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ENVIRONMENTAL ENGINEERING ABSTRACTS

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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
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ACCELERATION ENVIRONMENTS

JOURNAL OF ENVIRONMENTAL SCIENCES
DETERMINATION OF ACCELERATION DUE TO GRAVITY
=JL.ENVIR.SCI VOL.10,P.26-28 FEB.1967 4FIG

JOU7001A

1.EVALUATION 2.MEASUREMENT 3.NATURAL 4.NOMINAL 5.SINGLE
7. TEST-EQUIP 8.ENVIRO-MEAS 9.GRAVITAL

A NEW ABSOLUTE DETERMINATION OF THE ACCELERATION DUE TO GRAVITY HAS BEEN MADE BY DOUGLAS R. TATE OF THE NBS INSTITUTE FOR BASIC STANDARDS. THE RESULT, REDUCED TO A GRAVITY METER STATION ON THE FLOOR OF THE SITE, IS $9.801018 \text{ M/S SQUARED}$, WITH A STANDARD DEVIATION OF $\pm 0.3 \times 10^{-5} \text{ TO THE } \pm 5 \text{ M/S SQUARED}$. THE NEW NBS EXPERIMENT INVOLVES TIME AND DISTANCE MEASUREMENTS ON A FREELY FALLING BODY.

JOURNAL OF ENVIRONMENTAL SCIENCES
NEW ZERO GRAVITY RESEARCH FACILITY
=JL.ENVIR.SCI VOL.10,P.29 FEB.1967 1FIG

JOU7002A

1.INFORMATION 2.FACILITY 3.SPACE 4.NOMINAL 5.COMBINED 7.FACILITY 8.ENVIRO-MEAS 9.SUB-GRAVITAL

FIVE SECONDS OF WEIGHTLESSNESS CAN BE PRODUCED IN THE NEW ZERO GRAVITY RESEARCH FACILITY AT NASAS LEWIS RESEARCH CENTER. THIS TIME IS DOUBLED WHEN THE EXPERIMENT IS PROJECTED UPWARDS FROM THE BOTTOM OF THE CHAMBER BY A HIGH-PRESSURE ACCELERATOR. THE EXPERIMENT THEN FALLS FREE TO A DECELERATOR CART, THUS TRAVERSING THE 450-FOOT DISTANCE TWICE. THE FACILITY CAN HANDLE EXPERIMENTS WEIGHING UP TO 6000 POUNDS.

GENERAL ENVIRONMENTS

ELECTRONIC INSTRUMENT DIGEST
MECHANICAL-TO-ELECTRICAL TRANSDUCERS
=EID VOL.3,P.24-32 JAN.1967 19FIG

ELE7001G

1.EVALUATION 2.INSTRUMENT 3.GENERAL 4.NOMINAL 5.SINGLE
7.ACCELEROMETER, TRANSDUCER, TRANSDUCER-DISPLMT, GAGE-STRAIN
8.ENVIRO-MEAS 9.FORCES, VIBR

A PRACTICAL REVIEW ARTICLE WHICH COVERS TRANSDUCER PRINCIPLES, TYPES, BASIC CONSIDERATIONS AND APPLICATIONS.

HENDRICKS JW ORNL

HEN7001G

HIGH TEMPERATURE-HIGH VACUUM THERMOCOUPLE DRIFT TESTS
=ENVIR. QUAR VOL.13,P.34-38 MAR.1967 6FIG 2TABLES1.XPER-RESULTS 2.INSTRUMENT 3.GENERAL 4.NOMINAL 5.COMBINED
7.SENSOR-TEMP 8.ENVIRO-EFFECTS 9.VH-TEMP,UH-TEMP,HI-VAC

THE TESTS WERE RESTRICTED TO 1000-1450 DEGREES C AND 10 TO THE MINUS 6 TO 10 TO THE MINUS 8 OPERATING CONDITIONS AND TO COMMERCIALLY AVAILABLE NOBLE AND REFRACTORY-METAL THERMOCOUPLES. COMMERCIAL THERMOCOUPLES OF THE TYPE PT90RH10 VERSUS PT, PT94RH6 VERSUS PT70RH30, W VERSUS W74RE26 AND W95RE5 VERSUS W74RE26 WERE SHOWN TO BE STABLE WITHIN PLUS OR MINUS 10 DEGREES C FOR TIMES UP TO 1000 HOURS AT PRESSURES BETWEEN 10 TO THE MINUS 6 AND 10 TO THE MINUS 8 TORR IN THE RANGE 1200 TO 1450 DEGREES C. WIRE SIZE AND ALLOY CONTENT DID NOT AFFECT THE STABILITY IN THESE TESTS. SEVERE THERMAL EMF CHANGES WERE OBSERVED AT 1200 DEGREES C FOR PT90RH10 VERSUS PT THERMOCOUPLES SHEATHED IN TANTALUM OR NIOBIUM AND MAGNESIUM OXIDE INSULATED.

SANNES T PHILIPS

SAN7001G

TINY THERMOCOUPLES--ADVANCES IN DESIGN EXTEND APPLICATIONS
=INSTR. TECH VOL.14,P.35-40 MAR.1967 10FIG1.EVALUATION 2.INSTRUMENT 3.GENERAL 4.NOMINAL 5.SINGLE
7.SENSOR-TEMP, REACTORS 8.ENVIRO-MEAS 9.HI-TEMP,VH-TEMP,
UH-TEMP,LO-TEMP,VL-TEMP,UL-TEMP

IMPROVED MANUFACTURING TECHNIQUES AND NEW INSULATION MATERIALS HAVE MADE THERMOCOUPLES VALUABLE IN MANY DIFFERENT APPLICATIONS. THE AUTHOR DETAILS USES IN THE FIELDS OF NUCLEAR POWER, AUTOMOBILE TESTS, STEEL AND CONCRETE, HEAVY MACHINERY, AND PLASTICS, TEXTILES, AND CERAMICS.

HYGRO-ENVIRONMENTS

CARTIN TJ WESTINGHOUSE

CAR7001H

ENVIRONMENTAL TEST EQUIPMENT FOR UNDERSEA TECHNOLOGY
=JL.ENVIR.SCI VOL.10,P.30-35 FEB.1967 8FIG 2TABLES1.INFORMATION 2.SIMULATION,FACILITY 3.NATURAL 4.NOMINAL
5.SINGLE 7.CHAMBER,HUMAN 8.ENVIRO-MEAS 9.OCEAN

AN OUTLINE OF THE DIFFERENT ASPECTS OF THE UNDERSEA ENVIRONMENT WITH A DESCRIPTION OF THE FACILITIES NOW IN USE IN THE UNDERSEAS DIVISION OF WESTINGHOUSE TO SIMULATE THESE ENVIRONMENTS.

INDUCED ENVIRONMENTS

COBB, VI. BUNKER-RAMO CORP.
DIGITAL CHATTER/TRANSFER DETECTOR
=IES PROC.1967,P.293-295 1FIG

COB7001I

1.DESIGN 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.RELAY,
SWITCHES,ELECTR-CIRCUIT 8.ENVIRO-EFFECTS 9.VIBR,SHOCK

THE PURPOSE OF THE CHATTER DETECTOR IS TO DETECT IF THE DEVICE
DESIGNED FOR CONTINUOUS ELECTRICAL CIRCUIT CREATES AN OPEN
CIRCUIT FOR A PERIOD OF TIME GREATER THAN THE SPECIFIED
AMOUNT. THE TRANSFER DETECTOR IS USED TO DETERMINE INTERMIT-
TENT CLOSURE OF A DEVICE DESIGNED TO BE OPENED ELECTRICALLY.
THE BUNKER-RAMO DESIGN USES DIGITAL CIRCUITS WHICH ARE AN
IMPROVEMENT OVER SOME OF THE OLDER METHODS USING RELAYS OR
ELECTRON TUBES.

FAGAN JR, RCA
EFFECT OF AIR DAMPING ON STRUCTURAL FATIGUE FAILURE
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.4,P.75-79 3REF 4FIG

FAG6002I

1.THEORY 2.MEASUREMENT 3.PLANETARY 4.LIFE 5.COMBINED
6.GENERALIZED 7.STRUCTURE 8.ENVIRO-EFFECTS 9.DAMPING,HI-VAC

FATIGUE DATA OF MOST STRUCTURAL MATERIALS CAN BE EXPRESSED
MATHEMATICALLY AS A POWER FUNCTION RELATING STRESS TO NUMBER
OF CYCLES TO FAILURE. AFTER DETERMINING THE EXPRESSION DE-
SCRIBED FOR SINE AND RANDOM FORCING EXCITATIONS, IT IS POSSIBLE
TO PLOT CURVES RELATING THE RATIO OF DAMPING PARAMETERS IN AIR
AND IN A VACUUM TO THE TIME TO FAILURE OF THE STRUCTURE. THE
PRINCIPAL CONCLUSION IS THAT WHEN LOW-MASS LARGE-AREA STRUC-
TURES ARE VIBRATION EXCITED IN A VACUUM, THEY SHOULD BE TESTED
TO REFLECT THE LACK OF AIR DAMPING ON THE STRUCTURE.

