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THE BOEING COMPANY

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MODEL NO. WS-133A CONTRACT NO. AF04(648)-289

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FOREWORD

This document, D2-14934-2, entitled "WS-133A Maintainability Progress Report", is submitted to BSD/STL in accordance with the requirements of Technical Directive 62-4488, "Maintainability Requirement Program," dated 28 May 1962.

REFERENCES

a. MIL-M-26512B, Maintainability Requirements for Aerospace Systems and Equipment," dated 23 March 1962.

b. 6120-7822-DU-RD1, "Maintainability Criteria, Preliminary," dated 16 March 1962.

c. T.D. 62-4488, "Maintainability Requirements Program", dated 28 May 1962.

d. CCN 448, dated 28 May 1962.

e. CCP 803, dated 5 October 1962.

f. D2-14475, "WS-133A Maintainability Program Plan."

g. D2-4747-1, "Maintainability Design Criteria for Minuteman Electronic Equipment."

h. D2-4747-2, "Maintainability Design Criteria for Minuteman Transportation and Handling Equipment."

i. D2-4747-3, "Maintainability Design Criteria for Minuteman Facilities and Facilities Equipment."

j. Boeing letter 2-5261-2-249, dated December 20, 1962, with enclosure, "List of WS-133A Equipment Selected for Maintainability Demonstrations."

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1.0 SCOPE

This document constitutes The Boeing Company's monthly status report to the Air Force on Maintainability Activities pertaining to the WS-133A Minuteman Weapon System. The Maintainability Program is a contractual obligation of The Boeing Company under CCN 448 of Contract Number AF 04(648)-289.

2.0 PURPOSE

The Air Force has requested that The Boeing Company develop Maintainability Criteria and conduct a Maintainability Program in accordance with this criteria. This is being accomplished in accordance with the WS-133A Maintainability Program Plan (D2-14475) based on the requirements set forth in MIL-M-26512B as amended by Technical Directive 62-4488.

The purpose of this document is to report to the appropriate Air Force agencies the progress achieved in execution of the Maintainability Plan and to detail the work accomplished during the reporting period.

3.0 INTRODUCTION

This document is the second of the monthly reports that outline the progress achieved by the contractor in the WS-133A Maintainability Program. The first report covered the period from 18 October 1962 thru 31 December 1962. This report covers the period from 1 January 1963 to 31 January 1963. Each succeeding report will cover a monthly period from the first thru the last day of each month.

The Maintainability Program Plan for the Minuteman Weapon System is two-fold; it provides both a Design Review and Evaluation Plan and a Test and Demonstration Plan. The monthly reports contain status of progress and problem areas encountered in each of these plans.

4.0 MAINTAINABILITY REVIEW AND EVALUATION

4.1 MAINTAINABILITY REVIEWS

4.1.1 Program

As part of the Maintainability (M) effort under CCP-803 and the WS-133A Maintainability Program Plan (D2-14475), specific figure "A" items are being reviewed for M and soldering in accordance with criteria as specified in 6120-7822-DU-RDI. Major M problem areas revealed by these reviews are reported through initiation of a Maintainability Action Request (MAR). Minor M problems of the product improvement type are reported to the Design Project through a Maintainability Review Report (MRR).

4.1.2 Figure "A" Items To Be Reviewed

a. The following figure "A" items were selected by the customer for M review:

1) 1207 Drier, Air Compressor;

2) 1281 Fault Locator Set, AN/GSM-69;

3) 1288 Battery, Storage;

4) 1337 Distribution Box;

5) 1338 Console, Communications Control;

6) 1367 Motor/Generator, PU-521;

7) 1380 Distribution Box;

8) 1385 Distribution Box;

9) 1412 Signal Assembly Voice Reporting;

10) 1423 Antenna Group, AN/GRA-72;

11) 1424 Antenna, AS-1213/GRC-113;

12) 1425 Antenna System, H. F., Receiving & Transmitting;

13) 1426 Antenna, H. F., Transmitting, Hardened;

4.1.2 (Continued)

14) 1607 Security and Alarm Set;

15) 3007 Test-Set, Explosive Set Circuitry;

16) 3092 Test-Set, Programmer Group;

17) 4018 Adapter AN/GSM-61 ;

18) 4043 Elevator, Work Cage;

19) 4152 Test Equipment, Electrical Facility, Base Maintenance;

20) 4220 Test-Set, Relay;

21) 4252 CIV Set, AN/GSQ-65;

22) 4344 Fault Locator, SCN Cable;

23) 4451 Controller, Azimuth Drive;

24) 4487 Command Signal Simulator;

25) 4489 Message Generator;

26) 4490 Simulator Set, Electrical Functions;

27) 4491 Start-Up Unit;

28) 4515 Static Frequency Changer;

29) 4523 Common Power Supply;

30) 4539 Test-Set, VRSA;

31) 4601 Function Simulator, H.F./UHF Radio;

32) 4632 Test-Set, Electric Power, LF;

33) 4633 Test-Set, Electric Power, LCF.

b. The Minutes of the Maintainability Review Meetings held at Boeing on 9 January 1962, and at RCA, on 16 January 1962 (file

4.1.2 (Continued)

No. 2-6331-0-366, dated 7 February 1962) listed certain figure "A" items which were not reviewed due to non-availability of hardware. These items are being reviewed on a schedule compatible with equipment availability.

c. Other figure "A" items are being reviewed as problem areas are identified by review of Field Service Reports, System Test Action Requests, Unsatisfactory Reports, M Evaluation/Observation (E/O) Reports, and other field reports prepared by Boeing organizations.

4.2 MAINTAINABILITY ACTION REQUESTS (MAR)

During the reporting period the following MAR was initiated:

2-7724-A1, NCU Zero Alignment Test Set, BGS-116.

Status of all MAR's initiated to date is contained in the MAR Status Summary Chart (See Section 6.2).

4.3 MAINTAINABILITY REVIEW REPORTS (MRR)

During the reporting period MRR's on the following equipments were completed:

a) Common Power Supply, figure A 4523;

b) Alarm Set Test Set, Figure A 3109;

c) MGE Electrical Equipment cases, MGE Figure A's;

d) Distribution Box J-1269, Figure A 1337;

e) Voice Reporting Signal Assembly, Figure A 1412;

f) HSM-80C Section 49 skirt;

g) Distribution Box J-1312, Figure A 1380;

h) Test Set, Explosive Set Circuitry, Figure A 3007.

The MRR's have been forwarded to the cognizant design group for consideration as product improvement items. (See Maintainability Review Status Summary Chart Section 6.1).

4.4 FIELD LIAISON REPORTS

Surveillance of operational activities to obtain additional Maintainability data is being accomplished thru review of STAR's (Systems Test Action Requests), FSR's (Field Service Reports), UR's (Unsatisfactory Reports), and BIAR's (Base Installation Action Requests). During the reporting period, twelve (12) STAR's, five (5) FSR's, and eight (8) BIAR's have been reviewed for Maintainability implications. Certain of these reports will be followed by M Engineers to ascertain that the reply/action satisfactorily solves the problem. MAR/MRR action will be initated on those reports requiring additional Maintainability consideration.

5.0 MAINTAINABILITY TEST AND DEMONSTRATION

5.1 TEST AND DEMONSTRATION PLAN

a. Tests and performance demonstrations already scheduled for other purposes at the STP III installation, Vandenberg Air Force Base, and Minuteman Wing installation are being utilized to provide as many Maintainability demonstrations as possible. Maintainability Engineers are participating in those tests and demonstrations which have inherent Maintainability significance, and are documenting their observations.

b. Items of equipment whose Maintainability features have a major impact upon the operation and maintenance of the Weapon System have been selected. Only demonstrations involving these items are being documented, pending both BSD approval of the equipment list and contractual coverage for any additional tests considered necessary by the Customer.

5.2 TEST AND DEMONSTRATION EQUIPMENT LIST

a. The "List of WS-133A Equipment Selected for Maintainability Demonstrations" was transmitted to BSD by letter 2-5261-2-249, dated December 20, 1962. This list identified applicable maintenance operations which may be observed during remaining scheduled test and demonstration activities, to provide Maintainability demonstrations of the selected Figure "A" equipment items. It also identified, for each selected equipment item, those maintenance operations which should be demonstrated but were not at that time known to be included within any scheduled test or demonstration.

b. The "Demonstration Requirements Status Summary" (Section 6.3 of this report) provides monthly amplification and updating of the "List of WS-133A Equipment selected for Maintainability Demonstrations." It contains a tabulation of the maintenance operations which should be demonstrated for each selected "Figure A" equipment item, and identifies any scheduled events which are known to include these operations. It also contains a completion record, which provides completion dates and observer report numbers for all demonstrations which have been accomplished during current and previous reporting periods.

c. Maintainability Engineers will continue to participate in the scheduled demonstration events listed in the "Demonstration Requirements Status Summary," pending further direction from BSD.

5.3 MAINTAINABILITY EVALUATION/OBSERVATION (E/O) REPORTS

E/O Reports are prepared for both "dynamic" observations of maintenance and "static" evaluations of M design. The Maintainability E/O's provide the basis for subsequent corrective action on the noted problems, and are submitted in this Progress Report as a demonstration record.

a) "Static" evaluations are complete visual inspections made on a non-interference basis whenever equipment becomes conveniently available. "Dynamic" observations are made during applicable maintenance operations using actual equipment. In either case the E/O Reports document the demonstration results.

b) Each completed E/O Report is evaluated by the Maintainability Engineers who have Maintainability-review responsibility for the specific "Figure A" items of equipment identified in the report. When Maintainability deficiencies are identified in the E/O, MAR's and/or MRR's are initiated for appropriate action.

c) Seven E/O Reports were written during the report period covered by this document. They were prepared by the Maintainability Engineers who participated in the M demonstrations. The reports are contained in Section 6.4.

6.0 REPORTS

This section contains status charts, copies of Maintainability Action Requests (MAR's), and Maintainability Evaluation Observation (E O) Reports.

6.1 MAINTAINABILITY REVIEW STATUS SUMMARY

The Maintainability Review Status Chart contains an up-to-date summary of all Figure A equipments reviewed in accordance with the discussion contained in Section 4. As additional Figure A items are reviewed they will be entered on this chart with notations as to action taken and date review is completed. This chart will be revised and reproduced in each succeeding monthly status report.

MAINTAINABILITY REVIEW STATUS CHART

Figure "A" NO.	SUBJECT	ACTION REPORT		DATE REVIEW COMPLETED
		MAR NO.	MRR NO.	
1367	Motor-Generator, PU-521 (LCF)		1-1367	December 14, 1962
1282/1288	Battery Storage	3-1282-A1	2-1282	December 14, 1962
1243/1338	Consoles (telephone & transmitter control)		3-1243	December 14, 1962
1369	Antenna Set		4-1369	December 14, 1962
4488	Decoder Kit		5-4488	December 14, 1962
1283	Motor-Generator, PU-515	1-1283-A1	6-1283	December 21, 1962
4252	Code Inserter-Verifier Set		7-4252	December 21, 1962
1370	Lighting Equipment Group		8-1370	December 21, 1962
1201	Programmer Group		9-1201	December 21, 1962
4523	Common Power Supply		10-4523	December 24, 1962
3109	Alarm Set Test Set		11-3109	January 8, 1963
Various	Electrical Equipment Cases, MGE		12-MGE	January 18, 1963
1337	Distribution Box, J-1296		13-1337	January 23, 1963
1412	Voice Reporting Signal Assembly		14-1412	January 21, 1963
6950	HSM-80C Section 49 Skirt		15-6950	January 22, 1963
1380	Distribution Box, J-1312		16-1380	January 23, 1963
3007	Test Set, Explosive Set Circuitry		17-3007	January 29, 1963

6.2 MAR STATUS SUMMARY

The MAR Status Chart contains up-to-date list of MAR's issued and the current status of each MAR. Copies of MAR's will be included in each monthly status report until such time as they are considered closed. MAR's requiring no further consideration by either the originating engineer or the organization responsible for corrective action will be closed. This status is assigned by the MAR originator only when one of the following has been achieved:

a) An authorized hardware, procedure, specification or other corrective action has been found to satisfy the MAR problem;

b) The organization responsible for action rejects the request for corrective action and the MAR originator concurs with reasons given for the rejection;

c) The MAR originator considers that the MAR requires no further action because of related actions taken, events occurring, or status changing after initiation of the MAR.

MAR STATUS CHART

MAR NO	SUBJECT	Date Issued	STATUS
1-1283-A1	DC Drive Motor Disconnect	To be issued	- - - - -
2-7724-A1	NCU Zero Alignment Test Set	January 22, 1963	In Work*
3-1282-A1	Launch Facility Battery Shock Mounts	December 5, 1962	In Work*

MAR copies immediately follow this chart.

