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FLEET RELIABILITY ASSESSMENT PROGRAM. VOLUME 2. AN/SSR-1 SATELL--ETC(U)
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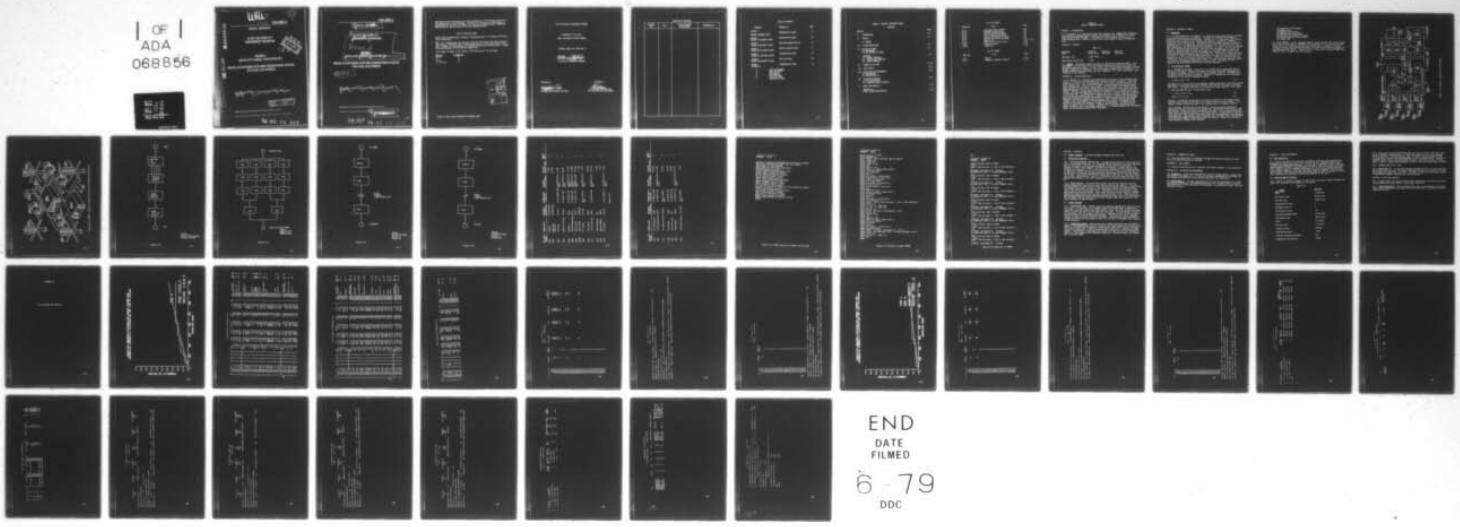

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FINAL REPORT

FLEET RELIABILITY ASSESSMENT PROGRAM

AN/SSR-1 SATELLITE SIGNAL RECEIVING SET

NAVAL ELECTRONIC SYSTEMS ENGINEERING CENTER VALLEJO, CALIFORNIA

Published by direction of Commander, Naval Electronics Systems Command.

VOLUME 2

(9) FINAL REPORT.

(6) FLEET RELIABILITY ASSESSMENT PROGRAM.

Volume 2.

AN/SSR-1
SATELLITE SIGNAL RECEIVING SET. Volume 2.

NAVAL ELECTRONIC SYSTEMS ENGINEERING CENTER
VALLEJO, CALIFORNIA

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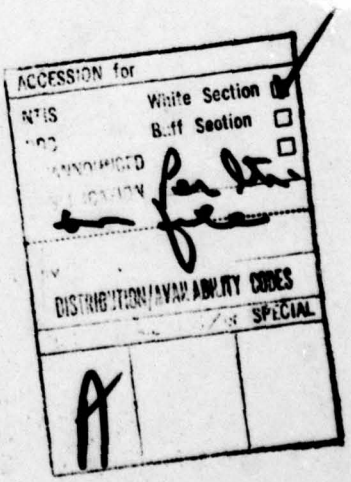

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FLEET RELIABILITY ASSESSMENT PROGRAM

DEPARTMENT OF THE NAVY

NAVAL ELECTRONIC SYSTEMS COMMAND

PREPARED UNDER THE DIRECTION OF

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RELIABILITY ENGINEERING BRANCH

REVIEWED BY

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APPROVED BY

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RECORD OF CHANGES

CHANGE NO.	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY

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VOLUME 2
AN/SSR-1 EQUIPMENT REPORT

SECTION I - INTRODUCTION.

1-1 The AN/SSR-1 is a receive-only Ultra High Frequency (UHF, 300MHz-36GHz) communications satellite (SATCOM) terminal capable of providing up to 15 channels of 75 band (100 word per minute) teletype. It is used as a Fleet broadcast receiver and is widely deployed on all classes of surface craft large enough to require teletype service.

SECTION II - RESULTS

TABLE 2-2.1

Equipment MTBF	Observed 23,321 hours	Predicted 1200 hours	Specified 1000 hours
90% Upper Limit	38,637 hours		
Operational Availability	0.998		

2-1 SUMMARY. The AN/SSR-1 greatly exceeds its specified and predicted MTBF's. The performance is so good that Fleet users actually apologized to FRAP interviewers for not having anything to report. At the current level of performance and usage, a typical AN/SSR-1 system can be expected to fail at the rate of roughly once in three years. No hardware problems were discovered. One user commented, "It's like a light bulb. Turn it ON and it runs forever".

SECTION III - SYSTEM DESCRIPTION

3-1 The AN/SSR-1 is a complete self-contained UHF receive-only Fleet broadcast radio system. It requires only input power and a teletype printer to function. Satellite reception is via four small fixed antennas set in a square or diamond pattern on the ship's weather deck. The received UHF signal is down converted by an amplifier/converter located near the base of each antenna. The four signals are combined using a phase-averaging technique which creates the effect of having a single very large hemispherical antenna. In this way the mechanical complexities of a trainable array are avoided. The combiner/demouldator section of the radio is located below deck, usually in the radio room. The demultiplexer section can be co-located or remotely located so as to be near the teletype machines. Although basically a time-division multiplexed Phase Shift Keyed (PSK) system, the AN/SSR-1 is capable of operation in the Frequency Modulated (FM) mode by substituting an external voice frequency teletype multiplex terminal, such as the AN/UCC-1, for the demultiplexer section. Maintenance of the antenna and the amplifier/convertor sections is by replacement. The amplifier/converter is charged with dry nitrogen. Shipboard users have been supplied with the means to measure, purge, and recharge these units. The combiner/demodulator and demultiplexer are maintained by module-level replacement.

SECTION IV - RELIABILITY MODEL

4-1 BACKGROUND

4-1.1 SYSTEM DESCRIPTION - The AN/SSR-1 is a Satellite Signal Receiving Set, designed to receive and process Fleet broadcasts. Two modes are employed, FM (Frequency Modulation) and PSK (Phase Shift Keying). Figure 2-4.1 is a functional block diagram of the set which consists of four antennas and amplifier converters, a combiner demodulator, and a demultiplexer. The function of the redundant antenna and amplifier converter units is to supply four diversified inputs which are combined in the combiner demodulator, providing hemispherical reception. To receive, at least one antenna must be illuminated by the satellite. When more than one antenna is in view of the satellite, improved signal-to-noise ratio results. This added benefit enables the system to operate reliably in noisy environments and locations where signal levels have previously been considered lower than practical. Figure 2-4.2, pictorical drawing of the set, is useful in the following discussion. Physically the four antennas are separated as far as installation constraints permit. Amplifier Converter units are located near antennas to minimize cable losses. At lower frequency, amplified signals are routed to the combiner demodulator by twin-ax cable. The output, if PSK, is routed via the demultiplexer to the ship's teletype equipment.

4-2 THE RELIABILITY MODEL

4-2.1 THE FORM OF THE MODEL - Figure 2-4.3 is a simple block diagram that depicts the Reliability Model. Basically the model consists of the series configuration of the diversity elements (Block D) and the series elements (Block S). MIL-HDBK-217B is used as a basis for the calculations. Equation 1 is appropriate for calculating reliability of two identical redundant elements.

$$R\,(TOT) = 2(R) - R^2 \qquad (1)$$

See Figure 2-4.4 for a detail of the redundant elements (Block D). Two series strings consisting of an antenna, Amplifier converter, and triplexer feed each of two Amplifier filters. The series reliability is calculated by using equations 2 and 3 where $L = (\text{Failure Rate}/10^6)$ and T is the mission time.

$$L = L(1) + L(2) + L(3) \qquad (2)$$

$$R(S) = E\ X\ P\ (-LT) \qquad (3)$$

Equation 1 is applied a second time to calculate reliability of the larger blocks and this total reliability of Block D is in series with the series elements. This method is useable because only one of the redundant paths is needed to receive.

4-2.2 MISSION - The missions for the AN/SSR-1, Receive FM and Receive PSK are depicted by Figures 2-4.5 and 2-4.6, respectively. Configuration difference in the two missions is that blocks R015 through R021 are added in series during receive PSK. These blocks are modules contained in the demultiplexer. No environmental considerations were taken into account by the model other than those embodied in the failure rates employed. These failure rates are manufacturers estimated rates using MIL-HDBK-217B where environmental factors were taken into account. Figure 2-4.7 provides a cross reference listing of the following:

(1) Reliability Block Number
(2) Nomenclature
(3) Reference Designation
(4) Manufacturers stock Number
(5) National Stock Number (if known)
(6) Failure Rate (per million hours)
(7) Number used

4-4 BASIC PROGRAM - A basic language program to run on the NOS time sharing system was written to calculate the reliability of the AN/SSR-1 for a given mission time. Figure 2-4.8 is a listing of the data file (F2TAS) used in running the program. It should be noted that different estimated or actual failure rates may be used by inserting them into "F2TAS". Figure 2-4.9 is a listing of the program (RMOD8) and Figure 2-4.10 is a sample run of the program.