MENENDEZ MG, MARTIN CO
ENVIRONMENT OF NUCLEAR EXPLOSIONS
=IES PROC.1967,P.313-317 2REF 5FIG

MEN7001I

1.INFORMATION 2.SOURCE,EFFECTS 3.INDUCED 4.NOMINAL 5.SINGLE
7.WEAPONS,GUIDED-MISSILE 8.ENVIRO-MEAS 9.BLAST-TEMP,BLAST-
SHOCK,EMR,NUCLEAR,X-RAYS

THE FIRST SECTION DISCUSSES THE ENVIRONMENT PRODUCED BY A
NUCLEAR EXPLOSION FROM A DYNAMIC POINT OF VIEW. EMPHASIS IS
PLACED ON THE PHENOMENOLOGY OF THE EARLY TIME FIREBALL NOT
ONLY BECAUSE ITS ENVIRONMENT IS THE MOST SEVERE BUT BECAUSE IT
DOMINATES THE ELECTROMAGNETIC RADIATION FROM A NUCLEAR BURST.
THE SECOND SECTION PRESENTS THE EFFECTS OF THIS ENVIRONMENT ON
MISSILE SYSTEMS TREATING THE VARIOUS EFFECTS SEPARATELY.

MUTTER HP BOEING
MULTI-SHAKER MULTI-ENVIRONMENT TESTING TECHNIQUES
=IES PROC.1967,P.329-334 8FIG

MUT70011

1.DESIGN 2.SIMULATION,FACILITY 3.INDUCED 4.LIFE 5.COMBINED
7.SATURN,PRESSURE-SYSTEM,SHAKER 8.ENVIRO-MEAS 9.ACOUSTIC,RDM-
VIBR,CRYOGENIC,HI-TEMP,VH-TEMP

THE RELIABILITY TEST PROGRAM FOR THE SATURN V,S-1C STAGE
PNEUMATIC SYSTEMS REQUIRED TESTING TO COMBINED ENVIRONMENTS
THAT WOULD DUPLICATE OR EXCEED THE ENVIRONMENTS EXPERIENCED
BY THE S-1C STAGE DURING ITS LIFE CYCLE OF GROUND TESTING AND
FLIGHT. THE HAZARDOUS NATURE OF THE TESTS REQUIRED THE CON-
STRUCTION OF AN ISOLATED GAS FLOW FACILITY. MULTI-POINT VIBRA-
TION EXCITATION WAS PROVIDED BY A COMPLETELY MOBILE EIGHT
SHAKER VIBRATION SYSTEM WITH REMOTE OPERATION CAPABILITY.

PEVERLEY RW GENERAL ELEC
ACOUSTICALLY INDUCED VIBRATION TESTING OF SPACECRAFT
COMPONENTS

PEV60011

=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.3,P.39-46 1REF 10FIG

1.EVALUATION 2.SIMULATION 3.INDUCED 4.NOMINAL 5.SINGLE 7.COM-
PONENT,APOLLO 8.ENVIRO-MEAS 9.LF-VIBR,HF-VIBR,ACOUSTIC

APPROXIMATELY 70 COMPONENTS WERE TESTED ON TWO DISTINCT STRUC-
TURAL SIMULATORS. ONE SIMULATOR DUPLICATED A SEGMENT OF THE
APOLLO SERVICE MODULE RADIAL BEAM. THE ACOUSTIC SPECTRUM WAS
SHAPED TO PRODUCE VIBRATION LEVELS WHICH SATISFIED THE VIBRA-
TION TEST CRITERIA. THE SECOND SIMULATOR WAS A HALF SECTION OF
A SERVICE MODULE WHICH WAS EXCITED BY ACOUSTIC ENERGY DUPLI-
CATING THE WORST CASE FLIGHT ENVIRONMENT. THIS TEST PROGRAM
PROVIDED AN EXCELLENT SIMULATION OF PREDICTED FLIGHT ENVIRON-
MENTS PLUS A REASONABLE MARGIN OF SAFETY. A DESCRIPTION OF THE
USE OF ACOUSTICALLY INDUCED VIBRATION METHODS IN A MISSION OR
SPACE VEHICLE QUALIFICATION PROGRAM AND A DISCUSSION OF THE
ADVANTAGES AND SHORTCOMINGS OF THE METHODS IS INCLUDED.

POWELL A DAVID TAYLOR MODEL BASIN
SHOCK AND VIBRATION--A PERSPECTIVE
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.2,P.5-8

POW60011

1.PHILOSOPHY 2.ENGR-PRACTICE 3.INDUCED 7.TRAINING 9.SHOCK,
VIBR

THE FIELD OF SHOCK AND VIBRATION IS ANALYZED BY CONSIDERING
1)THE NATURE OF THE FIELDS OF ENGINEERING APPLICATION WHICH
HAS PRODUCED THE ENGINEERING NEEDS, 2)THE DIFFERENT CROSS-CUT
OF THE WAY IN WHICH THESE NEEDS HAVE BEEN MET, AND 3)SOME AS-
PECTS OF THE EDUCATIONAL PROCESSES BY WHICH PEOPLE HAVE BEEN
ABLE TO ACCEPT THE CHALLENGES.

STEADING TW IBM

STE7003I

MEASUREMENT AND SIMULATION OF THE COMPUTER ENVIRONMENT
=IES PROC.1967,P.275-283 5REF 12FIG

1.DESIGN 2.MEASUREMENT,SIMULATION 3.INDUCED 4.NOMINAL 5.SINGLE
7.COMPUTER 8.ENVIRO-MEAS 9.DUST,LF-VIBR,HF-VIBR,VHF-VIBR,
ELECTRICAL

DESCRIBES THREE FIELD INVESTIGATIONS MADE BY IBM WHICH RESULTED IN BETTER DEFINITIONS OF EARTH ENVIRONMENTAL PARAMETERS OF MAN-OPERATED COMMERCIAL AND INDUSTRIAL COMPUTERS. THE ENVIRONMENTS OF INTEREST WERE FLOOR VIBRATION,AIRBORNE DUST,AND CONDUCTED ELECTRICAL SWITCHING TRANSIENT NOISES. THE TECHNIQUES USED IN DEFINING THESE ENVIRONMENTS AS WELL AS EXPERIMENTAL METHODS USED IN SIMULATING THEM ARE DESCRIBED.

TEST ENGINEERING

TES3003I

PLASTIC BAG + INGENUITY = TEST CHAMBER
=TEST ENG VOL.10,P.30 OCT.1963 1FIG

1.DESIGN 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE 7.APOLLO,
PLASTIC,MOTOR,CHAMBER 9.LO-TEMP,HI-TEMP

THIS POLYETHYLENE SHROUD WAS BUILT AT LOCKHEED PROPULSION CO. IT IS FED AIR AT THE DESIRED TEMPERATURES FROM A PORTABLE AIR CONDITIONING-HEATING UNIT. TEST SCHEDULE CALLS FOR FIRINGS WHEN THE MOTOR AND ITS SOLID PROPELLANT HAVE BEEN PRECONDITIONED TO TEMPERATURES OF 20,70 AND 140 DEGREES F. THE SHROUD CAN MAINTAIN THE MOTORS CONDITIONED TEMPERATURES WITHIN 5 DEGREES F.

TUSTIN W TUSTIN INST OF TECH

TUS7003I

AN INEXPENSIVE PIGGY-BACK TEST CHAMBER FOR USE WITH SHAKERS
=TEST ENG VOL.17,P.34-35 APR.1967 1REF 7FIG

1.INFORMATION 2.FACILITY 3.INDUCED, 4.NOMINAL 5.COMBINED
7.CHAMBER,SHAKER 8.ENVIRO-MEAS 9.HI-TEMP,LO-TEMP,VL-TEMP,
UL-TEMP,HUMIDITY,VIBR

REVIEWS A CYLINDRICAL TEMPERATURE/HUMIDITY CHAMBER ATTACHED TO A SHAKER WHICH WAS DESIGNED BY GE ENGINEERS.