MAINTAINABILITY ACTION REQUEST

WS-133 WEAPON SYSTEM

The Boeing Company Aero-Space Division Seattle Washington MAINTAINABILITY GROUP Organization 2-5261-30 Mail Stop 50-66 Telephone JU6-6263	ROUTING ACTION: Kazuo Kobayaski ORGAN. 2-6433 M.S. 42-93 CC: Dan Ranney 14-01 D. A. Cole 43-86 Dan Supplee 34-03	PAGE: 1 of 3 MAR No. 2-7724-A1 DATE: 22 January 1963 DATE REPLY DUE: 5 February 1963

FIGURE A NO. 7724 SYSTEM Nozzle Control Unit SUBSYSTEM BGS-116 Test Set

Statement of Problem:

Failure of the connector/cable on the NCU Zero Alignment Test Set, which is returned to Boeing Seattle for repair, is affecting Plant 77 capability for maintenance of the NCU.

Factors of Problem:

1. The connector which mates with the NCU is "molded" to the cable which connects the NCU to the test set and proper facilities to do this molding are not available at Plant 77.

2. Spares Provisioning, organization 2-5274, can not authorize an entire figure A as a spare.

3. The cable is not provided as a spare; Drawing # 25-26801 calls out separate components to make up this cable.

4. Six of these figure A items have been sent from Plant 77 to Boeing for repair. One unit has been returned to Plant 77 after 75 days turn-around time and the others are still at Boeing after 25 days.

5. The test sets have a high usage factor. BIAR-Plant 77-130T, December 12, 1962, states "connectors become damaged thru constant normal usage."

Discussion:

The connector mates with a connector on the NCU and, if a damaged test set connector is used, resultant damage to the NCU connector requires that the NCU be returned to Autonetics for repair. Plant 77 has been unable to mold

Minuteman Finance J. Niederkrome		Minuteman System Analysis R. B. Grobe
M Engineer: E. Hardy	Approved by: J. S McEacheran	Approved by:

Discussion(Continued)

or pot the connector to the cable. This molding is required because test set is used in a hazardous area.

The current high failure rate for this test set plus the lengthy turn-around time requires that a change be made in the present repair concept or that the quantity authorized at Plant 77 be increased for this figure A.

NOTE: Since the cost of this figure A is only $790, increased authorization for this item at Plant 77 can be provided at a relative low cost; therefore a cost study will not be made. The problem here is not costs but that a maintenance bottleneck is to be prevented.

Recommendation:

Redesign of the connector/cable to make it replaceable at Plant 77.

Note:

This is a preliminary cost study to assertain if the M proposal will result in a savings to the customer. Values used are gross figures and do not constitute official Boeing cost estimates. Their use is limited to planning purposes and trade studies for this M proposal.

MAINTAINABILITY ACTION REQUEST

WS-133 WEAPON SYSTEM

The Boeing Company Aero-Space Division Seattle Washington MAINTAINABILITY GROUP Organization 2-5261-30 Mail Stop 50-66 Telephone 114-6263	ROUTING ACTION: F. L. Strum ORGAN. H&D Power Unit M.S. 52-26 CC: K. Niebauer 52-26 P. Koenig 52-91 J. M. Barker 50-66 D. A. Cole 43-86	PAGE: 1 of 2 MAR No. 3-1282-A1, Revision 1 DATE: February 14, 1963 (December 5, 1962) DATE REPLY DUE:

FIGURE A NO. 1282 SYSTEM Electrical SUBSYSTEM Storage Battery

Statement of Problem:

Difficulty is being experienced in installing Launch Facility battery shock mounts at operational sites.

References:

(a) **Parson Drawing SK-161**

(b) **FSR No MAFB 341 SMW-53F**

(c) **BSD Drawing SK-162**

Field Service Report received from Malmstrom Air Force Base (reference b) reports considerable difficulty in installing Launcher battery shock mounts. This same difficulty can be expected whenever batteries must be moved or replaced during the life of the weapon system.

Investigation and review of an alternate mount such as that represented by BSD drawing SK-162 (reference c) indicates elimination of the installation and maintenance problem. Cost studies show that due to simplicity of design, an overall savings of approximately $655,220 can be realized. This savings is based upon effectivity at Wing III. As the savings is approximately $625 per Launch Facility, it is recommended that this change be effected as soon as possible.

Recommend ECP be processed to change shock mounts to ones similar to BSD drawing SK-162 (reference c).

Minuteman Finance J. Niederkrome		Minuteman System Analysis R. B. Grobe
M Engineer R. L. Stearns	Approved by: J. S. McKecheran	Approved by:

WEAPON SYSTEM ELEMENTS
- ___ Missile
- ___ Launch Control Facility
- ___ Launch Facility
- ___ OGE
- ___ MGE
- ___ RPIE
- ___

CHANGE TASKS AND FUNCTIONS
- X EOP Processing (or PRR)
- X Research and development
- ___ Retrofit and TCTO
- ___ Special change-retrofit equipment
- X Publications and drawings
- X Figure A, forms B, C, C-1 changes
- ___ Manufacturing changes
- ___ Hardware changes
- ___ Mandatory, "make-work" changes
- ___ Customer directed
- ___ Boeing initiated

LOGISTIC SUPPORT
- ___ Maintenance loading & time lines
- X Manhours and personnel requirements
- ___ Crew-vehicle hours and trips
- ___ "On-site" vs SMSB vs Depot repair
- ___ Spares
- ___ Test and maintenance equipment
- ___ Training
- ___ Transportation
- ___ Supply functions

OPERATIONAL FACTORS
- ___ Downtime or availability
- ___ Reliability
- ___ Standardization & interchangeability
- ___ Compatibility (PAS, 465L, radio nets, power, GFE, test equipment, etc.)
- ___ Interfaces and secondary faults
- ___ Schedule impact
- ___ Safety and hazards
- ___ Human factors (MIL-STD-803)

COST SUMMARY

	Cost	Savings
R&D	$50,000	
Publications & Drawings	5,000	
Form C	2,000	
Cost of modifying batteries $17.00/unit 12 units/LF, 150 LF/wing & 7 wings (Wings III through IX)		
Total cost of battery change $17X12X150X7	214,200	
Old shock mount $1800 for material/unit 240 manhours for manufacture. New shock mount $1800 for material/unit 184 manhours (56 less manhours) $10.00/hr. 150 LF/wing & 7 wings 56X $10X13X150X7 = Manufacturing savings		$588,000
Savings of 2 manhours per unit on installation at $12.40/hr. $12,40X2X13X150X7 =		338,420
Totals	$271,200	$926,420
Net Savings		$655,220

Note:

This is a preliminary cost study to assertain if the M proposal will result in a savings to the customer. Values used are gross figures and do not constitute official Boeing Cost estimates. Their use is limited to planning purposes and trade studies for this M proposal.

6.3 DEMONSTRATION REQUIREMENTS STATUS SUMMARY

The following Demonstration Requirements Status Summary contains an up-to-date summary of scheduled maintainability demonstration events for each selected "Figure A" equipment item, including completion dates and E/O Report numbers for those demonstrations which have occurred during the current and previous reporting periods. The Summary also lists those maintenance operations which should be demonstrated but are currently 'unscheduled."

DEMONSTRATION REQUIREMENTS

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION	DEMONSTRATION EVENT
1231 Programmer Group	Organizational-Level Checkout Partial	Verification; T. O. 21-SM80A-2 par. 2-28 thru fig. 2-34
	Complete	Technical Approval Demonstrati 1-18, Malmstrom AFB
	Organizational-Level Fault Isolation	Technical Approval Demonstrati 1-18, Malmstrom AFB
	Field-Level Checkout Drawer A1	Verification; T. O. 31X3-12-8-2 7-11, 7-12A, 7-13
	Drawer A2	Technical Approval Demonstrat 1-14, Malmstrom AFB
	(Part No. -44)	Verification; T. O. 31X3-12-8-2 7-12A, 7-13
	(Part No. -50)	Verification, T. O. 31X3-12-8-2 7-12A, 7-13
	(Part No. -51)	Verification, T. O. 31X3-12-8-2 7-12A, 7-13
	Drawer A3 (Part No. -49)	Verification, T. O. 31X3-12-8-2 7-12A, 7-13
	(Part No. -56)	Verification; T. O. 31X3-12-8-2 7-12A, 7-13
	Drawer A4 (Part No. -56)	Verification, T. O. 31X3-12-8-2 7-12A, 7-13
	(Part No. -62)	Verification, T. O. 31X3-12-8-2 7-12A, 7-13
	Drawer A6 (Part No. -40)	Verification, T. O. 31X3-12-8-2 11-17 thru 11-2[illegible]
	(Part No. -50)	Verification, T. O. 31X3-12-8- 11-17 thru 11-2[illegible]
	Drawer A7	Verification, T. O. 31X3-12-8- 12-15 thru 12-19

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RATION REQUIREMENTS STATUS SUMMARY

DEMONSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
ification, T. O. 21-SM80A-2-3, . 2-28 thru fig. 2-34						
hnical Approval Demonstration 8, Malmstrom AFB	11-7-62				EO-1201-1	1-18-63
hnical Approval Demonstration 8, Malmstrom AFB	11-7-62				EO-1201-1	1-18-63
ification, T. O. 31X3-12-8-2, par 1, 7-12A, 7-13						
hnical Approval Demonstration 4, Malmstrom AFB						
ification; T. O. 31X3-12-8-2, par. 2A, 7-13						
ification; T. O. 31X3-12-8-2, par 2A, 7-13						
ification, T. O. 31X3-12-8-2, par. 2A, 7-13						
ification, T. O. 31X3-12-8-2, par. 2A, 7-13						
ification; T. O. 31X3-12-8-2, par. 2A, 7-13						
ification, T. O. 31X3-12-8-2, par. 2A, 7-13						
ification, T. O. 31X3-12-8-2, par. 2A, 7-13						
ification, T. O. 31X3-12-8-2, par. 17 thru 11-2[illegible]						
ification, T. O. 31X3-12-8-2, par. 17 thru 11-2[illegible]						
ification; T. O. 31X3-12-8-2, par. 18 thru 12-19						

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DEMONSTRATION REQUIREMENTS

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVENT
	Field-Level Fault Isolation	Drawer A1	UNSCHEDULED
		Drawer A2	Technical Approval Demonstratio 1-14, **Malmstrom AFB**
		Drawer A3	UNSCHEDULED
		Drawer A4	UNSCHEDULED
		Drawer A6	UNSCHEDULED
		Drawer A7	UNSCHEDULED
1211 Launch Facility Environmental Control System	Organizational-Level Checkout		UNSCHEDULED
	Organizational-Level Fault Isolation		UNSCHEDULED
	Organizational Level Adjustment	Dampers D-1, D-2	UNSCHEDULED
		Dampers D-3, D-3A, D-3B	UNSCHEDULED
		Damper D-4	UNSCHEDULED
		Damper D-5	UNSCHEDULED
		Switches PF-2, PF-3, PF-4	UNSCHEDULED
		Switch PF-5	UNSCHEDULED
		Pressure Regulator PC-1	UNSCHEDULED
		Flow Sensor FA-1	UNSCHEDULED
		Flow Sensor FA-2	UNSCHEDULED
		Thermostat TC-1	UNSCHEDULED
		Thermostat TC-4	UNSCHEDULED

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RATION REQUIREMENTS STATUS SUMMARY

DEMONSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
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chnical Approval Demonstration 14, Malmstrom AFB						
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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVEN
	Field-Level Fault Isolation	Drawer A1	UNSCHEDULED
		Drawer A2	Technical Approval Demonstra 1-14, Malmstrom AFB
		Drawer A3	UNSCHEDULED
		Drawer A4	UNSCHEDULED
		Drawer A6	UNSCHEDULED
		Drawer A7	UNSCHEDULED
1211 Launch Facility Environmental Control System	Organizational-Level Checkout		UNSCHEDULED
	Organizational-Level Fault Isolation		UNSCHEDULED
	Organizational-Level Adjustment	Dampers D-1, D-2	UNSCHEDULED
		Dampers D-3, D-3A, D-3B	UNSCHEDULED
		Damper D-4	UNSCHEDULED
		Damper D-5	UNSCHEDULED
		Switches PE-2, PE-3, PE-4	UNSCHEDULED
		Switch PE-5	UNSCHEDULED
		Pressure Regulator PC-1	UNSCHEDULED
		Flow Sensor FA-1	UNSCHEDULED
		Flow Sensor FA-2	UNSCHEDULED
		Thermostat TC-1	UNSCHEDULED
		Thermostat TC-4	UNSCHEDULED

TECHNOLOGY DEMONSTRATION STATUS SUMMARY

DEMONSTRATION ELEMENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
HEDULED						
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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVENT
		Thermostat TC-5	UNSCHEDULED
		Thermostat HL-1	UNSCHEDULED
		Thermostats TA-1, TA-6	UNSCHEDULED
		Thermostats TA-2, TA-5	UNSCHEDULED
		Thermostat TA-4	UNSCHEDULED
		Low Temp. Cutout	UNSCHEDULED
		Oil Pressure Cutout	UNSCHEDULED
		Pressure Reg. PRV-2	UNSCHEDULED
		Restrictors	UNSCHEDULED
		Brine Balancing	UNSCHEDULED
		Air Flow Balancing	UNSCHEDULED
		Emerg. Water Flow Balancing	UNSCHEDULED
	Organizational-Level Calibration	Pressure Gage	UNSCHEDULED
		Temperature Gage	UNSCHEDULED
	Field-Level Checkout	Chiller Unit	UNSCHEDULED
		Emerg. Cooling Unit	UNSCHEDULED
		Misc. Components	UNSCHEDULED

