALING COMPOUNDS,
HEAT TREATMENT, GLASS TEXTILES, MOLYBDENUM ALLOYS,
NIOBIUM ALLOYS, NICKEL ALLOYS, ZIRCONIUM COMPOUNDS,
OXIDES, THERMAL STRESSES, CERAMIC FIBERS, CERAMIC
COATINGS, STRUCTURAL PROPERTIES, ANTENNAS (U)
IDENTIFIERS: X-20 SPACECRAFT, RENE 41 (ALLOY) (U)

THIS REPORT SUMMARIZES THE SIGNIFICANT ADVANCES IN
THE MATERIALS STATE OF THE ART RESULTING FROM THE
X-20 PROGRAM. IT PROVIDES A CONCISE REVIEW OF
THE MATERIALS DEVELOPMENT PROGRAMS CONDUCTED IN
DIRECT SUPPORT OF THE X-20, THE SIGNIFICANT
MATERIALS AND PROCESSES THAT RESULTED,
RECOMMENDATIONS, AND REFERENCES TO MORE DETAILED
DOCUMENTATION. SPECIFIC TECHNOLOGIES COVERED ARE
REFRACTORY ALLOYS, REFRACTORY ALLOY COATINGS,
REFRACTORY ALLOY FASTENERS, SUPERALLOYS, NOSE CAPS,
HIGH-TEMPERATURE INSULATIONS, CRYOGENIC INSULATIONS,
BEARINGS, HYDRAULIC FLUIDS, WINDOWS, AND
MISCELLANEOUS MATERIALS AND PROCESSES. EACH SECTION
IS COMPLETE WITHIN ITSELF TO FACILITATE EVALUATION BY
DESIGNERS AND MATERIALS USERS OF ANY OF THE DATA FOR
APPLICATION TO THEIR REQUIREMENTS. THIS REPORT IS
DIVIDED INTO TWO PARTS: THE FIRST PART COVERS THE
DEVELOPMENT OF MATERIALS AND PROCESSES FOR HIGH-
TEMPERATURE STRUCTURES AND HEAT SHIELDS; THE SECOND
PORTION COVERS THE REMAINDER OF THE X-20 MATERIALS
ADVANCEMENTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-456 910

MARTIN CO DENVER COLO

PRETEST INFORMATION 3.3-PERCENT 624A AERODYNAMIC
HEATING INVESTIGATION, NASA-LANGLEY UNITARY PLAN WIND
TUNNEL, (U)

FEB 63 44P SVENDSEN, H. O. ;

REPT. NO. SSR CR63 19

CONTRACT: AF04 695 150

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•AERODYNAMIC HEATING, MODEL TESTS),
(•BOOST-GLIDE VEHICLES, AERODYNAMIC HEATING), WIND
TUNNEL MODELS, TEST METHODS, TEST FACILITIES,
INSTRUMENTATION, HEAT TRANSFER, TEMPERATURE, PRESSURE,
CONICAL BODIES, CYLINDRICAL BODIES, ROCKET MOTORS (SOLID
PROPELLANT), THRUST VECTOR CONTROL SYSTEMS, TABLES,
EXHAUST GASES, BASE FLOW, SHOCK WAVES, NOSE CONES,
LAUNCH VEHICLES (AEROSPACE) (U)
IDENTIFIERS: X-20 SPACECRAFT, SPACECRAFT SKIN (U)

A NEED EXISTS FOR EXPERIMENTAL HEAT TRANSFER DATA
THAT CAN BE NONDIMENSIONALIZED FOR PREDICTING VEHICLE
SKIN AND STRUCTURAL TEMPERATURES. THE TEST
DESCRIBED HERE WAS CONCEIVED TO PROVIDE THESE DATA.
TESTING WILL BE ON THE COMPLETE 624A VEHICLE
WITH TWO PAYLOADS, THE DYNA-SOAR (X-20) AND A
CONE-CYLINDER (621A). A CHECK WILL ALSO BE
MADE OF CORE-ALONE HEATING AT THE HIGHEST FACILITY
MACH NUMBER FOR POST STAGING HEATING STUDIES.
TESTING WILL BE IN THE HIGH MACH NUMBER LEG OF
THE NASA 4-X 4-FT UNITARY PLAN WIND
TUNNEL, LANGLEY RESEARCH CENTER, LANGLEY
FIELD, VIRGINIA. THE REPORT DESCRIBES THE
FACILITY, MODEL, INSTRUMENTATION, TEST PROCEDURE,
DATA REDUCTION, AND SECURITY PLANNED FOR THE TEST.
{AUTHOR} (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-455 328

BOEING CO SEATTLE WASH

THERMAL CONDUCTIVITY OF Q-FELT INSULATION AT ELEVATED
TEMPERATURES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 APR-15 AUG 64,

OCT 64 88P EICHENBERGER, T. W. :

REPT. NO. D2 81285

CONTRACT: AF33 615 1624

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•THERMAL INSULATION, THERMAL
CONDUCTIVITY), (•CERAMIC FIBERS, THERMAL INSULATION),
(•QUARTZ, CERAMIC FIBERS). HIGHTEMPERATURE RESEARCH,
MANNED SPACECRAFT, BOOST-GLIDE VEHICLES, REENTRY
VEHICLES, PHYSICAL PROPERTIES, MECHANICAL PROPERTIES,
TABLES, THERMAL PROPERTIES, TEST EQUIPMENT, TEST
METHODS, HEAT-RESISTANT MATERIALS (U)

IDENTIFIERS: Q-FELT, X-20 SPACECRAFT (U)

THE THERMAL CONDUCTIVITY OF Q-FELT, A COMMERCIAL
MICRO-QUARTZ FIBROUS INSULATION MATERIAL, WAS
EVALUATED. TESTS WERE CONDUCTED ON SEVERAL
DENSITIES EACH OF AS RECEIVED AND THERMALLY
STABILIZED MATERIAL AT ELEVATED TEMPERATURES AND AT
ATMOSPHERIC AND REDUCED PRESSURES. MEAN TEST
TEMPERATURES RANGED FROM 200 TO 2560 F AND REDUCED
PRESSURES TO 0.1 MM/MERCURY WERE USED. CURVES HAVE
BEEN PREPARED PRESENTING THE MEAN APPARENT THERMAL
CONDUCTIVITY OF BOTH THERMALLY STABILIZED AND
UNSTABILIZED Q-FELT AS A FUNCTION OF MEAN
TEMPERATURE, GAS PRESSURE AND MATERIAL DENSITY.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-455 313

BOEING CO SEATTLE WASH

MECHANICAL PROPERTY EVALUATION OF RENE[®] 41 FOR X-20
VEHICLE ENVIRONMENT, (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 APR-15 AUG 64,

SEP 64 1V CLARK, H. R. ;

REPT. NO. D2 81281

CONTRACT: AF33 615 1624

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•NICKEL ALLOYS, MECHANICAL PROPERTIES),
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, RESEARCH
PLANES, SHEETS, METAL PLATES, RODS, FORGING, HEAT
TREATMENT, CHEMICAL MILLING, FRACTURE (MECHANICS),
TENSILE PROPERTIES, COMPRESSIVE PROPERTIES, SHEAR
STRESSES, STRAIN (MECHANICS), PIPES, REENTRY VEHICLES,
SPACE ENVIRONMENTAL CONDITIONS, ATMOSPHERE ENTRY, HIGH-
TEMPERATURE RESEARCH, EXPERIMENTAL DATA, TABLES, TEST
METHODS, SIMULATION, TOUGHNESS (U)
IDENTIFIERS: X-20 SPACECRAFT, RENE 41 (ALLOY) (U)

THIS REPORT IS THE RESULT OF WORK ACCOMPLISHED TO
PROVIDE BASIC MECHANICAL PROPERTY DESIGN ALLOWABLES
FOR RENE[®] 41 SHEET, PLATE, BAR, FORGINGS, AND
TUBING FROM ROOM TEMPERATURE TO 2000 F. SPECIMENS
WERE TESTED IN THE AS-HEAT TREATED CONDITION AND
AFTER THERMAL EXPOSURES REPRESENTING ANTICIPATED
BOOST AND RE-ENTRY ENVIRONMENTS FOR THE X-20
VEHICLE. SPECIAL STUDIES ARE INCLUDED WHICH SHOW
THE MECHANICAL PROPERTY BEHAVIOR OF RENE[®] 41 SHEET
AFTER CHEM MILLING OPERATIONS, EXPOSURES TO
TEMPERATURES ABOVE 2000 F, AND WHEN LOADED AT
VARIOUS STRAIN RATES AT ROOM AND ELEVATED
TEMPERATURES. ALSO INCLUDED ARE TEAR PROPERTIES
AND RESIDUAL STRENGTH AFTER CREEP EXPOSURES.
(AUTHOR) (U)

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OOO REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-454 897

BOEING CO SEATTLE WASH

LEAK TEST OF X-20A PRESSURIZED COMPARTMENTS. (U)

DESCRIPTIVE NOTE: REPT. FOR JAN-NOV 64.

NOV 64 39P

CONTRACT: AF33 615 1792

PROJ: 620A

TASK: 620A

MONITOR: FDL TR64 178

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NOFORN

SUPPLEMENTARY NOTE: ORIGINAL COPY IS OF POOR QUALITY.
REPRODUCTION MAY NOT BE ENTIRELY LEGIBLE.

DESCRIPTORS: (MANNED SPACECRAFT, PRESSURIZED CABINS),
(PRESSURIZED CABINS, GAS LEAKS), SEALS (STOPPERS),
EFFECTIVENESS, MODEL TESTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE COMPARTMENTS IN PRODUCTION FOR THE ENVIRONMENTAL TEST MODEL WERE COMPLETED TO A TEST CONFIGURATION WHICH ELIMINATED ALL NONSTRUCTURAL ITEMS SUCH AS EQUIPMENT SUPPORT STRUCTURE, FOOT WELL, DUCTS, INTERNAL EQUIPMENT, WIRING, AND PLUMBING. COMPARTMENT PENETRATIONS WERE MADE IN ACCORDANCE WITH THE DESIGNED FLIGHT CONFIGURATION EXCEPT THAT A REDUCED NUMBER OF ELECTRICAL PENETRATIONS WERE MADE. THE INFLATABLE SEAL SYSTEM FUNCTIONAL TEST OF THE PILOT'S HATCH, THE PILOT'S COMPARTMENT EQUIPMENT ACCESS DOOR, AND THE EQUIPMENT COMPARTMENT ACCESS DOOR VERIFIED THAT THESE SYSTEMS WOULD RETAIN SUFFICIENT PRESSURE TO PROVIDE A SATISFACTORY COMPARTMENT SEAL. A PROOF PRESSURE TEST OF EACH COMPARTMENT DEMONSTRATED THE INTEGRITY OF THE STRUCTURE. THE ACTUAL LEAK RATE OF THE PILOT'S COMPARTMENT WAS FOUND TO BE .025 POUNDS OF AIR PER MINUTE, WELL WITHIN THE DESIGN GOAL OF 0.168 POUNDS OF AIR PER MINUTE, AND THE ACTUAL LEAK RATE OF THE EQUIPMENT COMPARTMENT WAS FOUND TO BE 0.021 POUNDS OF AIR PER MIN., ALSO WELL WITHIN THE DESIGN GOAL OF 0.100 POUNDS OF AIR PER MINUTE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-452 645

BOEING CO SEATTLE WASH

PRELIMINARY SKIN PANEL FLUTTER TESTS, AO-375D2, -3,

SPO NO. 57 AND 58,

(U)

MAY 62 112P HAYNES, R. M. :

REPT. NO. D2 8148

CONTRACT: AF33 600 41517 , AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, FLUTTER), MANNED
SPACECRAFT, WIND TUNNEL MODELS, AIRPLANE PANELS, MODEL
TESTS, TRANSONIC CHARACTERISTICS, SUPERSONIC
CHARACTERISTICS, THERMAL INSULATION, PRESSURE, PANELS
(STRUCTURAL), CONSTRUCTION (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

A PRELIMINARY PANEL FLUTTER TEST PROGRAM WAS
CONDUCTED IN THE SUPERSONIC AND TRANSONIC SPEED
REGIMES TO DETERMINE WHETHER OR NOT PANELS OF THE
DESIGN CURRENT IN THE EARLY STEP I PROGRAM WERE
ADEQUATE, AND IF NOT, PROVIDE DATA TO ASSIST IN THE
DESIGN OF NEW PANELS. THE FIRST PART OF THE TEST
WAS CONDUCTED AT THE LANGLEY RESEARCH CENTER 4
FOOT SUPERSONIC WIND TUNNEL. NINE DIFFERENT
PANELS WERE TESTED TO DETERMINE THE EFFECT OF SIZE,
MATERIAL, CORRUGATION DEPTH, EDGE CLIP SPACING, SKIN
THICKNESS, AND HEAT SHIELD CLIP SPACING. THE
RESULTS OF THIS TEST, ALTHOUGH THEY WERE SOMEWHAT
CLOUDED BY A DIFFERENTIAL PRESSURE ACROSS THE PANEL,
INDICATED THE BASIC INSULATED PANELS WERE NOT
ADEQUATE AND THE UNINSULATED PANELS, WERE AT BEST
MARGINAL FROM THE FLUTTER STANDPOINT. THE SECOND
PART OF THE TEST WAS CONDUCTED AT THE AMES
RESEARCH CENTER 11 FOOT TRANSONIC WIND
TUNNEL. ELEVEN PANELS WERE TESTED TO INVESTIGATE
THE EFFECT OF PANEL STIFFNESS, SIZE, MATERIAL, AND
INSULATION DEPTH ON THE FLUTTER BOUNDARIES. THE
RESULTS OF THIS TEST INDICATE THAT THE DYNAMIC
PRESSURE OF FLUTTER OF A GIVEN PANEL IS MUCH LOWER IN
THE TRANSONIC REGION THAN HAD BEEN EXPECTED FROM
EXTRAPOLATION OF SUPERSONIC RESULTS. EVEN
INCREASES IN STIFFNESS AND CHANGES IN SIZE THAT WERE
MADE IN THE PANEL DESIGN AS A RESULT OF SUPERSONIC
TESTS WERE NOT ADEQUATE TO PREVENT TRANSONIC FLUTTER.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-450 152

BOEING CO SEATTLE WASH

ASSEMBLY AND TEST OF CRYOGENIC OXYGEN TANKS.

(U)

DESCRIPTIVE NOTE: SUMMARY REPT.,

OCT 64 12P KELSOE, R. C. ;

REPT. NO. DN D2 81290

CONTRACT: AF33 615 1897

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•PROPELLANT TANKS, TESTS), LIQUEFIED
GASES, OXYGEN, LIQUID ROCKET OXIDIZERS, THERMAL
INSULATION, GAS LEAKS, ACCEPTABILITY, BOOST-GLIDE
VEHICLES, MANUFACTURING METHODS, PROCESSING

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

TWO OXYGEN STORAGE TANK ASSEMBLIES WERE FABRICATED,
THE SUPER INSULATION EVACUATED, VACUUM JACKET LEAK
CHECKED, TANK VESSEL PROOF PRESSURE TESTED, AND THE
TANK HEAT INLEAK MEASURED. FABRICATION AND ASSEMBLY
OPERATIONS DID NOT EXPOSE ANY PROBLEMS NOT
ANTICIPATED BY EXPERIENCE GAINED DURING THE X-20A
PROGRAM. (AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-450 020

BOEING CO SEATTLE WASH

O2 COOLER ASSEMBLY. (U)

DESCRIPTIVE NOTE: SUMMARY REPT.,

OCT 64 68P BANGSUND, E. L. ;

REPT. NO. DN D2 81291

CONTRACT: AF33 615 1897

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COOLING VENTILATING
EQUIPMENT), (•COOLING + VENTILATING EQUIPMENT, LIQUEFIED
GASES), OXYGEN, MANNED SPACECRAFT, PERFORMANCE
(ENGINEERING), DESIGN, GAS LEAKS, PRESSURE (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

AT THE TIME OF X-20A CONTRACT TERMINATION AN
OXYGEN COOLER ASSEMBLY HAD BEEN PARTIALLY ASSEMBLED
AT THE MISSILE PRODUCTION CENTER. UNDER THE
AUSPICES OF THE AIR FORCE AERO PROPULSION
LABORATORY, RESEARCH AND TECHNOLOGY DIVISION,
A CONTRACT WAS NEGOTIATED TO COMPLETE THE ASSEMBLY,
ADJUSTMENT, AND FUNCTIONAL TESTING. FABRICATION AND
ASSEMBLY EXPOSED ONLY MINOR PROBLEMS NOT ANTICIPATED
BY EXPERIENCE GAINED DURING THE X-20A PROGRAM.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-450 018

BOEING CO SEATTLE WASH

LH2 SYSTEM SERVICING TEST. (U)

DESCRIPTIVE NOTE: SUMMARY REPT.,

OCT 64 133P BANGSUND, E. L. ; DHARDING, L.

REPT. NO. DN D2 81277

CONTRACT: AF33 615 1897

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•GROUND SUPPORT EQUIPMENT, HYDROGEN),
(•HYDROGEN, GROUND SUPPORT EQUIPMENT), (•LIQUEFIED
GASES, GROUND SUPPORT EQUIPMENT), CRYOGENICS, NITROGEN,
HELIUM, CONTAMINATION, PUMPS, VACUUM PUMPS, HEAT
EXCHANGES, INSTRUMENTATION, FILTERS (FLUID), TESTS,
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

AT THE TIME OF X-20A CONTRACT TERMINATION A
PROTOTYPE LIQUID HYDROGEN SERVICING SYSTEM HAD BEEN
ASSEMBLED AT THE TULALIP TEST SITE. UNDER THE
AUSPICES OF THE AIR FORCE AERO PROPULSION
LABORATORY, RESEARCH AND TECHNOLOGY DIVISION,
A CONTRACT WAS NEGOTIATED TO COMPLETE ASSEMBLY,
ADJUSTMENT, AND FUNCTIONAL TESTING. SIX TEST RUNS
WERE CONDUCTED TO DEMONSTRATE THE SYSTEMS
CAPABILITIES. RUN NUMBER 1 WITH LIQUID NITROGEN
ESTABLISHED THAT THE SYSTEM WAS CRYOGENICALLY SOUND,
RUNS 2, 3, AND 4 DEMONSTRATED CERTAIN TEST
OBJECTIVES AND CAPABILITIES BUT NOT A COMPLETE
SERVICING OPERATION DUE TO COMPONENT FAILURES AND
PROCEDURAL PROBLEMS. RUNS 5 AND 6A WERE
ABBREVIATED DUE TO FILTER CONTAMINATION. RUN 6B
DELIVERED HYDROGEN TO THE CRYOGENIC TANK IN A
CONDITION ABOVE THE CRITICAL TEMPERATURE AND
PRESSURE. IT WAS CONCLUDED THAT THE HYDROGEN
SERVICING SYSTEM IS CAPABLE OF SERVICING HYDROGEN TO
A FACILITY AT A PREDETERMINED TEMPERATURE, PRESSURE,
AND FLOWRATE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-449 927

BOEING CO SEATTLE WASH

GENERAL ASSEMBLY AND OPERATING INSTRUCTIONS HYDROGEN
SERVICING SYSTEM, (U)

OCT 64 1V BANGSUND,E. ;HARDING,L. ;

REPT. NO. DN D2 81275

CONTRACT: AF33 615 1897

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: ORIGINAL COPY IS OF POOR QUALITY.
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DESCRIPTORS: (BOOST-GLIDE VEHICLES, STORAGE TANKS),
LIQUEFIED GASES, HYDROGEN, DESIGN, CONSTRUCTION,
INSTRUMENTATION, INSTALLATION, OPERATION, PERFORMANCE
(ENGINEERING), GROUND SUPPORT EQUIPMENT, HANDLING,
PRESSURE VESSELS, CRYOGENICS, CONTROL SYSTEMS,
TEMPERATURE CONTROL, PRESSURE REGULATORS, HANDBOOKS,
SPECIFICATIONS, FUEL TANKS (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT OUTLINES THE INFORMATION NEEDED FOR
SET-UP OF A LABORATORY HYDROGEN SERVICING SYSTEM
COMPRISING THE RECOOLER, THE H2 PUMP UNIT, THE
HYDROGEN TANK, THE HYDROGEN CONTROL AND
INSTRUMENTATION RACKS, AND ASSOCIATED TRANSFER LINES
AND EQUIPMENT. IT INCLUDES A GENERAL DESCRIPTION
OF THE EQUIPMENT, INSTALLATION INSTRUCTIONS,
FABRICATION REQUIREMENTS, OPERATION PRINCIPLES, AND
INSTRUCTION CALIBRATION REQUIREMENTS, AND BLOCK AND
FLOW DIAGRAMS AND SCHEMATICS. CONTAINED IN THE
APPENDIX ARE MANUFACTURERS INDIVIDUAL COMPONENT
MAINTENANCE AND OPERATING INSTRUCTIONS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-449 039

MARTIN CO BALTIMORE MD
DYNA SOAR STEP-1. GROUND SUPPORT SYSTEM SPECIFICATION
(TEST OPERATION PLAN). PART 11. MAINTENANCE ANALYSIS
SPECIFICATION (TEST OPERATION PLAN). VOLUME 1. AIR
VEHICLE REQUIREMENTS, (U)
324P WILLIAMS, S. ;

REPT. NO. ER11345 VOL. 2

CONTRACT: AFD4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUPERSEDES REPT. NO. ER 11345, PT.
2, DATED 8 DEC 60.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, BOOSTER MOTORS),
(*BOOSTER MOTORS, GROUND SUPPORT EQUIPMENT),
(*MAINTENANCE EQUIPMENT, BOOSTER MOTORS), (*GROUND
SUPPORT EQUIPMENT, BOOSTER MOTORS), SPECIFICATIONS,
MILITARY REQUIREMENTS, MAINTENANCE (U)
IDENTIFIERS: X-20 SPACECRAFT, TITAN (U)

THIS ANALYSIS ESTABLISHES THE MAINTENANCE
FUNCTIONAL REQUIREMENTS WHICH MUST BE CONSIDERED TO
DERIVE MAINTENANCE GROUND EQUIPMENT FOR THE DYNA-
SOAR STEP I TEST PROGRAM. IT INCLUDES THE
BOOSTER AIRBORNE SYSTEMS, SUBSYSTEMS AND MAJOR
COMPONENTS, AND THE OPERATIONAL GROUND EQUIPMENT END
ITEMS REQUIRING MAINTENANCE. THE FULL RANGE OF
PREDICTABLE MAINTENANCE FUNCTIONS ARE ANALYZED
AGAINST THESE CRITERIA AND CLASSIFIED ACCORDINGLY.
THOSE FUNCTIONS AND EQUIPMENT NOT MEETING THE
ESTABLISHED PARAMETERS ARE SUBJECTS OF A
MAINTAINABILITY STUDY. HOWEVER, MODIFICATIONS TO
EXISTING EQUIPMENT WERE INCORPORATED WHERE POSSIBLE
TO REDUCE COSTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-448 544

BOEING CO SEATTLE WASH

EVALUATION OF FASTENERS FOR REFRACTORY ALLOYS, (U)

DEC 63 1V MARR, F. G. :

REPT. NO. T2 2655

CONTRACT: AF33 657 7132

MONITOR: IDEP 307 00 00 90C6 01

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*FASTENINGS, REFRACTORY METAL ALLOYS),
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, REENTRY
VEHICLES, STEEL, CORROSIONRESISTANT ALLOYS, HIGH-
TEMPERATURE RESEARCH, OXIDATION, DESIGN, EFFECTIVENESS,
ACCEPTABILITY (U)

IDENTIFIERS: X-20 SPACECRAFT, IDEP (U)

THIS REPORT DEALS FIRST WITH DEVELOPMENT OF
FASTENERS WHICH, WHEN COATED, MEET THE OXIDATION
PROTECTION REQUIREMENTS AND SECONDLY WITH THE
INSTALLATION PROCEDURES DEVELOPED. ALL FASTENERS
WERE TESTED TO SIMULATED X-20 RE-ENTRY CONDITONS TO
DETERMINE IF THEIR GENERAL OVERALL SHAPE (CORNERS,
ETC.) WAS ADAPTABLE TO THE DISILICIDE COATING AND
TO DETERMINE IF THE MATERIAL SHAPE ITSELF POSSESSED
THE ABILITY TO WITHSTAND THE HIGH TEMPERATURES OF THE
SIMULATED RE-ENTRY. (AUTHOR) (U)

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-448 032

MARTIN CO BALTIMORE MD

GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION
PLAN) PART II. MAINTENANCE ANALYSIS SPECIFICATION
(TEST OPERATION PLAN) VOLUME I -- AIR VEHICLE

REQUIREMENTS. DYNA SOAR. STEP-I, (U)

JUL 61 32DP WILLIAMS,S. I

REPT. NO. ER11345 ,VOL. 1 PT. 2

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUPERSEDES REPT. NO. ER11345 DATED
8 DEC 60.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, SPECIFICATIONS),
(•SPECIFICATIONS, BOOST-GLIDE VEHICLES), (•MAINTENANCE,
BOOST-GLIDE VEHICLES), (•GROUND SUPPORT EQUIPMENT,
SPECIFICATIONS), MANNED SPACECRAFT, BOOSTER MOTORS,
GLIDERS, LOGISTICS, GUIDED MISSILE COMPONENTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS REVISED MAINTENANCE ANALYSIS
SPECIFICATION (TEST OPERATION PLAN)
PRESENTS THE MAINTENANCE CONCEPT AND POLICIES AND
ANALYZES THE BOOSTER AIRBORNE SYSTEMS, SUBSYSTEMS AND
MAJOR COMPONENTS; AND THE BOOSTER SYSTEM'S AGE END
ITEMS, REFLECTED BY PART I (OGSESS), TO DERIVE
MAINTENANCE FUNCTIONAL REQUIREMENTS. BY THIS MEANS
THIS DOCUMENT, WITH H FUTURE REVISIONS, WILL
ESTABLISH: (1) REQUIREMENTS FOR THE MAINTENANCE
GROUND EQUIPMENT (MGE), (2) BASES FOR
MAINTENANCE PROCEDURES, AND (3) BASES FOR
TECHNICAL PERSONNEL AND LOGISTIC REQUIREMENTS.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-447 957

BOEING CO SEATTLE WASH

APPLICATIONS OF X-20 STATE OF THE ART DEVELOPMENTS TO
FUTURE SPACE SYSTEMS. (U)

DEC 63 1V

REPT. NO. D2 81035

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, REPORTS), MANNED
SPACECRAFT, RESEARCH PLANES, RESEARCH PROGRAM
ADMINISTRATION, COSTS, AERODYNAMICS, MATERIALS,
PROCESSES, CRYOGENICS, LANDING GEAR, WINGS, TESTS,
INSTRUMENTATION (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THE X-20A GLIDER WAS PRIMARILY A RE-ENTRY
VEHICLE DESIGNED TO BE BOOSTED TO ORBITAL VELOCITIES
AND THEN DEMONSTRATE MANNED CONTROLLED MANEUVERING
RE-ENTRY TO A CONVENTIONAL LANDING. IT WAS A
VEHICLE OF SUCH SOPHISTICATION THAT ITS DEVELOPMENT
AND DESIGN ADVANCED THE STATE-OF-THEART IN MANY
TECHNOLOGIES. THESE ADVANCES CAN BE OF THE
GREATEST IMPORTANCE TO THIS NATION IN THE SPACE ERA.
MANY OF THESE DEVELOPMENTS HAD BEEN NEARLY
COMPLETED AT THE TERMINATION OF THE X-20 PROGRAM.
SO THAT THESE DEVELOPMENTS WILL NOT BE LOST, THE
FOLLOWING DOCUMENT IS PRESENTED AS A PRELIMINARY
LISTING OF TASKS WHICH SHOULD BE COMPLETED.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-447 816

BOEING CO SEATTLE WASH
PROCESS DOCUMENT - FABRICATION OF THE BOEING NOSE
CAP, (U)

3P BRESLICH, F. N. ;

REPT. NO. DN D2 80608
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, NOSE CONES), (*NOSE
CONES, DESIGN), MANUFACTURING METHODS, MANNED
SPACECRAFT, HANDBOOKS, SPECIFICATIONS (U)
IDENTIFIERS: X-20 SPACECRAFT, NOSE CAPS (U)

THIS DOCUMENT SETS FORTH THE ENGINEERING
REQUIREMENTS AND DESCRIBES THE MANUFACTURING
PROCESSES AND SEQUENCES REQUIRED FOR THE FABRICATION
OF NOSE CAPS. AND THE NECESSARY TEST COMPONENTS FOR
DESIGN AND CONCEPT VERIFICATION. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-447 532

BOEING CO SEATTLE WASH

208 GROUND VIBRATION MODEL TEST - ANALYSIS

CORRELATION X-20A,

(U)

SEP 64 520P

GOLDEN, C. T. ; HAGER, T. R. ;

MORTVEDT, R. L. ;

REPT. NO. DN D2 81302

CONTRACT: AF33 615 1785

PROJ: 620A

TASK: 620A

UNCLASSIFIED REPORT
NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, VIBRATION), MODEL TESTS, FREQUENCY, AIRFRAMES, STRUCTURES, CORRELATION TECHNIQUES, ELASTICITY, DYNAMICS, MATHEMATICAL ANALYSIS, MATHEMATICAL PREDICTION, DIGITAL COMPUTERS, SIMULATION, TABLES, EXPERIMENTAL DATA, EQUATIONS, MOTION, FUSELAGES, WINGS (U)

IDENTIFIERS: X-20 SPACECRAFT, SCALING, EQUATIONS OF MOTION (U)

A CORRELATION STUDY WAS CONDUCTED COMPARING THE ANALYTICALLY-DETERMINED DYNAMIC CHARACTERISTICS OF A FULL SCALE X-20A RE-ENTRY VEHICLE WITH THOSE OF A 208 MODEL. THE MODEL WAS CONSTRUCTED SIMULATING THE SCALED ELASTIC, INERTIA, AND GEOMETRIC PROPERTIES OF THE FULL SCALE VEHICLE, AND WAS TESTED TO DETERMINE ITS CHARACTERISTICS FOR COMPARISON WITH ANALYSIS. THE TEST DETERMINED THE FLEXIBILITY INFLUENCE COEFFICIENTS, THE FIRST THREE SYMMETRIC AND THE FIRST THREE ANTISYMMETRIC VIBRATORY MODES AND FREQUENCIES OF THE MODEL. THE OBJECTIVE WAS TO DEMONSTRATE THAT A MODEL COULD BE CONSTRUCTED, FOR GROUND VIBRATION TESTING, THAT WOULD CLOSELY APPROXIMATE THE DYNAMIC CHARACTERISTICS OF A FULL SCALE PROTOTYPE. CORRELATION WAS QUITE GOOD, AND THE STUDY CONSIDERED SUCCESSFUL. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 982

BOEING CO SEATTLE WASH

SPECIFICATION FOR THE DYNA SOAR STEP I MOCKUP, (U)

MAR 61 BP FRITCH, J. I

REPT. NO. DN D2 7683 VOL. I

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED 14 SEP 60.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, SIMULATION),
SPECIFICATIONS, DESIGN, AIRFRAMES, FUSELAGES, BOOSTER
MOTORS, SECOND-STAGE MOTORS, SPACECRAFT CABINS (U)
IDENTIFIERS: X-20 SPACECRAFT, MOCKUP (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 980

BOEING CO SEATTLE WASH

DYNA SOAR PROGRAM PLAN (STEP I) GOVERNMENT FURNISHED
AIRCRAFT EQUIPMENT (GFAE) PLAN. (U)

1P

REPT. NO. DN D2 5697 21

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, MANUFACTURING
METHODS), MANNED SPACECRAFT, LAUNCH VEHICLES
(AEROSPACE), GUIDED MISSILE COMPONENTS, GOVERNMENT
PROCUREMENT, INDUSTRIAL PROCUREMENT, RESEARCH PROGRAM
ADMINISTRATION, MANAGEMENT ENGINEERING (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT CONSISTS OF THREE SECTIONS.
SECTION I DESCRIBES THE GENERAL PROCEDURE ON HOW
GOVERNMENT FURNISHED AIRCRAFT EQUIPMENT
PLAN (GFAE) FOR SUPPORT OF THE DYNA SOAR
PROGRAM STEP I WILL BE OBTAINED. SECTION II
DESCRIBES THE CONTROL AND ACCOUNTABILITY PROCEDURES
FOR GFAE. SECTION III COVERS THE DOCUMENTATION
OF REQUIREMENTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AO-446 584

BOEING CO SEATTLE WASH

ORTHOTROPIC PANEL FLUTTER ANALYSIS CORRELATION, (U)

AUG 64 87P GOLDEN, C. T. ; SHERMAN, L.

L. ;

REPT. NO. DN D2 81301

CONTRACT: AF33 615 1785

PROJ: 620A

TASK: 620A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, FLUTTER), (*PANELS
(STRUCTURAL), BOOST-GLIDE VEHICLES), SUPERSONIC
CHARACTERISTICS, AIRFRAMES, FUSELAGES, OSCILLATION,
MOTION, EQUATIONS, THEORY, MATHEMATICAL ANALYSIS, WIND
TUNNEL MODELS, MODEL TESTS, AERODYNAMIC
CHARACTERISTICS (U)

IDENTIFIERS: X-20 SPACECRAFT, SPACECRAFT SKIN, PISTON
THEORY (U)

THIS DOCUMENT PRESENTS THE ANALYTICAL METHODS
DEVELOPED DURING THE X-20 PROGRAM FOR THE
PREDICTION OF PANEL FLUTTER OF RECTANGULAR
ORTHOTROPIC PANELS SUBJECTED TO SUPERSONIC FLOW OVER
ONE SURFACE. THE MODEL ANALYSIS APPROACH IS USED IN
DEVELOPING THE EQUATIONS OF MOTION. FOR COMPLEX
STRUCTURES, THE ANALYTICAL DETERMINATION OF THE
STIFFNESS CHARACTERISTICS IS NOT ADEQUATE TO GIVE
ACCURATE RESULTS. HOWEVER, THIS DEFICIENCY IS
CORRECTED BY USING EXPERIMENTAL SHAKE TEST
FREQUENCIES TO FORMULATE THE STIFFNESS MATRIX. BOTH
METHODS ARE PRESENTED. EXAMPLES OF TWO MODE, THREE
MODE, AND MULTI-MODE ANALYSES ARE GIVEN AND THE
RESULTS ARE COMPARED WITH WIND TUNNEL TEST RESULTS.
THE RESULTS OF AN ANALYSIS USING THREE-DIMENSIONAL
AERODYNAMIC SURFACE THEORY ARE COMPARED WITH ONE
USING PISTON THEORY AERODYNAMICS. COMPARISONS OF
ANALYTICAL AND WIND TUNNEL TEST RESULTS ARE GIVEN FOR
SEVERAL PANELS HAVING DIFFERENT SIZES, SUPPORT
CONDITIONS, AND TYPES OF CONSTRUCTION. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 581

BOEING CO SEATTLE WASH

NON-SIMILAR BOUNDARY LAYER - REAL GAS COMPUTER

PROGRAM (DECK AS 1188),

FEB 64 375P

JAECK,C. ;JACKSON,W. ;

(U)

REPT. NO. D2 81296

CONTRACT: AF33 615 1791

PROJ: 620A

TASK: 620A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LAMINAR BOUNDARY LAYER), AERODYNAMIC CHARACTERISTIC, PROGRAMMING (COMPUTERS), PARTIAL DIFFERENTIAL EQUATIONS, STAGNATION POINT, THREE-DIMENSIONAL FLOW, VELOCITY, ENTHALPY, SHEAR STRESSES, TEMPERATURE, AERODYNAMIC HEATING, MATHEMATICAL ANALYSIS, DIGITAL COMPUTERS, NUMERICAL METHODS AND PROCEDURES. TABLES

(U)

IDENTIFIERS: X-20 SPACECRAFT, FORTRAN

(U)

THIS DOCUMENT DESCRIBES THE NON-SIMILAR BOUNDARY LAYER PROGRAM AND PROVIDES INSTRUCTIONS FOR ITS USE. THIS PROGRAM PROVIDES DETAIL CALCULATION OF LAMINAR BOUNDARY LAYER CHARACTERISTICS FOR EITHER STAGNATION OR NON-STAGNATION FLOW, INCLUDING THREE-DIMENSIONAL EFFECTS AND MASS INJECTION. A BRIEF DESCRIPTION OF THE NUMERICAL METHOD IS GIVEN FOLLOWED BY A DETAILED DESCRIPTION OF THE EQUATIONS AND CALCULATIONS. NUMERICAL INSTABILITY OF THE BOUNDARY LAYER EQUATIONS IS DISCUSSED AND STABILITY RELATIONSHIPS ARE PRESENTED. A SAMPLE CASE IS INCLUDED TO ILLUSTRATE INPUT-OUTPUT DISPLAY. FLOW CHARTS AND PROGRAM LISTINGS ARE ALSO GIVEN. THE PROGRAM IS WRITTEN IN THE FORTRAN II AND FAP LANGUAGES FOR THE IBM 7094 DIGITAL COMPUTER. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-446 199

AIR FORCE FLIGHT TEST CENTER EDWARDS AFB CALIF
AN INVESTIGATION OF THE COEFFICIENTS OF FRICTION AND
WEAR PROPERTY OF WIRE BRUSH SKIDS CONSTRUCTED WITH

RENE 41 BRISTLES, (U)

AUG 64 18P TEBBEN, GERALD D. ;

REPT. NO. TDR64 11

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LANDING GEAR),
(•LANDING GEAR, BRUSHES), WIRE, NICKEL ALLOYS, CHROMIUM
ALLOYS, COBALT ALLOYS, MOLYBDENUM ALLOYS, FRICTION, WEAR
RESISTANCE, PERFORMANCE (ENGINEERING), RESEARCH PLANES,
MANNED SPACECRAFT (U)

IDENTIFIERS: RENE 41 (ALLOY), X-20 SPACECRAFT, X-15
AIRCRAFT (U)

WIRE BRUSH SKIDS WERE EVALUATED FOR COEFFICIENTS OF
FRICTION ON DRY LAKEBED AND CONCRETE SURFACES. THE
SKID BRUSHES WERE MADE OF RENE 41 BRISTLES AND HAD
BEEN PROPOSED FOR THE MAIN LANDING GEAR SKIDS ON THE
X-20A (DYNA-SOAR). THE LANDING GEAR SKID
TRAILER ORIGINALLY CONSTRUCTED FOR THE X-15 PROGRAM
WAS USED TO PERFORM THE TESTS. COEFFICIENTS OF
FRICTION WERE DETERMINED FOR THE GROUND SPEED
VELOCITY RANGE BETWEEN ZERO AND 120 KNOTS. THESE
COEFFICIENTS WERE DEPENDENT UPON THE COMPOSITION OF
THE DRY LAKEBED AND VARIED FROM 0.51 TO 0.68 AT
VELOCITIES ABOVE 50 FPS. THE AVERAGE VALUE OF
COEFFICIENTS OF FRICTION ON THE CONCRETE RUNWAY WAS
0.36. NO APPRECIABLE WEAR OF THE SKIDS WAS OBSERVED
AS A RESULT OF 26,800 FEET OF SLIDE-OUT ON THE DRY
LAKEBED. ON A CONCRETE RUNWAY THE WIRE BRUSHES WERE
COMPLETELY WORN DOWN TO THEIR MOUNTING FRAMES IN A
SLIDEOUT OF 10,300 FEET. SEVERE WEAR OF THE FRAMES
RESULTED IN THE COMPLETE DISINTEGRATION OF THE REAR
PORTION OF EACH SKID. SIXTEEN MILLIMETER FILM
COVERAGE OF THE SKIDS INDICATED THAT COMPLETE WEAR
DOWN OF THE WIRE BRISTLES HAD OCCURRED BY 6000 FEET
OF SLIDE-OUT ON CONCRETE. THE WIRE BRUSHES WOULD BE
SATISFACTORY AS MAIN GEAR SKIDS, USED IN COMBINATION
WITH A CERMET COATED NOSE SKID, FOR DRY LAKEBED
OPERATIONS. BECAUSE OF MARGINAL WEAR PROPERTIES,
THE BRUSHES WOULD NOT BE SATISFACTORY FOR CONCRETE
OPERATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-445 611

AEROJET-GENERAL CORP AZUSA CALIF
OPERATIONAL GROUND SUPPORT EQUIPMENT SYSTEM
SPECIFICATION OGSSESS (TEST PLAN) PART I, VOLUME I.
ROCKET ENGINE SUBSYSTEMS DYNA SOAR BOOSTER. (U)

37P

REPT. NO. AGC DS 1301 REV. A
CONTRACT: AFO4 647 613

UNCLASSIFIED REPORT
NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (+BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), (+ROCKET MOTORS (LIQUID PROPELLANT),
BOOST-GLIDE VEHICLES), MANNED SPACECRAFT, GROUND SUPPORT
EQUIPMENT, SPECIFICATIONS, AIR TRANSPORTATION,
CONSTRUCTION, CHECKOUT PROCEDURES, TEST METHODS, BOOSTER
MOTORS, SECOND STAGE MOTORS, PROCESSING, ALIGNMENT,
ELECTRICAL EQUIPMENT, ELECTRONIC EQUIPMENT,
INSTALLATION, OPERATION, TRANSPORTATION, SCHEDULING,
LOGISTICS, MANAGEMENT ENGINEERING (U)
IDENTIFIERS: X-20 SPACECRAFT, LR-87 ENGINES, LR-91
ENGINES, TITAN (U)

THIS SPECIFICATION PRESENTS A CHRONOLOGICAL
SEQUENCE OF FUNCTIONAL SUPPORT EVENTS THAT MUST OCCUR
IN THE DELIVERY OF THE ROCKET ENGINE SUBSYSTEM OF THE
DYNA SOAR, STEP I (DS-I) VEHICLE FROM THE
CONTRACTORS FACILITY THROUGH A COMPLETE CYCLE OF
EMPLOYMENT IN THE GROUND TEST AND LAUNCH PHASES
OF THE PROGRAM. THE PURPOSE OF THIS SPECIFICATION
IS TO PROVIDE THE REQUIREMENTS FOR SUPPORT OF THE
TITAN II ROCKET ENGINES (XLR87AJ-5 AND
XLR91-AJS) AND THE AEROSPACE GROUND
EQUIPMENT WHICH WILL BE EMPLOYED IN THE DS-I
PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-445 392

MARTIN CO BALTIMORE MD

BOOSTER AIRBORNE ELECTRICAL SYSTEM. DYNA SOAR STEP-
I, (U)

AUG 61 16P FOLBERTH, G. ;

REPT. NO. DS3161 REV. A

CONTRACT: AFO4 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, POWER SUPPLIES),
AIRBORNE, ELECTRICAL EQUIPMENT, ELECTRIC POWER
PRODUCTION, AUXILIARY POWER SUPPLIES, GUIDED MISSILE
BATTERIES, INVERTERS, DESIGN, ELECTRIC RELAYS, ELECTRIC
SWITCHES, SPECIFICATIONS, ELECTRIC IGNITERS, RELEASE
MECHANISMS, STAGING, SEPARATION, ABORT (U)
IDENTIFIERS: X-20 SPACECRAFT, TITAN (U)

THE ELECTRICAL SYSTEM OF DYNA-SOAR SUPPLIES ALL
THE DC AND AC POWER REQUIRED BY THE AIRBORNE
SUBSYSTEMS DURING FLIGHT. THE ELECTRICAL SYSTEM
CONSISTS PRIMARILY OF THE ACCESSORY POWER SYSTEM, THE
INSTRUMENT POWER SYSTEM AND THE FLIGHT SEQUENCING
SYSTEM. THE ACCESSORY POWER SYSTEM (APS) IS
COMPOSED OF ONE BATTERY, ONE INVERTER AND ASSOCIATED
POWER DISTRIBUTION. BOTH THE APS BATTERY RATED
AT 42.5 AH AND THE INVERTER RATED AT 3000 VA AT
.8 PF WERE USED IN THE TITAN I MISSILE. THESE
ITEMS HAVE PROVEN THEIR RELIABILITY AND ARE AVAILABLE
FOR DYNA-SOAR USAGE. THE INSTRUMENT POWER
SYSTEM IS PRIMARILY COMPOSED OF ONE BATTERY RATED AT
12 AH AND ASSOCIATED POWER DISTRIBUTION. ALL
MOTOR DRIVEN SWITCHES USED FOR DYNA-SOAR ARE THE
SAME AS THOSE FOR TITAN II. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 441

MARTIN CO BALTIMORE MD

GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION
PLAN) PART I-VOLUME I OPERATIONAL GROUND SUPPORT
EQUIPMENT SYSTEM SPECIFICATION (TEST OPERATION PLAN)

DYNA SOAR STEP-1,

(U)

459P

WILLIAMS, SEARS ;

REPT. NO. ER11345 1

CONTRACT: AFO4 647 61D

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•LAUNCH VEHICLES (AEROSPACE), CHECKOUT
PROCEDURES), GROUND SUPPORT EQUIPMENT, TEST METHODS,
ROCKET MOTORS (LIQUID PROPELLANT), BOOST-GLIDE VEHICLES,
DESIGN, TEST FACILITIES, CONSTRUCTION, BOOSTER MOTORS,
HYDRAULIC SYSTEMS, MALFUNCTIONS, DETECTORS,
ACCEPTABILITY, HANDLING, TRANSPORTATION, LAUNCHING
SITES, ELECTRICAL EQUIPMENT, FUEL SYSTEMS, SECOND-STAGE
MOTORS, LIQUID ROCKET PROPELLANTS, MAINTENANCE (U)
IDENTIFIERS: X-20 SPACECRAFT, TITAN, TITAN 2 (U)

THIS PLAN CONSISTS OF AN ANALYSIS OF THE
CHRONOLOGICAL SEQUENCE OF FUNCTIONAL SUPPORT EVENTS
WHICH MUST OCCUR FROM THE DELIVERY OF THE
DYNASOAR STEP 1 BOOSTER TO THE ASSOCIATE
CONTRACTOR FOR THE BOOSTER'S VERTICAL TEST FACILITY
THROUGH THE COMPLETE DYNA-SOAR CYCLE OF
EMPLOYMENT OF THE ELEMENTS OF THE TEST OPERATION.
THIS DOCUMENT SHALL BE USED AS THE PRIMARY BASIS
FOR THE PREPARATION OF THE MAINTENANCE ANALYSIS
SPECIFICATION PLAN (MASP) AND THE GROUND
SUPPORT EQUIPMENT RECOMMENDATION DATA.