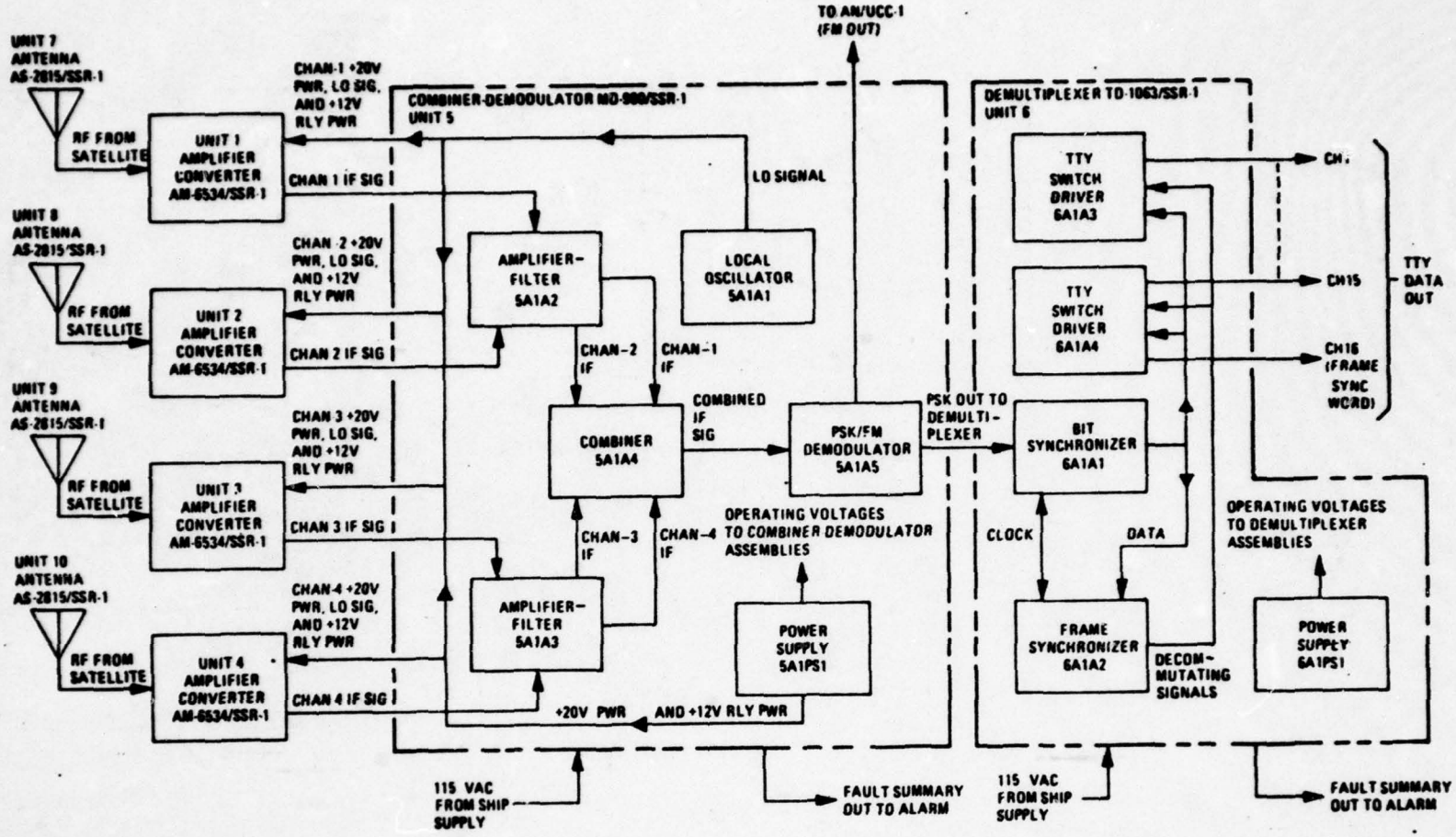


Figure 2-4.1 AN/SSR-1 Functional Block Diagram

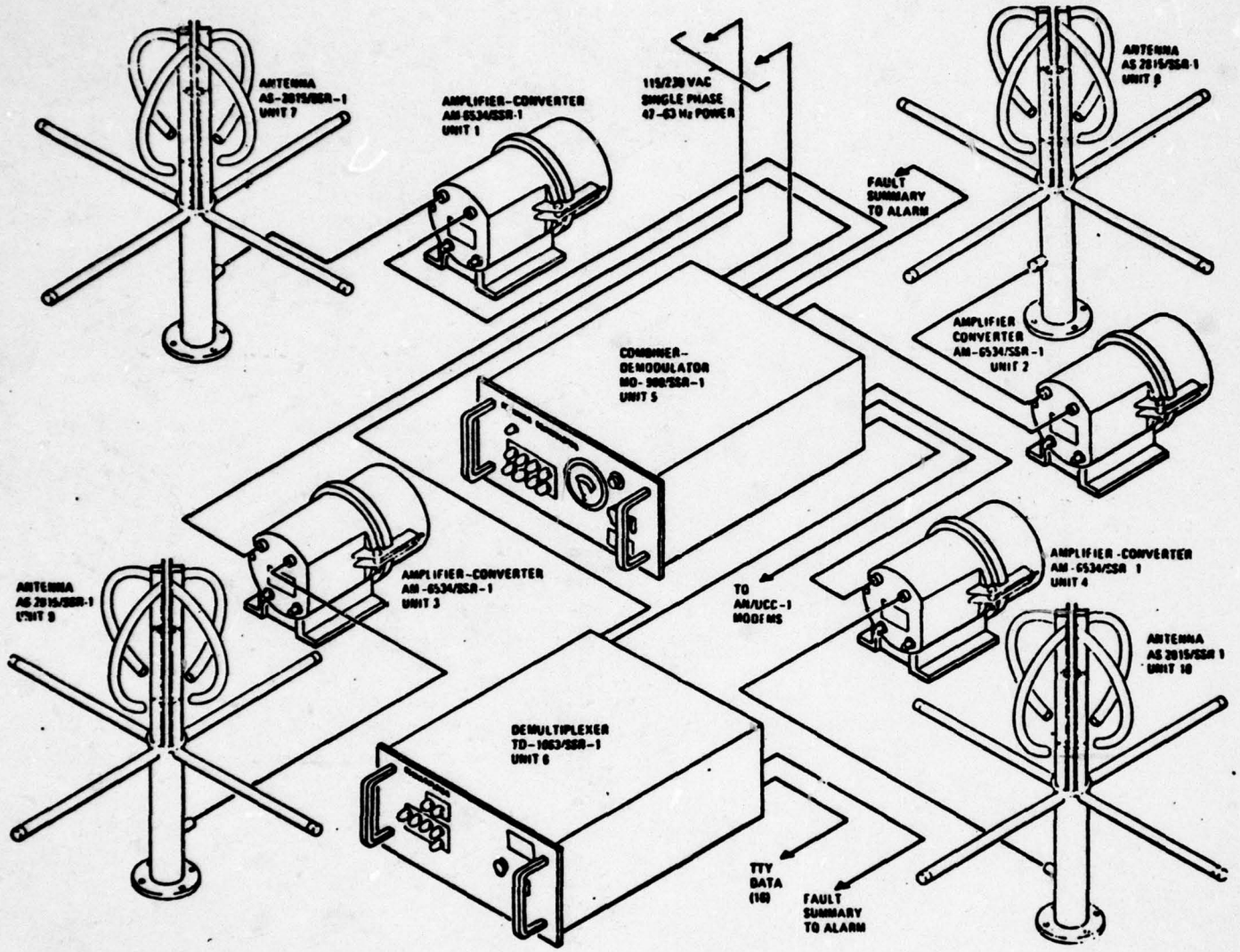
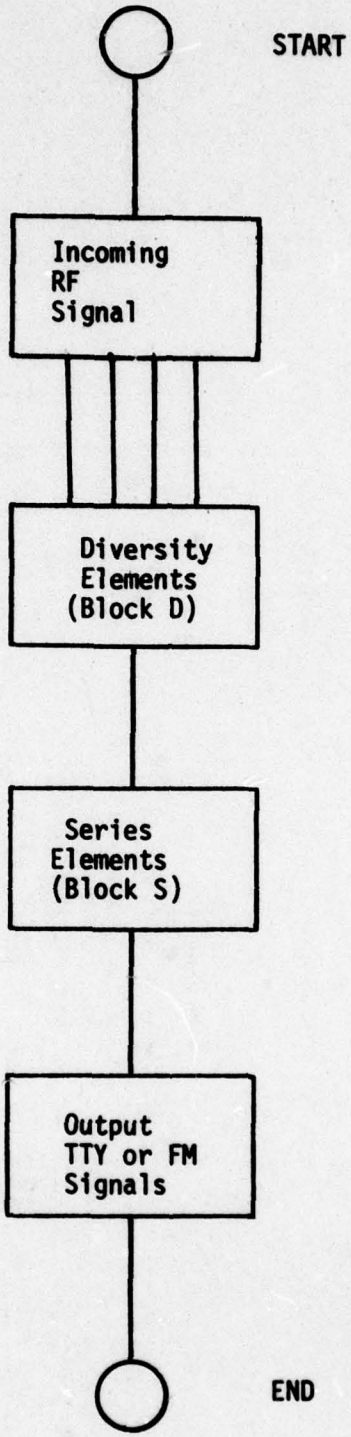