WHITFIELD JD VON KARMAN GAS DYN FAC

WHI7001I

SIMULATING HIGH-SPEED AERODYNAMICS
=SPACE/AERO VOL.47,P.83-91 MAR.1967 11REF 10FIG

1.EVALUATION 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE 7.TUNNELS-WIND,SHOCK-TUBE 8.ENVIRO-MEAS 9.AERODYNAMIC,REENTRY-ACCEL

FOR DIFFERENT LEVELS OF THE MACH AND REYNOLDS NUMBER PARAMETERS,DIFFERENT OPERATIONAL TEST UNITS ARE CURRENTLY MOST APPROPRIATE IN SIMULATING FULL-SCALE FLIGHT. THE PARTICULAR ADVANTAGES AND LIMITATIONS OF THE DIFFERENT TYPES OF FACILITIES ARE GIVEN.

STATIC ENVIRONMENTS

BATCHELDER GM UNIV OF NH
STRESS-STRAIN MEASUREMENT
=TEST ENG VOL.10,P.16-17+ SEPT.1963

BAT3001J

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

A GOOD REVIEW ARTICLE WHICH EXPLAINS THE PRINCIPLES,ADVANTAGES,DISADVANTAGES AND USES OF THE VARIOUS MECHANICAL,OPTICAL AND ELECTRICAL STRAIN MEASURING DEVICES.

MEASUREMENT/INSTRUMENTATION

BRITTON ER GENERAL ELEC
THE DEVELOPMENT OF AN INFRARED SIGNATURE ANALYSIS TECHNIQUE,
A NON-DESTRUCTIVE TESTING TOOL
=IES PROC.1967,P.223-228 15FIG

BRI7001K

1.EVALUATION 2.METHOD 3.GENERAL 4.NOMINAL 7.OPTICAL-INSTR,
SENSOR 8.NONDESTRUC-TEST

CRITICAL AREAS OF FEASIBILITY WERE INVESTIGATED,ESSENTIALLY DETERMINING FAULT IDENTIFICATION IN FABRICATED ELECTRONIC ASSEMBLIES. ADDITIONALLY,AN ATTEMPT WAS MADE AT ASSOCIATION OF SIGNATURE PATTERNS WITH SPECIFIC CATEGORIES OF DEFECTS IN ELECTRONIC,OR ELECTROMECHANICAL ASSEMBLIES,SIGNIFICANTLY THE DEVELOPMENT OF SIGNATURE TECHNIQUES. THE GOAL OF THE STUDY IS TO ESTABLISH THE POSITION OF IR TESTING TECHNIQUE THROUGH DESIGN,DEVELOPMENT AND PRACTICAL APPLICATION.

PRESSURE ENVIRONMENTS

EARNSHAW KB
AN ULTRA-HIGH-SPEED IMAGE DISSECTING CAMERA FOR PHOTOGRAPHING
SHOCK WAVES
=INDUS.PHOTOG VOL.16,P.10+ JUNE 1967 4REF 6FIG

EAR7001M

1.EVALUATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE
7.CAMERA 8.ENVIRO-MEAS 9.SHOCK-PRESS

AN ULTRA-HIGH SPEED IMAGE DISSECTING CAMERA PATTERNED AFTER AN ORIGINAL DESIGN BY SULTANOFF HAS PRODUCED MOTION PICTURES OF SHOCK WAVES HAVING VELOCITIES GREATER THAN 7 CM/MICROSECOND. THE CAMERA IS READILY ADAPTABLE TO EITHER STREAK OR FRAMING PHOTOGRAPHY. A DISCUSSION OF THE CAMERA SYSTEM DESIGN INDICATES THE MODIFICATIONS OF THE ORIGINAL DESIGN WHICH ALLOW FOR GREATER FLEXIBILITY OF CAMERA USE. SEVERAL PHOTOGRAPHS OF HIGH-SPEED SHOCK WAVES ARE USED TO DEMONSTRATE THE VARIOUS MODES OF CAMERA OPERATION. THE VERY HIGH FRAMING RATE (1X10 TO THE 8/SECOND)AND THE EASY ADAPTATION FROM STREAK TO FRAMING PHOTOGRAPHY MAKE THIS CAMERA A USEFUL TOOL FOR RESEARCH.

HASLANIAN MH NRC EQUIP CORP
NEW LIGHT ON CLEAN VACUUM

HAB3001M

=TEST ENG VOL.10,P.26-29+ OCT.1963 10REF 6FIG

1.EVALUATION 2.FACILITY,METHOD 3.GENERAL 4.NOMINAL 5.SINGLE
7.CHAMBER,PUMP,SEALS-O-RINGS 8.ENVIRO-MEAS 9.HI-VAC

VARIOUS BAFFLES AND TRAPS TO STOP THE MIGRATION OF THE
CONDENSED PUMP FLUID IN A VACUUM CHAMBER ARE DESCRIBED AND
ANALYZED. EXPERIMENTAL RESULTS OF THE MEASUREMENT OF THE
EFFECTIVENESS OF THE DIFFERENT METHODS ARE GIVEN.

JACKSON EA ASTRO-ELECTRONICS DIV
SAFETY CONTROL OF SPACE ENVIRONMENTAL CHAMBERS
=JL.ENVIR.SCI VOL.10,P.22-25 FEB.1967 7FIG

JAC7001M

1.DESIGN 2.PROTECTION 3.INDUCED 4.NOMINAL 5.SINGLE 7.RELAY,
SAFING-DEVICE 8.ENVIRO-CONTROL 9.HI-VAC

A POTENTIAL PROBLEM IN THERMAL-VACUUM TESTING OF SPACE HARD-
WARE IS THE INADVERTENT OPERATION OF EQUIPMENT UNDER TEST
WHILE THE PRESSURE IN THE VACUUM CHAMBER IS IN THE 50 MM TO
0.5 MICRON REGION. THIS DANGER REGION ALLOWS A GLOW DISCHARGE
ACROSS SMALL VOLTAGE DIFFERENCE. AN ARC WILL RESULT IF CURRENT
IS AVAILABLE. SPACE CENTER THERMAL-VACUUM CHAMBERS PROTECT THE
TEST ITEM BY AN ALARM VACUUM DEGRADATION, POWER SHUT-OFF TO
THE TEST ITEM IF THE DANGER AREA IS APPROACHED, AND MEASURE-
MENT OF THE VACUUM LEVEL INSIDE EQUIPMENT ENCLOSURES.

MATHEWS AJ ARO
EFFECTS OF VARIOUS OPERATING PARAMETERS ON MASS SPECTROMETER
SENSITIVITY
=IES PROC.1967,P.215-221 3REF 11FIG

MAT7001M

1.EVALUATION 2.INSTRUMENT 3.SPACE 4.NOMINAL 5.SINGLE
7.PRESSURE-SENSOR 8.ENVIRO-MEAS 9.HI-VAC

THE MORE IMPORTANT OPERATIONAL CHARACTERISTICS OF TWO MAGNETIC
DEFLECTION TYPE MASS SPECTROMETERS, A QUADRUPOLE MASS SPECTROM-
ETER, AND A TIME-OF-FLIGHT MASS SPECTROMETER ARE PRESENTED.
EXPERIMENTAL DATA SHOW THE CHANGE IN MASS SPECTROMETER SENSI-
TIVITY AS RELATED TO TIME, PRESSURE, AND IONIZING CURRENT.

TEST ENGINEERING
RECORDING A LIFE TEST FOR A STEPPING SWITCH
=TEST ENG VOL.10,P.14-15 NOV.1963 3FIG

TES3002M

1.DESIGN 2.FACILITY 3.NATURAL 4.LIFE 5.SINGLE 7.SWITCHES,RE-
CORDER 8.ENVIRO-EFFECTS 9.UH-PRESS

A LENGTH OF PIPE, A PLASTIC BAG, SOME OIL, A PUMP, TWO VOLTAGE
SOURCES, AND A MASSA STRIP-CHART RECORDER WERE THE BASIC IN-
GREDIENTS FOR A VERY SUCCESSFUL HIGH PRESSURE TEST WHICH VERI-
FIED THE OPERATION OF A STEPPING SWITCH UNDER 3000 PSI FOR A
PROTRACTED PERIOD. COLUMBIA UNIVERSITY'S HUDSON LABORATORY,
WITH THE COOPERATION OF MASSA DIV, COHU ELECTRONICS, INC.,
DESIGNED THE SET-UP AND PERFORMED THE 24-HOUR TEST.

