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ENVIRONMENTAL ENGINEERING ABSTRACTS

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ENVIRONMENTAL ENGINEERING ABSTRACTS

Prepared for

THE ENVIRONMENTAL TESTING LABORATORY

Organization 7300

By

The Simulated Environments Information Center
Sandia Laboratory Library

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SANDIA CORPORATION

Albuquerque, New Mexico

INTRODUCTION

The intent of this bulletin is to abstract information in the field of environmental engineering. Selection of material, abstracting, subject coding, and editing are the responsibility of the Simulated Environments Information Center. The SEIC is located in the Environmental Test Library, Building 860, Rm. 208, telephone 264-7568. Inquiries should be directed to this Center.

The code number, appearing to the right of each entry, is a unique identification number used for machine subject retrieval. The final letter of the code indicates the major subject of the article and determines the order of listing in this bulletin.

<u>Major Subject</u>	<u>Code</u>
ACCELERATION	A
ACOUSTIC	B
ATMOSPHERIC	C
CLIMATIC	D
ELECTRICAL	E
GASEOUS	F
GENERAL	G
HYGRO-ENVIRONMENT	H
INDUCED	I
STATIC	J
MEASUREMENT/INSTRUMENTATION	K
NATURAL	L
PRESSURE	M
RADIATION	N
MECHANICAL SHOCK	O
SPACE	P
SPECIFICATIONS	Q
HI-TEMP AND UNSPECIFIED TEMP	R
LOW-TEMP AND TEMP SHOCK	S
RANDOM VIBR AND UNSPECIFIED VIBR	T
SINUSOIDAL	U
BIOLOGICAL	V
MISCELLANEOUS	W
UNRELATED	X
RELIABILITY	Y
ENGINEERING PRACTICES	Z

ACCELERATION ENVIRONMENTS

HARRS EA CONVAIR

HAR5001A

A MANNED REVOLVING SPACE STATION SIMULATOR
-IES PROC.1965,P.449-453 7FIG1.DESIGN 2.SIMULATION 3.SPACE 4.NOMINAL 5.SINGLE 7.SPACECRAFT,
HUMAN 8.ENVIRO-CONTROL 9.FORCES

THE MRSSS HAS THE CAPABILITY OF REVOLVING FROM 0 TO 15 RPM, CARRYING FOUR MEN SIMULTANEOUSLY, AND IT IS CAPABLE OF VARYING INCLINATIONS, FROM THE VERTICAL, OF 0 TO 50 DEGREES. IT ALSO PROVIDES SYSTEMS FOR AUDIO COMMUNICATIONS, CLOSED-CIRCUIT TV, WASTE DISPOSAL, RUNNING WATER, ELECTRIC POWER AND SIGNAL CAPABILITIES

JOHANSSON JW LOCKHEED
TANK LEVEL IN SPACE

JOH6001A

-INSTR.AND CONT.SYS VOL.39,P.95-96 FEB.1966 3FIG

1.DESIGN 2.MEASUREMENT 3.SPACE 4.NOMINAL 5.SINGLE 7.CRYO-
LIQUID 8.ENVIRO-EFFECTS,ENVIRO-MEAS 9.FORCES,SUB-GRAVITAL

STORAGE OF LH2 IN ORBITING SPACE VEHICLES IS IMPORTANT IN BOTH EARTH-ORBIT AND ESCAPE-TYPE MISSIONS. A CLOSE TALLY OF BOIL-OFF LOSSES IS REQUIRED TO DETERMINE AVAILABLE TOTAL IMPULSE AND FOR LAUNCH WINDOW CALCULATIONS. ASSUMING THAT THE CONTAINER IS STABILIZED THIS CAN BE DONE BY APPLYING A KNOWN IMPULSE AND MEASURING THE RESULTANT ACCELERATION OF THE CONTAINER. FROM THIS THE MASS OF THE CONTAINER PLUS REMAINING LIQUID MAY BE CALCULATED.

THAYER WS AIRCRAFT ARMAMENTS INC

THA5001A

HUMAN ANGULAR MOTION CAPABILITY IN THE ZERO GRAVITY ENVIRONMENT
-IES PROC.1965,P241-250 7REF 12FIG 3TABLES1.STUDY 2.SIMULATION,METHOD,FACILITY 3.SPACE 4.NOMINAL
5.SINGLE 7.HUMAN 8.ENVIRO-EFFECTS 9.SUB-GRAVITAL

THE TEST OBJECTIVE WAS TO DETERMINE THE UPPER LIMITS OF ANGULAR MOTION CAPABILITY FOR THE WEIGHTLESS SPACE CREWMAN. THE PRINCIPAL PIECES OF TEST EQUIPMENT WERE A LOW FRICTION ROTARY PLATFORM AND AN OVERHEAD TORQUE HANDLE WHICH WAS INSTRUMENTED TO MEASURE THE TORQUE PULSE PRODUCED BY THE SUBJECT.

ACOUSTIC ENVIRONMENTS

FRICKE W. BELL AEROSYSTEMS CO. FRI5001B
PREDICTION OF SOUND INDUCED VIBRATIONS OF A VTOL AIRCRAFT
=IES PROC.1965,P.289-297 7REF 9FIG 2TABLES

1.STUDY 2.SIMULATION 3.INDUCED 4.NOMINAL 5.SINGLE 7.AIRCRAFT
8.ENVIRO-EFFECTS 9.ACOUSTIC

DESCRIBES A STATISTICAL METHOD USED FOR PREDICTING ACOUSTICALLY EXCITED VIBRATION OF THE COCKPIT STRUCTURE OF THE BELL X-22A. THE APPROACH USES THE MODAL DENSITY AND THE ENERGY ABSORPTION COEFFICIENT OF THE STRUCTURE AS SIGNIFICANT QUANTITIES. VIBRATION LEVELS ARE CALCULATED FROM THESE TWO QUANTITIES AND FROM THE PREDICTED SOUND PRESSURE SPECTRUM. THEY ARE COMPARED WITH MEASURED VIBRATION LEVELS OBTAINED WITH A REPRESENTATIVE SECTION OF THE FUSELAGE, SUSPENDED IN A REVERBERANT CHAMBER AND SUBJECTED TO A SIMULATED X-22A SOUND PRESSURE FIELD. CALCULATED AND MEASURED ACCELERATION VALUES ARE IN GOOD AGREEMENT.

PARROTT TL NASA LANGLEY RAR6001B
STRAIN RESPONSE OF SIMPLY SUPPORTED BEAMS TO POINT AND
ACOUSTIC LOADING
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 5, P. 77-84 3REF 11FIG

1.STUDY 2.EFFECTS 3.INDUCED 4.NOMINAL 5.SINGLE 7.STRUCTURE
8.ENVIRO-EFFECTS 9.ACOUSTIC

PRESENTS A COMPARISON OF MEASURED AND PREDICTED STRAIN RESPONSES FOR CAREFULLY CONTROLLED EXPERIMENTS ON BEAMS WHOSE BOUNDARY CONDITIONS APPROXIMATE TO A HIGH DEGREE OF ACCURACY THOSE OF A SIMPLE SUPPORT. IN GENERAL, GOOD AGREEMENT BETWEEN MEASURED AND PREDICTED DYNAMIC BENDING STRAIN WAS OBTAINED. HOWEVER, FOR SINUSOIDAL POINT LOADING THE THEORY OVERPREDICTED, AND FOR SINUSOIDAL ACOUSTIC LOADING IT UNDERPREDICTED THE DYNAMIC STRAINS. FOR RANDOM LOADING THE THEORY AND EXPERIMENT WERE IN CLOSE AGREEMENT. THE TOTAL EQUIVALENT VISCOUS DAMPING, MEASURED BY THE LOG DECREMENT TECHNIQUE, WAS FOUND TO HAVE AMPLITUDE AND MODAL DEPENDENCE.

SUGAMELE J. BOEING SUG5001B
EVALUATION OF ACOUSTIC ENVIRONMENTAL EFFECTS ON FLIGHT ELECTRONIC EQUIPMENT
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 3, P. 259-279 24REF 13FIG
=2TABLES

1.EVALUATION 2.EFFECTS 3.INDUCED 4.NOMINAL 5.SINGLE 6.MIL-STD-810 7.RELAY, SWITCHES, POTENTIOMETER, METER, TUBE, ACCELEROMETER, CAPACITOR, RESISTOR, TRANSISTOR, ELECTRIC CIRCUIT 8.ENVIRO-EFFECTS
9.ACOUSTIC

AVAILABLE ELECTRONIC COMPONENT AND FLIGHT PACKAGE ACOUSTIC TEST DATA OBTAINED FROM THE LITERATURE AND BOEING TESTING EXPERIENCE ARE CLASSIFIED AND PRESENTED ACCORDING TO THEIR FUNCTION AND STRUCTURAL CHARACTERISTICS. A DISCUSSION IS GIVEN ON THE ACOUSTIC SENSITIVITY OF THE EQUIPMENT ITEMS IN EACH CATEGORY. FROM THIS BODY OF INFORMATION, A PROCEDURE IS SUGGESTED WHICH OUTLINES THE STEPS FOR EVALUATING ELECTRONIC EQUIPMENT WHICH IS REQUIRED TO FUNCTION IN SEVERE ACOUSTIC ENVIRONMENTS.

TRUMMEL MC JPL TRU5001B
GROUND TEST SIMULATION OF LIFT-OFF AND TRANSONIC VIBRATION EX-
CITATION MECHANISMS ON THE RANGER SPACECRAFT
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 2, P. 75-84 2REF 16FIG

1. STUDY 2. SIMULATION, MEASUREMENT 3. INDUCED 4. NOMINAL 5. SINGLE
7. RANGER 8. ENVIRO-MEAS 9. ACOUSTIC

FOR ANALYSIS, MEASUREMENTS ARE GROUPED INTO THREE STRUCTURALLY
SIMILAR REGIONS. DATA FROM A TYPICAL REGION ARE STATISTICALLY
ANALYZED IN NARROW FREQUENCY BANDS AND THE 95-PERCENTILE VALUE
IS COMPARED TO THE 50-PERCENTILE VALUE. A METHOD OF USING
ACOUSTIC ACCEPTANCE MEASUREMENTS TO PREDICT LAUNCH VIBRATION
LEVELS IS DEVELOPED AND COMPARED WITH ACTUAL RANGER FLIGHT
DATA. THE DISTRIBUTION OF VIBRATION OVER THE SPACECRAFT AND
THE DIRECTIONALITY OF EXCITED VIBRATION ARE COMPARED UNDER
BOTH MODES OF VIBRATION EXCITATION.

CLIMATIC ENVIRONMENTS

HANSON KR MARTIN CO HAN5001D
A METHOD OF DETERMINING EFFECTIVE SKY TEMPERATURE FOR THE CAL-
CULATION OF RADIATION HEAT TRANSFER AT THE EARTH'S SURFACE
=IES PROC. 1965, P. 321-324 9REF 2FIG 1TABLE

1. THEORY 2. METHOD 3. NATURAL 4. NOMINAL 5. SINGLE 7. ORDNANCE
8. ENVIRO-EFFECTS 9. NAT-XPOS

A COMPARISON MADE OF THE ANALYTICALLY PREDICTED SURFACE TEM-
PERATURES (BASED ON A 410 DEG R SKY TEMPERATURE) AND ACTUAL
MEASURED TEMPERATURES OF GROUND SUPPORT EQUIPMENT REVEALED
THAT A SIGNIFICANT DISCREPANCY EXISTED WHICH APPEARED TO BE
THE RESULT OF THE RADIATION FACTOR IN THE ENERGY EQUATION. AN
ANALYTICAL APPROACH BASED ON THE SPECTRAL EMISSION CHARACTER-
ISTICS OF THE ATMOSPHERE CAUSED BY THE PRESENCE OF WATER VAPOR
AND CARBON DIOXIDE WAS DEVELOPED.