QUIREMENTS STATUS SUMMARY

RATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT		DATE COMPLETED	REPORT	
		NO.	DATE		NO.	DATE

2

DEMONSTRATION REQUIREMENT

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVE
	Field-Level Fault Isolation	Chiller Unit	UNSCHEDULED
		Emerg Cooling Unit	UNSCHEDULED
		Misc. Components	UNSCHEDULED
	Field-Level Adjustment	High Pressure Cutout	UNSCHEDULED
		Low Pressure Cutout	UNSCHEDULED
		Oil Pressure Cutout	UNSCHEDULED
		Low Temp. Cutout	UNSCHEDULED
		Damper D-1	UNSCHEDULED
		Damper D-2	UNSCHEDULED
		Switches PE-2, PF-3	UNSCHEDULED
		Pressure Reg. PC-1	UNSCHEDULED
		Restrictor RS-1	UNSCHEDULED
		Pressure Gage	UNSCHEDULED
		Temp. Gages TG-4, TG-5	UNSCHEDULED
		Restrictor RS-1A	UNSCHEDULED
		Switch PR-5A	UNSCHEDULED
		Switches PE-6A, PE-7A	UNSCHEDULED
		Thermostat TA-3	UNSCHEDULED
		Thermostat HL-2	UNSCHEDULED

QUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT		DATE COMPLETED	REPORT	
		NO.	DATE		NO.	DATE

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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION REQ	
1213 Digital Data Processing Equipment (LCF)	Organizational-Level Checkout	Partial	Revalidation; T.O. 31-[illegible]60A par. 2-36 thru 2-39	
		Complete	UNSCHEDULED	
	Organizational-Level Fault Isolation		UNSCHEDULED	
	Field-Level Checkout	CV-1236 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-.
		MX-3686 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		MX-3687 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		CV-1243 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		CV-1237 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		MX-3742 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		MU-446 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		CV-1249 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
		CV-1250 Drawer	Verification; T.O. 8-5, 8-7	31X2-32-
	Field-Level Fault Isolation	CV-1236 Drawer	UNSCHEDULED	
		MX-3686 Drawer	UNSCHEDULED	
		MX-3687 Drawer	UNSCHEDULED	
		CV-1243 Drawer	UNSCHEDULED	
		CV-1237 Drawer	UNSCHEDULED	

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
T.O. 21-SM80A-2-3, u 2-39						
ED						
ED						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
T.O. 31X2-32-3-2, par.						
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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVENT
		MX-3742 Drawer	UNSCHEDULED
		MU-446 Drawer	UNSCHEDULED
		CV-1249 Drawer	UNSCHEDULED
		CV-1250 Drawer	UNSCHEDULED
	Field-Level Adjustment	CV-1237 Drawer	Verification; T.O. 31X2-3[illegible]
1214 Guidance Section Liquid Cooler	Organizational-Level Checkout	System Checkout	UNSCHEDULED
		Pump Package Operation	Technical Approval Demonstra[illegible] 1-15, Malmstrom AFB
	Organizational-Level Fault Isolation		UNSCHEDULED
	Remove and Replace Pumping Assembly		Technical Approval Demonstra[illegible] 1-15, Malmstrom AFB
	Field-Level Checkout	Water Chiller	Technical Approval Demonstra[illegible] 1-13, Malmstrom AFB
			Verification, T.O. 35E9-35-1[illegible] 3-4
		Pumping Assembly	Technical Approval Demonstr[illegible] 1-15, Malmstrom AFB
			Verification; T.O. 35E9-35-1[illegible] 3-21
		Control Amplifier	Verification; T.O. 35E9-35-1[illegible] 3-30
	Field-Level Fault Isolation	Water Chiller	UNSCHEDULED
		Pumping Assembly	UNSCHEDULED
		Control Amplifier	UNSCHEDULED

[redacted]

QUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
)						
)						
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.O. 31X2-32-3-2, par. 13.4						
D						
roval Demonstration rom AFB						
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roval Demonstration rom AFB						
roval Demonstration rom AFB						
T. O. 35E9-35-1, par.						
roval Demonstration rom AFB						
T. O. 35E9-35-1, par.						
T. O. 35E9-35-1, par.						
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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVE
1228 Status-Command Message Processing Group (LF)	Organizational-Level Checkout		Technical Approval Demonstr 1-20, Malmstrom AFB
	Organizational-Level Fault Isolation		Technical Approval Demonstr 1-20, Malmstrom AFB
	Field-Level Checkout	MC-3775 Drawer	Verification; T. O. 31X2-32-3 18-5, 18-7
		MX-3776 Drawer	Verification; T. O. 31X2-32-3 18-5, 18-7
		CV-1254 Drawer	Verification; T. O. 31X2-32-3 18-5, 18-7
		KY-411 Drawer	Verification; T. O. 31X2-32-3 8-5, 8-7
	Field-Level Fault Isolation	MC-3775 Drawer	UNSCHEDULED
		MX-3776 Drawer	UNSCHEDULED
		CV-1254 Drawer	UNSCHEDULED
		KY-411 Drawer	UNSCHEDULED
1243 Launch Control Console	Organizational-Level Checkout		Technical Approval Demonst 1-20, Vandenberg AFB
	Organizational-Level Fault Isolation		UNSCHEDULED
	Field-Level Checkout	DC Power Filter Assy	Verification; T. O. 31X3-3-9- 11-3
		Telephone Xmtr. Control	Verification; T. O. 31X3-3-9-
	Field-Level Fault Isolation	DC Power Filter Assy	UNSCHEDULED
		Telephone Xmtr. Control	UNSCHEDULED
	Removal, Replacement, and Checkout of Launch Control Panel		Technical Approval Demonst 1-18, Vandenberg AFB

EQUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
eval Demonstration om AFB	11-7-62	EO-1228-1	11-29-62			
eval Demonstration om AFB	11-7-62	EO-1228-1	11-29-62			
. O. 31X2-32-3-2, par.						
. O. 31X2-32-3-2, par.						
. O. 31X2-32-3-2, par.						
. O. 31X2-32-3-2, par.						
D						
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reval Demonstration erg AFB				1-29-63	EO-1214-1	1-30-63
D						
. O. 31X3-3-9-2-1, par.						
. O. 31X3-3-9-2-1, par.						
D						
D						
roval Demonstration erg AFB				1-29-63	EO-1241-1	1-30-63

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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION I
1251 Digital Data Group (LF)	Organizational-Level Checkout		Technical Approval Demon 1-20, Malmstrom AFB
	Organizational-Level Fault Isolation		Technical Approval Demon 1-20, Malmstrom AFB
	Field-Level Checkout	RT-646 Drawer	Verification; T.O. 31X2-3 18-5, 18-7
		DT-252 Drawer	Verification; T.O. 31X2-3 18-5, 18-7
		MX-3772 Drawer	Verification; T.O. 31X2-3 18-5, 18-7
		MX-3773 Drawer	Verification; T.O. 31X2-32 8-5, 8-7
		CV-1253 Drawer	Verification; T.O. 31X2-32 8-5, 8-7
	Field-Level Fault Isolation	RT-646 Drawer	UNSCHEDULED
		DT-252 Drawer	UNSCHEDULED
		MX-3772 Drawer	UNSCHEDULED
		MX-3773 Drawer	UNSCHEDULED
		CV-1253 Drawer	UNSCHEDULED
	Field-Level Adjustment	RT-646 Drawer	Verification; T.O. 31X2-32 29-8 thru Fig. 29-4
		DT-252 Drawer	Verification, T.O. 31X2-32 19-10 thru fig. 19-6
1265 Digital Data Group (LF)	Organizational-Level Checkout	Partial	Revalidation; T.O. 21-SM8(2-36 thru 2-39
		Complete	UNSCHEDULED
	Organizational-Level Fault Isolation		UNSCHEDULED

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
roval Demonstration rom AFB	11-7-62	EO-1251-1	11-29-62			
roval Demonstration rom AFB	11-7-62	EO-1251-1	11-29-62			
'. O. 31X2-32-3-2, par.						
'. O. 31X2-32-3-2, par.						
'. O. 31X2-32-3-2, par.						
. O. 31X2-32-3-2, par.						
. O. 31X2-32-3-2, par.						
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O. 31X2-32-3-2, par. 29-4						
O. 31X2-32-3-2, par. 19-6						
O. 21-SM80A-2-3, par.						

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DEMONSTRATION REQUIREMENTS

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVEN
	Field-Level Checkout	T-869 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		R-1096 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		AM-3159 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		MX-3681 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		MX-3682 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		MX-3683 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		MX-3684 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		MX-3685 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		ID-979 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
		R-1131 Drawer	Verification; T.O. 31X2-32-3-18-5, 18-7
	Field-Level Fault Isolation	T-869 Drawer	UNSCHEDULED
		R-1096 Drawer	UNSCHEDULED
		AM-3159 Drawer	UNSCHEDULED
		MX-3681 Drawer	UNSCHEDULED
		MX-3682 Drawer	UNSCHEDULED
		MX-3683 Drawer	UNSCHEDULED
		MX-3684 Drawer	UNSCHEDULED
		MX-3685 Drawer	UNSCHEDULED

EQUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
.O. 31X2-32-3-2, par.						
.O. 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
.O. 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
.O 31X2-32-3-2, par.						
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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVE
		ID-979 Drawer	UNSCHEDULED
		R-1131 Drawer	UNSCHEDULED
	Field-Level Adjustment	T-869 Drawer	Verification; T.O. 31X2-32-3 18-13
		R-1096 Drawer	Verification; T.O. 31X2-32-3 18-13 thru fig. 19-7
		AM-3159 Drawer	Verification; T.O. 31X2-32-3 18-13 thru fig. 20-7
		ID-979 Drawer	Verification; T.O. 31X2-32-3 22-8
		R-1131 Drawer	Verification; T.O. 31X2-32-3 18-13 thru fig. 23-3
1283 Motor-Generator Set (LF)	Organizational-Level Checkout		Verification; T.O. 21-SM80A 2-23
	Organizational-Level Fault Isolation		UNSCHEDULED
	Organizational-Level Brush Adjustment		UNSCHEDULED
1284 Power Supply Set (LF)	Organizational-Level Checkout	Voltage and Ckt. Brkrs.	Verification; T.O. 21-SM80A 2-26
		Relays	Verification; T.O. 21-SM80A 2-27
	Organizational-Level Fault Isolation	Voltage and Ckt. Brkrs.	UNSCHEDULED
		Relays	UNSCHEDULED

EQUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
D						
D						
O, 31X2-32-3-2, par.						
O, 31X2-32-3-2, par. 19-7						
O, 31X2-32-3-2, par. 20-7						
O, 31X2-32-3-2, par.						
O, 31X2-32-3-2, par. 23-3						
O, 21-SM80A-2-11, par.						
D						
D						
O, 21-SM80A-2-11, par.						
O, 21-SM80A-2-11, par.						
D						
D						

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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EV
	Field-Level Checkout (Fig. A 1284 and 1289)	Preparation	Verification; T. O. 35C2-2-6 4-4, fig. 4-1
		PP-3026 Supply	Verification; T. O. 35C2-2-6 fig. 4-2
		PP-3030 Supply	Verification; T. O. 35C2-2-6 4-2
		PP-3027 Supply	Verification; T. O. 35C2-2-6 4-2
	Field-Level Fault Isolation (Fig. A 1284 and 1289)	PP-3026 Supply	UNSCHEDULED
		PP-3030 Supply	UNSCHEDULED
		PP-3027 Supply	UNSCHEDULED
1289 Power Supply Set (LCF)	Organizational-Level Checkout		Verification; T. O. 21-SM80. fig. 1-10C
	Organizational-Level Fault Isolation		UNSCHEDULED
	Field-Level Checkout		(See Fig. A 1284)
	Field-Level Fault Isolation		(See Fig. A 1284)
1296 Restricted Area Anti-Intrusion Alarm Set	Organizational-Level Checkout	VRSA Input	Verification; T. O. 21-SM80. 2-4A thru fig. 1-9
		Inner Security	Verification; T. O. 21-SM80. 2-4A thru fig. 1-9
		Outer Security	Verification; T. O. 21-SM80. 2-4A thru fig. 1-9

EQUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
O 35C2-2-63-1, par.						
O. 35C2-2-63-1,						
O. 35C2-2-63-1, fig.						
O. 35C2-2-63-1, fig.						
D						
D						
D						
O. 21-SM80A-2-11,						
D						
4)						
4)						
O. 21-SM80A-2-4, par. 1-9						
O 21-SM80A-2-4, par. 1-9						
O. 21-SM80A-2-4, par. 1-9						