RADIATION ENVIRONMENTS

KRAMER FA HUGHES AIRCRAFT
A PERPETUAL SUN--THE S-4A SYSTEM
=IES PROC.1967,P.253-259 13FIG

KRA7001N

1.DESIGN 2.FACILITY 3.SPACE 4.NOMINAL 5.SINGLE 7.RADIATION-
SOURCE,SURVEYOR,OPTICS,ARC-LAMP 8.ENVIRO-MEAS 9.SOLAR

THE S-4A SIMULATOR CONSISTS OF A HEXAGONAL ARRAY OF 19 INTER-
FLECTOR MODULES. EACH MODULE COLLECTS THE RADIATION OF A COM-
PACT ARC LAMP AND PROJECTS THIS RADIATION OVER AN EIGHT-FOOT-
DIAMETER TEST AREA FIFTY FEET AWAY.

MECHANICAL SHOCK ENVIRONMENTS

BRESK F MONTEREY RES LAB
SHOCK PROGRAMMERS
=IES PROC.(TUTORIAL SERIES) 1967,P.141-149 2REF 18FIG

BRE70010

1.STUDY 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE 6.MIL-STD-202,
MIL-STD-810A 7.SHOCK-TESTERS,PULSE 8.ENVIRO-CONTROL 9.SHOCK

PRINCIPLES OF THE MOST COMMONLY USED SHOCK PROGRAMMERS ARE
EXPLAINED. MAINTENANCE AND TEST PROCEDURES AND PROBLEMS ARE
DISCUSSED.

HOLLEY FJ NASA GODDARD
TRANSPORTATION ENVIRONMENTAL MEASUREMENT AND RECORDING SYSTEM
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.6,P.163-172 7REF 10FIG
=1TABLE

HOL60010

1.DESIGN 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.ACCELER-
OMETER,RECORDER 8.ENVIRO-MEAS 9.TRANSPORT

MOST OF THE ELECTRONICS OF THE SYSTEM ARE MOLECULAR ELECTRONIC
DEVICES WHICH CONVERT ANALOG DATA FROM TRANSDUCERS INTO PRE-
ANALYZED DIGITAL FORM FOR RECORDING IN IBM COMPUTER-COMPATIBLE
FORMAT ON A CARTRIDGE INCREMENTAL DIGITAL TAPE RECORDER. THE
RECORDED INFORMATION INCLUDES THE DIRECTION,MAGNITUDE,DURA-
TION,AND TIME OCCURRENCE OF TRANSIENT VIBRATION OR SHOCK
ABOVE PREDETERMINED THRESHOLD LEVELS,AS WELL AS PERIODIC
MEASUREMENTS OF QUASI-STATIC PHENOMENA SUCH AS TEMPERATURE AND
HUMIDITY.

HUGHES PS NAVAL ORD LAB

HUG60010

DIRECT MEASUREMENT OF 5-IN/54 GUN SETBACK ACCELERATION
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVI-
=RONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 2, P. 53-61 16 FIG 1 TABLE

1. XPER-RESULTS 2. MEASUREMENT 3. INDUCED 4. NOMINAL 5. SINGLE
7. SEALS, ACCELEROMETERS, DATA-SYSTEM 8. ENVIRO-MEAS 9. BLAST-SHOCK

RECORDING OF A SIGNIFICANT PORTION OF SETBACK SHOCK FOR SIX ROUNDS, FIRED IN A SHORTENED 5-IN/54 NAVAL GUN, WAS SUCCESSFULLY ACCOMPLISHED WITH PIEZOELECTRIC TRANSDUCERS AND HARD-WIRE INSTRUMENTATION. SEVERAL ROUNDS WERE ALSO FIRED TO INVESTIGATE CORRELATION BETWEEN CHAMBER PRESSURE AND PROJECTILE ACCELERATION. THE RECORDED PULSES HAD SUPERIMPOSED OSCILLATIONS WITH FREQUENCIES UP TO 11 KHZ AND AMPLITUDES ESTIMATED AT 1-1/2 TIMES THE FAIRED PEAK VALUE. INITIAL PORTIONS OF THE PROJECTILE ACCELERATION RECORDINGS WERE OF COMPLEX SHAPE, LAGGED PRESSURE BY A SIGNIFICANT AMOUNT, AND THE HIGH-FREQUENCY PEAKS VARIED WIDELY FROM SHOT TO SHOT. SHOCK SPECTRA WERE COMPILED IN THE HIGH-FREQUENCY REGION FOR THE PULSES. TEST APPARATUS AND INSTRUMENTATION ARE DESCRIBED.

JORDAN JC LING ELECTRONICS

JOR70020

SHOCK RESPONSE SPECTRUM SYNTHESIS AND ANALYSIS
=IES PROC. (TUTORIAL SERIES) 1967, P. 161-164 5 REF 5 FIG

1. DESIGN 2. FACILITY 3. INDUCED 4. NOMINAL 5. SINGLE 7. SPECTRUM-ANALYZER 8. ENVIRO-CONTROL 9. SHOCK

FOLLOWING A BRIEF TREATMENT OF THE BASIC CONCEPTS AND DEFINITION OF THE SHOCK RESPONSE SPECTRUM METHOD, A DETAILED DESCRIPTION IS GIVEN OF THE LING MODEL SSA-100 SHOCK RESPONSE SPECTRUM ANALYZER AND MODEL PRM-100 PEAK READING METER WHICH CONSTITUTE A COMPLETE ANALYSIS SYSTEM.

LAND NS NASA LANGLEY

LAN70020

LABORATORY SIMULATION OF LUNAR SURFACE EROSION BY ROCKETS
=IES PROC. 1967, P. 285-292 7 REF 8 FIG

1. DESIGN 2. SIMULATION 3. PLANETARY 4. NOMINAL 5. SINGLE 7. ROCKET, GROUND, OPTICAL-INSTR, MODEL 8. ENVIRO-EFFECTS 9. IMPACT-SOFT

SOFT LANDINGS ON THE MOON ACCOMPLISHED BY FIRING RETRO-ROCKETS PRODUCE EROSION OF THE LUNAR SURFACE WHICH CAN INTRODUCE SEVERAL HAZARDS--IMPAIRMENT OF VISIBILITY DUE TO OUTTHROWN SURFACE MATERIAL, POSSIBLE DAMAGE TO THE VEHICLE BY DUST PARTICLE IMPACT, AND FORMATION OF A CRATER UNEVEN ENOUGH TO IMPAIR LANDING STABILITY. THIS PAPER DESCRIBES AN EXPERIMENTAL TECHNIQUE DEVELOPED AT THE NASA LANGLEY RESEARCH CENTER. IT INCLUDES A BRIEF DESCRIPTION OF THE PHYSICAL CHARACTERISTICS OF THE JET IMPINGING A SURFACE, SCALING FACTORS CONSIDERED IN DEVISING EXPERIMENTS, EXPERIMENTAL APPARATUS EMPLOYED AND SOME TYPICAL RESULTS.

ROTHAUG RJ DT BROWN TEST LAB

ROT70010

PRACTICAL ASPECTS OF SHOCK TESTING
=IES PROC.(TUTORIAL SERIES) 1967,P.155-159 7FIG

1.XPER-RESULTS 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE
7.SHOCK-TESTERS 8.ENVIRO-CONTROL 9.SHOCK

SINCE THE CONDITION OF THE SHOCK MACHINE AND THE INSTRUMENTATION ARE OF THE UTMOST IMPORTANCE FOR THE SUCCESSFUL CONDUCT OF A TEST,THE SUBJECT OF PREVENTIVE MAINTENANCE IS THE MAIN THEME OF THIS PAPER.

SMITH FW LAB CORP

SMI70020

SHOCK MACHINE MAINTENANCE
=IES PROC.(TUTORIAL SERIES) 1967,P.151-153 3FIG

1.INFORMATION 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE
7.SHOCK-TESTERS 8.ENVIRO-CONTROL 9.SHOCK

THE MANUFACTURER OF THE MIL-S-901 SHOCK MACHINE AND OTHER SHOCK-TESTERS LISTS THE MOST COMMON PROBLEM AREAS AS--1)MIS-UNDERSTANDING OF INSTRUMENTATION AND READOUT SYSTEMS, 2)TOO CLOSE FILTERING, 3)USE OF VIBRATION SIGNAL CONDITIONING SYSTEMS FOR SHOCK APPLICATIONS,AND 4)INADEQUATE FIXTURING.