(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 214
BOEING CO SEATTLE WASH
BASE IMPLEMENTATION INTERFACES. VOLUME 1. (U)
SEP 63 1V
REPT. NO. D2 80244 2
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (*GROUND SUPPORT EQUIPMENT, INDEXES),
LAUNCHING SITES, INSTRUMENTATION, MANAGEMENT PLANNING,
MANAGEMENT ENGINEERING, TRAILERS, TEST EQUIPMENT,
MOBILE, CHECKOUT EQUIPMENT, COMMAND AND CONTROL SYSTEMS,
SYSTEMS ENGINEERING (U)
IDENTIFIERS: X-20 SPACECRAFT, INTERFACES (U)

THIS DOCUMENT IS THE INTERFACE CONTROL SYSTEM USED
TO FULFILL CONTRACTUAL RESPONSIBILITIES RELATING TO
THE CONTROL OF ALL BASE IMPLEMENTATION INTERFACES ON
THE X-20 (DYNA-SOAR) 620A PROGRAM, AND ALL
INTERFACES BETWEEN THE X-20 (DYNA-SOAR) 620A
PROGRAM AND THE 624A PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 212

BOEING CO SEATTLE WASH

X-20 (DYNA-SOAR) INSTALLATION CRITERIA LAUNCH COMPLEX

AREA - CCMTA. (U)

61P

REPT. NO. DN21 80040

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (=BOOST-GLIDE VEHICLES, INSTALLATION),
INSTRUCTION MANUALS, POWER SUPPLIES, GUIDED MISSILE
COMPONENTS, CONTROL SYSTEMS, DATA TRANSMISSION SYSTEMS,
COMMUNICATION SYSTEMS, TELEVISION EQUIPMENT, GROUND
SUPPORT EQUIPMENT, LAUNCHING SITES, SPECIFICATIONS,
ELECTRICAL EQUIPMENT, STRUCTURAL PARTS, PIPES (U)
IDENTIFIERS: X-20 SPACECRAFT, INTERFACE (U)

SECTION A CONTAINS ALL THE APPLICABLE
SPECIFICATIONS AND PUBLICATIONS NECESSARY TO PROPERLY
FABRICATE, INSTALL SECURE, INTEGRATE, AND OPERATE
THE X-20A (DYNA-SOAR) SYSTEM AT THE AFMTC.
SECTION B CONTAINS AS ATTACHMENT I SPECIFIC
INTERFACE DATA RELATIVE TO PHYSICAL SIZE, WEIGHT, AND
PHYSICAL AND/OR FUNCTIONAL INTERFACES BETWEEN THE
620A/624A EQUIPMENT AND/OR FACILITIES AT THE
AFMTC LAUNCH COMPLEX. SECTION C CONTAINS
DETAILED INSTALLATION CRITERIA DRAWINGS AS
ATTACHMENT II. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 200

BOEING CO SEATTLE WASH

DEVELOPMENT TEST PLAN - DESIGN INTEGRATION DYNA-SOAR,
(U)

SEP 61 94P HUSTING, H. W. I

REPT. NO. D2 5697 16 VOL. 6

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MANAGEMENT
PLANNING), RESEARCH PROGRAM ADMINISTRATION, FLIGHT
SIMULATORS, STRUCTURES, VIBRATION, SIMULATION, MODELS
(SIMULATIONS), EJECTION SEATS, JETTISONABLE EQUIPMENT,
HEAT SHIELDS, TESTS, SCHEDULING, TEST VEHICLES,
DESTRUCTORS, JET BOMBERS (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 190

BOEING CO SEATTLE WASH

DYNA-SOAR DEVELOPMENT TEST PLAN - FUNCTIONAL. (U)

MAR 62 1V

REPT. NO. D2 5697 16 VOL. 5

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GUIDE VEHICLE, RESEARCH PROGRAM
ADMINISTRATION), MANNED SPACECRAFT, TESTS, AIRBORNE,
MANAGEMENT PLANNING, GROUND SUPPORT EQUIPMENT (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 183

BOEING CO SEATTLE WASH
SPECIFICATION, X-20 SIMULATOR (MARK I-C) CREW
STATION, (U)

28P TWEEDDALE, A. D. ;

REPT. NO. DN D2 80414 2

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, SIMULATORS),
SPECIFICATIONS, WIRING DIAGRAMS, CONFIGURATION, MANNED
SPACECRAFT, STANDARDS, DISPLAY SYSTEMS, MILITARY
REQUIREMENTS, ELECTRONIC EQUIPMENT, HUMAN ENGINEERING,
SAFETY, RELIABILITY, RADIO INTERFERENCE, STORAGE,
TRANSPORTATION (U)

IDENTIFIERS: X-20 SPACECRAFT, CREW STATION, MARK I-C
CREW STATION (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 16DL

BOEING CO SEATTLE WASH
ENGINEERING PROGRAM STATEMENT X-20 (DYNA-SOAR) GLIDER
FLIGHT CONTROL SUBSYSTEM ELECTRONICS, (U)
FEB 61 27P TWEEDDALE, A. D. ;

REPT. NO. D2 7483 D
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOTICE: RELEASE ONLY TO DEPARTMENT OF
DEFENSE AGENCIES IS AUTHORIZED. OTHER CERTIFIED
REQUESTERS SHALL OBTAIN RELEASE APPROVAL FROM RESEARCH AND
TECHNOLOGY DIV., WRIGHT-PATTERSON AFB, OHIO,
ATTN: SENX-A.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, FLIGHT CONTROL
SYSTEMS), ELECTRONIC EQUIPMENT, HYDRAULIC
SERVOMECHANISMS, MANAGEMENT ENGINEERING, GOVERNMENT
PROCUREMENT, SYSTEMS ENGINEERING (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 156

BOEING CO SEATTLE WASH
SPECIFICATION, X-20 (MARK II-A) SIMULATOR CREW
STATION AND REPEATER CONSOLE. (U)

FEB 63 46P

REPT. NO. D2 80797

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, CONTROL
SIMULATORS), (*FLIGHT SIMULATORS, MANNED SPACECRAFT),
SPECIFICATIONS, AIRCRAFT CABINS, COCKPITS, FLIGHT
INSTRUMENTS, INDICATOR LIGHTS, HUMAN ENGINEERING,
CONTROL PANELS, ELECTRIC CABLES, MILITARY REQUIREMENTS,
DISPLAY SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE CREW STATION, REPEATER CONSOLE, AND
INTERCONNECTING CABLES FOR THE MARK IIA SIMULATOR
ARE DEFINED. THE NEW SIMULATOR INCLUDES CHANGES AS
OF 1 MAY 63. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-444 116

BOEING CO SEATTLE WASH

DYNA-SOAR FUNCTIONAL TEST DIRECTORY, (U)

MAY 62 215P SIMPSON, D. M. ;

REPT. NO. D2 80260

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•DIRECTORIES, TESTS), TEST EQUIPMENT, TEST
METHODS, BOOST-GLIDE VEHICLES, MASNED SPACECRAFT,
GROUND SUPPORT EQUIPMENT, AIRFRAMES, ENVIRONMENTAL
TESTS, INSTRUMENTATION (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 689

BOEING CO SEATTLE WASH

ELEVON STRENGTH CHECK NOTES - MODEL X-20, (U)

JUL 64 IV MCGINNIS, J. C. ;

REPT. NO. D2 81294

CONTRACT: AF33 615 1786

PROJ: 620A

TASK: 620A

UNCLASSIFIED REPORT
NOFORM

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, ELEVONS), MANNED SPACECRAFT, FLIGHT CONTROL SYSTEMS, DESIGN, CONSTRUCTION, AERODYNAMIC CONTROL SURFACES, STRUCTURES, AIRPLANE PANELS, BEAMS (STRUCTURAL), LOADING (MECHANICS), AERODYNAMIC LOADING, STRESSES, THERMAL STRESSES, DRAG, SHEAR STRESSES, TORQUE, BEARINGS, MECHANICAL FASTENERS, BOLTS, WELDS, ANALYSIS, DATA, PANELS (STRUCTURAL), HEAT RESISTANT METALS, CHROMIUM ALLOYS, COBALT ALLOYS, NICKEL ALLOYS, HEAT SHIELDS, INSTALLATION (U)

IDENTIFIERS: X-20 SPACECRAFT, RENE 41 (ALLOY) (U)

THIS DOCUMENT IS THE RESULT OF EDITING APPROXIMATELY 2000 PAGES OF STRENGTH CHECK NOTES ON THE X-20 ELEVON PRIMARY STRUCTURE. THIS COMPILATION REPRESENTS THE IMPORTANT STRENGTH CHECK NOTES IN SUPPORT OF ELEVON ENGINEERING DRAWINGS RELEASED PRIOR TO THE X-20 (DYNA-SOAR) CONTRACT TERMINATION IN DECEMBER OF 1963. THE REFRACTORY ALLOY LEADING EDGES AND EROSION SHIELD WITH THEIR ASSOCIATED SUPPORT PARTS AND INSULATION ARE NOT INCLUDED IN THESE STRENGTH CHECK NOTES. THIS DOCUMENT CONTAINS ALL NECESSARY REFERENCE MATERIAL SO THAT ADDITIONAL REFERENCE MATERIAL IS NOT NECESSARY FOR ITS USE. EXTERNAL LOADS ARE PRESENTED. STRUCTURAL ALLOWABLES AND THERMAL REFERENCE DATA ARE CONTAINED IN THE APPENDIX. TESTS ON CORRUGATED SHEAR WEBS AND CORRUGATED TORQUE BOX STRUCTURES HAVE DEMONSTRATED THE CONTROL SURFACE STRUCTURAL CONCEPT. FINAL VERIFICATION OF THE PRIMARY STRUCTURE FLIGHT HARDWARE WILL BE ACCOMPLISHED THE X-20 ELEVON WILL BE TESTED IN THE AIR FORCE WRIGHT-PATTERSON FIELD STRUCTURAL TEST FACILITY IN THE FALL OF 1964. (AUTHOR) (U)

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015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 534

BOEING CO SEATTLE WASH

WEIGHT ANALYSIS REPORT, MODEL X-20, (U)

JUL 64 1V RANKIN, C. W. I

REPT. NO. D2 81264 3

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, WEIGHT),
AERODYNAMIC CONTROL SURFACES, FINS, ELEVONS, AERIAL
RUDDERS, DESIGN, AERODYNAMIC LOADING, FITTINGS, LOADING
(MECHANICS), AIRPLANE PANELS, AIRFRAMES, HEAT SHIELDS,
MOMENTS, ACCELERATION (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

VOLUME 3 OF THIS SEVEN-VOLUME REPORT COVERS THE
DETAIL WEIGHT ANALYSES OF THE MODEL X-20 FIXED
FINS, RUDDER, AND ELEVONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 532

BOEING CO SEATTLE WASH

WEIGHT ANALYSIS REPORT, MODEL X-20, (U)

JUL 64 1V RANKIN, C. W. ;

REPT. NO. D281264 7

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, WEIGHT), GUIDED
MISSILE COMPONENTS, FLIGHT CONTROL SYSTEMS, ELECTRONIC
EQUIPMENT, COMMUNICATION SYSTEMS, GUIDED MISSILE
TRACKING SYSTEMS, LANDING GEAR DOORS, DISPLAY SYSTEMS,
SYSTEMS ENGINEERING, AUXILIARY POWER PLANTS, AIRFRAMES,
NITROGEN, OXYGEN, PAYLOAD, TOLERANCES (MECHANICS), FIRE
ALARM SYSTEMS, ANALYSIS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-443 319

LEAR INC GRAND RAPIDS MICH

MOTOR GENERATOR FOR 4060L INDICATOR AS USED ON DYNA-

SOAR (X20) PROGRAM. (U)

JAN 64 46P VERKAIK, A. ;

REPT. NO. 9D3J1F

MONITOR: IDEP 532 29 40 06FD 04

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MOTOR GENERATORS, ENVIRONMENTAL TESTS),
BOOST-GLIDE VEHICLES, SHOCK (MECHANICS), VIBRATION,
ACCELERATION, TEMPERATURE, SERVO MOTORS, GYROSCOPES (U)

IDENTIFIERS: X-20 SPACECRAFT, IDEP (U)

FOUR UNITS WERE GIVEN ROOM TEMPERATURE, SHOCK,
VIBRATION, AND ACCELERATION TESTS. NO ADVERSE
EFFECTS WERE NOTED. UNITS WERE THEN TESTED AT
HIGH AND LOW TEMPERATURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-442 215

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
PROCUREMENT SPECIFICATION LOW LEVEL LOW SPEED
MECHANICAL COMMUTATOR, (U)

JUL 61 38P LEHMANN, J. L. ; SIMMONS, T.

H. ;

REPT. NO. 7660 1

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•COMMUTATORS, SPECIFICATIONS), MANNED
SPACECRAFT, BOOST-GLIDE VEHICLES, DESIGN, VELOCITY,
PULSE MODULATION, CODING (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION ESTABLISHES HARDWARE DESIGN
REQUIREMENTS FOR THE LOW LEVEL LOW SPEED MECHANICAL
COMMUTATOR FOR THE GLIDER PORTION OF THE DYNA
SOAR TEST INSTRUMENTATION SUBSYSTEM AND WHICH
IS DESIGNATED AS LLS COMMUNTOR. THIS
EQUIPMENT WILL SAMPLE INFORMATION INCO A FORM
SUITABLE FOR PCM ENCODING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-442 213

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
DETAIL EQUIPMENT SPECIFICATION DYNA-SOAR GLIDER TEST
INSTRUMENTATION SUBSYSTEM. (U)

41 64P

REPT. NO. 7660 28

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•INSTRUMENTATION, BOOST-GLIDE VEHICLES),
SPECIFICATIONS, TEST EQUIPMENT (ELECTRONICS), MANNED
SPACECRAFT, TELEMETER SYSTEMS, MIXERS (ELECTRONIC),
CODING, PULSE GENERATORS, PULSE MODULATION, FREQUENCY
MODULATION (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DETAIL EQUIPMENT SPECIFICATION DEFINES
THE CONSTRUCTION OF THE PCM CONVERSION SET, FM
CONVERSION SET, MIXER SET AND TIME CODE
GENERATOR SET OF THE DYNA-SOAR GLIDER
TEST INSTRUMENTATION SUB-SYSTEM. (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-441 951

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
DRAWING INDEX FOR X-20 ACCEPTANCE TEST PROCEDURE,
SIL. (U)

JAN 64 3P

REPT. NO. 7660 69

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, CHECKOUT
PROCEDURES), MANNED SPACECRAFT, DESIGN, MECHANICAL
DRAWINGS, INERTIAL GUIDANCE, FLIGHT CONTROL SYSTEMS,
DOCUMENTATION, INDEXES, TEST METHODS, COMMUNICATION
SYSTEMS, ELECTRONIC EQUIPMENT (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

D15416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 921

THIOKOL CHEMICAL CORP ELKTON MD
FAILURE ANALYSIS OF SQUIB PART NUMBER 13897-01, (U)
NOV 63 28P TAYLOR, G. F. ;
REPT. NO. RER343

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (ROCKET IGNITERS, FAILURE (MECHANICS)),
EXPLOSIVES INITIATORS, TESTS, DIELECTRICS, ROCKET MOTORS
(SOLID PROPELLANT), ELECTRICAL PROPERTIES, DROP TESTING,
TEST METHODS, BOOST-GLIDE VEHICLES (U)
IDENTIFIERS: TE-400 MOTORS, TE-364 MOTORS, X-20
SPACECRAFT (U)

WHILE UNDERGOING THE QUALIFICATION TEST PROGRAM,
TWO SQUIBS WERE SUBJECTED TO A 1,000 VAC/RMS
DIELECTRIC TEST. THE SQUIBS, ONE FROM GROUP 1
AND ONE FROM GROUP 8 OF THE SEQUENTIAL TEST
PROGRAM, HAD JUST COMPLETED HIGH TEMPERATURE
VIBRATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 914

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR COMPARISON,
GAIN COMPUTER. (U)

DEC 62 8P

REPT. NO. TDS 2546 D3 44

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CIRCUITS, FLIGHT CONTROL SYSTEMS),
COMPUTERS, SPECIFICATIONS, ENVIRONMENTAL TESTS, MILITARY
REQUIREMENTS, MANNED SPACECRAFT, BOOST-GLIDE VEHICLES,
GAIN, RELAYS (U)

IDENTIFIERS: COMPARATORS, X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR THE GAIN COMPUTER COMPARATOR FOR USE IN THE
BG197 COMPUTER FOR THE MH-132 DYNA-SOAR
FLIGHT CONTROL SUBSYSTEM ELECTRONICS.

(AUTHR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 911

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR BETA
AMPLIFIER LIMITER.

(U)

MAR 62 8P

REPT. NO. TDS 2546 D3 39

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•AMPLIFIERS, LIMITERS), (LIMITERS,
AMPLIFIERS), SPECIFICATIONS, COMPUTERS, FLIGHT CONTROL
SYSTEMS, MANNED SPACECRAFT, BOOST-GLIDE VEHICLES,
DESIGN, PRINTED CIRCUITS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR BETA AMPLIFIER LIMITER. THESE
REQUIREMENTS REFLECT THE FINDINGS OF DESIGN STUDIES
CONDUCTED UNDER THE BOEING COMPANY LETTER
ORDER NO. 1-043004-9552. NECESSARY ENGINEERING
RECORDS, DRAWINGS, SPECIFICATIONS, TESTS, ETC. SHALL
BE INITIATED TO PROVIDE FOR A PRODUCTION RELEASE.
THE AMPLIFIER LIMITER IS FOR USE IN THE BG197
COMPUTER FOR THE MH-132 DYNA-SOAR FLIGHT
CONTROL SUBSYSTEM ELECTRONICS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 909

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR BOOSTER TARS
MODULATOR. (U)

JUN 62 10P

REPT. NO. TDS2546 03 36

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MODULATORS, FLIGHT CONTROL SYSTEMS),
MANNED SPACECRAFT, BOOST-GLIDE VEHICLES, BOOSTERS,
SPECIFICATIONS, ENVIRONMENTAL TESTS, MILITARY
REQUIREMENTS, COMPUTERS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR A BOOSTER TARS MODULATOR FOR USE IN THE
BG197 COMPUTER FOR THE MH-132 DYNA-SOAR
FLIGHT CONTROL SUBSYSTEM ELECTRONICS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 905

HONEYWELL INC LOS ANGELES CALIF
TECHNICAL DEVELOPMENT SPECIFICATION FOR COMPARATOR,
ADAPTIVE NETWORK. (U)

DEC 62 8P

REPT. NO. TDS2546 D3 21

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (CIRCUITS, ADAPTIVE CONTROL SYSTEMS),
SPECIFICATIONS, FLIGHT CONTROL SYSTEMS, COMPUTERS,
MANNED SPACECRAFT, BOOSTGLIDE VEHICLES, DESIGN,
ELECTRONIC RELAYS, TRANSISTORS, PRINTED CIRCUITS (U)
IDENTIFIERS: X-20 SPACECRAFT, COMPARATORS (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR THE ADAPTIVE NETWORK COMPARATOR. THESE
REQUIREMENTS REFLECT THE FINDINGS OF DESIGN STUDIES
CONDUCTED UNDER THE BOEING COMPANY LETTER
ORDER NO. 2-043004-9552. NECESSARY ENGINEERING
RECORDS, DRAWINGS, SPECIFICATIONS, TESTS, ETC. SHALL
BE INITIATED TO PROVIDE FOR A PRODUCTION RELEASE.
THE COMPARATOR IS FOR USE IN THE BG197 COMPUTER
FOR THE MH-132 DYNA-SOAR FLIGHT CONTROL
SUBSYSTEM ELECTRONICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 902

HONEYWELL INC LOS ANGELES CALIF

TECHNICAL DEVELOPMENT SPECIFICATION FOR BAND PASS
AMPLIFIER. (U)

APR 62 7P

REPT. NO. TDS2546 03 11

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BAND-PASS AMPLIFIERS, SPECIFICATIONS),
MANNED SPACECRAFT, BOOST-GLIDE VEHICLES, COMPUTERS,
FLIGHT CONTROL SYSTEMS, EXTREMELY LOW FREQUENCY (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS SPECIFICATION DEFINES THE DESIGN REQUIREMENTS
FOR A BAND PASS AMPLIFIER. THESE
REQUIREMENTS REFLECT THE FINDINGS OF DESIGN STUDIES
CONDUCTED UNDER THE BOEING COMPANY LETTER
ORDER NO. 2-043004-9552. NECESSARY ENGINEERING
RECORDS, DRAWINGS, SPECIFICATIONS, TESTS, ETC. SHALL
BE INITIATED TO PROVIDE FOR A PRODUCTION RELEASE.
THE AMPLIFIER WILL BE USED IN THE BG197
COMPUTER FOR THE MH-132 DYNA SOAR FLIGHT
CONTROL SUBSYSTEM ELECTRONICS. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 899

GARRETT CORP LOS ANGELES CALIF

DEVELOPMENT PERFORMANCE TEST GLYCOL TEMPERATURE AND
HYDROGEN PRESSURE CONTROL 179140 BOEING X-20 (DYNA-
SOAR) PART 10-20917-8, (U)

JAN 64 24P CHASE, A. B. ;

REPT. NO. DS265

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TEMPERATURE CONTROL, SAFETY VALVES),
(•BOOST-GLIDE VEHICLES, TEMPERATURE CONTROL), HEAT
EXCHANGERS, FUEL TANKS, GLYCOLS, HYDROGEN, CONTROL,
PRESSURE, DETECTORS, HEAT TRANSFER, COOLING,
RELIABILITY, TEST METHODS, ACCEPTABILITY, REDUNDANT
COMPONENTS, BOOST GLIDE VEHICLES, CRYOGENICS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 897

GARRETT CORP LOS ANGELES CALIF
DEVELOPMENT TEST PERFORMANCE DUAL PRESSURIZATION HEAT
EXCHANGER 179106 USED IN THE GLYCOL TEMPERATURE AND
HYDROGEN PRESSURE CONTROL 179140 BOEING X-20 DYNA-
SOAR PART 10-20917-8, (U)
JAN 64 6P COUGHLIN, W. P. DURHAM, R. E.

REPT. NO. DS264

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HEAT EXCHANGERS, PERFORMANCE
(ENGINEERING)), (•BOOST-GLIDE VEHICLES, HEAT
EXCHANGERS), TEST METHODS, PRESSURE, TEMPERATURE
CONTROL, CONTROL, HYDROGEN, GLYCOLS, CHECK VALVES,
RELIABILITY, ACCEPTABILITY, THERMAL CONDUCTIVITY,
COOLING, CRYOGENICS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 895

SUNSTRAND AVIATION-DENVER COLO

ANALYSIS OF THE FAILURE OF TURBINE WHEELS IN DYNA-
SOAR APU MODEL 876, SERIAL NUMBER 001 IN TESTS 001
AND 003, (U)

63P KAPIC, D, ; HANDLOGTEN, H. R. ;
REPT. NO. 21DER62

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TURBINE WHEELS, FAILURE (MECHANICS)),
(•BOOST-GLIDE VEHICLES, AUXILIARY POWER PLANTS),
VIBRATION, FATIGUE (MECHANICS), TITANIUM ALLOYS,
STRESSES, THERMAL STRESSES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

DURING THE FIRST DEVELOPMENT TEST OF THE DYNA-
SOAR MODEL 876 APU THE TURBINE WHEEL FAILED AT
APPROXIMATELY 39,000 RPM, FROM THE APPEARANCE OF
THE MACHINE AFTER THE FAILURE AND FROM ANALYSIS OF
VIBRATION MEASUREMENTS MADE DURING THE TESTS, IT
APPEARED THAT THE FAILURE HAD BEEN CAUSED BY
VIBRATION IN A STATIONARY WAVE MODE, WITH FIVE
WAVELENGTHS PER REVOLUTION. THE MAJOR EXCITATION
FOR THIS VIBRATION CAME FROM THE ALTERNATOR. A
SECOND TEST WAS THEREFORE RUN IN WHICH THE
ALTERNATOR WAS NOT MOUNTED ON THE APU, AND THE
APU WAS DRIVEN BY HYDRAULIC MOTOR MOUNTED ON THE
HYDRAULIC PUMP PAD. THE TURBINE WHEEL FAILED IN
THIS TEST AT 41,000 RPM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 892

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
OPERATION AND MAINTENANCE MANUAL. X-20 SIL STATION.
VOLUME III. PCM SUBSYSTEM. (U)

JAN 64 75P

REPT. NO. EMR 7660 202

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, PULSE COMMUNICATION
SYSTEMS), (*PULSE COMMUNICATION SYSTEMS, MAINTENANCE),
SIMULATORS, HANDBOOKS, GROUND SUPPORT EQUIPMENT, CONTROL
SYSTEMS, ELECTRONIC COMMUTATORS, CIRCUITS, WIRING
DIAGRAMS, OPERATION, SIMULATORS, ELECTRONIC COMMUTATORS,
CHECKOUT PROCEDURES, DIGITAL RECORDING SYSTEMS,
TELEMETER SYSTEMS, DATA PROCESSING SYSTEMS, SPACE-TO-
SURFACE (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

INSTRUCTIONS ARE PRESENTED FOR OPERATION AND
MAINTENANCE OF THE PULSE CODE MODULATED (PCM)
SUBSYSTEM, PART OF THE X-20 GROUND DATA
RECOVERY ELEMENTS, SYSTEM INTEGRATION
LABORATORIES (SIL) STATION. THIS SUBSYSTEM
ACCEPTS PCM DATA FROM THE GLIDER, TAPE
RECORDER/REPRODUCER, OR PCM SIGNAL SIMULATOR
AND DECOMMUTATES THE DATA TO PROVIDE BINARY, DECIMAL
AND ANALOG OUTPUTS TO OTHER SUBSYSTEMS OF THE SIL
STATION. INSTRUCTIONS ARE PROVIDED FOR INDIVIDUAL
ASSEMBLIES COMPRISING THE PCM SUBSYSTEM AS
FOLLOWS: PCM SIGNAL SIMULATOR, PCM SIGNAL
CONDITIONER, PCM DECOMMUTATOR, ZAND DIGITAL
PRINTER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 887

BOEING CO SEATTLE WASH

NOSE CAP DEVELOPMENT TESTS - FULL SIZE STRUCTURAL
DEMONSTRATOR TESTS DYNA-SOAR, (U)

JAN 64 71P ESCH,P. G. ;LANDRY,B. E. ;

SWEGLE,A. R. ;

REPT. NO. D2 80083

CONTRACT: AF33 615 1787

PROJ: 620A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NOSE CONES, BOOST-GLIDE VEHICLES),
(*BOOST-GLIDE VEHICLES, NOSE CONES), SIMULATED
ENVIRONMENT, ACCEPTABILITY, ATMOSPHERE ENTRY, HIGH
TEMPERATURE RESEARCH, INSTRUMENTATION, HEATING, ABORT,
TEST FACILITIES, REFRACTORY METAL ALLOYS, STAGNATION
POINT, STRUCTURAL PROPERTIES, TEST METHODS, VIBRATION,
ASCENT TRAJECTORIES, DESCENT TRAJECTORIES,
THERMOCOUPLES, PYROMETERS, TORCHES, EXHAUST GASES (U)
IDENTIFIERS: NOSE CAPS, X-20 SPACECRAFT (U)

A FULL SCALE NOSE CAP STRUCTURAL DEMONSTRATOR WAS
TESTED IN THE OXY-PROPANE TORCH AND RAMJET
FACILITIES. INITIAL TESTING CONSISTED OF
SUBJECTING THE NOSE CAP TO SIMULATED MAXIMUM BOOST
THERMAL ENVIRONMENT IN THE PROPANE TORCH. DUE TO
PROBLEMS IN TEST CONDUCTION AND WITH A PROPANE BURNER
CONTROL VALVE THE NOSE CAP WAS SUBJECTED TO SEVERE
HEATING RATES AND MAXIMUM TEMPERATURE WAS MAINTAINED
FOR AN ADDITIONAL 90 SECONDS PAST PROGRAMMED
TERMINATION. BOTH THE NOSE CAP AND ITS
INSTRUMENTATION APPEARED SOUND AFTER THE TEST.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 885

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-2D ACCEPTANCE TEST PROCEDURE CALIBRATED TAPE
PREPARATION SUBSYSTEM SIL.

(U)

44 5DP

REPT. NO. 7660 69 11

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RADIO COMMUNICATION
SYSTEMS), (•TEST EQUIPMENT (ELECTRONICS), PULSE
COMMUNICATION SYSTEMS), SPACE-TO-SURFACE, SIMULATION,
RADIO SIGNALS, TAPES, CALIBRATION, DATA PROCESSING
SYSTEMS, TEST METHODS, ACCEPTABILITY, INPUT-OUTPUT
DEVICES, MIXERS (ELECTRONIC), OSCILLATORS, FREQUENCY
MODULATION, RADIO EQUIPMENT

(U)

IDENTIFIERS: X-2D SPACECRAFT

(U)

THE CALIBRATED TAPE PREPARATION SUBSYSTEM IS
COMPRISED OF ALL THE SIGNAL SIMULATORS AND OTHER
EQUIPMENT TO EXERCISE, MIX OR COMBINE THE VARIOUS
SIMULATED GROUND STATION INPUT SIGNALS. THE TESTING
OF THE CALIBRATED TAPE PREPARATION SUBSYSTEM WILL
CONSIST PRIMARILY OF THE VERIFICATION OF ALL THE
OUTPUTS OF EACH OF THE THREE SIGNAL SIMULATORS,
MODULATION OF THE THREE VCO'S, AND THE APPLICATION
OF THE SIX VARIOUS INPUTS TO THE MIXER FOR A PROPERLY
COMBINED COMPOSITE MULTIPLEX SIGNAL. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 883

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST PROCEDURE FOR PCM SUBSYSTEM PCM
SIGNAL SIMULATOR, SIL. (U)

44 1V

REPT. NO. 7660 69 041

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PULSE COMMUNICATION
SYSTEMS), MODELS (SIMULATION), PULSE MODULATION,
TELEMETER SYSTEMS, ELECTRONIC EQUIPMENT, TEST METHODS,
ACCEPTABILITY, GROUND SUPPORT EQUIPMENT, RADIO SIGNALS,
TEST EQUIPMENT (ELECTRONICS) (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 881

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST PROCEDURE FOR INERTIAL GUIDANCE
(IG) DECOMMUTATOR SUBSYSTEM, SIL. (U)

44 1V

REPT. NO. 7660 69 06

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•INERTIAL GUIDANCE, INPUT-OUTPUT DEVICES),
ANALOG COMPUTERS, PROGRAMMING (COMPUTERS),
ACCEPTABILITY, DISPLAY SYSTEMS, DATA PROCESSING SYSTEMS,
TEST EQUIPMENT (ELECTRONICS), TEST METHODS, PULSE
MODULATION, BOOST-GLIDE VEHICLES, CORRELATIONS, SIGNAL
GENERATORS, COMPUTER LOGIC, SIMULATION, ERRORS, SIGNAL-
TO-NOISE RATIO, ELECTRONIC COMMUTATORS, AUTOMATIC (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE INERTAIL GUIDANCE DECOMMUTATOR IS A PCM
GROUND STATION TO WHICH TWO SPECIAL FEATURES HAVE
BEEN ADDED; THESE ARE VARIABLE WORD LENGTH LOGIC AND
FRAME SYCHRONIZATION LOGIC. ONCE INITIAL
CONDITIONS HAVE BEEN INSERTED, AS DICTATED BY THE
MISSION, THE IG DECOM SUBSYSTEM IS COMPLETELY
AUTOMATIC AND NO FURTHER ADJUSTMENTS OR CHANGES ARE
NECESSARY DURING MISSION LIFETIME. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 806

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 ACCEPTANCE TEST PROCEDURE FOR PCM SUBSYSTEM,
SIL. (U)

AUG 62 1V

REPT. NO. EMR7660 69 04

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, PULSE COMMUNICATION
SYSTEMS), (*PULSE COMMUNICATION SYSTEMS, GROUND SUPPORT
EQUIPMENT), TEST METHODS, REMOTE CONTROL SYSTEMS,
DISPLAY SYSTEMS, ACCEPTABILITY, CIRCUITS, MANNED
SPACECRAFT, DIGITAL SYSTEMS, VOLTMETERS,
OSCILLOSCOPES (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THE TESTING OF THE PULSE CODE MODULATED
(PCM) SUBSYSTEM CONSISTS PRIMARILY OF THE
APPLICATION OF A SIGNAL INPUT FROM THE PCM SIGNAL
SIMULATOR WHILE MONITORING THE OUTPUTS ON THE CRT
BARGRAPH, BINARY AND DECIMAL DISPLAY LIGHTS, DIGITAL
PRINTER, DIGITAL VOLTMETER AND OSCILLOSCOPE FOR
COMPARISON TO THE OUTPUT OF THE SIGNAL SOURCE INPUT.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 777

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
TECHNICAL PROPOSAL HYDROGEN TANK PRESSURIZATION
SYSTEM BOEING DYNA SOAR. VOLUME 1, (U)
67P FLEMING, W. T. ; BAYER, J. ;

HALEY, J. T. ;
REPT. NO. DS53R

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PNEUMATIC
SYSTEMS), (•PNEUMATIC SYSTEMS, GOOST-GLIDE VEHICLES),
PRESSURE REGULATORS, TANKS, HYDROGEN, MANNED SPACECRAFT,
DESIGN, CENTRIFUGAL COMPRESSORS, CHECK VALVES,
MECHANICAL DRAWINGS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS PROPOSAL PRESENTS THE AIRESEARCH CONCEPT
FOR A HYDROGEN TANK PRESSURIZATION SYSTEM COMPRISED
OF A PRESSURE REGULATOR VALVE, A PRESSURE RELIEF
VALVE, A CHECK VALVE, AND A MOTOR DRIVEN CENTRIFUGAL
COMPRESSOR, TO COMPLY WITH THE REQUIREMENTS OF
BOEING SOURCE CONTROL DRAWING DATED AUGUST
30, 1961, PRESSURE CONTROL SHYDROGEN TANKAGE.
THE PROPOSED SYSTEM MEETS THE REQUIREMENTS SET
FORTH IN THE BOEING SPECIFICATION EXCEPT AS NOTED
IN SPECIFIC COMMENTS. COMPONENTS OF THE SYSTEM
INCORPORATE DESIGN DETAILS EVOLVED ON THE BASIS OF
EXTENSIVE DEVELOPMENT TESTS, COMPREHENSIVE
QUALIFICATION TESTING, AND ACTUAL SERVICE EXPERIENCE,
AND ARE CONSIDERED COMPLETELY SUITABLE FOR
INSTALLATION IN THE PRESSURIZATION SYSTEM OF THE
BOEING DYNA SOAR VEHICLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 745

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
OPERATION AND MAINTENANCE MANUAL X-20 SIL STATION
VOLUME II. TIMING SUBSYSTEM, (U)
JAN 64 1V

REPT. NO. EMR7660 201

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), INSTRUCTION MANUALS, HANDBOOKS, OPERATION,
MAINTENANCE, TIMING CIRCUITS, DATA PROCESSING SYSTEMS,
TIMING DEVICES, MANNED SPACE CRAFTS, ELECTRONIC
EQUIPMENT, RECOVERY, TIME SIGNALS, TIMING DEVICES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THIS MANUAL PROVIDES INSTRUCTIONS FOR OPERATION AND
MAINTENANCE OF THE TIMING SUBSYSTEM, PART OF THE
X-20 GROUND DATA RECOVERY ELEMENTS,
SYSTEM INTEGRATION LABORATORIES (SIL)
STATION. THIS SUBSYSTEM GENERATES AND DISPLAYS A
TIME CODE, AND ALSO CONTROLS OTHER EQUIPMENT AT
PRESELECTED TIME INTERVALS. INSTRUCTIONS ARE
PROVIDED FOR THE INDIVIDUAL ASSEMBLIES COMPRISING THE
TIMING SUBSYSTEM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 743

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
OPERATION AND MAINTENANCE MANUAL. X-20 SIL STATION.
VOLUME LX. CALIBRATED TAPE PREPARATION SUBSYSTEM. (U)

JAN 64 1V

REPT. NO. EMR7660 208

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TELEMETER SYSTEMS, INSTRUCTION MANUALS),
(•DATA PROCESSING SYSTEMS, INSTRUCTION MANUALS),
MAINTENANCE OF THE CALIBRATED TAPE PREPARATION SUBSYSTEM,
MECHANICAL DRAWINGS, MANNED SPACECRAFT, MODULES
(ELECTRONIC) (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS MANUAL PROVIDES INSTRUCTIONS FOR THE OPERATION
AND MAINTENANCE OF THE CALIBRATED TAPE
PREPARATION SUBSYSTEM WHICH IS PART OF THE X-20
GROUND DATA RECOVERY ELEMENTS, SYSTEMS
INTEGRATION LABORATORIES (LIL) STATION. IN
ADDITION TO NORMAL SUBSYSTEM OPERATING AND
MAINTENANCE INSTRUCTIONS, THIS MANUAL PROVIDES
INSTRUCTIONS FOR PREPARING THE SYSTEM ACCURACY
VERIFICATION TAPE USED TO CHECK THE OPERATIONAL
ACCURACY OF THE SIL STATION. SOME UNITS OR
SUBASSEMBLIES OF THE CALIBRATED TAPE
PREPARATION SUBSYSTEM ARE FUNCTIONALLY COMMON
WITH OTHER SUBSYSTEMS OF THE SIL STATION. UNITS
OF THIS SUBSYSTEM DESCRIBED IN SEPARATELY SUPPLIED
PUBLICATIONS WILL NOT BE DISCUSSED IN DETAIL IN THIS
MANUAL. EMR AND VENDOR MANUALS SUPPLIED AS
SUPPORTING DOCUMENTS TO THIS MANUAL ARE LISTED.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 740

BOEING CO SEATTLE WASH
COATINGS FOR REFRACTORY METALS, (U)
DEC 63 72P CONA, D. ;
REPT. NO. D280094 3

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, REFRACTORY METAL
ALLOYS), (*REFRACTORY METAL ALLOYS, PROTECTIVE
TREATMENTS), MOLYBDENUM ALLOYS, TITANIUM ALLOYS, NIOBIUM
ALLOYS, COATINGS, OXIDATION, ZIRCONIUM ALLOYS, WINGS,
EMISSIVITY (U)

IDENTIFIERS: X-20 SPACECRAFT, MOLYBDENUM ALLOY 0.5 TI,
NIOBIUM ALLOY S-82, NIOBIUM ALLOY C-103, PACK
CEMENTATION, NIOBIUM ALLOY 1 ZR, NIOBIUM ALLOY 10T;
52R (U)

THE DYNA SOAR VEHICLE REQUIRES RELIABLE LEADING
EDGES AND SKIN PANELS CAPABLE OF WITH-STANDING RE-
ENTRY CONDITIONS ANTICIPATED FOR THESE COMPONENTS.
WHEN CONSIDERING DESIGN, FABRICATION, AND WEIGHT
THE MOST PROMISING MATERIALS ARE THE REFRACTORY
METALS. SEVERAL REFRACTORY METALS OFFER THE
DESIRED HIGH TEMPERATURE PHYSICAL PROPERTIES BUT NONE
POSSSESS THE REQUIRED OXIDATION RESISTANCE.
OXIDATION RESISTANCE IS ATTAINED BY PROTECTIVE
COATINGS. THE LACK OF RELIABLE COATINGS FOR DYNA
SOAR HAS NECESSITATED COATING DEVELOPMENT ACTIVITY BY
THE CONTRACTOR. THE FOLLOWING PRESENTS PROGRESS ON
(1) CONTRACTOR COATING DEVELOPMENT AND (2)
HIS EVALUATION OF IMPROVED OR RECENTLY DEVELOPED
COMMERCIAL COATINGS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 738

BOEING CO SEATTLE WASH

MASTER INDEX, X-20 GROUND SUPPORT EQUIPMENT DATA

REFERENCES,

(U)

JAN 64 78P

FLASH, P. No. ; YOUNG, J. G. ;

REPT. NO. D2 81008

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR

NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GROUND SUPPORT EQUIPMENT, BOOST-GLIDE

VEHICLES), (*BOOST-GLIDE VEHICLES, GROUND SUPPORT

EQUIPMENT), MECHANICAL DRAWINGS, DOCUMENTATION,

SCHEDULING, TABLES, CHECKOUT EQUIPMENT, MAINTENANCE

EQUIPMENT, TEST EQUIPMENT, ELECTRICAL EQUIPMENT, GUIDED

MISSILE COMPONENTS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

THIS DOCUMENT CONTAINS A BRIEF SUMMATION OF THE

DOCUMENTS AND DRAWINGS THAT HAVE BEEN ACCOMPLISHED

TOWARD THE DESIGN AND PROVISIONING OF THE X-20

GROUND SUPPORT SYSTEM. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 736

BOEING CO SEATTLE WASH

ILLUSTRATIONS AND FUNCTIONAL DESCRIPTIONS OF X-20

AGE,

(U)

JAN 64 71P
REPT. NO. D2 81255

REED, R. S. :

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•GROUND SUPPORT EQUIPMENT, BOOST GLIDE
VEHICLES), (•BOOST GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), HANDLING, TRANSPORTATION, PICTURES,
CONFIGURATION, CHECKOUT EQUIPMENT, CONTROL, LAUNCHING,
LAUNCHING SITES, MAINTENANCE EQUIPMENT, DISPLAY SYSTEMS,
HANDLING, TRANSPORTATION (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 734

BOEING CO SEATTLE WASH

ANALYSIS OF MATHEMATICAL FORMULAE USED IN GENERATING
DYNA-SOAR MASS DISTRIBUTION AND INERTIA REPORTS, (U)

DEC 63 24P LINDSAY, R. W. ;

REPT. NO. D2 80745

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MATHEMATICAL
MODELS), COMPUTERS, PROGRAMMING (COMPUTERS), WEIGHT,
CENTER OF GRAVITY, PITCH (MOTION), YAW, MOMENT OF
INERTIA, ROLL, LOAD DISTRIBUTION, NUMERICAL METHODS AND
PROCEDURES, MATHEMATICAL LOGIC, COMPUTER LOGIC, CENTER
OF MASS, CENTER OF GRAVITY (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE PURPOSE OF THIS DOCUMENT IS TO DESCRIBE THE
MATHEMATICAL FORMULAS USED IN THE COMPUTER PROGRAM
WHICH PRODUCES THE MASS DISTRIBUTION AND INERTIA
REPORT FOR THE DYNA-SOAR GLIDER AND AIR
VEHICLE. THIS PROGRAM IS APPLICABLE, WITH MINOR
MODIFICATIONS, TO ALL OTHER TYPE VEHICLES. A
MATHEMATICAL MODEL MADE UP OF TWO TYPICAL PARTS IS
USED AS AN EXAMPLE IN THE DISCUSSION. THE FORMULAS
FOR BREAKING UP AN INDIVIDUAL PART AND DISTRIBUTING
THE WEIGHT IS DESCRIBED. THEN THE PROCEDURES ARE
DEMONSTRATED FOR SUMMING THE WEIGHTS PER INCH, PITCH,
YAW AND ROLL INERTIA ABOUT CENTERS OF GRAVITY. THE
FORMULAS FOR PRODUCTS OF INERTIA AND PRINCIPAL
AXES ARE ALSO GIVEN. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 732

BOEING CO SEATTLE WASH
FABRICATION OF REFRACTORY ALLOYS, (U)
DEC 61 53P MARR, F. G. ; SLOSSON, S. R. ;
REPT. NO. D2 80094 7
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR
NATIONALS IS NOT AUTHORIZED.
SUPPLEMENTARY NOTE:

DESCRIPTORS: (+BOOST-GLIDE VEHICLES, REFRACTORY METAL
ALLOYS), (+REFRACTORY METAL ALLOYS, MATERIAL FORMING),
MANNED SPACECRAFT, RESEARCH PLANES, MOLYBDENUM ALLOYS,
NIOBIUM ALLOYS, MACHINING, MECHANICAL FASTENERS, ARC
WELDING, TENSILE PROPERTIES, DUCTILITY, REFRACTORY
COATINGS, OXIDATION, SCREW THREADS (U)
IDENTIFIERS: X-20 SPACECRAFT, MOLYBDENUM ALLOY D.5 TI,
MOLYBDENUM ALLOY T2M, NIOBIUM ALLOY 16TI 52R, NIOBIUM
ALLOY FS-80, NIOBIUM ALLOY FS-82 (U)

IT IS ESSENTIAL THAT THE DYNA-SOAR VEHICLE HAVE
A HIGHLY RELIABLE REFRACTORY SKIN AND LEADING EDGE
MATERIAL. SEVERAL TYPES OF REFRACTORY MATERIALS
ARE CAPABLE OF WITHSTANDING THE ANTICIPATED REENTRY
CONDITIONS. THE MATERIALS CHOSEN FOR THE DYNA-
SOAR (MOLYBDENUM AND/OR NIOBIUM) WOULD THEN
UNDERSTANDABLY HAVE TO BE FABRICATED INTO DIFFERENT
FORMS TO MEET THE DESIGN REQUIREMENTS. THE NIOBIUM
ALLOYS, HAVING AN EXTREMELY LOW BRITTLE-DUCTILE
TRANSITION TEMPERATURE, AND SLIGHTLY LOWER IN
STRENGTH THAN MOLYBDENUM ALLOYS, ARE COMPARATIVELY
EASY TO FABRICATE INTO COMPONENT PARTS AT ROOM
TEMPERATURE. THE MOLYBDENUM ALLOYS, HAVE A HIGHER
BRITTLE-DUCTILE TRANSITION TEMPERATURE AND MUST BE
FORMED AT ELEVATED TEMPERATURES. HANDLING
TECHNIQUES FOR MOLYBDENUM ALLOYS MUST BE MORE RIGID
BECAUSE OF BRITTLINESS AND DELAMINATION
CHARACTERISTICS EXHIBITED BY THE MATERIAL.
MACHINING OF MOLYBDENUM AND NIOBIUM ALLOYS IS NOT
DIFFICULT, BUT LIMITED FOR MOLYBDENUM BECAUSE OF ITS
BRITTLINESS. CAUTION MUST BE TAKEN IN CHOOSING
THE CORRECT TOOL OF EITHER MATERIAL. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-441 698

BOEING CO SEATTLE WASH

REFRACTORY METAL PROCUREMENT FOR DYNA-SOAR.