HAZARD IF COOK ELEC-INLAND TEST LABS HAZ5001D
SALT, FUNGUS, HUMIDITY, OZONE AND SUNSHINE
=IES PROC. (TUTORIAL SERIES), 1965, P. 1-12 1FIG

1. INFORMATION 2. SIMULATION, PROTECTION, MEASUREMENT 3. NATURAL
4. AGING 5. SINGLE-COMPL 6. MIL-E-5272, MIL-STD-202, MIL-C-9452,
MIL-T-945A, JAN-C-173 7. TEST-EQUIP, PLATING, PLASTIC 8. ENVIRO-
EFFECTS 9. NAT-XPOS

A REVIEW ARTICLE WHICH INCLUDES A GENERAL DESCRIPTION OF THE
ENVIRONMENT, ITS SIMULATION, MEASUREMENT AND PROTECTIVE COUNTER-
MEASURES FOR THE FIVE ENVIRONMENTS LISTED IN THE TITLE.

LOWY MA GULTON INDUS INC

LOW5001D

CLIMATIC ENVIRONMENTS--READOUT AND PRESENTATION
=IES PROC.(TUTORIAL SERIES),1965,P.83-92 17FIG 3TABLES

1.INFORMATION 2.INSTRUMENT 3.GENERAL 4.NOMINAL 7.RECORDER,
OPTICAL-INSTR,SENSOR 8.ELECTRICAL,MECHANICAL,ENVIRO-MEAS
9.CLIMATIC

DISCUSSES THE SYSTEMS USEFUL IN THE FIELD OF TEMPERATURE OR
PRESSURE ENVIRONMENTS. THESE INCLUDE MECHANICAL INDICATORS,
ELECTRICAL OUTPUTS,PRINTER AND DIGITAL VOLTMETERS,GRAPHIC RE-
CORDERS AND TAPE RECORDERS.RECORDERS ARE COMPARED ON THE BASIS
OF COST,ACCURACY AND RESPONSE.

ELECTRICAL ENVIRONMENTS

AIYA SVC INDIAN INST OF SCI

AIY5001E

SOME CHARACTERISTICS OF TROPICAL THUNDERSTORMS
=NATURE VOL.208,P.641-644 NOV.13,1965 34REF 4FIG

1.STUDY 2.MEASUREMENT 3.ATMOSPHERE 4.NOMINAL 5.SINGLE
7.RF-EQUIP 8.ENVIRO-MEAS 9.LIGHTNING

EXPLAINS THE VALIDITY OF A METHOD OF FOLLOWING THUNDERSTORM
ACTIVITY BY STUDYING THE NOISE BURSTS ARISING FROM THEM. THESE
NOISE BURSTS RESULT FROM RADIATION FROM LIGHTNING FLASHES
PICKED UP BY A VERTICAL AERIAL AND FED TO A SUPERHETERODYNE
RECEIVER TUNED TO A HIGH FREQUENCY. NOISE BURST MEASUREMENTS
HAVE BEEN MADE BY USING RECORDERS,FIELD-STRENGTH METERS AND
COUNTERS. SOME CHARACTERISTICS OF TROPICAL THUNDERSTORMS ARE
GIVEN FROM INTERPRETATION OF THIS NOISE DATA.

GENERAL ENVIRONMENTS

CORBETT SW MICROWAVE ELEC CORP

COR5001G

DESIGNING TRAVELING WAVE TUBES TO WITHSTAND MILITARY AIRBORNE
AND SHIPBOARD ENVIRONMENTS
=IES PROC.1965,P.219-223 10FIG 1TABLE

1.EVALUATION 2.MITIGATION 3.GENERAL 4.LIFE 5.SINGLE 6.MIL-E-
16400,MIL-E-5400 7.TUBE 8.FUNCTIONAL 9.HI-TEMP,LO-TEMP,LO-
=PRESS,HI-HUM,HF-VIBR,LO-G,SALT

MICROWAVE ELECTRONICS CORP HAS DEVELOPED A SERIES OF TUBES
WHICH ESSENTIALLY ARE UNAFFECTED BY ENVIRONMENTS OF TEMPERA-
TURE CYCLING FROM -62 DEG C TO +120 DEG C,ALTITUDES TO 70,000
FT,VIBRATION LEVELS OF 20 G TO 2000 CPS,SHOCKS TO 50 G WITH
5 TO 20 MILLISECOND PULSES,SALT SPRAY,AND 10 DAYS OF 95 PER-
CENT RELATIVE HUMIDITY. THIS ARTICLE DESCRIBES WHAT MEASURES
WERE TAKEN IN DESIGN TO MITIGATE THE EFFECTS OF THESE ENVIRON-
MENTS.

DEAN RD BOEING

DEA5001G

EFFECTS OF COMBINED HEAT AND NOISE ON HUMAN PERFORMANCE, PHYSIOLOGY, AND SUBJECTIVE ESTIMATES OF COMFORT AND PERFORMANCE
=IES PROC. 1965, P. 55-64 29REF 15FIG 5TABLES

1. XPER-RESULTS 2. METHOD, EFFECTS 3. GENERAL 4. NOMINAL 5. SYNERGISTIC 7. HUMAN 8. ENVIRO-EFFECTS 9. HI-TEMP, ACOUSTIC

TEN PILOTS WERE TESTED UNDER 20-MINUTE EXPOSURE PERIODS TO TEN COMBINATIONS OF HEAT AND NOISE. THE SUBJECTS PERFORMED SIMULTANEOUSLY TWO MONITORING TASKS AND ONE TRACKING TASK. DATA WERE ALSO OBTAINED ON SIX PHYSIOLOGICAL MEASURES AND TWO SUBJECTIVE MEASURES. THE DATA INDICATED THAT TEMPERATURES AS HIGH AS 110 DEGREES F (AT 50-PERCENT RELATIVE HUMIDITY AND 150-FTH PER-MINUTE AIR VELOCITY) AND WHITE NOISE AS HIGH AS 110 DB DID NOT DEGRADE PERFORMANCE OR THERMAL EQUILIBRIUM. HEAT WAS FOUND TO INCREASE HEART RATE, AXILLARY TEMPERATURE, AND THIGH TEMPERATURE, BUT HAD NO EFFECT ON RECTAL TEMPERATURE. NOISE WAS FOUND TO INCREASE HEART RATE AND RESPIRATORY RATE. THE INTERACTION BETWEEN NOISE AND HEAT SUGGESTED THAT NOISE LOWERED THIGH TEMPERATURE AT AMBIENT TEMPERATURES IN THE VICINITY OF 100 DEG F.

MATTHEWS LE USN MISSILE CENTER

MAT5001G

THE ELIMINATION OF SUBSTANDARD PARTS BY ENVIRONMENTAL TESTING
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 3, P. 227-233 3REF 6FIG

1. STUDY 2. ENGR-PRACTICE 3. GENERAL 4. LIFE 5. COMBINED 6. MIL-STD-721A 7. GUIDED-MISSILE, RELIABILITY 8. ENVIRO-EFFECTS 9. RDM-VIBR, LO-PRESS, HI-TEMP, LO-TEMP

DISCUSSES OBJECTIVES, LABORATORY TESTS ASSOCIATED WITH DIFFERENT DESIGN STATES, AND POSSIBLE GAINS OF LABORATORY DEBUGGING TESTS OR TESTS TO ELIMINATE SUBSTANDARD PARTS, THE PRINCIPAL CAUSE OF EARLY FAILURES. EACH OF A SET OF MISSILES WAS SUBJECTED TO TWO TEN-MINUTE VIBRATION TESTS UNDER A COMBINED TEMPERATURE-ALTITUDE ENVIRONMENT. THE TEMPERATURE RANGED FROM 180 DEGREES F TO -30 DEGREES F, AND THE ALTITUDE WAS 40,000 FT. THE MISSILE WAS CHECKED FOR ACCEPTABLE OPERATION BEFORE, DURING AND AFTER THE ENVIRONMENTAL TEST. THE MISSILES WERE LATER FLIGHT TESTED. ALTHOUGH THE SAMPLE SIZE WAS SMALL, THERE WAS A CORRELATION BETWEEN LAB AND FLIGHT TESTS TO INDICATE VALUE FOR THE DEBUGGING TESTS.

NASH HE LEEDS AND NORTHRUP

NAS5001G

CLIMATIC SENSORS AND TRANSDUCERS--TEMPERATURE AND HUMIDITY
=IES PROC. (TUTORIAL SERIES), 1965, P. 31-37 14REF

1. INFORMATION 2. INSTRUMENT 3. GENERAL 4. NOMINAL 5. SINGLE 7. HUMID-INDICTR, SENSOR-TEMP 8. ENVIRO-EFFECTS 9. HOT, COLD, HUMIDITY

THIS PAPER CONCERNS ITSELF WITH A GENERAL DESCRIPTION OF THE VARIOUS TYPES OF HUMIDITY AND TEMPERATURE SENSORS, THEIR METHODS OF APPLICATION, AND THE ASSOCIATED CIRCUITS WHICH MAKE READOUT AND PRESENTATION POSSIBLE.

RADER WP MARTIN CO

RAD5001G

ON SYNERGETIC EFFECTS OF COMBINATIONS OF VIBRATION AND OTHER ENVIRONMENTS
=US DIRECTOR OF DEFENSE, SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 2, P. 97-105 2REF 9FIG
=1TABLE

1. STUDY, DESIGN 2. SIMULATION, FACILITY 3. GENERAL 4. NOMINAL
5. COMBINED, SYNERGISTIC 7. CHAMBER, SHAKER 8. ENVIRO-CONTROL
9. VIBR, HOT, COLD, SHOCK, HUMIDITY, SUSTAINED, PRESSURE

A PROGRAM WAS CONDUCTED TO DETERMINE THE SIGNIFICANT EFFECTS OF COMBINING VIBRATION WITH OTHER ENVIRONMENTS. A TEST ITEM WAS DEVELOPED SPECIFICALLY TO HAVE A MEASURABLE RESPONSE TO EACH ENVIRONMENT OF INTEREST IN THE INVESTIGATION. THE MULTI-ENVIRONMENT FACILITY USED IN THE EXPERIMENTAL PROGRAM IS DESCRIBED AND EXPERIMENTAL RESULTS ARE GIVEN. THROUGH REGRESSION TECHNIQUES, A MATHEMATICAL QUANTIFICATION OF THE FUNCTIONAL RELATIONSHIP BETWEEN ENVIRONMENTAL CONDITIONS WAS ESTABLISHED. THIS PROVIDED A MEANS FOR TESTING THE AGREEMENT BETWEEN THEORY AND EXPERIMENT.

SIEGELMAN A BECKMAN INSTR

SIE7001G

LIFE-TEST RECORDING--WHICH TECHNIQUE
=EID VOL. 3, P. 8-16 JAN. 1967 6FIG 3TABLES

1. EVALUATION 2. DATA 3. GENERAL 4. LIFE 5. SINGLE 7. RECORDER
8. ENVIRO-EFFECTS

DEFINES FIVE CLASSES OF LIFE TESTING, DISCUSSES THE RECORDERS THAT ARE AVAILABLE, AND INDICATES THE CLASSES OF LIFE-TEST RECORDING TO WHICH EACH MAY BE ADVANTAGEOUSLY APPLIED.