TEST ENGINEERING

TES30040

SHOCK RECORDERS UPHOLD SUCCESS OF 1,700 TESTS ON OCEANIC CABLE REPEATERS
=TEST ENG VOL.10,P.34-35 OCT.1963 3FIG

1.INFORMATION 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE
7.RECORDER,ELFCTR-CIRCUIT,CABLES 8.ENVIRO-MEAS 9.TRANSPORT

AN IMPACT-O-GRAPH INSTRUMENT WAS ATTACHED TO A PLATE ON THE CABLE REPEATER HOUSING FOR A TEST SERIES SIMULATING THE TRIP THE REPEATERS WOULD HAVE TO MAKE TO REACH OPERATIONAL SITE.

SPACE ENVIRONMENTS

CHUAN RL CELESTIAL RES CORP

CHU7001P

IGNITION OF HYPERGOLIC PROPELLANTS IN A SIMULATED SPACE ENVIRONMENT
=JL SPACECRAFT AND ROCKETS VOL.4,P.282-284 FEB.1967 6REF
=3FIG

1.XPER-RESULTS 2.EFFECTS 3.SPACE 4.NOMINAL 5.COMBINED 7.PROPELLANT-LIQUID,CHAMBER 8.ENVIRO-MEAS 9.LO-PRESS,VL-PRESS,HI-VAC,LO-TEMP,VL-TEMP,UL-TEMP

THIS INVESTIGATION ESTABLISHES IGNITION LIMITS OF VARIOUS HOMOGENEOUS AND HETEROGENEOUS PHASE COMBINATIONS OF THE HYPERGOLIC PAIR HYDRAZINE AND NITROGEN TETROXIDE,UNDER PRESSURE AND TEMPERATURE CONDITIONS CHARACTERISTIC OF SPACE CHAMBERS,AND AT THREE GEOMETRIC SCALES. IN THIS LAST RESPECT THE EXPERIMENTS WERE GUIDED BY A THERMAL REACTION MODEL WHEREIN THE ONSET OF SUSTAINED REACTION BETWEEN A PAIR OF REACTANTS IS DETERMINED BY BALANCING THE RATE OF ENERGY RELEASE OF THE REACTION AGAINST THE RATE OF ENERGY REMOVAL BY THE CONTAINING VESSEL.

DOWNEY MJ EUROPEAN SPACE TECH CENTER

DOW6001P

MATERIALS AND COMPONENTS IN SPACE ENVIRONMENTS
=SOCIETY OF ENVIRONMENTAL ENGINEERS SYMPOSIUM PAPERS, ENVIRON-
=MENTAL ENGINEERING--ITS ROLE IN SOCIETY LONDON, APR. 1966
=VOL. 5 11P 3TABLES

1. STUDY 2. SOURCE, EFFECTS 3. SPACE 4. NOMINAL 5. SINGLE 7. MATE-
RIALS 8. ENVIRO-MEAS, ENVIRO-EFFECTS 9. HOT, COLD, PRESSURE, RADIA-
TION, MAGNETIC-FIELD, METEORIODS

SUMMARIZES THE KNOWN RESULTS OF THE EARTHS SURROUNDING ENVI-
RONMENTS. LISTS THE VARIOUS MATERIALS, COMPONENTS AND COATINGS
USED IN A SATELLITE AND OUTLINES THE TYPES OF DEGRADATION RE-
SULTING MAINLY FROM VACUUM, ULTRAVIOLET AND CORPUSCULAR RADIA-
TION.

FISHER F GENERAL ELEC

FIS7001P

MEASUREMENT OF SATELLITE SUBSYSTEM LEAK RATES IN A THERMAL-
VACUUM ENVIRONMENT
=IES PROC. 1967, P. 179-182 3FIG

1. EVALUATION 2. MEASUREMENT 3. SPACE 4. NOMINAL 5. COMBINED
7. SEALS, CHAMBER 8. LEAK-DETECT 9. HI-VAC, HOT

A CALIBRATED LEAK RATE SYSTEM WAS DESIGNED FOR CALIBRATING
MASS SPECTROMETERS. BY ALLOWING KNOWN LEAK RATES OF A GAS TO
ENTER AN EVACUATED CHAMBER TO WHICH A MASS SPECTROMETER WAS
COUPLED, THE RELATIONSHIP BETWEEN MASS SPECTROMETER OUTPUT AND
LEAK RATE WAS DETERMINED. BY MEASURING THE EQUIVALENT LEAK
RATES OF RESIDUAL CHAMBER GASES, THEN PLACING THE TEST ARTICLE
IN THE CHAMBER AND MEASURING THE LEAK RATES OF THE SUBSYSTEMS,
THE DIFFERENCE BETWEEN THE TWO, THAT IS, THE LEAK RATE OF THE
TEST ARTICLE WAS DETERMINED.

SPECIFICATIONS

SEAMAN E CONSULTANT

SEA7001Q

IEC ENVIRONMENTAL TESTING TC/50 COMMITTEE REPORT
=JL. ENVIR. SCI VOL. 10, P. 14-16 FEB. 1967 4FIG

1. ORGANIZATION 2. ENGR-PRACTICE 6. MIL-STD-202, IEC-68-50A-108,
IEC-68-50A-109

TECHNICAL COMMITTEE 50 OF THE INTERNATIONAL ELECTROTECHNICAL
COMMISSION MET IN LONDON, NOVEMBER 21-29, 1967, TO DEVELOP
NEW OR IMPROVE EXISTING ENVIRONMENTAL TEST METHODS. THE SCOPE
OF THE WORK CURRENTLY IN PROGRESS IN TC50 IS SUMMARIZED IN A
CHART WHICH IDENTIFIES THE PROBLEM AREAS AS WELL AS THE ORGAN-
IZATIONAL STRUCTURE OF THE COMMITTEE TOGETHER WITH ITS SUB-
COMMITTEES AND WORKING GROUPS. ANOTHER CHART ILLUSTRATES THE
PRELIMINARY THINKING ON SEQUENCE OF TESTS FOR COMPONENTS.

HIGH TEMPERATURE AND UNSPECIFIED TEMPERATURE

GREENBERG S AMER INSTR CO
LIQUID CO₂ COOLING CAPACITY NOMOGRAPH
=TEST ENG VOL.10,P.20-22+ NOV.1963 4REF 4FIG

GRE3002R

1.EVALUATION 2.METHOD,MITIGATION 3.GENERAL 4.NOMINAL 5.SINGLE
7.CHART,CHAMBER,REFRIG 8.ENVIRO-CONTROL 9.HI-TEMP

THE INFORMATION PROVIDED BY THE NOMOGRAPH CAN BE USED TO ESTIMATE CONSUMPTION UNDER ANY NORMAL CONDITION OF STORAGE AND USAGE, TO SERVE AS A CALORIMETRIC STANDARD TO CALCULATE THE HEAT TRANSFER OF AN APPARATUS, AND TO CALCULATE THE EFFICIENCY OF OTHER HEAT EXCHANGE SYSTEMS.

MURRAY TP US STEEL CORP
POLARADIOMETER--A NEW INSTRUMENT FOR TEMPERATURE MEASUREMENT
=REV.SCI.INSTR VOL.38,P.791-798 JUNE 1967 9REF 12FIG

MUR7001R

1.STUDY 2.INSTRUMENT 3.GENERAL 4.NOMINAL 5.SINGLE 7.SENSOR-TEMP
8.ENVIRO-EFFECTS 9.HI-TEMP,VH-TEMP

THE INSTRUMENT EXAMINES FOR POLARIZATION THE SUM OF (1)RADIATION EMITTED BY THE TEST SURFACE AND (2)RADIATION EMITTED BY A BLACKBODY AND REFLECTED FROM THE TEST SURFACE. IN MEASUREMENTS UP TO 450 DEG C ON METALLIC SURFACES WITH EMITTANCES OF 0.05 TO 0.47, THE DETERMINATION OF EQUALITY OF SAMPLE AND REFERENCE TEMPERATURES WAS ACCURATE WITHIN + OR - 2 PERCENT, WITH NO EMITTANCE CORRECTIONS. FURTHER TESTS ARE REQUIRED TO APPORTION THIS ERROR AMONG SAMPLE SURFACE CHARACTERISTICS, INSTRUMENT CHARACTERISTICS, AND EXPERIMENTAL ERROR. AWAY FROM THE NULL, THE ERROR SIGNAL DEPENDS ON THE DIFFERENCE OF THE EMITTANCES.