(U)

NOV 61 67P BERGSTROM, T. R. I

REPT. NO. D2 80094 4

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MANNED SPACECRAFT, REFRACTORY METAL ALLOYS), (*REFRACTORY METAL ALLOYS, PROCUREMENT), (*INDUSTRIAL PROCUREMENT, REFRACTORY METAL ALLOYS), MOLYBDENUM ALLOYS, TITANIUM ALLOYS, SHEETS, SPECIFICATIONS, MECHANICAL PROPERTIES, CONTAMINATION, HEAT SHIELDS, AIRFRAMES, AERODYNAMIC CONTROL SURFACES, FINS, ELEVONS, WINGS, BOOST-GLIDE VEHICLES, RESEARCH PLANES (U)

IDENTIFIERS: X-20 SPACECRAFT, MOLYBDENUM ALLOY TZM, MOLYBDENUM ALLOY TM (U)

PROCUREMENT OF SIZABLE QUANTITIES OF REFRACTORY ALLOY SHEET OF CONSISTENT HIGH QUALITY IS ESSENTIAL TO THE DYNA-SOAR PROGRAM. THE FLYING WEIGHT OF REFRACTORY ALLOY PER VEHICLE, OR PER FLIGHT IF THE REFRACTORY ALLOY STRUCTURE IS REFURBISHED, IS APPROXIMATELY 1000 POUNDS. REFRACTORY METALS WILL BE USED IN THREE TYPES OF APPLICATIONS ON THE DYNA-SOAR VEHICLE. THE APPLICATION INVOLVING THE GREATEST QUANTITY OF MATERIAL IS FOR HEAT SHIELD SKIN PANELS ON THE BOTTOM SURFACES OF THE BODY, WING AND ELEVON AND THE OUTBOARD SURFACE OF THE FIN AND RUDDER. THE SECOND AREA OF APPLICATION IS FOR BODY, WING, FIN, RUDDER, AND ELEVON LEADING EDGES. THE THIRD AREA OF APPLICATION IS STRUCTURE TO SUPPORT THE NOSE CAP. MOLYBDENUM 1/25 TI (TM) AND MOLYBDENUM 1/28 TI, 0.088 ZR (TZM) ARE THE TWO ALLOYS THAT HAVE BEEN UTILIZED TO DATE FOR DYNASOAR WORK. THE MAJORITY OF THE MATERIAL PROCURED THUS FAR IN THE PROGRAM HAS BEEN TM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-441 668

BOEING CO SEATTLE WASH

DYNA-SOAR STRUCTURAL DESIGN CRITERIA - AERO-SPACE

GROUND EQUIPMENT, (U)

NOV 61 28P ECKBLAD, DAVID M. I

REPT. NO. D2 6967

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

RELEASE OR ANNOUNCEMENT TO FOREIGN GOVERNMENTS OR THEIR NATIONALS IS NOT AUTHORIZED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*GROUND SUPPORT EQUIPMENT, BOOST GLIDE VEHICLES), (*BOOST GLIDE VEHICLES, GROUND SUPPORT EQUIPMENT), DESIGN, STRUCTURAL PROPERTIES, TRANSPORTATION, PRODUCTION, CHECKOUT PROCEDURES, LAUNCHING SITES, MECHANICAL PROPERTIES, ENVIRONMENT, LOAD DISTRIBUTION, HANDLING, SAFETY, MILITARY REQUIREMENTS, WEIGHT, COMPATIBILITY (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

THIS DOCUMENT CONTAINS THE STRUCTURAL DESIGN CRITERIA NECESSARY TO DESIGN THE AERO-SPACE GROUND EQUIPMENT (AGE) FOR THE DYNA-SOAR STEP I GLIDER, THE BOOSTER/GLIDER TRANSITION, AND THEIR COMPONENTS. THE AERO-SPACE GROUND EQUIPMENT CATEGORY INCLUDES ALL EQUIPMENT USED TO TRANSPORT, HANDLE, AND SERVICE THE GLIDER, THE BOOSTER/GLIDER TRANSITION, AND THEIR COMPONENTS. THIS DOCUMENT IS LIMITED TO INFORMATION REQUIRED TO DEFINE ENVIRONMENT, LOADS, AND MATERIAL ALLOWABLES NECESSARY FOR STRUCTURAL DESIGN OF AGE. IT ALSO PRESENTS REQUIREMENTS FOR STRUCTURAL SUBSTANTIATION OF AGE. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-440 731

BOEING CO SEATTLE WASH

COMMENTS ON HEAT TRANSFER TESTING EXPERIENCE GAINED

ON X-20 PROGRAM, (U)

DEC 63 31P GAZ, J. :

REPT. NO. D2 80949

CONTRACT: AF33 657 7132

MONITOR: IDEP 556 DD DD ODC6 01

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, HEAT TRANSFER),
(•HYPERSONIC WIND TUNNELS, HEAT TRANSFER), MODEL TESTS,
TEST FACILITIES, SELECTION, TURBULENT BOUNDARY LAYER,
DIGITAL SYSTEMS, RESEARCH PROGRAM ADMINISTRATION,
HYPERSONIC CHARACTERISTICS, PAINTS, THERMAL STRESSES,
OPTICAL COATINGS, MONITORS (U)
IDENTIFIERS: IDEP, X-20 SPACECRAFT (U)

THE COMMENTS IN THIS DOCUMENT RESULT FROM
EXPERIENCE GAINED BY CONDUCTING HEAT TRANSFER TESTS
ON DYNA SOAR (X-20- MODELS IN VARIOUS
HYPERSONIC AND HYPERVELOCITY TUNNELS OV R SEVERAL
YEARS. SUCH SUBJECTS AS PRE-TEST ANALYSIS,
TECHNICAL PLANNING, FACILITY CHOICE, AND MONITORING
TEST ARE DISCUSSED. THE CAPABILITIES OF NINE WIND
TUNNEL FACILITIES ARE COMPARED FROM THE STANDPOINT OF
HEAT TRANSFER TESTING. THE SUBJECTS OF HEAT SENSOR
LOCATION, THERMOCOUPLE SPOTWELDING, AND DATA
RECORDING ALSO ARE TREATED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-439 662

FRANKFORD ARSENAL PHILADELPHIA PA
PROPELLANT ACTUATED DEVICES.

(U)

DESCRIPTIVE NOTE: PROGRESS REPT., NOV-DEC 63.

DEC 63 86P

MONITOR: AFA 91 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•EXPLOSIVE ACTUATORS, ABSTRACTS),
(•PROPELLANTS, ABSTRACTS), (•CARTRIDGES (PAD),
ABSTRACTS), (•ABSTRACTS, SCIENTIFIC RESEARCH), SAFETY
DEVICES, ROCKET MOTORS (SOLID PROPELLANT), ROCKET MOTORS
(HYBRID PROPELLANT), DELAY ELEMENTS (EXPLOSIVE), FUZES.
(ORDNANCE), CATAPULTS, EJECTION, EJECTION SEALS,
AUTOMATION, BOMB EJECTORS, GAS GENERATING SYSTEMS, LIFE
RAFTS, AIR-SEA RESCUES, PARACHUTES, MANNED SPACECRAFT (U)
IDENTIFIERS: PROPELLANT ACTUATED DEVICES (PAD), MILD
DETONATING FUZE (MOF), X-20 SPACECRAFT (U)

CONTENTS: HIGH TEMPERATURE PROPELLANTS FOR
CREW ESCAPE SYSTEM ROCKETS; FEASIBILITY OF
A HYBRID ROCKET FOR CREW ESCAPE CAPSULE
APPLICATION; PROPELLANT ACTUATED DEVICES IN
SPACE ENVIRONMENT; CLOSE TOLERANCE DELAY;
ANCILLARY COMPONENTS FOR ESCAPE SYSTEMS;
MILD DETONATING FUSE (MOF); COMPONENTS FOR
ELECTRICALLY INITIATED ESCAPE SYSTEMS; CO-
AXIAL CATAPULT; TIME DELAY MECHANISM;
DYNA-SOAR TECHNICAL ASSISTANCE; XM18 GAS
GENERATOR; CHARACTERISTICS OF DYNAMIC SEALS,
SEALING MATERIALS, AND SEALING TECHNIQUES FOR
PAD; IMPROVED PROPELLANTS AND PRIMERS FOR
PAD APPLICATIONS; INVESTIGATION OF RECENTLY
DEVELOPED MATERIALS AND MANUFACTURING
TECHNIQUES FOR APPLICATION TO PAD;
IMPROVEMENT OF PAD TO ELIMINATE TOXIC
PROPELLANT GASES (2 REPORTS); MEDIUM
PERFORMANCE MINIATURE INITIATOR; DEVELOPMENT
OF BALLISTIC REEL; GUN LAUNCHED ROCKET;
ROCKET ALTITUDE SENSING AND THRUST
DIRECTION CONTROL; DEVELOPMENT OF TWENTY-
MAN LIFE RAFT INFLATOR; HEAVYDUTY
PYROTECHNIC DELAY REEFING LINE CUTTER; AND
BOMB EJECTOR CARTRIDGE FOR MAU-12/A BOMB
RACK. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-438 114

BOEING CO SEATTLE WASH
CERAMIC FIBER HIGH TEMPERATURE THERMAL INSULATION
DEVELOPMENT, (U)

NOV 62 37P PERKOWSKI, W. S. ;
REPT. NO. D2 80755
CONTRACT: AF33 657 7132
MONITOR: IDEP 501.44.15.00-C6-01

UNCLASSIFIED REPORT

AVAILABILITY: MICROFILM ONLY AFTER ORIGINAL COPIES
EXHAUSTED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CERAMIC FIBERS, THERMAL INSULATION),
(•THERMAL INSULATION, CERAMIC FIBERS), OXIDES, ALUMINUM
COMPOUNDS, SILICON COMPOUNDS, DIOXIDES, ZIRCONIUM
COMPOUNDS, HEAT-RESISTANT MATERIALS, YTTRIUM COMPOUNDS,
MANUFACTURING METHODS (U)

IDENTIFIERS: IDEP, ALUMINUM OXIDE, SILICON DIOXIDE,
ZIRCONIUM OXIDE, YTTRIUM OXIDE, X-20. SPACECRAFT (U)

THIS REPORT SUMMARIZES THE RESULTS OF DEVELOPMENT
WORK PURSUED TO PROVIDE A THERMAL INSULATION MATERIAL
FOR THE X-20 (DYNA-SOAR) VEHICLE BY EXPANDING
AND REFINING EXISTING BOEINGDEVELOPED PROCESSES FOR
FIBERING ALUMINA AND ZIRCONIA BY HYDROSOL EVAPORATION
TECHNIQUES. THE PHILOSOPHY USED IN THE DESIGN OF A
FIBERING APPARATUS IS PRESENTED, ALONG WITH THE
OPERATIONAL PROCEDURES EMPLOYED. THE RESULTS OF A
STATISTICAL STUDY OF THE PROCESS VARIABLES AFFECTING
BOTH QUANTITY AND QUALITY OF FIBERS PRODUCED ON THE
APPARATUS ARE DESCRIBED. SELECTED THERMAL AND
MECHANICAL PROPERTIES OF FIBROUS PRODUCTS ARE
PRESENTED, AND SOME COMPARISON OF SIMILAR MATERIALS
OBTAINED FROM OTHER COMPANIES IS MADE. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-435 189

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
CORROSION STUDIES OF ETHYLENE GLYCOL-WATER SOLUTIONS
INHIBITED IN ACCORDANCE WITH BOEING SOURCE CONTROL

DRAWING 10-20917, REV. G,

(U)

AUG 62 14P MASTERS, D. S. ; TANZA, G. F. ;

CRAWFORD, V. K. ;

REPT. NO. DS116R

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COOLING),
(•CORROSION, GLYCOLS), COOLING + VENTILATING
EQUIPMENT, HYDROGEN. LIQUID COOLED, WATER,
MATERIALS, HEAT EXCHANGERS, CORROSION INHIBITION,
ETHYLENES

(U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, TRIETHANOLAMINE
PHOSPHATE, SODIUM MERCAPTOBENZOTHIADIAZOLE, ETHYLENE
GLYCOL

(U)

THE INHIBITED ETHYLENE GLYCOL-WATER SOLUTION
CONTEMPLATED FOR USE IN THE HYDROGEN COOLING SYSTEM
OF THE X-20 DOES NOT INDUCE CORROSION ON OR ATTACK
ANY OF THE CONTEMPLATED MATERIALS WHICH WILL BE IN
CONTACT WITH THE ETHYLENE GLYCOL-WATER SOLUTION.
PURE NICKEL IS THE SINGLE MATERIAL THAT WAS SHOWN
TO BE UNSATISFACTORY FOR USE WITH THIS SOLUTION.
(AUTHOR)

(U)

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D15416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-435 128

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
HYDROGEN COOLING EQUIPMENTS BOEING X-20 (DYNASOAR)
SPACE GLIDER. (U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 16 FOR FEB
63.

MAR 63 ;V BUSCH, E. F. ;
REPT. NO. DS 154 R

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COOLING), (•COOLING
+ VENTILATING EQUIPMENT, HYDROGEN), SPACECRAFT CABINS,
GLYCOLS, PUMPS, TEMPERATURE, HYDROGEN, PRESSURE
REGULATORS, HEAT EXCHANGERS, COMPRESSORS, CHECK VALVES,
FANS, CRYOGENICS, HALOCARBON PLASTICS, PLASTIC SEALS,
SCHEDULING, TESTS, LIQUID COOLED (U)
IDENTIFIERS: 1963, TEFLON, X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AO-434 728

BOEING CO SEATTLE WASH
EVALUATION OF SATELLITE 19 HIGH TEMPERATURE BEARINGS,
(U)

APR 64 45P ARMSTRONG, C. S. ;
REPT. NO. 02 20418 1

UNCLASSIFIED REPORT
NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BALL BEARINGS, BOOST-GLIDE VEHICLES),
(•ELEVONS, BOOST-GLIDE VEHICLES), COBALT ALLOYS,
CHROMIUM ALLOYS, TUNGSTEN ALLOYS, ATTACHMENT, HALOCARBON
PLASTICS, SPECIFICATIONS, TESTS, ACCEPTABILITY,
PERFORMANCE (ENGINEERING), MECHANICAL PROPERTIES,
STAINLESS STEEL, SEALING COMPOUNDS, FRICTION, LIFE
EXPECTANCY, LOADING (MECHANICS), ABLATION, MISALIGNMENT,
NON-DESTRUCTIVE TESTING (U)
IDENTIFIERS: 1964, HAYNES STAR-J METAL, X-20
SPACECRAFT, TEFLON, HAYNES SATELLITE ALLOY NO. 19 (U)

NINETEEN, FOUR INCH BORE, TORQUE TUBE TYPE, HIGH
TEMPERATURE BALL BEARINGS WERE EVALUATED IN LOAD
SPECTRUM AND LIFE TESTS AT TEMPERATURES RANGING FROM
1000 TO 1700 F. THE BEARINGS, WHICH WERE
DESIGNED FOR THE INBOARD ELEVON HINGE OF THE X-20
VEHICLE, WERE CONSTRUCTED WITH RACES OF HAYNES
SATELLITE 19 AND HAD BALLS MADE OF HAYNES STAR
J METAL. IN ADDITION THEY WERE PROVIDED WITH
ABLATIVE SEALS CONSTRUCTED OF TEFLON AND STAINLESS
STEEL TO RETAIN MIL-L-7870 OIL AND TO PROTECT THE
BEARING FROM DIRT DURING NORMAL TEMPERATURE HANDLING.
SPHERICAL SECTIONS WERE INCLUDED IN THE BEARING
ASSEMBLY TO ALLOW SELF-ALIGNMENT. THESE BEARINGS
WERE EVALUATED IN THE BOEING UNIVERSAL BEARING
MACHINE AT RADIAL LOADS FROM 2000 TO 37,000 LB. AND
AN OSCILLATORY MOVEMENT OF ±10 DEGREES AT 20 CPM.
LIMIT LOADS WERE DETERMINED AT 1000, 1200, 1400,
1600 AND 1700 F AND LOAD LIFE CURVES WERE
ESTABLISHED AT 1000, 1400 AND 1700 F. THE BEARINGS
EXCEEDED X-20 DESIGN LOAD REQUIREMENTS WITHOUT
FRICTION COEFFICIENTS INCREASING TO OVER .1. THE
TEFLON SECTIONS OF THE ABLATIVE SEALS VAPORIZED
WITHOUT CAUSING ANY JAMMING OF THE BEARING. THE
STAINLESS STEEL SNAP RINGS IN THE SEAL ASSEMBLY WERE
CORRODED DUE TO THE DECOMPOSITION PRODUCTS OF THE
TEFLON. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 157

BOEING CO SEATTLE WASH

DYNA-SOAR MANUFACTURING PLAN,

(U)

DEC 63 343P WEEKS, L. K. ;

REPT. NO. D2 80715

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MANUFACTURING
METHODS), (*LAUNCH VEHICLES (AEROSPACE), MANUFACTURING
METHODS), MACHINE TOOLS, GUIDED MISSILE COMPONENTS,
PRODUCTION, PROCUREMENT, PROCESSING, MANAGEMENT
ENGINEERING, CONTROL, COSTS, CONFIGURATION, SCHEDULING,
QUALITY CONTROL, INSTALLATION, PERFORMANCE
(ENGINEERING), RELIABILITY, TEST FACILITIES, MACHINE
SHOP PRACTICE, RESEARCH PROGRAM ADMINISTRATION, GROUND
SUPPORT EQUIPMENT, DESIGN (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 119

CHANCE VOUGHT CORP DALLAS TEX

X-20 NOSE CAP TZM MOLYBDENUM FINAL MECHANICAL
PROPERTIES REPORT, (U)

NOV 63 62P

EDWARDS, R. G. ;

REPT. NO. 311 23

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,
SEATTLE, WASH. CONTRACT AF33 657 7132.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, NOSE CONES),
(*MOLYBDENUM ALLOYS, MECHANICAL PROPERTIES), TITANIUM
ALLOYS, ZIRCONIUM ALLOYS, TENSILE PROPERTIES, HIGH-
TEMPERATURE RESEARCH, MANNED SPACECRAFT, RESEARCH PL(A) (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, MOLYBDENUM ALLOY
TZM (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 D33

BOEING CO SEATTLE WASH

EMITTANCE IMPROVEMENT COATING DEVELOPMENT FOR
REFRACTORY ALLOYS, (U)

DEC 63 1V KERLEE, C. E. ;

REPT. NO. D2 81110

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, REFRACTORY
COATINGS), (•COATINGS, EMISSIVITY), SILICIDES,
MANNED SPACECRAFT, RESEARCH PLANES, MOLYBDENUM
ALLOYS, TITANIUM ALLOYS, ZIRCONIUM ALLOYS, NIOBIUM
ALLOYS, METAL COATINGS, NICKEL, CARBIDES,
TITANIUM COMPOUNDS, SILICON COMPOUNDS, COBALT,
CHROMIUM, OXIDATION, TEMPERATURE (U)

IDENTIFIERS: 1963, FLUIDIZED BED, X-20 SPACECRAFT,
MOLYBDENUM ALLOY TZM, MOLYBDENUM ALLOY D-5TI,
NIOBIUM ALLOY FS-82, NIOBIUM ALLOY D-36 (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 027

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYN-SOAR) ACCESSORY POWER UNIT. (U)

DESCRIPTIVE NOTE: MONTHLY STATUS REPT. 1-31 MAR 63.

MAR 63 1V

REPT. NO. DSR18

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AUXILIARY POWER PLANTS), GAS TURBINES, GAS TURBINE REGENERATORS, GEARS, COMBUSTION CHAMBERS, HYDRAULIC PRESSURE PUMPS, HEAT EXCHANGERS, VALVES, ELECTRONIC EQUIPMENT, CONTROL SYSTEMS, GENERATORS, TACHOMETERS, BY-PASS VALVES, COMBUSTION PRODUCTS, TEMPERATURE, RELIABILITY, THRUST, BEARINGS, CONTAINERS, TURBINE PARTS, GAS TURBINE BLADES, FAILURE (MECHANICS), BRAKES, TURBINES, PNEUMATIC VALVES (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 024

BOEING CO SEATTLE WASH

X-20 TRUSS INTERNAL LOADS CALCULATION PROCEDURE, (U)

MAR 64 114P GRISHAM, A. F. ;

REPT. NO. D2 81242

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AIRFRAMES),
STRUCTURES, DEFLECTION, MATHEMATICAL MODELS, WINGS,
BEAMS (STRUCTURAL), MECHANICAL PROPERTIES, MATRIX
ALGEBRA, ELASTICITY, LOAD DISTRIBUTION, SHEAR STRESSES,
STRESSES, AIRCRAFT PANELS, MOMENTS, LOADING
(MECHANICS) (U)
IDENTIFIERS: 1964, TORSION, X-20 SPACECRAFT (U)

THE APPROACH IS PRESENTED TO THE PROBLEM OF OBTAINING DEFLECTIONS AND INTERNAL LOADS FOR X-20 GLIDER TRUSS STRUCTURE SUBJECTED TO EXTERNAL LOADS AND THERMAL GRADIENTS. THE FORMULATION OF CLASSICAL STRUCTURAL ANALYSIS THEORY IN MATRIX ALGEBRA TERMINOLOGY IS DESCRIBED ALONG WITH METHODOLOGY DEVELOPED FOR APPLYING THE FORMULATION TO THE TRUSS STRUCTURE. INCLUDED IS A DISCUSSION OF (1) THE REPRESENTATION OF PHYSICAL AND GEOMETRIC PROPERTIES OF THE STRUCTURE IN MATRIX FORM; (2) EXECUTION OF FORMULATED MATRIX EQUATIONS; (3) TECHNIQUES FOR OPERATING WITH PARTITIONS OF MATRICES WHERE THE MATRICES ARE LARGER THAN PRESENT COMPUTER PROGRAMS CAN HANDLE; (4) CHECKS NECESSARY TO INSURE VALIDITY OF ALL SOLUTIONS OBTAINED; (5) USE OF UNIT LOAD SYSTEMS TO REDUCE COMPUTER EXPENSE AND PROVIDE AN ECONOMICAL TOOL FOR PARAMETER STUDIES; (6) CHOICE OF INPUT AND OUTPUT DATA FORMS AND FORMATS. THE DEFLECTIONS AND INTERNAL LOADS PROGRAM COUPLES DIRECTLY TO THE EXTERNAL LOADS PROGRAM SO THAT A CHECKED SOLUTION FOR ALL MEMBERS IN THE TRUSS IS OBTAINED DIRECTLY FROM EXTERNAL PRESSURE DATA WITHOUT REQUIREMENTS FOR ENGINEERING DIRECTION OR INPUTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 007

BOEING CO SEATTLE WASH

CRITERIA FOR GROUND TESTING AND EVALUATING THE TEST
RESULTS OF DYNA SOAR STRUCTURAL DEMONSTRATOR. NO. 4

NOSE CAP,

(U)

AUG 62 1V EDWARDS, R. G. ;

REPT. NO. 3 14000 2R45

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

AVAILABILITY: MICROFILM ONLY AFTER ORIGINAL COPIES
EXHAUSTED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, NOSE CONES),
(*NOSE CONES, MANNED SPACECRAFT), ENVIRONMENTAL TESTS,
PERFORMANCE (ENGINEERING), SIMULATION, GRAPHITE,
ZIRCONIUM COMPOUNDS, OXIDES, PINS (MECHANICAL), STYRENE
PLASTICS (U)

IDENTIFIERS: 1962, NOSE CAPS, X-20 SPACECRAFT,
ZIRCONIUM OXIDE (U)

THIS REPORT ESTABLISHES THE CRITERIA FOR GROUND
TESTING AND EVALUATING THE TEST RESULTS FOR THE NO.
4 STRUCTURAL DEMONSTRATOR NOSE CAP. THIS
IS A PART OF THE DYNA SOAR NOSE CAP
DEVELOPMENT PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 005

BELL AEROSYSTEMS CO BUFFALO N Y

REACTION CONTROL SYSTEM PROJECT X-20 (DYNA-SOAR) (U)

DESCRIPTIVE NOTE: PROGRAM STATUS REPT. 23 NOV-12 DEC
63.

DEC 63 15P

REPT. NO. 8233 933017

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,
SEATTLE, WASH.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, ATTITUDE CONTROL
SYSTEMS), (*ATTITUDE CONTROLS SYSTEMS, BOOST-GLIDE
VEHICLES), CONTROL JETS, THRUST, COMBUSTION CHAMBERS,
INSTALLATION, FUEL TANKS, RELIABILITY, PERFORMANCE
(ENGINEERING), WEIGHT, SPECIFICATIONS, ACCEPTABILITY,
SCHEDULING, HYDROGEN PEROXIDE, VALVES, PIPES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-434 ODD

BOEING CO SEATTLE WASH

DYNA SOAR NOSE CAP. THERMAL ANALYSIS OF THE NO. 4
STRUCTURAL DEMONSTRATOR. (U)

JUN 62 1V HENSEN, C. C. ; EDWARDS, R. G.

REPT. NO. 3 14000 2R39

PROJ: 3 14000 2R39

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, NOSE CONES), (•NOSE
CONES, TEMPERATURE), STRUCTURES, MATHEMATICAL ANALYSIS,
MANNED SPACECRAFT, RESEARCH PLANES, REFRACTORY
MATERIALS, HEAT SHIELDS, HEAT TRANSFER (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE MAXIMUM TEMPERATURES EXPERIENCED BY THE NO. 4
STRUCTURAL DEMONSTRATOR NOSE CAP ASSEMBLY ARE
AS FOLLOWS: MAXIMUM TEMPERATURE ON THE HEAT SHIELD
WAS 2362 F AND OCCURED ON THE FORWARD MOLYBDENUM
FACE AT 57 MIN. AFTER START OF RE-ENTRY FOR THE
EQUILIBRIUM GLIDE MISSION. THE REAR FACE
MAXIMUM WAS 1800 F. IN THE MOLYBDENUM RING AND
CLAMP THE MAXIMUM TEMPERATURE WAS COMPUTED AS 2008
F. THIS OCCURRED 56.0 MIN. AFTER START OF RE-ENTRY
FRO THE EQUILIBRIUM GLIDE RE-ENTRY MISSION.
MAXIMUM LUG TEMPERATURE WAS 1880 F. THIS IS
REPRESENTATIVE OF THE MAXIMUM TEMPERATURES EXPECTED
FOR THE RENE' TRUSS ATTACHMENTS. (AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 993

CHANCE VOUGHT CORP DALLAS TEX
VERIFICATION TEST PLAN FULL SCALE X-20 NOSE CAP
ASSEMBLIES, X-20 (DYNA SOAR) NOSE CAP, (U)
JUN 63 1V ALVIS, E. P. ;
REPT. NO. 3 14000 3R28 REV. A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,
SEATTLE, WASH., CONTRACT AF33 657 7132.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, NOSE CONES), (•NOSE
CONES, ENVIRONMENTAL TESTS), (•ENVIRONMENTAL TESTS,
SIMULATION), MANNED SPACECRAFT, GRAPHITE, ZIRCONIUM
COMPOUNDS, OXIDES, PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, NOSE CAPS,
ZIRCONIUM OXIDE (U)

ENVIRONMENTAL TESTING AS SPECIFIED IN THIS TEST
PLAN IS A CONTINUATION OF THE DYNA SOAR NOSE
CAP DEVELOPMENT PROGRAM. THE ENVIRONMENTAL
TESTING PRESENTED IN THIS TEST PLAN IS INTENDED TO
DEMONSTRATE THE CAPABILITY OF FULL SCALE VERIFICATION
NOSE CAP ASSEMBLIES TO WITHSTAND THE ANTICIPATED
MAXIMUM FLIGHT ENVIRONMENTS OF ONE X-20 FLIGHT.

IN ADDITION, THE ANTICIPATED HUMIDITY AND LOW
TEMPERATURE CONDITIONS DURING SHIPMENT WILL BE
SIMULATED ON ONE NOSE CAP. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 990

BOEING CO SEATTLE WASH

LAUNCH CONTROL EQUIPMENT BREADBOARD DEVELOPMENT

PROGRAM,

(U)

MAR 64

BSP

SHAWVER, G. E. ;

REPT. NO. D2 81073

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (•GROUND SUPPORT EQUIPMENT,
INSTRUMENTATION), (•LAUNCHING SITES, INSTRUMENTATION),
CONTROL SYSTEMS, MONITORS, DISPLAY SYSTEMS, CONTROL
SIMULATORS, LIQUIFIED GASES, NITROGEN, HYDROGEN,
MAINTENANCE, LAUNCHING, ELECTRONIC EQUIPMENT, CHECKOUT
EQUIPMENT, CONTROL PANELS, TRANSPORTATION (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, LAUNCH CONTROL
EQUIPMENT (U)

UNCLASSIFIED

D15416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 988

BOEING CO SEATTLE WASH
CRYOGENIC DIAPHRAGM MATERIAL DEVELOPMENT, (U)
63 37P HOLMES, HENRY ;

REPT. NO. D2 80286
CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, FUEL TANKS),
(•DIAPHRAGMS (MECHANICS), CRYOGENICS), INFLATABLE
STRUCTURES, LIQUEFIED GASES, HALOCARBON PLASTICS,
LAMINATES, LAMINATED PLASTICS, MANNED SPACECRAFT,
RESEARCH PLANES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, EXPULSION
BLADDERS (U)

THIS REPORT COVERS THE WORK ACCOMPLISHED UNDER THE
DYNA-SOAR PROGRAM IN THE MATERIALS EVALUATION OF
CRYOGENIC DIAPHRAGMS. THE MAJORITY OF WORK
PERFORMED WAS CENTERED AROUND TESTING OF VARIOUS
TEFLON LAMINATE CONFIGURATIONS AND THE VARIABLES OF
FABRICATING THE LAMINATES. FLEX LIFE AT CRYOGENIC
TEMPERATURES AND PERMEABILITY WERE ESTABLISHED AS THE
TWO MAIN CRITERIA POINTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 941

CHANCE VOUGHT CORP DALLAS TEX
DYNA-SOAR HETS NOSE CONE STRUCTURAL DESIGN DATA AND
MATERIALS ALLOWABLES TEST PLAN, (U)
FEB 64 12P BAYLOR, R. N. ;
REPT. NO. AST EOR12863 ,AST311 3 REV. B

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,
SEATTLE, WASHINGTON. CONTRACT AF33 657 7132.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, NOSE CONES), (*NOSE
CONES, MATERIALS), STRUCTURES, MATHEMATICAL ANALYSIS,
DESIGN, TESTS, DOCUMENTATION, INDEXES, TABLES, MANNED
SPACECRAFT, RESEARCH PLANE, MECHANICAL PROPERTIES,
MOLYBDENUM ALLOYS, TITANIUM ALLOYS, ZIRCONIUM ALLOYS,
GRAPHITE, ZIRCONIUM COMPOUNDS, ALUMINUM COMPOUNDS,
OXIDES (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, MOLYBDENUM ALLOY (U)
T2M

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 937

CHANCE VOUGHT CORP DALLAS TEX

X-20 (DYNA SOAR) NOSE CAP HYPER THERMAL TEST

APPARATUS, DESCRIPTIVE REPORT, (U)

DEC 63 26P GOODNIGHT, F. H. ;

REPT. NO. 311 11

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MANNED SPACECRAFT, NOSE CONES), (*NOSE CONES, MANNED SPACECRAFT), TEST FACILITIES, HEATERS, REENTRY VEHICLES, HEAT, OXIDATION, FLAMES, HEAT TRANSFER, HEAT SHIELDS, TEMPERATURE, MEASURING DEVICES (ELECTRICAL + ELECTRONIC) (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

A HYPER THERMAL TEST APPARATUS WAS CONSTRUCTED AS A TOOL FOR USE IN DEMONSTRATING THE INTEGRITY OF THE X-20 (DYNA SOAR) NOSE CAP. THE APPARATUS PRODUCES REALISTIC SIMULATION OF X-20 RE-ENTRY THERMAL ENVORONMENTS FOR ENVIRONMENTAL TESTING. SIMULATED RE-ENTRY HEAT FLUXES ARE SUPPLIED BY CONVECTION HEATING AND BY A RADIATION SHROUD WHICH LIMITS THE HEAT RADIATED AWAY BY THE SPECIMEN. CONVECTION HEATING IS SUPPLIED BY THE PRODUCTS OF COMBUSTION OF OXYGEN AND PROPANE. HEATING RATES ARE CONTROLLED BY A VARIABLE FLAME TEMPERATURE TO REPRODUCE THE TIME VARIATION OF NOSE CAP TEMPERATURES THAT WILL BE EXPERIENCED BY THE FLIGHT ARTICLE. ACOUSTIC AND BOUNDARY LAYER OXIDATION ENVORONMENTS ARE ALSO SIMULATED. THE BURNER HAS BEEN IN OPERATION SINCE JULY 1962 AND HAS MET ALL DESIGN OBJECTIVES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 935

BOEING CO SEATTLE WASH

CONVERSION AND STORAGE EQUIPMENT-TEST INSTRUMENTATION

SUBSYSTEM, GLIDER.

(U)

AUG 61 135P

REPT. NO. 10 81003

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, INSTRUMENTATION),
MANNED SPACECRAFT, ELECTRONIC EQUIPMENT,
SPECIFICATIONS, TEST EQUIPMENT, DATA PROCESSING SYSTEMS,
DATA STORAGE SYSTEMS, DATA TRANSMISSION SYSTEMS,
PHOTOGRAPHIC RECONNAISSANCE, TRANSDUCERS, TEST METHODS,
TELEMETER SYSTEMS, RESEARCH PROGRAM ADMINISTRATION (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 932

SUNDSTRAND AVIATION-DENVER COLO

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST

STATUS,

(U)

APR 62 68P RAND, L. T. ;

REPT. NO. 6DSR,6

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), TURBINE WHEELS, GAS TURBINES, SCHEDULING,
VIBRATION, EXCITATION, METALS, GEARS, CONTAINERS, TESTS,
COMBUSTION CHAMBER, CATALYST, VALVES, GENERATORS,
TACHOMETERS, VIBRATION, TURBINES, HYDRAULIC PRESSURE
PUMPS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 93D

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
STATUS OF THE HYDROGEN COOLING EQUIPMENT X-20 (DYNA-
SOAR) AS OF THE STOP WORK ORDER DATE DECEMBER 15,

1963,

JAN 64 73P CHASE, A. B. I

(U)

REPT. NO. DS252

UNCLASSIFIED REPORT

NOTICE: FOR REFERENCE ONLY AT EACH OF THE DDC
OFFICES. THIS REPORT CANNOT BE SATISFAC-TORILY
REPRODUCED: (COPIES NOT SUPPLIED BY DDC)

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COOLING + VENTILATING EQUIPMENT, MANNED
SPACECRAFT), (*RESEARCH PLANES, COOLING + VENTILATING
EQUIPMENT), (*HYDROGEN, COOLING + VENTILATING
EQUIPMENT), BOOST-GLIDE VEHICLES, DESIGN, GLYCOLS,
HYDRAULIC FLUIDS, DIGITAL SYSTEMS, RELIABILITY,
SPACECRAFT CABINS, CRYOGENICS, CONTROL SYSTEMS, OXYGEN,
NITROGEN, INDEXES, RESEARCH PROGRAM ADMINISTRATION (U)
IDENTIFIERS: X-20 SPACECRAFT, 1963 (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 927

SUNDSTRAND AVIATION-DENVER COLO

ACCESSORY POWER UNIT FOR X-20 (DYNA-SOAR). (U)

JAN 63 99P

REPT. NO. DSR14 15

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), (•AUXILIARY POWER PLANTS, BOOST-GLIDE
VEHICLES), (•ELECTRIC POWER PRODUCTION, BOOST-GLIDE
VEHICLES), MANNED SPACECRAFT, RESEARCH PLANES, BEARINGS,
GEARS, COMBUSTION CHAMBERS, VALVES, CIRCUITS, CONTROL
SYSTEMS, HYDRAULIC PRESSURE PUMPS, TURBINE WHEELS,
HEATERS, LUBRICATION, CATALYSTS, HYDROGEN, OXYGEN (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 925

LING-TEMCO-VOUGHT INC DALLAS TEX

GRAPHITE FINAL MECHANICAL PROPERTIES REPORT, (U)

NOV 63 1V EDWARDS, R. G. I

REPT. NO. 311 24

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,

SEATTLE, WASH., CONTRACT AF33 657 7132.

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, NOSE CONES), (*NOSE
CONES, MANNED SPACECRAFT), GRAPHITE, MECHANICAL
PROPERTIES, PERFORMANCE (ENGINEERING), COATINGS, SILICON
PLASTICS, MOISTUREPROOFING, DEFORMATION, ELASTICITY,
RESEARCH PLANES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, NOSE CAPS (U)

THE PURPOSE OF THE TESTS REPORTED WAS TO ESTABLISH
THE FINAL DESIGN MECHANICAL PROPERTIES OF RT0029
(RVC) GRAPHITE FOR USE IN THE FINAL STRESS ANALYSIS
OF THE X-20 NOSE CAP GRAPHITE STRUCTURAL SHELL.