ANDERSON AR COOK ELECTRIC CO

AND5001I

INDUCED ENVIRONMENTS

THE METHODOLOGY OF TEST PLANNING APPLIED TO AN EXPERIMENTAL STUDY
=IES PROC. 1965, P. 625-631 9FIG

1. DESIGN 2. METHOD 3. INDUCED 4. LIFE 5. SEQUENTIAL 7. MATERIALS,
CHAMBER, PARACHUTE 8. ENVIRO-EFFECTS 9. HI-TEMP, HI-VAC

THE PURPOSE OF THE EXPERIMENTAL STUDY DISCUSSED IN THIS PAPER WAS TO DETERMINE THE EFFECTS OF BIOLOGICAL STERILIZATION AND VACUUM ON SELECTED CONTROL COMPONENTS OF A PARACHUTE RETARDATION SYSTEM. SINCE THE SUCCESSFUL OUTCOME OF ANY EXPERIMENTAL STUDY DEPENDS TO A GREAT EXTENT ON THE PLANNING AND TEST APPARATUS DESIGNED OR UTILIZED, THIS PAPER PRESENTS THE METHODOLOGY EMPLOYED IN ANALYZING THE BASIC PROBLEM, DEFINING THE NECESSARY AREAS OF INVESTIGATION, AND GENERATING THE TEST MATRIX AND EQUIPMENT. A SYNOPSIS OF TEST RESULTS IS ALSO PRESENTED.

BOUCHE RR ENDEVCO CORP

BOU50011

ENSURING THE ACCURACY OF SHOCK AND VIBRATION MEASUREMENTS
=IES PROC.1965,P.409-415 13REF 3FIG

1.EVALUATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE
7.ACCELEROMETER 8.CALIBRATION,ENVIRO-EFFECTS,ELECTRICAL
9.VIBR,SHOCK,ELECTRIC-FIELD

A REVIEW OF CURRENT TOPICS CONCERNING ACCELERATION MEASUREMENTS. CERTAIN LABORATORY AND FIELD CALIBRATIONS MUST BE PERFORMED ON THE ACCELEROMETERS. IT IS ALSO NECESSARY TO SELECT APPROPRIATE ELECTRONIC ACCESSORY EQUIPMENT. IT IS IMPORTANT TO CONSIDER CERTAIN ENVIRONMENTAL EFFECTS, SUCH AS TRANSIENT TEMPERATURE, MOUNTING CONDITIONS AND RESONANT FREQUENCY EXCITATION PRESENT DURING SHOCK TESTING APPLICATIONS.

BOUCHE RR ENDEVCO

BOU70011

UNDERSTANDING ACCELEROMETERS
=ELEC.ENG VOL.26,P.90-94 APR.1967 5FIG 2TABLES

1.EVALUATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE
ACCELEROMETER,PIEZO-ELECTRIC 8.ENVIRO-MEAS 9.VIBR,SHOCK

A TEXTBOOK-TYPE ARTICLE ON THE FUNDAMENTALS OF PIEZOELECTRIC AND PIEZORESISTIVE ACCELEROMETERS.

CLEVENSON SA NASA LANGLEY RES CEN

CLE50021

FATIGUE LIFE UNDER VARIOUS RANDOM LOADING SPECTRA
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTALS,SYMPOSIUM,35TH,OCT.1965 PT.2,P.21-31 5REF 14FIG

1.STUDY 2.EFFECTS 3.INDUCED 4.LIFE 5.SINGLE 7.ALLOYS 8.ENVIRO-EFFECTS 9.RDM-VIBR,LF-VIBR,STATIC

IT WAS INDICATED THAT FOR THE THREE SPECTRA CONSIDERED THERE WAS ESSENTIALLY NO DIFFERENCE IN FATIGUE LIFE. THE EFFECT OF THE RATIO OF PEAKS TO ZERO-MEAN CROSSINGS WAS FOUND TO BE NEGLIGIBLE IN THE RANGE OF RATIOS INVESTIGATED. THE RESULTS INDICATED THAT THE LINEAR CUMULATIVE DAMAGE THEORY WAS VERY UNCONSERVATIVE, ESPECIALLY AT THE LOW STRESS LEVELS. FRACTOGRAPH STUDIES SHOWED QUALITATIVELY THE EXPECTED TYPES OF FAILURE WHEREIN THE OUTER SECTIONS OF THE ALUMINUM-ALLOY SPECIMEN FAILED DUE TO FATIGUE AND THE INNER AREA FAILED DUE TO TENSILE LOADING.

DARSEY DM SANDIA CORP

DAR70011

WIDE DYNAMIC RANGE REMOTE CONTROL SYSTEM, A THEORETICAL AND EMPIRICAL STUDY
=IES PROC.1967,P.375-379 12FIG

1.STUDY 2.METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.CABLES
8.ENVIRO-MEAS 9.VIBR,SHOCK

TWISTED PAIR CABLE, AS USED IN TELEPHONE LINES, WAS SELECTED FOR THIS SIGNAL TRANSMISSION SYSTEM. A THEORETICAL DESIGN AND THE REMOTE CONTROL SYSTEM NOW IN OPERATION ARE DISCUSSED.

GERTEL M. ALLIED RES ASSOC
DERIVATION OF SHOCK AND VIBRATION TEST SPECIFICATIONS BASED ON
MEASURED ENVIRONMENTS
=JL.ENVIR.SCI VOL.9,P.14-19 DEC.1966 8REF 7FIG GER60021

1. PHILOSOPHY 2. SIMULATION 3. INDUCED 4. DESTRUCTION 5. SINGLE
6. ASA 8. ENVIRO-CONTROL 9. VIBR, SHOCK

A PROGRESS REPORT OF THE AMERICAN STANDARDS ASSNS S2-W-46
EXPLORATORY GROUP WHICH REVIEWS MANY OF THE FACTORS RELATIVE
TO EXACT DUPLICATION OF ENVIRONMENTS VERSUS SIMULATION OF
DAMAGING EFFECTS. A SAMPLE APPROACH TO THE DEVELOPMENT OF SE-
VERITY LEVEL AND DURATION OF A SINUSOIDAL SWEEP FREQUENCY TEST
IS PRESENTED, BASED ON A SYNTHESIZED VIBRATORY ACCELERATION IN-
PUT VERSUS CYCLES TO FAILURE CURVE FOR EQUIPMENT. AN ANALOGOUS
APPROACH CAN BE USED FOR SHOCK TESTS. THE SYNTHESIZED CURVE IS
EMPLOYED IN CONJUNCTION WITH A CONCEPT OF CUMULATIVE DAMAGE
UNDER VARYING AMPLITUDE INPUT CONDITIONS. THESE THEN REPRESENT
THE NECESSARY FAILURE CRITERIA WHICH ARE ESSENTIAL FOR DEVEL-
OPING ALL SHOCK AND VIBRATION (SINUSOIDAL OR RANDOM) LABORATORY
TEST PROCEDURES.

MASRI SF CALIF INST TECH
CUMULATIVE DAMAGE CAUSED BY SHOCK EXCITATION
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
RONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 3, P. 57-71 12REF 12FIG MAS50011
=2 TABLES

1. STUDY 2. METHOD, EFFECTS 3. INDUCED 4. DESTRUCTION 5. SINGLE
7. GLASS, STRUCTURE-ELASTIC BODY 8. ENVIRO-EFFECTS 9. VIBR, SHOCK

REPEATED IMPACT EXPERIMENTS WERE MADE USING PIN-ENDED GLASS
BEAM SPECIMENS AND CANTILEVER PLASTIC BEAM SPECIMENS. IT WAS
FOUND THAT A SIMPLE LINEAR LAW OF FATIGUE DAMAGE ACCUMULATION
COULD NOT EXPLAIN THE RESULTS, AND THAT THE MODIFIED CRACK
GROWTH HYPOTHESIS GAVE A GOOD AGREEMENT WITH MEASURED DATA.

NASHIF AD UNIV OF DAYTON
NEW METHOD FOR DETERMINING DAMPING PROPERTIES OF VISCO-
ELASTIC MATERIALS
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
RONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 4, P. 37-47 2REF 9FIG NAS60011
=1 TABLE

1. STUDY 2. MITIGATION, METHOD 3. INDUCED 4. NOMINAL 5. COMBINED
7. ISOLATOR, ELASTOMER 8. ENVIRO-EFFECTS 9. LO-TEMP, HI-TEMP,
DAMPING

DESCRIBES A SIMPLIFIED APPROACH TO THE PROBLEM OF MEASURING
THE DAMPING PROPERTIES OF VISCOELASTIC MATERIALS USING SYM-
METRIC SPECIMENS IN THE OBERST APPARATUS. IT IS SHOWN THAT THE
PROCEDURE FOR DETERMINING THE LOSS FACTOR AND YOUNG'S MODULUS
OF THE VISCOELASTIC MATERIAL IS FAR SIMPLER THAN THAT FOR
SPECIMENS COATED ON ONLY ONE SIDE. EXPERIMENTS ARE DESCRIBED
WHICH DEMONSTRATE GOOD AGREEMENT BETWEEN MEASUREMENTS TAKEN ON
BOTH TYPES OF SPECIMEN, THEREBY DEMONSTRATING THE ACCURACY OF
THE NEW TECHNIQUE. EXPERIMENTAL ERRORS AND THEIR EFFECT ON THE
CALCULATED VALUES OF THE DAMPING PROPERTIES ARE DISCUSSED.

NEWTON JD MB ELECTRONICS

NEW50021

METHODS OF CONTROL OF MULTIPLE SHAKER TESTING SYSTEM
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,35TH,OCT.1965 PT.2,P.85-96 12FIG

1.EVALUTION 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE 7.SHAKER,
AMPLIFIER 8.ENVIRO-CONTROL 9.VIBR,RDM-VIBR,PROGRAMMED

THE TWO BASIC SHAKER-AMPLIFIER CONFIGURATIONS DISCUSSED ARE
(1)SEVERAL SHAKERS CONNECTED ELECTRICALLY IN SERIES AND DRIVEN
FROM ONE LARGE POWER AMPLIFIER,AND (2)EACH SHAKER DRIVEN FROM
ITS AMPLIFIER AND INDEPENDENTLY CONTROLLED. THE MODES OF CON-
TROL AVAILABLE IN EACH CASE AND THE ANTICIPATED RESULTS ARE
PRESENTED. ACTUAL TEST RESULTS ARE PRESENTED FOR TWO DIFFERENT
SPECIMENS USING THE DIFFERENT MODES OF CONTROL.

PURSIFULL LJ ARMY TRANSP ENGR AGENCY

PUR40011

PROBLEMS ENCOUNTERED IN THE USE OF INSTRUMENTS FOR MEASURING
DYNAMIC ENVIRONMENTS
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,34TH,OCT.1964 PT.4,P.255-258 4FIG

1.EVALUATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.COMBINED
7.RECORDER,ISOLATOR 8.ENVIRO-MEAS 9.VIBR,TRANSPORT

IN A RECENT TEST,THE VIBRATION EXPERIENCED DURING THE HIGHWAY
PORTION OF THE MOVEMENT RESULTED IN CONFUSING NOISE-TYPE SIG-
NALS,ALTHOUGH THE TAPE RECORDER USED WAS ADEQUATELY SHOCK-
MOUNTED TO PREVENT MECHANICAL DAMAGE. THE INTELLIGENCE TRANS-
MITTED BY THE RECORDER WAS SUBMERGED BY THIS NOISE,WHICH IS
APPARENTLY CAUSED BY ARCING,TAPE FLUTTER,OR A COMBINATION OF
THESE FACTORS. TO COUNTER THESE PROBLEMS A STUDY IS BEING MADE
ON A NEW SLIDING SHOCK-ABSORBING PLATFORM DESIGNED FOR LONG
TRAVEL TO REDUCE TRANSMISSION OF LOW-FREQUENCY SHOCKS,ACCELER-
ATIONS AND FORCES.