Figure 2-4.2 AN/SSR-1 Satellite Signal Receiving Set Equipments Relationship



AN/SSR-1
Overall Block Diagram
Reliability Model

Figure 2-4.3

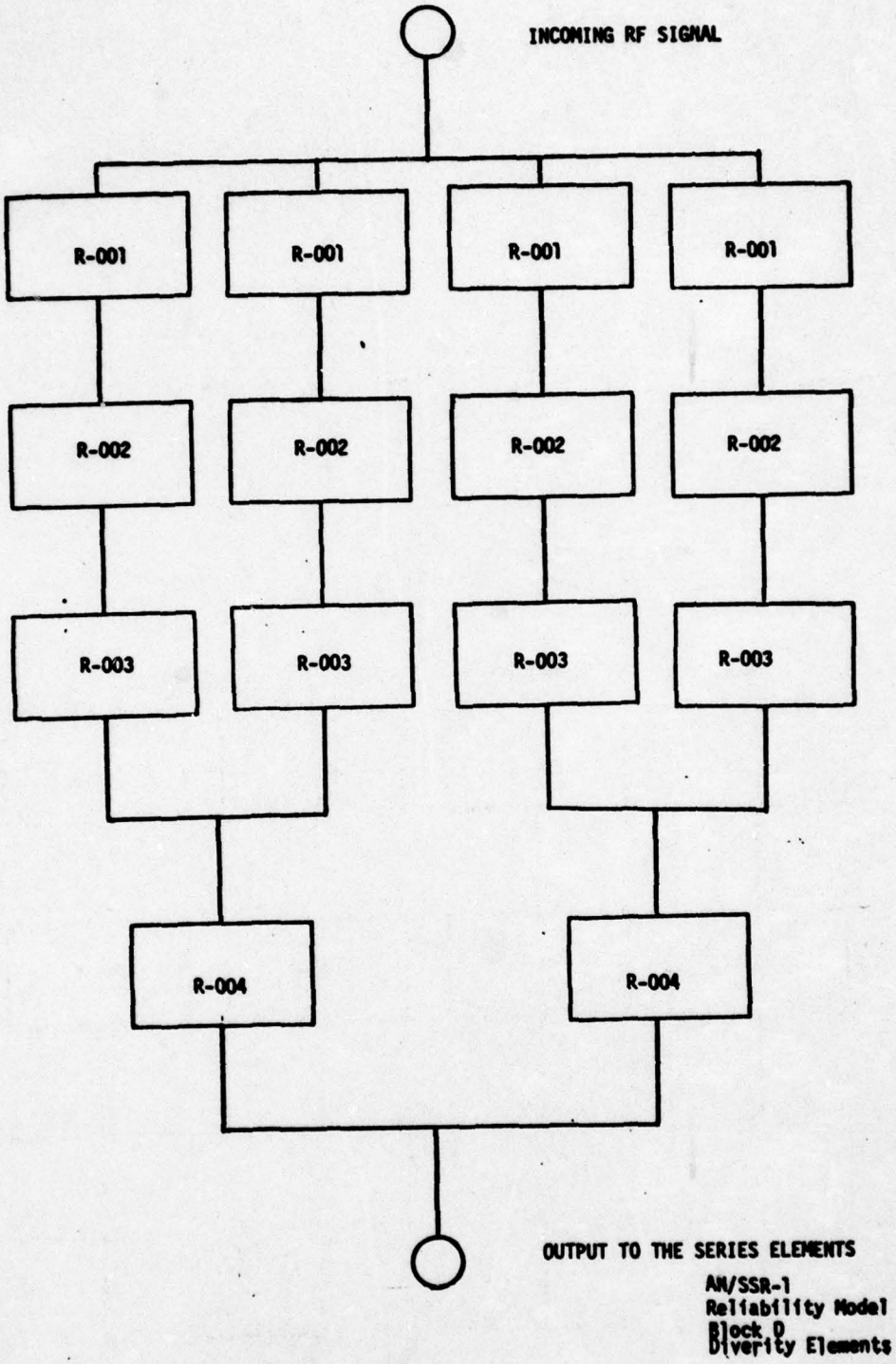
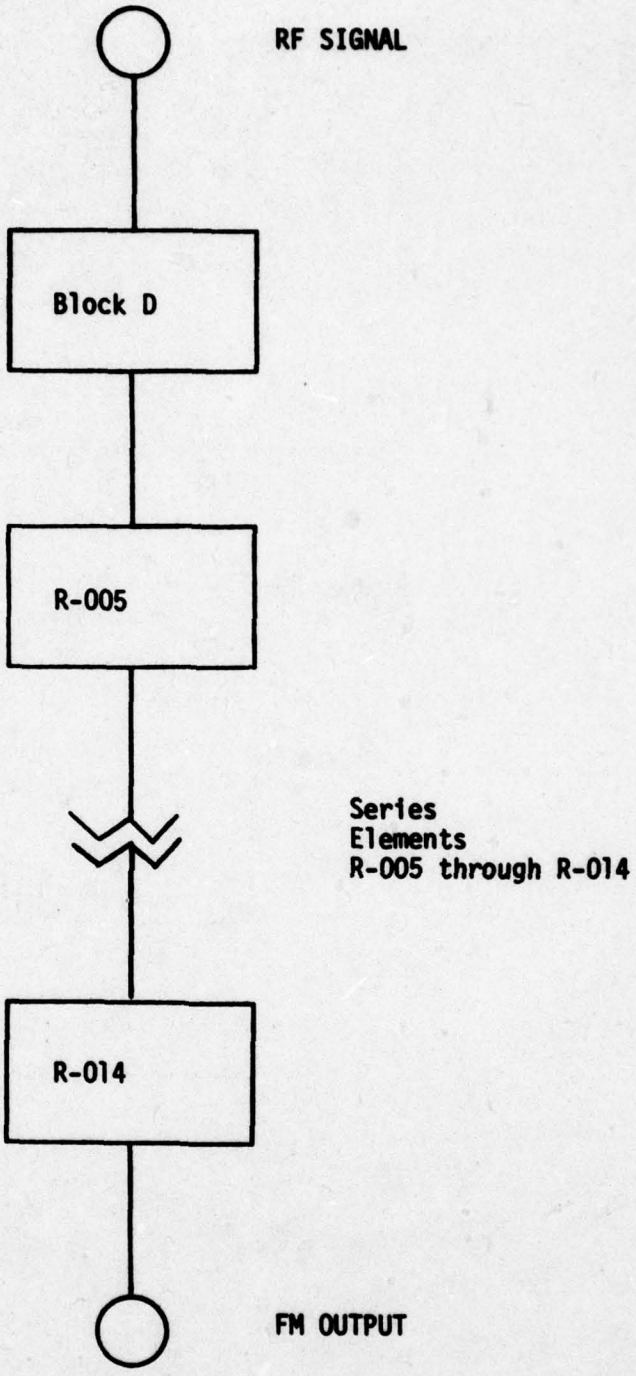
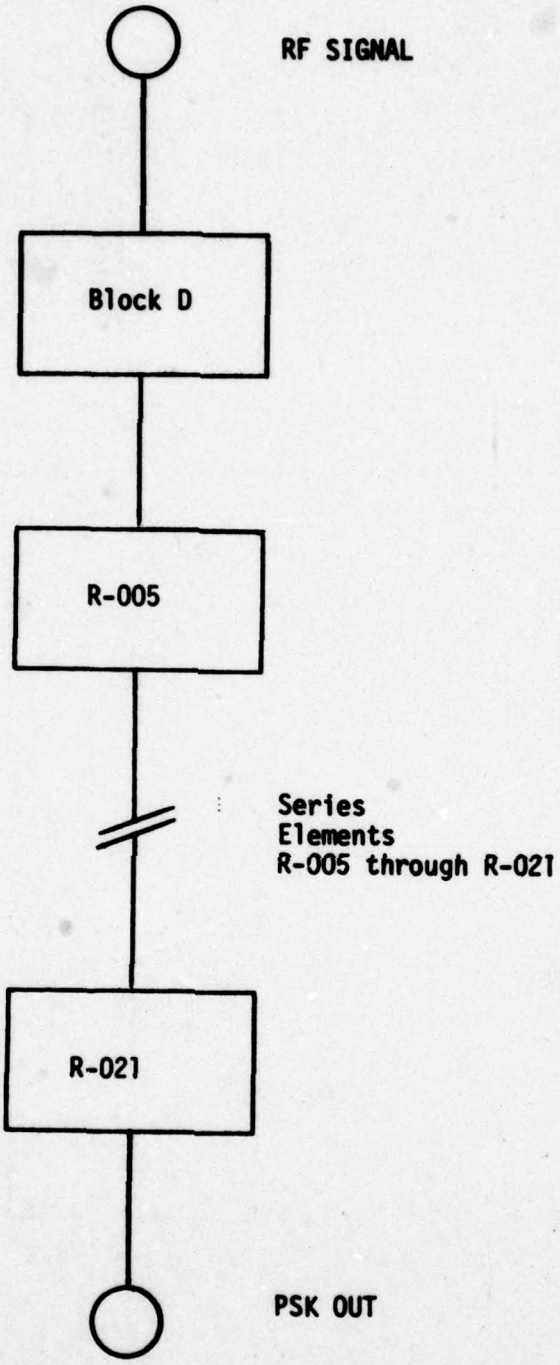

INCOMING RF SIGNAL
R-001
R-001
R-001
R-001
R-002
R-002
R-002
R-002
R-003
R-003
R-003
R-003
R-004
R-004
OUTPUT TO THE SERIES ELEMENTS
AN/SSR-1
Reliability Model
Block D
Diverity Elements

Figure 2-4.4



AN/SSR-1
Reliability Model
Mission 1
Receive FM

Figure 2-4.5



AN/SSR-1
Reliability Model
Mission 2
Receive PSK

Figure 2-4.6

REL BLOCK NUMBER	NOMENCLATURE	REFERENCE DESIGNATION	MANUFACTURERS STOCK NO.	NATIONAL STOCK NUMBER	FAILURE RATE/10^6 HOUR	NUMBER USED
R001	Antenna	AS-2815/SSR-1			0.046	4
R002	Amplifier Converter	AM-6534/SSR-1			19.790	4
R003	Triplexer	P/O 5A2	P/O 01-P00137F001	4G-5820-01-013-6034	2.586	4
R004	Amplifier Filter	5A1A2/3	01-P00132 F001	4G-6130-01-013-6493	224.921	2
R005	Combiner	5A1A4	01-P00133 F001	4G-5820-01-013-6102	51.203	1
R006	FM/PSK Demodulator	5A1A5	01-P00363 F001	4G-5820-01-013-6142	45.482	1
R007	Power Supply	5A1PS1	01-P00131 F001	AG-0099-LL-HH7-8674	50.454	1
R0008	On/Off Relay	5A1A6A153			0.500	1
R009	RFI Filter	P/O 5A2	P/O 01-P00137 F001	4G-5820-01-013-6034	1.278	2
R010	Front Panel	5A6A1			25.833	1
R011	Local Oscillator	5A1A1	01-P00134 F001	4G-0099-LL-HH7 8677	54.236	1
R012	Cable Assembly	5W1			2.064	1
R013	Cable Assembly	5A6W1			1.279	1
R014	RFI Filter	P/O 5A2	P/O 01-P00137	4G-5820-01-013-6034	0.049	1