(AUTHOR)

(U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 923

BOEING CO SEATTLE WASH

FABRICATION OF MOLYBDENUM ALLOYS, (U)

DEC 63 IV ELROD, S. D. ;

REPT. NO. D2 80273

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, MOLYBDENUM ALLOYS),
(*MOLYBDENUM ALLOYS, MATERIAL FORMING), MANNED
SPACECRAFT, RESEARCH PLANES, REFRACTORY COATINGS,
MACHINING, HEAT TREATMENT, MECHANICAL PROPERTIES,
WELDING, THERMAL JOINING, ARC WELDING, ELECTRON BEAMS,
TITANIUM ALLOYS, ZIRCONIUM ALLOYS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, MOLYBDENUM ALLOY
TZM (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 864

SUNDSTRAND AVIATION-DENVER PACOIMA CALIF

ACCESSORY POWER UNIT FOR X-20(DYNA-50AR).

(U)

DESCRIPTIVE NOTE: MONTHLY STATUS REPT. 1-30 APR 63.

MAY 63 180P

REPT. NO. DSR19

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER PLANTS), MANNED SPACECRAFT, GEARS, COMBUSTION CHAMBERS, ROCKET MOTORS (LIQUID PROPELLANT), CATALYSTS, PALLADIUM, CAPTIVE TESTS, HEAT EXCHANGERS, VALVES, OXYGEN, HYDROGEN, ELECTRONIC EQUIPMENT, GAS TURBINES, CONTROL SYSTEMS, TEMPERATURE CONTROL, PRESSURE, RESEARCH PROGRAM ADMINISTRATION, RELIABILITY, QUALITY CONTROL, TESTS, SERVOMECHANISMS, TRANSDUCERS

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 824

WESTINGHOUSE ELECTRIC CORP LIMA OHIO

X-20 DYNA-SOAR GLIDER.

(U)

DESCRIPTIVE NOTE: QUALIFICATION TEST STATUS REPT. FOR
PERIOD ENDING 12 DEC 63.

DEC 63 1V

REPT. NO. 14

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MANNED SPACECRAFT, ELECTRIC POWER
PRODUCTION), (•ELECTRIC POWER PRODUCTION, GENERATORS),
(•GENERATORS, MANNED SPACECRAFT), BOOST-GLIDE VEHICLES,
VOLTAGE REGULATORS, TRANSFORMERS, PERFORMANCE
(ENGINEERING), ELECTRICAL PROPERTIES, TABLES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 822

TRW INC CLEVELAND OHIO

DESIGN DEVELOPMENT TEST STATUS REPORT FOR REACTION
CONTROL POWER COMPONENT. (U)

DESCRIPTIVE NOTE: MONTHLY DESIGN DEVELOPMENT TESTING
STATUS REPT. NO. 4 FOR PERIOD ENDING FEB 62,

MAR 62 24P MONASTRA, J. C. ; RICHARDS, R.

E. ; KUBICA, A. J. ;

REPT. NO. ER4700 4

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•THRUST VECTOR CONTROL SYSTEMS, CONTROL
JETS), (•PNEUMATIC VALVES, PERFORMANCE (ENGINEERING)),
LIQUID ROCKET PROPELLANTS, HYDROGEN, OXYGEN,
COMPATIBILITY, BI-PROPELLANTS, OPERATION, IGNITION,
NITROGEN, GAS GENERATING SYSTEMS, ROCKET MOTORS (LIQUID
PROPELLANT), COMBUSTION CHAMBERS, VALVES, FLIGHT CONTROL
SYSTEMS, BOOST-GLIDE VEHICLES (U)

IDENTIFIERS: 1962, REACTION CONTROL SYSTEMS, X-20
SPACECRAFT (U)

TESTING WAS PERFORMED ON THE BREADBOARD COMBUSTOR
ASSEMBLY, THE BREADBOARD RIGHT ROLL THRUST CONTROL
VALVE ASSEMBLY, THE BREADBOARD CONTROL BOX, THE
BREADBOARD PILOT CONTROL VALVE, AND THE BI-PROPELLANT
CHAMBER PRESSURE CONTROL VALVE. IGNITION OF THE
MAIN PROPELLANTS WITH THE PILOT CONCEPT WAS REALIZED
WITH BOTH THE LIQUID AND THE GASEOUS CONCENTRIC
INJECTOR DESIGNS. MAIN OXYGEN INJECTOR BURNOUTS
APPEAR TO BE A RESULT OF HIGH O/F RATIOS AT THE
OXYGEN INJECTOR BECAUSE OF THE LARGE OXYGEN FLOW
BEING INTRODUCED AT ONE POINT. TESTS OF ALTERNATE
DESIGNS ARE IN PROGRESS. THE COMPATIBILITY OF THE
PILOT CONTROL VALVE AMPLIFIER AND THE PILOT CONTROL
VALVE TORQUE MOTOR HAS BEEN ESTABLISHED. TESTING
OF THE BI-PROPELLANT VALVE IN AN EQUIVALENT NITROGEN
ANALOG OF THE RCPC SYSTEM HAS BEEN COMPLETED AND
HAS VERIFIED THE VALVE RESPONSE. THE HYDROGEN AND
OXYGEN VALVE OPENING OCCURS SIMULTANEOUSLY IN LESS
THAN A MILLISECOND AND CLOSURES IN LESS THAN 3
MILLISECONDS WITH A 6 TO 8 MILLISECOND HYDROGEN VALVE
OVERRIDE. (AUTHOR) (U)

UNCLASSIFIED

D15416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-433 572

BOEING CO SEATTLE WASH

DEVELOPMENT PROGRAMS, THERMAL INSULATIONS, X-20, (U)

DEC 63 182P OTTESTAD, D. J. IPERKOWSKI, W.

S. I

REPT. NO. D2 80283

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, THERMAL
INSULATION), (•THERMAL INSULATION, CERAMIC FIBERS),
MANNED SPACECRAFT, RESEARCH PLANES, SILICON COMPOUNDS,
ALUMINUM COMPOUNDS, ZIRCONIUM COMPOUNDS, OXIDES, FOILS,
ALUMINUM, PAPER, GLASS TEXTILES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 569

BOEING CO SEATTLE WASH
HYDROGEN COOLING EQUIPMENTS - INTEGRATED HYDROGEN
COOLING AND SECONDARY POWER SUBSYSTEM.

(U)

APR 62 97P

REPT. NO. 10 20917L

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (+COOLING + VENTILATING EQUIPMENT, MANNED
SPACECRAFT), (+RESEARCH PLANES, COOLING + VENTILATING
EQUIPMENT), (+HYDROGEN, CRYOGENICS), (+BOOST-GLIDE
VEHICLES, COOLING + VENTILATING EQUIPMENT), LIQUEFIED
GASES, SPECIFICATIONS, WATER, GLYCOLS, FLUID FLOW,
VIBRATION, ACCELERATION, PERFORMANCE (ENGINEERING),
SPACECRAFT CABINS, NITROGEN, OXYGEN, HYDRAULIC FLUIDS,
DESIGN (U)

IDENTIFIERS: X-20 SPACECRAFT, 1962 (U)

THIS SPECIFICATION COVERS THE DESIGN, DEVELOPMENT,
PERFORMANCE, AND TESTING REQUIREMENTS FOR THE
HYDROGEN COOLING EQUIPMENTS PORTION OF THE
INTEGRATED HYDROGEN COOLING AND SECONDARY POWER
EQUIPMENTS FOR THE DYNA-SOAR. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 566

BOEING CO SEATTLE WASH

NITROGEN PURGE EQUIPMENT, FIRE PROTECTION AND SAFETY
SUBSYSTEM, (U)

MAR 63 IV BURKE, N. K. , JR. :

REPT. NO. 10 81170A

CONTRACT: AF33.657 7132

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•FIRE SAFETY, SAFETY DEVICES), (•SAFETY
DEVICES, FIRE SAFETY), FIRE CONTROL SYSTEMS, DESIGN,
SPECIFICATIONS, NITROGEN, LIQUIFIED GASES (U)

IDENTIFIERS: NITROGEN PURGE EQUIPMENT, 1963, FIRE
PROTECTION, X-20 GLIDER (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 563

BOEING CO SEATTLE WASH

ANALOG COMPUTER SIMULATION OF THE DYNA-SOAR GLIDER
INTEGRATED ENVIRONMENTAL CONTROL AND SECONDARY POWER
SUBSYSTEMS, VOLUME I. (U)

MAR 63 1V MASTERMAN, R. J. ;

REPT. NO. D2 8001 3 VOL. 1

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, MODELS
{SIMULATION}), MANNED SPACECRAFT, AUXILIARY POWER
PLANTS, SPACE ENVIRONMENTAL CONDITIONS, CLOSED-CYCLE
ECOLOGICAL SYSTEMS, CONTROLLED ATMOSPHERES, TEMPERATURE
CONTROL, DESIGN, COMPATIBILITY, EFFECTIVENESS,
PERFORMANCE (ENGINEERING), MATHEMATICAL MODELS, ANALOG
COMPUTERS, MATHEMATICAL PREDICTION, ROCKET MOTORS
(LIQUID PROPELLANT), LIQUID ROCKET PROPELLANTS, PRESSURE
REGULATORS, HYDROGEN, OXYGEN, COOLANTS, GLYCOLS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE PERFORMANCE OF THE NOVEMBER 1962 CONFIGURA
TION OF THE DYNA-SOAR GLIDER INTEGRATED
ENVIRONMENTAL CONTROL AND SECONDARY POWER SUBSYSTEMS,
AS DETERMINED BY ANALOG COMPUTER SIMULATION, IS
REPORTED IN THIS DOCUMENT. THE PERFORMANCE OF THE
INTEGRATED SUBSYSTEMS IS SHOWN FOR MANY REALISTIC
OPERATING CONDITIONS BY MEANS OF ANALOG COMPUTER
DATA, AND AN ANALYSIS OF THESE COMPUTER DATA IS
GIVEN. ATTENTION IS GIVEN TO SUBSYSTEM PERFORMANCE
DEFICIENCIES, AND DESIGN IMPROVEMENTS ARE
RECOMMENDED. (AUTHOR) (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 561

BOEING CO SEATTLE WASH

ANALOG COMPUTER SIMULATION OF THE DYNA-SOAR GLIDER
INTEGRATED ENVIRONMENTAL CONTROL AND SECONDARY POWER
SUBSYSTEMS, (U)

MAR 63 315P CRAVENS, E. W. ;

REPT. NO. D2 800013 VOL 3

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (+BOOST-GLIDE VEHICLES, MODELS
(SIMULATION)), MANNED SPACECRAFT, AUXILIARY POWER
PLANTS, SPACE ENVIRONMENTAL CONDITIONS, CLOSED-CYCLE
ECOLOGICAL SYSTEMS, CONTROLLED ATMOSPHERES, MATHEMATICAL
MODELS, ANALOG SYSTEMS, ANALOG COMPUTERS, MATHEMATICAL
PREDICTION, PERFORMANCE (ENGINEERING), LAUNCHING,
ORBITAL TRAJECTORIES, LANDINGS, SIMULATION, EXPERIMENTAL
DATA, TABLES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, GRAPHS (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 283

BOEING CO SEATTLE WASH

SPECIFICATION, CHARACTERISTICS OF GLIDER ELECTRIC
POWER AND GENERAL REQUIREMENTS FOR LOAD EQUIPMENT, (U)

DEC 63 29P STINEMAN, R. W. I

REPT. NO. D2 7391

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, POWER SUPPLIES),
(*POWER SUPPLIES, SPECIFICATIONS), MANNED SPACECRAFT,
RESEARCH PLANES, ELECTRICAL PROPERTIES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY. SEARCH CONTROL NO. 015416

AD-433 273

BOEING CO SEATTLE WASH

DEVELOPMENTAL TEST REPORT - ELECTRICAL POWER

DISTRIBUTION SYSTEM (EWA 3-289), (U)

DEC 63 SISP SMITH,STEPHEN.B. ;

REPT. NO. D2 81050

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, POWER EQUIPMENT),

(*ELECTRIC POWER PRODUCTION, MANNED SPACECRAFT),

ELECTRICAL ENGINEERING, RESEARCH PLANES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 269

BOEING CO SEATTLE WASH

HYDRAULIC FLUID EVALUATION TESTS, (U)

DEC 63 109P STEVENS, W. R. ;

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HYDRAULIC FLUIDS, BOOST-GLIDE VEHICLES),
(*BOOST-GLIDE VEHICLES, HYDRAULIC FLUIDS), HYDRAULIC
SYSTEMS, HIGH-PRESSURE RESEARCH, HIGH-TEMPERATURE
RESEARCH, VISCOSITY, FLAMMABILITY, VOLUME, SHEAR
STRESSES, MECHANICAL PROPERTIES, NOMOGRAPHS, TEST
METHODS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, HYDRAULIC FLUID
MLO-8200, HYDRAULIC FLUID MLO-60-294, HYDRAULIC FLUID
MLO-7277 (U)

HYDRAULIC FLUIDS WERE EVALUATED UNDER CONDITIONS
SIMULATING THOSE TO BE ENCOUNTERED IN THE GLIDER
HYDRAULIC SYSTEM. HYDRAULIC FLUIDS MLO-8200,
MLO-60-294, AND MLO-7277 WERE EVALUATED ON A
COMPARATIVE BASIS WITH RESPECT TO THE EFFECT OF 50
HOURS OF PUMPING WITH A SHEARING ORIFICE IN A 400 F
AREA. FLUID PARAMETERS INCLUDING BULK MODULUS,
LUBRICITY, VISCOSITY, AND FLAMMABILITY WERE
DETERMINED. THE FLUIDS TESTED SHOWED NO
SIGNIFICANT DETERIORATION OF FLUID PROPERTIES AND
WERE IN SATISFACTORY CONDITION FOR FUTURE USE.
ORONITE MLO-8200 FLUID VISCOSITY DECREASED 16%
OVER THE 50-HOUR PERIOD BUT THE TREND INDICATED THE
FLUID MAY BE USED CONSIDERABLY LONGER BEFORE A
LIMITING HIGH TEMPERATURE VISCOSITY IS REACHED.
EVALUATION OF THE PRESSURE-VOLUME-TEMPERATURE
BEHAVIOR OF THE FLUIDS DISCLOSED NO SIGNIFICANT
CHANGE IN THE FLUID BULK MODULUS DUE TO 50 HOURS OF
SHEARING AT 400 F. MLO-7277 HYDRAULIC FLUID HAD
THE HIGHEST BULK MODULUS OF THE FLUIDS TESTED BY
APPROXIMATELY 10%. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 267

BOEING CO SEATTLE WASH

SIGNAL DATA CONVERTER QUALIFICATION TEST PROGRAM AND
TEST SET, (U)

DEC 63 122P ANDERSON, GLEEN H. ;

BURLINGAME, J. W. ;

REPT. NO. D2 81052

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TELEMETER SYSTEMS, MANNED SPACECRAFT),
(•ELECTRONIC EQUIPMENT, MANNED SPACECRAFT),
(•PROGRAMMING (COMPUTERS), MANNED SPACECRAFT), BOOST-
GLIDE VEHICLES, RESEARCH PLANES, VELOCITY, ANALOG
COMPDT91-3-C6A5A30G CONVERTERS, ERRORS, CORRECTIONS,
TESTS, AUTOMATIC, TELEMETERING DATA (U)

IDENTIFIERS: VERDAN COMPDTER, SIGNAL DATA CONVERTER,
X-20 SPACECRAFT, 1963 (U)

THE PROGRAMS PRESENTED IN THIS REPORT ALLOW THE
VERDAN COMPUTER TO PERFORM AUTOMATIC TESTS OF THE
SIGNAL DATA CONVERTER (SDC) WITH A MINIMUM
AMOUNT OF ATTENTION FROM THE OPERATOR. THE TEST
PROGRAMS ARE DESIGNED TO BE USED WHEN A CONSIDERABLE
PORTION OF THE SDC IS WORKING PROPERLY.

APPLICATIONS FOR THESE TESTS INCLUDE LOCATING
INTERMITTENT FAILURES, CONTINUOUS TESTING DURING
ENVIRONMENTAL TESTS, CHECK AFTER REPAIRS, OR AS A
FINAL ACCEPTANCE TEST. THE TESTER IS AUTOMATICALLY
CONTROLLED FROM THE COMPUTER, REQUIRING NO ATTENTION
FROM THE OPERATOR. THE TEST CHASSIS CONTAINS
CIRCUITRY WHICH PROVIDES TIME SYNCHRONIZATION BETWEEN
THE SDC AND THE COMPUTER FOR THE TESTS, SCALES
SELECTED DATA FROM THE SDC, AND PROVIDES BUFFER
STORAGE FOR THESE DATA WHEN NECESSARY. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 265

BOEING CO SEATTLE WASH

QUALIFICATION TEST PROCEDURES FOR PNEUMATIC TUBING,
FITTINGS, FLEXIBLE HOSE, AND CLAMPS, (U)

DEC 63 40P PHELPS, V. J. ;

REPT. NO. D2 80779 2

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•PIPES, TEST METHODS), (•FITTINGS, TEST
METHOOS), (•HOSES, TEST METHODS), (•MECHANICAL
FASTENERS, TEST METHODS), HIGH PRESSURE RESEARCH,
VIBRATION, PNEUMATIC SYSTEMS, BOOST-GLIDE VEHICLES,
MANNED SPACECRAFT, RESEARCH PLANES, HEAT SHIELDS,
LANDING GEAR, LOW TEMPERATURE RESEARCH, ENVIRONMENTAL
TESTS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

QUALIFICATION TEST PROCEDURES FOR PNEUMATIC TUBING,
FITTINGS, FLEXIBLE HOSE, AND CLAMPS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 262

BOEING CO SEATTLE WASH
MATERIAL DEVELOPMENT PROGRAM, BOEING NOSECAP, X-20,

(U)

JAN 64 83P BRESLICH, F. N., JR.; BURNS,

C. D. ;

REPT. NO. D2 80287

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, NOSE CONES),
(•NOSE CONES, REFRACTORY MATERIALS), MANNED
SPACECRAFT, OXIDES, HAFNIUM COMPOUNDS, THORIUM
COMPOUNDS, REINFORCING MATERIALS, PLATINUM ALLOYS,
RHODIUM ALLOYS, MATERIAL FORMING, HONEYCOMB CORES,
CERAMIC MATERIALS, ZIRCONIUM OXIDES

(U)

IDENTIFIERS: X-20 SPACECRAFT, NOSE CAPS, HAFNIUM
OXIDE, THORIUM DIOXIDE

(U)

PRELIMINARY SCREENING INDICATED THAT HAFNIA,
ZIRCONIA, AND THORIA ALL PROVIDED THE CHEMICAL
CHARACTERISTICS AND THERMAL CAPABILITY TO WITHSTAND
THE ENVIRONMENT OF THE X-20A NOSE CAP.
ADVANTAGES IN AVAILABILITY, DENSITY, AND GENERAL
STATE -OF-THE-ART DICTATED THAT THE MAJOR EFFORT BE
SPENT ON ZIRCONIA, AND AFTER THE COMPLETION OF
PRELIMINARY STUDIES THE HAFNIA AND THORIA EFFORTS
WERE TERMINATED. ALL DESIGN CONCEPTS CONSIDERED
FOR THE X-20A NOSE CAP INCLUDED REINFORCEMENT OF
THE OXIDE PHASE WITH A METALLIC SYSTEM; SCREENING AND
PRELIMINARY PERFORMANCE TESTS INDICATED THAT
OXIDATION PROBLEMS ASSOCIATED WITH THE REFRACTORY
METALS PRECLUDED THEIR CONSIDERATION. THE NOBLE
METALS PROVIDED THE REQUIRED RESISTANCE TO OXIDATION
AND NON-REACTIVITY WITH ZIRCONIA; PLATINUM, RHODIUM,
AND IRIDIUM HAVE SUFFICIENTLY HIGH MELTING POINTS AND
STRENGTH AT TEMPERATURES EXPECTED TO BE ENCOUNTERED.
THE FINAL MATERIAL, PLATINUM-13% RHODIUM,
COMBINES SUFFICIENTLY HIGH MELTING POINT WITH
ADEQUATE FORMABILITY TO ALLOW THE SEVERE DEFORMATIONS
REQUIRED TO FABRICATE THE REINFORCEMENT STRUCTURES.
(AUTHOR)

(U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 259

BOEING CO SEATTLE WASH

HEAT TREATMENT OF RENE® 41, (U)

JAN 64 38P STEWART, R. E. ;

REPT. NO. D2 80277

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NICKEL ALLOYS, HEAT TREATMENT),

(*MATERIALS FORMING, NICKEL ALLOYS), BOOSTGLIDE

VEHICLES, MANNED SPACECRAFT, RESEARCH PLANES, CHROMIUM

ALLOYS, COBALT ALLOYS, AGING (MATERIALS), MECHANICAL

PROPERTIES, COLD WORKING, HIGH-TEMPERATURE RESEARCH,

TENSILE PROPERTIES (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, RENE® 41

{ALLOY} (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-433 117

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM
OPERATION AND MAINTENANCE INSTRUCTIONS. (U)

MAR 64 1V

REPT. NO. 1179MIB VOL. 2

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), INSTRUCTION MANUALS,
OPERATION, MAINTENANCE, CALIBRATION, TEST EQUIPMENT,
MEASUREMENT, ELECTRONIC EQUIPMENT, GROUND SUPPORT
EQUIPMENT, CONTROL SYSTEMS, MALFUNCTIONS, POWER
SUPPLIES, MONITORS, VOLTMETERS, AMPLIFIERS,
ACCELEROMETERS, GYROSCOPES, DETECTORS, VOLTAGE
REGULATORS, OSCILLOSCOPES, CHECKOUT EQUIPMENT, DIGITAL
COMPUTERS, CONTAINERS, HANDLING, PACKING MATERIALS,
STORAGE, RADIO INTERFERENCE, MANNED SPACECRAFT, RESEARCH
PLANES (U)

IDENTIFIERS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), INSTRUCTION
MANUALS, OPERATION, MAINTENANCE, CALIBRATION,
TEST EQUIPMENT, MEASUREMENT, ELECTRONIC EQUIPMENT,
GROUND SUPPORT EQUIPMENT, CONTROL SYSTEMS,
MALFUNCTIONS, POWER SUPPLIES, MONITORS,
VOLTMETERS, AMPLIFIERS, ACCELEROMETERS,
GYROSCOPES, DETECTORS, VOLTAGE REGULATORS,
OSCILLOSCOPES, CHECKOUT EQUIPMENT, DIGITAL
COMPUTERS, CONTAINERS, HANDLING, PACKING
MATERIALS, STORAGE, RADIO INTERFERENCE, MANNED
SPACECRAFT, RESEARCH PLANES (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-432 984

HONEYWELL INC ST PETERSBURG FLA

PRIMARY GUIDANCE SUBSYSTEM.

(U)

DESCRIPTIVE NOTE: FINAL STATUS REPT.

MAR 64 235P

REPT. NO. 1179 SR37

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), INERTIAL GUIDANCE,
MEASUREMENT, ELECTRONIC EQUIPMENT, MOTOR GENERATORS,
GROUND SUPPORT EQUIPMENT, DESIGN, TESTS, ENVIRONMENTAL
TESTS, FLIGHT TESTING, SLEDS, TELEMETER SYSTEMS,
MALFUNCTIONS, DETECTION, MODEL TESTS, RADIO
INTERFERENCE, MAINTENANCE EQUIPMENT, TEST EQUIPMENT,
LAUNCHING, AIRBORNE, LAUNCHING SITES, RESEARCH PROGRAM
ADMINISTRATION, MANNED SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

UNCLASSIFIED

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 980

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM.
OPERATION AND MAINTENANCE INSTRUCTIONS.

(U)

MAR 64 1V

REPT. NO. 1179MIB VOL. 3

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), SPECIFICATIONS,
OPERATION, MAINTENANCE, CALIBRATION, TEST EQUIPMENT,
CONTROL SYSTEMS, CHECKOUT EQUIPMENT, MEASUREMENT,
MALFUNCTIONS, DETECTORS, SIMULATION, GYROSCOPES,
ACCELEROMETERS, AMPLIFIERS, MONITORS, POWER SUPPLIES,
TELEMETER SYSTEMS, GROUND SUPPORT EQUIPMENT, MANNED
SPACECRAFT, RESEARCH PLANES

(U)

IDENTIFIERS: 1964, DRAWINGS (SPECIFICATIONS), X-20
SPACECRAFT

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 953

BOEING CO SEATTLE WASH

PROPERTIES OF COLUMBIUM-TITANIUM-ZIRCONIUM ALLOYS,

(U)

DEC 63

IV

STACY, J. T. ;

REPT. NO. D280274

CONTRACT: D280274

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, REFRACTORY METALS
AND ALLOYS), (•NIOBIUM ALLOYS, MECHANICAL PROPERTIES),
OXIDATION, CREEP, PROTECTIVE TREATMENTS, REFRACTORY
COATINGS, COATINGS, SILICIDES, MATERIAL FORMING, FATIGUE
(MECHANICS), HEAT TREATMENT, COLD WORKING, TITANIUM
ALLOYS, ZIRCONIUM ALLOYS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, NIOBIUM ALLOY D-

36

(U)

UNCLASSIFIED

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 951

BOEING CO SEATTLE WASH

HYDRAULIC TUBING AND FITTING EVALUATION TEST PROGRAM,

(U)

DEC 63 261P EACRETT, I. ;

REPT. NO. D2 810033

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, HYDRAULIC SYSTEMS),
MANNED SPACECRAFT, HYDRAULIC COUPLINGS, PIPES, TESTS,
PERFORMANCE (ENGINEERING), ACCEPTABILITY, FATIGUE
(MECHANICS), FAILURE (MECHANICS), PIPE FITTINGS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 949

BOEING CO SEATTLE WASH

MISCELLANEOUS DESIGN TO MEET COMPLIANCE ANALYSES.

(U)

JAN 64 1V

REPT. NO. D2 80730

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), MANNED SPACECRAFT, MILITARY
REQUIREMENTS, SPECIFICATIONS, DESIGN, PILOTS, SAFETY,
ABORT, LAUNCH VEHICLES(AEROSPACE), SEPARATION,
MALFUNCTIONS, DETECTION, ANALYSIS, ASTRONAUTS (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT, SPACECRAFT SAFETY,
ESCAPE SYSTEMS, TRANSITION SECTION (U)

THIS PILOT SAFETY ANALYSIS REPORT PROVIDING
DESIGN-TO-MEET COMPLIANCE IS BEING PREMATURELY
RELEASED DUE TO THE CANCELLATION OF THE X-20
PROGRAM. THE STATUS OF THE CURRENT DESIGN TO
PROVIDE THE REQUIRED SAFETY GOAL HAS BEEN
CONTINUOUSLY MONITORED, AND WILL BE REPORTED TO
RECORD, FOR ANY FUTURE APPLICATIONS, THE STATUS
ACHIEVED AND THE PROJECTED PLANS FOR COMPLETING THIS
REQUIREMENT. AREAS OF INCOMPLETE DETAILED ANALYSIS
WILL BE DEFINED AND RECOMMENDATIONS INFLUENCING
CONFIGURATION CHANGES TO IMPROVE SAFETY WILL BE
PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 947

BOEING CO SEATTLE WASH

SYSTEM SAFETY MODEL (AIR LAUNCH). (U)

FEB 64 16P

REPT. NO. D2 80858

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, SAFETY), MANNED
SPACECRAFT, AIR TO SURFACE, AIRBORNE, LAUNCHING, FLIGHT
TESTING, AVIATION SAFETY, EJECTION SEATS, AVIATION
ACCIDENTS, STATISTICAL ANALYSIS, RESEARCH PROGRAM
ADMINISTRATION (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, AIR-LAUNCH (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 938

BOEING CO SEATTLE WASH

COMPATIBILITY OF MATERIALS AT HIGH TEMPERATURE, (U)

DEC 63 1V ELROD, S. D. :

REPT. NO. D2 80271

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*RE-ENTRY VEHICLES, REFRACTORY METALS AND ALLOYS), (*REFRACTORY METALS AND ALLOYS, COMPATIBILITY), (*COMPATIBILITY, REFRACTORY MATERIALS), BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, REFRACTORY COATINGS, MOLYBDENUM ALLOYS, TITANIUM ALLOYS, ZIRCONIUM COMPOUNDS, NIOBIUM ALLOYS, RIVETED JOINTS, NICKEL ALLOYS, CHROMIUM ALLOYS, IRON ALLOYS, PLATINUM, PLATINUM ALLOYS, NICKEL, THORIUM COMPOUNDS, OXIDES, CERMETS, IRIIDIUM (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, MOLYBDENUM ALLOY TZM, NIOBIUM ALLOY D-36, NICKEL TD (NI2THO2), BENI 41 (ALLOY), HASTELLOY X, HS-25 (ALLOY), NEO-CERAM (COATING) (U)

COATED TZM IS COMPATIBLE WITH Q-FELT, CHROME ALUMINUM-PHOSPHATE, ZIRCONIA, COATED TA AND SAUERISEN CEMENTS NO. 6, 74 AND 78 UP TO 3000 F, WITH COATED NB ALLOYS TO 2700 F. COATED TZM IS COMPATIBLE WITH RENE' 41 AND TD-NICKEL AT 2000 F AND CALORIZED TD-NICKEL AT 2400 F. COATED D-36 IS COMPATIBLE WITH Q-FELT, CHROME-ALUMINUM-PHOSPHATE, COATED TA AND SAUERISEN CEMENTS NO. 6, 74 AND 78 UP TO 2700 F. COATED D-36 COMPATIBLE WITH RENE' 41 AND TD-NICKEL AT 2000 F AND WITH CALORIZED TD-NICKEL AT 24000 F. IT IS ALSO COMPATIBLE WITH HS-25 AT 2300F. COATED TZM AND COATED D-36 ARE INCOMPATIBLE WITH PT, RH AND IR. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 936

BOEING CO SEATTLE WASH

SUMMARY REPORT FOR SURFACE TEMPERATURE AND PRESSURE
MEASUREMENT ON THE X-20A, (U)

FEB 64 351P BRUNSCHWIG, F. S. ; WILHELM, J.

K. ; WISMER, K. L. ;

REPT. NO. D2 81058

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (◆BOOST-GLIDE VEHICLES, ATMOSPHERE ENTRY),
MANNED SPACECRAFT, REENTRY VEHICLES, AERODYNAMIC
LOADING, AERODYNAMIC HEATING, AIRFRAMES, SURFACE
TEMPERATURES, PRESSURE, TEMPERATURE SENSITIVE ELEMENTS,
THERMOCOUPLES, TRANSDUCERS, AIRPLANE NOSES, PRESSURE
GAGES, MODEL TESTS, PERFORMANCE (ENGINEERING), DESIGN,
ATTACHMENT, ORIFICES, HIGH TEMPERATURE RESEARCH, PIPES,
LOW-PRESSURE RESEARCH, INSTRUMENTATION, TEST FACILITIES,
MEASUREMENT (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

FOUR DEVELOPMENTAL PROGRAMS ARE PRESENTED, THESE
ARE: (1) THE MEASUREMENT OF SURFACE TEMPERATURE
ON THE VEHICLE PROPER; (2) THE MEASUREMENT OF
SURFACE TEMPERATURE; (3) PRESSURE ON THE VEHICLE
NOSE CAP; AND (4) A LOW PRESSURE MEASUREMENT
PROGRAM. THIS DOCUMENT IS IN THE FORM OF A
COMPILATION OF REPORTS INCLUDING STUDIES OF
INSTRUMENT AND SYSTEM DESIGN, TEST REPORTS, AND
INSTRUMENT AND INSTRUMENT COMPONENT EVALUATIONS.

DUE TO THE COMPLICATION OF THE EXTRAORDINARY
ACCURACIES REQUIRED AT HIGH TEMPERATURES, THERE ARE
SEVERAL COMPLETE REPORTS DEALING WITH ATTACHMENT OF
THERMOCOUPLES TO THIN PANELS AND THE THERMAL AND
STRUCTURAL IMPLICATIONS OF THIS ATTACHMENT. IT
SUMMARIZES RESULTS AND TASK STATUS AT THE TIME OF THE
PROGRAM TERMINATION IN DECEMBER 1963.

(AUTHOR)

(U)

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015416

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 934

BOEING CO SEATTLE WASH

WATER WALL DEVELOPMENT TESTING REPORT, (U)

MAY 63 1V KAY, W. W. ; DAWLEY, R. A. ;

REA, S. E. ;

REPT. NO. D2 80812

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, HEAT SHIELDS),
MANNED SPACECRAFT, AIRPLANE PANELS, SPACECRAFT CABINS,
THERMAL RADIATION, HEAT TRANSFER, WATER, CONSTRUCTION,
ENVIRONMENTAL TESTS, VIBRATION, PRESSURE, ACCELERATION,
THERMAL INSULATION, ATTACHMENT, STORAGE, LIFE
EXPECTANCY, PERFORMANCE (ENGINEERING), MODEL TESTS (U)
IDENTIFIERS: 1963, X-2D SPACECRAFT, WATER WALL (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 932

BOEING CO SEATTLE WASH

X-20A SAFETY OPERATIONAL REQUIREMENTS. (U)

DEC 63 62P

REPT. NO. D2 80028

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, SAFETY), RESEARCH PROGRAM ADMINISTRATION, MANNED SPACECRAFT, CHECKOUT PROCEDURES, CONSTRUCTION, INSTALLATION, TEST METHODS, AIRFRAMES, SPACECRAFT CABINS, GROUND SUPPORT EQUIPMENT, LAUNCHING SITES, HANDLING, TRANSPORTATION, MAINTENANCE, LIQUEFIED GASES, ELECTRICAL EQUIPMENT, ELECTRONIC EQUIPMENT, ORDNANCE, LAUNCHING, LANDINGS, AVIATION SAFETY (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, SPACECRAFT

SAFETY (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 924

BOEING CO SEATTLE WASH

X-20 AGE CRYOGENIC INSTRUMENTATION, (U)

JAN 64

88P

ROSENBERY, W. J. GIBSON, S.

D. ;

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•LIQUEFIED GASES, MEASUREMENT),

(•CRYOGENICS, BOOST-GLIDE VEHICLES), TEMPERATURE,

PRESSURE, OXYGEN, NITROGEN, HYDROGEN, INSTRUMENTATION,

STORAGE TANKS, POTENTIOMETERS, ELECTRIC BRIDGES, WIRING

DIAGRAMS, GROUND SUPPORT EQUIPMENT, LIQUID LEVEL GAGES,

TEMPERATURE SENSITIVE ELEMENTS, RESISTANCE THERMOMETERS,

MONITORS (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

TWO DISTINCT TYPES OF CRYOGENIC INSTRUMENTATION SYSTEMS WERE EVALUATED: THE PASSIVE TEMPERATURE PRESSURE MONITORING SYSTEM AND THE LEVEL SENSING SYSTEM FOR THE X-20 GROUND SERVICING RECOOLERS. AN EXISTING, COMMERCIALY DEVELOPED SYSTEM WAS RECOMMENDED FOR THE LATTER APPLICATION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 921

BOEING CO SEATTLE WASH

REACTION CONTROL DISTRIBUTION LINE DEVELOPMENT TEST, (U)

JAN 64 6DP MARTIN, R. H. ; ALLEN, R. M. ;

REPT. NO. T2 2652

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, CONTROL JETS),
(*CONTROL SYSTEMS, PIPES), TESTS, HYDROGEN PEROXIDES,
NITROGEN, CLAMPS, NOZZLES, MOUNTING BRACKET, HEATERS,
THERMAL EXPANSION, TEMPERATURE, DEFLECTION, TIME, PANELS
(STRUCTURAL), WATER, PIPE FITTINGS, TORQUE, DEFLECTION,
THERMAL INSULATION (U)

IDENTIFIERS: 1964, BENDING, REACTION CONTROL SYSTEMS, (U)
X-20 SPACECRAFT (U)

TESTS WERE PERFORMED TO EVALUATE DESIGNS AND
MATERIALS FOR THE HYDROGEN PEROXIDE AND NITROGEN
DISTRIBUTION LINES USED IN THE X-20 REACTION
CONTROL SYSTEMS. THE ITEMS TESTED INCLUDE TUBING,
FITTING, FITTINGS, FLEXIBLE HOSE, CLAMPS, BRACKETS,
AND INSULATION. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 919

BOEING CO SEATTLE WASH
INDICATOR - ANGLE OF ATTACK.

(U)

24P

REPT. NO. 10 20930

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ANGLE OF ATTACK, FLIGHT INSTRUMENTS),
(*BOOST-GLIDE VEHICLES, FLIGHT INSTRUMENTS), (*FLIGHT
INSTRUMENTS, ANGLE OF ATTACK), AIRCRAFT EQUIPMENT,
SPECIFICATIONS, DESIGN, PERFORMANCE (ENGINEERING),
TESTS, INERTIAL GUIDANCE, MILITARY REQUIREMENTS, MANNED
SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: X-20 SPACECRAFT, DRAWING
(SPECIFICATIONS) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 917

SUNDSTRAND AVIATION-DENVER COLO
DESIGN ANALYSIS OF DYNA-SOAR MODEL 876C APU GEARBOX,
LUBRICATION SYSTEM, PROPELLANT PLUMBING AND MOUNTING
LINKS. (U)

40P

REPT. NO. 23DER62 REV. B

UNCLASSIFIED REPORT
NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), GEARS, CONTAINERS, LUBRICANTS, OILS, PRESSURE
REGULATORS, VALVES, PRESSURE, VOLUME, NITROGEN, TESTS,
STORAGE TANKS, PNEUMATIC SYSTEMS, PNEUMATIC DEVICES (U)
IDENTIFIERS: 1963, ACCUMULATORS, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 915

SUNDSTRAND AVIATION-DENVER COLO

X-20 (DYNA-SOAR) ACCESSORY POWER UNIT. (U)

DESCRIPTIVE NOTE: MONTHLY DEVELOPMENT STATUS REPT., 1
OCT-13 DEC 63.

DEC 63 156P

REPT. NO. DSR23

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (+BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), GAS TURBINES, GEARS, CONTAINER, LUBRICATION,
LUBRICANTS, TESTS, PRESSURE REGULATORS, COMBUSTION
CHAMBERS, DESIGN, HYDRAULIC PRESSURE PUMPS, VALVES,
PRESSURE, SOLENOIDS, GAS LEAKS, TEMPERATURE, CONTROL
SYSTEMS, TEST METHODS, RELIABILITY (U)
IDENTIFIERS: 1963, GEARBOX, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 913

SUNDSTRAND AVIATION-DENVER COLO

DESIGN ANALYSIS REPORT X-20 APU PRIME MOVER. (U)

DEC 63 120P

REPT. NO. 24 DER 62 REV. C

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER PLANTS), MANNED SPACECRAFT, ELECTRICAL EQUIPMENT, GAS TURBINES, TURBINE BLADES, GAS GENERATING SYSTEMS, TURBINE VEHICLES, DESIGN, CONSTRUCTION, RELIABILITY, STRESSES, FAILURE (MECHANICS), RESEARCH PROGRAM ADMINISTRATION (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

AS A RESULT OF TURBINE BLADE CRACKING PROBLEMS, IT BECAME NECESSARY TO EMBARK IN EARLY JUNE 1963 ON A RECOVERY PROGRAM TO MEET PREDICTED APU PERFORMANCE AND SATISFY THE STRUCTURAL REQUIREMENTS FOR A PRIME MOVER LIFE OF 250 HOURS WITHOUT BLADE CRACKING. ADDITIONAL EFFORT WAS ALSO NECESSARY TO SATISFY NEW REQUIREMENTS IMPOSED ON THE TURBINE ASSEMBLY TO PROVIDE A LARGE STRESS MARGIN. THIS WAS TO BE ACCOMPLISHED WITH MINIMUM REDESIGN TO MEET THESE OBJECTIVES AND THE EARLIEST POSSIBLE QUALIFICATION DATE, NOVEMBER 4, 1963. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 911

FAIRCHILD STRATOS CORP HAGERSTOWN MD
SYSTEM ANALYSIS FOR LANDING GEAR EXTENSION SYSTEM -
BAC SPEC. 10-81130 WINDOW HEAT SHIELD JETTISON
SYSTEM - BAC SPEC. 10-81131. (U)

NOV 63 12P

REPT. NO. SR382

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, AIRFRAMES), MANNED
SPACECRAFT, WINDSHIELDS, HEAT SHIELDS, JETTISONABLE
EQUIPMENT, LANDING GEAR, EXTENDABLE STRUCTURES,
MATHEMATICAL ANALYSIS, DESIGN, ACTUATORS, PNEUMATIC
DEVICES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 909

FAIRCHILD STRATOS CORP MANHATTAN BEACH CALIF
ACCEPTANCE TEST PROCEDURE FOR LANDING GEAR EXTENSION
SYSTEM -- BAC SPEC. 10-81130, HEAT SHIELD JETTISON
ACTUATOR -- BAC SPEC. 10-81132 'E'. (U)

29P

REPT. NO. SR369A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: IN COOPERATION WITH BOEING CO.,
SEATTLE, WASH.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PNEUMATIC DEVICES),
(•ACTUATORS), MANNED SPACECRAFT, ACCEPTABILITY, TEST
METHODS, SPECIFICATIONS, RESEARCH PROGRAM
ADMINISTRATION, DESIGN, LANDING GEAR, EXTENDABLE
STRUCTURES, WINDSHIELDS, HEAT SHIELDS, JETTISONABLE
EQUIPMENT, OPERATION, EFFECTIVENESS, ENVIRONMENTAL
TESTS, TEST EQUIPMENT (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 907

FAIRCHILD STRATOS CORP HAGERSTOWN MD
PROGRAM STATUS REPORT FOR PNEUMATIC ACTUATOR SYSTEMS

10-81130, 10-81131, (U)

NOV 63 10P MILLER, M. ;

REPT. NO. SR353 3

UNCLASSIFIED REPORT

DISTRIBUTION: MICROFICHE ONLY AFTER ORIGINAL COPIES
EXHAUSTED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, HEAT SHIELDS),
(*LANDING GEAR, BOOST-GLIDE VEHICLES), SCHEDULING,
WEIGHT, PNEUMATIC DEVICES, ACTUATORS, JETTISONABLE
EQUIPMENT (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 905

FAIRCHILD STRATOS CORP HAGERSTOWN MD
RELIABILITY PROGRAM PLAN AND ANALYSIS OF DYNASOAR
PNEUMATIC ACTUATOR SYSTEMS, (U)

1V LAMOREAUX, C. L. ;

REPT. NO. SR330

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, PNEUMATIC DEVICES),
ACTUATORS, MANNED SPACECRAFT, RESEARCH PROGRAM
ADMINISTRATION, RELIABILITY, CHECKOUT PROCEDURES,
LANDING GEAR, EXTENDABLE STRUCTURES, WINDSHIELDS, HEAT
SHIELDS, JETTISONABLE EQUIPMENT, PITOT TUBES, DESIGN,
TEST METHODS, MANUFACTURING METHODS, SPECIFICATIONS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 853

SUNDSTRAND AVIATION-DENVER COLO
DESIGN ANALYSIS REPORT X-20 (DYNA-SOAR) 876C1
CONTROLLER, VOLUME 2.