REDFORD DF THIOKOL

RED60011

SHOCK AND VIBRATION TESTING USING FOUR-SHAKER SYSTEM
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.3,P.91-99 1REF 8FIG

1.DESIGN 2.FACILITY 3.INDUCED 4.NOMINAL 5.COMBINED 7.SHAKER,
SATURN 8.ENVIRO-MEAS 9.LO-G,LF-VIBR,HF-VIBR,RDM-VIBR,UL-TEMP

THIOKOLS WASATCH DIV WAS AWARDED A CONTRACT TO TEST A LOX
VENT DUCT IN THREE DIFFERENT ENVIRONMENTS--HALF-SINE SHOCK,
SWEEP FREQUENCY SINE VIBRATION, AND RANDOM VIBRATION. TO
ACCOMPLISH TEST OBJECTIVES,FOUR-SHAKER SYSTEMS WERE USED IN
CONJUNCTION WITH A WAVE SYNTHESIZER,AUTOMATIC SINE WAVE VIBRA-
TION CONTROL UNITS,AND AN AUTOMATIC RANDOM VIBRATION CONTROL
UNIT.

ROBERTSON KD ARMY MATS RES AGENCY

ROB40011

DESIGN OF A LIGHTWEIGHT PACKAGING SYSTEM TO SURVIVE DYNAMIC AND STATIC LOADS
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTALS, SYMPOSIUM, 34TH, OCT. 1964 PT. 4, P. 275-283 2REF 7FIG 9TABLES

1.DESIGN, STUDY 2.PROTECTION, MITIGATION 3.INDUCED 4.NOMINAL 5.SINGLE 7.PACKAGING 8.ENVIRO-EFFECTS 9.VH-PRESS, LO-TEMP, HI-TEMP, LO-G, LF-VIBR, HF-VIBR

THE SYSTEM WEIGHED APPROXIMATELY 180 LBS, THE TOTAL WEIGHT, INCLUDING PACKAGING, WAS NOT TO EXCEED 210 LBS. THE FRAGILITY LEVEL OF THE PACKAGING SYSTEM WAS 27G. THE SYSTEM WAS INTENDED FOR WORLDWIDE DISTRIBUTION AND WOULD BE SUBJECTED TO EXTREMES OF TEMPERATURE, MINUS 60 DEGREES TO PLUS 150 DEGREES F. IT WAS SPECIFIED THAT IT REMAIN OPERABLE IF ACCIDENTALLY DROPPED FROM A HEIGHT OF 3 FT. IN SERVICE, THE PACKAGING SYSTEM COULD BE SUBJECTED TO A HYDROSTATIC OR AXIAL PRESSURE OF 22 PSI. THE SYSTEM FINALLY DEVELOPED CONSISTED OF A RIGID INNER CONTAINER SURROUNDED BY PACKAGING MATERIAL CONSTRAINED BY A FLEXIBLE TOUGH OUTER BAG.

SKOLKA EJ NASA GODDARD

SKO60011

HYDRAULIC EXCITER COMBINED ENVIRONMENT TESTS
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTALS, SYMPOSIUM, 36TH, OCT. 1966 PT. 3, P. 119-138 2REF 34FIG

1.STUDY 2.FACILITY 3.INDUCED 4.NOMINAL 5.COMBINED 7.SHAKER 8.ENVIRO-MEAS 9.SUSTAINED, HF-VIBR, LF-VIBR, CROSS-TALK

THE COMBINATION OF VIBRATION AND SUSTAINED ACCELERATION WAS INVESTIGATED BY OPERATING A 5000-LB FORCE RATED HYDRAULIC VIBRATION EXCITER ON A 20-FT DIAMETER CENTRIFUGE. THE EXCITER TEST FREQUENCY SPECTRUM WAS FROM 20 TO 500 CPS. TEST DATA INDICATED THAT THE INTERACTION OF EXCITER HARMONIC CONTENT WITH RESONANCE GENERATED IN THE CENTRIFUGE SYSTEM PRODUCED HIGH LEVELS OF EXCITER ACCELERATION DISTORTION. INCREASES IN SUSTAINED ACCELERATION LEVELS PRODUCED HIGHER ACCELERATION WAVEFORM DISTORTION FOR FREQUENCIES ABOVE 150 CPS. AT LOWER FREQUENCIES, RESONANCES OF CENTRIFUGE EQUIPMENT AND HYDRAULIC SYSTEM COMPONENTS DISTORTED EXCITER INPUT SIGNALS AND CONSEQUENTLY THE OUTPUT WAVEFORM.

STATIC ENVIRONMENTS

YAMANA M UNIV OF TOKYO

YAM7001J

STRESS-DISTRIBUTION MEASUREMENT BY MEANS OF VIBRATION METHOD
=JL.AIRCRAFT VOL.4, P.16-21 JAN-FEB.1967 7REF 10FIG

1.EVALUATION 2.EFFECTS 3.INDUCED 4.NOMINAL 5.SINGLE 7.AIRCRAFT, GAGE-STRESS 8.ENVIRO-EFFECTS 9.STATIC

BY APPLYING A HAND-HELD EXTENSOMETER AT VARIOUS PLACES ON THE SURFACE OF A STRUCTURE SUBJECTED TO A DYNAMIC LOAD OF A FINITE AMPLITUDE, THE DISTRIBUTION OF THE STRAIN CAN BE MEASURED PRECISELY AND QUICKLY. A MECHANICAL AND AN ELECTRONIC TYPE OF EXTENSOMETER ARE USED. SEVERAL PROCEDURES FOR APPLYING A SUITABLE DYNAMIC LOAD TO THE STRUCTURE ARE ILLUSTRATED, SUCH AS THE APPLICATION OF FATIGUE TESTING MACHINES AND THE RESONANCE METHOD. THE METHODS FOR DETERMINING THE LOAD ACTING ON A SPECIFIED STATION OF A STRUCTURE IN RESONANT VIBRATION, INCLUDING THE ADDITIVE-MASS METHOD APPLIED TO A COMPLETE AIRPLANE, ARE DESCRIBED AND ILLUSTRATED BY EXAMPLES.

MEASUREMENT/INSTRUMENTATION

LANCZ HW NBS

LAN5003K

STANDARDS AND CALIBRATION OF INSTRUMENTS
=IES PROC.(TUTORIAL SERIES),1965,P.39-47 22REF

1.INFORMATION 2.ENGR-PRACTICE,INSTRUMENT 3.GENERAL 4.NOMINAL
5.SINGLE 6.GENERALIZED 8.CALIBRATION

DISCUSSES THREE DIFFERENT BUT RELATED ASPECTS OF
THE SUBJECT,STANDARDS AND CALIBRATION OF INSTRUMENTS--(1)THE
LANGUAGE OF MEASUREMENTS,(2)ENVIRONMENTAL PROBLEMS IN CALIBRA-
TION,(3)OUR NATIONAL STANDARDS SYSTEM.

PRESSURE ENVIRONMENTS

HELMER JC VARIAN

HEL6001M

ION GAUGE FOR VACUUM PRESSURE MEASUREMENTS BELOW 1×10^{-11} TO THE
MINUS 10 TORR
=REV.SCI.INSTR VOL.37,P.1652-1654 DEC.1966 9REF 5FIG

1.DESIGN 2.INSTRUMENT 3.GENERAL 4.NOMINAL 5.SINGLE 7.GAGE
8.ENVIRO-MEAS 9.HI-VAC

LOW PRESSURE MEASUREMENTS BY BAYARD-ALPERT GAGES ARE LIMITED
BY X-RAY PHOTOELECTRIC CURRENTS AT THE ION COLLECTOR,EQUIVA-
LENT TO A PRESSURE READING OF ABOUT 1×10^{-11} TO THE MINUS 11 TORR.
THROUGH EFFORTS TO REDUCE THIS X-RAY CURRENT,THE BAYARD-ALPERT
STRUCTURE HAS BEEN MODIFIED,WHEREBY A BEAM OF IONS IS EXTRACT-
ED FROM THE GRID AND BENT AROUND A CORNER TO A REMOTE COLLEC-
TOR. BY THIS GEOMETRY THE COLLECTOR IS SHIELDED FROM THE X-RAY
SOURCE AT THE GRID,AND THE PHOTOELECTRIC CURRENT IS REDUCED BY
A FACTOR OF 100,WITHOUT INCURRING A LOSS IN GAGE SENSITIVITY.
BENDING OF THE ION BEAM IS ACCOMPLISHED BY A CYLINDRICAL,ELEC-
TROSTATIC FIELD,IN WHICH THE ION TRAJECTORIES ARE INDEPENDENT
OF E/M. 100 PERCENT MODULATION OF THE ION BEAM INTENSITY IS
ACHIEVED BY TURNING OFF THE BENDING FIELD,THEREBY PERMITTING
PRESSURE MEASUREMENTS AS LOW AS 1×10^{-14} TO THE MINUS 14 TORR. A
TOTAL PRESSURE OF 5×10^{-13} TO THE MINUS 13 TORR,NITROGEN EQUIVA-
LENT,HAS BEEN MEASURED IN A STAINLESS STEEL VACUUM SYSTEM EM-
PLOYING ION SPUTTERING AND TITANIUM SUBLIMATION AS THE MEANS
OF EVACUATION.

MOREFIELD RI BOLT BERANEK

MOR5001M

DYNAMIC COMPARISON CALIBRATOR FOR HIGH RANGE PRESSURE TRANS-
DUCERS
=IES PROC.1965,P.511-515 1REF 3FIG 1TABLE

1.EVALUATION 2.INSTRUMENT 3.GENERAL 4.NOMINAL 5.SINGLE
7.TRANSDUCER,PRESSURE-SENSOR 8.ENVIRO-MEAS 9.VH-PRESS,UH-PRESS

DESCRIBES THE HYDRAULIC PISTONPHONE,A DYNAMIC COMPARISON CALI-
BRATOR DEVELOPED TO ALLOW DIRECT DETERMINATION OF A TRANSDUCER
FREQUENCY RESPONSE. A SINUSOIDAL PRESSURE IS APPLIED TO TWO
PRESSURE TRANSDUCERS,THE TRANSDUCER SYSTEM UNDER TEST AND A
REFERENCE TRANSDUCER. WITH THE MAXIMUM STATIC PRESSURE,
5000 PSI,THE DEVICE CAN APPLY A DYNAMIC PRESSURE OF 5000 PSI
PEAK-TO-PEAK FROM NEAR DC TO 800 CPS. THE MAXIMUM DYNAMIC
PRESSURE IS REDUCED TO 2500 PSI PEAK-TO-PEAK AT 1000 CPS,
120 PSI AT 1600 CPS AND 40 PSI AT 2000 CPS.