Figure 2-4.7

REL BLOCK NUMBER	NOMENCLATURE	REFERENCE DESIGNATION	MANUFACTURERS STOCK NO.	NATIONAL STOCK NUMBER	FAILURE RATE/10^6 HOUR	NUMBER USED
R015	Bit Synchronizer	6A1A1	01-P00139 F001		23.705	1
R016	Frame Synchronizer	6A1A2	01-P00140 F001	4G-5820-01-018-8539	21.340	1
R017	TTY Switch Driver	6A1A3/4	P/O 01-P00144 F001		60.798	2
R018	Front Panel	6A1A5	01-P00144 F001		15.770	1
R019	Low Pass Filter	6A2	01-P00142 F001		33.039	1
R020	Power Supply	6A1PS1	01-P00138 F001	4G-6130-01-013-6540	47.454	1
R021	Transistor Driver	P/O 6A1A3	P/O 01-P00144 F001		1.212	1

```
 77/03/29. 09.41.01.
PROGRAM   F2TAS


MISSION 1 RECEIVE FM,ANTENNA,AS-2815/SSR-1,0.04640
AMPLIFIER CONVERTER,AM-6534/SSR-1,19.79020
TRIPLEXER,P/O 5A2,2.58598
AMPLIFIER FILTER,5A1A2/3,224.92127
COMBINER,5A1A4,51.20327
FM/PSK DEMODULATOR,5A1A5,45.43183
POWER SUPPLY,5A1PS1,50.45408
ON/OFF RELAY,5A1A6A153,0.50000
RFI FILTER,P/O 5A2,1.27795
FRONT PANEL,5A6A1,25.83312
LOCAL OSCILLATOR,5A1A1,54.23582
CABLE ASSEMBLY,5W1,2.06364
CABLE ASSEMBLY,5A6W1,1.27947
RFI FILTER,P/O 5A2,0.04897
MISSION 2 RECEIVE PSK RTTY,BIT SYNC,6A1A1,23.70454
FRAME SYNCH,6A1A2,21.33971
TTY SWITCH DRIVER,6A1A3,60.79766
FRONT PANEL,6A1A5,15.76988
LOW PASS FILTER,6A2,33.03928
POWER SUPPLY,6A1PS1,47.45408
TRANSISTOR DRIVER,P/O 6A1A3,1.21155
READY.
```

Figure 2-4.8 "F2TAS" Data File of Module Failure Rates

```
 77/03/29. 09.50.14.
PROGRAM   RMOD8

00100 FILE #1: "F2TAS"
00110 RESTORE #1
00120 PRINT "INPUT MISSION TIME IN HOURS"
00130  INPUT S$
00140 T=VAL(S$)
00150 INPUT #1,A$
00160 P=0
00170 FOR N=1 TO 3
00180 INPUT #1, A$(N),B$(N),C$(N)
00190 C(N)=VAL(C$(N))
00200 LET P=P+C(N)
00210 NEXT N
00220 R(1)=EXP(-(.000001*P*T))
00230 R(2)=(2*R(1))-(R(1)**2)
00240 INPUT #1,A$,B$,C$
00250 LET F=VAL(C$)
00260 R(3)=EXP(-(.000001*Q*T))
00270 R(4)=R(2)*R(3)
00280 R(5)=(2*R(4))-(R(4)**2)
00290 Q=0
00300 FOR N=1 TO 10
00310 INPUT #1,A$(N),B$(N),C$(N)
00320 D(N)=VAL(C$(N))
00330 Q=Q+D(N)
00340 NEXT N
00350 R(6)=EXP(-(.000001*Q*T))
00360 R(7)=R(5)*R(6)
00370 PRINT "TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2"
00380 INPUT Y$
00390 IF Y$= "1" THEN 420
00400 IF Y$= "2" THEN 440
00410 GO TO 370
00420 PRINT "MISSION 1 RELIABILITY ";R(7)
00430 GO TO 540
00440 INPUT #1,A$
00450 L=0
00460 FOR N=1 TO 7
00470 INPUT #1,A$(N),B$(N),C$(N)
00480 E(N)=VAL(C$(N))
00490 L=L+E(N)
00500 NEXT N
00510 R(8)=EXP(-(.000001*L*T))
00520 R(9)=R(8)*R(7)
00530 PRINT "MISSION 2 RELIABILITY ";R(9)
00540 PRINT "TO CONTINUE TYPE Y, TO END PROGRAM TYPE N"
00550 INPUT A$
00560 IF A$= "Y" THEN 110
00570 END
READY.
```

Figure 2-4.9 Listing of Program "RMOD8"

```
RUN

 77/03/14. 12.20.01.
PROGRAM   RMOD8

INPUT MISSION TIME IN HOURS
? 500
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 1
MISSION 1 RELIABILITY  .890329
TO CONTINUE TYPE Y, TO END PROGRAM TYPE N
? Y
INPUT MISSION TIME IN HOURS
? 500
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 2
MISSION 2 RELIABILITY  .794575
TO CONTINUE TYPE Y, TO END PROGRAM TYPE N
? Y
INPUT MISSION TIME IN HOURS
? 1000
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 1
MISSION 1 RELIABILITY  .758489
TO CONTINUE TYPE Y, TO END PROGRAM TYPE N
? Y
INPUT MISSION TIME IN HOURS
? 1000
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 2
MISSION 2 RELIABILITY  .618942
TO CONTINUE TYPE Y, TO END PROGRAM TYPE N
? Y
INPUT MISSION TIME IN HOURS
? 1500
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 1
MISSION 1 RELIABILITY  .644325
TO CONTINUE TYPE Y, TO END PROGRAM TYPE N
? Y
INPUT MISSION TIME IN HOURS
? 1500
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 2
MISSION 2 RELIABILITY  .474959
TO CONTINUE TYPE Y, TO END PROGRAM TYPE N
? Y
INPUT MISSION TIME IN HOURS
? 2000
TYPE 1 FOR MISSION 1, TYPE 2 FOR MISSION 2
? 1
MISSION 1 RELIABILITY  .540996
```

Figure 2-4.10 Sample Run of "RMOD8"

SECTION V - PROBLEMS

5-1 CURRENT PROBLEMS. No current hardware problems were identified.

5-2 INSTALLATION PROBLEMS.

5-2.1 AMPLIFIER/CONVERTER PRESSURE SEAL. The amplifier/converter is a unit about the size of a two-pound coffee can. It is mounted outside the ship's hull within ten cable feet of the antenna it serves (each antenna has its own amplifier/converter). To preserve its water tight integrity, the amplifier/converter is pressurized with dry nitrogen to a pressure of 15 PSI. Early units were supplied with flat rubber washers on the type N connector on the rear of the unit to serve as the case-to-connector seal. On some units the connector mounting hole was slightly oversized and the flat washers did not seal. Later units and refitted leakers were fitted with "O" ring seals, which are virtually 100% effective. There is no indication that early production units will develop seal problems at the type N connector at a later date and none have been reported.

5-2.2 TWINAX REVERSAL. The cable which connects the amplifier/converter with the combiner/demodulator below deck is a dual coaxial cable called "twinax". It was discovered by MOTU-1 located at Pearl Harbor (and other installers and support groups) that the bulkhead penetration fittings for the twinax cable reverse the local oscillator signal line and the incoming signal line. Installations with an even number of bulkhead penetrations had no problem. Those installations with an odd number of bulkhead penetrations experienced a puzzling cross of the two signal lines. Insertion of an additional bulkhead penetration connector restored the proper signal/line relationship. The USS SOMERS, DDG-34, reported this problem, "Antenna leads were installed in connector backwards by FMAG PH Hawaii".

5-3 SIGNAL PROBLEMS.

5-3.1 INTERFERENCE (QRM). AN/SSR-1 users have reported problems with satellite recepton in port. At Charleston, SC, one FRAP platform told interviewers of helping to track down a man-made interference (QRM) problem. Normal UHF signal sniffers had been unable to locate the source of the interfering radiation. Using an AN/SSR-1 rigged up to be portable, they pin pointed a dock-side air compressor as the interference source. Similar problems are being experienced elsewhere. The USS WICHITA, AOR-1, reported, "Unable to receive satellite signal in NB-B mode. Problem was discussed with MOTU-9. Problem resolved to be high industrial noise (in the) area of Bethleham Steel Shipyard in San Francisco".

5-3.2 INTERFERING SIGNALS. Reports have come to FRAP of problems using the AN/SSR-1 system in the European area due to an overlap of the SATCOM frequencies assigned to AN/SSR-1 use and those used by commercial communications satellites. Overlay of relayed television transmissions is said to be particularly effective in blocking out SATCOM signals. This problem is understood to be severe, but FRAP has no direct information about it as FRAP sample surface platforms deploying to the Mediterranean area dropped out of the FRAP sample.

SECTION VI - CORRECTIVE ACTIONS

6-1 Since the reliability of the AN/SSR-1 exceeds the specified value by a factor of 23, no corrective action is required.

SECTION VII - COST BENEFIT

7-1 Since no corrective action is required, cost benefit analysis is not applicable.

SECTION VIII - SPECIFICATION REQUIREMENTS

8-1 RELIABILITY. ELEX-R-149, RECEIVING SET, SATELLITE SIGNAL AN/SSR-1, dated 21 May 1973 states in paragraph 3.2.3.1, "The specified mean-time-between-failure (MTBF) θ_o (as defined by MIL-STD-781) of the receive system shall be 1,000 hours".

8-2 MAINTAINABILITY. The above specification calls out the requirements for a maintainability program plan, plug replaceable modules, and a maximum preventive maintenance downtime of 2 hours during each 120 day period. No quantitative repair time specification is given.

SECTION IX - FLEET DATA ANALYSIS

9-1 DATA COLLECTION.

9-1.1 Data in the FRAP field study was collected by interviews with operating and maintenance personnel and by mail in the form of copies of 3M OPNAV 4790/2K forms returned using preaddressed envelopes. To allow use of parametric analysis, FRAP requested sample platforms to include Elapsed Time Meter (ETM) reading with each submission. Numerical data was encoded, keypunched, and statistically reduced using electronic digital computers. Data from interviews, narrative comments on the 3M forms, and information from failure analysis was used by FRAP reliability engineers to correlate, interpret and, sometimes, correct data submitted by the Fleet.

9-2 COMPUTER ANALYSIS RESULTS.

9-2.1 Results of computer analysis of Fleet failure data may be found in Appendix 2A. Table 2-9.1 provides a brief summary of the results.