(U)

IV

REPT. NO. 3IDER62REV. B

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (MANNED SPACECRAFT, CONTROL SYSTEMS),
SPECIFICATIONS, BOOST-GLIDE VEHICLES, DESIGN, ANALYSIS,
VELOCITY, TEMPERATURE, ELECTRIC POTENTIAL, POWER,
CIRCUITS, TURBINES, GENERATORS, TRANSISTORS, VOLTAGE
REGULATORS

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, PACKAGING

(U)

DESIGN ANALYSIS REPORT X-20 (DYNA-SOAR) 876C1
CONTROLLER, VOLUME 2.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-432 840

RAYTHEON CO WALTHAM MASS
DEVELOPMENT TEST PROCEDURES, VOLUME I, AIRBORNE
EQUIPMENT. (U)

MAR 64 IV

REPT. NO. CR64 408 31 1 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•RADIO COMMUNICATION SYSTEMS, BOOST-GLIDE
VEHICLES), (•BOOST-GLIDE VEHICLES, RADIO COMMUNICATION
SYSTEMS), AIRBORNE, GUIDED MISSILE TRACKING SYSTEMS,
MANNED SPACECRAFT, TEST METHODS, RADIO RECEIVERS, RADIO
TRANSMITTERS, TESTS, TEST EQUIPMENT (ELECTRONICS) (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

UNCLASSIFIED

D15416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 838

RAYTHEON CO WALTHAM MASS

DEVELOPMENT TEST PROCEDURES X-20 (DYNA-SOAR)

COMMUNICATIONS AND TRACKING SUBSYSTEM. VOLUME 3.

AEROSPACE GROUND EQUIPMENT (AGE),

(U)

MAR 64 1V

REPT. NO. CR64 408 31 3 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•GROUND SUPPORT EQUIPMENT, BOOST-GLIDE

VEHICLES), (•BOOST-GLIDE VEHICLES, GROUND-SUPPORT

EQUIPMENT), CHECKOUT PROCEDURES, CHECKOUT EQUIPMENT,

MAINTENANCE EQUIPMENT, TEST SETS, ANTENNAS, TEST

METHODS, TEST EQUIPMENT (ELECTRONICS), CALIBRATION

(U)

IDENTIFIERS: 1964, X-20 SPACECRAFT

(U)

DEVELOPMENT TEST PROCEDURES X-20 (DYNA-SOAR)

COMMUNICATIONS AND TRACKING SUBSYSTEM. VOLUME 3.

AEROSPACE GROUND EQUIPMENT (AGE).

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 752

BOEING CO SEATTLE WASH

NOSE CAP DEVELOPMENT TESTS, (U)

SEP 63 83P LANDRY, B. E. I

REPT. NO. D2 80083

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•NOSE CONES, BOOST-GLIDE VEHICLES),
CONFIGURATION, FEASIBILITY STUDIES, ZIRCONIUM COMPOUNDS,
OXIDES, PLATINUM ALLOYS, CALIBRATION, TEST FACILITIES,
ATMOSPHERE ENTRY, SPACE ENVIRONMENTAL CONDITIONS,
SIMULATION, PERFORMANCE (ENGINEERING), PLASMA JETS,
INSTRUMENTATION, GRAPHITE, AERODYNAMIC CHARACTERISTICS,
HIGH TEMPERATURE RESEARCH, REINFORCING MATERIALS, HEAT-
RESISTANT MATERIALS, HEAT-RESISTANT METALS + ALLOYS,
MODEL TESTS, TEST METHODS, STAGNATION POINT, THERMAL
RADIATION, COOLING, ACOUSTIC PROPERTIES, VIBRATION,
AERODYNAMIC HEATING, EROSION, EXHAUST GASES, TEST
EQUIPMENT (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, NOSE CAPS (U)

TESTS WERE CONDUCTED TO: (1) DETERMINE THE
GROSS CAPABILITY OF THE FACILITY FOR TESTING
FULLSCALE X-20 NOSE CAPS; AND (2) CALIBRATE THE
THERMAL, PRESSURE, VIBRATION, AND ACOUSTIC
ENVIRONMENTS PROVIDED BY THE FACILITY. A 3000
POUND THRUST LIQUID OXYGEN-GASOLINE ROCKET MOTOR WAS
DEVELOPED TO PROVIDE A THERMAL ENVIRONMENT FOR
TESTING THE FULL-SCALE X-20 NOSE CAP FROM AMBIENT
TO TEMPERATURES APPROACHING 400 F. THE EXHAUST
STREAM TEMPERATURES AND PRESSURE WERE DETERMINED BY
USING HEMISPHERICAL GRAPHITE AND WATER-COOLED
STAINLESS STEEL MODELS; BOTH OF WHICH WERE MOUNTED ON
TRAVERSING FIXTURES CAPABLE OF 3 TO 30 FEET AXIAL
DISPLACEMENT FROM THE ROCKET NOZZLE EXIT PLANE.
THE HEATING RATE AND MAXIMUM STABILIZED TEMPERATURE
OF THE TEST SPECIMENS WERE CONTROLLED BY OPERATION OF
THE TRAVERSING FIXTURE, AS LONG AS A STABLE EXHAUST
PRESSURE WAS MAINTAINED. SEVERE EROSION LIMITED
MAXIMUM GRAPHITE MODEL TEMPERATURES TO 3900 F.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 651

BOEING CO SEATTLE WASH
HYDRAULIC SYSTEM METALLIC AND ELASTOMERIC SEAL
EVALUATION PROGRAM, (U)

DEC 63 157P EACRETT, I. I
REPT. NO. D2 81034
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, HYDRAULIC SYSTEMS),
(•HYDRAULIC SEALS, HIGH TEMPERATURE RESEARCH), METAL
SEALS, PLASTIC SEALS, RUBBER SEALS, SYNTHETIC RUBBER, (U)
MANNED SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 649

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT - DYNA SOAR, (U)
392P BOWERS, D. A. ;

REPT. NO. D2 80085 VOL. 2

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•900ST-GLIDE VEHICLES, LEADING EDGE
FLAPS), THERMAL STRESSES, TABLES, DATA, TEMPERATURE,
HIGH TEMPERATURE RESEARCH, EXPERIMENTAL DATA (U)
IDENTIFIERS: 1963, X2D SPACECRAFT, LEADING EDGE (U)

LEADING EDGES DEVELOPMENT - DYNA SOAR.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 647

BOEING CO SEATTLE WASH

X-20 TERMINATION ENGINEERING DOCUMENTATION, VOLUME

I.

(U)

DEC 63 1V

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, ELECTRONIC
EQUIPMENT), PULSE TRANSMITTERS, AIRBORNE, CONFIGURATION,
SPECIFICATIONS, TIMING DEVICES, DESIGN, PERFORMANCE.
(ENGINEERING), POWER SUPPLIES, MIXERS (ELECTRONICS),
ELECTRICAL EQUIPMENT, MECHANICAL DRAWINGS, WIRING
DIAGRAMS, DATA STORAGE SYSTEMS, FREQUENCY CONVERTERS,
COMPUTERS, ACCEPTABILITY, TEST EQUIPMENT, OPERATION,
VISUAL INSPECTION, TEST METHODS, CHECKOUT PROCEDURES,
GROUND SUPPORT EQUIPMENT, CONTAINERS, RECORDING SYSTEMS,
MAGNETIC RECORDING SYSTEMS, MAGNETIC TAPE (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, INTERFACE (U)

X-20 TERMINATION ENGINEERING DOCUMENTATION, VOLUME

I.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 645

TRW INC CLEVELAND OHIO

REACTION CONTROL POWER COMPONENT RELIABILITY FAILURE

RATE ANALYSIS, DYNA SOAR, (U)

11P BEATTY, H. W., JR.:

REPT. NO. TM3245 93

PROJ: 516 808950 08

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, ATTITUDE CONTROL SYSTEMS), FAILURE (MECHANICS), MATHEMATICAL ANALYSIS, ELECTRICAL EQUIPMENT, GAS FLOW, IGNITION, CONTROL JETS, RELIABILITY, GAS GENERATING SYSTEMS, VALVES, CONTROL SYSTEMS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT, REACTION CONTROL SYSTEMS (U)

REACTION CONTROL POWER COMPONENT RELIABILITY FAILURE RATE ANALYSIS, DYNA SOAR.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. D15416

AD-432 642

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
PRELIMINARY DEVELOPMENT TEST BASIC HEAT TRANSFER DATA
CRYOGENIC HEATER EQUIPMENT COMPARTMENT COOLER UNIT

178390 BOEING DYNA SOAR PART 10-20917-3, (U)

JAN 62 IIP DURHAM, R. E. ; BUSCH, E. F. ;

REPT. NO. DS76R

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, COOLING), (•HEAT
EXCHANGERS, BOOST-GLIDE VEHICLES), HEAT TRANSFER,
NITROGEN, CRYOGENICS, LIQUEFIED GASES, COOLING +
VENTILATING EQUIPMENT, TEST METHODS, COOLANTS,

TEMPERATURE (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 640

HONEYWELL INC MINNEAPOLIS MINN

MH-132 X-20 GLIDER FLIGHT CONTROL SUBSYSTEM

ELECTRONICS PROGRAM.

(U)

DESCRIPTIVE NOTE: MONTHLY PROGRESS REPT. NO. 30,

JAN 64 17P RAMEY, L. M. ;

REPT. NO. 2546PR30

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, FLIGHT CONTROL SYSTEMS), STABILIZATION SYSTEMS, PITCH (MOTION), ROLL, ABORT, SIMULATION, LAUNCHING, ELEVONS, SERVOMECHANISMS, ANALOG COMPUTERS, ACTUATORS, SPECIFICATIONS, ACCEPTABILITY, ELECTRONIC EQUIPMENT, YAU, ACCELEROMETERS, COMPATIBILITY, RELIABILITY, AEROELASTICITY

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, FLEXIBLE STRUCTURES

(U)

MH-132 X-20 GLIDER FLIGHT CONTROL SUBSYSTEM ELECTRONICS PROGRAM.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 638

SUNDSTRAND AVIATION-DENVER COLO
DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT STATUS
REPORT. (U)

JUN 62 77P
REPT. NO. DSR 8

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, AUXILIARY POWER
PLANTS), (*AUXILIARY POWER PLANTS, TURBINE PARTS),
CHROMIUM ALLOYS, COBALT ALLOYS, BEARINGS, ACCEPTABILITY,
PERFORMANCE (ENGINEERING), TURBINE BLADES, TURBINE
WHEELS, HYDROGEN EMBRITTLEMENT, TITANIUM, MECHANICAL
PROPERTIES, BRAZING, GEARS, CONTAINERS, CHECKOUT
PROCEDURES, NICKEL ALLOYS, SCHEDULING, TESTS, FUEL
INJECTORS, COMBUSTION CHAMBERS, CONTROL SYSTEMS,
HYDRAULIC PRESSURE PUMPS, REGENERATIVE COOLING
(ROCKETS), HYDROGEN, LIQUIFIED GASES, COOLING, HEAT
EXCHANGERS, GRAPHITE, VIBRATION (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT, RENE 41 (U)

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT STATUS REPORT.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 636

BOEING CO SEATTLE WASH

WINDOW DEVELOPMENT - DYNA SOAR, (U)

DEC 63 203P COVEY, JAMES H. ;

REPT. NO. D2 80088

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, WINDSHIELDS),
MANNED SPACECRAFT, AIRPLANE PANELS, SILICON COMPOUNDS,
OXIDES, GLASS, SEALS, GLASS TEXTILES, MODEL TESTS,
ATMOSPHERE ENTRY, AERODYNAMIC HEATING, THERMAL STRESSES,
INSTALLATION, PRESSURE, AERODYNAMIC LOADING, STRUCTURES,
AIRFRAMES, DESIGN, ANALYSIS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

FULL-SIZE WINDOW INSTALLATIONS WERE SUBJECTED TO SIMULATED REENTRY TEMPERATURE AND PRESSURE CYCLES. OBSERVATIONS WERE MADE OF SEAL DURABILITY; AND DATA WERE COLLECTED ON SEAL DEFLECTION; SEAL SET AND LEAKAGE RATE. TWO SEAL CONFIGURATIONS WERE TESTED. EACH UTILIZED REFRASIL FABRIC IN CONTACT WITH THE WINDOW PANE AND MOUNTING FRAME. THE TESTS INDICATED THAT REFRASIL FABRIC IS EASILY ABRADED, BUT DID NOT DEPRECIATE SIGNIFICANTLY IN SEALING QUALITIES FOR THE CYCLES IMPOSED. HOWEVER, THE USE OF REFRASIL FABRIC WAS DISCONTINUED AS A WINDOW MOUNTING MATERIAL FOR THE X-20. THE INSTALLATION PROCEDURE FOR MOUNTING THE WINDOW IN THE FRAME REQUIRED CLAMPING PRESSURE TO OBTAIN INITIAL SEAL DEPRESSION. IT WAS FOUND THAT A SPRING LOADED CLAMPING FIXTURE WAS REQUIRED TO PREVENT LOCAL PINCHING AND WINDOW CRACKING DURING INSTALLATION OF THE RETAINING FRAME. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 633

SUNDSTRAND AVIATION-DENVER COLO

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST
STATUS,

(U)

FEB 62 74P RAND, T. I

REPT. NO. DSR4

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, AUXILIARY POWER
PLANTS), (*AUXILIARY POWER PLANTS, PERFORMANCE
(ENGINEERING), COMBUSTION CHAMBERS, CATALYSTS, LIFE
EXPECTANCY, CHECKOUT PROCEDURES, PELLETS, IGNITERS,
GEARS, SERVOMECHANISMS, VALVES, HYDROGEN, DIAPHRAGMS
(MECHANICS), HYDRAULIC PRESSURE PUMPS, CONTROL SYSTEMS,
ELECTRONIC EQUIPMENT, SERVOMOTORS, PRODUCTION,
PROCESSING (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST STATUS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 631

BOEING CO SEATTLE WASH

PERFORMANCE OF OXIDATION RESISTANT COATINGS FOR
MOLYBDENUM, (U)

DEC 63 IV KERLEE, C. E. ;

REPT. NO. D2-81112 VOL. 1

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MOLYBDENUM ALLOYS, PROTECTIVE
TREATMENTS), (•COATINGS, OXIDATION), (•NIOBIUM ALLOYS,
PROTECTIVE TREATMENTS), SILICIDES, TITANIUM ALLOYS,
ZIRCONIUM ALLOYS, REENTRY VEHICLES, MECHANICAL
PROPERTIES, DUCTILITY, THICKNESS, EMISSIVITY, HEAT
TREATMENT, CONTAMINATION, BOOST GLIDE VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES (U)

IDENTIFIERS: 1963, MOLYBDEUM ALLOY D-5T1, MOLYBDENUM
ALLOY TZM, NIOBIUM ALLOY D-36, X-20 SPACECRAFT,
FLUIDIZED BED (U)

PERFORMANCE OF OXIDATION RESISTANT DISILICIDE COATINGS ON
MOLYBDENUM AND NIOBIUM ALLOYS FOR X-20 SPACE CRAFT. VOL
1.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 629

GARRETT CORP LOS ANGELES CALIF AIRESEARCH MFG DIV
ANALYSIS REPORT INTEGRATED COOLING SYSTEM DYNASOAR
VEHICLE,

(U)

IV CHESSMORE, G. O'REILLY, J. I
REPT. NO. DS109R

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST GLIDE VEHICLES, COOLING AND
VENTILATING EQUIPMENT), MANNED SPACECRAFT, HEAT
EXCHANGERS, REGENERATIVE COOLING, CRYOGENIC STORAGE
DEVICES, HEAT TRANSFER, ELECTRONIC EQUIPMENT, CONTROL
SYSTEMS, COOLANTS, SPACECRAFT CABINS, FEASIBILITY
STUDIES, EFFECTIVENESS, DESIGN, TEMPERATURE CONTROL,
AERODYNAMIC HEATING, GLYCOLS, CRYOGENICS, LIQUEFIED
GASES, HYDROGEN

(U)

IDENTIFIERS: 1962, X-20 SPACECRAFT

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 627

ELECTRO-MECHANICAL RESEARCH INC SARASOTA FLA
X-20 TEST INSTRUMENTATION SUBSYSTEM AIRBORNE PCM
SUMMARY ENGINEERING REPORT. (U)
43 44P

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: (SUB CONTRACT AND BOCIAN AIRCRAFT
CO., SEATTLE, WASH. CONTRACT AF33 657 7132)

DESCRIPTORS: (•TELEMETER SYSTEMS, PULSE MODULATION),
(•BOOST-GLIDE VEHICLES, TELEMETER SYSTEMS),
INSTRUMENTATION, PULSE COMMUNICATION SYSTEMS, CODING,
AIRBORNE, MANNED SPACECRAFT, ANALOG-TO-DIGITAL
CONVERTERS, GATES (CIRCUITS), SWITCHING CIRCUITS,
AMPLIFIERS, COMPUTER LOGIC (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, PULSE CODE
MODULATION, COMMON MODE COMPENSATION (U)

IT IS THE PURPOSE OF THIS REPORT TO PROVIDE A
DETAILED DESCRIPTION OF SYSTEM AND CIRCUIT OPERATION;
CALUCULATE, ANALYZE AND TABULATE THE RESULTS OF
ENGINEERING MODEL DECK TESTS; PRESENT A CALCULATED
SYSTEM ERROR FOR THE AIRBORNE PCM EQUIPMENT;
PREDICT PERFORMANCE OF A PROTOTYPE SYSTEM TO BE BUILT
AND TESTED PER RIGID MANUFACTURING STANDARDS; AND
COMPARE PREDICTED PERFORMANCE WITH BOEING ACCURACY
REQUIREMENTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 623

WESTINGHOUSE ELECTRIC CORP LIMA OHIO

DYNA-SOAR ELECTRICAL POWER GENERATION SYSTEM. (U)

NOV 63 1V

REPT. NO. REPT. NO. ,I. 8. 2920 23

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: UNCLASSIFIED REPORT

DESCRIPTORS: (•MANNED SPACECRAFT, BOOST-GLIDE VEHICLES),

(•ELECTRIC POWER PRODUCTION, MANNED SPACECRAFT),

GENERATORS, VOLTAGE REGULATORS, CIRCUITS, CIRCUIT

BREAKERS, TRANSISTORS, DIODES (SEMICONDUCTOR),

POTENTIOMETERS, DIRECT CURRENT, ALTERNATING CURRENT (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

DYNA-SOAR ELECTRICAL POWER GENERATION SYSTEM.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 621

CHANCE VOUGHT CORP DALLAS TEX

X-20 NOSE CAP DESIGN PHILOSOPHY AND CRITERIA, (U)

1V EDWARDS, R. G. ;

REPT. NO. 3 14000 2R40 REV. 3

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: SUBCONTRACT TO BOEING CO.,

SEATTLE, WASHINGTON, CONTRACT AF33 657 7132.

DESCRIPTORS: (NOSE CONES, BOOST-GLIDE VEHICLES), MANNED
SPACECRAFT, DESIGN, THEORY, LOADING (MECHANICS),
AERODYNAMIC LOADING, ATMOSPHERE ENTRY,
AEROTHERMOELASTICITY, STRUCTURES, GRAPHITE, ZIRCONIUM
COMPOUNDS, OXIDES, CERAMIC MATERIALS, MOLYBDENUM,
NIOBIUM, HEAT SHIELDS, CORRECTIONS, AIRPLANE NOSES,
VIBRATION (U)

IDENTIFIERS: X-20 SPACECRAFT, NOSE CAPS (U)

X-20 NOSE CAP DESIGN PHILOSOPHY AND CRITERIA.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 618

BOEING CO SEATTLE WASH
DEVELOPMENT PROGRAM, BEARINGS, LUBRICANTS AND
HYDRAULIC FLUIDS.

(U)

JAN 64 135P ARMSTRONG, C. S. ;
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, MATERIALS),
(•BEARINGS, HIGH TEMPERATURE RESEARCH), (•HYDRAULIC
FLUIDS, HIGH TEMPERATURE RESEARCH), (•LUBRICANTS, HIGH
TEMPERATURE RESEARCH), HEAT RESISTANT MATERIALS, SPACE
ENVIRONMENTAL CONDITIONS, REENTRY VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES (U)

IDENTIFIERS: (•BOOST-GLIDE VEHICLES, MATERIALS),
(•BEARINGS, HIGH-TEMPERATURE RESEARCH),
(•HYDRAULIC FLUIDS, HIGH-TEMPERATURE RESEARCH),
(•LUBRICANTS, HIGH-TEMPERATURE RESEARCH), HEAT
RESISTANT MATERIALS, SPACE ENVIRONMENTAL CONDITIONS,
REENTRY VEHICLES, MANNED SPACECRAFT, RESEARCH
PLANES (U)

DEVELOPMENT PROGRAM, BEARINGS, LUBRICANTS, AND HYDRAULIC
FLUIDS FOR THE DYNA-SOAR.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 616

BOEING CO SEATTLE WASH

NOSE CAP DEVELOPMENT - RADIANT HEAT TESTS, (U)

MAY 63 52P JENSEN, W. R. ;

REPT. NO. D2 80083

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: {•BOOST-GLIDE VEHICLES, NOSE CONES}, {•NOSE
CONES, ZIRCONIUM COMPOUNDS}, OXIDES, MANNED SPACECRAFT,
RESEARCH PLANES, AERODYNAMIC HEATING, SIMULATION, HIGH-
TEMPERATURE RESEARCH (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

NOSE CAP DEVELOPMENT - RADIANT HEAT TESTS. DYNA-SOAR.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 614

BOEING CO SEATTLE WASH
NOSE CAP DEVELOPMENT TESTS - FULL SIZE STRUCTURAL
DEMONSTRATOR TESTS DYNA-SOAR.

(U)

62P ESCH, P. G. ; LANDRY, B. E. ;

SWEGLE, A. R. ;

REPT. NO. D2 80083 SECT. 6

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NOSE CONES, BOOST-GLIDE VEHICLES),
MANNED SPACECRAFT, AIRPLANE NOSES, HEAT SHIELDS,
HEMISPHERICAL SHELLS, ZIRCONIUM COMPOUNDS, OXIDES,
CERAMIC MATERIALS, MODEL TESTS, MODELS (SIMULATION),
ATMOSPHERE ENTRY, AERODYNAMIC HEATING, THERMAL STRESSES,
TORCHES, TEST FACILITIES, EXHAUST GASES, PRESSURE,
DESIGN, EFFECTIVENESS, ASCENT TRAJECTORIES, DESCENT
TRAJECTORIES

(U)

IDENTIFIERS: X-20 SPACECRAFT, NOSE CAPS

(U)

FULL SCALE BOEING NOSE CAP STRUCTURAL DEMONSTRATOR
WAS TESTED IN THE OXY-PROPANE TORCH AND RAMJET
FACILITIES. INITIAL TESTING CONSISTED OF
SUBJECTING THE NOSE CAP TO SIMULATED MAXIMUM BOOST.
THERMAL ENVIRONMENT IN THE PROPANE TORCH. DUE TO
PROBLEMS IN TEST CONDUCTION AND WITH A PROPANE
BURNER CONTROL VALVE THE NOSE CAP WAS SUBJECTED TO
SEVERE HEATING RATES AND MAXIMUM TEMPERATURE WAS
MAINTAINED FOR AN ADDITIONAL 90 SECONDS PAST
PROGRAMMED TERMINATION. BOTH THE NOSE CAP AND ITS
INSTRUMENTATION APPEARED SOUND AFTER THE TEST.
(AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 612

BOEING CO SEATTLE WASH

STEEL TO ALUMINUM BRAZING, (U)

JAN 64 18P CRANE, C. H. ;

REPT. NO. D2 81106

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (+STAINLESS STEEL, BRAZING), (+ALUMINUM
ALLOYS, BRAZING), BOOST-GLIDE VEHICLES, MANNED
SPACECRAFT, RESEARCH PLANES, PRESSURE VESSELS, PIPES,
CRYOGENICS, FLUXES (FUSION) (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, ALUMINUM ALLOY
6061, STAINLESS STEEL 304L (U)

STEEL TO ALUMINUM BRAZING.

UNCLASSIFIED

015416

SUNDSTRAND AVIATION-DENVER COLO.
DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST
STATUS.

(U)

MAR 62 76P
REPT, NO. DSR5

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AUXILIARY POWER
PLANTS), COMBUSTION CHAMBERS, CATALYSTS, ROCKET
IGNITERS, LUBRICANTS, FLUID FLOW, GEARS, CONTAINERS, GAS
TURBINES, SEALS (STOPPERS), CONTROL SYSTEMS, VALVES,
PNEUMATIC SERVOMECHANISMS, HYDRAULIC PRESSURE PUMPS,
POWER, ELECTRONIC EQUIPMENT (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

DYNA-SOAR ACCESSORY POWER UNIT DEVELOPMENT TEST STATUS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 588

RAYTHEON CO WALTHAM MASS

SAFETY DESIGN AND OPERATIONAL REQUIREMENTS, X-20

(DYNA-SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM, (U)

MAR 64 IV

REPT. NO. CR64 408 29 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMUNICATION SYSTEMS, BOOSTGLIDE VEHICLES), (*BOOST-GLIDE VEHICLES, COMMUNICATION SYSTEMS), VOICE COMMUNICATION SYSTEMS, DATA TRANSMISSION SYSTEMS, SUPERHIGH FREQUENCY, ULTRAHIGH FREQUENCY, C BAND, TRANSMITTER RECEIVERS, TRACKING, SAFETY, GROUND SUPPORT EQUIPMENT, CHECKOUT PROCEDURES, TESTS, RANGES (ESTABLISHMENTS), HAZARDS, SHIPBORNE, AIRBORNE, MAINTENANCE EQUIPMENT, FLIGHT TESTING, RESEARCH PROGRAM ADMINISTRATION, ANTENNAS, MANNED SPACECRAFT, RESEARCH PLANES (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

SAFETY DESIGN AND OPERATIONAL REQUIREMENTS, X-20
(DYNA-SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM,

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 584

BOEING CO SEATTLE WASH
INSULATED PANEL DEVELOPMENT (DYNA-SOAR). PLASMA
TUNNEL TESTS.

(U)

IV SMITH, N. E. ; OAKES, W. G. ;

NAMATAME, T. ;

REPT. NO. D2 80080 SECTION II

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HEAT SHIELDS, BOOST-GLIDE VEHICLES),
(•STRUCTURAL PARTS, MANNED SPACECRAFT), RESEARCH PLANES,
ENVIRONMENTAL TESTS, ATMOSPHERE ENTRY, SIMULATION, TEST
FACILITIES (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

DYNA-SOAR INSULATED PANEL DEVELOPMENT, PLASMA TUNNEL
TEST DATA ON EROSION SHIELD, VOL. I, SECTION II.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 545

BOEING CO SEATTLE WASH

EXTERNAL SURFACE SEAL DEVELOPMENT TESTS. (U)

DEC 63 91P COVEY, JAMES H. I

REPT. NO. D2-80876

CONTRACT: AF 33(657)-7132

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (SEALS (STOPPERS), HEAT RESISTANT
MATERIALS), METAL SEALS, MANNED SPACECRAFT, GLASS
TEXTILES, COMPOSITE MATERIALS, GASKETS, COMPRESSIVE
PROPERTIES, LAMINATES, WEAR RESISTANCE (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

EVALUATION OF SEALING MATERIALS AT HIGH TEMPERATURE FOR
USE IN DYNA-SOAR.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 543

BOEING CO SEATTLE WASH

INSULATED PANEL DEVELOPMENT DYNA-SOAR, (U)

OCT 63 255P DARCY, KENNETH E. ;

REPT. NO. D2 80080 SECTION I

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HEAT SHIELDS, BOOST-GLIDE VEHICLES),
(•STRUCTURAL PARTS, MANNED SPACECRAFT); RESEARCH PLANES,
ENVIRONMENTAL TESTS, SIMULATION, NOISE, AERODYNAMIC
HEATING, AERODYNAMIC LOADING, LOADING (MECHANICS),
VIBRATION, ACCELERATION, DEFLECTION, EXPERIMENTAL
DATA (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

DYNA-SOAR INSULATED PANEL DEVELOPMENT. THERMAL, SONIC
AND LOAD TEST DATA, VOL. III, SEC. I,

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 541

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT - DYNA SOAR,
282P BOWERS, D, A. ;

(U)

REPT. NO. D2 80085 VOL. 3

CONTRACT: AF33 657.7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LEADING EDGE
FLAPS), TABLES, DATA, THERMAL STRESSES, TEMPERATURE,
STRESSES, SHEAR STRESSES, LOADING (MECHANICS), HIGH
TEMPERATURE RESEARCH, EXPERIMENTAL DATA

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, LEADING EDGE

(U)

LEADING EDGES DEVELOPMENT - DYNA SOAR.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 539

BOEING CO SEATTLE WASH

X-20 TERMINATION MANUFACTURING SUMMARY, (U)

DEC 63 1V

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, ELECTRONIC
EQUIPMENT), MANNED SPACECRAFT, RESEARCH PROGRAM
ADMINISTRATION, MANUFACTURING METHODS, DATA PROCESSING
SYSTEMS, AIRBORNE, MODULES (ELECTRONIC) (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THIS REPORT IS INTENDED TO PROVIDE A NARRATIVE
DESCRIPTION OF THE STATUS ON THE MAJOR ELEMENTS OF
THE SUBJECT SYSTEM AT THE TIME OF WORK STOPPAGE ON
DECEMBER 13, 1963. THIS REPORT, ALONG WITH THE
LATEST X-20 PRODUCTION STATUS REPORTS ISSUED BY
PRODUCTION CONTROL, SHOULD PROVIDE A FAIRLY
COMPLETE STATUS OF THE PROGRAM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-432 372

BOEING CO SEATTLE WASH

HYDROGEN RECOOLER DEVELOPMENT TESTS SUMMARY EWA 3-
294, (U)

DEC 63 IV BOCK, C. O. BANGSUND, EO :

REPT. NO. D2 81025 VOL I

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (FUEL SYSTEMS, HYDROGEN), HEAT EXCHANGERS,
PIPES, TRANSPORTATION, TEMPERATURE, LOW TEMPERATURE
RESEARCH, MILITARY REQUIREMENTS, OXYGEN, LIQUIFIED
GASES, CRYOGENICS, COOLING, NITROGEN, COOLANTS, VACUUM,
THERMAL INSULATION, GAS LEAKS, TESTS, TEST METHODS, PIPE
FITTINGS, BOOST-GLIDE VEHICLES, REFRIGERATION
SYSTEMS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

AN ACCOUNT IS PRESENTED OF TESTING CONDUCTED UNDER
EWA 3-294 TO INVESTIGATE HEAT LEAK OF VACUUM
INSULATED TRANSFER LINES AND TO CONFIRM THAT THE
HYDROGEN RECOOLER DESIGN SATISFIES GLIDER TEMPERATURE
REQUIREMENTS. ALSO INCLUDED ARE AN ACCOUNT OF
OXYGEN COOLING COIL DEVELOPMENT TESTS AND A
PERFORMANCE EVALUATION OF SEVERAL RECOOLER
COMPONENTS. TESTING WAS CONDUCTED IN TWO PHASES,
DURING THE FIRST PHASE THE TRANSFER LINES WERE
TESTED AND THE RECOOLER WAS TESTED FUNCTIONALLY WITH
LIQUID NITROGEN AT SEATTLE. DURING THE SECOND
PHASE THE OXYGEN COOLING COIL TESTS WERE CONDUCTED
AND THE RECOOLER WAS TESTED WITH HYDROGEN AT
TULALIP. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-432 370

BOEING CO SEATTLE WASH

WELDING OF COLUMBIUM ALLOYS;

(U)

DEC 63 IV STACY, J. T. ;

REPT, NO. D2 80270

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•NIOBIUM ALLOYS, WELDING), (•WELDING, NIOBIUM ALLOYS), (•RESEARCH PLANES, NIOBIUM ALLOYS), (•REFRACTORY METALS AND ALLOYS, NIOBIUM ALLOYS), BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, REPORTS, SPOT WELDING, CRYOGENICS, THERMAL JOINING, HAFNIUM ALLOYS, TITANIUM ALLOYS, ZIRCONIUM ALLOYS, TANTALUM ALLOYS, ELECTRODES, TENSILE PROPERTIES, HEAT TREATMENT, VACUUM FURNACES, PROCESSING, STRESSES, PHOTOMICROGRAPHY, ACIDS, WELDS, COATINGS, PICKLING, PICKLING COMPOSITIONS, MECHANICAL PROPERTIES, SPOT WELDS (U)

IDENTIFIERS: X-20 SPACECRAFT, NIOBIUM ALLOY C-103, NIOBIUM ALLOY D-36, NIOBIUM ALLOY FS-82, ETCHANTS, 1963, FUSION WELDING (U)

THIS DOCUMENT CONTAINS SEVEN INFORMAL INTERNAL REPORTS ISSUED BY THE X-20 MATERIALS AND PROCESSES STAFF CONCERNING THE WELDING OF COLUMBIUM ALLOYS. THESE REPORTS CONTAIN DATA NOT FORMALLY DOCUMENTED ELSEWHERE EXCEPT AS PRESENTED FROM TIME TO TIME IN QUARTERLY PROGRESS REPORTS. WITH THE CANCELLATION OF THE X-20, IT HAS BECOME PROPER TO DOCUMENT THE WORK AS EXPEDITIOUSLY AS POSSIBLE. TO ACCOMPLISH THIS OBJECTIVE, THE VELLUMS OF THE INFORMAL REPORTS HAVE BEEN APPENDED TO THIS DOCUMENT AND AN OVERALL SUMMARY HAS BEEN PREPARED. IN THE EARLIER STAGES OF THE X-20 PROGRAM, SOME WORK WAS DONE TO DETERMINE THE FEASIBILITY OF RESISTANCE WELDING TWO OF THE COLUMBIUM ALLOYS OF INTEREST AT THAT TIME, C-103 AND D-36. WHEN IT BECAME EVIDENT THAT THE SPOT WELDING OF COLUMBIUM ALLOYS WOULD NOT BE ONE OF THE FABRICATION METHODS USED ON THE X-20, FURTHER WORK WAS DISCONTINUED. FUSION WELDING INVESTIGATIONS WERE CARRIED OUT ON THREE COLUMBIUM-BASE ALLOYS: C-103, D-36, AND FS-82. FUSION WELDS WERE MADE USING THE TUNGSTEN ARC PROCESS. SELECTION OF D-36 AS THE COLUMBIUM ALLOY FOR THE X-20 LED TO ADDITIONAL WORK ON D-36. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416-

AD-432 180

BOEING CO SEATTLE WASH
TEST EQUIPMENT X-20 SERVICE SIMULATION, (U)
DESCRIPTIVE NOTE: ,10 BY JOSEPH M,
DEC 63 1V
REPT. NO, D2 81114
CONTRACT: AF33 657.7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, REFRACTORY COATINGS), (•TEST FACILITIES, SPACE ENVIRONMENTAL CONDITIONS), (•REFRACTORY COATINGS, TEST METHODS), REENTRY VEHICLES, ENVIRONMENTAL TESTS, CALIBRATION, ATMOSPHERE ENTRY, HIGH TEMPERATURE RESEARCH, REFRACTION COATINGS, SILICIDES, OXIDATION, LOW PRESSURE RESEARCH, FLIGHT TESTING, SIMULATION, TEST EQUIPMENT, HEAT RESISTANT MATERIALS, TITANIUM COMPOUNDS, ZIRCONIUM COMPOUNDS, MOLYBDENUM COMPOUNDS, CONFIGURATION, PERFORMANCE (ENGINEERING), TRANSPORT PROPERTIES, PERFORMANCE TESTS, ALLOYS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

IT WAS NECESSARY TO DETERMINE THE CAPABILITY OF THE TEST EQUIPMENT TO SIMULATE THE IN-FLIGHT ENVIRONMENT IN ORDER TO ESTABLISH THE CONFIDENCE LEVEL OF MATERIAL EVALUATION TESTS. THE EQUIPMENT CALIBRATION TO DO THIS REQUIRED ONLY THE DETERMINATION OF THE EQUIPMENT MASS TRANSFER COEFFICIENT SINCE THE TEMPERATURE AND PRESSURE MEASUREMENT TECHNIQUES USED WERE WELL ESTABLISHED. ORIGINAL EQUIPMENT CALIBRATION WORK ATTEMPTED TO EVALUATE THE MASS TRANSFER COEFFICIENT IN THE PLANT 1 RE-ENTRY SIMULATOR DURING RE-ENTRY TESTING BY DETERMINING THE RATE OF CONSUMPTION OF PURE MOLYBDENUM AND ASSUMING THE REACTION WAS MASS TRANSPORT CONTROLLED. LATER WORK SHOWED THAT THE ATTACK RATE ON PURE MOLYBDENUM WAS CHEMICAL REACTION RATE CONTROLLED IN BOTH THE PLANT 1 AND 2,01 BUILDING FACILITIES (I.E, THERE WAS SUFFICIENT OXYGEN AVAILABLE FOR REACTION OF PURE MOLYBDENUM). THEREFORE THE RATE OF SUPPLYING OXYGEN WOULD NOT BE SO SLOW AS TO LIMIT THE RATE OF A SLOWER REACTION. THIS LED TO A RECOMMENDATION TO USE TEST TIMES EQUAL TO FLIGHT TIMES RATHER THAN EXTENDED-TIME TESTS FOR BARE OR COATED REFRACTORY ALLOYS IN BOTH FACILITIES, (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 968

BOEING CO SEATTLE WASH
DEVELOPMENT OF OXIDATION RESISTANT COATINGS FOR
MOLYBDENUM, (U)

DEC 62 IV GUNDERSON, JOSEPH M. ;

REPT. NO. D2 81109

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MOLYBDENUM ALLOYS, REFRACTORY COATINGS),
(•REFRACTORY COATINGS, MOLYBDENUM ALLOYS),
(•MANUFACTURING METHODS, REFRACTORY COATINGS), GAS FLOW,
IODINE, SILICON, SILICIDES, CERAMIC COATINGS, TITANIUM
ALLOYS, ZIRCONIUM ALLOYS, OXIDATION, INHIBITION,
THICKNESS, CRYSTAL STRUCTURE, EMISSIVITY, PHASE STUDIES,
HIGH TEMPERATURE RESEARCH (U)

IDENTIFIERS: 1963, MO-0.5% TI, TZM MOLYBDENUM ALLOY,
X-20 SPACECRAFT (U)

THE DEVELOPMENT OF SILICIDE TYPE OXIDATION
RESISTANT COATINGS FOR MOLYBDENUM WAS INITIATED IN
PACK CEMENTATION TYPE EQUIPMENT BUT THE MAJOR
DEVELOPMENTAL ACCOMPLISHMENTS WERE MADE IN THE
FLUIDIZED BED TYPE PROCESS EQUIPMENT, THE EFFECT
OF TEMPERATURE ON COATING RATE IS SUCH THAT THERE IS
A DISCONTINUITY IN THE REGION OF 1600 F, THE
COATING RATE INCREASES WITH INCREASING TEMPERATURE
BOTH ABOVE AND BELOW THE DISCONTINUITY BUT COATING
RATES ARE MUCH HIGHER BELOW 1600 F THAN THEY ARE IN
THE HIGHER TEMPERATURE REGION, THIS CHANGE IN
COATING RATE IS CLOSELY ASSOCIATED WITH WHAT HAS
SUBSEQUENTLY BEEN IDENTIFIED AS A PHASE
TRANSFORMATION, COATINGS PRODUCED AT TEMPERATURES
BELOW ABOUT 1600 F ARE PRIMARILY HEXAGONAL
MOSI₂ WHILE THOSE FORMED ABOVE 1600 F ARE
TETRAGONAL MOSI₂, OXIDATION LIFE AND
TEMPERATURE CAPABILITY APPEAR TO BE FUNCTIONS
PRIMARILY OF COATING THICKNESS WHILE EMITTANCE IS
PRIMARILY A FUNCTION OF SURFACE CONTAMINATION PERHAPS
INFLUENCED BY SURFACE ROUGHNESS, (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 909

MARTIN CO BALTIMORE MD

DYNA-SOAR LAUNCH COMPLEX SAFETY PROCEDURE, (U)

OCT 61 1V KERR, J. R. :

REPT. NO. OS63 61

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCHING SITES, SAFETY), HAZARDS, LIQUID
ROCKET PROPELLANTS, IGNITION, PROTECTIVE CLOTHING,
WARNING SYSTEMS, FIRES, EXPLOSIONS, BOOST-GLIDE
VEHICLES, LAUNCH VEHICLES (AEROSPACE), FIRE SAFETY,
GUIDED MISSILE SAFETY (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THIS DOCUMENT DEFINES THOSE PROCEDURES AND POLICIES
NECESSARY TO MINIMIZE AND, WHERE POSSIBLE, ELIMINATE
HAZARDOUS EXPOSURE TO PERSONNEL AND PROPERTY. THIS
PROCEDURE IS PREPARED AS A PART OF THE SAFETY AND
HEALTH PROGRAM FOR ALL DYNASOAR STEP 1 MISSILE
SYSTEMS AND COMPONENTS TESTS AT THE AMR LAUNCH
COMPLEX. REQUIREMENTS DESCRIBED ARE BINDING ON ALL
OS STEP 1 LAUNCH COMPLEX PERSONNEL, INCLUDING
SYSTEM AND ASSOCIATE CONTRACTORS PERSONNEL, MILITARY
PERSONNEL, AND VISITORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 907

MARTIN CO BALTIMORE MD

DYNA SOAR STEP I, AIRBORNE MALFUNCTION DETECTION
SYSTEM SPECIFICATION.