ROSENBLATT JP BETHLEHEM CORP
PROGRESS IN PRESSURE--HIGH AND LOW
-ENVIR. QUAR VOL. 11, P. 26 SEPT. 1965 1FIG

ROS5002M

1. INFORMATION 2. FACILITY 3. NATURAL 4. NOMINAL 5. SINGLE
7. CHAMBER 9. UH-PRESS

CONTAINS A PICTURE OF A BETHLEHEM HIGH-PRESSURE HYDROSTATIC CHAMBER DELIVERED TO GOODYEAR AEROSPACE CORP, AKRON, FOR TESTING UNDERWATER COMPONENTS AND SYSTEMS. IT IS DESIGNED FOR MAXIMUM WORKING PRESSURE OF 1500 PSIG AND HAS BEEN TESTED TO MORE THAN 2350 PSIG. ARTICLE DOES NOT DESCRIBE THE FACILITY, BUT DISCUSSES BRIEFLY AND GENERALLY IN AN ELEMENTARY FASHION PRESSURE TESTING.

RADIATION ENVIRONMENTS

BEAUCHENE JH AEROSPACE CONTROLS
ROTATING SOLAR SIMULATOR AT LANGLEY
-TEST ENG VOL. 17, P. 35+ MAR. 1967 1FIG

BEA7001N

1. INFORMATION 2. FACILITY 3. SPACE 4. NOMINAL 5. SINGLE 7. ARC-LAMP, CHAMBER, OPTICS 8. ENVIRO-CONTROL 9. SOLAR

THE DESIGN PERMITS THE LAMPHOUSE TO BE LOCATED EXTERNALLY WHERE PROPER COOLING AND CONTROL ARE FACILITATED WHILE PERMITTING INTRODUCTION OF THE LIGHT ENERGY INTO THE 60-FT SPHERICAL FREE BODY DYNAMICS FACILITY AT AN OPTIMUM ANGLE AND LOCATION. ONE OF THE UNIQUE FEATURES IS A LIGHTWEIGHT MIRROR 4 FT BY 5 FT WEIGHING JUST 30 LBS.

CLAUSEN W CONVAIR
EFFECTIVE RADIATIVE PROPERTIES OF SURFACES IN SPACE SIMULATION FACILITIES
-IES PROC. 1965, P. 393-400 10REF 5FIG 2TABLES

CLA5003N

1. STUDY 2. SIMULATION 3. SPACE 4. NOMINAL 5. SINGLE 7. PLATING FACILITY, SPACECRAFT 8. ENVIRO-EFFECTS 9. SOLAR

SPECTRAL ABSORPTANCE CHARACTERISTICS OF A NUMBER OF COATINGS ARE PRESENTED AND ARE COMBINED WITH PUBLISHED SPECTRAL INTENSITIES OF THE MOST POPULAR SIMULATION SOURCES INCLUDING CARBON-ARCS, MERCURY-XENON LAMPS, INFRARED LAMPS. THE DIFFERENCE IN THE RADIANT HEAT ABSORBED BETWEEN GROUND LEVEL SIMULATION AND ACTUAL EXTRATERRESTRIAL FLIGHT IS THE CRITERION FOR EVALUATING A PARTICULAR SOURCE-COATING COMBINATION. SPECIFIC RECOMMENDATIONS ARE GIVEN FOR MATERIALS FOR WHICH THE SIMULATION ERRORS ARE THE GREATEST AND IN SOME INSTANCES ALTERNATE COATINGS ARE SUGGESTED FOR WHICH THE SIMULATION DIFFICULTIES ARE LESS SEVERE. CALORIMETRIC DATA FROM THE GO/CONVAIR SPACE SIMULATION FACILITY FOR ELECTROPLATED GOLD SAMPLES ARE PRESENTED WITH DIFFERENCES NOTED BETWEEN PREDICTED AND OBSERVED RESULTS.

ELDER GE WHITE SANDS MISSILE RANGE

ELD5001N

NUCLEAR EFFECTS FACILITIES AT WHITE SANDS MISSILE RANGE
=IES PROC.1965,P.569-572 1REF 8FIG1.DESIGN 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE 7.RADIATION-
EQUIP,WEAPONS 8.ENVIRO-EFFECTS 9.NUCLEAR

FOUR DEVICES ARE USED TO PRODUCE THE DESIRED RADIATION ENVIRONMENTS. 1) EITHER PULSED GAMMA RAYS OR ELECTRONS ARE PRODUCED BY A TRAVELING WAVE TYPE LINEAR ELECTRON ACCELERATOR WITH MAXIMUM ENERGY OF 19 MEV. PULSE WIDTH CAN BE VARIED FROM 20 NANoseconds TO 10 MICROSECONDS IN A SINGLE PULSE OR AT A 10 PULSE PER SECOND RATE. 2) THE PULSED NEUTRON GENERATOR PRODUCES 14 MEV NEUTRONS WITH AN OUTPUT OF 10 TO THE 9TH POWER WITH A 10 MICROSECOND PULSE WIDTH. 3) THE STEADY STATE NEUTRON GENERATOR PRODUCES 10 TO THE 8TH POWER 2.5 MEV NEUTRONS PER SECOND WITH A DEUTERIUM TARGET AND 10 TO THE 11TH POWER 14 MEV NEUTRONS PER SECOND WITH A TRITIUM TARGET. 4) THE FAST BURST REACTOR PROVIDES THE FISSION WEAPON NEUTRON AND GAMMA ENVIRONMENT. THE OUTPUT AT THE SAFETY SHIELD COVERING THE CORE IS 10 TO THE 14TH POWER NEUTRONS PER SQ CM WITH A PEAK GAMMA RATE OF 3×10 TO THE 8TH POWER RADS PER SECOND. THE PULSE WIDTH AT HALF POWER POINTS IS 40 MICROSECONDS.

LASZLO TS PHILIP MORRIS RES CENTER

LAS6001N

THE RECIPROCITY PRINCIPLE IN SPACECRAFT SURFACE TESTING
=JL.ENVIR.SCI VOL.9,P.13 DEC.1966 3REF1.PHILOSOPHY 2.SIMULATION 3.SPACE 4.NOMINAL 5.SINGLE 7.PLATING
8.ENVIRO-EFFECTS 9.SOLAR

IT IS CONCLUDED THAT THE APPLICATION OF THE ESH(EQUIVALENT SUN HOURS) PRINCIPLE IN TESTING THE SPACE BEHAVIOR OF SURFACES IS LIKELY TO LEAD TO ERRONEOUS RESULTS. A MISSION OF 1000 HOURS AT ONE SUN INTENSITY CANNOT BE DUPLICATED IN TESTING BY USING A SIMULATED SOLAR RADIATION OF 10 SUN INTENSITY FOR 100 HOURS.

MECHANICAL SHOCK ENVIRONMENTS

ADAMS JL JPL

ADA50010

HIGH IMPACT SPACECRAFT EQUIPMENT
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 35TH, OCT.1965 PT.3,P.243-258 2REF 19FIG
=1TABLE1.EVALUATION,DESIGN 2.ENGR-PRACTICE,MITIGATION 3.INDUCED
4.NOMINAL 5.SINGLE 7.PACKAGING,COMPONENT,BEARINGS,SHOCK-
TESTERS 9.IMPACT-HARD

IN ADDITION TO DISCUSSING DESIGN PHILOSOPHIES AND TEST EQUIPMENT, PRESENTS DETAILS ON AN IMPACT-RESISTANT GAS CHROMATOGRAPH, AN IMPACT-RESISTANT S-BAND TRANSMITTER, AND VARIOUS MECHANISM ELEMENTS AND DEVICES WHICH HAVE BEEN BUILT. RESULTS INDICATE THE FEASIBILITY OF BUILDING SPACECRAFT-TYPE EQUIPMENT CAPABLE OF SURVIVING IMPACTS ON THE ORDER OF 10,000 GS FROM SEVERAL HUNDRED FEET PER SECOND.

BAKKEN LH SANDIA CORP

BAK70010

A MECHANICAL SHOCK FILTER

=ISA TRANS VOL.6,P.31-34 JAN.1967 7REF 4FIG 1TABLE

1.EVALUATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.ACCELEROMETER,FILTER 8.ENVIRO-CONTROL 9.HI-G

A MECHANICAL SHOCK FILTER HAS BEEN DEVELOPED WHICH IS CAPABLE OF ISOLATING AN ACCELEROMETER FROM THE HIGH-FREQUENCY, HIGH-AMPLITUDE SPIKES CHARACTERISTIC OF HIGH G-LEVEL SHOCK TESTING. SUCH SIGNALS CAN CAUSE ERRONEOUS ACCELEROMETER READINGS DUE TO OVERDRIVEN ELECTRONICS, NONLINEAR ACCELEROMETER RESONANCES, OR PHYSICAL DAMAGE TO THE ACCELEROMETER. THE FIRST PROBLEM CAN BE SOLVED BY PROPER DESIGN OF THE RECORDING CIRCUITS, BUT THE LATTER TWO MUST BE SOLVED BEFORE THE TRANSFORMATION TO AN ELECTRICAL SIGNAL. A METHOD TO PREFILTER THE SIGNAL MECHANICALLY, INVOLVING THE SUPPORT OF THE TRANSDUCER IN A GRANULAR MEDIUM, IS PRESENTED WITH SUPPORTING TEST RESULTS IN SEVERE ENVIRONMENTS.

BRITTON WR MARTIN CO

BRI60010

PYROTECHNIC SHOCK TESTING OF A FULL-SCALE REENTRY VEHICLE

=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 2, P. 71-81 1REF 19FIG

1.XPER-RESULTS 2.SIMULATION 3.INDUCED 4.NOMINAL 5.SINGLE 7.EXPLOSIVE, STRUCTURE, PARACHUTE, ISOLATORS, ACCELEROMETER 8.ENVIRO-EFFECTS 9.BLAST-SHOCK

THE DATA PRESENTED SHOW THE DYNAMIC RESPONSES OF THE VEHICLE WHEN SUBJECTED TO SHOCK INPUTS GENERATED BY FLEXIBLE LINEAR SHAPED CHARGES, EXPLOSIVE BOLTS, AND PRESSURE CARTRIDGES. DUE TO SEVERE SHOCK TRANSIENTS, VARIOUS METHODS OF ATTENUATING THESE SHOCK LEVELS WERE INVESTIGATED. THE EFFECTS OF VARIOUS SHOCK ISOLATION TECHNIQUES ARE ALSO SHOWN.

FORTE JS LTV LING ELEC

FOR50030

SHOCK ANALYSIS AND SYNTHESIS

=IES PROC. 1965, P. 263-269 18REF 3FIG

1.STUDY 2.METHOD, MEASUREMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.MODEL 8.ENVIRO-EFFECTS, ENVIRO-MEAS 9.SHOCK

A BRIEF RESUME OF SHOCK TESTING BACKGROUND AND A COMPILATION OF THE MOST ACCEPTED IDEAS IN ORDER TO POINT OUT THE ADVANTAGES OF DEFINING A SHOCK BY ITS RESPONSE SPECTRUM. ALSO DISCUSSES THE EQUIPMENT DEVELOPED TO MEASURE SHOCK SPECTRUM AND PRESENTS SOME POSSIBLE AREAS OF ITS USE.