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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVE
	Organizational-Level Fault Isolation	VRSA Input	UNSCHEDULED
		Inner Security	UNSCHEDULED
		Outer Security	UNSCHEDULED
	Organizational-Level Adjustment	Receiver - Transmitter	UNSCHEDULED
		Converter - Monitor	UNSCHEDULED
	Field-Level Checkout	Receiver - Transmitter	Verification; T.O. 31X3-2-1 7-19 thru fig. 10-2
		Converter - Monitor	Verification; T.O. 31X3-2-1 8-8 thru fig. 8-2
		Power Supply	Verification; T.O. 31X3-2-1 9-6 thru fig. 9-4
	Field-Level Fault Isolation	Receiver - Transmitter	UNSCHEDULED
		Converter - Monitor	UNSCHEDULED
		Power Supply	UNSCHEDULED
	Field-Level Adjustment	Receiver - Transmitter	UNSCHEDULED
		Converter - Monitor	UNSCHEDULED
1337 Distribution Box (LF)	Organizational-Level Checkout		Verification; T.O. 21SM80A 2-30 thru 2-32
	Organizational-Level Fault Isolation		UNSCHEDULED

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
D						
D						
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D						
T. O. 31X3-2-12-2, par. 10-2						
T. O. 31X3-2-12-2, par. 3-2						
T. O. 31X3-2-12-2, par. 9-4						
ED						
ED						
ED						
ED						
ED						
T. O. 21SM80A-2-11, par. 2						
ED						

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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION	DEMONSTRATION EVE
1338 Communication Control Console	Organizational-Level Checkout	UNSCHEDULED
	Organizational-Level Fault Isolation	UNSCHEDULED
	Field-Level Checkout (Arm & Status Panel)	Verification; T.O. 31X3-3-
	Field-Level Fault Isolation	UNSCHEDULED
1367 Motor-Generator (LCF)	Organizational-Level Checkout	Verification; T.O. 21-SM80 fig. 1-10A
	Organizational-Level Fault Isolation	UNSCHEDULED
	Organizational-Level Servicing	UNSCHEDULED
1412 Voice Reporting Signal Assembl	Organizational-Level Checkout	UNSCHEDULED
	Organizational-Level Fault Isolation	UNSCHEDULED
	Field-Level Checkout	Verification; T.O. 31S1-2G
	Field-Level Fault Isolation	UNSCHEDULED
	Field-Level Component Replacement	UNSCHEDULED
	Inspection	UNSCHEDULED
3013 Console Test Set	Organisational-Level Utilisation (1243)	Technical Approval Demons 1-20, Vandenberg AFB
	Field-Level Checkout	Verification; T.O. 33D9-17
	Field-Level Fault Isolation	UNSCHEDULED
	Voltmeter Calibration	UNSCHEDULED

UIREMENTS STATUS SUMMARY

RATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
ED						
T.O. 31X3-3-9-2-1						
ED						
T.O. 21-SM80A-2-11,				1-2-63	EO-1367-1	4-2-63
ED						
ED						
ED						
ED						
T.O. 31S1-2GSW 4-1						
ED						
ED				1-4-63	EO-1412-1	1-4-63
ED				1-18-63	EO-1412-2	1-22-63
proval Demonstration berg AFB				1-29-63	EO-3018-1	1-30-63
T.O. 33D9-17-26-1						
ED						
ED						

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FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVE
3092 Programmer Group Test Set	Organizational-Level Utilization (1201)	Partial	Verification; T. O. 21-SM80A 2-28 thru fig. 2-34
		Complete	Technical Approval Demonst: Malmstrom AFB
	Field-Level Checkout		Verification; T. O. 33D9-111 5-26
	Field-Level Fault Isolation		UNSCHEDULED
	Field-Level Adjustment	Self Test Generator	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
		Clock	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
		Evaluator A	Verification; T. O. 33D9-111 8-6 thru 8-13
		Evaluator B	Verification; T. O. 33D9-111 8-6 thru 8-14
		Evaluator C Phase 1	Verification; T. O. 33D9-111 8-6 thru 8-15
		Evaluator C Phase 2	Verification; T. O. 33D9-111 8-6 thru 8-16
		Evaluator D	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
		Evaluator E	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
		Reset and Generator	Verification; T. O. 33D9-111 8-6 thru 8-19
		Pulse Generator Reset	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
		Latching Relay Bias	Verification; T. O. 33D9-111 11-5
	Voltmeter Calibration		UNSCHEDULED

[redacted]

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
Γ. O. 21-SM80A-2-3, par. 2-34						
roval Demonstration 1-18, FB	11-7-62				EO-3092-1	1-18-63
Γ. O. 33D9-111-3-1, par.						
:D						
Γ. O 33D9-111-3-1, par. 1-3						
Γ. O. 33D9-111-3-1, par. 1-3						
Γ. O 33D9-111-3-1, par.						
Γ. O. 33D9-111-3-1, par.						
Γ. O. 33D9-111-3-1, par.						
Γ. O. 33D9-111-3-1, par.						
Γ. O. 33D9-111-3-1, par. 1-3						
Γ. O. 33D9-111-3-1, par. 1-3						
Γ. O. 33D9-111-3-1, par.						
Γ. O. 33D9-111-3-1, par. 1-3						
Γ. O. 33D9-111-3-1, par.						
D						

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION E
3109 Alarm Set Test Set	Organizational-Level Utilization (1296)	Incomplete	Attempted Verification; T. (-2-4
		VRSA Input	Verification; T. O. 21-SM80 2-4A thru fig. 1-9
		Inner Security	Verification; T. O. 21-SM80 2-4A thru fig. 1-9
		Outer Security	Verification; T. O. 21-SM8 par. 2-4A thru fig. 1-9
	Field-Level Utilization (1296)		Verification; T. O. 31X3-2- 7-18 thru fig. 10-2
	Field-Level Checkout	Fault Locator	Verification; T. O. 33D9-13 5-9A thru fig. 5-8A
		Antenna Simulator	Verification; T. O. 33D9-13 5-16 thru 5-22
	Field-Level Adjustment	Fault Locator	Verification; T. O. 33D9-13 fig. 8-1
		Antenna Test Set	Verification; T. O. 33D9-13 8-3
	Inspection		UNSCHEDULED
4012 DAC Test Set	Organizational-Level Utilization (1228, 1251)		Technical Approval Demons 1-20, Malmstrom AFB
	Field-Level Checkout	Continuity	Verification; T. O. 33D9-13. 4-10 thru 4-12
		Self-Verification	Verification; T. O. 33D9-13 4-1A, 4-2A
		Meter Relay	Verification; T. O. 33D9-13 7-1, 7-2
		Oscillator	Verification; T. O. 33D9-13. 7-1, 7-2
		Test Signal	Verification; T. O. 33D9-13 7-1, 7-2

EQUIREMENTS STATUS SUMMARY

ISTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
ification; T. O. 21-SM80A	10-15-62	EO-3109-1	10-15-62			
. O. 21-SM80A-2-4, par. 1-9						
. O. 21-SM80A-2-4, par. 1-9						
. O. 21-SM80A-2-4, fig. 1-9						
O. 31X3-2-12-2, par. 0-2						
O. 33D9-137-2-1, par 5-8A						
O. 33D9-137-2-1, par.						
O. 33D9-137-2-1,						
O. 33D9-137-2-1, fig.						
				1-17-63	EO-3109-2	1-17-63
ova: Demonstration m AFB	11-7-62	EO-4012-1	11-29-62			
O. 33D9-133-3-1, par.						
O. 33D9-133-3-1, fig.						
O. 33D9-133-3-1, fig.						
O. 33D9-133-3-1, fig.						
O. 33D9-133-3-1, fig.						

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVE
	Field-Level Fault Isolation		UNSCHEDULED
4018 Test Adapter Group	Field-Level Utilization	(1201)	Technical Approval Demonst 1-14, Malmstrom AFB
		(1228, 1251)	Verification; T.O. 31X2-32-
		(1201)	Verification; T.O. 31X3-12-
		(3092)	Verification; T.O. 33D9-111 5-26
		(4252)	Verification; T.O. 31X2-62-
	Field-Level Checkout	Self Test	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
		Module A4	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
		Module A5	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
		Module A5 (Model A)	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
		Generator A6	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
		Converter A7	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
		Simulator A8	Verification; T.O. 33D7-50- 5-7 thru fig. 5-4
	Field-Level Adjustment	MX-3618	
		Stimuli Eval. Ckt.	UNSCHEDULED
		Voltage Reg. Ckt.	UNSCHEDULED
		Buffer Amp. Ckt.	UNSCHEDULED

QU MENTS STATUS SUMMARY

TRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
ıval Demonstration m AFB						
O. 31X2-32-3-2						
O. 31X3-12-8-2						
O. 33D9-111-3-1, par.						
O. 31X2-62-4-1, par. 5-9						
D. 33D7-50-3-1, par. 4						
O. 33D7-50-3-1, par. 4						
O. 33D7-50-3-1, par. 4						
O. 33D7-50-3-1, par. 4						
O. 33D7-50-3-1, par. 4						
O. 33D7-50-3-1, par. 4						
O. 33D7-50-3-1, par. 4						
)						
)						
)						

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION	DEMONSTRATION EVENT
	Eval. & Univib. Ckt.	UNSCHEDULED
	False Eval. Ckt	UNSCHEDULED
	Self Test Ckt.	UNSCHEDULED
	Response Time Eval.	UNSCHEDULED
	Ref. Voltage	UNSCHEDULED
	MX-4214	
	Self Test Ckt	UNSCHEDULED
	Stimuli Gen. (25-33140)	UNSCHEDULED
	Stimuli Gen. (25-33141)	UNSCHEDULED
	PP-3377	
	Univibrator Ckt.	UNSCHEDULED
	Clock Pulse Simulator-(25-33111)	UNSCHEDULED
	Clock Pulse Simulator (25-33115)	UNSCHEDULED
	Clock Pulse Supply (25-33112)	UNSCHEDULED
	Clock Pulse Supply (25-33113)	UNSCHEDULED

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
D						
F						
ED						
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2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION	DEMONSTRATION EV
	Power Supply (25-33122)	UNSCHEDULED
	Power Supply (25-33125)	UNSCHEDULED
	Power Supply (25-33126)	UNSCHEDULED
	PP-3378	
	Power Supply (25-33132)	UNSCHEDULED
	Power Supply (25-33135)	UNSCHEDULED
	Power Supply (25-33136)	UNSCHEDULED
	PP-3376	
	Power Supply (25-33106)	UNSCHEDULED
	Power Supply (25-33123)	UNSCHEDULED
4043 Elevator Work Cage	Organizational-Level Utilization	UNSCHEDULED
	Field-Level Checkout	Verification; T. O. 35A4-2-3
	Field-Level Fault Isolation	UNSCHEDULED
	Field-Level Servicing	UNSCHEDULED
	Field-Level Repair	**UNSCHEDULED**
4152 Base Maintenance Electronic Facility Test Equipment	Field-Level Utilization (1201 Drawer A6, Part No. -40)	Verification; T. O. 31X3-12-11-17 thru 11-23
	(1201 Drawer A6, Part No. -50)	Verification; T. O. 31X3-12-11-17 thru 11-23
	(1201 Drawer A7)	Verification; T. O. 31X3-12-12-15 thru 12-19

REQUIREMENTS STATUS SUMMARY

ONSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
ED						
ED						
ED						
ED						
ED						
ED						
ED						
ED						
ED	12-18-62	EO-4043-1	12-18-62			
T. O. 35A4-2-31-1						
ED						
ED						
ED				1-25-63	EO-4043-2	1-25-63
T. O. 31X3-12-8-2, par. 23						
T. O. 31X3-12-8-2, par. 23						
T. O. 31X3-12-8-2, par 19						

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION	DEMONSTRATION EVEN
	(1243 DC Power Filter)	Verification ;T. O. 31X3-3-9-2 11-3
	(1243 Telephone Xmtr. Control)	Verification; T. O. 31X3-3-9-
	(1338 Arm & Status Panel)	Verification; T. O. 31X3-3-9-
	(3013)	Verification; T. O. 33D9-17-2
	(3092 Self Test Gen.)	Verification; T. O. 33D9-111- 8-6 thru fig. 8-3
	(3092 Clock)	Verification; T. O. 33D9-111- 8-6 thru fig. 8-3
	(3092 Evaluator A)	Verification; T. O. 33D9-111- 8-6 thru fig. 8-13
	(3092 Evaluator B)	Verification; T. O. 33D9-111- 8-6 thru fig. 8-14
	(3092 Evaluator C◆1)	Verification; T. O. 33D9-111- 8-6 thru fig. 8-15
	(3092 Evaluator C◆2)	Verification; T. O. 33D9-111- 8-6 thru 8-16
	(3092 Evaluator D)	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
	(3092 Evaluator E)	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
	(3092 Reset & Gen	Verification; T. O. 33D9-111 8-6 thru fig. 8-19
	(3092 Pulse Gen. Reset)	Verification; T. O. 33D9-111 8-6 thru fig. 8-3
	(3109 Antenna Simulator)	Verification; T. O. 33D9-137 5-16 thru 5-22
	(Dummy Decoder Assembly)	