TABLE 2-9.1

Factor	Observed
Operational MTBF	17,050 hours
Not Greater Than	28,248 hours
Not Less Than	10,802 hours
Operational Failures	9
Equipment Failures	7
Verification Factor	.94
Estimated Equipment MTBF	23,321 hours
Not Greater Than	38,637 hours
MTTR	12.6 hours
Not Less Than	1.02 hours
Typical Mission	120 days
Mission Duty Cycle	0.752
Missions Completed w/o Repair	91%
Operational Availability	0.998

9-2.2 Two of the nine observed failures were the result of signal fade (QSB), which is not an AN/SSR-1 system problem. In both cases relocation of the ship restored AN/SSR-1 operation. The best estimate, then, of AN/SSR-1 System Operational MTBF is 21,922 hours, based on the seven equipment failures reported to FRAP. (Review of CASREPTS failed to turn up any additional failures). With the observed 75.2% duty cycle, a typical AN/SSR-1 may be expected to fail at the rate of once every 3.33 years.

9-2.3 PROBLEMS IDENTIFIED. None.

9-2.4 MAINTAINABILITY. Of the seven observed equipment failures, six were rectified during FRAP data collection. All repair times were two hours or less with four being the minimum reportable time of one hour. According to FRAP field interviews, repairs on the AN/SSR-1 commonly required less than ten minutes.

SECTION X - DEPOT DATA ANALYSIS

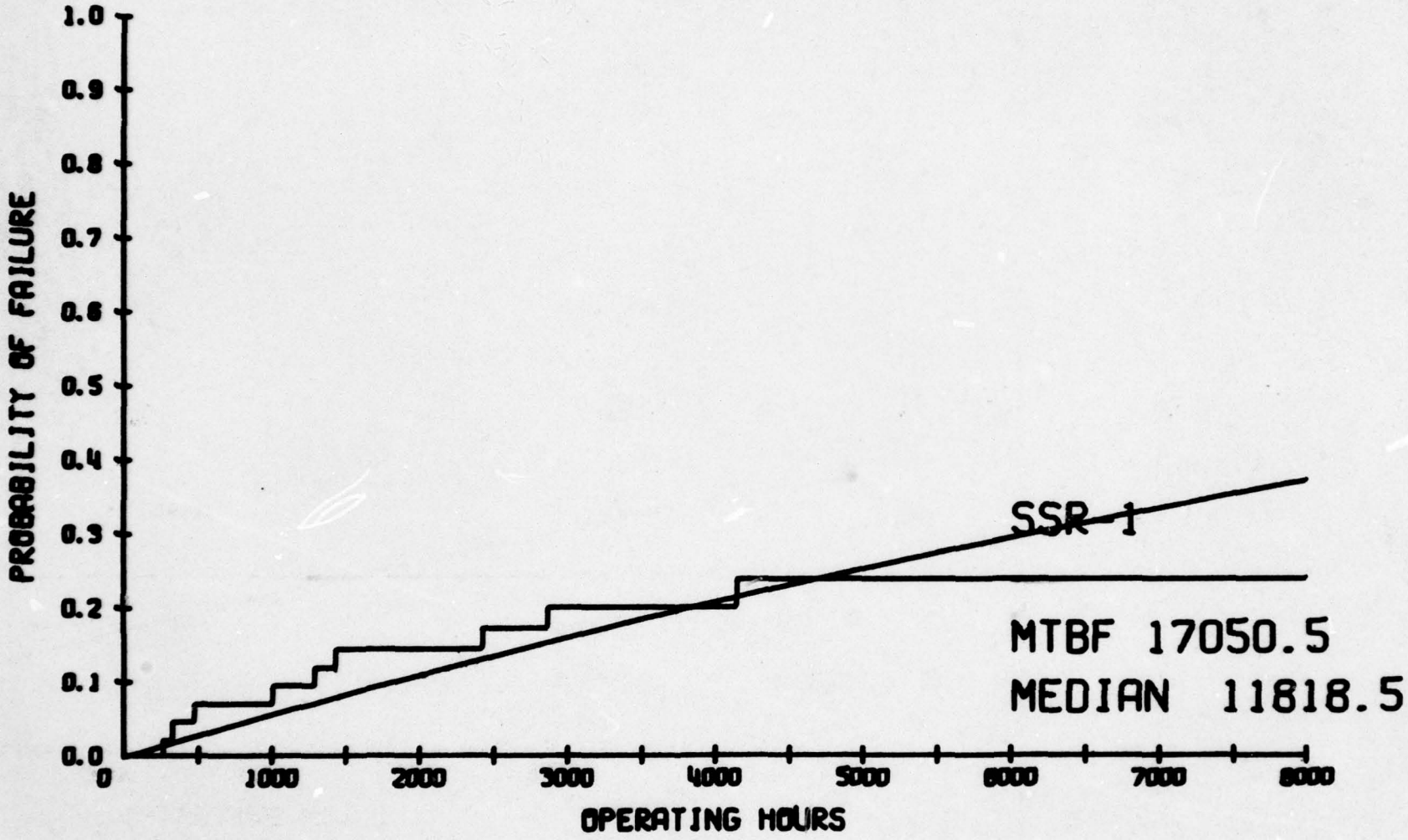
10-1 A depot repair facility has recently been established at the Naval Electronics Systems Engineering Center (NESEC) in San Diego, California.

10-2 VERIFICATION RATIO. The verification ratio was calculated based on 24 module returns from the fleet, with 21 being verified by depot test. The observed verification ratio is 0.94.

APPENDIX 2A

FLEET FAILURE DATA ANALYSIS

CUMULATIVE OBSERVED DISTRIBUTION VERSUS THEORETICAL
EXPONENTIAL PROBABILITY DISTRIBUTION FOR TIME TO FAILURE



FLEET RELIABILITY ASSESSMENT DATA

MTYP	DATE		WRA	OL1	OL2	OL3	ETM	ETM1	ETM2	OPERATE	DUTY	TTF	SYS	UIC	SHIP NAME	HULL	NO
0	6153	0	0	0	0	0	1640.0	0.0	0.0	0.0	0.000	0.0	1	31350	MONTICELLO	LSD	35
4	7072	7072	0	0	0	0	0.0	7787.8	7787.8	6147.8	.902	6147.8	1	31350			
0	6153	0	0	0	0	0	911.3	0.0	0.0	0.0	0.000	0.0	1	33430	CORAL SEA	CVA	43
4	7034	7034	0	0	0	0	0.0	5841.3	5841.3	4930.0	.835	4930.0	1	33430			
0	6170	0	0	0	0	0	1574.1	0.0	0.0	0.0	0.000	0.0	1	33640	CONSTELLATION	CVA	64
8	6240	6240	0	0	0	0	0.0	3147.3	3147.3	1573.2	.936	1573.2	1	33640			
4	7039	7039	0	0	0	0	0.0	6449.2	6449.2	4875.1	.868	4875.1	1	33640			
NO INITIAL RECORD-FIRST RECORD USED																	
4	7073	7073	0	0	0	0	8024.3	8024.3	8024.3	0.0	0.000	0.0	1	33650	ENTERPRISE	CVN	65
0	6181	0	0	0	0	0	3770.7	0.0	0.0	0.0	0.000	0.0	1	33680	NIMITZ	CV	68
3	6236	6236	3	4	0	0	0.0	5073.0	5075.0	1302.3	.987	1302.3	1	33680			
3	6279	6279	3	6	0	0	0.0	6096.0	6096.0	2323.3	.988	1021.0	1	33680			
8	7051	7051	0	0	0	0	0.0	9285.0	9285.0	5512.3	.977	3189.0	1	33680			
4	7090	7090	0	0	0	0	0.0	153.7	153.7	6381.0	.970	4057.7	1	33680			
0	6162	0	0	0	0	0	184.7	0.0	0.0	0.0	0.000	0.0	1	46290	PROTEUS	AS	19
4	7057	7057	0	0	0	0	0.0	2012.0	2012.0	1827.3	.293	1827.3	1	46290			
0	6155	0	0	0	0	0	1300.2	0.0	0.0	0.0	0.000	0.0	1	46630	SOMERS	DDG	34
0	6159	6166	0	0	0	0	1615.8	1613.6	1615.8	0.0	0.000	0.0	1	46630	SOMERS	DDG	34
0	6271	0	0	0	0	0	3330.0	0.0	0.0	0.0	0.000	0.0	1	46630	SOMERS	DDG	34
4	7084	7084	0	0	0	0	0.0	7531.5	7531.5	4201.5	.983	4201.5	1	46630			
0	6155	0	0	0	0	0	876.1	0.0	0.0	0.0	0.000	0.0	1	46640	MORTON	DD	948
8	6258	6258	0	0	0	0	0.0	2947.0	2947.0	2070.9	.838	2070.9	1	46640			
4	7087	7087	0	0	0	0	0.0	5971.9	5971.9	5095.8	.715	5095.8	1	46640			
0	6159	0	0	0	0	0	2380.5	0.0	0.0	0.0	0.000	0.0	1	46680	ADAMS,CHARLES	DDG	2
4	7084	7084	0	0	0	0	0.0	5846.7	5846.7	3466.2	.498	3466.2	1	46680			
0	6153	0	0	0	0	0	1367.2	0.0	0.0	0.0	0.000	0.0	1	46790	HOEL	DDG	13
8	6182	6182	0	0	0	0	0.0	1872.6	1872.6	505.4	.726	505.4	1	46790			
8	6274	6274	0	0	0	0	0.0	3386.3	3386.3	2019.1	.695	2019.1	1	46790			
8	6293	6293	0	0	0	0	0.0	3820.0	3820.0	2452.8	.730	2452.8	1	46790			
8	6315	6315	0	0	0	0	0.0	4351.0	4351.0	2983.8	.767	2983.8	1	46790			
8	7040	7040	0	0	0	0	0.0	6072.5	6072.5	4705.3	.778	4705.3	1	46790			
4	7071	7071	0	0	0	0	0.0	6290.3	6290.3	4923.1	.725	4923.1	1	46790			
0	6159	0	0	0	0	0	7171.1	0.0	0.0	0.0	0.000	0.0	1	46890	HUNLEY	AS	31
4	7082	7082	0	0	0	0	0.0	4111.7	4111.7	6940.6	1.004	6940.6	1	46890			
0	6153	0	0	0	0	0	1176.2	0.0	0.0	0.0	0.000	0.0	1	46910	WADDELL	DDG	24
8	7001	7001	0	0	0	0	0.0	4371.1	4371.1	3194.9	.625	3194.9	1	46910			
4	7071	7071	0	0	0	0	0.0	5264.5	5264.5	4088.3	.602	4088.3	1	46910			
NO INITIAL RECORD-FIRST RECORD USED																	
4	7087	7087	0	0	0	0	2837.3	2837.3	2837.3	0.0	0.000	0.0	1	46970	LAKE,SIMON	AS	33
0	6154	0	0	0	0	0	2171.2	0.0	0.0	0.0	0.000	0.0	1	46980	PAGE,RICHARD L	FFG	5
8	7098	7098	0	0	0	0	0.0	9239.1	9239.1	7067.9	.953	7067.9	1	46980			
4	7115	7115	0	0	0	0	0.0	9631.7	9631.7	7460.5	.954	7460.5	1	46980			
0	6155	0	0	0	0	0	3011.1	0.0	0.0	0.0	0.000	0.0	1	46990	FURER,JULIUS A	FFG	6
8	6265	6265	0	0	0	0	0.0	4635.4	4635.4	1624.3	.615	1624.3	1	46990			
4	7082	7082	0	0	0	0	0.0	8258.6	8258.6	5247.5	.749	5247.5	1	46990			
0	6153	0	0	0	0	0	649.8	0.0	0.0	0.0	0.000	0.0	1	58490	WICHITA	AOR	1
8	6198	6198	0	0	0	0	0.0	943.0	943.0	293.2	.271	293.2	1	58490			
8	6218	6218	0	0	0	0	0.0	1236.8	1236.8	587.0	.376	587.0	1	58490			
8	6230	6230	0	0	0	0	0.0	1880.0	1880.0	1230.2	.666	1230.2	1	58490			
4	7041	7041	0	0	0	0	0.0	4191.6	4191.6	3541.8	.583	3541.8	1	58490			