TECHNOLOGY WEEK
RADIATION SHIELDING DEVELOPED FOR CRYOGENIC FUEL STORAGE
=TECH.WEEK VOL.20,P.30 APR.3,1967 2FIG

TEC7001R

1.INFORMATION 2.METHOD 3.SPACE 4.NOMINAL 5.SINGLE 7.SHIELD,
CRYO-LIQUID 8.ENVIRO-EFFECTS 9.HOT

THE IDEA BEING DEVELOPED BY AEROJET-GENERAL IS TO INSTALL INTERMEDIATE SHELLS IN THE VACUUM BARRIER OF DOUBLE-WALLED CRYOGENIC STORAGE VESSELS AND THEN DEPEND ON THIN, HEAT-REFLECTIVE COATINGS TO TRAP INCOMING HEAT. CHILLED VAPORS FROM THE TANKS OUTLET LINE WOULD REMOVE THE TRAPPED HEAT WITH THE OUTWARD FLOW OF THE CRYOGEN.

RANDOM VIBRATION AND UNSPECIFIED VIBRATION

MULTHAUP HA BROWN ENG CO
THE VIBRATION ENVIRONMENT OF LIQUID PROPELLANT ROCKET ENGINES
=IES PROC.1967,P.307-312 3FIG 1TABLE

MUL7001T

1.XPER-RESULTS 2.SOURCE 3.INDUCED 4.NOMINAL 5.SINGLE 7.ROCKET,
MOTOR,SATURN 8.ENVIRO-MEAS 9.LF-VIBR,HF-VIBR,RDM-VIBR

VIBRATION SOURCES IN AN ENGINE ARE DEFINED, TRANSFER CHARACTERISTICS OF ENGINE STRUCTURES ARE DISCUSSED, AND PROBLEMS ASSOCIATED WITH UPGRATING AN ENGINE ARE DELINEATED. THE F-1 ENGINE, A LOX/RP-1 LIQUID PROPELLANT 1.5-MILLION POUND THRUST ROCKET ENGINE BEING DEVELOPED BY ROCKETDYNE FOR USE IN THE SATURN V FIRST STAGE, IS USED AS AN EXAMPLE TO ILLUSTRATE AND VALIDATE SOME OF THE GENERAL STATEMENTS MADE.

PIERSOL AG MEAS ANALYSIS CORP

PIE7001T

PRACTICAL INTERPRETATIONS OF UNUSUAL CHARACTERISTICS IN RE-
DUCED VIBRATION DATA
=JL.ENVIR.SC! VOL.10,P.17-21 FEB.1967 5REF 10FIG

1.XPER-RESULTS 2.DATA 3.INDUCED 4.NOMINAL 5.SINGLE 8.ENVIRO-
MEAS 9.RDM-VIBR

OUTLINES A FEW OF THE BETTER DEFINED QUALITATIVE DATA EVALUA-
TION TECHNIQUES WHICH, WHEN USED WITH CAUTION BY AN EXPERIENCED
ANALYST, CAN PERMIT CONSIDERABLY MORE USABLE ENGINEERING IN-
FORMATION TO BE EXTRACTED FROM DATA THAN CLASSICAL PROCEDURES
WOULD INDICATE POSSIBLE.

USHER T UNHOLTZ-DICKIE CORP

USH7001T

AVERAGE FORCE-ACCELERATION CONTROL FOR SINUSOIDAL AND RANDOM
VIBRATION TESTING
=IES PROC.1967,P.319-327 13REF 9FIG 2TABLES

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

TWO-INPUT CONTROL FROM THE WEIGHTED AVERAGE OF THE FORCE MAG-
NITUDE TRANSMITTED TO A TEST SPECIMEN AND THE ACCELERATION
MAGNITUDE AT THE POINT OF FORCE MEASUREMENT FOR SINUSOIDAL
TESTING IS CONSIDERED IN THIS PAPER AS A NATURAL EXTENSION OF
PRESENT TESTING TECHNIQUES. SIMILAR CONTROL TO THE WEIGHTED
AVERAGE OF FORCE AND ACCELERATION SPECTRAL DENSITIES IS CON-
SIDERED FOR RANDOM VIBRATION TESTING. BOTH THE PRACTICAL AND
PHILOSOPHICAL IMPLICATIONS ARE TREATED, AND THE TECHNIQUE IS
COMPARED TO OTHER METHODS OF FORCE-ACCELERATION CONTROL.

SINUSOIDAL VIBRATION

ACKLEY RA CONVAIR

ACK7001U

A LASER INTERFEROMETER AND ITS APPLICATION TO VIBRATION AMPLI-
TITUDE MEASUREMENT
=IES PROC.1967,P.235-240 13FIG

1.DESIGN 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.OPTICAL-
LASER,SHAKER 8.ENVIRO-EFFECTS 9.VIBR

DESCRIBES TWO CONFIGURATIONS OF A LASER INTERFEROMETER THAT IS
SIMPLER TO OPERATE THAN MOST OTHERS IN THAT ACCURATE PARALLEL-
ISM OF COMPONENTS AND COMPLEX ELECTRONICS TO DISTINGUISH
FRINGE DIRECTION ARE AVOIDED. THEORETICAL ACCURACIES (AS HIGH
AS 10 TO THE -11 INCHES IN SOME AREAS) ARE GIVEN. AT-
TAINMENT OF THESE UNDER SPECIAL LABORATORY CONDITIONS WITH
SMALL SHAKERS IS DESCRIBED AS WELL AS THE PROBLEMS ASSOCIATED
WITH APPLYING THIS INTERFEROMETER TO LARGER SHAKERS. THE
PRESENT SUCCESS AND LIMITATIONS ARE GIVEN IN DETAIL TOGETHER
WITH PROPOSED MODIFICATIONS TO REMOVE THESE LIMITATIONS.

BRENNAN WJ. LING ELECTRONICS

BRE7002U

TROUBLESHOOTING AND MAINTENANCE OF POWER AMPLIFIERS IN VIBRATION TESTING SYSTEMS
=IES PROC.(TUTORIAL SERIES) 1967,P.167-170

1.DESIGN 2.FACILITY 3.INDUCED 4.NOMINAL 5.SINGLE 7.AMPLIFIER
8.ENVIRO-MEAS 9.VIBR

IN ORDER TO EFFECTIVELY DIAGNOSE DIFFICULTIES OF A VIBRATION SYSTEM POWER AMPLIFIER, IT IS ESSENTIAL THAT THE POWER AMPLIFIER BE CONSIDERED SEPARATELY FROM THE OTHER SYSTEM COMPONENTS AND THAT THE VARIOUS FUNCTIONS OF THE POWER AMPLIFIER BE LOOKED UPON AS ENTITIES. THESE CAN BE CATEGORIZED AS--1)SYSTEM CONSIDERATIONS, 2)POWER SUPPLIES, 3)SIGNAL PATH, 4)INTERLOCK CIRCUITS, 5)DYNAMIC BRAKING AND CROWBAR CIRCUITS.

CLARKE RL. HOFFMANN MFG CO

CLA7001U

NOISE AND VIBRATION IN ROLLING BEARINGS
=ENVIR.ENG NO.25,P.14-17 MAR.1967 4FIG

1.DESIGN 2.MEASUREMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.RECORDER, BEARINGS, SPECTRUM-ANALYZER, MOTOR 8.ENVIRO-MEAS 9.VIBR

A THOROUGH TREATMENT OF THE METHODS AND EQUIPMENT USED FOR VIBRATION ANALYSIS RELATED TO THE SURFACE OF THE BEARING COMPONENTS, THE NOISE OF THE ASSEMBLED BEARING, THE VIBRATION OF THE MACHINE TOOL IN WHICH THE BEARING IS MOUNTED, AND THE SURFACE OF THE WORKPIECE FINISHED ON THE MACHINE TOOL.