HOWARD EP AEROSPACE CORP

HOW60010

METHOD FOR IMPROVING A DYNAMIC MODEL USING EXPERIMENTAL

TRANSIENT RESPONSE DATA

=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 5, P. 1-15 2REF 4FIG 4TABLES

1.THEORY 2.SIMULATION, METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.MODEL, STRUCTURE, SHOCK-TUBE 8.ENVIRO-CONTROL 9.BLAST-SHOCK

THE DATA REQUIRED AS INPUT TO THE METHOD CONSIST OF MEASUREMENTS OF THE APPLIED LOAD AND SOME LIMITED RESPONSE INFORMATION. TWO EXAMPLES DEMONSTRATE THE IMPROVEMENT IN THE MATHEMATICAL MODEL OF A SIX-DEGREE-OF-FREEDOM SYSTEM WHEN THE LOADING AND LIMITED RESPONSE INFORMATION IS KNOWN WITHOUT EXPERIMENTAL ERROR. FUTURE EFFORTS ARE OUTLINED TO STUDY EFFECTS OF ERROR IN EXPERIMENTAL INPUT DATA AND FEASIBILITY OF APPLICATION TO SYSTEMS OF MANY DEGREES OF FREEDOM.

KELLEY RW SANDIA CORP KEL50010
TRANSIENT RESPONSE OF LINEAR DAMPED, LUMPED, SPRING-MASS SYSTEMS
BY EXPERIMENTALLY DERIVED TRANSFER FUNCTIONS
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 3, P. 187-205 14REF 16FIG

1. STUDY, THEORY 2. METHOD 3. INDUCED 4. NOMINAL 5. SINGLE 7. MODEL
8. ENVIRO-EFFECTS 9. LOG

THE TRANSFER FUNCTION FOR A MECHANICAL MODEL, INTENDED TO REPRESENT A VISCOUSLY DAMPED, SINGLE-DEGREE SYSTEM, IS EXPERIMENTALLY DERIVED BY SUBJECTING THE MECHANICAL MODEL TO STEADY-STATE, SINUSOIDAL VIBRATION, AND UTILIZING THE RESULTING BODE PLOTS. THIS EXPERIMENTAL TRANSFER FUNCTION IS USED TO PREDICT THE TRANSIENT RESPONSE TO A MECHANICAL SHOCK PULSE. THE SUITABILITY OF THIS EXPERIMENTAL TRANSFER FUNCTION IS INVESTIGATED BY COMPARING THE RESPONSE WITH THE THEORETICAL RESPONSE OF THE IDEALIZED SYSTEM AND WITH THE ACTUAL RESPONSE OF THE MODEL TO A MECHANICAL SHOCK PULSE. A DISCUSSION IS PRESENTED ON METHODS OF IMPROVING THE EXPERIMENTAL TRANSFER FUNCTION BY UTILIZING THE AMPLITUDE AND PHASE PLOTS.

KELLEY RW SANDIA CORP KEL70010
INSTRUMENTATION FOR ACCELEROMETER SHOCK CALIBRATION
=IES PROC. 1967, P. 341-352 10REF 11FIG 5TABLES

1. EVALUATION 2. INSTRUMENT 3. INDUCED 4. NOMINAL 5. SINGLE 7. ACCELEROMETER, CALIBR-EQUIP 8. ENVIRO-MEAS 9. SHOCK

AN INSTRUMENTATION SYSTEM HAS BEEN DEVELOPED FOR USE WITH A BALLISTIC PENDULUM SHOCK ACCELEROMETER CALIBRATOR. THE SYSTEM PROVIDES READOUT AND DISPLAY OF THE PEAK AMPLITUDES FROM A STRAIN-GAGE LOAD CELL AND FROM THE SHOCK ACCELEROMETER BEING TESTED. THE RESULTS OF AN ACCURACY STUDY OF THE SYSTEM ARE ALSO GIVEN. THE COMPUTATIONS FOR OBTAINING VALUES FOR OVERALL SYSTEM ACCURACY ARE SHOWN AND AN OVERALL ACCURACY FIGURE FOR THE COMPLETE SYSTEM IS GIVEN.

MILLER WR LTV LING ELECTRONICS MIL40010
SHAPING SHOCK ACCELERATION WAVEFORMS FOR OPTIMUM ELECTRODYNAMIC SHAKER PERFORMANCE
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENT, SYMPOSIUM, 34TH, OCT. 1964 PT. 3, P. 345-354 3REF 20FIG
=1TABLE

1. THEORY, DESIGN 2. FACILITY, METHOD 3. INDUCED 4. NOMINAL 5. SINGLE
6. MIL-STD-810 7. SHAKER, MODEL 9. SHOCK

THE MECHANICAL SHAKER AND LOAD SYSTEM IS PRESENTED FOR TWO BASIC CONDITIONS, (1) SHAKER AT LOW FREQUENCY BARE TABLE OR WITH A SIMPLE MASS LOAD, AND (2) SHAKER AT HIGH FREQUENCY BARE TABLE OR AT A LOW FREQUENCY WITH A RESONANT LOAD. THE ELECTRICAL ANALOG CIRCUITS, INCLUDING THE ELECTRICAL PARAMETERS OF THE SHAKER, ARE GIVEN FOR THE TWO CASES. A STEP BY STEP METHOD FOR GRAPHICALLY DETERMINING THE POWER REQUIREMENT, STARTING WITH THE ACCELERATION WAVESHAPE, CONSTITUTES THE BODY OF THIS PAPER.

SAUNDERS H GENERAL ELEC
EFFECT OF ASYMMETRICAL TRAPEZOIDAL PULSE ON SINGLE-DEGREE-OF-FREEDOM SYSTEMS
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTALS,SYMPOSIUM,36TH,OCT.1966 PT.5,P.119-125 5REF 5FIG
=2TABLES

SAU60030

1.THEORY 2.EFFECTS 3.INDUCED 4.NOMINAL 5.SINGLE 7.COMPONENT, PULSE 8.ENVIRO-EFFECTS 9.SHOCK

EQUATIONS ARE DERIVED FOR PREDICTING THE MAXIMUM ACCELERATION RESPONSE OF A PHYSICALLY OBTAINABLE ASYMMETRICAL TRAPEZOIDAL PULSE. THE EQUATIONS EMPLOY THE ACTUAL RISE, DECAY AND DWELL PORTIONS OF THE PULSE. THE SOLUTION IS OBTAINED BY UTILIZING THE LAPLACE TRANSFORM METHOD IN TERMS OF THE DIRAC DELTA FUNCTION. COMPARISONS ARE MADE BETWEEN THE THEORETICAL RECTANGULAR PULSE AND A FEW TRAPEZOIDAL PULSES HAVING DIFFERENT RISE, DECAY AND DWELL TIMES. THE RECTANGULAR PULSE IS THE MOST SEVERE. THE RISE AND DECAY TIMES HAVE A SECONDARY EFFECT ON THE RESPONSE. THE DWELL TIME HAS THE MOST IMPORTANT EFFECT. BY USING THE DERIVED EQUATIONS, THE DESIGNER CAN EVALUATE THE DEGREE OF DEPARTURE BETWEEN THE IDEALIZED AND ACTUAL TEST CONDITION AND CAN THUS DEFINE AN EQUIVALENT TRAPEZOIDAL PULSE CAPABLE OF FURNISHING A SIMILAR RESPONSE IN THE COMPONENT.

SEVIN E IIT RES INST
MIN-MAX RESPONSE PROBLEMS OF DYNAMIC SYSTEMS AND COMPUTATIONAL SOLUTION TECHNIQUES
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTALS,SYMPOSIUM,36TH,OCT.1966 PT.5,P.69-76 3REF 4FIG

SEV60010

1.THEORY 2.METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.ISOLATOR, COMPUTER 8.ENVIRO-CONTROL 9.SHOCK

ANALYSIS AND DESIGN PROBLEMS OF DYNAMIC SYSTEMS ARE CONSIDERED IN WHICH THE SYSTEM AND/OR DISTURBANCES ARE NOT COMPLETELY PRESCRIBED AND THE EXTREMAL PEAK RESPONSES ARE OF INTEREST. DISCUSSIONS ARE PRESENTED OF MATHEMATICAL TECHNIQUES OF LINEAR AND NONLINEAR PROGRAMMING AND DYNAMIC PROGRAMMING WHICH CAN BE USED TO SOLVE THESE SO-CALLED MIN-MAX PROBLEMS. THESE TECHNIQUES SERVE TO DETERMINE NOT ONLY THE EXTREMAL RESPONSES BUT ALSO THE UNKNOWN PROPERTIES OF THE SYSTEM (THE OPTIMUM DESIGN PROBLEM) AND/OR THE DISTURBANCE (THE EXTREMAL RESPONSE ANALYSIS PROBLEM) WHICH GENERATE THESE RESPONSES. DETAILED CONSIDERATION IS LIMITED TO SINGLE-DEGREE-OF-FREEDOM DYNAMIC SYSTEMS.

THEOCARIS PS NATL TECH UNIV,GREECE
THE MOIRE METHOD FOR THE STUDY OF EXPLOSIONS
=EXPER.MECH VOL.7,P.202-210 MAY 1967 16REF 9FIG

THE70010

1.STUDY 2.MEASUREMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.OPTICAL-INSTR,EXPLOSIVE,PLASTIC 8.ENVIRO-MEAS 9.BLAST-SHOCK

EXPLOSIVES HAVE BEEN USED TO PRODUCE WEAK SHOCK WAVES IN CENTRAL CAVITIES OF PLEXIGLAS SPHERES. SHOCK PRESSURES ENGENDERED WERE LESS THAN THE SO-CALLED STABLE SHOCK THRESHOLD AND THEY RESULTED IN A DECOMPOSITION OF THE SHOCK WAVE INTO AN ELASTIC PRECURSOR PRECEDING THE SO-CALLED PLASTIC SHOCK WAVE. THE DIFFERENTIAL MOIRE METHOD HAS BEEN USED TO MEASURE SIMULTANEOUSLY THE PRECURSOR AND SHOCK-WAVE VELOCITIES, AS WELL AS THE VELOCITY OF THE CAVITY INTERFACE. MOREOVER, THE DISPLACEMENT FIELD GIVEN BY THE MOIRE PATTERN YIELDS THE COMPONENTS OF STRAINS AND THE PARTICLE VELOCITY BEHIND EACH SHOCK.

VOLZ WA WESTINGHOUSE

VOL60010

APPLICATION OF POLYURETHANE FOAM TO SHOCK ISOLATION OF
LARGE SILO-BASED MISSILES
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 2, P. 89-95 2REF 9FIG

1. STUDY 2. MITIGATION 3. INDUCED 4. NOMINAL 5. SINGLE 7. PLASTIC,
ISOLATOR, STORAGE-SITE, MODEL 8. ENVIRO-EFFECTS 9. SHOCK

INCLUDES A DESCRIPTION OF THE SHOCK ISOLATOR CONCEPT CON-
SIDERED IN THE STUDY, A DISCUSSION OF FUNDAMENTAL FOAM CHARAC-
TERISTICS, A DESCRIPTION OF THE MATHEMATICAL MODEL USED AND
THE TESTS RUN, AND A DISCUSSION OF TYPICAL TEST RESULTS.