(U)

AUG 61 15P MAAG, K. R. :

REPT. NO. MB 564

CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), (•LAUNCH VEHICLES (AEROSPACE),
MALFUNCTIONS), BOOSTER MOTORS, DETECTORS, ELECTRONIC
EQUIPMENT, DISPLAY SYSTEM, SPECIFICATIONS, AIRBORNE,
ABORT, AERODYNAMIC CHARACTERISTICS, PITCH, ROLL, YAW,
ELECTRICAL EQUIPMENT, SWITCHING CIRCUITS
IDENTIFIERS: 1961, X-20 SPACECRAFT

(U)

(U)

A SPECIFICATION IS PRESENTED OF THE PERFORMANCE AND
GENERAL DESIGN REQUIREMENTS FOR THE AIRBORNE
BOOSTER MALFUNCTION DETECTION SYSTEM OF THE
DYNA SOAR STEP I BOOSTER. THIS
SPECIFICATION SHALL BE USED AS THE CONTRACTUAL
DOCUMENT TO DESCRIBE THE REQUIREMENTS OF THE MDS OF
THE BOOSTER PORTION OF THE AIR VEHICLE.
(AUTHOR)

(U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 904

MARTIN CO BALTIMORE MD

DYNA SOAR STEP I GROUND INSTRUMENTATION SYSTEMS
SPECIFICATION, (U)

AUG 61 37P AKRE, R. C. I

REPT. NO. MB554

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (*GROUND SUPPORT EQUIPMENT,
INSTRUMENTATION), LAUNCH VEHICLES (AEROSPACE), LAUNCHING
SITES, QUALITY CONTROL, TELEMETER SYSTEMS, DATA STORAGE
SYSTEMS, DESIGN, PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THE PERFORMANCE AND GENERAL DESIGN REQUIREMENTS ARE
PRESENTED FOR THE GROUND INSTRUMENTATION
SYSTEMS TO BE USED WITH THE DYNA SOAR STEP
I BOOSTER PROGRAM, (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 968

BOEING CO SEATTLE WASH
DEVELOPMENT OF OXIDATION RESISTANT COATINGS FOR
MOLYBDENUM. (U)

DEC 62 1V GUNDERSON, JOSEPH M. ;
REPT. NO. D2 81109
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•MOLYBDENUM ALLOYS, REFRACTORY COATINGS),
(•REFRACTORY COATINGS, MOLYBDENUM ALLOYS),
(•MANUFACTURING METHODS, REFRACTORY COATINGS), GAS FLOW,
IODINE, SILICON, SILICIDES, CERAMIC COATINGS, TITANIUM
ALLOYS, ZIRCONIUM ALLOYS, OXIDATION, INHIBITION,
THICKNESS, CRYSTAL STRUCTURE, EMISSIVITY, PHASE STUDIES,
HIGH TEMPERATURE RESEARCH (U)
IDENTIFIERS: 1963, Mo-0.5% Ti, TZM MOLYBDENUM ALLOY,
X-20 SPACECRAFT (U)

THE DEVELOPMENT OF SILICIDE TYPE OXIDATION
RESISTANT COATINGS FOR MOLYBDENUM WAS INITIATED IN
PACK CEMENTATION TYPE EQUIPMENT BUT THE MAJOR
DEVELOPMENTAL ACCOMPLISHMENTS WERE MADE IN THE
FLUIDIZED BED TYPE PROCESS EQUIPMENT, THE EFFECT
OF TEMPERATURE ON COATING RATE IS SUCH THAT THERE IS
A DISCONTINUITY IN THE REGION OF 1600 F, THE
COATING RATE INCREASES WITH INCREASING TEMPERATURE
BOTH ABOVE AND BELOW THE DISCONTINUITY BUT COATING
RATES ARE MUCH HIGHER BELOW 1600 F THAN THEY ARE IN
THE HIGHER TEMPERATURE REGION, THIS CHANGE IN
COATING RATE IS CLOSELY ASSOCIATED WITH WHAT HAS
SUBSEQUENTLY BEEN IDENTIFIED AS A PHASE
TRANSFORMATION, COATINGS PRODUCED AT TEMPERATURES
BELOW ABOUT 1600 F ARE PRIMARILY HEXAGONAL
MO₅Si₂ WHILE THOSE FORMED ABOVE 1600 F ARE
TETRAGONAL MO₅Si₂, OXIDATION LIFE AND
TEMPERATURE CAPABILITY APPEAR TO BE FUNCTIONS
PRIMARILY OF COATING THICKNESS WHILE EMITTANCE IS
PRIMARILY A FUNCTION OF SURFACE CONTAMINATION PERHAPS
INFLUENCED BY SURFACE ROUGHNESS, (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 909

MARTIN CO BALTIMORE MD

DYNA-SOAR LAUNCH COMPLEX SAFETY PROCEDURE, (U)

OCT 61 1V KERR, J. R. I

REPT. NO. DS63 61

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCHING SITES, SAFETY), HAZARDS, LIQUID
ROCKET PROPELLANTS, IGNITION, PROTECTIVE CLOTHING,
WARNING SYSTEMS, FIRES, EXPLOSIONS, BOOST-GLIDE
VEHICLES, LAUNCH VEHICLES (AEROSPACE), FIRE SAFETY,
GUIDED MISSILE SAFETY (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THIS DOCUMENT DEFINES THOSE PROCEDURES AND POLICIES
NECESSARY TO MINIMIZE AND, WHERE POSSIBLE, ELIMINATE
HAZARDOUS EXPOSURE TO PERSONNEL AND PROPERTY, THIS
PROCEDURE IS PREPARED AS A PART OF THE SAFETY AND
HEALTH PROGRAM FOR ALL DYNASOAR STEP I MISSILE
SYSTEMS AND COMPONENTS TESTS AT THE AMR LAUNCH
COMPLEX, REQUIREMENTS DESCRIBED ARE BINDING ON ALL
DS STEP I LAUNCH COMPLEX PERSONNEL, INCLUDING
SYSTEM AND ASSOCIATE CONTRACTORS PERSONNEL, MILITARY
PERSONNEL, AND VISITORS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 907

MARTIN CO BALTIMORE MD

DYNA SOAR STEP I, AIRBORNE MALFUNCTION DETECTION
SYSTEM SPECIFICATION, (U)

AUG 61 15P MAAG, K. R. ;

REPT. NO. MB 564

CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), (*LAUNCH VEHICLES (AEROSPACE),
MALFUNCTIONS), BOOSTER MOTORS, DETECTORS, ELECTRONIC
EQUIPMENT, DISPLAY SYSTEM, SPECIFICATIONS, AIRBORNE,
ABORT, AERODYNAMIC CHARACTERISTICS, PITCH, ROLL, YAW,
ELECTRICAL EQUIPMENT, SWITCHING CIRCUITS (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

A SPECIFICATION IS PRESENTED OF THE PERFORMANCE AND
GENERAL DESIGN REQUIREMENTS FOR THE AIRBORNE
BOOSTER MALFUNCTION DETECTION SYSTEM OF THE
DYNA SOAR STEP I BOOSTER, THIS
SPECIFICATION SHALL BE USED AS THE CONTRACTUAL
DOCUMENT TO DESCRIBE THE REQUIREMENTS OF THE MDS OF
THE BOOSTER PORTION OF THE AIR VEHICLE.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 904

MARTIN CO BALTIMORE MD

DYNA SOAR STEP I GROUND INSTRUMENTATION SYSTEMS
SPECIFICATION, (U)

AUG 61 37P AKRE, R. C. ;

REPT. NO. MB554

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (•GROUND SUPPORT EQUIPMENT,
INSTRUMENTATION), LAUNCH VEHICLES (AEROSPACE), LAUNCHING
SITES, QUALITY CONTROL, TELEMETER SYSTEMS, DATA STORAGE
SYSTEMS, DESIGN, PERFORMANCE (ENGINEERING) (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THE PERFORMANCE AND GENERAL DESIGN REQUIREMENTS ARE
PRESENTED FOR THE GROUND INSTRUMENTATION
SYSTEMS TO BE USED WITH THE DYNA SOAR STEP
I BOOSTER PROGRAM, (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-431 902

MARTIN CO BALTIMORE MD

DYNA SOAR STEP-1, LAUNCH COMPLEX FACILITY DESIGN

CRITERIA FOR DYNA SOAR,

(U)

42

IV

WILLIAMS, S. J

REPT. NO. ER11356A

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCHING SITES, BOOST-GLIDE VEHICLES),
LAUNCH VEHICLES (AEROSPACE), SAFETY, BUILDINGS, LIQUID
ROCKET PROPELLANTS, STORAGE, LIQUID ROCKET OXIDIZERS,
CIVIL ENGINEERING, STORAGE TANKS, GROUND SUPPORT
EQUIPMENT, TEST FACILITIES, INSTRUMENTATION, MANAGEMENT
ENGINEERING (U)

IDENTIFIERS: 1962, TITAN, X-20 SPACECRAFT (U)

CONTENTS: SITE: PRIMARY AND SUPPORTING
FUNCTIONS: MISSION AND ORGANIZATIONAL CHART:
FLOW CHART: FLOW CHART NARRATIVE:
SCHEMATICS: EQUIPMENT LIST: SPECIAL
CONSIDERATIONS: AND APPENDICES. (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 885

SPERRY PHOENIX CO ARIZ
FLIGHT TEST PLAN AND FACILITY REQUIREMENTS FOR X-20
REMOTE CONTROL RECOVERY SUBSYSTEM DEVELOPMENT FLIGHT
TEST PROGRAM. (U)

FEB 63 1V

REPT. NO. REPT. NOS. 273 110 273 111273 112

CONTRACT: AF33 557 9614

UNCLASSIFIED REPORT

AVAILABILITY: MICROFILM ONLY AFTER ORIGINAL COPIES
EXHAUSTED.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, REMOTE CONTROL
SYSTEMS), LAUNCHING, LANDINGS, FLIGHT TESTING, GROUND
SUPPORT EQUIPMENT, RECOVERY, TEST VEHICLES, TRAILERS,
DESIGN, COMMUNICATION SYSTEMS, ANTENNAS, JET FIGHTER,
DRONES, DESCENT TRAJECTORIES, AERODYNAMIC
CHARACTERISTICS, FLIGHT INSTRUMENTS, TRANSPONDERS,
INSTRUMENTATION, INSTRUMENT LANDINGS, FLIGHT PATHS,
TERMINAL GUIDANCE (U)
IDENTIFIERS: 1963, F-104, X-20 SPACECRAFT (U)

THE FACILITIES REQUIRED TO SUPPORT THE DEVELOPMENT
FLIGHT TESTS OF THE X-20 REMOTE CONTROL
RECOVERY SUBSYSTEM TO BE CONDUCTED AT EDWARDS
AIR FORCE BASE, CALIFORNIA, THE REMOTE
CONTROL RECOVERY SUBSYSTEM WILL BE USED TO
RECOVER THE EARLY UNMANNED X-20 VEHICLES, TO
ACCOMPLISH THIS, TWO GROUND CONTROL STATIONS WILL BE
USED ALONG WITH TRANSPONDER AND FLIGHT CONTROL
COUPLING EQUIPMENT INSTALLED IN THE X-20 VEHICLE.
DURING THE RECOVERY OPERATION, ONE GROUND STATION,
THE ACQUISITION CONTROL CENTER (ACC), WILL
BE LOCATED AT POINT ARGUELLO, CALIFORNIA, TO
ACQUIRE THE VEHICLE AS IT APPROACHES THE WEST COAST
AFTER HAVING BEEN LAUNCHED FROM THE ATLANTIC
MISSILE RANGE, THE SECOND GROUND STATION, THE
TERMINAL CONTROL CENTER (TCC), WILL BE
LOCATED AT EDWARDS AIR FORCE BASE,
CALIFORNIA, AND WILL BE USED TO CONTROL THE
LETDOWN APPROACH AND LANDING OF THE VEHICLE,
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 883

SPERRY PHOENIX CO ARIZ
WORK STATEMENT FOR X-20 REMOTE CONTROL RECOVERY
SUBSYSTEM, (U)
DEC 62 IV
REPT. NO. 273 101
CONTRACT: AF33 657 9614

UNCLASSIFIED REPORT
AVAILABILITY: REFERENCE ONLY AT DDC HQ. AFTER
ORIGINAL COPIES EXHAUSTED,
SUPPLEMENTARY NOTE:

DESCRIPTORS: (=BOOST-GLIDE VEHICLES, REMOTE CONTROL
SYSTEMS), MANNED SPACECRAFT, RECOVERY, COMMAND GUIDANCE,
RADAR TRACKING, GLIDE PATH SYSTEM, RADAR BEACONS,
AIRBORNE, INSTRUMENTATION, TEST EQUIPMENT,
SPECIFICATIONS, TERMINAL FLIGHT FACILITIES, DESCENT
TRAJECTORIES (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT, AN/TPW-1, AN/MPS-
19, AN/APW-22, F-104 AIRCRAFT (U)

THIS DOCUMENT DEFINES THE WORK ITEMS TO BE
PERFORMED BY THE SPERRY PHOENIX COMPANY IN
PROVIDING THE REMOTE CONTROL RECOVERY
SUBSYSTEM (RCRS) FOR RECOVERY AND LANDING OF THE
UNMANNED X-20 DYNASOAR VEHICLES. THE RCRS
PROGRAM SHALL CONSIST OF FIVE PHASES AS FOLLOWS:
PHASE (1) SYSTEM DESIGN ANALYSIS, PHASE (2)
EQUIPMENT MODIFICATION AND FABRICATION, PHASE (3)
RCRS SYSTEM TEST AND EVALUATION, PHASE (4)
TEMPORARY STORAGE, AND PHASE (5) OPERATIONAL
SUPPORT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 878

RADIO CORP OF AMERICA CAMDEN N J INDUSTRIAL ELECTRONIC PRODUCTS

OPERATING PRACTICE NO. 11, CONFIGURATION AND CHANGE CONTROL X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM. (U)

DEC 62 1V

REPT. NO. OP11

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, MANAGEMENT ENGINEERING), COMMUNICATION SYSTEM, TRACKING, MANNED SPACECRAFT (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

OPERATING PRACTICE NO. 11 CONFIGURATION AAND CHANGE CONTROL X-20 (DYNA-SOAR) COMMUNICATIONS AND TRACKING SUBSYSTEM.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-43; 876

RADIO CORP OF AMERICA CAMDEN N J DEFENSE ELECTRONIC
PRODUCTS

DYNA SOAR, COMMUNICATIONS AND TRACKING
SUBSYSTEM.

(U)

DESCRIPTIVE NOTE: FAILURE REPT, TABULATION, APR-NOV
62,

NOV 62 17P

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, COMMUNICATION
EQUIPMENT), MALFUNCTIONS, FAILURE (MECHANICS),
TRACKING, TABLES, MANNED SPACECRAFT

(U)

IDENTIFIERS: 1962, X-20 SPACECRAFT

(U)

FAILURE REPORT TABULATION X-20 (DYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM - APR-NOV 62,

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 809

MARTIN CO BALTIMORE MD

PRELIMINARY PROPULSION SUBSYSTEM TEST PROGRAM, (U)

AUG 61 19P HANEY, R. W. I

REPT. NO. ER11361

CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST GLIDE VEHICLES, LAUNCH VEHICLES
(AEROSPACE)), MANNED SPACECRAFT, BOOSTER MOTORS,
RESEARCH PROGRAM ADMINISTRATION, NON-DESTRUCTIVE
TESTING (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THE REPORT DESCRIBES THE DYNASOAR STEP I
PROPULSION SUBSYSTEM TESTS NECESSARY TO DEVELOP AND
VERIFY COMPONENTS, AND SYSTEMS, AND TO DEMONSTRATE
THE FLIGHT READINESS OF THE BOOSTER VEHICLE.

(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 766

RADIO CORP OF AMERICA CAMDEN N J DEFENSE ELECTRONIC
PRODUCTS

TEST REPORT, DEI MODEL TMR-5A TELEMETRY RECEIVER
(PRELIMINARY), X-20 (DYNA-SOAR) COMMUNICATIONS AND
TRACKING SUBSYSTEM, ADDENDUM NO. 1, (U)

NOV 62 26P

REPT. NO. 4 ; CR62 4087 4 1

CONTRACT: 4 , CR62 408 7 4 1

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TELEMETERING RECEIVERS, BOOSTGLIDE
VEHICLES), COMMUNICATION SYSTEMS, TRACKING, DISTORTION,
TESTS, PULSE DISCRIMINATORS, MODULATION, MANNED
SPACECRAFT, VIDEO SIGNALS (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 689

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
X-20A DYNA-SOAR SYSTEM 620A MATERIEL SUPPORT PLAN.

(U)

JUL 63 IV

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), MANAGEMENT ENGINEERING, SCHEDULING,
LOGISTICS, GROUND SUPPORT EQUIPMENT, MILITARY
FACILITIES, TEST FACILITIES, LAUNCHING SITES,
PROCUREMENT, PRODUCTION, STORAGE, MAINTENANCE, SUPPLY
DEPOTS, QUALITY CONTROL, TRANSPORTATION, HANDLING,
PACKING MATERIALS, DATA PROCESSING SYSTEMS, GUIDED
MISSILE PERSONNEL, MAINTENANCE PERSONNEL (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE PURPOSE OF THIS PLAN IS TO DEFINE THE
PRINCIPAL ACTIONS REQUIRED TO PROVIDE MATERIAL
SUPPORT FOR THE X-20A (DYNA-SOAR) PROGRAM.
THE X-20A (DYNA-SOAR) PROGRAM IS A USAF
RESEARCH AND DEVELOPMENT EFFORT TO PRODUCE A
MISSILE BOOSTED HYPERSONIC GLIDER WITH A MULTI-ORBIT
CAPABILITY. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 520

SPERRY PHOENIX CO ARIZ

ELECTRO-INTERFERENCE CONTROL PLAN FOR AEROSPACE
GROUND EQUIPMENT, X-20 RCRS PROJECT, (U)

MAY 63 8P

REPT. NO. 273 114

CONTRACT: AF33 657 9614

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GROUND SUPPORT
EQUIPMENT), (•GROUND SUPPORT EQUIPMENT, RADIOFREQUENCY
INTERFERENCE), MANNED SPACECRAFT, RESEARCH PLANES,
ELECTRONIC EQUIPMENT, ANALYSIS, RADAR EQUIPMENT, DATA
PROCESSING SYSTEMS, FEASIBILITY STUDIES, TEST METHODS,
ELECTROMAGNETIC SHIELDING, ELECTRIC INSULATION, GROUND
(ELECTRICAL) (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

A DESCRIPTION IS PRESENTED OF A PLAN TO CONTROL
ELECTRO-INTERFERENCE IN THE GROUND EQUIPMENT
ASSOCIATED WITH THE X-20 GLIDER RCRS AT THE
SEVERAL TEST SITES. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 333

MARTIN CO DENVER COLO
INTERFACE SPECIFICATION, MANNED SPACECRAFT (X-20A) TO
STANDARDIZED SPACE LAUNCHING SYSTEM IFS-T11121000
PROGRAM 24A, (U)
MAY 63 1V

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, STANDARDIZATION),
(•LAUNCH VEHICLES (AEROSPACE), STANDARDIZATION),
(•GUIDED MISSILE COMPONENTS, STANDARDIZATION),
CONFIGURATION, COMPATIBILITY, TESTS, NOISE, MANNED
SPACECRAFT, SPECIFICATIONS, ATTACHMENT, JOINTS (U)
IDENTIFIERS: 1963, TITAN 3, X-20 SPACECRAFT,
INTERFACES (U)

THE INTENT OF THIS INTERFACE SPECIFICATION IS
TO PROVIDE SYSTEMATIC AND ENFORCEABLE CONFIGURATION
CONTROL FOR THE EQUIPMENT AND SYSTEMS FURNISHED BY
THE 6202A PROGRAM AND THE MARTIN COMPANY, AND
TO SERVE AS INTERFACE BASE LINE DEFINITION.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 219

BOEING CO SEATTLE WASH
WATER WALL CONSTRUCTION;

(U)

IV KAY, W. W. ; DAWLEY, R. A. ;

REA, S. E. ;

REPT. NO. D2 80603.

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, *SPACECRAFT CABINS),
(*SPACECRAFT CABINS, THERMAL INSULATION), MANUFACTURING
METHODS, CONSTRUCTION, PANELS (STRUCTURAL), WATER,
MATERIALS, HALOCARBON PLASTICS, PRESSURE, MAINTENANCE,
HANDLING, HEAT SHIELDS (U)

IDENTIFIERS: 1963, TEFLON, WATER WALL, X-20 (U)
SPACECRAFT (U)

THE PROCEDURES TO BE USED IN THE FABRICATION,
FILLING AND REPAIRING OF THE X-20 WATER WALL ARE
PRESENTED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-43; 214

BOEING CO SEATTLE WASH

DEVELOPMENT TESTS OF X-20A SHF ANTENNAS AND
WAVEGUIDES, (U)

NOV 63 174P

MORCHIN, W. C. ;

REPT. NO. T2. 2641

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ANTENNAS, BOOST-GLIDE VEHICLES),
(*AIRPLANE ANTENNAS, SUPERHIGH FREQUENCY), (*WAVEGUIDES,
GAS LEAKS), TESTS, PRESSURE, BOOST-GLIDE VEHICLES,
FLIGHT TESTING, SIMULATION, VIBRATION, TEMPERATURE,
ELECTRICAL PROPERTIES, C BAND, K BAND, X BAND,
TRANSMISSION LINE, GASES, TEST METHODS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THE TESTS WERE DEVELOPMENTAL TESTS ON THE X-20 ANTENNA SYSTEM COMPONENTS TO VERIFY PROPER DESIGN AND TO OBTAIN INFORMATION ON GAS LEAKAGE AND ELECTRICAL CHARACTERISTICS OF THE COMPONENTS. THE TEST PERIOD EXTENDED FROM SEPTEMBER 1962 TO OCTOBER 1963 AND WAS AN EXTENSION OF EARLIER TESTS. THE TESTS ENCOMPASSED BENCH LEVEL PRESSURE TESTS, VIBRATION-PRESSURE TESTS, AND TEMPERATURE-PRESSURE TESTS ON THE X-20 ANTENNAS AND WAVEGUIDES. GAS LEAKAGE MEASUREMENTS WERE MADE UNDER BENCH LEVEL, VIBRATION AND TEMPERATURE ENVIRONMENTS TO OBTAIN INFORMATION WITH WHICH TO DESIGN THE X-20 ANTENNA PRESSURIZATION SYSTEM. THE TEST ENVIRONMENTS WERE ADJUSTED TO SIMULATE THOSE EXPECTED FOR THE X-20. WAVEGUIDE LOSS MEASUREMENTS WERE MADE TO OBTAIN ELECTRICAL DESIGN INFORMATION. THE ANTENNAS AND WAVEGUIDES WERE MADE AS CLOSELY AS POSSIBLE TO PRODUCTION DRAWINGS USING SPECIFIED MATERIALS. THE BASIC BODY OF THE REPORT CONSISTS OF THE TEST PROCEDURE USED, RESULTS OBTAINED, AND DISCUSSION OF THE DATA INTERPRETATION. THE TEST PROCEDURE PORTION OF THE DOCUMENT IS DIVIDED ACCORDING TO TEST FUNCTION SUCH AS BENCH LEVEL, VIBRATION OR TEMPERATURE. THE RESULTS ARE RELATED ACCORDING TO THE COMPONENT TESTED FOLLOWING THE MAJOR CATEGORY OF CONCERN SUCH AS GAS LEAKAGE, MECHANICAL VERIFICATION OR ELECTRICAL PROPERTIES. INTERPRETATION OF THE DATA IS GIVEN UNDER THE MAJOR CATEGORIES.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 149

GENERAL ELECTRIC CO PHILADELPHIA PA MISSILE AND SPACE
DIV

INVESTIGATION OF TOXIC PROPERTIES OF MATERIALS USED
IN SPACE VEHICLES. (U)

DESCRIPTIVE NOTE: REPT, FOR MAR 62-JAN 63,

43 162P OLEWINSKI, W. J.; RAPIER,

G.; SLAWECKI, T. K.; WARNER, H.;

REPT. NO. 63SD795

CONTRACT: AF33 657 8029

PROJ: AF-6302

TASK: 630203

MONITOR: AMRL

TDR63 99

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MATERIALS, TOXICITY), (*POLYMERS,
BIBLIOGRAPHY), (*BIBLIOGRAPHY, MATERIALS), ORGANIC
MATERIALS, SPACECRAFT CABINS, SPACECRAFT, DETECTION,
CONTAMINATION, GASES, VAPORS, GAS DETECTORS, PARTICLES,
TEST METHODS, INSTRUMENTATION, IDENTIFICATION, THERMAL
STRESSES, STRESSES, MONITORS, BIOLOGY, POLYMERS,
DEGRADATION, TEMPERATURE, SPECTROPHOTOMETERS, GAS
ANALYSIS, PYROLYSIS (U)

IDENTIFIERS: DYNA SOAR, TOXIC OFF-GASSING, DETECTION
KITS, CONTAMINANTS, APOLLO, MERCURY, GEMINI, 1963 (U)

THE OBJECTIVES OF THIS PROGRAM WERE: (1) TO
COMPILE LISTS OF MATERIALS PRESENTLY USED OR PROPOSED
FOR USE IN SPACECRAFT - SPECIFICALLY, THE APOLLO,
MERCURY, GEMINI, AND DYNA-SOAR PROGRAMS - AND
TO AND TO ASSESS THE POSSIBLE TOXIC PROPERTIES AND
BREAKDOWN PRODUCTS OF THESE MATERIALS UNDER THERMAL
AND OTHER ANTICIPATED STRESSES AND (2) TO
EVALUATE METHODS FOR THE DETECTION AND IDENTIFICATION
OF SPACE CABIN CONTAMINANTS FOR THE PURPOSE OF
COMPILING THE REQUIREMENTS, METHODS, AND
SPECIFICATIONS ON AVAILABLE INSTRUMENTATION, THESE
IN TURN CAN SERVE AS THE BASIS FOR DEVELOPMENT OF A
COMPACT KIT FOR DETECTION OF TOXIC OFF-GASSING FROM
MATERIALS EMPLOYED IN SPACE VEHICLES, FOR OTHER
THAN SHORT DURATION MISSIONS, MONITORING
INSTRUMENTATION MUST BE CAPABLE OF THE DETECTION AND
IDENTIFICATION OF A WIDE VARIETY OF TOXIC
CONTAMINANTS, SOME OF WHICH MAY NOT HAVE BEEN
ANTICIPATED, A HIGHLY SENSITIVE MULTIPLE GAS
DETECTOR, EITHER DIRECTLY OR IN COMBINATION WITH A
TRACE GAS SEPARATION AND CONCENTRATION TECHNIQUE,
APPEARS TO BE A DESIRABLE APPROACH. (AUTHOR) (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 136

HONEYWELL INC ST PETERSBURG FLA
X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM,
RELIABILITY DETAILED SYSTEM ANALYSIS, SUPPLEMENT. (U)
IV.

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GUIDANCE),
(•GUIDANCE, BOOST-GLIDE VEHICLES), GROUND SUPPORT
EQUIPMENT, RELIABILITY, ANALYSIS, TEST EQUIPMENT,
LAUNCHING, CONTROL, FAILURE (MECHANICS), INERTIAL
GUIDANCE, MAINTENANCE, CHECKOUT PROCEDURES, MEASUREMENT,
POWER SUPPLIES, DIGITAL COMPUTERS, ACCELEROMETERS, GYRO
COMPASSES, SIMULATION, MALFUNCTIONS, DETECTORS,
ELECTRONIC EQUIPMENT, DATA, MONITORS, MANNED SPACECRAFT,
RESEARCH PLANES (U)

IDENTIFIERS: 1963, AEROSPACE GROUND EQUIPMENT, X-20
SPACECRAFT, AUXILIARY EQUIPMENT (U)

THIS REPORT SUPPLEMENTS MH AERO REPORT 1179-
SR-7F, REVISION C, DATED 31 DECEMBER 1962.

THE CURRENT ANALYSIS COVERS AGE RELIABILITY,
WHEREAS THE DECEMBER 1962 REPORT COVERED IGS
RELIABILITY ONLY, THE AGE RELIABILITY ANALYSIS
IS SEPARATED INTO THREE DISTINCT AREAS: (1)

TEST SETS, (2) LAUNCH CONTROL
EQUIPMENT, AND (3) AUXILIARY EQUIPMENT.

BRIEF, FUNCTIONAL DESCRIPTIONS, BLOCK DIAGRAMS,
PARTS INVENTORY, AND FAILURE RATES ARE INCLUDED FOR
EACH ASSEMBLY FOR WHICH INFORMATION IS AVAILABLE.
THE RELIABILITY ANALYSIS FOR AGE TEST SETS IS
PRESENTED FOR EACH INDIVIDUAL TEST SET. NO ATTEMPT
HAS BEEN MADE TO ANALYZE THE RELIABILITY OF AGE
TEST SETS AS A SINGLE ENTITY. LIKEWISE, NO
ATTEMPT HAS BEEN MADE TO ESTIMATE THE RELIABILITY OF
AUXILIARY EQUIPMENT IN A SERIES CONFIGURATION; EACH
OF THE EQUIPMENTS IS PRESENTED INDIVIDUALLY. THE
DETAILED RELIABILITY ANALYSIS FOR THE LAUNCH
CONTROL EQUIPMENT IS NOT AVAILABLE FOR THIS
REPORT. THE RELIABILITY ANALYSIS WILL BE UPDATED
AS REQUIRED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-431 134

HONEYWELL INC ST PETERSBURG FLA

X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, SLED

TEST OPERATION PLAN,

(U)

42P

STEPHENSON, S. K. ;

REPT. NO. 1179SR13

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GUIDANCE),
(•GUIDANCE, BOOST-GLIDE VEHICLES), TESTS, TEST METHODS,
SLEDs, SCHEDULING, DATA, RELIABILITY, REPORTS,
ENVIRONMENTAL TESTS, FLIGHT TESTING, STRESSES,
ACCELERATION, VIBRATION, INERTIAL GUIDANCE, CALIBRATION,
TEST FACILITIES, VELOCITY, MEASUREMENT, SIMULATION,
GROUND SUPPORT EQUIPMENT, TELEMETER SYSTEMS, LAUNCHING,
PROGRAMMING (COMPUTERS), DATA PROCESSING SYSTEMS, MANNED
SPACECRAFT, RESEARCH PLANES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THIS SLED TEST OPERATION PLAN PRESENTS THE
OBJECTIVES AND PROCEDURES FOR SLED TESTING THE X-
20A (DYNA-SOAR) INERTIAL GUIDANCE
SUBSYSTEM. THESE TESTS ARE AN INTEGRAL PORTION
OF THE DESIGN AND DEVELOPMENT TEST PROGRAMS AS
REQUIRED FOR THE FULFILLMENT OF THE CONTRACT,
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 052

BOEING CO SEATTLE WASH

FABRICATION REQUIREMENTS FOR CRYOGENIC TANKS, (U)

NOV 63 20P CRANE, C. H. :

REPT. NO. D2 80535

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•PRESSURE VESSELS, MANUFACTURING METHODS),
CRYOGENICS, PROPELLANT TANKS, MILITARY REQUIREMENTS,
BOOST-GLIDE VEHICLES, MANNED SPACECRAFT, MACHINING,
ALUMINUM, WELDING, HEAT TREATMENT, CLEANING, TESTS,
OXYGEN, HYDROGEN, NITROGEN, VACUUM, LIQUEFIED GASES (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

REQUIREMENTS ARE PRESENTED FOR ALL PRESSURE VESSELS
AS WELL AS TO SUPPLEMENT MATERIAL AND PROCESS
SPECIFICATIONS WHERE SUCH SPECIFICATIONS ARE NOT
ADEQUATE. THIS DOCUMENT CONTROLS THE FOLLOWING
PRESSURE VESSEL ASSEMBLIES AND THEIR COMPONENT PARTS:
HYDROGEN TANK, OXYGEN TANK, AND NITROGEN TANK.

(AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 039

HONEYWELL INC ST PETERSBURG FLA

X-20 (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM

ENVIRONMENTAL TEST PLAN;

(U)

DEC 62 1V MILNES, R. ; TAKASUGI, J. ;

REPT. NO. 1179SR18

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, GUIDANCE),
(*GUIDANCE, BOOST-GLIDE VEHICLES), MANNED SPACECRAFT,
RESEARCH PLANES, TEST METHODS, TEST, ENVIRONMENTAL
TESTS, RELIABILITY, SPECIFICATIONS, ERRORS, PERFORMANCE
(ENGINEERING), ACCELERATION, STABILIZED PLATFORM,
MEASUREMENT, DIGITAL COMPUTER, MOTOR GENERATORS, TEST
EQUIPMENT, SCHEDULING, DATA, RADIO FREQUENCY,
INTERFERENCE, TEMPERATURE, PRESSURE, HUMIDITY,
VIBRATION, SHOCK (MECHANICS), DATA PROCESSING SYSTEMS (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

THE X-2 (DYNA-SOAR) ENVIRONMENTAL TEST
PLAN IS SUBMITTED, THE PURPOSE OF THE PLAN BEING TO
PROVIDE A TEST PROGRAM FOR GIVING CONFIDENCE IN THE
OPERATIONAL CAPABILITIES OF THE X-20 PRIMARY
GUIDANCE SUB-SYSTEM (PGS) DURING ENVIRONMENTAL
EXTREMES AS OUTLINED IN THE X-20 PGS MODEL
SPECIFICATION. (AUTHOR) (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-431 035

MARTIN CO BALTIMORE MD

BOOSTER DESIGN ANALYSIS FOR RELIABILITY. DYNA SOAR,
STEP-1, (U)

AUG 61 92P BOSS, R. E. I

REPT. NO. DS32 61REV, A

CONTRACT: AF04 647 610

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (LAUNCH VEHICLES (AEROSPACE),
RELIABILITY), BOOST-GLIDE VEHICLES, FLIGHT TESTING,
ELECTRICAL EQUIPMENT, HYDRAULIC SYSTEMS, BOOSTER MOTORS,
SECOND STAGE MOTORS, ACTUATORS, FLIGHT CONTROL SYSTEMS,
FUEL SYSTEMS, STRUCTURES, FAILURE (MECHANICS), DESIGN,
ROCKET MOTORS (LIQUID PROPELLANT) (U)

IDENTIFIERS: 1961, TITAN, TITAN 2, X-20

SPACECRAFT (U)

THE RESULTS OF THE PRELIMINARY REVIEW OF THE DSI
AIRBORNE EQUIPMENT DESIGN ARE PRESENTED, TOGETHER
WITH A CALCULATION OF THE PREDICTED RELIABILITY OF
THE AIRBORNE SYSTEM. PRESENTLY IDENTIFIED PROBLEM
AREAS ARE LISTED, WITH RECOMMENDATIONS FOR
CORRECTIVE ACTION. INITIAL CALCULATIONS INDICATE
THAT THE BOOSTER SYSTEM IS CAPABLE OF REACHING ITS
PRESCRIBED GOAL OF .90 PRESUMING ATTAINMENT OF GOALS
BY THE ENGINE AND RADIO GUIDANCE SYSTEM ASSOCIATE
CONTRACTORS. (AUTHOR) (U)

UNCLASSIFIED

015416

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-431 033

HONEYWELL INC ST PETERSBURG FLA

GROUND SUPPORT SYSTEM SPECIFICATION (TEST OPERATION
PLAN), VOLUME I, PART I, (U)

JUL 61 72P ROHLFS, I. G. ;

REPT. NO. 1179R ED21065 REV. A

CONTRACT: AF33 600 42569

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, INERTIAL GUIDANCE),
(•INERTIAL GUIDANCE, CHECKOUT PROCEDURES), MILITARY
REQUIREMENTS, GROUND SUPPORT SYSTEMS, ELECTRONIC
EQUIPMENT, TEST METHODS (U)

IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THE CHRONOLOGICAL SEQUENCE IS PRESENTED OF
OPERATIONAL SUPPORT EVENTS THAT MUST OCCUR FROM
DELIVERY OF THE PRIMARY GUIDANCE SUBSYSTEM
(PGS) THROUGHOUT THE COMPLETE CYCLE OF EMPLOYMENT
OF THE PRIMARY GUIDANCE SUBSYSTEM AS AN
INTEGRATED PART OF THE GLIDER VEHICLE IN THE AIR
LAUNCH AND GROUND LAUNCH TEST PROGRAMS.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 990

BOEING CO SEATTLE WASH

QUALIFICATION TEST PROCEDURES FOR WATER WALL. (U)

JUL 63 18P MILLER, CHARLES B. I

REPT. NO. D2 80803.2

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (SPACECRAFT CABINS, THERMAL INSULATION),
(LAUNCH VEHICLES (AEROSPACE), SPACECRAFT CABINS), HEAT
SHIELDS, WATER, TESTS, TEST METHODS, TEST EQUIPMENT,
ACCEPTABILITY, RELIABILITY, QUALITY CONTROL,
INSTALLATION (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, WATER WALL (U)

THE TEST PROCEDURES DEMONSTRATE THAT THE WATER
WALL ASSEMBLIES CAN BE FABRICATED PER DRAWING AND
THAT THESE ASSEMBLIES ALONG WITH THE ASSOCIATED
INSTALLATION ATTACHMENTS WILL MEET THE TEST
REQUIREMENTS. (AUTHOR) (U)

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015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-430 884

BOEING CO SEATTLE WASH

GLIDER AND GLIDER/BOOSTER TRANSITION STATIC TEST
REQUIREMENTS, (U)

44 1V ROUNDS, D. A. ;

REPT. NO. D2 6793 1

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, TEST METHODS),
MANNED SPACECRAFT, GLIDERS, STRUCTURES, NON-DSTRUCTIVE
TESTING, SPECIFICATION, 2LOADING (MECHANICS),
AERODYNAMIC LOADING, SIMULATION, AIRFRAMES, WINDSHIELDS,
AIRPLANE PANELS, AERODYNAMIC CONTRL SURFACES, THERMAL
STRESSES, DEFLECTION, PITCH (MOTION), YAW (U)
IDENTIFIERS: 1964, X-20 SPACECRAFT, TRANSTAGE,
STRUCTURAL INTEGRITY (U)

THIS DOCUMENT DETAILS THE STRUCTURES TECHNOLOGY
POSITION ON TEST REQUIREMENTS AND PLANS FOR A MINIMAL
GROUND VERIFICATION STATIC TEST PROGRAM FOR THE
PRIMARY STRUCTURE OF THE GLIDER AND GLIDER/BOOSTER
TRANSITION SECTION. D2-6793-1 IS AN IN-HOUSE
WORKING PUBLICATION AND, AS SUCH, DOES NOT CONSTITUTE
THE OFFICIAL PROGRAM TEST REQUIREMENTS FOR STATIC
TEST. THIS DOCUMENT SERVES AS THE MEANS FOR
TRANSMITTAL OF STRUCTURES TECHNOLOGY GROUND
VERIFICATION STATIC TEST REQUIREMENTS FOR THE PRIMARY
STRUCTURE OF THE GLIDER AND GLIDER/BOOSTER TRANSITION
SECTION TO THOSE WRITING THE CONTRACTUAL DETAIL PLANS
AND TEST REQUIREMENTS DOCUMENTS. (AUTHOR20 (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-430 875

BOEING CO SEATTLE WASH

QUALIFICATION TEST REQUIREMENTS FOR WATER WALL, (U)

JUL 63 12P KAY, W. ;

REPT, NO. D2 80803 1

CONTRACT: DA91-591-EUC-2644

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•SPACECRAFT CABINS, THERMAL INSULATION),
(•LAUNCH VEHICLES (AEROSPACE), SPACECRAFT CABINS), HEAT-
SHIELDS, WATER, TESTS, TEST METHODS, ENVIRONMENTAL
TESTS, SPECIFICATIONS, ACCEPTABILITY, SPACE
ENVIRONMENTAL CONDITIONS, STRUCTURAL PROPERTIES,
MILITARY REQUIREMENTS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, WATER WALL (U)

THIS DOCUMENT DEFINES THE REQUIREMENTS FOR THE
QUALIFICATION TESTS OF THE WATER WALLS OF THE
ENVIRONMENTAL CONTROL SUBSYSTEM, PRIMARILY THESE
TESTS DEMONSTRATE ONLY THAT THE WATER WALL IS
STRUCTURALLY ADEQUATE TO WITHSTAND FLIGHT
ENVIRONMENT. HOWEVER, COUPLED TOGETHER WITH THE
WATER WALL DEVELOPMENT TESTS, THE INTEGRITY AND
ADEQUACY OF THE WATER WALL TO FULLY MEET ALL OF ITS
REQUIREMENTS IS SUBSTANTIATED, THESE TESTS
INCLUDED THERMAL-ALTITUDE, VIBRATION, ACOUSTICAL AND
STRENGTH OF ATTACHMENT PARTS, IN ADDITION, THE
WATER WALL WILL BE TESTED IN CONJUNCTION WITH THE
ENVIRONMENTAL TEST MODEL, (AUTHOR) (U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 850

HONEYWELL INC ST PETERSBURG FLA

X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, X-20A

(DYNA-SOAR) PGS RADIO FREQUENCY INTERFERENCE (RFI).

DETAILED TEST PLAN,

(U)

MAY 63

1V

SCHMIDT, A. P., GOBLE, J. A. :

REPT. NO. 1179SR22

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, GUIDANCE).

(•GUIDANCE, BOOST-GLIDE VEHICLES), RADIOFREQUENCY

INTERFERENCE, TEST METHODS, TESTS, TEST EQUIPMENT,

FREQUENCY, INERTIAL GUIDANCE, MOTOR GENERATORS,

ELECTRONIC EQUIPMENT, STABILIZED PLATFORMS, DIGITAL

COMPUTERS, CALIBRATION, MEASUREMENT, DATA, MANNED

SPACECRAFT, RESEARCH PLANES

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

THE PURPOSE OF THIS DOCUMENT IS TO DELINEATE AND
DEFINE THE INTERFERENCE TEST METHODS, PROCEDURES AND
CONFIGURATIONS NECESSARY TO DEMONSTRATE COMPLIANCE
OF THE PGS TO APPLICABLE PORTIONS OF MIL-I-26600
FOR CLASS I EQUIPMENT. (AUTHOR)

(U)

UNCLASSIFIED

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 830

BOEING CO SEATTLE WASH

FIRE PROTECTION AND SAFETY SUBSYSTEM, PERFORMANCE
SPECIFICATION FOR.

(U)

JUN 61

1V

COWLEY, R. T.; KJOSNESS, D. M.