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
T. O. 31X3-3-9-2-1, par.						
T. O. 31X3-3-9-2-1, par.						
T. O. 31X3-3-9-2-1, par.						
T. O. 33D9-17-26-1						
T. O. 33D9-111-3-1, par. 8-3						
T. O. 33D9-111-3-1, par. 8-3						
T. O. 33D9-111-3-1, par. 8-13						
T. O. 33D9-111-3-1, par. 8-14						
T. O. 33D9-111-3-1, par. 8-15						
T. O. 33D9-111-3-1, par.						
T. O. 33D9-111-3-1, par. 8-3						
T. O. 33D9-111-3-1, par. 8-3						
T. O. 33D9-111-3-1, par. 8-19						
T. O. 33D9-111-3-1, par. 8-3						
T. O. 33D9-137-2-1, par. 2						
				1-28-63	To Be Written	

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVEN
		(3109 Fault Locator)	Verification; T.O. 33D9-137-2 5-9A thru fig. 5-8A
			Verification; T.O. 33D9-137-2 8-1
		(4252 Pwr Supply Control)	Verification; T.O. 31X2-62-4
		(4252 Reg. Power Supply)	Verification; T.O. 31X2-62-4
		(4252 Verifier Indicator)	Verification; T.O. 31X2-62-4
		(4252 CSD Verifier Unit)	Verification; T.O. 31X2-62-4
		(4490 Simulator Set)	Verification; T.O. 33D9-14-2 5-10, fig. 5-1
		(1412)	Verification; T.O. 31S1-2GSW
		(4491)	Verification; D2-10825-44
		(1284, 1289)	Verification, T.O. 35C2-2-63
		(1296 Receiver - Xmtr.)	Verification; T.O. 31X3-2-12 7-19 thru fig. 10 2
		(1296 Converter - Monitor)	Verification; T.O. 31X3-2-12 8-8 thru fig. 8 2
		(1296 Power Supply)	Verification; T.O. 31X3-2-12 9-6 thru fig. 9-4
	Field-Level Checkout	Maintenance Table	Verification; T.O. 33D9-6-21 4-8, fig. 4-5
		Elec. Dummy Load	Verification; T.O. 33D9 6-21 4 10
		Test Set Power Supply	Verification; T.O. 33D9-6-21 4-12, fig. 4-6

EQUIREMENTS STATUS SUMMARY

STRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
.O; 33D9-137-2-1, par. 5-8A						
.O; 33D9-137-2-1, fig.						
.O; 31X2-62-4-1						
.O; 31X2-62-4-1						
.O; 31X2-62-4-1						
.O; 31X2-62-4-1						
.O, 33D9-14-26-1, par.						
.O; 31S1-2GSW4-1						
2-10825-44						
.O, 35C2-2-63-1						
.O, 31X3-2-12-2, par. 10 2						
.O, 31X3-2-12-2, par. 2						
.O, 31X3-2-12-2, par. 4						
.O, 33D9-6-21-1, par.						
.O, 33D9-6-21-1, par.						
.O, 33D9-6-21-1, par.						

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EV
	Field-Level Adjustment	Converter - Monitor Test Set	UNSCHEDULED
		Launch Simulator Test Set	UNSCHEDULED
4252 Code Inserter - Verifier	Organizational-Level Utilization		Technical Approval Demonst 1-23,, Ellsworth AFB
	Field-Level Checkout	VUR & FSA	Verification, T.O. 31X2-62-5-9.
		End-to-End	UNSCHEDULED
	Field-Level Fault Isolation		UNSCHEDULED
	Field-Level Adjustment	Power Supply Control	Verification; T.O. 31X2-62-
		Code Indicator	Verification; T.O. 31X2-62-
		Reg. Power Supply	Verification; T.O. 31X2-62-
		Verifier Unit Indicator	Verification; T.O. 31X2-62-
		CSD Verifier Unit	Verification; T.O. 31X2-62-
		Coder Unit Brushes	UNSCHEDULED
	Inspection		UNSCHEDULED
4487 Command Signals Simulator	Organizational-Level Utilization	Partial	Verification; T.O. 21-SM80A 2-73
		Complete	UNSCHEDULED

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
D						
D						
roval Demonstration h AFB						
. O. 31X2 62-4-1, par.						
D						
D						
. O. 31X2-62-4-1						
. O. 31X2-62-4-1						
. O. 31X2-62-4-1						
. O. 31X2-62 4-1						
. O. 31X2-62-4-1						
D						
D	11-7-62	EO-4252-1	11-7-62			
O. 21-SM80A-2-3, par.						
D						

2

FIGURE A EQUIPMENT ITEM	MAINTENANCE OPERATION		DEMONSTRATION EVI
4489 Message Generator	Organizational-Level Utilization	Partial	Verification; T.O. 21-SM8 par. 2-73
		Complete	UNSCHEDULED
	Field-Level Checkout		Verification; D2-10825-43
	Field-Level Fault Isolation		UNSCHEDULED
4490 Missile Launch Electrical Function Simulator Set	Organizational-Level Utilization	Partial	Verification; T.O. 21-SM8 par. 2-73
		Complete	UNSCHEDULED
	Field-Level Checkout	Simulator Set	Verification; T.O. 33D9-1 5-10, fig. 5-1
		Recorder	Verification; T.O. 33D9-1 5-12
	Field-Level Fault Isolation		UNSCHEDULED
4491 Launch Facility Startup Unit	Organizational-Level Utilization	Partial	Verification; T.O. 21-SM8 2-73
		Complete	Verification; T.O. 21-SM8 2-67, fig. 2-37
	Field-Level Checkout		Verification; D2-10825-44
	Field-Level Fault Isolation		UNSCHEDULED
	Field-Level Adjustment	Gyro Start Assy	UNSCHEDULED
		Power Supply Assy	UNSCHEDULED

REQUIREMENTS STATUS SUMMARY

NSTRATION EVENT	COMPLETION RECORD					
	PREVIOUS			CURRENT		
	DATE COMPLETED	REPORT NO.	REPORT DATE	DATE COMPLETED	REPORT NO.	REPORT DATE
; T. O. 21-SM80A-2-3,						
LED						
; D2-10825-43						
LED						
; T. O. 21-SM80A-2-3,						
LED						
; T. O. 33D9-14-26-1, par. -1						
; T. O. 33D9-14-26-1, par.						
LED						
; T. O. 21-SM80A-2-3, par						
; T. O. 21-SM80A-2-3, par -37				1-25-63	To Be Written	
; D2-10825-44						
LED						
LFD						
LED						

2

6.4 CURRENT EVALUATION/OBSERVATION (E/O) REPORTS

The following pages contain the seven E/O Reports completed during the period covered by this document. The reports are arranged in numerical order, by report number.

Each E/O Report consists of a M Checklist and a supplementary rating analysis. The checklist contains numerical ratings for all major Maintainability features observed and evaluated during the indicated demonstration event. The supplementary rating analysis accompanying the checklist both substantiates the numerical ratings and provides constructive recommendations. The recommendations propose specific improvements to be made in order to attain Good" Maintainability.

MAINTAINABILITY ~~EVALUATION~~/OBSERVATION REPORT

(port No. EO-1201-1/3092-1 Date January 18, 1963 Page 1 of 9

Prepared by John L. Wright 2-5261 M/S 50-66 phone JU 6-6263

Figure A No. 1201/3092 Nomen Programmer Group/Programmer Group Test Set

Dwg. No. 25-22036-87/25-26725-1 Serial No. Not Recorded

Observed Event Demo. 1-18 Location Malmstrom AFB Date November 7, 1962

Title or Description Fault Isolation of Programmer Group

T.O. Procedures T.O. 21-SM80A-2-3; Par. 2-52 through 2-60

MAINTAINABILITY CHECKLIST

1	Fault Isolation	3	14	Lines and Cables	2
2	Standardization	N/O	15	Fasteners	3
3	Interchangeability	N/O	16	Covers, Cases, Shields	4
4	Packaging, Mounting	4	17	Disposable Modules	N/O
5	Accessibility	3	18	Test Equipment	1
6	Work Space	4	19	Servicing, Handling, Equip.	N/A
7	Testing, Servicing	3	20	Tools	N/A
8	Displays	4	21	Platforms, Stands, Shelters	N/A
9	Handles	4	22	Technical Order	3
10	Labels, Marking	3	23	Figure A	N/E
11	Controls	4	24	Form B/C	N/E
12	Work Aids	N/A	25	Specifications	N/E
13	Connectors, Connections	2	26	Personnel Requirements	N/E

CHECKLIST RATINGS

4	Good Maintainability	N/A	Not Applicable
3	Satisfactory Maintainability	N/O	No Observation Possible
2	Unsatisfactory Maintainability	N/E	Not Evaluated
1	Poor Maintainability		

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

ATTACHMENT: "Minutes of Post-Demonstration Critique of Class I Demonstration 1-18" 8 November, 1962

Item 1. Fault Isolation

General Fault Isolation capability is apparently quite good, except during final end-to-end checkout. If a malfunction indication occurs during end-to-end checkout (paragraph 2-60 of T.O. 21-SM80A-2-3), repetition of the entire programmer group checkout procedure is required. It would be much less time-consuming if the end-to-end checkout procedure contained instructions directing the technician to repeat only specific drawer checks for any given malfunction indication. (NOTE: This problem so impressed the Air Force Technical Approval Team that it was made a matter of record. Refer to paragraph 3 of the attached Post-Demonstration Critique Minutes.)

RECOMMENDATION:

The Programmer Group end-to-end checkout procedure should be revised to include instructions directing the technician to repeat only specific drawer checks for any given malfunction indication.

Item 5. Accessibility

Programmer Group connectors, to which test set cables must be connected, are located at the top rear of the rack. They are therefore not readily accessible without a stepladder. Moving the stepladder in and out of position is time-consuming and clumsy, and might conceivably lead to damage of the test set. The ladder cannot be left in position, because it obscures the equipment and is simply in the way.

RECOMMENDATION:

One possible way of eliminating the ladder problem would be redesign of Figure A 1201 to provide completely accessible test connectors, possibly also eliminating the necessity for breaking some of the connections at the top rear of the rack.

Item 7. Testing and Servicing

One of the paramount Maintainability criteria specified for Minuteman in STL Document 6120-6882-DU-RDI (and restated in M Memo 62-1) requires that test points for fault isolation at the operational site be brought to standard connectors on drawer fronts. The implication is that test connections are to be readily accessible. Programmer Group drawers have indeed been provided with individual test connectors, but many additional connections are required at the top rear of the rack during checkout. The poor accessibility of these connections is discussed under Item 5.

RECOMMENDATION:

The test connectors recommended under Item 5 should be located on the face

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RECOMMENDATION:

The test connectors recommended under Item 5 should be located on the face

RECOMMENDATION: (Continued)

of a new drawer A5, which would replace the present blank panel between drawers A4 and A6.

Item 10. Labels and Marking

a. In preparation for the demonstration, a Boeing technician inserted a faulty circuit board in one of the Programmer Group drawers. He had to try several times before he was able to insert it so that it would mate properly with its connector. The difficulty was caused by the fact that it is very hard to select simultaneously the proper slots into which both ends of the card should slide. It is quite easy to start the card in non-opposing slots, resulting in crooked card installation and possibly causing connector or card damage.

RECOMMENDATION:

All slots in which cards are installed should be plainly marked to differentiate them from unused slots. Opposing slots should both be marked, to preclude misalignment of boards during insertion.

b. Plastic program cards are used to operate the 3092 test set. Though the T.O. contains instructions specifying proper insertion of the cards in the card reader, it would be quite possible for a technician to insert them wrong-end-first.

RECOMMENDATION:

Test set program cards should have a positive printed indication of the proper end to be inserted into the card reader.

Item 13. Connectors and Connections

a. Because of the fact that the 3092 Test Set was apparently designed to connect to several already - existing operational connectors of Fig. A 1201, there are 19 cable connections to be made before any checkout can be accomplished. Naturally, this is very time-consuming, especially since the technician must make over half of them in an area of limited accessibility, while standing on a stepladder. (NOTE: This problem, too, was made a matter of record by the Air Force Technical Approval Team. Refer to paragraph 4 of the attached Post-Demonstration Critique Minutes, which is a dignified summary of the much more vehement off-the-record comments made by several of the critique attendees).

RECOMMENDATION:

The multitude of connections required could be greatly reduced through incorporation of the test connectors recommended under Items 5 and 7. Large

RECOMMENDATION: (Continued)

multi-pin test connectors should be used, combining many circuits which under present conditions can be completed only by separate connections to many existing operational connectors.

b. It undoubtedly will remain necessary to disconnect at least some of the connections at the top rear of the Programmer Group, to isolate the equipment from external circuits during checkout. But it may be possible that some of the operational connections could remain intact without affecting the checkout operation.

RECOMMENDATION:

Only those operational programmer group connections which would affect the checkout operation should be disconnected. As many connections as possible should remain undisturbed.