FLEET RELIABILITY ASSESSMENT DATA

MTYP	DATE		WRA	OL1	OL2	OL3	ETM	ETM1	ETM2	OPERATE	DUTY	TTF	SYS	UIC	SHIP NAME	HULL NO
0	6155	0	0	0	0	0	1637.1	0.0	0.0	0.0	0.000	0.0	1	58500	MILWAUKEE	AOR 2
4	7073	7073	0	0	0	0	0.0	7611.1	7611.1	5974.0	.880	5974.0	1	58500		
0	6155	0	0	0	0	0	2338.5	0.0	0.0	0.0	0.000	0.0	1	71780	GUAM	LPH 9
8	6188	6188	0	0	0	0	0.0	2339.0	2339.0	.5	.001	.5	1	71780		
4	7042	7042	0	0	0	0	0.0	7578.5	7578.5	5240.0	.866	5240.0	1	71780		
4	7101	7101	0	0	0	0	0.0	8990.0	8990.0	6651.5	.891	6651.5	1	71780		
0	6155	0	0	0	0	0	4772.1	0.0	0.0	0.0	0.000	0.0	1	71940	CORONADO	LPD 11
4	7081	7081	0	0	0	0	120.1	120.1	120.1	5348.0	.766	5348.0	1	71940		
NO INITIAL RECORD-FIRST RECORD USED																
4	7081	7081	0	0	0	0	2907.1	2907.1	2907.1	0.0	0.000	0.0	1	73520	GUADALCANAL	LPH 7
0	6155	0	0	0	0	0	5449.1	0.0	0.0	0.0	0.000	0.0	1	200010	WHITNEY,MOUNT	LCC 20
8	6175	6175	0	0	0	0	0.0	5903.0	5903.0	453.9	.946	453.9	1	200010		
4	7081	7081	0	0	0	0	0.0	2453.9	2453.9	7004.8	1.003	7004.8	1	200010		
0	6155	0	0	0	0	0	1957.1	0.0	0.0	0.0	0.000	0.0	1	200190	MANITOWOC	LST1180
8	7049	7049	0	0	0	0	0.0	4989.0	4989.0	3031.9	.488	3031.9	1	200190		
4	7073	7073	0	0	0	0	0.0	5393.5	5393.5	3436.4	.506	3436.4	1	200190		
0	6154	0	0	0	0	0	1315.0	0.0	0.0	0.0	0.000	0.0	1	200280	SAN BERNARDINO	LST1189
8	6202	6202	0	0	0	0	0.0	1555.7	1555.7	240.7	.209	240.7	1	200280		
8	6259	6259	0	0	0	0	0.0	2235.5	2235.5	920.5	.365	920.5	1	200280		
4	7071	7071	0	0	0	0	0.0	5977.3	5977.3	4662.3	.689	4662.3	1	200280		
0	6155	0	0	0	0	0	3101.1	0.0	0.0	0.0	0.000	0.0	1	200670	BROWN,JESSE L.	FF 1089
8	6176	6176	0	0	0	0	0.0	3556.0	3556.0	454.9	.903	454.9	1	200670		
8	6265	6265	0	0	0	0	0.0	4549.8	4549.8	1448.7	.549	1468.7	1	200670		
6	6336	6336	4	17	0	0	0.0	5979.0	5979.0	2877.9	.663	2877.9	1	200670		
4	7031	7031	0	0	0	0	0.0	7447.0	7447.0	4345.9	.751	1468.0	1	200670		
4	7112	7112	0	0	0	0	0.0	9380.6	9380.6	6279.5	.813	3401.6	1	200670		
0	6155	0	0	0	0	0	8067.3	0.0	0.0	0.0	0.000	0.0	1	200710	CAPODONNO	FF 1093
3	6203	6215	4	17	0	0	0.0	8332.3	8332.3	265.0	.184	265.0	1	200710		
4	7084	7084	0	0	0	0	0.0	9699.4	9699.4	1632.1	.231	1367.1	1	200710		
0	6159	0	0	0	0	0	1859.0	0.0	0.0	0.0	0.000	0.0	1	200740	VALDEZ	FF 1096
3	7001	7001	3	6	0	0	0.0	6017.0	6017.0	4158.0	.837	4158.0	1	200740		
4	7112	7112	0	0	0	0	0.0	8455.2	8455.2	6596.2	.864	2438.2	1	200740		
0	6182	0	0	0	0	0	567.0	0.0	0.0	0.0	0.000	0.0	1	201220	KANSAS CITY	AOR 3
8	7040	7040	0	0	0	0	0.0	4844.8	4844.8	4277.8	.799	4277.8	1	201220		
4	7080	7080	0	0	0	0	0.0	5638.9	5638.9	5071.9	.804	5071.9	1	201220		
0	6159	0	0	0	0	0	2194.1	0.0	0.0	0.0	0.000	0.0	1	521970	DAVIS	DD 937
8	6184	6184	0	0	0	0	0.0	2600.7	2600.7	406.6	.678	406.6	1	521970		
4	7082	7082	0	0	0	0	0.0	6903.4	6903.4	4709.3	.681	4709.3	1	521970		
0	6154	0	0	0	0	0	2042.1	0.0	0.0	0.0	0.000	0.0	1	522000	DUPONT	DD 941
4	7031	7031	0	0	0	0	0.0	6694.2	6694.2	4652.1	.801	4652.1	1	522000		
0	6154	0	0	0	0	0	4645.4	0.0	0.0	0.0	0.000	0.0	1	522310	FARRAGUT	DDG 37
4	7031	7031	0	0	0	0	0.0	8156.0	8156.0	3510.6	.604	3510.6	1	522310		
NO INITIAL RECORD-FIRST RECORD USED																
4	7082	7082	0	0	0	0	7226.3	7226.3	7226.3	0.0	0.000	0.0	1	522330	MACDONOUGH	DDG 39
0	6155	0	0	0	0	0	5132.0	0.0	0.0	0.0	0.000	0.0	1	527020	DANIELS,JOSEPH	CG 27
4	7081	7081	0	0	0	0	0.0	1406.6	1406.6	6274.6	.898	6274.6	1	527020		
0	6182	0	0	0	0	0	2086.0	0.0	0.0	0.0	0.000	0.0	1	527030	WAINWRIGHT	CG 28
8	6265	6265	0	0	0	0	0.0	4199.7	4199.7	2113.7	1.061	2113.7	1	527030		
3	6282	6282	4	17	0	0	4522.0	4522.0	4523.0	2436.0	1.015	2436.0	1	527030		

FLEET RELIABILITY ASSESSMENT DATA

MTYP	DATE		WRA	OL1	OL2	OL3	ETM	ETM1	ETM2	OPERATE	DUTY	TTF	SYS	UIC	SHIP NAME	HULL NO
6	6296	6296	4	17	0	0	4858.0	4858.0	4858.0	2771.0	1.013	335.0	1	527030		
4	7082	7082	0	0	0	0	0.0	6543.0	6543.0	4456.0	.701	1685.0	1	527030		
0	6153	0	0	0	0	0	1213.0	0.0	0.0	0.0	0.000	0.0	1	527040	JOUETT	CG 29
8	6182	6182	0	0	0	0	0.0	1872.0	1872.0	659.0	.947	659.0	1	527040		
3	6214	6214	9	999	0	0	2651.7	2651.7	2651.7	1438.7	.983	1438.7	1	527040		
3	6241	6241	9	999	0	0	3134.5	3134.5	3134.5	1921.5	.910	482.8	1	527040		
8	6274	6274	0	0	0	0	0.0	3940.6	3940.6	2727.6	.939	806.1	1	527040		
8	6306	6306	0	0	0	0	0.0	4604.4	4604.4	3391.4	.924	1469.9	1	527040		
0	7033	0	0	0	0	0	5682.2	0.0	0.0	0.0	0.000	0.0	1	527040	JOUETT	CG 29
8	7034	7034	0	0	0	0	0.0	5706.2	5706.2	24.0	1.000	24.0	1	527040		
4	7038	7038	0	0	0	0	0.0	5801.2	5801.2	119.0	.992	119.0	1	527040		
0	6156	0	0	0	0	0	269.9	0.0	0.0	0.0	0.000	0.0	1	540570	WHIPPLE	FF 1062
8	6258	6258	0	0	0	0	0.0	2138.4	2138.4	1868.5	.763	1868.5	1	540570		
4	7080	7080	0	0	0	0	0.0	4827.8	4827.8	4557.9	.657	4557.9	1	540570		

R E L I A B I L I T Y

SSR-1 SYSTEM LEVEL

TIME TO FAIL	NO. FAILURES	NO. CENSORED	SURVIVORS	CPDF	EXPONENTIAL	MAX DIFFERENCE
119.0		1.				
265.0	1.		40.	.024	.015	.009
335.0	1.		39.	.049	.019	.029
482.8	1.		38.	.073	.028	.045
1021.0	1.		37.	.098	.058	.039
1302.3	1.		36.	.122	.074	.048
1367.1		1.				
1438.7	1.		34.	.147	.081	.066
1469.9		1.				
1685.0		1.				
1827.3		1.				
2436.0	1.		30.	.175	.133	.041
2438.2		1.				
2877.9	1.		28.	.203	.155	.048
3401.6		1.				
3436.4		1.				
3466.2		1.				
3510.6		1.				
3541.8		1.				
4057.7		1.				
4088.3		1.				
4158.0	1.		20.	.241	.216	.025
4201.5		1.				
4557.9		1.				
4652.1		1.				
4662.3		1.				
4709.3		1.				
4875.1		1.				
4923.1		1.				
4930.0		1.				
5071.9		1.				
5095.8		1.				
5247.5		1.				
5348.0		1.				
5974.0		1.				
6147.8		1.				
6274.6		1.				
6651.5		1.				
6940.6		1.				
7004.8		1.				
7460.5		1.				