REPT. NO. D2 8098

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, FIRE SAFETY),
SPECIFICATIONS, VENTILATION, NITROGEN, PRESSURE, FUEL
SYSTEMS

(U)

IDENTIFIERS: 1961, X-20 SPACECRAFT, PURGE

(U)

SPECIFICATIONS ARE GIVEN FOR THE PERFORMANCE,
DESIGN DEVELOPMENT, AND TESTING REQUIREMENTS OF THE
FIRE PROTECTION AND SAFETY SUBSYSTEM OF THE GLIDER
SYSTEM. THIS SPECIFICATION INCLUDES THE FOLLOWING
TABS: PRE-LAUNCH NITROGEN PURGE SECONDARY
SUBSYSTEM, AIR VENTILATION SECONDARY SUBSYSTEM, AND
INFLIGHT NITROGEN PURGE SECONDARY SUBSYSTEM.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 792

RAYTHEON CO WALTHAM MASS

FUNCTIONAL INTEGRATION TEST PLAN (PRELIMINARY). X-20
(DYNA-SOAR) COMMUNICATIONS AND TRACKING

SUBSYSTEM,

(U)

NOV 62 139P

REPT. NO. CR62 408 15 3 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ELECTRONIC EQUIPMENT, BOOSTGLIDE
VEHICLES), (*BOOST-GLIDE VEHICLES, ELECTRONIC
EQUIPMENT), (*TEST METHODS, ELECTRONIC EQUIPMENT),
TESTS, AIRBORNE, GROUND SUPPORT EQUIPMENT, RADIO
TRANSMITTERS, TRANSMITTER RECEIVERS, ANTENNAS, RADIO
RECEIVERS, VERY HIGH FREQUENCY, ULTRA HIGH FREQUENCY,
TRANSPONDERS, C-BAND (U)
IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

A PRELIMINARY FUNCTIONAL INTEGRATION TEST
PLAN FOR THE X-20 (DYNA-SOAR)
COMMUNICATIONS AND TRACKING SUBSYSTEM IS
PRESENTED. THE PLAN INCLUDES THE DETAILED LISTING
OF THE TESTS TO BE PERFORMED DURING THE FUNCTIONAL
INTEGRATION PHASE OF THE DEVELOPMENT TEST TO BE
PERFORMED AT THE RCA NEW CASTLE ENGINEERING
FACILITY (NCEF), NEW CASTLE, DELAWARE.
FIVE AREAS ARE CONSIDERED: AIRBORNE PRIME
EQUIPMENT, AIRBORNE PRIME/AGE EQUIPMENT,
SURFACE PRIME EQUIPMENT, SURFACE PRIME AGE
EQUIPMENT, INTEGRATED SYSTEM TESTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 790

RAYTHEON CO WALTHAM MASS

GROUND INSTRUMENTATION PLAN FOR DEVELOPMENT TEST
PROGRAM, X-20 (DYNA-SOAR) COMMUNICATIONS AND
TRACKING SUBSYSTEM, (U)

NOV 63 1V

REPT. NO. CR63 40B 15 1 5 1

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TEST FACILITIES, INSTRUMENTATION),
(*BOOST-GLIDE VEHICLES, DATA PROCESSING SYSTEMS), (*DATA
PROCESSING SYSTEMS, TEST FACILITIES), MANNED SPACECRAFT,
TRACKING, GROUND SUPPORT EQUIPMENT, DATA TRANSMISSION
SYSTEMS, MAGNETIC RECORDING SYSTEMS, MAGNETIC TAPE, TEST
EQUIPMENT (ELECTRONICS), PHOTOGRAPHIC RECORDING SYSTEMS,
RADIO COMMUNICATION SYSTEMS, ULTRA HIGH FREQUENCY,
INTERCOMMUNICATION SYSTEMS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, AN/GRC-27, AN/AIC-

10 (U)

CONTENTS: SYSTEM COMPOSITION-MAGNETIC TAPE
RECORDER/REPRODUCER SYSTEM, CTS SIGNAL PROCESSING
EQUIPMENT, TEST AND RECORDING EQUIPMENT,
PHOTOPANEL CAMERA AND BORESIGHT CAMERA, RANGE
SAFETY TONES, INTERCOMMUNICATIONS SET AN/AIC-10,
UHF RADIO SET AN/GRC-27; DATA SIGNALS;
SIGNAL CONDITIONING; DATA REDUCTION, (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 788

RADIO CORP OF AMERICA CAMDEN N J DEFENSE ELECTRONIC PRODUCTS

PROGRAM PLAN SHF COMMUNICATIONS SITE SURVEY AT EDWARDS AIR FORCE BASE, DYNA SOAR (STEP I) COMMUNICATIONS AND TRACKING SUBSYSTEM, (U)

SEP 61 14P

REPT. NO. CR61 408 4 21 1

CONTRACT: AF33 600 42616

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TEST FACILITIES, COMMUNICATION SYSTEMS), (•BOOST-GLIDE VEHICLES, TEST FACILITIES), (•COMMUNICATION SYSTEMS, TEST FACILITIES), INSTRUMENTATION, COMMUNICATION EQUIPMENT, SUPERHIGH FREQUENCY, TELEMETERING RECEIVERS, TELEMETERING TRANSMITTERS, TRACKING, RADIOFREQUENCY INTERFERENCE, REFLECTION, BORESIGHTING (U)
IDENTIFIERS: 1961, X-20, ATMOSPHERIC STRATIFICATION (U)

■ SITE SURVEY PROGRAM WAS INITIATED AT EDWARDS AIR FORCE BASE TO DETERMINE THE EFFECTS OF ATMOSPHERIC STRATIFICATION ON SHF COMMUNICATIONS, AND TO INVESTIGATE THE AREAS OF COMPATIBILITY BETWEEN THE DYNA SOAR COMMUNICATION AND TRACKING SUBSYSTEM AND EXISTING SYSTEMS AT EDWARDS AFB. THIS PROGRAM HAS THE FOLLOWING SPECIFIC AIMS:
(1) TO DETERMINE THE CHARACTERISTICS OF POINT-TO-POINT SHF COMMUNICATIONS BETWEEN THE SELECTED GROUND SITE AND THE POSSIBLE LANDING AREAS;
(2) TO INVESTIGATE THE PRESENCE OF ATMOSPHERIC STRATIFICATION DUE TO SEVERE THERMAL GRADIENTS;
(3) TO DETERMINE THE EFFECTS, IF ANY, OF MULTI-PATH INTERFERENCE TO THE MICROWAVE COMMUNICATION LINK TO THE NASA FACILITY DUE TO THE PRESENCE OF ADDITIONAL REFLECTING SURFACES; (4) TO DETERMINE THE FEASIBILITY OF UTILIZING THE EXISTING BORESIGHT TOWER FOR ALIGNING THE ANTENNA SYSTEM OF THE END ITEM. A PROBLEM MAY EXIST DUE TO THE PROXIMITY OF AN EXISTING WATER TOWER TO THE LINE OF SIGHT; (5) TO INVESTIGATE ANY PROBLEMS DUE TO RF INTERFERENCE. IT IS THE PURPOSE OF THIS PLAN TO DEFINE THE EQUIPMENT AND TECHNIQUES WHICH WILL BE UTILIZED IN THE SITE SURVEY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 786

RAYTHEON CO WALTHAM MASS
FACILITY REQUIREMENTS AFFTC, EDWARDS AIR FORCE BASE,
DYNA-SOAR COMMUNICATIONS AND TRACKING SUBSYSTEM, (U)

MAY 62 IV

REPT. NO. CR62 408 11 1.2

CONTRACT: AF33 657 7134

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TEST FACILITIES, BOOST-GLIDE VEHICLES),
(•BOOST-GLIDE VEHICLES, TEST FACILITIES), MANNED
SPACECRAFT, COMMUNICATION SYSTEMS, TRACKING, GROUND
SUPPORT EQUIPMENT, BUILDINGS, COMMUNICATION EQUIPMENT,
DATA TRANSMISSION SYSTEMS, SHELTERS, PERSONNEL, BORE
SIGHTING (U)

IDENTIFIERS: 1962, X-20 SPACECRAFT (U)

CONTENTS: AIRBORNE CTS FACILITY--FUNCTIONAL
AREAS, FLOOR PLANS, EQUIPMENT LISTS, PERSONNEL
FLOW, WORK FLOW, SPECIAL CONSIDERATIONS; GROUND
CTS FACILITY--FUNCTIONAL AREAS, FLOOR PLANS,
EQUIPMENT LISTS, PERSONNEL FLOW, WORK FLOW,
SPECIAL CONSIDERATIONS; CTS BORESIGHT FACILITY-
FUNCTIONS, BORESIGHT TOWER, BORESIGHT EQUIPMENT
SHELTER, EQUIPMENT LISTS, FLOOR PLANS;
COMMUNICATIONS AND DATA NETWORK REQUIREMENTS;
FLIGHT TEST CONTROL CENTER; TEST FORCE
FACILITY; APPENDIX A, COMMUNICATIONS AND
DATA NETWORK CIRCUIT DESCRIPTIONS; APPENDIX
B, BIBLIOGRAPHY, (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 772

BOEING CO SEATTLE WASH

SUMMARY OF X-20A MAJOR TECHNOLOGICAL
BREAKTHROUGHS, (U)

JAN 64 28P

REPT. NO. D2 81249

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (BOOST-GLIDE VEHICLES, RESEARCH PROGRAM
ADMINISTRATION), STRUCTURAL PARTS, BEARINGS, REFRACTORY
METALS + ALLOYS, DATA STORAGE SYSTEMS, FLIGHT CONTROL
SYSTEMS, CRYOGENICS, MAINTENANCE EQUIPMENT, QUALITY
CONTROL, SILICIDES, COATINGS, PROCESSING, IODINE,
MATERIALS (U)

IDENTIFIERS: 1964, X-20 SPACECRAFT (U)

IDENTIFYING DESCRIPTIONS ARE PRESENTED OF MAJOR
TECHNOLOGICAL BREAKTHROUGHS ACCOMPLISHED ON THE X-
20A PROGRAM, WITH REFERENCES TO SOURCE
INFORMATION FOR DETAILS OF EACH ITEM DESCRIBED.
INCLUDED ARE MATERIALS DEVELOPMENT, HARDWARE
DEVELOPMENT AND QUALITY CONTROL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO: 015416

AD-430 740

BOEING CO SEATTLE WASH

REVISED ANALYSIS X-20 VIBRATION AND ACOUSTIC ENVIRONMENT,

(U)

JAN 64 199P

SUTHERLAND, L. C. ; FURLONG, J.

C. 1

REPT, NO. D2 8109 1

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST GLIDE VEHICLES, NOISE), (*LAUNCH VEHICLES (AEROSPACE), NOISE), ENVIRONMENTAL TESTS, VIBRATION, AERODYNAMIC CHARACTERISTICS, ROCKET MOTOR NOISE, TEST EQUIPMENT (ELECTRONICS), NOISE ANALYZERS, MATHEMATICAL ANALYSIS, TEST METHODS, STAGING, TURBULENCE

(U)

IDENTIFIERS: 1964, X-20 SPACECRAFT, TITAN 3, AERODYNAMIC NOISE, SEPARATED FLOW

(U)

CONTENTS: ENVIRONMENTAL ANALYSIS - ACOUSTICS; ENVIRONMENTAL ANALYSIS - AERODYNAMIC NOISE; EQUIPMENT RESPONSE TO ACOUSTIC ENVIRONMENT; ACOUSTIC TEST REQUIREMENTS; ENVIRONMENTAL ANALYSIS - VIBRATION (SOURCES, RESPONSE OF GLIDER TO LAUNCH NOISE, RESPONSE OF GLIDER/TRANSITION TO AERODYNAMIC NOISE, RESPONSE OF GLIDER/TRANSITION TO STAGING SHOCKS, AND RESPONSE OF GLIDER/TRANSITION TO TURBULENCE AND ENGINE VIBRATION); VIBRATION DESIGN REQUIREMENTS (INSTALLATION REQUIREMENTS AND VIBRATION LOAD FACTORS); AND VIBRATION TEST REQUIREMENTS (SPECIAL SUBSTITUTE SINE TEST, SWEEP RATE FOR CYCLING TESTS, AND MECHANICAL FORCE MEASUREMENTS DURING VIBRATION TESTS).

(U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-430 470

BOEING CO SEATTLE WASH
INDICATOR - SIDE SLIP,

(U)

22P

REPT, NO. 10 81015

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INSTRUMENTATION, ATTITUDE INDICATORS),
(*ATTITUDE INDICATORS, BOOSTGLIDE VEHICLES), (*BOOST-
GLIDE VEHICLES, ATTITUDE INDICATORS), SPECIFICATIONS,
MECHANICAL DRAWINGS, POWER, MECHANICAL PROPERTIES (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THIS DRAWING COVERS THE DESIGN, FABRICATION,
PERFORMANCE AND TESTING REQUIREMENTS FOR ONE TYPE OF
EQUIPMENT DESIGNATED AS THE SIDE-SLIP
INDICATOR, THIS INDICATOR DISPLAYS SIDE SLIP
INFORMATION OBTAINED FROM THE INERTIAL GUIDANCE
SYSTEM, (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 468

BOEING CO SEATTLE WASH
SIGNAL DATA CONVERTER DESIGN SPECIFICATIONS, (U)
30P KUENSTER, G. B. †

REPT. NO. D2 80269
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (DATA PROCESSING SYSTEMS, SPECIFICATIONS),
INERTIAL GUIDANCE, COMPUTERS, DISPLAY SYSTEMS, MILITARY
REQUIREMENTS, MECHANICAL DRAWINGS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, DATA
CONVERTERS (U)

DESIGN SPECIFICATIONS ARE GIVEN FOR A SIGNAL DATA
CONVERTER FOR USE IN THE X-20 SPACECRAFT, THE
SIGNAL DATA CONVERTER ACCEPTS DATA INPUTS FROM THE
INERTIAL GUIDANCE SYSTEM VERDAN COMPUTER AND CONVERTS
THESE DATA INTO FORMS SUITABLE FOR USE BY THE TEST
DATA SUBSYSTEM AND CERTAIN OF THE PILOTS DISPLAYS,
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-430 466

BOEING CO SEATTLE WASH

INDICATOR - RATE OF CLIMB,

(U)

APR 63 23P

REPT, NO. 10 81179

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•RATE OF CLIMB INDICATORS,
SPECIFICATIONS), MECHANICAL DRAWINGS, BOOSTGLIDE
VEHICLES, DESIGN

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT

(U)

SPECIFICATION FOR RATE OF CLIMB INDICATOR FOR X-20
SPACECRAFT.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-430 408

BOEING CO SEATTLE WASH

INDICATOR-THERMAL MONITOR, (U)

SEP 61 21P

REPT. NO. 10 20927

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, SURFACE
TEMPERATURE); (*FLIGHT INSTRUMENTS, MONITORS), DISPLAY
SYSTEMS, TEMPERATURE, INSTALLATION, SCALE,
THERMOCOUPLES, PERFORMANCE (ENGINEERING), RELIABILITY,
QUALITY CONTROL, INSTRUMENT PANELS (U)
IDENTIFIERS: 1961, X-20 SPACECRAFT (U)

THE DRAWING GIVEN IN THIS DOCUMENT COVERS THE
DESIGN, FABRICATION, PERFORMANCE AND TESTING
REQUIREMENTS FOR ONE TYPE OF SINGLE-POINTER
THERMAL MONITOR INDICATOR, WHICH WILL BE USED
TO MONITOR VEHICLE SURFACE TEMPERATURE. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-429 201

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
PROCEEDINGS OF 1962 X-20A (DYNA-SOAR) SYMPOSIUM,
ABSTRACTS. (U)

MAR 63 172P

MONITOR: ASD TDR63 148, VOL. 6

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE: REPORT ON THE 1962 X-20A
SYMPOSIUM, HELD IN NOVEMBER AT AERONAUTICAL SYSTEMS
DIVISION, WRIGHT-PATTERSON AIR FORCE BASE,
OHIO.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, SYMPOSIA),
(•SYMPOSIA, BOOST-GLIDE VEHICLES), ABSTRACTS, DESIGN,
TEST METHODS, GROUND SUPPORT EQUIPMENT, ELECTRICAL
EQUIPMENT, ELECTRONIC EQUIPMENT, FLIGHT CONTROL SYSTEMS,
STRUCTURES, INSTRUMENTATION, CONTROL SYSTEMS,
COMMUNICATION SYSTEMS, TELEMETRY SYSTEMS, AVIATION
MEDICINE, SPACE MEDICINE (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

ABSTRACTS OF THE PROCEEDINGS OF THE 1962 X-
20A (DYNA-SOAR) SYMPOSIUM ARE PRESENTED IN
THIS REPORT. THE X-20A PROGRAM DEVELOPING THE
PILOT CONTROLLED LIFTING REENTRY GLIDER AND
CONDUCTING FULL-SCALE HYPERSONIC FLIGHT RESEARCH IS
ONE OF THE MOST EXTENSIVE ADVANCED DEVELOPMENTS UNDER
WAY IN THE AIR FORCE. TO INSURE THE TIMELY
DISSEMINATION OF THE DATA OBTAINED BY THE X-20A
PROGRAM, THE 1962 X-20A SYMPOSIUM WAS HELD TO
PRESENT NEW AND SIGNIFICANT KNOWLEDGE GAINED DURING
THIS DEVELOPMENT PERIOD TO THE AEROSPACE INDUSTRY,
SCIENTIFIC AND GOVERNMENT AGENCIES. MATERIALS
WERE PRESENTED IN TEN TECHNICAL AREAS CONSISTING OF
FLIGHT MECHANICS, STRUCTURES, MATERIALS, GUIDANCE,
COMMUNICATIONS, INSTRUMENT POWER AND ENVIRONMENT
SUBSYSTEMS, BIOASTRONAUTICS, TESTING AND GROUND
SUPPORT. PAPERS IN TWO OF THESE AREAS ARE
ASSEMBLED IN EACH OF FIVE VOLUMES OF THIS REPORT.
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-429 193

HONEYWELL INC ST PETERSBURG FLA

X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, (U)

DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT., 1 JULY-30
SEP 63.

OCT 63 1V

REPT. NO. 11790R R2

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ALL-INERTIAL GUIDANCE, BOOSTGLIDE
VEHICLES), (*BOOST-GLIDE VEHICLES, INERTIAL GUIDANCE,
MANNED SPACECRAFT, RELIABILITY (ELECTRONICS), DIODES,
CIRCUITS, MALFUNCTIONS, STABILIZED PLATFORMS, NAVIGATION
COMPUTERS (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

A SUMMARY OF RELIABILITY ACTIVITIES, A TABULATION
OF BOTH CURRENT AND CUMULATIVE RELIABILITY ACTIVITY
FIGURES, A BRIEF DESCRIPTION OF SPECIFIC PROBLEM
AREAS, AND A SUMMARY OF CORRECTIVE ACTIONS AND
SPECIAL TESTS WHICH HAVE BEEN COMPLETED, ARE
INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-429 157

LITTON SYSTEMS INC WOODLAND HILLS CALIF
THE LITTON FLIGHT DATA COMPUTER AS A RE-ENTRY CONTROL
DIRECTOR. (U)

DESCRIPTIVE NOTE: SUPPL. TO FINAL REPT..
NOV 63 136P DOMMASCH, DANIEL O. ;
LAUOEMAN, CHARLES W. ;
REPT. NO. SMFD2 6

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPPL. TO AD-425 655.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, FLIGHT CONTROL
SYSTEMS), (•FLIGHT CONTROL SYSTEMS, NAVIGATION
COMPUTERS, FEASIBILITY STUDIES, DESCENT TRAJECTORIES,
DATA PROCESSING SYSTEMS, PROGRAMMING (COMPUTERS),
COMPUTER LOGIC, DIGITAL COMPUTERS, GLIDE PATH SYSTEMS,
DISPLAY SYSTEMS, INSTRUMENT PANELS, DESIGN, ENERGY
MANAGEMENT, TERMINAL GUIDANCE, OPTIMIZATION, LIFT,
LANDINGS (U)
IDENTIFIERS: 1963, X-20 AIRCRAFT, DOLIAAC, FLARE
LANDING (U)

THE RESULTS ARE SUMMARIZED OF THE INVESTIGATIONS
CARRIED OUT DURING APPROXIMATELY THE PAST YEAR
INVOLVING UTILIZATION OF THE DOLIAAC LOGIC AND
ASSOCIATED SYSTEMS FOR PROGRAMMING THE LITTON
FLIGHT DATA COMPUTER (FDC) TO PROVIDE FOR SAFE RE-
ENTRY AND LANDING OF ADVANCED FLIGHT VEHICLES,
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-428 936

HONEYWELL INC ST PETERSBURG FLA

X-20A (DYNA-SOAR) PRIMARY GUIDANCE SUBSYSTEM, (U)

JAN 64 34P

REPT. NO. AR1179SR35

CONTRACT: AF33 657 7133

UNCLASSIFIED REPORT

NOFORN

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ALL-INERTIAL GUIDANCE, BOOSTGLIDE VEHICLES), (•BOOST-GLIDE VEHICLES, INERTIAL GUIDANCE), MANNED SPACECRAFT, POSITION FINDING, ACCELEROMETERS, NAVIGATION COMPUTERS, TEST SETS, CHECKOUT EQUIPMENT, DIGITAL DIFFERENTIAL ANALYZERS, DIGITAL COMPUTERS, GYROSCOPES, STABILIZED PLATFORMS, GIMBALS, CIRCUITS, REAL TIME (U)

THE X20A GUIDANCE SYSTEM IS A COMPLETE ALL-INERTIAL, ALL-ATTITUDE SYSTEM. THE BASIC FUNCTION IS TO MEASURE SPECIFIC FORCES ACTING ON THE CARRYING VEHICLE AND UTILIZE THESE MEASUREMENTS IN THE COMPUTATION OF NAVIGATION AND ATTITUDE REFERENCE PARAMETERS. THESE PARAMETERS IN TURN ARE MECHANIZED TO PROVIDE GUIDANCE AND CONTROL SIGNALS AT THE GUIDANCE SYSTEM'S OUTPUT INTERFACE. THE X-20A PRIMARY GUIDANCE SYSTEM MEASURES SPECIFIC FORCES, PROCESSES THE INFORMATION ON A REAL TIME BASIS, AND GENERATES THE FOLLOWING PARAMETERS: INERTIAL VELOCITY, EARTH RELATIVE VELOCITY, ALTITUDE RATE, INERTIAL POSITION, POSITION RELATIVE TO TEN SELECTABLE LANDING SITES, ALTITUDE, LOCAL LEVEL, AND TIME. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-427 137

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
HOW PERT IS USED IN MANAGING THE X-20 (DYNA-SOAR)
PROGRAM, (U)

SEP 63 31P SADOW, RAYMOND M. ;
MONITOR: ASD TDR63 698

UNCLASSIFIED REPORT
NOFORN

SUPPLEMENTARY NOTE: PRESENTED AT THE ASD 1963 SCIENCE
AND ENGINEERING SYMPOSIUM, 18-19 SEP 1963.

DESCRIPTORS: (•OPERATIONS RESEARCH, MANNED SPACECRAFT),
(•MANAGEMENT ENGINEERING, SCHEDULING), (•MANNED
SPACECRAFT, OPERATIONS RESEARCH), EFFECTIVENESS, UNITED
STATES GOVERNMENT, INDUSTRIAL RELATIONS, CRYOGENIC
STORAGE DEVICES, ANALYSIS (U)

IDENTIFIERS: PERT, 1963, X-20 SPACECRAFT, REPORTING
NETWORKS (U)

THIS REPORT DESCRIBES HOW THE PROGRAM
EVALUATION REVIEW TECHNIQUE (PERT) HAS
DEVELOPED IN THE X-20 PROGRAM AND HOW IT IS USED IN
MANAGING THAT PROGRAM. THE X-20 SYSTEM
PROGRAM OFFICE (SPO), AERONAUTICAL SYSTEMS
DIVISION (ASD) ORGANIZED AND DIRECTS THE OVERALL
X-20 PERT EFFORT OF BOTH GOVERNMENT AND
INDUSTRY PARTICIPANTS AND EMPLOYS A SYSTEM OF
DISCRETE DETAILED NETWORKS WHICH COLLECTIVELY COVER
THE ENTIRE PROGRAM. THE DATA FROM THESE
'REPORTING' NETWORKS IS COMPUTER INTEGRATED INTO
A TOTAL PROGRAM PERT OUTPUT. THE PROBLEM OF
TRANSLATING VOLUMINOUS DATA INTO MEANINGFUL
INFORMATION FOR TOP MANAGEMENT AND THE DEVELOPMENT OF
EFFECTIVE PERT ANALYSES, DISPLAYS, AND INDICATORS
ARE COVERED. THE OPERATING CONCEPTS, ATMOSPHERE,
AND RESOURCES NECESSARY FOR A SUCCESSFUL PERT
OPERATION, THE ROLE OF PERT IN X-20 CONTRACTORS'
IN-HOUSE MANAGEMENT SYSTEMS WITH ACTUAL EXAMPLES, AND
ITS USES WITHIN THE X-20 SPO ARE ALSO DESCRIBED.
EXPERIENCE AND INSIGHT INTO THE DYNAMICS OF A
SYSTEMS DEVELOPMENT PROGRAM AND THE 'HONEST'
REPORTING RESULTING FROM THE X-20 PERT SYSTEM ARE
PRESENTED AS UNIQUE AND ADVANCED ASPECTS OF THIS NEW
MANAGEMENT TECHNIQUE. A REVIEW OF RESOURCES
REQUIRED TO OPERATE PERT ARE PRESENTED.

(AUTHOR)

(U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-426 251

BOEING CO SEATTLE WASH

X-20/624A AIR VEHICLE BUFFET TEST-SPO 203, (U)

OCT 63 288P LOCKLEER, M. D. ;

REPT. NO. T2 2648

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (SPACECRAFT, TRANSONIC CHARACTERISTICS),

(TRANSONIC FLOW, NOISE), SHOCK WAVES, ANGLE OF ATTACK,

YAW, BOUNDARY LAYER (U)

IDENTIFIERS: X-20 SPACECRAFT, 1963 (U)

AERODYNAMIC NOISE DATA OBTAINED FROM A TRANSONIC WIND TUNNEL TEST OF AN X-20/TAN IIIC MODEL ARE REPORTED. MEASUREMENTS MADE AT 28 TEST POINTS ON THE X-20 PAYLOAD ONLY WERE DESIGNED TO DEFINE THE AERODYNAMIC NOISE ENVIRONMENTS RESULTING FROM SEPARATED FLOW AND FLUCTUATING SHOCK PHENOMENA ASSOCIATED WITH TRANSONIC FLIGHT IN THE MACH NUMBER RANGE 0.60 - 1.08. ANGLES OF ATTACK AND YAW WERE VARIED WITHIN ± 4 DEGREES. REPORTED DATA INCLUDE OVER-ALL AND ONE-THIRD OCTAVE BAND SOUND PRESSURE LEVELS AND SPACE-CORRELATION COEFFICIENTS IN THE FREQUENCY RANGE 40 - 2500 CPS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-425 543

BOEING CO SEATTLE WASH

DATA REPORT: AEDC TUNNEL C, BOEING TEST NO, 010,
SURFACE ROUGHNESS HEAT TRANSFER AND PRESSURE TEST ON
MODEL AD-633M-2, (U)

NOV 63 IV AYLING, D. L. ;

REPT. NO. DN D2 80912

CONTRACT: AF33 657 7132

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REPRODUCED: DDC DOES NOT FURNISH COPIES.

DESCRIPTORS: •BOOST-GLIDE VEHICLES, ANGLE OF ATTACK,
BOUNDARY LAYER, HEAT TRANSFER, HYPERSONIC
CHARACTERISTICS, MODEL TESTS, PRESSURE, ROUGHNESS,
SURFACE PROPERTIES, SURFACES, TABLES, WIND TUNNEL MODELS
(U)

HEAT TRANSFER AND PRESSURE DATA WERE OBTAINED FROM
A SERIES OF FLAT PLATES WITH VARIOUS WAVE
CONFIGURATIONS REPRESENTING SURFACE ROUGHNESS, AT
ANGLES OF ATTACK FROM -5 TO +10 DEGREES,
BOUNDARY LAYER DATA INCLUDES THE PROBE PRESSURE
TEMPERATURE READINGS FROM 3 THERMOCOUPLES MOUNTED ON
THE MODEL AND THE VERTICAL PROBE POSITION, THE
CENTERLINE OF THE PROBE WAS .020 INCH FROM THE MODEL
SURFACE WHEN THE PROBE POSITION IS ZERO, THE
MACH 10 TUNNEL, TUNNEL C, IS AN AXI-SYMMETRIC
CONTINUOUS FLOW, VARIABLE DENSITY, HYPERSONIC WIND
TUNNEL WITH A 50-INCH DIAMETER TEST SECTION,
BECAUSE OF CHANGES IN BOUNDARY LAYER THICKNESS
CAUSED BY CHANGING PRESSURE LEVEL, THE MACH 10
CONTOURED NOZZLE PRODUCES AN AVERAGE TEST SECTION
MACH NUMBER WHICH VARIES FROM 10.0 AT A STAGNATION
PRESSURE OF 200 PSIA TO 10.2 AT 1800 PSIA, THE
CENTERLINE FLOW DISTRIBUTION IS UNIFORM ABOUT 0.5%
IN MACH NUMBER, THERE IS A SLIGHT AXIAL GRADIENT
ON THE ORDER OF 0.01 MACH NUMBER PER FOOT, A
HYDRAULICALLY DRIVEN ANGLE OF ATTACK MECHANISM
PITCHES THE MODEL IN A VERTICAL PLANE FROM -15 TO +
15 DEGREES, THE REMOTELY CONTROLLED, WATER-COOLED
ROLL MECHANISM IS ELECTRICALLY DRIVEN AND IS CAPABLE
OF ROTATING THE MODEL STING COMBINATION + OR - 180
DEGREES, THE TESTS WERE PERFORMED AT $P_0=340$ AND
 1640 PSIA, AND $T_0=1256$ AND 1426 F RESPECTIVELY AT
A NOMINAL FREESTREAM REYNOLDS NUMBER PER FOOT OF
0.5 AND 2.0×10^6 . (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-424 030

NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AVIATION
MEDICAL ACCELERATION LAB
PILOT BIOMEDICAL AND PSYCHOLOGICAL INSTRUMENTATION
FOR MONITORING PERFORMANCE DURING CENTRIFUGE
SIMULATIONS OF SPACE FLIGHT, (U)

OCT 63 29P CHAMBERS, RANDALL M. ; NELSON,

JOHN G. ;

MONITOR: NADC MA , NAVMED
REPT. NO. 3

63081 , MRO05 13 6002 4,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CENTRIFUGES, ACCELERATION TOLERANCE),
(•MONITORS, CENTRIFUGES), (•INSTRUMENTATION, SPACE
MEDICINE), TRAINING, MEDICAL RESEARCH, PHYSIOLOGY,
PILOTS, MEASUREMENT, PERFORMANCE TESTS, BEHAVIOR,
PSYCHOLOGY (U)

IDENTIFIERS: 1963, HUMAN CENTRIFUGE,
BIOINSTRUMENTATION, BIOMEDICAL MONITORING, X-20
SPACECRAFT, TOLERANCES (PHYSIOLOGY), PERFORMANCE
(HUMAN) (U)

THIS REPORT PRESENTS SOME OF THE RESULTS OF RECENT
CENTRIFUGE ACCELERATION RESEARCH AND TRAINING
PROJECTS IN WHICH THE BIOMEDICAL,
PSYCHOPHYSIOLOGICAL, AND PSYCHOLOGICAL PERFORMANCES
OF PILOTS WERE MONITORED AND MEASURED. MONITORING
AND RECORDING INSTRUMENTATION TECHNIQUES ARE
DESCRIBED, AND AN ATTEMPT IS MADE TO IDENTIFY AND
QUANTIFY SOME OF THE CAPABILITIES AND LIMITATIONS OF
PILOT PERFORMANCE DURING EXPOSURE TO ACCELERATIONS
WHICH VARY IN MAGNITUDE, DURATION, DIRECTION, RATE
OF ONSET, AND PROFILE COMPLEXITY. APPARATUS AND
METHODS ARE PRESENTED AND DISCUSSED FOR MONITORING
VISUAL DISTURBANCE, DISCRIMINATION AND RESPONSE
BEHAVIOR, COMPLEX SKILL BEHAVIOR, AND AN APPROACH IS
MADE TO THE PROBLEM OF MONITORING HIGHER MENTAL
FUNCTIONING. THE PILOTS AND OTHER VOLUNTEERS IN
THESE TRAINING AND RESEARCH PROGRAMS WERE THE 7
MERCURY ASTRONAUTS, 6 DYNA-SOAR CONSULTANT
PILOTS, APPROXIMATELY 35 OTHER TEST PILOTS, AND
APPROXIMATELY 40 OTHER MILITARY AND CIVILIAN
VOLUNTEERS. (AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-421 746

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT - DYNA SOAR,
138P BOWERS, D. A. ;

(U)

REPT. NO. D2 80085

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, LEADING EDGES
FLAPS), DESIGN, AERODYNAMIC CONFIGURATIONS,
ENVIRONMENTAL TESTS, NOISE, TESTS, HEAT, TEMPERATURE,
TEST EQUIPMENT, INSTRUMENTATION, TEST METHODS,
THERMOCOUPLES, LOAD DISTRIBUTION, X-RAY PHOTOGRAPHY,
ACOUSTICS, SOUND, SONIC FATIGUE, AERODYNAMIC HEATING (U)
IDENTIFIERS: 1963, LEADING EDGES, HEAT LAMPS, X-20
SPACECRAFT (U)

A SERIES OF FIVE LEADING EDGE CONCEPTS WERE
SUBJECTED TO THREE SEPARATE ENVIRONMENT TEST
PROGRAMS. EACH CONFIGURATION WAS EXPOSED TO A SONIC
ENVIRONMENT, A THERMAL GRADIENT TEST, A SECOND SONIC
EXPOSURE, AND FINALLY, A STATIC LOAD TEST. THE
PURPOSE OF THESE TESTS WAS TO EVALUATE THESE FIVE
BASIC LEADING EDGE CONCEPTS AND THEIR VARIOUS DESIGN
FEATURES TO OBTAIN INFORMATION FOR A PRODUCTION
CONFIGURATION AND TO VERIFY ANALYTICAL PROCEDURES.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-421 685

BOEING CO SEATTLE WASH

LEADING EDGES DEVELOPMENT - DYNA SOAR, VOLUME III

THERMAL GRADIENT AND LOADS TEST DATA, (U)

IV BOWERS, D. A. ; ESCH, PAUL G.

REPT. NO. D2 80085 VOL. 3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST GLIDE VEHICLES, LEADING EDGE
FLAPS), MANNED SPACECRAFT, AERODYNAMIC LOADING,
TEMPERATURE, LOAD DISTRIBUTION, PRESSURE, DEFLECTION,
SHEAR STRESSES, TIME, THERMOCOUPLES, EXPERIMENTAL DATA,
TABLES, AERODYNAMIC HEATING, DELTA WINGS (U)

IDENTIFIERS: 1963, LEADING EDGE, TEMPERATURE GRADIENT,
X-20 SPACECRAFT (U)

CONTENTS: TABULATED TEMPERATURE DATA, TABULATED
PRESSURE LOAD VS. DEFLECTION DATA, TABULATED PRESSURE
LOAD VS. MAXIMUM SHEAR STRESS AND PRINCIPAL STRESS
DATA, RAPID LOAD VS. TIME CURVES, TABULATED RAPID
LOAD VS. DEFLECTION DATA, TABULATED SLOW LOAD VS.
DEFLECTION DATA, AND TOLERANCES FOR THERMOCOUPLES. (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-420 397

BOEING CO SEATTLE WASH

DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM, (U)

41 36P

REPT, NO. 81205

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BOOST-GLIDE VEHICLES, EJECTION SEATS),
(*MANNED SPACECRAFT, SURVIVAL), (*EJECTION SEATS, BOOST-
GLIDE VEHICLES), SPECIFICATIONS, DESIGN, TESTS, MILITARY
REQUIREMENTS, PROTECTIVE CLOTHING, FLIGHT CLOTHING,
PARACHUTES, DISCONNECT FITTINGS, CARTRIDGES (PAD),
ANTHROPOMETRY, MATERIALS, ALUMINUM ALLOYS, WEIGHT,
CONFIGURATION, RESCUE KITS, HEAT SHIELDS (U)
IDENTIFIERS: X-20 SPACECRAFT, 1961 (U)

THIS DRAWING COVERS THE DESIGN, FABRICATION,
PERFORMANCE AND TESTING REQUIREMENTS FOR A TYPE OF
EQUIPMENT DESIGNATED EJECTION SEAT AND SURVIVAL
SYSTEM. THE SPECIFIED EJECTION SEAT AND SURVIVAL
SYSTEM SHALL PROVIDE FOR PILOT ESCAPE AND SURVIVAL
FROM THE DYNA-SOAR GLIDER IN INSTANCES WHEN
SATISFACTORY LANDING SITE CANNOT BE REACHED OR WHEN
OTHER CONDITIONS MAKE AN ATTEMPTED GLIDER LANDING
IMPRACTICAL, THE UPWARD EJECTION SEAT AND RAIL
ASSEMBLY FOR THE DYNA-SOAR VEHICLE SHALL BE
PATTERNED AFTER EXISTING STATE-OF-THE-ART EJECTION
SEATS. SIZE REQUIREMENTS FOR THE PILOT ARE BASED
ON A 5TH TO 75TH PERCENTILE MAN, (MAXIMUM) FULLY
DRESSED IN A FULL PRESSURE - BODY RESTRAINT SUIT
SYSTEM, A QUALIFIED AIR FORCE BACK TYPE
PARACHUTE AND A SEAT TYPE RESCUE AND SURVIVAL KIT
SHALL BE PROVIDED, EJECTION SEQUENCING SHALL BE
ACCOMPLISHED BY ACTUATING A TWO HANDED EJECTION
CONTROL LOCATED ON THE FRONT EDGE OF THE SEAT BUCKET
BETWEEN THE PILOT'S LEGS, AFTER EJECTION,
AUTOMATIC SEAT/MAN SEPARATION SHALL BE PROVIDED, WITH
AUTOMATIC PARACHUTE DEPLOYMENT AT 14,000 FEET OR
LESS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-418 550

BOEING CO SEATTLE WASH
INSULATED PANEL DEVELOPMENT, (U)
SEP 63 1V BACKUS, W.E.; SWEGLE, A.R.
REPT, NO, DOC, NO, D2 80080
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (•BOOST GLIDE VEHICLES, THERMAL INSULATION), (•THERMAL INSULATION, PANELS (STRUCTURAL)), MANNED SPACECRAFT, TEMPERATURE, REFRACTORY METALS AND ALLOYS, TESTS, QUARTZ, FIBERS (AL), HEAT SHIELDS, ACOUSTICS, ENVIRONMENTAL TESTS, HIGH TEMPERATURE RESEARCH, THERMAL RADIATION, VIBRATION, PLASMA PHYSICS, TEST METHODS, EROSION, BEAMS (STRUCTURAL), (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT, (U)

X-20 INSULATED PANELS ARE UTILIZED TO BEAM AIR LOADS TO PRIMARY STRUCTURE IN AREAS WHERE SURFACE TEMPERATURE EXCEEDS 2000 F. THIRTY-FOUR TESTS WERE CONDUCTED ON 22 INSULATED PANELS UTILIZING VARIATIONS OF THE PRELIMINARY PANEL CONCEPT. THESE TESTS COMBINED WITH PREVIOUS TESTS PROVIDED THE DEVELOPMENT TEST BACKGROUND FOR THE X-20 SURFACE PANELS CONCEPT EVALUATION. THE TESTS HAVE COVERED THE PRIMARY ELEMENTS OF THE DESIGN ENVIRONMENT FOR X-20 EXTERNAL SURFACE - ACOUSTIC VIBRATION (WITH SIMULTANEOUS BOOST-ACCELERATION LOADING), EXPOSURE TO HIGH TEMPERATURES (INCLUDING HIGH ENERGY GAS FLOW), AIR LOADING, AND CRYOGENIC EXPOSURE. SPECIMENS AND TEST FIXTURES WERE CLOSE SIMULATIONS OF ANTICIPATED FULL SIZE SURFACE PANEL STRUCTURE AT THE TIME THE TEST SPECIMENS WERE DESIGNED. SUBSEQUENT CHANGES IN DESIGN ARE TO BE GUIDED AND LIMITED BY TEST RESULTS SO THAT THE BASIC ELEMENTS OF THE FINAL PRODUCTION ARTICLE WILL BE SIMILAR TO THOSE IN THE TEST PROGRAM, (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-418 545

BOEING CO SEATTLE WASH
PRIMARY STRUCTURE DEVELOPMENT, LTS-652 SHEAR WEB AND
PANEL TESTS, (U)

SEP 63 1V OLSON, J.L.
REPT. NO. DOCUMENT NO. D2 80081
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: (BOOST GLIDE VEHICLES, AIRPLANE
PANELS), AERODYNAMIC CONTROL SURFACES, WEB
BEAMS, THERMAL EXPANSION, SHEAR STRESSES, LOAD
DISTRIBUTION, HIGH TEMPERATURE RESEARCH, TESTS,
TEST METHODS, INSTRUMENTATION, DEFLECTION,
EXPERIMENTAL DATA, THERMOCOUPLES, TEMPERATURE,
STRESSES, FAILURE (MECHANICS), AIRFRAMES,
HONEYCOMB CORES, (U)

IDENTIFIERS: 1963, X-20 SPACECRAFT, CORRUGATED
STRUCTURES, (U)

TESTS WERE PERFORMED TO DETERMINE THE EFFECTS OF
THERMAL GRADIENTS ON ULTIMATE SHEAR STRENGTHS OF
SHEAR WEBS AND DETERMINE THE EFFECTS OF DIFFERENT
TYPES OF LOADING ON SHEAR WEBS AND PANELS. THE
SPECIMENS WERE TESTED UNDER TWO DIFFERENT TYPES OF
LOADING AND AT ROOM AND ELEVATED TEMPERATURES. THE
CONDITIONS SIMULATED DYNA-SOAR FLIGHT CONDI
TIONS. THE TEST SPECIMEN CONFIGURATIONS, INSTRU
MENTATION, TEST PLANS, CONDITIONS AND TEST RESULTS
ARE DETAILED IN THIS DOCUMENT SECTION. TEST
READINGS HAVE BEEN INCLUDED IN THIS REPORT IN THE
FORM OF COMPUTER PRINT-OUT DATA AND HAND WRITTEN
DATA. THIS DATA INCLUDES TEMPERATURE, DEFLECTION,
LOAD AND STRAIN READINGS, (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-416 194L

ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GROUND
MD

ENGINEER DESIGN TEST OF DYNASOAR ROCKET CATAPULT
(LABORATORY VIBRATION OF IGNITERS, INITIATORS AND
CATAPULT),

(U)

SEP 63 37P JERVIS, ROBERT H.:

PROJ: 9 4 0002 04; 2213DTDS 9 62

MONITOR: APG DPS 1022

UNCLASSIFIED REPORT

NOTICE: ONLY MILITARY OFFICES MAY REQUEST FROM DDC,
OTHERS REQUEST APPROVAL OF ARMY MUNITIONS COMMAND,
FRANKFORD ARSENAL, PHILADELPHIA, PA. NO
AUTOMATIC RELEASE TO FOREIGN NATIONALS.

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, EJECTION
SEATS); (•EXPLOSIVES INITIATORS, BAILOUT),
SENSITIVITY, VIBRATION, RESONANCE, IGNITERS,
CATAPULTS, AVIATION SAFETY, CARTRIDGES (PAD),
MANNED SPACECRAFT,

(U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-413 297

SCHOOL OF AEROSPACE MEDICINE BROOKS AFB TEX
LECTURES IN AEROSPACE MEDICINE - 4 THRU 8
FEBRUARY 1963.

63 455P

(U)

UNCLASSIFIED REPORT

DESCRIPTORS: (SPACE MEDICINE, TRAINING), MAN,
SPACE FLIGHT, HUMAN ENGINEERING, GUIDED
MISSILES, PERFORMANCE TESTS, MONITORS, LIFE
SUPPORT, MANNED, WASTES (SANITARY ENGINEER
ING), SHIELDING, ASTRONAUTICS, ECOLOGY,
PHYSIOLOGY.

(U)

IDENTIFIERS: LECTURES, 1963, TOXICOLOGY, DYNA-
SOAR, STARGAZER, GEMINI, APOLLO, BIOMAGNETICS.

(U)

LECTURES IN AEROSPACE MEDICINE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-413 208

BELL AEROSYSTEMS CO BUFFALO N Y
EVALUATION OF N2 SHUTOFF VALVES FOR COMPLIANCE
WITH FUNCTIONAL REQUIREMENTS, (U)

DEC 62 4P

REPT. NO. 82332 11 1

MONITOR: IDEP 925,50,85,94-C4-02

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (•HIGH-PRESSURE VALVES, NITROGEN),
(•CUT-OFF VALVES, NITROGEN), GAS FLOW, PERFORM
ANCE (ENGINEERING), TESTS, (U)
IDENTIFIERS: IDEP, 1962, X-20 SPACECRAFT, (U)

TEST OF 1000 TO 5000 PSIG NITROGEN GAS SHUTOFF VALVE FOR
USE IN THE DYNA-SOAR PROGRAM,

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-411 822

BOEING CO SEATTLE WASH

DATA REPORT AEDC-8-BC-24, A MACH 8 HEAT TRANSFER
AND PRESSURE TEST TO INVESTIGATE SHOCK BOUNDARY LAYER
INTERACTION ON A FLAT PLATE MODEL, AR-500M-2,

SPO 188,

(U)

JUL 63 658P TRUSSELL, D.R.;

REPT. NO. D2 22491. VOL. II

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: (•FLAT PLATE MODELS, TURBULENT
BOUNDARY LAYER), (•HYPERSONIC FLOW, FLAT PLATE
MODELS), DATA, HEAT TRANSFER, PRESSURE,
BOOST-GLIDE VEHICLES, MODELS (SIMULATIONS),
BOUNDARY LAYER,

(U)

IDENTIFIERS: 1963, X-20 SPACECRAFT,

(U)

MACH 8 HEAT TRANSFER AND PRESSURE TEST TO INVESTIGATE
SHOCK BOUNDARY LAYER INTERACTION ON A FLAT PLATE MODEL.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-411 725

HONEYWELL INC ST PETERSBURG FLA
TEST ON SEMICONDUCTORS, TRANSISTORS, SILICON, NPN,
TRIODE, VHF, MP, GENERAL PURPOSE,
JUN 62 69P ACOSTA, L. J.