Item 14. Lines and Cables

The programmer group checkout procedure requires self-test of the 3092 Test Set before actual checkout of the programmer group. Special self-test connections of the 19 test set cables are required; this occupies over half of the time required for self-test performance. Of the 19 cables, 16 are then disconnected (from the special self-test distribution box) and reconnected elsewhere. By the time this is accomplished, the area around the programmer group resembles the aftermath of an explosion in a spaghetti factory, no how methodically the reconnections were done. The programmer group is draped with cables of many different sizes; the smallest cables incongruously are terminated in the largest connectors, to mate with the operational programmer group connectors. Through it is not noted specifically in the attached Minutes, the Technical Approval Team Chairman stated during the critique that there "must be over 1000 dollars tied up just in cables and connectors for the 3109 Test Set."

RECOMMENDATION:

Incorporation of the programmer group test connectors recommended under Items 5, 7, and 13a, coupled with redesign of the 3092 Test Set as recommended under Item 18, would greatly reduce the confusion and loss of time which are inherent in checkout of the programmer group under present conditions.

Item 15. Fasteners

A Boeing technician removed the cover of a programmer group drawer to insert a faulty circuit board. The cover was held by 26 non-captive screws.

RECOMMENDATION:

Fewer screws should be used to hold programmer group drawer covers. Captive screws would be much more desirable than non-captive screws, to facilitate handling.

Item 18. Test Equipment

a. As mentioned under Item 14, special self-test connections of the 19 test set cables, 16 of them to a separate "suitcase" distribution box which is considered part of the test set, are required. The distribution box serves no other purpose than to interconnect the cables during the self-test procedure. The time presently required just for making all the self-test connections is over half an hour. (The whole self-test, including hookup, takes less than an hour.)

Incorporation of the programmer group test connectors recommended under Items 5, 7, 13a, and 14 would require redesign of the 3092 Test Set Fault Locator, to provide compatible test cabling. The redesigned fault locator would have a significantly reduced number of test cable connectors. In fact the reduction would be so significant that it should be possible to incorporate the self-test interconnection function now performed by the distribution box into the fault locator itself. The self-test interconnection connectors could be placed on the fault locator in the space to be vacated through reduction of the present number of test connectors. The test set would then comprise only two "suitcases" instead of three, since the distribution box would be eliminated.

Reduction in the number of test cables would alleviate the problems which are naturally inherent in storage and handling of so many cables for one purpose. It would also achieve a time saving of well over 10 per cent in the total programmer group checkout operation.

RECOMMENDATION:

The advantages to be realized through redesign of the 3092 test set (and the 1201 programmer group, of course) are great enough that such redesign is strongly recommended.

b. An even more significant time saving could be realized if the Test Set redesign were to include incorporation of a semi-automatic program card reader. Perhaps as many as 200 cards must be used during the entire checkout operation. Manual insertion of that many cards, one by one, is naturally very time-consuming and tedious.

RECOMMENDATION:

Redesign effort should include at least consideration of the possibility that a suitable semi-automatic card reader might be incorporated in the test set.

NOTE

Recommendations under a and b, above might not necessarily be valid if the present Programmer Group maintenance philoscphy were abandoned. If a philosophy of wholesale drawer replacement without on-site checkout were adopted, actual usage of the 3092 Test Set might not be frequent enough to allow a significant overall time saving through incorporation of the recommended improvements.

c. "The card reader handle must not be left in the up position for more than three minutes during the following tests. Launch Enable Switch may burn up if card reader is engaged more than 3 minutes. This caution does not apply to card number -216."

This caution note is inserted after paragraph 2-60 step a. of T.O. 21SM80A-2-3. It is hardly adequate as the sole protection against burning up the Launch Enable Switch. The technician certainly cannot be expected to start a stop-watch each time he lifts the handle, because he isn't told to do so. And, since he is primarily concerned with performing the step-by-step checkout procedure, it will be very easy for him to forget the caution note before he gets very far into that procedure.

RECOMMENDATION:

Automatic protection of the Launch Enable Switch should be built into the 3092 Test Set. A timer should start each time the handle is lifted, and automatically either sound a warning or disconnect the circuit after three minutes.

d. Part numbering of program cards is very confusing. Card decks and individual cards are identified by dash numbers of the same drawings. As a typical (but hypothetical) example of the confusion that can result, assume that deck no. 25-26646-1 contains cards no. 25-26646-137 through no. 25-26646-164. If the technician is informed that the -1 deck contains cards -137 through -164 he can grasp and remember this fairly well. He will even be able to sort the cards properly if the -1 deck inadvertently gets mixed with a -13 deck consisting of cards -108 through -135. But what happens to the cards when there is a minor equipment change?

Suppose that equipment rework necessitates changes in cards -138, -147, -149, -151, -152, and -161. These dash-numbers must be dropped and six new cards, -165 through -170, must be added. Of course this changes the deck dash-number to -2. And what cards does it contain? The ease of remembering is suddenly gone, because the deck is no longer an easily remembered unbroken sequence of card dash-numbers. Now how can the technician at the Launch Facility sort mixed decks, or even be sure his unmixed deck is really complete? For that matter, since individual cards are marked only with the card dash-number and nowhere indicate the deck dash-number or equipment part numbers to which they apply, how can he even be sure that deck is actually the proper one for the equipment he is checking?

NOTE

The above example is really more factual than hypothetical. It is based upon the situation which actually exists for the card deck specified in paragraph 2-59 steps a through i of T.O. 21-SM80A-2-3. The only thing hypothetical is the initial deck configuration.

RECOMMENDATION:

The best way to minimize confusion among the maintenance personnel would be to adopt a card deck numbering system in which each deck is composed of serially-numbered cards (beginning in each case with 1, 2, 3, etc.), all bearing the deck part number. Equipment changes should be accommodated by decks with new dash-numbers to the basic deck part number, but each new deck should again have cards numbered 1 and on. Then if the technician's deck is incomplete or contains cards belonging in another deck he will know it immediately.

Item 22. Technical Order 21-SM80A-2-3 (changed 6 January 1963)

a. Paragraphs 2-56 through 2-60 are inconsistent in their methods of identifying test set program card decks. The identification used is:

Paragraph 2-56 step a - "25-30947-125 through 25-30947-147"

Paragraph 2-58 step a - "25-31059-106 through 25-31059-110"

Figure 2-34 - "Deck Number"
"25-26643-140"
"25-26644-1"
"25-26644-165"
"25-26645-1"

Paragraph 2-59 step a - "deck no. 25-26646"

Paragraph 2-60 step a - "25-26642-165 through 25-26642-232"

Note that in some cases reference is made to a series of cards, and in others a deck number is specified. No information is given to indicate how many or what cards constitute a given deck (until farther along in subsequent steps; and then the technician is simply told, for example, to use "card numbers -139 through -171 except for numbers -147, -149, -151, -152, and -161," without any indication of the deck number). No information is given to indicate that a given series of cards may intentionally have missing cards (until, again, farther along in subsequent steps). The inconsistency and incompleteness of information

are very apt to confuse the technicians, and in fact did confuse the Boeing technicians who conducted the demonstration covered by this report.

RECOMMENDATION:

Each card deck and its contents should be completely identified in the first time it is specified. Example: "Remove program deck 25-26646-2 (cards 25-26646-137 through -171, except for missing cards -138, -147, -149, -151, -152, and -161) from card container for..." (All of the statements tabulated above should be revised.)

b. Paragraph 2-56 step a initiates use of program cards "25-30947-125 through 25-30947-147." Then, during use of these cards, paragraph 2-56 steps v-1 and ax-1 require use of cards -148 and -149, respectively. From the associated text it is obvious that steps v-1 and ax-1 were inserted as alternates for paragraphs steps v and ax, to be used when a 25-26725-2 test set is used in place of the original 25-26725-1 test set. Apparently paragraph 2-56 step a was overlooked when the change was inserted.

RECOMMENDATION:

Paragraph 2-56 step a should be changed to include the -148 and -149 cards. To accomplish both this and the recommendation made under a above, the following revised wording is suggested to replace paragraph 2-56 step a:

"NOTE

"Omit step a when using test set 25-26725-2. Omit step a-1 when using test set 25-26725-1.

"a. Remove program card deck 25-30947-2 (cards 25-30947-125 through -147) from card container . Insert deck in UNTESTED CARDS slot of Fault Locator (figure 2-26).

"a-1. Remove program card deck 25-30947-3 (cards 25-30947-125 through -149, except for missing cards -128 and -139) from card container. Insert deck in UNTESTED CARDS slot of Fault Locator (figure 2-26)."

c. Paragraph 2-56 step b specifies that, among other required indications, a red light "should start to flash at 4 cps." The immediate reaction of a technician reading the requirement is to attempt a count, to verify that the rate is indeed 4 cps, as specified. Naturally, it is impossible to count that fast, and twice as impossible to count the 8 cps specified in the note of step 2-56 ay (3).

RECOMMENDATION:

Visual verification of 4 cps and 8 cps flash rates is impossible. The 4 cps and 8 cps rates should therefore be replaced by general descriptive terms (such as "rapidly" and "very rapidly", respectively). Steps requiring such generalization are 2-56 b, 2-56 ay (3) NOTE, 2-56 ay (5), and 2-57b.

d. Identical notes inserted before steps 2-56 d, 2-58 c, 2-59 f, and 2-60 c specify the proper orientation of program cards for insertion in the card reader. The note states that "cards must be inserted with printed side up and the cut end toward the operator inserting the card." Since the operator is free to move anywhere he pleases around the fault locator "suitcase," this is not a very precise instruction.

RECOMMENDATION:

Program card insertion instructions given in the notes preceding steps 2-56 d, 2-58 c, 2-59 f, and 2-60 c should be changed to use a fixed object, rather than the operator, as the point of reference. For example, it would be much more clear to state "Cards must be inserted with printed side up, and cut end away from the card reader," or "cards must be inserted uncut-end-first, with printed side up."

e. Paragraph 2-59 tells the technician to look up a card deck number in figure 2-34, and then to "Use this deck after performing steps a through j." Steps a through j then use an entirely different deck. Reference to figure 2-34 in paragraph 2-59 is premature, and only causes confusion in the technicians' minds.

RECOMMENDATION:

The second and third sentences of paragraph 2-59, referring to figure 2-34, should be deleted. Step 2-59 k should then be revised to direct the technician to figure 2-34, for selection of the proper card deck to be used in steps 1 and on.

f. Steps 2-59 i and 2-60 e do not disclose whether the cards specified following the words "except for" are intentionally missing or are present but will not be used. This might be confusing to the technician.

RECOMMENDATION:

Steps 2-59 i and 2-60 e should be revised to indicate specifically that certain cards are missing. This can be accomplished easily by revising the wording to read "... except for missing cards... " etc.

HEADQUARTERS
SITE ACTIVATION TASK FORCE
BALLISTIC SYSTEMS DIVISION (AFSC)
Malmstrom AFB, Montana

TO: Members

DATE: 8 November 1962

SUBJECT: Minutes of Post-Demonstration Critique of Class I Demonstration 1-18

FROM: Lt Col Hahnemann

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1. The demonstration was conducted at Site B-5 on 7 November in accordance with T.O. 21SM80A-2-3, 15 September 1962 and 21SM80A-2-3C, 27 September 1962. The TAT agreed that the demonstration was conducted in a satisfactory manner and authorized the Chairman to so notify The Boeing Company.

2. The TAT made the following recommendations for Demonstration 1-18:

a. BSD Exhibit 61-32 presently states operating crews are to have no knowledge of location of fault. This is unimportant. Since the demonstration is proving the adequacy of the T.O. and equipment, proper operation of equipment locating the fault satisfies the purpose of the demonstration.

b. It is recommended that VRSA be in an operating condition prior to beginning the three related demonstrations, 1-18, 1-19, 1-20.

c. The M&IR should reflect the VRSA be queried just prior to the fault, during the fault and after the fault removed.

3. There definitely is lack of correlation of T.O. and M&IR and card in regard to identification of cards where the fault may be. Major Fulton of TAT will contact Mr. Volke of The Boeing Company Engineering to inform him of the problem and make the recommendation for what action should be taken to resolve these problem areas.

4. The procedure for self-test of test equipment is over-complicated and time-consuming because of the necessity for connecting and removing a total of 19 cables.

5. The Boeing Company crew which performed the demonstration is to be commended for the manner in which the demonstration was conducted. This demonstration crew was under the direction of Michael Halsey, TBC.