R E L I A B I L I T Y

SSR-1 SYSTEM LEVEL

EQUIPMENT OPERATING HOURS (O.H.) =153454.1 CALENDAR HOURS(C.H.) =, 204024.0 DUTY CYCLE (O.H./C.H.) = .752

NUMBER OF FAILURES = 9. OBSERVED FAILURE RATE/O.H. = .58649E-04

DISTRIBUTION DETERMINATION,

K-S CRITICAL VALUE (.10, 9.) = .311

MAX DIFF CALC = .066, IS LESS THAN CRITICAL VALUE THEREFORE THE EXPONENTIAL DISTRIBUTION IS ASSUMED

FOR THE ASSUMED DISTRIBUTION

EST. MEAN = 17050.456, EST. MEDIAN = 11818.475, 90 PER CENT LCL FOR MEAN = 10802.1, 90 PER CENT UCL FOR MEAN = 28247.678

90 PERCENT UCL 28247.68 IS GREATER THAN 1000.00 HOURS, THEREFORE THE EQUIPMENT MEETS THE SPECIFICATIONS

R E L I A B I L I T Y

SSR-1 WRA 3 LEVEL

TIME TO FAIL	NO. FAILURES	NO. CENSORED
119.0		1.
1021.0	1.	
1302.3	1.	
1632.1		1.
1827.3		1.
2438.2		1.
3391.4		1.
3436.4		1.
3466.2		1.
3510.6		1.
3541.8		1.
4057.7		1.
4088.3		1.
4158.0	1.	
4201.5		1.
4456.0		1.
4557.9		1.
4652.1		1.
4662.3		1.
4709.3		1.
4875.1		1.
4923.1		1.
4930.0		1.
5071.9		1.
5095.8		1.
5247.5		1.
5348.0		1.
5974.0		1.
6147.8		1.
6274.6		1.
6279.5		1.
6651.5		1.
6940.6		1.
7004.8		1.
7460.5		1.

EQUIPMENT OPERATING HOURS (O.H.) =153454.1 CALENDAR HOURS(C.H.) =, 204024.0 DUTY CYCLE (O.H./C.H.) = .752

NUMBER OF FAILURES = 3. OBSERVED FAILURE RATE/O.H. = .19550E-04

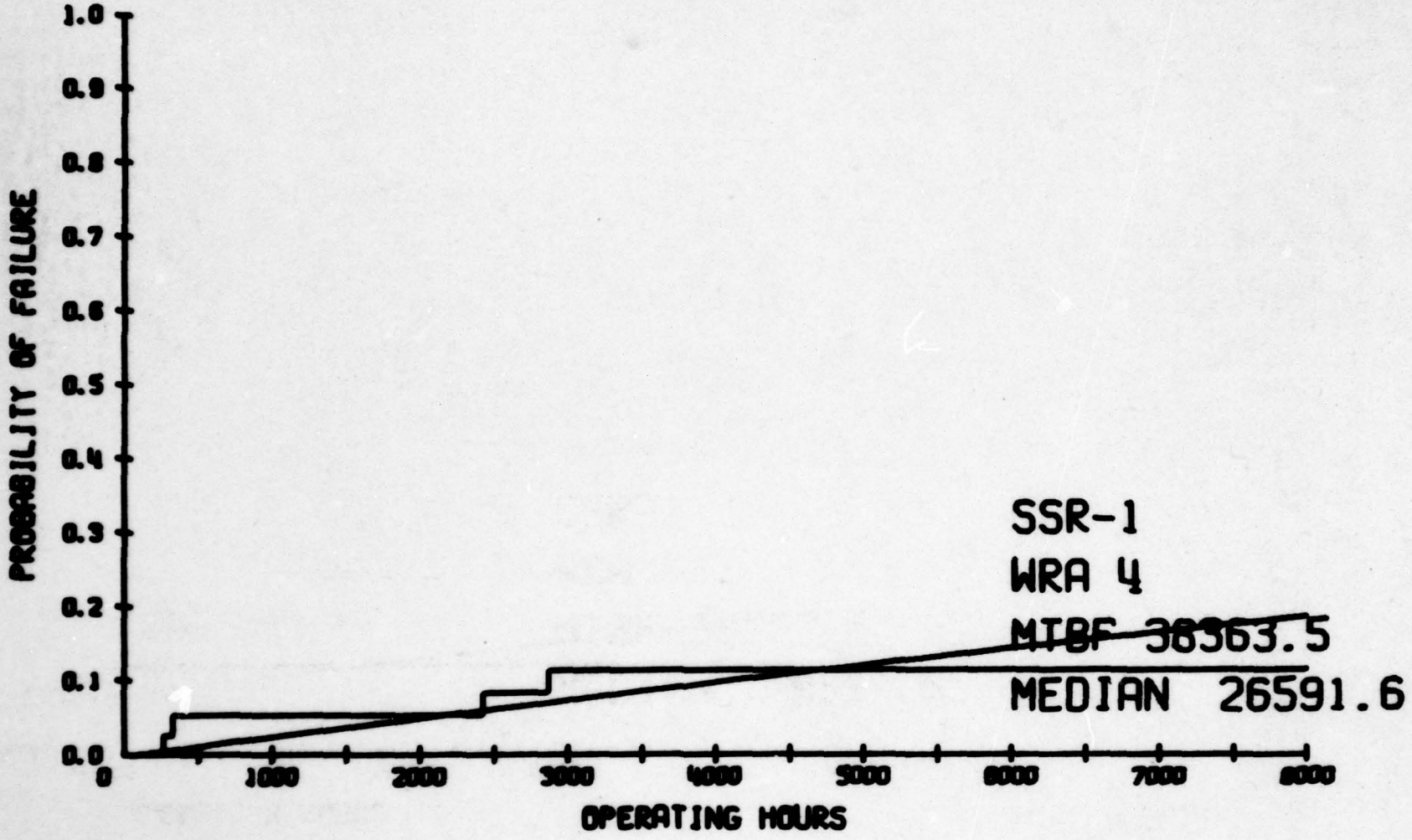
LESS THAN FOUR FAILURES THE EXPONENTIAL DISTRIBUTION IS ASSUMED

FOR THE ASSUMED DISTRIBUTION

EST. MEAN = 51151.367, EST. MEDIAN = 35455.426, 90 PER CENT LCL FOR MEAN = 22969.4, 90 PER CENT UCL FOR MEAN = 139242.331

90 PERCENT UCL 139242.33 IS GREATER THAN 1440.00 HOURS, THEREFORE THE EQUIPMENT MEETS THE SPECIFICATIONS

CUMULATIVE OBSERVED DISTRIBUTION VERSUS THEORETICAL
EXPONENTIAL PROBABILITY DISTRIBUTION FOR TIME TO FAILURE



RELIABILITY

SSR-1 WRA 4 LEVEL

TIME TO FAIL	NO. FAILURES	NO. CENSORED	SURVIVORS	CPDF	EXPONENTIAL	MAX DIFFERENCE
119.0		1.				
265.0	1.		35.	.028	.007	.021
335.0	1.		34.	.056	.009	.047
1367.1		1.				
1685.0		1.				
1827.3		1.				
2436.0	1.		30.	.086	.062	.024
2877.9	1.		29.	.116	.072	.044
3391.4		1.				
3401.6		1.				
3436.4		1.				
3466.2		1.				
3510.6		1.				
3541.8		1.				
4088.3		1.				
4201.5		1.				
4557.9		1.				
4652.1		1.				
4662.3		1.				
4709.3		1.				
4879.1		1.				
4923.1		1.				
4930.0		1.				
5071.9		1.				
5095.8		1.				
5247.5		1.				
5348.0		1.				
5974.0		1.				
6147.8		1.				
6274.6		1.				
6381.0		1.				
6596.2		1.				
6651.5		1.				
6940.6		1.				
7004.8		1.				
7460.5		1.				

R E L I A B I L I T Y

SSR-1 WRA 4 LEVEL

EQUIPMENT OPERATING HOURS (O.H.) =153454.1 CALENDAR HOURS(C.H.) =, 204024.0 DUTY CYCLE (O.H./C.H.) = .752

NUMBER OF FAILURES = 4. OBSERVED FAILURE RATE/O.H. = .26066E-04

DISTRIBUTION DETERMINATION,

K-S CRITICAL VALUE (.10, 4.) = .449

MAX DIFF CALC = .047, IS LESS THAN CRITICAL VALUE THEREFORE THE EXPONENTIAL DISTRIBUTION IS ASSUMED

FOR THE ASSUMED DISTRIBUTION

EST. MEAN = 38363.525, EST. MEDIAN = 26591.569, 90 PER CENT LCL FOR MEAN = 19197.2, 90 PER CENT UCL FOR MEAN = 87930.905

90 PERCENT UCL 87950.90 IS GREATER THAN 3542.00 HOURS, THEREFORE THE EQUIPMENT MEETS THE SPECIFICATIONS

R E L I A B I L I T Y

SSR-1 WRA 9 LEVEL

TIME TO FAIL	NO. FAILURES	NO. CENSORED
119.0		1.
482.8	1.	
1438.7	1.	
1469.9		1.
1632.1		1.
1827.3		1.
3436.4		1.
3466.2		1.
3510.6		1.
3541.8		1.
4088.3		1.
4201.5		1.
4456.0		1.
4557.9		1.
4652.1		1.
4662.3		1.
4709.3		1.
4875.1		1.
4923.1		1.
4930.0		1.
5071.9		1.
5095.8		1.
5247.5		1.
5348.0		1.
5974.0		1.
6147.8		1.
6274.6		1.
6279.5		1.
6381.0		1.
6596.2		1.
6651.5		1.
6940.6		1.
7004.8		1.
7460.5		1.