HANKS BR. NASA LANGLEY

HAN6002U

MECHANISMS AND SCALING OF DAMPING IN A PRACTICAL STRUCTURAL JOINT
=US DIRECTOR OF DEFENSE SHOCK, VIBRATION AND ASSOCIATED ENVIRONMENTS, SYMPOSIUM, 36TH, OCT. 1966 PT. 4, P. 1-8 10REF 10FIG

1.XPER-RESULTS 2.METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.MODEL, LUBRICANT, STRUCTURE-BEAM-FREE, CLAMP 8.ENVIRO-EFFECTS
9. DAMPING

A CANTILEVER CONFIGURATION WAS UTILIZED WHEREIN THE BEAM WAS BOLTED BETWEEN TWO ANGLE BRACKETS AT THE SUPPORT. FOUR GEOMETRICALLY SIMILAR ASSEMBLIES, COVERING A SCALE RANGE OF APPROXIMATELY 20 TO 1, WERE TESTED. FREE DECAY OF THE FUNDAMENTAL MODE WAS MEASURED OVER A RANGE OF JOINT CLAMPING PRESSURES AND BEAM TIP AMPLITUDES. ALSO, DAMPING CHANGES RESULTING FROM THE ADDITION OF LIQUID LUBRICANTS AND VISCOELASTIC FILMS TO THE JOINT INTERFACES WERE INVESTIGATED. DATA INDICATE THAT AN INCREASE IN MODEL SIZE RESULTS IN A DECREASE IN DAMPING ATTRIBUTED TO THE STRUCTURAL JOINT. JOINT DAMPING IS SHOWN TO BE SLIGHTLY DEPENDENT ON VIBRATION AMPLITUDE AND TO VARY AS AN INVERSE FUNCTION OF JOINT CLAMPING PRESSURE. JOINT DAMPING MAY BE SUBSTANTIALLY INCREASED BY THE ADDITION OF LIQUID LUBRICANTS OR VISCOELASTIC FILMS AT THE JOINT INTERFACES.

HENDERSON FM DAVID TAYLOR MODEL BASIN

HEN6002U

COMPUTER PROGRAM FOR GENERAL SHIP VIBRATION CALCULATIONS
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.6,P.115-130 5REF 9FIG

1.THEORY 2.EFFECTS,SIMULATION 3.INDUCED 4.NOMINAL 5.SINGLE
7.MODEL,SUBMARINE,STRUCTURE-BEAM-FREE,COMPUTER 8.ENVIRO-
EFFECTS 9.VIBR,TORSIONAL-VIBR

A DIGITAL COMPUTER PROGRAM WAS DEVELOPED FOR CALCULATING THE APPROXIMATE STEADY-STATE RESPONSE TO HARMONIC FORCES AND NATURAL FREQUENCIES OF A SYSTEM OF SLENDER,MODERATELY NONUNIFORM BEAMS WITH ELASTIC COUPLINGS. THIS SYSTEM IS USED TO REPRESENT A SHIP HULL CONNECTED ELASTICALLY TO ITS PROPULSION SYSTEM AND TO FLEXIBLY MOUNTED UNITS WHICH MAY INFLUENCE THE VIBRATION. THE PROGRAM HANDLES VERTICAL,HORIZONTAL,LONGITUDINAL,TORSIONAL,COUPLED VERTICAL-TORSION,AND HORIZONTAL-TORSION VIBRATION. FINITE-DIFFERENCE EQUATIONS ARE USED TO APPROXIMATE THE SYSTEMS OF STEADY-STATE DIFFERENTIAL EQUATIONS WHICH THE BEAM SYSTEM SATISFIES IN EACH TYPE OF VIBRATION.

JAMESON BW ITT

JAM3001U

ERROR CONSIDERATIONS IN AN ACCELEROMETER CALIBRATION SYSTEM
=TEST ENG VOL.10,P.22-24+ SEPT.1963 1FIG

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

A DISCUSSION OF SOME OF THE FACTORS THAT FREQUENTLY LIMIT THE ACCURACY OF THE CALIBRATION OF PIEZOELECTRIC ACCELEROMETERS BY COMPARATIVE TECHNIQUES.

LOEWY RG UNIV OF ROCHESTER

LOE6001U

THE CHALLENGE OF THE SECOND HALF OF THE DECADE
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.2,P.1-4

1.PHILOSOPHY 2.SOURCE 3.INDUCED 4.NOMINAL 5.SINGLE 7.GUIDED-
MISSILE,AIRCRAFT 9.VIBR

AN OUTLINE OF THE VIBRATION PROBLEMS IN THE SPACE AGE WHICH HAVE BEEN INCREASING IN NUMBER,VARIETY AND IMPORTANCE.

RAMBOZ JD METROLOGY ENG CENTER

RAM7001U

A TREATISE CONCERNING THE MEASUREMENT OF ACCELEROMETER
TRANSVERSE SENSITIVITY RATIO
=IES PROC.1967,P.297-305 13REF 8FIG 2TABLES

1.STUDY 2.MEASUREMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.ACCELER-
OMETER,SHAKER,PIEZO-ELECTRIC 8.ENVIRO-MEAS 9.VIBR

THE CONCEPT OF VECTOR SOLUTIONS UTILIZING BOTH PHASE AND MAGNITUDE MEASUREMENTS IS EXPLAINED AND TYPICAL LABORATORY SET-UPS ARE SHOWN. THE MANNER IN WHICH THE ACCELEROMETER TSR AND THE SHAKER TRANSVERSE ACCELERATION RATIO (TAR) COMBINE TO PRODUCE ONE OUTPUT SIGNAL FROM THE ACCELEROMETER IS SHOWN IN VECTOR,RECTILINEAR,AND POLAR DIAGRAMS. THE REQUIRED EQUATIONS ARE GIVEN FOR THE SOLUTION AND REDUCTION OF THE MEASURED DATA. LABORATORY RESULTS ARE PRESENTED COVERING A FREQUENCY RANGE FROM ABOUT 10 TO 1000 HZ.

RICCI RJ GENERAL ELEC

RIC7001U

VIBRATION TEST INSTRUMENTATION CALIBRATION
=IES PROC.(TUTORIAL SERIES) 1967,P.171-173 1FIG

1.DESIGN 2.INSTRUMENT 3.INDUCED 4.NOMINAL 5.SINGLE 7.CALIBR-
EQUIP,ACCELEROMETER,DATA-SYSTEM 8.CALIBRATION 9.VIBR

GE MISSILE AND SPACE DIVISION AT VALLEY FORGE,PA,ENSURES THAT EACH VIBRATION TEST WILL BE A VALID ONE BY INSISTING ON ADHERENCE TO CALIBRATION PROCEDURES IN FOUR BASIC CATEGORIES. 1)ALL INDIVIDUAL INSTRUMENTS AND THE ENTIRE VIBRATION TEST-SYSTEM ARE PERIODICALLY CALIBRATED. THIS IS THE SYSTEM CALIBRATION CONCEPT WHICH INVOLVES CALIBRATION PERSONNEL GOING TO THE EQUIPMENT. 2)THE COMPLETE SYSTEM,INCLUDING INSTRUMENTATION AND TEST EQUIPMENT,IS OPERATOR CALIBRATED AS A UNIT ON A DAILY BASIS,OR AT LEAST BEFORE EACH TEST. 3)THE CONTROL ACCELEROMETER CALIBRATION IS VALIDATED DAILY. 4)THE DATA RECORDING AND PLAYBACK INSTRUMENTATION IS CHECKED BEFORE EACH TEST.

ROCKWELL DW BUR NAVAL WEAP

ROC5001U

MEASUREMENT OF ACCELEROMETER TRANSVERSE SENSITIVITY
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,35TH,OCT.1965 PT.4,P.73-97 9REF 32FIG

1.THEORY 2.INSTRUMENT,METHOD 3.INDUCED 4.NOMINAL
5.SINGLE 7.ACCELEROMETER,TRANSDUCER,MODEL 8.ENVIRO-EFFECTS,
CALIBRATION 9.VIBR

SEVERAL UNIQUE TECHNIQUES OF TRANSVERSE SENSITIVITY MEASUREMENT ARE PRESENTED. THESE TECHNIQUES DO NOT DEPEND ON THE AVAILABILITY OF PURE UNILATERAL MOTION,BUT EMPLOY METHODS OF ACCOUNTING FOR THE VECTOR COMPONENTS OF THE ACCELEROMETER OUTPUT DUE TO LATERAL MOTION. THE PROPOSED TECHNIQUES HAVE THE ADVANTAGE OF NOT BEING LIMITED TO A SINGLE FREQUENCY. A SPECIAL TRANSDUCER HAS BEEN FABRICATED WITH A LOW TRANSVERSE SENSITIVITY ON A SPECIFIED AXIS OVER A WIDE FREQUENCY RANGE,IE, LESS THAN 0.1 PERCENT FROM 40HZ TO 1000 HZ,AND LESS THAN 1 PERCENT TO 8000 HZ.