6. AFTO 22's generated against this demonstration will be attached to these minutes.

7. **Attendees:**

Mr. W. P. Barney	TBC
Mr. F. E. Whittemore	TBC QC
Mr. G. W. Halsey	TBC
Mr. S. G. Wisnewski	TBC
Mr. John L. Wright	TBC
Mr. C. S. Allen	SATAF/STL
Mr. John A. Labrie	TBC
Major W. L. Fulton	SATAF Engr
Captain Ellis Curtis	SATAF Engr
Lt Col Elton	SAC (341st)
Lt Col R. H. Hahnemann, Chairman	SATAF Engr

Robert H. Hahnemann
ROBERT H. HAHNEMANN, Lt Col, Chairman

A. M. Elton
A. M. ELTON, Lt Col (SAC) 341st

Francis M. Shine
FRANCIS M. SHINE, Captain, OOAMA

for David G. Hanson
RALPH D. CLAXTON, AFQC

MAINTAINABILITY EVALUATION/OBSERVATION REPORT

Report No. RO-1243-1/3013-1 Date 1-30-63 Page 1 of 4

Prepared by A. H. Smith M/S 6207-1 phone 866-3761

Figure A No. 1243/3013 Nomen Launch Control Console/Console Test Set

Dwg. No. 25-24172/25-25980-1 Serial No. 000004/000003

Observed Event Demo 1-18, 20 Location VAFB Date 1-29-63

Title or Description TAT Class I Demo Console Checkout

T.O. Procedures 21-SM80A-2-3 Paras. 3-21A and B. 2-4 thru 2-15

MAINTAINABILITY CHECKLIST					
1	Fault Isolation	4	14	Lines and Cables	4
2	Standardization	4	15	Fasteners	3
3	Interchangeability	4	16	Covers, Cases, Shields	3
4	Packaging, Mounting	3	17	Disposable Modules	N/O
5	Accessibility	3	18	Test Equipment	4
6	Work Space	3	19	Servicing, Handling, Equip.	N/O
7	Testing, Servicing	4	20	Tools	2
8	Displays	4	21	Platforms, Stands, Shelters	N/A
9	Handles	4	22	Technical Order	1
10	Labels, Marking	4	23	Figure A	N/E
11	Controls	4	24	Form B/C	N/E
12	Work Aids	3	25	Specifications	N/E
13	Connectors, Connections	3	26	Personnel Requirements	4

CHECKLIST RATINGS

4	Good Maintainability	N/A	Not Applicable
3	Satisfactory Maintainability	N/O	No Observation Possible
2	Unsatisfactory Maintainability	N/E	Not Evaluated
1	Poor Maintainability		

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

Item 4 a. The instrument panel of the Console Test Set AN/GSM-58 is secured to the bottom of the case by 22 screws, which appears to be an excessive number.

Recommendation: The number of screws should be reduced. Ten should be adequate.

b. Test Cables for the Console Test Set are stored in the lid of the case, being retained by a hinged cover. The hinged cover is lined with sponge rubber of approximately two inches thickness. The excessive, and apparently unnecessary, thickness of the padding results in considerable difficulty in closing the cover, and makes careful arrangement of the cables necessary.

Recommendation: The thickness of the rubber padding should be reduced to half an inch.

Item 6 During the Traffic-on-net and SCN-test-received checkout procedure, (paragraph 2-14 of T.O. 21-SM80A-2-3) it is necessary to connect test cables to 300A1J6 and J7. These jacks are located on the back of the Launch Control Console, and are difficult to reach. There are a number of other cables mounted on the back of the console, and these are even more difficult to reach due to the small clearance between the console and the wall of the capsule, and due to the fact that the connectors would be manipulated at the fullest extent of the arm.

Recommendation: All cables on the back of the Console should be relocated so as to be more readily accessible, or alternatively the console should be moved approximately three inches further away from the wall.

Item 12 Connectors P11 of Display Panel Cable, and P13 of Status Monitor Cable, in the Console Test Set, are of the changeable keying variety. One has a male keying shell, the other a female. To change the keying, a knurled lock-nut must be loosened and screwed out approximately one eighth of an inch, then the shell must be moved out so as to disengage its retaining castellations. The shell may then be rotated to the desired position, pushed back to engage the castellations and secured by tightening the locking unit. Considerable difficulty was encountered during the demonstration for two reasons:

1. The T.O. did not explain the action of these special connectors.
2. The keying shells were stiff and were not easy to disengage from their castellations. Even after the mode of operation had been deduced it was still difficult to withdraw the female shell without risking damage to the connector pins or to the fine-threaded lock-nut. This was finally accomplished by inserting the blade of a screwdriver in a groove near the end of the shell and levering the shell out very carefully.

Recommendation:

1. A tool should be provided with the Test-Set to facilitate withdrawal of the female keying shell. A simple spring-steel device which expands and grips the groove in the shell would be quite adequate.

2. The T.O. should be revised to incorporate a fuller description of the key-changing process (see item 22).

Item 13 W1 of the GSM-58 has to be connected to 300A1J7 at the rear of the console, during the test procedures. The connector that is normally connected to J7 is an elbow connector, due to work-space considerations, but P10 of W1, the test connector, is a straight plug, making connection difficult unless the kick-panel at the rear of the console knee-hole is removed.

Recommendation: P10 of W1 of the GSM-58 should be a 120 degree elbow connector.

Item 15 The hinged cable-storage cover in the lid of the AN/GSM-58 is secured by two quarter-turn fasteners. Due to the large pressures exerted on these fasteners (see item 4) it is probable that they will be high failure rate items. If the female part of the fastener fails, it will be very difficult to replace due to the rivetted and welded construction of the lid.

Recommendation:

1. The pressure should be reduced as indicated in item 4.
2. Larger, more robust fasteners should be used.
3. A third fastener should be added to distribute the load more evenly.

Item 16 All the connectors in the AN/GSM-58 have loose plastic dust covers, including those on the instrument panel.

Recommendation: Captive dust covers should be used.

Item 20 When removing the Launch Control Panel (Demonstration 1-18) per paragraph 3-21A, of 21-SM80A-2-3, it is necessary to undo the allen screws holding the Mechanical Code Units on to the back of the panel. The purpose of this step is to dissipate the codes in the Code Units.

The allen screws utilized are of a non-standard size; and it was found that a suitable allen wrench was not included in the tool-kit available. Further inquiry revealed that wrenches used at the Code Inserter Verifier room had been purchased locally, and that the item is comparatively difficult to obtain. A special wrench used by Boeing technicians (ground to size from a larger wrench) was eventually obtained, but considerable time was wasted.

Recommendation:

1. The need for using a bastard-size screw should be re-evaluated. If their usage is supposed to make access to the code units more difficult, it should be borne in mind that the screws are not countersunk and maybe removed by using long-nosed pliers. If security is not the reason, then the use of a standard size of screw should be strongly recommended.
2. If the existing screws must be used, then a special wrench should be supplied and listed in the T.O. as necessary special equipment.

Item 22 a. Paragraph 2-10c of 21-SM80A-2-3 contains a note explaining how to change the keying of plugs P11 and P13 of the GSM-58. This note does not describe the process accurately enough, and it was necessary during the demonstration to disassemble the plugs before their mode of operation was discovered.

Recommendation: The Note should be expanded along the following lines: "Key plug P11 to plug P13 by unscrewing knurled sleeve nut on barrel of plug approximately one eighth of an inch, pulling keying shell outwards to disengage castellations, turning barrel to position 2 (as indicated through window on barrel), and tightening sleeve nut."

b. Paragraph 2-13c was found to be very confusing and easily misunderstood, especially steps (2) through (5). Considerable discussion resulted before the correct method and sequencing of the test was discovered.

Recommendation: The relevant portions should be re-written along the following lines.

2-13c

(2) Push LCC . . . . . etc. . . . . push button is released

NOTE

For the remaining positions of the STATUS DISPLAY SELECTOR switch, an audible alarm may be activated (buzzer or bell) and one of the two ALARM indicators on the Alarm-Control Panel may be illuminated. Refer to Fig. 2-5 to determine the proper reactions for each switch position.

(3) Move STATUS DISPLAY SELECTOR switch to LAUNCHER A, FAULT-ALARM 1 position.

(4) Push LCC DISPLAY TEST push button and hold in pressed position.

(5) Push ALARM RESET switch on Alarm-Monitor Panel when alarm is activated; audible alarm should reset.

(6) Release LCC DISPLAY TEST push button; visible Alarm should go out.

(7) Repeat steps (3) through (6) for the other STATUS DISPLAY SELECTOR switch positions listed in Fig. 2-5

NOTE

For those switch positions listed in Fig. 2-5 that do not result in activation of an alarm, it is only necessary to push the LCC DISPLAY TEST push button momentarily to confirm illumination of the appropriate MISSILE STATUS INDICATOR-LAUNCHER PANEL INDICATOR LIGHT.

MAINTAINABILITY ~~EVALUATION~~/OBSERVATION REPORT

Report No. EO-1367-1 Date 1-2-63 page 1 of 4

Prepared by A. H. Smith M/S 6207-1 phone 866/3761

Figure A No. 1367 NOMEN Motor Generator (LCC)

Dwg. No. 10-20945 Serial No.

Observed Event T.O. V&V Location VAFB Date 1-2-63

Title or Description Motor Generator Checkout

T.O. Procedures 21-SM80A-2-11, Figure 1-10A

MAINTAINABILITY CHECKLIST					
1	Fault Isolation	4	14	Lines and Cables	4
2	Standardization	4	15	Fasteners	4
3	Interchangeability	4	16	Covers, Cases, Shields	3
4	Packaging, Mounting	2	17	Disposable Modules	N/A
5	Accessibility	2	18	Test Equipment	3
6	Work Space	N/A	19	Servicing, Handling, Equip.	N/O
7	Testing, Servicing	N/O	20	Tools	N/O
8	Displays	N/A	21	Platforms, Stands, Shelters	N/O
9	Handles	4	22	Technical Order	N/E
10	Labels, Marking	3	23	Figure A	N/E
11	Controls	N/A	24	Form B/C	N/E
12	Work Aids	N/E	25	Specifications	N/E
13	Connectors, Connections	2	26	Personnel Requirements	4

Checklist Ratings

4 Good Maintainability
3 Satisfactory Maintainability
2 Unsatisfactory Maintainability
1 Poor Maintainability

N/A Not Applicable
N/O No Observation Possible
N/E Not Evaluated

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

Item 4.

The Control Panel box was not packaged for ease of maintenance-in-place. Due to the location of the generator in a pit, it is almost impossible to remove the access panel without removing the entire Motor Generator Set from the pit. The T.O. therefore calls for removal of the M.G. for most of the fault isolation steps.

During the V&V exercise observed, an over-voltage condition was discovered on step w of Figure 1-10A. The 60 cycle output was 125 volts, which is 2.6 volts high. At this point it would have been necessary to remove the M-G from the pit and replace the 60 cycle regulator if the T.O. fault isolation procedure was followed. The Test Operator decided to proceed with the V&V and appeal to Seattle engineering for a waiver on this point but due to A.F. personnel problems, the V&V was abandoned. It is obvious, however, that re-packaging of the Control Panel could eliminate the need for M-G set removal.

Two possible ways of accomplishing the re-packaging are:

a. Re-design the Control Panel so that the 60 cycle regulator, 400 cycle regulator and Transfer Panel are plug-in units that are withdrawn vertically from the top surface of the Control Panel.

   or

b. Re-design the Control Panel box so that the top surface may be removed, allowing access to the terminals and mounting-bolts from above. This solution, while much less desirable than a., could be accomplished with very much less effort, and could even be implemented as a retrofit effort at wing level.

Item 5.

The D.C. power connector is very difficult to install; organisational personnel report that installation time varies from fifteen minutes to as much as four hours.

The difficulty is considered to be due to the location of the connector, coupled with work-space problems.

The D.C. power cable is very large (approx. 3" dia) and is terminated in a special connector with a long rigid body. The socket is approximately 2 feet below the floor surface, close to the side wall of the pit.

Installation would be considerably eased if the D.C. power connector were to be re-located at the top of the Control Panel.

It is also possible that the bulky special connector could be dispensed with when the circuit-breaking modifications are incorporated in the LCC Motor Generator.

Item 10

Although each part of the M-G had a label, no serial number could be found for the combination of parts making up the Figure A 1367.

Item 13

See item 5 concerning the D. C. power cable connector.

When replacing modules in the Control Panel it is necessary, according to paragraphs 1-40, et. seq., to remove wires from the terminal boards, and tag them for identification purposes. Such connections should be permanently identified to reduce the possibility

of error.

Item 16

The comments in item 4 concerning packaging of the replaceable modules contained in the Control Panel could be considered as a deficiency in the Control Panel Cover; although the cover protects the equipment adequately, it also impedes access.

Item 18.

On step q of Figure 1-10A, alligator clip leads are used to connect a test meter to the 120 vac 60 cycle buss and neutral. The leads specified terminate at the meter in a double "banana" jack. During the V&V observed, the technician transposed the leads in error, thereby grounding the live connection and burning up the test lead. No serious damage occurred, fortunately, but is is felt that the leads used for this test should be clearly distinguished.