EQUIPMENT OPERATING HOURS (O.H.) =153454.1 CALENDAR HOURS(C.H.) =, 204024.0 DUTY CYCLE (O.H./C.H.) = .752

NUMBER OF FAILURES = 2. OBSERVED FAILURE RATE/O.H. = .13033E-04

LESS THAN FOUR FAILURES THE EXPONENTIAL DISTRIBUTION IS ASSUMED

FOR THE ASSUMED DISTRIBUTION

EST. MEAN = 76727.050, EST. MEDIAN = 53183.138, 90 PER CENT LCL FOR MEAN = 28832.3, 90 PER CENT UCL FOR MEAN = 288549.796

90 PERCENT UCL 288549.80 IS LESS THAN 2000000.00 HOURS, THUS A RELIABILITY PROBLEM EXISTS

RELIABILITY

SSR-1 O-LEVEL SUMMARY

WRA	O-LEVEL BLOCK	O-LEVEL NO.	O-LEVEL NOMENCLATURE	NUMBER FAILURES	LOWER 90 CONF LIM	MEAN	UPPER 90 CONF LIM	SPEC MTBF	OBSERVED FAILURE TIMES LOW	OBSERVED FAILURE TIMES HIGH	RELIAB PROBLEM
3	4	5A1A2	AMPLIFIER FILTER	1.	39451.19	153454.10	1456473.99	2223.00	1302.30	1302.30	NO
3	6	5A1A5	FM/PSK DEMOD	2.	28832.29	76727.05	288549.80	22011.00	2323.30	4158.00	NO
4	17	6A1A3	TTY SW DRIVER	4.	19197.24	38363.52	87950.90	8223.00	265.00	2877.90	NO
9	999			2.	28832.29	76727.05	288549.80	2000000.00	482.80	1438.70	YES

R E L I A B I L I T Y

2K SUMMARY FOR SSR-1 PROBLEM AREAS

JCN	SYSTEM	WRA	O-L	O-L	O-L	SYSTEM SYMPTON	DIAGNOSTIC	RESULTS
52704WP01	1	9	999	0	0	PSB	NO SIG	NO CORRECTIVENEC. CHANGE AREA
52704WP01	1	9	999	0	0	QSB		

FLEET MAINTAINABILITY ASSESSMENT DATA

WRA	OL1	OL2	OL3	DISCOVERY DATE	COMPLETION DATE	DOWN TIME (HRS)	REPAIR TIME (HRS)	SYS	UIC
3	4	0	0	6236	6236	2.0	2.0	1	03368
3	6	0	0	6279	6279	0.0	0.0	1	03368
			NO REPAIR TIME FOR THE ABOVE RECORD						
4	17	0	0	6336	6336	1.0	1.0	1	20067
4	17	0	0	6203	6215	288.0	1.0	1	20071
3	6	0	0	7001	7001	1.0	1.0	1	20074
4	17	0	0	6282	6282	2.0	2.0	1	52703
4	17	0	0	6296	6296	1.0	1.0	1	52703
9	999	0	0	6214	6214	0.0	0.0	1	52704
			NO REPAIR TIME FOR THE ABOVE RECORD						
9	999	0	0	6241	6241	0.0	0.0	1	52704
			NO REPAIR TIME FOR THE ABOVE RECORD						

MAINTAINABILITY (REPAIR TIME)

SSR-1 SYSTEM LEVEL

REPAIR TIME	FREQUENCY	CUM FREQUENCY	NPF	LOGNORMAL	MAX DIFFERENCE
1.0	4.	4.0	.571	.259	.312
2.0	2.	6.0	.857	.902	.330

TOTAL REPAIR HOURS = 8.0 NUMBER OF REPAIRS = 6. OBSERVED REPAIR RATE/HR = .7500E+00

DISTRIBUTION DETERMINATION

MEAN OF LN'S = .23 STD DEV OF LN'S = .36

LESS THAN FOUR DISTINCT REPAIR TIMES

THEREFORE THE LOGNORMAL DISTRIBUTION IS ASSUMED

EST MEAN = 1.33 EST MEDIAN = 1.26 90 PER CENT LCL ON MEDIAN = 1.02 90 PER CENT UCL ON MEDIAN = 1.56

SPECIFIED MTTR = .20 HOURS LOWER CONF LIM 1.02 IS GREATER THAN MTTR, THUS A MAINTAINABILITY PROBLEM EXISTS

MAINTAINABILITY (DOWN TIME)

SSR-1 SYSTEM LEVEL

DOWN TIME	FREQUENCY	CUM FREQUENCY	NPF	LOGNORMAL	MAX DIFFERENCE
1.0	3.	3.0	.429	.299	.130
2.0	2.	5.0	.714	.414	.300
288.0	1.	6.0	.857	.978	.264

TOTAL DOWN TIME (TDT) = 295.0 NUMBER OF REPAIRS (NR) = 6. OBSERVED DOWN TIME/REPAIR (TDT/NR) = 49.17

DISTRIBUTION DETERMINATION

MEAN OF LN'S = 1.17 STD DEV OF LN'S = 2.22

LESS THAN FOUR DISTINCT REPAIR TIMES

THEREFORE THE LOGNORMAL DISTRIBUTION IS ASSUMED

EST MEAN = 49.17 EST MEDIAN = 3.24 90 PER CENT LCL ON MEDIAN = .85 90 PER CENT UCL ON MEDIAN = 12.37

MAINTAINABILITY (REPAIR TIME)

SSR-1 WRA 3 LEVEL

REPAIR TIME	FREQUENCY	CUM FREQUENCY	NPF	LOGNORMAL	MAX DIFFERENCE
1.0	1.	1.0	.333	.240	.094
2.0	1.	2.0	.667	.760	.427

TOTAL REPAIR HOURS = 3.0 NUMBER OF REPAIRS = 2. OBSERVED REPAIR RATE/HR = .6667E+00

DISTRIBUTION DETERMINATION

MEAN OF LN'S = .35 STD DEV OF LN'S = .49

LESS THAN FOUR DISTINCT REPAIR TIMES

THEREFORE THE LOGNORMAL DISTRIBUTION IS ASSUMED

EST MEAN = 1.50 EST MEDIAN = 1.41 90 PER CENT LCL ON MEDIAN = .49 90 PER CENT UCL ON MEDIAN = 4.11

SPECIFIED MTTR = .20 HOURS LOWER CONF LIM .49 IS GREATER THAN MTTR, THUS A MAINTAINABILITY PROBLEM EXISTS

MAINTAINABILITY (REPAIR TIME)

SSR-1 WRA 4 LEVEL

REPAIR TIME	FREQUENCY	CUM FREQUENCY	NPF	LOGNORMAL	MAX DIFFERENCE
1.0	3.	3.0	.600	.309	.292
2.0	1.	4.0	.800	.933	.333

TOTAL REPAIR HOURS = 5.0 NUMBER OF REPAIRS = 4. OBSERVED REPAIR RATE/HR = .8000E+00

DISTRIBUTION DETERMINATION

MEAN OF LN'S = .17 STD DEV OF LN'S = .35

LESS THAN FOUR DISTINCT REPAIR TIMES

THEREFORE THE LOGNORMAL DISTRIBUTION IS ASSUMED

EST MEAN = 1.25 EST MEDIAN = 1.19 90 PER CENT LCL ON MEDIAN = .90 90 PER CENT UCL ON MEDIAN = 1.58

SPECIFIED MTTR = .20 HOURS LOWER CONF LIM .90 IS GREATER THAN MTTR, THUS A MAINTAINABILITY PROBLEM EXISTS

MAINTAINABILITY (REPAIR TIME)

SSR-1 O-LEVEL SUMMARY

WRA	O-LEVEL BLOCK	O-LEVEL NO.	O-LEVEL NOMENCLATURE	NUMBER REPAIRS	LOWER 90 CONF LIM	UPPER 90 CONF LIM	SPEC MTTR	OBSERVED REPAIR TIMES LOW	MEAN	HIGH	MAINT PROBLEM
3	4	5A1A2	AMPLIFIER FILTER	1.	NO CONF LIMITS		.2	2.0	2.00	2.0	
3	6	5A1A5	FM/PSK DEMOD	1.	NO CONF LIMITS		.2	1.0	1.00	1.0	
4	17	6A1A3	TTY SW DRIVER	4.	.90	1.58	.2	1.0	1.25	2.0	YES

MAINTAINABILITY (REPAIR TIME)

2K SUMMARY FOR SSR-1 PROBLEM AREAS

JCN	SYSTEM	WRA	O-L	O-L	O-L	SYSTEM SYMPTON	DIAGNOSTIC	RESULTS
03368DE021357	1	3	4	0	0	GARBLEDCOPY	BITE IN	DRPL AMP FIL
03368DE021437	1	3	6	0	0	GARBLE CPY	FLT LIT	EREPLACED FM/PSKDMD
20067DE01M345	1	4	17	0	0	NO COPY C10		R R TTY DVR
20071DE01M144	1	4	17	0	0	TTY CH INOP		RPL TTY SW DRIVER
20074	1	3	6	0	0	UNKN		R R PSK DEMOD
52703DE010363	1	4	17	0	0	NO KEY CH9	HI T H	R R TTY DVR
52703DE010373	1	4	17	0	0	NO KEY CH10	HI H T	A/C POOR-VENTL BAD

RMA SUMMARY SSW-1 SYSTEM LEVEL

TTF DISTRIBUTION IS EXPONENTIAL WITH MEAN = 17050.46

DT DISTRIBUTION IS LOGNORMAL WITH MEAN OF LNS = 1.17000 AND STANDARD DEVIATION OF LNS = 2.22000

RT DISTRIBUTION IS LOGNORMAL WITH MEAN OF LNS = .23000 AND STANDARD DEVIATION OF LNS = .36000

INHERENT AVAILABILITY = MTBF/(MTBF+MTTR)

MEAN TIME TO FAILURE = 17050.46

MEAN REPAIR TIME = 1.34

INHERENT AVAILABILITY = .9999

OBSERVED AVAILABILITY (SIMULATION OF RATIOS TTF/(TTF+DT))

90 PERCENT LCL ON INDIVIDUALS = .9809

90 PERCENT UCL ON INDIVIDUALS = .9979

MEAN = .9934

MEDIAN = .9894