SARDELLA G MARTIN CO

SAR6001U

RESONANCE TESTING OF A LIFTING BODY REENTRY VEHICLE
=US DIRECTOR OF DEFENSE SHOCK,VIBRATION AND ASSOCIATED ENVI-
=RONMENTS,SYMPOSIUM,36TH,OCT.1966 PT.3,P.83-90 5REF 10FIG
=2TABLES

1.STUDY 2.METHOD 3.INDUCED 4.NOMINAL 5.SINGLE 7.GUIDED-
MISSILE,MODEL,ACCELEROMETERS,DATA-SYSTEM 8.ENVIRO-EFFECTS
9.RESONANT

TESTS WERE PERFORMED ON THE PRODUCTION FLIGHT ARTICLE STRUCTURE AND HEAT SHIELD FOR CONFIGURATIONS REPRESENTING BOUNDARY CONDITIONS FOR THE LAUNCH AND REENTRY PHASES OF FLIGHT. THE RESPONSE OF THE VEHICLE UNDER SINUSOIDAL EXCITATION WAS PREDICTED BY THE MATRIX-FORCE METHOD TO CONTAIN MODES WHICH WERE CLOSELY SPACED IN FREQUENCY AND DEFLECTION PATTERNS WHICH WERE COMPLEX REQUIRING THREE-DIMENSIONAL REPRESENTATION. THESE REQUIREMENTS,IN ADDITION TO A SEVERE INTERNAL SPACE LIMITATION,FORMED THE BASIS FOR A TEST APPROACH WHICH INCLUDED A UNIQUE AUTOMATIC DATA PROCESSING LOOP. TYPICAL THREE-DIMENSIONAL MODE SHAPES ARE PRESENTED FOR BOTH OF THE CONFIGURATIONS TESTED.

BIOLOGICAL ENVIRONMENTS

NOWITZKY AM

NOW5001V

SPACECRAFT STERILIZATION, TECHNIQUES AND EQUIPMENT
=BOULDER, COLO, JOHNSON PUB CO, 1965 356P REFS FIGS TABLES

1. STUDY 2. METHOD 3. INDUCED 4. LIFE 5. SINGLE 6. JPL-SPEC-
X50-30275-TST-A, JPL-SPEC-GMO-50198-ETS-A 7. CLEAN-ROOM,
CAPACITOR, PLANET, RESISTOR, ENCAPSULATE, AGENA, RANGER, SURVEYOR,
SPACECRAFT, GSE, MATERIALS, HUMAN, TEST-EQUIP, TUBE 8. ENVIRO-
EFFECTS 9. STERILIZATION

THE APPLICATION OF THE RELATIVELY SIMPLE TECHNIQUES OF HOSPI-
TAL AND LABORATORY STERILIZATION TO SPACECRAFT DESIGN AND OP-
ERATIONS, PARTICULARLY DURING FINAL ASSEMBLY AND COUNTDOWN,
POSES A SERIES OF DESIGN AND INTEGRATION PROBLEMS. TRANSLATION
OF THESE BIOLOGICAL LABORATORY TECHNIQUES AND APPARATUS INTO
LAUNCH PAD AND FLIGHT HARDWARE (FROM BIOMEDICAL PRACTICE INTO
ENGINEERING APPROACH) IS THE PRIMARY OBJECTIVE OF THIS BOOK.

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AN ENGINEER LOOKS AT SPACECRAFT STERILIZATION
=IES PROC. 1966, P. 471-479 15REF 11FIG

1. INFORMATION 2. ENGR-PRACTICE 3. GENERAL 4. NOMINAL 5. SINGLE
6. JPL-STERILIZATION 7. SPACECRAFT, CLEAN-ROOM 8. ENVIRO-EFFECTS
9. STERILIZATION

THE STERILIZATION PLAN, FROM WHICH THE FINAL VEHICLE DESIGN,
MANUFACTURE AND LAUNCH OPERATIONS MUST EVOLVE, IS ESPECIALLY
DEPENDENT ON THE LAUNCH SCHEDULE. THIS FACTOR CAN LIMIT THE
UTILIZATION OF FUTURE RESULTS OF EVEN THE MOST EXPEDITIOUS OF
THE STERILIZATION RESEARCH PROGRAMS, REQUIRING THE VEHICLE DE-
SIGN BE FLEXIBLE TO INCORPORATE EFFICIENTLY THE CONTINUED RE-
SEARCH FINDINGS UNTIL RELATIVELY LATE IN THE DESIGN PHASE. THE
PRIMARY PURPOSE OF THIS PAPER IS TO ISOLATE THE MAJOR TECHNI-
CAL CONSIDERATIONS WHICH WILL INFLUENCE THIS DESIGN FLEX-
IBILITY.

RELIABILITY

CHAPLIN R RAE

CHA6006Y

AN APPROACH TO SYSTEM RELIABILITY
=SOCIETY OF ENVIRONMENTAL ENGINEERS SYMPOSIUM PAPERS, ENVIRON-
MENTAL ENGINEERING--ITS ROLE IN SOCIETY LONDON, APR. 1966
=VOL. 5 9P 1REF 6FIG

1. DESIGN 2. ENGR-PRACTICE 3. GENERAL 7. AIRCRAFT, COMPUTER,
RELIABILITY, MODEL

AN AIRBORNE SURVEILLANCE SYSTEM USED TO PATROL A FIXED LINE IS
TAKEN AS AN EXAMPLE OF A COMPLEX SYSTEM. RELIABILITY CAN BE
REGARDED AS AN APPROXIMATE ALTERNATIVE TERM TO OPERATING EFFI-
CIENCY AND MUST BE CONSIDERED IN RELATION TO EFFECTIVENESS.
THE EFFECTIVENESS OF A SYSTEM IN A PARTICULAR SITUATION IS
DESCRIBED BY THE PRODUCT OF TWO LARGELY INDEPENDENT FACTORS--
SYSTEM EFFECTIVENESS = SYSTEM CAPABILITY X SYSTEM RELIABILITY.

ENGINEERING PRACTICES

AMES GJ WATFORD COLL OF TECH
TECHNICAL EDUCATION AND THE ENVIRONMENTAL ENGINEER.
=ENVIR.ENG NO.25,P.17-18+ MAR.1967 5REF

AME7001Z

1.PHILOSOPHY 2.ENGR-PRACTICE 7.ENGINEER,TECHNICIAN

AN OUTLINE IS GIVEN OF A SPECIALIZED COURSE FOR LABORATORY TECHNICIANS IN ENVIRONMENTAL ENGINEERING. THE COURSE IS DIVIDED INTO THREE PARTS, EACH COMPLETE IN ITSELF. THE CONCENTRATION IS MAINLY ON THE PRINCIPLES OF MEASURING DEVICES AND AN ELEMENTARY ACCOUNT OF SOME OF THE METHODS OF HANDLING NUMERICAL DATA. SOME GENERAL RECOMMENDATIONS ARE MADE FOR A FOUR-YEAR DEGREE COURSE IN ENVIRONMENTAL ENGINEERING.

BAKER RL HUGHES AIRCRAFT
A SYSTEMS ENGINEERING APPROACH TO ENVIRONMENTAL LABORATORY
MANAGEMENT
=IES PROC.(TUTORIAL SERIES) 1967,P.133-138 5REF 4FIG

BAK7002Z

1.PHILOSOPHY 2.ENGR-PRACTICE 7.COMPUTER

DESCRIBES A GENERAL SYSTEMS APPROACH TO LABORATORY MANAGEMENT WHICH HAS BEEN SUCCESSFULLY APPLIED DURING THE PAST TWO YEARS TO AN OLDER ENVIRONMENTAL LAB. IT IS PARTICULARLY WELL ADAPTED TO COMPUTER-BASED MANAGEMENT SYSTEMS.

CARLETON JE GENERAL ELEC
OPTIMIZING RELIABILITY WITH AN INTEGRATED TEST PROGRAM
=IES PROC.1967,P.191-194 2FIG

CAR7002Z

1.ORGANIZATION 2.ENGR-PRACTICE 3.GENERAL 7.RELIABILITY

AN INTEGRATED TEST PROGRAM BRINGS TOGETHER THE GROUPS WHICH HAVE A NEED TO OBTAIN INFORMATION ABOUT THE PROPERTIES AND PERFORMANCE OF PRODUCTS. THESE GROUPS WOULD BECOME INVOLVED DURING THE EARLY STAGES OF PROPOSALS AND CONTRACTS. TOGETHER, THEY WOULD CHART THE COURSE OF ACTION TO BE FOLLOWED IN A TEST PROGRAM.

JOURNAL OF ENVIRONMENTAL SCIENCES
TECHNICAL EDUCATION--PROFESSIONAL DEVELOPMENT
=JL.ENVIR.SCI VOL.9,P.25-27 DEC.1966

JOU6004Z

1.PHILOSOPHY 2.ENGR-PRACTICE 3.GENERAL

THE AIMS AND PROGRAM OF THE EDUCATIONAL STANDING COMMITTEE, INSTITUTE OF ENVIRONMENTAL SCIENCES.