SPACE ENVIRONMENTS

GILES S ATOMICS INTERNATL

GIL5004P

SPACE AND ALTITUDE SIMULATION
=IES PROC. (TUTORIAL SERIES), 1965, P. 13-30 5REF 21FIG

1. INFORMATION 2. SIMULATION, INSTRUMENT 3. SPACE 4. NOMINAL
5. COMBINED 6. GENERALIZED 7. CHAMBER, PRESSURE-SYSTEM, GAGE, PUMP,
CRYO-LIQUID 8. ENVIRO-CONTROL 9. VL-PRESS, HI-VAC, SOLAR

THIS PAPER IS A SUMMARY OF THE TECHNIQUES USED IN SPACE AND
ALTITUDE ENVIRONMENT SIMULATION. THIS INCLUDES A DISCUSSION OF
ALL TYPES OF VACUUM PUMPING SYSTEMS INCLUDING MECHANICAL, DIF-
FUSION, AND CRYOGENIC PUMPS. THE OTHER SPACE ENVIRONMENTAL
FORCES ARE ALSO MENTIONED. THESE ARE HEAT TRANSFER (CONVECTIVE
AND RADIANT), THE THERMAL SPACE ENVIRONMENT, AND SOLAR RADIA-
TION. IT CONCLUDES WITH A DISCUSSION OF VACUUM GAGES.

LONG WG ATOMICS INTERNL

LON5001P

TESTING ELECTRICAL COMPONENTS FOR THE SNAP ENVIRONMENT
=IES PROC. 1965, P. 81-84 4FIG

1. XPER-RESULTS 2. EFFECTS 3. SPACE 4. LIFE 5. COMBINED 7. COMPONENT
8. ENVIRO-EFFECTS 9. HI-VAC, VH-TEMP, NUCLEAR

TESTS WERE CONDUCTED ON COMMERCIALY AVAILABLE CONNECTORS IN-
CORPORATING A CERAMIC INSULATION IN A STAINLESS STEEL BODY AND
ON A DIELECTRIC ENCAPSULATING MATERIAL OF PHOSPHATE-BONDED IN-
ORGANIC CEMENT. THERMAL-VACUUM TESTING IS FIRST CONDUCTED
FOLLOWED BY IRRADIATION TESTS UNDER VACUUM AT SERVICE TEMPER-
ATURES. DEGRADATION OF INSULATION RESISTANCE ON COMPONENTS
IS DUE TO OIL BACKSTREAMING FROM ROUGHING AND DIFFUSION PUMPS.
WITH ORGANIC CONTAMINATION MINIMIZED, THE EFFECT OF TEMPERATURE
MASKS ANY MINOR EFFECTS PRODUCED BY FAST NEUTRON AND GAMMA IR-
RADIATION ON CERAMIC INSULATION.

LUNDE AR BOEING

LUN7001P

SOLAR SIMULATION TEST APPLICATIONS
=TEST ENG VOL.17,P.28-29 JAN.1967 1REF 2FIG

1.INFORMATION 2.FACILITY 3.SPACE 4.LIFE 5.COMBINED 7.SOLAR-CELL,CHAMBER 8.ENVIRO-CONTROL 9.HI-VAC,SOLAR

BOEINGS KENT FACILITY IS DESCRIBED. IT IS SET UP TO DETERMINE THE DEGRADATION RATE OF SOLAR CELLS WHEN EXPOSED TO AN ENVIRONMENT OF VACUUM AND SOLAR RADIATION.

HIGH TEMPERATURE AND UNSPECIFIED TEMPERATURE

DITTBENNER GR LAWRENCE RAD LAB

DIT6001R

INTRINSIC THERMOCOUPLE FOR FAST RESPONSE
=INSTR.AND CONT.SYS VOL.39,P.85-86 DEC.1966 1REF 6FIG

1.DESIGN 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.SENSOR-TEMP,WIRE 8.ENVIRO-EFFECTS 9.VH-TEMP

TO MEASURE VERY FAST TEMPERATURE TRANSIENTS ON MATERIALS HEATED BY A NEUTRON RADIATION PULSE,LRL DEVELOPED A NEW UNIT MADE OF CHROMEL-CONSTANTAN TYPE E THERMOCOUPLE WIRE 0.001 AND 0.0005 INCH WIRE FLATTENED TO A RIBBON. EACH WIRE WAS INDIVIDUALLY SPOT-WELDED TO THE TEST SURFACE,THUS COMPLETING THE ELECTRICAL CIRCUIT AND FORMING AN INTRINSIC JUNCTION. THE 0.0005 INCH UNIT PROVIDED VALID TEMPERATURE MEASUREMENT TO ABOUT 5 PERCENT ACCURACY FOR TEMPERATURES TO 1300 DEG F. THE UNIT IS SMALL,HAS BEEN IMPACT-TESTED TO 5000 G,AND IS EASILY FABRICATED AND INSTALLED.

RANDOM VIBRATION AND UNSPECIFIED VIBRATION

BEUDER LR NORTHROP

BEU4001T

DYNAMIC RESPONSE OF A DIGITAL MAGNETIC FORCE-REBALANCE PENDULOUS ACCELEROMETER TO A VIBRATIONAL ENVIRONMENT
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTS,SYMPOSIUM,34TH,OCT.1964 PT.4,P.81-101 14REF 18FIG
=3TABLES

1.STUDY 2.METHOD,EFFECTS 3.INDUCED 4.NOMINAL 5.SINGLE 7.ACCELEROMETER,SKYBOLT 8.ENVIRO-EFFECTS 9.HF-VIBR,VHF-VIBR,RDM-VIBR

TWO SIMPLIFIED TECHNIQUES USED TO ANALYZE THE VIBRATION RESPONSE OF A STATE-OF-THE-ART ACCELEROMETER CONTROL SYSTEM ARE DEMONSTRATED. BOTH TECHNIQUES UTILIZE AN IDEAL RELAY MODEL TO ACCOUNT FOR A COMPLEX DIGITAL NETWORK IN THE SYSTEMS NONLINEAR FEEDBACK PATH. A FILTERED FREQUENCY RESPONSE IS DETERMINED BY A UNIQUE APPLICATION OF A DUAL-INPUT DESCRIBING FUNCTION, USE OF WHICH PERMITS ACCURATE EVALUATION OF VIBRATION RESPONSE LEVELS CAUSING QUENCHING OF THE LOOPS. AUTONOMOUS MODE OF OPERATION. A LINEARIZED SINUSOIDAL FREQUENCY RESPONSE IS USED TO DETERMINE THE POWER SPECTRAL DENSITY OF THE ACCELEROMETER PENDULUM RESPONSE TO A RANDOM VIBRATION INPUT.

CURTIS AJ HUGHES AIRCRAFT CUR5001T
ON THE USE OF MULTIPLE (MULTI-POINT) RANDOM EXCITATION WITH
APPLICATION TO SURVEYOR SPACECRAFT TESTS
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 2, P. 49-74 1 REF 14 FIG
=4 TABLES

1. STUDY 2. EFFECTS 3. INDUCED 4. NOMINAL 5. SINGLE 7. SPACE-
CRAFT, SHAKER 8. FUNCTIONAL, ENVIRO-CONTROL 9. RDM-VIBR

IN PART 1, THE THEORETICAL RESPONSE OF LINEAR STRUCTURES TO
MULTIPLE RANDOM INPUTS IS REVIEWED BRIEFLY TO DEMONSTRATE THE
NECESSITY FOR CONSIDERATION OF THE CORRELATION (OR LACK OF)
BETWEEN THE INDIVIDUAL EXCITATIONS. IN PART 2, TESTING PHILOSOPHY
AND EQUIPMENT CONSIDERATIONS ARE INTRODUCED BY NOTING
THEIR DEPENDENCE ON KNOWLEDGE OF THE CORRELATION CHARACTERIS-
TICS OF THE REAL ENVIRONMENT. IN PART 3, THE APPLICATION OF
THESE TECHNIQUES IN TESTING OF TWO SURVEYOR SPACECRAFT IS
DESCRIBED.

HEINRICHS JA MARTIN CO HEI6001T
FEASIBILITY OF FORCE-CONTROLLED SPACECRAFT VIBRATION TESTING
USING NOTCHED RANDOM TEST SPECTRA
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 3, P. 15-26 5 REF 10 FIG

1. STUDY 2. SIMULATION 3. INDUCED 4. NOMINAL 5. SINGLE 7. MODEL,
SPACECRAFT 8. ENVIRO-CONTROL 9. RDM-VIBR

AN ANALYTICAL EVALUATION OF STRUCTURAL LOADING AT THE BASE OF
THE SPACECRAFT CAUSED BY APPLICATION OF A BROADBAND ENVIRON-
MENTAL ACCELERATION SPECTRUM IS MADE. BY USING THIS ANALYTICAL
TECHNIQUE, NOTCHING REQUIREMENTS FOR THE BROADBAND TEST SPEC-
TRUM ARE ESTABLISHED WHICH RESULT IN RMS STRUCTURAL FORCES AT
THE SPACECRAFT BASE THAT ARE WITHIN THE SPACECRAFTS STRUCTUR-
AL DESIGN LOAD CRITERIA. STRUCTURAL LOADINGS OF OTHER STRUC-
TURAL ELEMENTS OF THE SPACECRAFT AND COMPONENT ACCELERATION
SPECTRA ARE EXAMINED ON THE BASIS OF THE NOTCHED SPECTRA AND
ARE FOUND TO BE WITHIN DESIGN VALUES.

MEAD DJ U OF SOUTHAMPTON MEA5001T
THE RANDOM VIBRATIONS OF A MULTI-SUPPORTED HEAVILY-DAMPED BEAM
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 3, P. 45-55 4 REF 7 FIG
=2 TABLES

1. THEORY 2. METHOD 3. INDUCED 4. NOMINAL 5. SINGLE 7. STRUCTURE,
MODEL 8. ENVIRO-EFFECTS 9. RDM-VIBR

A CONVENTIONAL ANALYSIS OF RANDOM VIBRATIONS OF A LIGHTLY-
DAMPED MULTI-SUPPORTED BEAM CONSIDERS THE RESPONSE OF EACH
SIGNIFICANT NORMAL MODE AND THEN ADDS THESE RESPONSES STATIS-
TICALLY. DIFFICULTIES ARISE WHEN THE DAMPING IS LARGE AND DIF-
FERS FROM MODE TO MODE, AT THE SAME TIME AS THE MODAL DENSITY
IS HIGH AND DAMPING COUPLING EXISTS BETWEEN THE MODES. A METH-
OD OF ANALYSIS WHICH AVOIDS THESE DIFFICULTIES BY DROPPING THE
NORMAL MODE APPROACH AND BY SEEKING A CLOSED FORM SOLUTION TO
THE HARMONIC FREQUENCY RESPONSE FUNCTIONS FOR THE BEAM IS
PRESENTED.

VACCARO JJ ROCKETDYNE

VAC5001T

STEADY-STATE RESPONSE OF A MULTIDEGREE OF FREEDOM SYSTEM
SUBJECTED TO RANDOM EXCITATION
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 35TH, OCT. 1965 PT. 3, P. 21-26 5REF 4FIG
=1TABLE

1. THEORY 2. METHOD 3. INDUCED 4. NOMINAL 5. SINGLE 7. MODEL, PUMP
8. ENVIRO-EFFECTS 9. RDM-VIBR

A DIRECT SPECTRAL ANALYSIS METHOD IS PRESENTED FOR DETERMINING THE STEADY-STATE POWER SPECTRAL DENSITY AND MEAN SQUARE RESPONSES OF A MULTIDEGREE OF FREEDOM SYSTEM SUBJECTED TO RANDOM EXCITATION. A NONMODAL-TYPE SOLUTION IS OBTAINED, USING THE PROPERTIES OF NORMAL MODES IN THE FORMULATION OF THE TRANSFER FUNCTION MATRIX, THUS AVERTING NUMEROUS COMPLEX MATRIX INVERSIONS. THE ANALYTICAL METHOD PRESENTED HAS DEMONSTRATED ITS USEFULNESS IN PREDICTING THE RESPONSE OF ROCKET ENGINE COMPONENTS AND IN INTERPRETING EXPERIMENTAL DATA.