(U)

REPT. NO. 6565

MONITOR: IDEP

742,10,30,00-62-01

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: (*SEMICONDUCTOR DEVICES, TRAN-
SISTORS); (*TRANSISTORS, SILICON); BOOST-GLIDE
VEHICLES, MANNED SPACECRAFT, RESEARCH PLANES,
SWITCHING CIRCUITS, DIRECT CURRENT, ELECTRICAL
PROPERTIES, CAPACITANCE, ELECTRICAL CONDUCTANCE,
HIGH TEMPERATURE RESEARCH, LOW TEMPERATURE
RESEARCH,

(U)

IDENTIFIERS: IDEP, X-20 SPACECRAFT, 1962.

(U)

EXCESSIVE LEAKAGE CURRENT DEVELOPED IN UNIT NO.
12 DURING THE TESTS OF ICBO AND ICEO AT ELEVATED
TEMPERATURES AS THE COLLECTOR TO BASE JUNCTION BECAME
REISTIVE. ERRATIC OPERATION OCCURRED DURING THE
SATURATION TESTS ON THIS UNIT AS VCE (SAT) WAS
OVER ONE VOLT FROM 0 C TO 150 C WITH =.) MA AND
WITH IC OF 10 MA AT -55 C AND 0 C, BUT WAS
NORMAL AT 85 C AND 150 C. SPONTANEOUS
OSCILLATIONS OCCURRED DURING THE PULSED DC CURRENT
GAIN MEASUREMENTS FROM 10 MA TO 50 MA WHEN IB WAS
PULSED AT A 300 US PULSE LENGTH AT A TWO PERCENT DUTY
CYCLE, THE OSCIL LATIONS WERE DUE TO LEAD LENGTH
FROM THE TEST CIRCUIT AND EQUIPMENT THROUGH THE
SELECTION SWITCHES TO THE TRANSISTR SOCKETS IN THE
TEMPER ATURE CHAMBER, THIS WAS STOPPED BY
CONNECTING A 680 PF CAPACITOR BETWEEN THE BASE AND
EMITTER LEADS AT THE DOOR TERMINALS. (AUTHOR)

(U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-411 271

BOEING CO SEATTLE WASH
CONTROL SURFACES DEVELOPMENT, DYNA-SOAR, (U)
320P BALOG, E. M. I

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•BOOST-GLIDE VEHICLES, AERODYNAMIC CONTROL SURFACES), (•AERODYNAMIC CONTROL SURFACES, FEASIBILITY STUDIES), DESIGN, ELEVONS, TENSILE PROPERTIES, CONFIGURATION, LOADING (MECHANICS), STABILITY, ENVIRONMENTAL TESTS, MODEL TESTS, HIGH-TEMPERATURE RESEARCH, BEAMS (STRUCTURAL), AIRPLANE PANELS (U)
IDENTIFIERS: 1963, X-20 SPACECRAFT (U)

THIS TEST PROGRAM WAS CONDUCTED TO EVALUATE CORRUGATED TORQUE BOX X-20 SPACECRAFT CONTROL SURFACE DESIGN CONCEPTS INVOLVING STRENGTH, STABILITY AND STIFFNESS OF TRUSS MEMBERS AND SHEAR WEBS UNDER STATIC LOAD AT ELEVATED TEMPERATURE. A TWO CELL TORQUE BOX TEST SPECIMEN, 42.0 X 32.5 IN, IN OVERALL DIMENSIONS WITH FLAT TOP AND TAPERED BOTTOM RENE' 41 CORRUGATED SURFACES, WAS SUBJECTED TO SIMULATED ENVIRONMENTS WHICH INCLUDED STATIC LOAD ONLY AND VARIOUS COMBINATIONS OF STATIC LOAD IN CONJUNCTION WITH UNIFORM AND NON-UNIFORM TEMPERATURE CONDITIONS. THE TEST SPECIMEN SATISFACTORILY SUSTAINED ALL TEST ENVIRONMENTAL CONDITIONS WITH NO MAJOR FAILURE OR PERMANENT DEFORMATION. THIS SERIES OF TESTS INDICATED THAT CORRUGATED SHEAR WEB BEAMS AND PANELS COULD BE COMBINED INTO A PRACTICAL TORQUE BOX STRUCTURE CAPABLE OF SATISFACTORILY SUSTAINING THE IMPOSED LOAD-TEMPERATURE ENVIRONMENT. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL No. 015416

AD-408 930

BOEING CO SEATTLE WASH

LANDING GEAR DEVELOPMENT,

JUN 63

1V

LEE, H. C.; SWEGLE, A. R.;

(U)

REPT. NO. DOCUMENT NO. D2 80086

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DESCRIPTORS: (•LANDING GEAR, BOOST GLIDE VEHICLES), (•BOOST GLIDE VEHICLES, LANDING GEAR), MANNED SPACECRAFT, RESEARCH PLANES, TEST METHODS, CRYOGENICS, TENSILE PROPERTIES, STRESSES, DUCTILITY, RUPTURE, HEAT TREATMENT, NICKEL ALLOYS, TEST EQUIPMENT, HIGH TEMPERATURE RESEARCH, FAILURE (MECHANICS), MECHANICAL PROPERTIES, IMPACT SHOCK, CHROMIUM ALLOYS,

(U)

IDENTIFIERS: X-20 SPACECRAFT, 1963, INCONEL, 'A' NICKEL, HASTELLOY X,

(U)

A SCREENING TEST PROGRAM WAS CONDUCTED ON FIVE PROMISING MATERIALS FOR USE IN THE X-20 LANDING GEAR ENERGY-ABSORBING SYSTEM. THE MATERIALS TESTED WERE INCONEL, 'A' NICKEL, HASTELLOY X, 19-9DL, AND 304 ELC. A TOTAL OF TWO HUNDRED AND TWO (202) TWO-INCH GAGE LENGTH TENSILE SPECIMENS WERE TESTED UNDER VARIOUS COMBINATIONS OF TEMPERATURES AND STRAIN RATES TO OBTAIN STRESS-STRAIN CURVES FOR COMPARING THE MATERIALS. INCONEL WAS CONCLUDED TO BE THE OVER-ALL BEST ENERGY STRAP MATERIAL FOR THE X-20 LANDING GEAR APPLICATION. THE ENERGY STRAP DEVELOPMENT PROGRAM WAS CONTINUED WITH THE TESTING OF PROPOSED FULL-SCALE MAIN GEAR AND NOSE GEAR ENERGY STRAP CONFIGURATIONS UNDER SIMULATED X-20 LANDING ENVIRONMENTS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-404 236

BOEING CO SEATTLE WASH
CRYOGENIC TANKS DEVELOPMENT, (DYNA SOAR), (U)
MAY 63 IV MATTERAND, D. L. ;
REPT. NO. D2-80092
CONTRACT: AF 33(657)-7132

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: •CRYOGENIC STORAGE DEVICES, CRYOGENICS,
LIQUEFIED GAS, HYDROGEN, ALUMINUM ALLOYS, HYDROSTATIC
PRESSURE, RUPTURE, NITROGEN, FUEL TANKS, BOOST-GLIOE (U)
VEHICLES, STRESSES, MECHANICAL PROPERTIES
IDENTIFIERS: X-20 SPACECRAFT, 2219-T6E46 ALUMINUM (U)
ALLOY

TWO TEST PROGRAMS WERE CONDUCTED TO OBTAIN BASIC
STRUCTURAL DATA ON THE USE OF 2219-T6E46 ALUMINUM
FOR THE X-20 CRYOGENIC STORAGE TANKS, THE
FOLLOWING SUMMARIZES THE TEST RESULTS: (1)
BIAXIAL STRENGTH OF 2219-T6E46 ALUMINUM AT
TEMPERATURES OF -395 F. AND LOWER AT 91,000 PSI
(MIN.) COMPARED TO UNIAXIAL STRENGTHS OF 88,200
PSI (MIN.) AT -423 F. (2) DUCTILE
FAILURES OCCURRED IN ALL FOUR TEST TANKS AT
TEMPERATURES OF -320 F. AND -395 F. (3) A LOW
FACTOR, PROTOTYPE LIQUID NITROGEN TANK FAILED AT A
PRESSURE OF 2650 PSI AFTER 252 PRESSURE CYCLES AT
1000 = 50 PSI. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-400 557

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
ANALYSIS OF TRANSIENT HEATING FOR FINITE AND SEMI-
INFINITE SLABS

(U)

JAN 63 IV MILLER, L.E.

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •AERODYNAMIC HEATING; •HEAT TRANSFER;
•PANELS (STRUCTURAL), ATMOSPHERE ENTRY, MATHEMATICAL
ANALYSIS, SHEETS, TEMPERATURE, THEORY, THERMAL
CONDUCTIVITY, THERMODYNAMICS
IDENTIFIERS: X-20 SPACECRAFT

(U)

(U)

ANALYSIS OF TRANSIENT HEATING FOR FINITE AND SEMI-
INFINITE SLABS.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-303 557L

NORTH AMERICAN AVIATION INC DOWNEY CALIF

FEB 56 1V

REPT. NO. NAD 56 105

UNCLASSIFIED REPORT

DISTRIBUTION: CONTROLLED: ALL REQUESTS TO AIR
RESEARCH AND DEVELOPMENT COMMAND, ATTN: RDZPS-
SR126, WASHINGTON, D. C.

DESCRIPTORS: •HYPERVELOCITY VEHICLES, •RESEARCH PROGRAM
ADMINISTRATION, DESIGN (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-298 352

BOEING CO SEATTLE WASH
FORMABILITY TESTS ON MO - .5% (EFFECTS OF STRAINING
ON RECRYSTALLIZATION OF MO - .5%) (U)
JUN 61 IV MARR, F. G. I

REPT. NO. T-2-2404-S7

MONITOR: IDEP 502,30.00,80-C6-07

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •DEFORMATION, •MOLYBDENUM ALLOYS, COLD
WORKING, EFFECTIVENESS, HARDNESS, HIGH-TEMPERATURE
RESEARCH, MONOCHROMATIC LIGHT, RECRYSTALLIZATION,
SHEETS, TITANIUM ALLOYS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

EFFECTS OF STRAINING ON RECRYSTALLIZATION OF
MO .5% SHEET.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-298 079

BOEING CO SEATTLE WASH

DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM (U)

61 1V BOTTEM, J.M.; MILL, B.S.;

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •BOOST-GLIDE VEHICLES, •EJECTION SEATS,
AVIATION SAFETY, CATAPULTS, DESIGN, PARACHUTES, SURVIVAL
KITS. (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

DYNA-SOAR (X-20) EJECTION SEAT AND SURVIVAL SYSTEM.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 662

BOEING CO SEATTLE WASH

EVALUATION OF DYNISCO SEMI-CONDUCTOR STRAIN GAGE

PRESSURE TRANSDUCER (0-1 PSIG)

(U)

FEB 62 IV SHAW, D.G.:

REPT. NO. T-2-2569

MONITOR: IDEP 851,20.50,80-C6-01

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: SEMICONDUCTOR DEVICES, CALIBRATION,
PIEZOELECTRIC GAGES, PRESSURE GAGES, SEMICONDUCTORS,
STRAIN GAGES, TEMPERATURE, TRANSDUCERS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

EVALUATION OF SEMICONDUCTOR, STRAIN-GAGE,
PRESSURE TRANSDUCER (0-1 PSIG), TO DETERMINE CONFORMANCE TO
VENDOR SPECIFICATIONS AND DYNASOAR VIBRATION
REQUIREMENTS,

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 660

BOEING CO SEATTLE WASH

FORMABILITY TESTS ON MO-0.5T1

(U)

FEB 61 IV MARR, F, G. I

REPT. NO. T-2-2404-55

MONITOR: IDEP 502,30,00,80-C6-05

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: DUCTILITY, MOLYBDENUM ALLOYS, METAL-
FORMING PRESSES, SHEETS, TESTS, TITANIUM ALLOYS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

FORMABILITY TESTS ON MO-0.5T1 SHEETS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-297 656

BOEING CO SEATTLE WASH

EVALUATION OF DYNISCO SEMI-CONDUCTOR STRAIN GAGE

PRESSURE TRANSDUCER (0-2 PSID)

(U)

MAR 62 1V SHAW, D.G.:

REPT. NO. T-2-2588

MONITOR: IDEP 851,20,50,80-C6-02

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: • SEMICONDUCTOR DEVICES, CALIBRATION,
PIEZOELECTRIC GAGES, PRESSURE GAGES, SEMICONDUCTORS,
STRAIN GAGES, TEMPERATURE, TRANSDUCERS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

EVALUATION OF A SEMICONDUCTOR STRAIN GAGE PRESSURE
TRANSDUCER (0-2 PSID) TO DETERMINE CONFORMANCE TO VENDOR
SPECIFICATIONS AND DYNASOAR VIBRATION REQUIREMENTS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-296 712

BOEING CO SEATTLE WASH

FORMABILITY TESTS ON MO-.5T1; (JOGGLING TESTS MO.-
5T1) (U)

JUN 61 1V MARR, F, G, J

REPT. NO. T2-2404

MONITOR: IDEP 502,30,00,80-C6-03

UNCLASSIFIED REPORT

NOFORN

DESCRIPTORS: HEAT RESISTANT METALS + ALLOYS, DIES,
JIGS, METAL-FORMING PRESSES, MOLYBDENUM, SHEETS, STRETCH
FORMING, TEMPERATURE, TITANIUM ALLOYS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

DETERMINATION OF MINIMUM CRACK-FREE JOGGLE RATIO
OBTAINABLE AND MINIMUM BEND RADIUS.

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-296 624

HONEYWELL INC HOPKINS MINN

VARIABLE RESISTOR INVESTIGATION

(U)

AUG 62 1V MEYER, T.;

REPT, NO. APP-000-712

MONITOR: IDEP 661,75.31.16-F5-01

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: POTENTIOMETERS

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

TESTS WERE MADE OF VARIABLE RESISTOR POTENTIOMETERS
TO DETERMINE WHETHER THE DEVICE MEETS THE
PREPRODUCTION TEST REQUIREMENTS OF THE APPLICABLE
SPECIFICATIONS. (AUTHOR)

(U)

UNCLASSIFIED

015416

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-293 283

CHANCE VOUGHT CORP DALLAS TEX
EMERGENCY DETECTION AND ESCAPE INITIATION SYSTEM.
PART II, SOLID PROPELLANT BOOSTERS (U)
NOV 62 1V EDWARDS, H.H.; SOLING, L.; TAYLOR, D.B.;
REPT, NO. TDR62 276 P23 14000 2R36
CONTRACT: AF33 616 8246
MONITOR: ASD TDR62 276 P2

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: *BOOSTER MOTORS, *ROCKET MOTORS, AUTOMATIC,
AVIATION SAFETY, BOOST-GLIDE VEHICLES, DETECTION,
DETECTORS, DYNAMICS, EXPLOSIONS, FAILURE (MECHANICS),
FIRE ALARM SYSTEMS, GROUND SUPPORT EQUIPMENT, GUIDED
BOMBS, HAZARDS, HYPERVELOCITY VEHICLES, MONITORS,
RELIABILITY, SATELLITES (ARTIFICIAL), SOLID ROCKET
PROPELLANTS, TEMPERATURE WARNING SYSTEMS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE INVESTIGATION AND DESIGN OF AN EMERGENCY
DETECTION AND ESCAPE INITIATION SYSTEM ARE DESCRIBED.
AN INVESTIGATION OF SOLID PROPELLANT BOOSTER FLIGHT
RECORDS WAS CONDUCTED TO DEFINE THE HAZARDS OF MULTI-
STAGE BOOST-GLIDE AND LOW EARTH ORBITAL VEHICLES,
VEHICLE RESPONSES TO PROBABLE FAILURES AND FLIGHT
ENVIRONMENTS ARE INVESTIGATED AND THE RESULTING
MANEUVERS DESCRIBED, TECHNIQUES FOR DETECTING
MALFUNCTIONS OR HAZARDOUS SITUATIONS ARE DISCUSSED,
THE CONCLUSIONS OF THIS PROGRAM INDICATE THAT
MANUAL AND AUTOMATIC MEANS OF DETECTING HAZARDS AND
INITIATING ESCAPE CAN BE SUCCESSFULLY INTEGRATED INTO
THE FLIGHT VEHICLE AND THAT A REASONABLY ACCURATE
DEFINITION OF SPACE FLIGHT HAZARDS CAN BE MADE.
(AUTHOR) (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-291 665

GENERAL APPLIED SCIENCE LABS INC WESTBURY N Y
RESEARCH ON ADVANCED PHYSICAL APPROACHES TO
ELECTROMAGNETIC WINDOW DESIGN, PART I: STRUCTURAL
INVESTIGATION OF ELECTROMAGNETIC WINDOWS (U)

OCT 62 IV MAGNUS, DANIEL E. EISEN, DENNIS;
REPT. NO. TDR62 40 P1
CONTRACT: AF33 616 7020
MONITOR: ASO TDR62 40 P1

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •AERODYNAMIC HEATING, •ELECTROMAGNETIC
FIELDS, •GUIDED MISSILE WINDOWS, •HYPERVELOCITY
VEHICLES, •MAGNETIC FIELDS, •SHOCK WAVES, ALUMINUM,
ANTENNAS, BOUNDARY LAYER, CERAMIC MATERIALS, ELECTRONS,
GAS IONIZATION, RADOMES, REENTRY VEHICLES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

AN ANALYSIS IS PRESENTED OF THE UNSTEADY STATE
TEMPERATURE AND STRESS DISTRIBUTIONS IN
ELECTROMAGNETIC WINDOWS PLACED ON HYPERSONIC
VEHICLES. DIGITAL PROGRAMS WHICH TAKE INTO ACCOUNT
VARIATIONS OF WINDOW GEOMETRY, BOUNDARY CONDITIONS,
WINDOW MATERIALS AND FLIGHT CONDITIONS WERE DEVELOPED
TO FACILITATE THE COMPUTATIONS. THE PROGRAMS ARE
USED TO DETERMINE THE FEASIBILITY OF ALUMINA AND
PYROCERAM WINDOWS FOR SEVERAL DIFFERENT TYPES OF
HYPERSONIC VEHICLES. BOTH SIDE WINDOWS AND OGIVAL
RADOMES ARE STUDIED. A DESCRIPTION OF THE DIGITAL
PROGRAM AND THE NUMERICAL RESULTS ARE PRESENTED. THE
IONIZED ENVIRONMENT SURROUNDING ELECTROMAGNETIC
WINDOWS ON HYPERSONIC VEHICLES IS ALSO PRESENTED.
BOTH THE VISCOUS AND INVISCID LAYERS ARE ANALYZED
GIVING THE ELECTRON DENSITY DISTRIBUTION THROUGH THE
BOUNDARY AND SHOCK LAYERS AND THE COLLISION FREQUENCY
VARIATION ACROSS THE SHOCK LAYER. THE ELECTRON
DENSITIES ARE EXCESSIVE FOR THE SUCCESSFUL OPERATION
OF RADAR INSTALLATIONS. METHODS BY WHICH THE ELECTRON
DENSITIES CAN BE REDUCED ARE DISCUSSED. THESE METHODS
INCLUDE BASE REGION ANTENNA LOCATIONS, SHOCK
GENERATOR INSTALLATIONS AND PROTUBERANCES (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-288 089L

CALIFORNIA UNIV BERKELEY INST OF ENGINEERING
RESEARCH

SKIN PANEL FLUTTER TEST, REF:NE I, AD-375D-4, SPO=
184 (U)

DEC 62 1V MORTVEDT,R,L.;RICH,R.L.;WAGNER,R.T.;
REPT, NO. D2 80641
CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT
DOD ONLY

DESCRIPTORS: •HYPERVELOCITY VEHICLES, AERODYNAMIC
CHARACTERISTICS, AIRPLANE PANELS, BOOST-GLIDE VEHICLES,
CHROMIUM ALLOYS, COBALT ALLOYS, DESIGN, FLUTTER, METAL
PLATES, MODEL TESTS, NICKEL ALLOYS, SKIN, TRANSONIC
CHARACTERISTICS, WIND TUNNEL MODELS (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-287 269

AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
OHIO

A REVIEW OF SCORING METHODS FOR TRACKING TASKS (U)

OCT 62 IV FROST, GEORGE G. I

REPT. NO. M P 14

UNCLASSIFIED REPORT

DESCRIPTORS: •TRACKING, •TRAINING DEVICES, ANALYSIS OF
VARIANCE, CIRCUITS, ELECTRONIC EQUIPMENT, ERRORS,
MEASUREMENT, TESTS (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

A REVIEW OF SCORING METHODS FOR TRACKING TASKS.

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-282 004L

BOEING CO SEATTLE WASH

DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM, (U)

DEC 62 27P

CONTRACT: AF33 657 7132

UNCLASSIFIED REPORT

DISTRIBUTION: ONLY GOVERNMENT AGENCIES MAY REQUEST
FROM DDC. OTHERS REQUEST APPROVAL OF AERONAUTICAL
SYSTEMS DIV., WRIGHT-PATTERSON AFB, OHIO,
ATTN: ASZRA,

DESCRIPTORS: •EJECTION SEATS, •HYPERVELOCITY
VEHICLES, GLIDERS, SAFETY, SPECIFICATIONS,
MILITARY REQUIREMENTS, SURVIVAL KITS, DESIGN,
AVIATION SAFETY (U)

IDENTIFIERS: RESEARCH PLANES, X-20 (U)

MILITARY REQUIREMENTS, SPECIFICATIONS, AND DESIGN
ARE GIVEN FOR THE DYNA-SOAR EJECTION SEAT AND
SURVIVAL SYSTEM, (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-278 607

BUREAU OF MINES PITTSBURGH PA

EVALUATION OF RADIANT HEAT FLUX AND TOXICITY IN DYNA-
SOAR-TITAN II DESTRUCT TESTS (U)

MAY 62 IV GIBSON, FRANK C.; MURPHY, JOHN M.;

BURGESS, DAVID;

REPT. NO. TDR62 221

MONITOR: ASD TDR62 221

UNCLASSIFIED REPORT

DESCRIPTORS: HEAT OF REACTION, MEASUREMENT, TESTS (U)

IDENTIFIERS: TITAN, X-20 SPACECRAFT (U)

TWO DESTRUCTION TESTS WERE CONDUCTED OF CELL MODELS OF THE TITAN II FUEL TANKAGE SYSTEMS. TOTAL QUANTITIES OF PROPELLANT INVOLVED WERE 14,000 POUNDS FOR ONE TEST, AND 32,000 POUNDS FOR THE OTHER OF THE AEROZINE-N SUB 2 O SUB 4 COMBINATION USED IN THIS BOOSTER. THE WORK WAS RESTRICTED TO PROVIDING INFORMATION ON 3 SPECIFIC QUESTIONS: (1) THE COMPLETENESS OF REACTION ON PUTTING TOGETHER THE HYPERGOLIC PROPELLANT COMBINATION; (2) THE RADIANT HEAT FLUX FROM THE REACTION ZONE; AND (3) THE QUANTITY AND DISTRIBUTION OF TOXIC VAPORS. NO CONSIDERATION IS GIVEN TO THE OVERPRESSURE PRODUCED BY THE EXPLOSION. IT IS ESTIMATED THAT REACTION WAS ABOUT 20% COMPLETED WITHIN A PERIOD OF 5 - 7 SECONDS. ADDITIONAL REACTION ENSUED ON THE TEST PAD AND ALL RESIDUAL FUEL WAS CONSUMED BY BURNING IN AIR. ABOUT HALF OF THE OXIDANT WAS DISPERSED UNREACTIONED AND LARGELY CARRIED UPWARD IN THE THERMAL COLUMN RESULTING FROM THE EXPLOSION. THE PEAK RADIATION LEVELS FROM THE EXPLOSIONS WERE ABOUT 10 TO THE 9TH POWER WATTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-275 758

AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO
AN AUTOMATIC LONGITUDINAL CONTROL SYSTEM FOR LANDING
A HYPERSONIC BOOST-GLIDE VEHICLE (U)

MAR 62 IV GALLAGHER, GILBERT GLYNAIER; WADDELL,
CHRIS;

REPT. NO. GGC EE 62 3

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •AUTOMATIC PILOTS, •GLIDE PATH SYSTEMS,
•HYPERVELOCITY VEHICLES, ANALOG SYSTEMS, CONTROL
SYSTEMS, GUIDANCE, INSTRUMENT LANDINGS, MATHEMATICAL
ANALYSIS, PITCH (MOTION), RADIO BEAMS, SIMULATION,
STABILIZATION SYSTEMS, VELOCITY (U)

IDENTIFIERS: X-20 SPACECRAFT (U)

AN AUTOMATIC CONTROL SYSTEM HAS BEEN DESIGNED TO
ASSUME COMMAND OF A BOOST-GLIDE VEHICLE AT
APPROXIMATELY 100,000 FT AND GUIDE IT DOWN TO A
SUCCESSFUL LANDING. AN AUTOPILOT AND ASSOCIATED
OFF-COURSE SENSING EQUIPMENT WAS DESIGNED TO KEEP THE
VEHICLE ON A GLIDE PATH PROVIDED BY A GROUND BASED
RADIO BEAM TRANSMITTER. MODIFICATIONS TO BE
AUTOMATICALLY SWITCHED INTO THE GLIDE-SLOPE CONTROL
SYSTEM AT A PREDETERMINED ALTITUDE, WERE DESIGNED SO
THAT THE SAME CONTROL SYSTEM WOULD GUIDE THE VEHICLE
ALONG AN EXPONENTIAL FLARE-OUT PATH TO A SATISFACTORY
LANDING. TO EFFECT SAFE LANDING VELOCITIES FROM A
WIDE RANGE OF GLIDESLOPE ENTRY VELOCITIES, AN
AUTOMATIC VELOCITY CONTROL SYSTEM WAS DESIGNED
EMPLOYING DIVE-BRAKE ADJUSTMENTS TO CORRECT VELOCITY
ERRORS. ALL PARTS OF THE AUTOMATIC CONTROL SYSTEM
PERFORMED SATISFACTORILY ON THE ANALOG COMPUTER, AND
EXERCISED TIGHT CONTROL OF THE VEHICLE OVER THE
ENTIRE FLIGHT REGIME. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-274 641

RADIO CORP OF AMERICA CAMDEN N J
STUDY OF INSTRUMENTATION AND TECHNIQUES FOR
MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH
ALTITUDES. VOLUME II. EFFECTS OF HIGH-ALTITUDE
ENVIRONMENTS ON VEHICLES AND EQUIPMENT (U)

IV WACHOLDER, B.V.; FAYER, E.

REPT. NO. TN59 307 V2
CONTRACT: AF33 616 6407
MONITOR: ASD TN59 307 V2

UNCLASSIFIED REPORT

DESCRIPTORS: •HYPERVELOCITY VEHICLES, •SATELLITES
(ARTIFICIAL), •SPACE ENVIRONMENTAL CONDITIONS,
•SPACECRAFT, AERODYNAMIC HEATING, ALLOYS, AURORAE,
AUXILIARY POWER PLANTS, CERAMIC MATERIALS, CLOSED-CYCLE
ECOLOGICAL SYSTEMS, COMMUNICATION SYSTEMS, CONTROL
SYSTEMS, COSMIC RAYS, DENSITY, ELECTRICAL CONDUCTANCE,
ELECTROMAGNETIC WAVES, ELECTRONIC EQUIPMENT, HAZARDS,
HIGH ALTITUDE, LUNAR PROBES, MAGNETIC FIELDS, MATERIALS,
METALS, METEORITES, ORGANIC MATERIALS, PLASMA PHYSICS,
PLASTICS, PRESSURE, SOLAR RADIATION, TEMPERATURE,
TERRESTRIAL MAGNETISM, UPPER ATMOSPHERE, VAN ALLEN
RADIATION BELT (U)

IDENTIFIERS: MERCURY PROJECT, X-15 AIRCRAFT, X-20
SPACECRAFT (U)

EQUIPMENT, ELECTRICAL EQUIPMENT, COMMUNICATION
SYSTEMS, AUXILIARY POWER PLANTS, CLOSED-CYCLE
ECOLOGICAL SYSTEMS.) (SHOCK, AERODYNAMIC HEAT
ING, METEORITES,) IDENTIFIERS: X-15, DYNA-
SOAR, MERCURY, ENVIRONMENTS ARE PRESENTED WHICH
WERE DETERMINED TO BE DELETERIOUS TO THE VEHICLE,
A CHART IS PRESENTED WHICH INDICATES WHICH OF THE
ENVIRONMENTS AFFECTS THE VARIOUS MATERIALS AND
SUBSYSTEMS. AN ANALYSIS WAS MADE OF THE EFFECTS OF
THE ENVIRONMENTS ON SUCH MATERIALS AS METALS,
PLASTICS, CERAMICS, ELASTOMERS, SURFACE COATING
MATERIALS, LUBRICANTS, AND HYDRAULIC FLUIDS, AN
ANALYSIS WAS MADE OF THE ENVIRONMENTAL EFFECTS ON
VEHICLE SUBSYSTEMS TAKEN FROM THE X-15,
DYNASOAR, AND MERCURY SYSTEMS. THE
SUBSYSTEMS ARE TYPICAL OF THOSE TO BE USED IN FUTURE
HIGH ALTITUDE VEHICLES. THE SUBSYSTEMS ANALYZED
ARE STRUCTURE, FLIGHT CONTROL, COMMUNICATIONS,
ENVIRONMENTAL CONTROL, ESCAPE, AND AUXILIARY POWER
UNITS. (AUTHOR) (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-274 190

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
SPACECREW TRAINING: A REVIEW OF PROGRESS AND
PROSPECTS

(U)

IV ECKSTRAND, GORDON A.; ROCKWAY, MARTY

R.;

REPT. NO. TR61 721

MONITOR: ASD TR61 721

UNCLASSIFIED REPORT

DESCRIPTORS: •ASTRONAUTICS; •TRAINING, ASTRONAUTS,
AVIATION PERSONNEL, MANNED, SELECTION, SPACE FLIGHT,
STRESS (PSYCHOLOGY)

(U)

IDENTIFIERS: MERCURY PROJECT, X-15 AIRCRAFT, X-20
SPACECRAFT

(U)

CURRENT PROGRESS AND FUTURE PROSPECTS IN THE FIELD
OF SPACECREW TRAINING ARE REVIEWED. DESCRIPTIONS
OF ALL CURRENT ASTRONAUT TRAINING PROGRAMS ARE
PRESENTED, AND A NUMBER OF GENERAL CONCLUSIONS WITH
REFERENCE TO SUCH TRAINING ARE DRAWN, BASED UPON THE
MANNED SPACE OPERATIONS WHICH HAVE BEEN CONDUCTED TO
DATE. IN ADDITION TO THE ACTUAL EXPERIENCE WHICH
HAS BEEN GAINED IN TRAINING SPACECREW PERSONNEL, A
REVIEW IS PRESENTED OF RECENTLY COMPLETED AND CURRENT
RESEARCH WHICH IS DIRECTLY RELEVANT TO THIS PROBLEM.
AREAS IN WHICH RESEARCH SHOULD BE ACCELERATED ARE
IDENTIFIED. (AUTHOR)

(U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-273 945

AEROJET-GENERAL CORP AZUSA CALIF
RELIABILITY STUDY OF THRUST VECTOR CONTROL
SYSTEMS

(U)

1V MOFFAT, W.H.; ANDERSON, W.B.;

REPT. NO. 2116

MONITOR: IDEP 347.40.00.00-A7-02

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •CONTROL SURFACES, •CONTROL SYSTEMS, •JETS,
BOOSTER MOTORS, CONTROL, DEFLECTION, EXHAUST GASES, JET
VANES, JETAVATORS, LIQUID JETS, MOVABLE NOZZLES,
RELIABILITY, ROCKET MOTOR NOZZLES, ROCKET MOTORS,
SECONDARY INJECTION, THRUST, THRUST VECTOR CONTROL
SYSTEMS

(U)

IDENTIFIERS: NOVA, X-20 SPACECRAFT

(U)

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015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-269 506L

BOEING CO SEATTLE WASH

DYNA-SOAR EJECTION SEAT AND SURVIVAL SYSTEM (U)

SEP 61 1V

REPT. NO. 10 81000 RB

UNCLASSIFIED REPORT

DDO ONLY

DESCRIPTORS: •EJECTION SEATS, •JETTISONABLE COCKPITS,
AVIATION SAFETY, CATAPULTS, DESIGN, GLIDERS,
HYPERVELOCITY VEHICLES, MILITARY REQUIREMENTS,
OPERATION, PARACHUTES, PRODUCTION, SURVIVAL KITS, TEST
METHODS (U)

UNCLASSIFIED

015416

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-266 288

RADIO CORP OF AMERICA CAMDEN N J
STUDY OF INSTRUMENTATION AND TECHNIQUES FOR
MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH
ALTITUDE, VOLUME I, VEHICLES AND ENVIRONMENTS (U)

IV WACHOLDER, B.V.; FAYER, E.;

CONTRACT: AF33 616 6407
MONITOR: ASD TN59 307

UNCLASSIFIED REPORT

DESCRIPTORS: *HYPERVELOCITY VEHICLES, *SATELLITES
(ARTIFICIAL), *SPACE ENVIRONMENTAL CONDITIONS,
*SPACECRAFT, AERODYNAMIC HEATING, ALBEDO, ATMOSPHERE,
ATMOSPHERE ENTRY, AURORAE, COSMIC RAYS, DRAG, GAS
IONIZATION, HAZARDS, INSTRUMENTATION, IONOSPHERE, LUNAR
PROBES, MAGNETIC DRIVES, MEASUREMENT, METEORITES, OZONE,
PRESSURE, SOLAR ATMOSPHERE, SOLAR CORONA, SOLAR
RADIATION, TEMPERATURE, UPPER ATMOSPHERE, VAN ALLEN
RADIATION BELT, VIBRATION (U)
IDENTIFIERS: X-15 AIRCRAFT, X-20 SPACECRAFT (U)

IDENTIFIER: DYNA-SOAR X-15. TYPICAL
EROSPACE VEHICLES AND THEIR TRAJECTORIES ARE
DESCRIBED. THE OPERATING ENVIRONMENTS OF THESE
VEHICLES, IN THE REGION OF SPACE BETWEEN THE EARTH
AND THE MOON, ARE DISCUSSED. THOSE VEHICLES
STUDIED INCLUDE THE BOOST-GLIDE VEHICLE, NEAREARTH
ORBITING VEHICLES, EXTREME ELLIPTICAL ORBITING
VEHICLES TRAVERSING THE VAN ALLEN RADIATION
BELTS, TRANSFER VEHICLES, AND LUNAR VEHICLES. EACH
VEHICLE STUDIED TYPIFIES ONE ENVIRONMENTAL PROBLEM,
SUCH AS RE-ENTRY CONDITIONS OR RADIATION EFFECTS.
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-263 595L

BOEING CO SEATTLE WASH

CREW STATION DESIGN REQUIREMENTS SPECIFICATION (U)

AUG 61 IV ROSS, LADNER V. J

REPT. NO. D2 8087 V1

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT
CONTROLLED

DESCRIPTORS: •COCKPITS, •FLIGHT INSTRUMENTS,
•HYPERVELOCITY VEHICLES, •INSTRUMENT PANELS, •REENTRY
VEHICLES, AIRCRAFT CABINS, CONTROL SYSTEMS, DESIGN,
FLIGHT, GLIDERS, JOB ANALYSIS, PILOTS, SATELLITES
(ARTIFICIAL), VISIBILITY (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-262 998L

BOEING CO SEATTLE WASH

CREW STATION DESIGN REQUIREMENTS SPECIFICATION (U)

JUN 61 IV KOLESAR, RICHARD D.; CANCLER, LEONARD;

REPT. NO. D2 8087 V2

CONTRACT: AF33 600 41517

UNCLASSIFIED REPORT

DOD ONLY

DESCRIPTORS: ♦FLIGHT CLOTHING, ♦FLIGHT INSTRUMENTS,
♦RADAR STATIONS, ACCELEROMETERS, ALTIMETERS, ATTITUDE
INDICATORS, BAROMETERS, DESIGN, INSTRUMENTATION,
MILITARY REQUIREMENTS, VELOCITY (U)

UNCLASSIFIED

015416

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-262 630

ADVISORY GROUP FOR AERONAUTICAL RESEARCH AND DEVELOPMENT
PARIS (FRANCE)

DYNA SOAR RESEARCH OBJECTIVES (U)

OCT 60 IV ANDERTON, FRANK R. JR.;

REPT. NO. 291

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •ASTRONAUTICS, •GLIDERS, •HYPERVELOCITY
VEHICLES, FLIGHT, FLIGHT TESTING, HYPERSONIC
CHARACTERISTICS, SPACE FLIGHT, SPACE PROBES (U)
IDENTIFIERS: X-20 SPACECRAFT (U)

THE RESEARCH OBJECTIVES OF THE DYNA SOAR
HYPERSONIC GLIDER ARE REVIEWED AND THE FLIGHT REGIME
FROM WHICH DATA WILL BE OBTAINED IS PRESENTED IN
COMPARISON WITH CURRENT MANNED SPACE PROJECTS, THE
DEVELOPMENT OF THE GLIDER THROUGH GROUND TESTING AND
RESEARCH IS OUTLINED AND AREAS IN WHICH SIGNIFICANT
TECHNICAL ADVANCES WILL BE MADE ARE POINTED OUT.
THE FLIGHT TEST PROGRAM IS DESCRIBED IN GENERAL
WITH REFERENCE MADE TO SPECIFIC TEST OBJECTIVES,
(AUTHOR) (U)

UNCLASSIFIED

015416

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ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-260 27B

JET PROPULSION LAB PASADENA CALIF
ASTRONAUTICS INFORMATION, OPEN LITERATURE SURVEY,
VOLUME III, NUMBER 6 (ENTRIES 31, 14631, 373) (U)
JUN 61 IV CARRINGER, E.M.; HOPPE, M.G.; NICHOLS,
B.H.;

CONTRACT: NASW6

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: BIBLIOGRAPHIES, ABLATION, ACCELEROMETERS,
ANTENNAS, ASTRONAUTICS, ATMOSPHERE, AURORAE, BALLOONS,
BIOLOGY, BOOSTER MOTORS, CLOSED-CYCLE ECOLOGICAL
SYSTEMS, COMMUNICATION SYSTEMS, COSMIC RAYS, GUIDANCE,
IONOSPHERE, LABORATORY ANIMALS, LASERS, MANNED, MARS,
MATERIALS, MEDICINE, METEORITES, MOON, NUCLEAR
PROPULSION, PHYSIOLOGY, PLANETS, POWER SUPPLIES,
PROPULSION, RADIO WAVES, REENTRY VEHICLES, SOLAR
SYSTEMS, SPACE FLIGHT, SPACECRAFT, SPACECRAFT CABINS,
UPPER ATMOSPHERE, VAN ALLEN RADIATION BELT, VENUS,
WEIGHTLESSNESS (U)
IDENTIFIERS: DISCOVERER, MARINER, MERCURY PROJECT,
SURVEYOR, X-20 SPACECRAFT (U)

OPEN-ENDED TERMS: SURVEYOR (PROJECT),
MERCURY, ATLAS, SATURN, MARINER, LASERS,
DYNA-SOAR, DISCOVERER, (U)

UNCLASSIFIED

015416

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, 015416

AD-256 840

HONEYWELL INC MINNEAPOLIS MINN

QUALITY AND RELIABILITY IN MANNED SPACE FLIGHTS (U)

MAY 61 IV DALE, EVERETT H. I

UNCLASSIFIED REPORT
NOFORN

DESCRIPTORS: •CONTROL SYSTEMS, •INSTRUMENTATION,
•QUALITY CONTROL, •SPACECRAFT, AUTOMATIC PILOTS,
CIRCUITS, DAMPING, ELECTRONIC EQUIPMENT, ELECTRONICS,
FAILURE (MECHANICS), HYDRAULIC SERVOMECHANISMS, MANNED,
RELIABILITY, RETRO ROCKETS, SERVOMECHANISMS, SPACE
FLIGHT, SPIN, STABILITY, STRESSES, YAW (U)
IDENTIFIERS: MERCURY PROJECT, X-15 AIRCRAFT, X-20
SPACECRAFT (U)

UNCLASSIFIED

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 015416

AD-243 546

AEROJET-GENERAL CORP SACRAMENTO CALIF
SOUND LEVEL MEASUREMENTS LRB7-AJ-1 AND LR91-AJ-1
LIQUID ROCKET ENGINES (U)

AUG 60 1V DOW, R.H. I
REPT. NO. TM129 RA
CONTRACT: AF04 645 B

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DESCRIPTORS: BOOSTER MOTORS, HAZARDS, HYPERVELOCITY
VEHICLES, LIQUID ROCKET PROPELLANTS, MEASUREMENT, NOISE,
ROCKET MOTOR NOISE, ROCKET MOTORS (U)
IDENTIFIERS: LR-87 ENGINES, LR-91 ENGINES, X-20
SPACECRAFT (U)

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AD-225 000

NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AVIATION
MEDICAL ACCELERATION LAB

THE REQUIREMENTS FOR MODIFICATION OF THE HUMAN
CENTRIFUGE FOR HIGH PERFORMANCE AIRCRAFT AND SPACE
VEHICLE SIMULATION RESEARCH (U)

JUL 59 1V CROSBIE, RICHARD J.:

REPT. NO. 5907

PROJ: ADC AE 1410NM 11 02 12 6ADC AE 1410

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DESCRIPTORS: •ACCELERATION TOLERANCE, •ATMOSPHERE ENTRY,
•CENTRIFUGES, •DECELERATION, •PILOTS, •SIMULATION,
•SPACE FLIGHT, •SPACECRAFT, DESIGN, TEST EQUIPMENT, TEST
FACILITIES (U)
IDENTIFIERS: X-15 AIRCRAFT, X-20 SPACECRAFT (U)

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AD-224 541

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
IV

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DESCRIPTORS: (•ASTRONAUTICS, •AERONAUTICS),
USSR, AIR FORCE OPERATIONS, RECOVERABLE BOOSTER
MOTORS, SPACE FLIGHT, VERTICAL TAKE-OFF PLANES,
MAINTENANCE, FLIGHT INSTRUMENTS, RADAR LANDING
CONTROL, RADAR NAVIGATION

(U)

IDENTIFIERS: X-20 SPACECRAFT

(U)

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