MAINTAINABILITY ~~EVALUATION~~/OBSERVATION REPORT

Report No. EO-1412-1 Date 1-4-63 Page 1 of 2

Prepared by A. H. Smith M/S 6207-1 phone 866-3761

Figure A No. 1412 Nomen Voice Reporting Signal Assembly

Dwg. No. 10-21330-2 Serial No. 0000001

Observed Event Unsched. Maint. Location VAFB Date 1-4-63

Title or Description Replacement of Faulty Audio Reproducer Module

T.O. Procedures TCTO 21-SM80A-644

MAINTAINABILITY CHECKLIST					
1	Fault Isolation	4	14	Lines and Cables	4
2	Standardization	4	15	Fasteners	2
3	Interchangeability	4	16	Covers, Cases, Shields	4
4	Packaging, Mounting	4	17	Disposable Modules	4
5	Accessibility	4	18	Test Equipment	4
6	Work Space	N/A	19	Servicing, Handling, Equip.	4
7	Testing, Servicing	3	20	Tools	2
8	Displays	N/A	21	Platforms, Stands, Shelters	N/A
9	Handles	3	22	Technical Order	4
10	Labels, Marking	4	23	Figure A	N/E
11	Controls	4	24	Form B/C	N/E
12	Work Aids	2	25	Specifications	N/E
13	Connectors, Connections	2	26	Personnel Requirements	2

CHECKLIST RATINGS

4	Good Maintainability	N/A	Not Applicable
3	Satisfactory Maintainability	N/O	No Observation Possible
2	Unsatisfactory Maintainability	N/E	Not Evaluated
1	Poor Maintainability		

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

Item 7. When replacement of an Audio Reproducer Unit is required, present practice calls for removal of the message tape from the faulty unit, and its installation in the new unit. This process takes one hour to perform and also disturbs the environment within the unit. The work should be performed in an environmentally controlled area to prevent the inclusion of dust and other foreign matter in the tape mechanism.

These requirements could be avoided and maintenance time saved if the Audio Reproducer Unit was fitted with a tape at the point of manufacture.

Item 9. The unit weighs approximately 70lbs., and is labelled to this effect. The label also calls for a two-man lift. The unit is provided with a single hinged handle in the centre of the front panel, which invites single-man lifting. Two handles should be provided to avoid possible injury to personnel.

Item 12. Electrical connections to the VRSA are made through a 100-pin connector, which is also used during fault-isolation as an access-point for probing. This activity could have detrimental effects on the reliability of the connector.

A proper break-out for access to the connector pins should be provided as a work aid.

Item 15. Printed Circuit Boards and Audio Reproducer Modules are attached to the chassis by means of Allen screws which are located close to the base of these items, approximately six inches deep. This geometry precludes the use of standard Allen wrenches.

The use of slotted screws for mounting purposes would allow the use of a normal screwdriver, and eliminate the need for a special Allen wrench tool. (See item 20)

Item 20. Due to the use of Allen screws for mounting components to the chassis, and to the geometry (see item 15), technicians in the Contractor Support Area at VAFB have found it necessary to have a special long-handled Allen wrench manufactured. If the mounting method is not changed, then a special wrench should be provided.

Item 26. Soldered joints are used extensively throughout the Assembly, resulting in the necessity for depot repair.

MAINTAINABILITY EVALUATION/OBSERVATION REPORT

Report No. EO-1412-2 Date 1-22-63 Page 1 of 3

Prepared by Ralph L. Stearns M/S 50-66 phone 6-6263

Figure A No. 1412 Nomen Signal Assembly, Voice Reporting

Dwg. No. 09621000 (10-21330) Serial No. P-3

Observed Event Location 9.101 Bldg. D. C. Date 1-18-63

Title or Description Inspection

T.O. Procedures

MAINTAINABILITY CHECKLIST

1	Fault Isolation	N/A	14	Lines and Cables	4
2	Standardization	3	15	Fasteners	3
3	Interchangeability	4	16	Covers, Cases, Shields	4
4	Packaging, Mounting	3	17	Disposable Modules	N/A
5	Accessibility	2	18	Test Equipment	3
6	Work Space	N/A	19	Servicing, Handling, Equip.	4
7	Testing, Servicing	N/A	20	Tools	3
8	Displays	4	21	Platforms, Stands, Shelters	N/A
9	Handles	4	22	Technical Order	N/A
10	Labels, Marking	4	23	Figure A	N/A
11	Controls	4	24	Form B/C	N/A
12	Work Aids	N/A	25	Specifications	N/A
13	Connectors, Connections	4	26	Personnel Requirements	N/A

CHECKLIST RATINGS

4	Good Maintainability	N/A	Not Applicable
3	Satisfactory Maintainability	N/O	No Observation Possible
2	Unsatisfactory Maintainability	N/E	Not Evaluated
1	Poor Maintainability		

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

Item 2.

A special allen wrench, a standard allen wrench, two sizes of phillips screw drivers, and a common blade screw driver are required to perform maintenance.

Recommendation

By standardization of the types of bolts the requirement for different hand tools could be minimized.

Item 4.

a. Due to the location of some of the mounting base mounting bolts several of the plug-in circuit boards have to be removed before their mounting base can be removed.

Recommendation

Changing the location of the base mounting bolts would eliminate this problem.

b. Due to the location of the filter unit mounting bolts the plug-in circuit board mounting base must be removed.

Recommendation

Changing the location of the filter unit mounting bolts would eliminate this problem.

Item 5.

See Item No. 4.

Item 15.

See Item No. 2

Item 18.

Figure A 4539 Test Set, Voice Reporting Signal Assembly is connected to VRSA by a cable about four feet long and 2 1/2 inches in diameter. The stiffness of this cable makes the use of the test set very difficult.

Item 20.

To remove the plug-in circuit boards and filter unit requires an allen wrench of greater than normal length.

Recommendation

Changing the allen head bolts to slotted hex-head bolts would eliminate the requirements for a special tool.

MAINTAINABILITY EVALUATION/~~OBSERVATION~~ REPORT

Report No. EO-3109-2 Date 1-17-63 Page 1 of 3

Prepared by A. H. Smith M/S 6207-1 phone 866-3761

Figure A No. 3109 Nomen Alarm Set Test-Set AN/GSM-59

Dwg. No. 25-26827 Serial No. 000015

Observed Event None Location VAFB Date 1-17-63

Title or Description Static Evaluation

T.O. Procedures 33D9-137-2-1 (reference)

MAINTAINABILITY CHECKLIST

1	Fault Isolation	N/O	14	Lines and Cables	4
2	Standardization	4	15	Fasteners	2
3	Interchangeability	3	16	Covers, Cases, Shields	4
4	Packaging, Mounting	2	17	Disposable Modules	N/O
5	Accessibility	4	18	Test Equipment	N/O
6	Work Space	N/A	19	Servicing, Handling, Equip.	N/O
7	Testing, Servicing	4	20	Tools	N/O
8	Displays	3	21	Platforms, Stands, Shelters	N/A
9	Handles	4	22	Technical Order	N/E
10	Labels, Marking	2	23	Figure A	N/E
11	Controls	4	24	Form B/C	N/E
12	Work Aids	N/O	25	Specifications	N/E
13	Connectors, Connections	1	26	Personnel Requirements	4

CHECKLIST RATINGS

4	Good Maintainability	N/A	Not Applicable
3	Satisfactory Maintainability	N/O	No Observation Possible
2	Unsatisfactory Maintainability	N/E	Not Evaluated
1	Poor Maintainability		

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

Item 3. Two connectors on the rear of the Fault-Locator panel are identical, and appear to have the same keying. They are J9 and J11. Since they are adjacent, some confusion could arise, and the keying on one should be changed.

Item 4. Test-set Antenna TS-1606/GSM-59 consists of a box, used for stowing cables, and a lid containing the Antenna Simulator. It is possible to get all the cables in the box, but the process requires ingenuity and patience. The problem is aggravated by a short tie-down strap (see Item 15). It is quite possible that the cables could be damaged by the sharp bends required if they were packed in intense cold. Damage to the cables could also occur due to the projecting handles on the panel of the Antenna Simulator in the lid. The only solution to this problem would appear to be enlarging the box or providing additional storage space.

The Antenna Simulator panel is secured to the lid by 28 screws, when 6 or 8 should be sufficient.

Item 8. The meter on the Fault-Locator panel has two scales, identified on the face of the meter as A and B. The Test Selector switch positions are referred to the appropriate scale by red or black dots, with a legend above the switch identifying the black dot as referring to the "Inner Scale", and the red dot the "Outer Scale".

The scales should be referred to as A and B to agree with the meter marking, and the dots should be replaced with the letters A and B. In time the dots will probably become obscured by dirt or wear, leading to possible confusion over test results.

Item 10. Each of the three boxes comprising the AN/GSM-59 weighs 90 lbs. or more but none are labelled to this effect. Warning labels should be affixed showing that two-man lift is required.

Each of the 17 cables bears a number of yellow labels with a confusing amount of "low significance" information. The identity and function of a cable is not immediately apparent, and attempting to find a particular cable in the pile can be irritating and time-consuming. The use of a differently colored label bearing nothing but the cable number and function in bold letters would be useful.

Item 13. The connectors provided on the cables were not apparently designed with exterior field use in mind.

All co-axial connectors require multiple -turn installation, where quarter-turn connectors would have been more appropriate.

The 70 ohm co-axial connectors are particularly unsuitable, since they are the conventional laboratory variety which are very prone to becoming detached from the cable under conditions of rough usage. A molded type should be used, or at least one having an adequate cable-clamping device.

All the connectors, with one exception, are provided with loose plastic dust covers; these are very likely to disappear in time, leaving the connectors open to sand, dust, mud, and moisture. The dust covers should be of a captive variety.

Item 15. The lateral cable tie-down strap in the Antenna Test Set Group is too short at the buckle end. When replacing the cables after use, the buckle gets lost under the cables; this is very frustrating since recovery disturbs the carefully arranged cables.

The job of stowing the cables would be facilitated somewhat if this strap were to be lengthened by six inches.

MAINTAINABILITY ~~EVALUATION~~/OBSERVATION REPORT

Report No. EO-4043-2 Date 1/25/63 Page 1 of 3

Prepared by A. H. Smith M/S 6207-1 phone 866-3761

Figure A No. 4043 Nomen Elevator Work Cage

Dwg. No. 25-18099 Serial No. 000007

Observed Event Repair Location VAFB-SMSB Date 1/25/63

Title or Description Replacement of damaged power cable.

T.O. Procedures

MAINTAINABILITY CHECKLIST

1	Fault Isolation	N/E	14	Lines and Cables	3
2	Standardization	N/E	15	Fasteners	N/E
3	Interchangeability	N/E	16	Covers, Cases, Shields	N/E
4	Packaging, Mounting	2	17	Disposable Modules	N/E
5	Accessibility	N/E	18	Test Equipment	N/E
6	Work Space	N/E	19	Servicing, Handling, Equip.	N/E
7	Testing, Servicing	N/E	20	Tools	N/E
8	Displays	N/E	21	Platforms, Stands, Shelters	N/E
9	Handles	N/E	22	Technical Order	N/E
10	Labels, Marking	N/E	23	Figure A	N/E
11	Controls	N/E	24	Form B/C	N/E
12	Work Aids	N/E	25	Specifications	N/E
13	Connectors, Connections	2	26	Personnel Requirements	N/E

CHECKLIST RATINGS

4 Good Maintainability
3 Satisfactory Maintainability
2 Unsatisfactory Maintainability
1 Poor Maintainability

N/A Not Applicable
N/O No Observation Possible
N/E Not Evaluated

Rating analyses are provided on succeeding pages, for all checklist items rated 3 or lower.

Item 4. a. The power cable was damaged when the cable-drum failed to reel in the slack while traversing, resulting in the elevator running-over the cable. To remove the power cable from the drum it was necessary to chip away a hard "potting" compound which surrounds the cable as it passes through the "axle" of the drum. This process is time-consuming and dirty.

The reason for using the compound is obscure; the likeliest explanation is that it is used to prevent moisture from entering the drum.

Recommendation:

An alternative method of sealing the aperture should be employed. Possibly a connector should be placed at this point with a mechanical clamp to prevent cable movement.

b. On the unit observed it was apparent that the relay-box was breaking away from its fasteners and will eventually break loose. The structure is supported as a cantilever with rivets or bolts at the bottom end.

Recommendation:

The relay box should be braced at the top end, possibly by adding a strap between the relay box and winch motor housing.

c. When the cable-reel is removed the tension in the re-wind spring must be released by removing the power cable connector and allowing the end of the cable to pass through the nylon guide-wheels and around the drum. If the drum is not held tightly, it unwinds rapidly, and the rewind spring becomes disengaged from the "axle". It is then necessary to open the spring mechanism to relocate the inner end of the spring into the slot.

Recommendation:

The innermost turn of the rewind spring should be slightly smaller in diameter than the axle, so that it will automatically re-engage upon rotation of the drum.

Item 13. It is not possible at present to check-out the elevator mechanism at the SMSA because the power cable connector does not fit any existing power outlet.

Recommendation:

A spare Power and Communications Distribution Box (GS-3508) should be provided for the Support Area to facilitate check-out of the elevator mechanism.

Item 14. When replacing the power cable, it is necessary to disconnect the cable from the slip-ring mechanism.

The leads from the slip-rings are all white, resulting in the necessity to draw a diagram to ensure correct replacement.

Recommendation:

The leads from the slip-rings should be color-coded to agree with the color coding of the power cable.