SINUSOIDAL VIBRATION

CALCATERRA PC BARRY CONTROLS

CAL5001U

PROBLEMS IN GETTING CONSISTENT RESULTS IN VIBRATION TESTING
=IES PROC. 1965, P. 29-31 2REF

1. PHILOSOPHY 2. ENGR-PRACTICE 3. INDUCED 4. NOMINAL 5. SINGLE
9. VIBR

GENERAL COMMENTS POINTING OUT THAT ACCURATE RESULTS CAN BE OBTAINED ONLY IF THE CHARACTERISTICS AND LIMITATIONS OF THE EXCITER, FIXTURES, TRANSDUCERS, TEST ITEM, AND DATA ACQUISITION AND REDUCTION COMPONENTS ARE KNOWN PRIOR TO TESTING. THE COMPLETE SYSTEM SHOULD BE CALIBRATED AS A SYSTEM. THE TEST REPORT MUST BE DETAILED AND COMPLETE.

CLEVENSON SA NASA LANGLEY RES CEN

CLE5001U

REPRESENTATION OF TRANSIENT SINUSOIDS IN THE ENVIRONMENTAL
VIBRATION TESTS FOR SPACECRAFT
=IES PROC. 1965, P. 139-144 5REF 9FIG

1. STUDY 2. SIMULATION 3. INDUCED 4. OVERTEST 5. SINGLE 7. ATLAS-
AGENA, SPACECRAFT 8. ENVIRO-CONTROL 9. VIBR, DAMPING

PRESENTS TWO METHODS OF TESTING WHICH MAY BE USED TO OBTAIN THE RESPONSE OF A SPACECRAFT DURING THE ENVIRONMENTAL TESTS THAT WILL BE EQUIVALENT TO ITS RESPONSE DUE TO EXCITATION BY TRANSIENT SINUSOIDS IN FLIGHT. ONE METHOD USES FLIGHT-MEASURED MAXIMUM AMPLITUDES OF THE SINUSOIDAL TRANSIENTS AND CONTROLS THE SWEEP RATE OF TESTING. THE OTHER METHOD IS TO SWEEP AT LOW RATES SO AS TO DEVELOP ESSENTIALLY STEADY-STATE CONDITIONS AND TO ADJUST THE AMPLITUDE OF THE SINUSOIDAL INPUT SO AS TO DEVELOP RESPONSES WHICH HAVE EQUIVALENT EFFECTS ON THE SPACECRAFT. THE PAPER ALSO PRESENTS RESULTS OF ANALYTICAL STUDIES THAT DETERMINED SPACECRAFT RESPONSES DUE TO VARIATIONS IN SWEEP RATES, DAMPING AND INPUT LEVELS.

JONFS DIG AF MATERIALS LAB

JON6002U

EFFECT OF TUNED VISCOELASTIC DAMPERS ON RESPONSE OF MULTI-SPAN STRUCTURES

=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTAL SYMPOSIUM,36TH,OCT.1966 PT.4,P.49-64 11REF 21FIG
=2TABLES1.STUDY 2.MITIGATION,METHOD 3.INDUCED 4.NOMINAL 5.SINGLE
7.ISOLATOR,STRUCTURE 8.ENVIRO-EFFECTS 9.DAMPING

THIS INVESTIGATION IS CONCERNED WITH THE RESPONSE OF A MULTI-SPAN BEAM WITH TUNED DAMPERS DISTRIBUTED UNIFORMLY ALONG ITS LENGTH. EXPRESSIONS FOR THE RESPONSE OF THE BEAM,BOTH WITH DISTRIBUTED TUNED DAMPING AND WITH HOMOGENEOUS VISCOELASTIC DAMPING, ARE OBTAINED AND NUMERICAL SOLUTIONS ARE DISCUSSED FOR A 9-SPAN PINNED BEAM UNDER UNIFORM HARMONIC LOADING. EFFECTIVE LOSS FACTORS ARE DEFINED FOR THE BEAM-DAMPER SYSTEM, AND THE EFFECTS OF SYSTEMATIC VARIATIONS OF DAMPER LOSS FACTOR AND DAMPER MASS ON THE EFFECTIVE LOSS FACTOR ARE DISCUSSED. IT IS SHOWN THAT SUBSTANTIAL AMOUNTS OF DAMPING CAN BE INTRODUCED. SOME PRELIMINARY EXPERIMENTS ON A SKIN-STRINGER-FRAME STRUCTURE ARE DESCRIBED.

KLEIN S AEROSPACE CORP

KLE5001U

VIBRATIONS OF MULTILAYER SHELLS OF REVOLUTION UNDER DYNAMIC AND IMPULSIVE LOADING

=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTAL SYMPOSIUM,35TH,OCT.1965 PT.3,P.27-44 13REF 5FIG

1.THEORY 2.METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.STRUCTURE-SHELL 8.ENVIRO-EFFECTS 9.VIBR

DESCRIBES A MATRIX DISPLACEMENT FINITE ELEMENT APPROACH TO THE LINEAR ELASTIC DYNAMIC ANALYSIS OF MULTILAYER SHELLS OF REVOLUTION UNDER AXISYMMETRIC AND ASYMMETRIC LOADS. THE DERIVATION OF THE MASS AND STIFFNESS MATRICES FOR A SHELL STRUCTURE IS OUTLINED. A METHOD OF HANDLING SHELLS UNDER IMPULSIVE LOADING IS ALSO DISCUSSED. THE SOLUTION FOR A SHALLOW SPHERICAL CAP UNDER TIME-VARYING AXISYMMETRIC PRESSURE LOAD INDICATES THE SCOPE,SPEED,AND ACCURACY OF THE SOLUTION METHOD.

MORGENTHAUER GW MARTIN CO

MOR5002U

SOME LATTICE VIBRATION PROBLEMS

=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVIRONMENTAL SYMPOSIUM,35TH,OCT.1965 PT.3,P.73-80 14REF 3FIG
=1TABLE1.THEORY 2.METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.MODEL
8.ENVIRO-EFFECTS 9.VIBR

TWO PROBLEMS ARE INVESTIGATED. TRANSFORM METHODS ARE APPLIED TO THE PROPAGATION OF DISTURBANCES THROUGH AN INFINITE LATTICE OF SIMILAR MASSES CONNECTED BY LINEAR SPRINGS. FORCING FUNCTIONS ARE USED IN THE SOLUTION OF FINITE, NONLINEAR N-DEGREE-OF-FREEDOM LATTICES.

PAINTER GW RCA

PAI6001U

USE OF FORCE AND ACCELERATION MEASUREMENTS IN SPECIFYING AND
MONITORING LABORATORY VIBRATION TESTS
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.3,P.1-13 2REF 18FIG

1.STUDY 2.SIMULATION,MEASUREMENT 3.INDUCED 4.NOMINAL 5.SINGLE
7.TRANSDUCER,SHAKER,AIRCRAFT 8.ENVIRO-MEAS 9.LF-VIBR,HF-VIBR

THE PROGRAM INVOLVED THE MEASUREMENT OF THE ACCELERATIONS AND FORCES EXPERIENCED BY SIMULATED EQUIPMENT ATTACHED TO A VIBRATING AIRCRAFT FUSELAGE. THE EQUIPMENT WAS LATER REMOVED FROM THE VEHICLE, PLACED ON A SHAKER, AND VIBRATED TO A TEST SPECIFICATION BASED ON AN ENVELOPE OF THE ACCELERATION PEAKS MEASURED IN THE FUSELAGE. COMPARISONS WERE THEN MADE OF THE ACCELERATION LEVELS THAT A RESONANT ELEMENT IN THE EQUIPMENT RECEIVED IN THE FUSELAGE AND ON THE SHAKER. THE TESTS ON THE SHAKER WERE REPEATED WITH THE EXCEPTION THAT, AT THOSE FREQUENCIES CORRESPONDING TO AN EQUIPMENT RESONANCE, THE FORCE TRANSMITTED TO THE EQUIPMENT BASE WAS NOT ALLOWED TO EXCEED THE MAXIMUM FORCE DEVELOPED (AT ANY FREQUENCY) WHEN THE EQUIPMENT WAS ATTACHED TO THE VIBRATING FUSELAGE. IT WAS FOUND THAT THIS PROCEDURE LARGELY ELIMINATED THE HIGH LEVELS OF OVERTESTING INTRODUCED BY THE CONVENTIONAL APPROACH.

SMALL EF BOEING

SMA5001U

A UNIFIED PHILOSOPHY OF SHOCK AND VIBRATION TESTING FOR
GUIDED MISSILES
=IES PROC.1965,P.277-282 5REF 4FIG

1.PHILOSOPHY 2.ENGR-PRACTICE 3.INDUCED 4.NOMINAL 5.SINGLE
7.GUIDED-MISSILE 8.ENVIRO-MEAS 9.VIBR

SERVICE AND LAB SHOCK AND VIBRATION DATA SHOULD BE ANALYZED BY THE SAME ANALYZER, SUCH AS A SHOCK SPECTRUM ANALYZER MODIFIED TO USE ANALOGS HAVING A FIXED PERCENTAGE CRITICAL DAMPING, WHICH SHOULD ANALYZE IN TERMS OF THE DAMAGING EFFECT ON SINGLE DEGREE OF FREEDOM SYSTEMS. WHEN THE SERVICE VIBRATION ENVIRONMENT AND THE SHARED-WHITE-NOISE LAB TEST VIBRATION HAVE BEEN SHOWN COMPATIBLE, POWER SPECTRAL DENSITY ANALYSIS MAY BE USED FOR ROUTINE CHECKS OF THE LAB VIBRATION TESTS. THE TEST ENVIRONMENT SHOULD BE INCREASED IN AMPLITUDE BY A RELIABILITY FACTOR.

YEAPLE F PRODUCT ENGINEERING

YEA5001U

NO-TOUCH VIBRATION SENSOR FOR MEASURING THE SHAKES
=PROD.ENG VOL.36,P.70-73 DEC.20,1965 4FIG

1.EVALUATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE
7.SENSOR,CAPACITOR 8.CALIBRATION,ELECTRICAL 9.VIBR

DESCRIBES A CAPACITANCE PROBE INVENTED BY GEORGE FOSTER, RELIANCE ELECTRIC CORP. IT SENSES THE VARYING POSITION OF THE VIBRATING PART BY MEASURING CHANGE IN CAPACITANCE AGAINST A PERMANENT, BUILT-IN STANDARD. FREQUENCY RESPONSE IS 1-20,000 CPS.

ENGINEERING PRACTICES

CONRAD CF THERMOTRON CORP
THE FIRST DECADES AND THE NEXT--FORTUNATELY FOR THIS OLD WORLD CON5001Z
=ENVIR. QUAR VOL. 11, P. 42-44 DEC. 1965

1. PHILOSOPHY 2. ENGR-PRACTICE 3. GENERAL

A YEAR AGO, PREPARING FOR ITS 10TH ANNIVERSARY OBSERVANCE, EQ SOLICITED COMMENTS ON **THE FIRST DECADE AND THE NEXT** FROM MANY ENVIRONMENTALISTS. THEIR ILLUMINATING REPLIES HAVE APPEARED IN THESE PAGES. FROM INDUSTRY VETERAN CF CONRAD CAME A STATEMENT THAT PROVIDED A FITTING SUMMARY.