

NAVSEA 0967-LP-137-3040

Revised

0967-LP-137-3041 T-1

0967-LP-137-3042 T-2

0967-LP-137-3043 T-3

MAINTENANCE STANDARDS BOOK

FOR

RADIO RECEIVING SETS

AN/WRR-2, -2A

AND

AN/FRR-59, -59A

SERIAL _____

OF MODEL _____

PUBLISHED BY DIRECTION OF
COMMANDER, NAVAL SEA SYSTEMS COMMAND

PUBLICATION: 6 APRIL 1964

TEMPORARY CHANGE T-1 NAVSHIPS 0967-137-3041 TO MAINTENANCE
STANDARDS BOOK FOR RADIO RECEIVING SETS AN/WRR-2, -2A AND
AN/FRR-59, -59A NAVSHIPS 0967-137-3040 (Formerly NAVSHIPS 94715.42)

1. This temporary change is in effect after Field Change 1-AN/WRR-2 or Field Change 1-AN/FRR-59 has been made. Therefore, do not correct the book until after the field change has been made.
2. This temporary change changes the book to reflect the equipment changes made by Field Change 1-AN/WRR-2 or Field Change 1-AN/FRR-59. The field change applies to all sets and its purpose is to provide improved tuning capability and to improve reliability and performance.
3. Make the following pen and ink corrections. Insert this temporary change in the maintenance standards book immediately after the front cover and preceding the title page.

20 October 1966

<u>Page</u>	<u>Paragraph, Table Figure or Step</u>	<u>Action</u>
1	Step No. (D2) (a)	Under PROCEDURE:, in the second line, cross out "* (1 KC)"
1	Step No. (D2) (b)	Under PROCEDURE:, in the seventh and eighth lines, cross out both references to "* (1 KC)"
1	Footnote	Cross out the footnote "* Models AN/WRR-2 and AN/FRR-59"
7	Step No. (S4)	Under OPERATING CONDITIONS AND CONTROL SETTINGS:, in the second line, cross out "** (1 KC)"

T-2

NAVSHIPS 0967-137-3042

UNCLASSIFIED

February 1967

TEMPORARY CHANGE T-2 to MAINTENANCE STANDARDS BOOK for RADIO RECEIVING SETS AN/WRR-2, 2A and AN/PRR-59, 59A NAVSHIPS 0967-137-3040 (Formerly NAVSHIPS 94715.42).

This temporary change contains information originally published as separate articles (Technical Manual Corrections) in the Electronics Information Bulletin, (EIB), number: 663.

The instructions, described herein, for making these changes shall be followed only if they have not been previously accomplished at the time the EIB, in which the information appeared, was received.

The purpose of this Temporary Change is to assure that publications drawn from stock, subsequent to publication of this information in the EIB, can be corrected.

Insert this Temporary Change in the book immediately behind the front cover and preceding the title page or preceding the latest change or correction in effect.

Make pen-and-ink corrections or changes to the book as follows:

1. Under Operating Conditions and Control Settings for Quarterly Step Q19 add: "BFO OFF."
2. Quarterly Step Q26 - at end of procedure add: "Remove test lead from J505 and replace P511."
3. Under Operating Conditions and Control Settings for U1 through U5 add: "Terminal measured will be determined by the connections made during installation."
4. Unscheduled Step U2 - under reference standards column change "6.3VAC" to "5.4VAC."

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T-3
NAVSHIPS 0967-137-3043

UNCLASSIFIED

SEPTEMBER 1969

Temporary Change T-1 to Maintenance Standards Book for AN/WRR-2, 2A and AN/FRR-59,59A NAVSHIPS 0967-137-3040

The purpose of this temporary change is to correct errors and/or update data in the original publication. This article appeared in EIB 746.

This temporary change does not supersede any other corrections or changes.

Maintenance support activities and holders of equipment accompanied by maintenance standards books shall make this temporary change in the book immediately upon receipt.

Insert this temporary change in the book immediately after the front cover and preceding the title page or prior changes or temporary corrections in effect. Make pen-and-ink changes in the book as follows:

Page 6, step No. Q27-Under Reference Standard
Column insert "MAX" after 10DB.

T-3
NAVSHIPS 0967-137-3043

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PAGE 1 (of 1)

LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Original		
ii through xi	Original		
1 through 14	Original		

NATIONAL COMPANY INC., MALDEN, MASSACHUSETTS, CONTRACT NO. NObsr-91085

This book supersedes NAVSHIPS 93550.42

Errors found in this publication (other than obvious typographical errors), which have not been corrected by means of Temporary or Permanent Changes should be reported on the User Activity Technical Manual Comment Sheet NAVSHIPS 4914 (10-62) FSN 0105-503-9850 located at the back of this book. Such report should include the complete title of the publication and the publication number (short title). Identify the page and line or figure and location of the error, and forward report to the Fleet Electronics Effectiveness Branch, Electronics Publications Section, Bureau of Ships, Washington 25, D. C.

GENERAL

Maintenance Standards Books are issued for most Navy electronic equipments, and are the basic element of the POMSEE Program. This Maintenance Standards Book is assigned permanently to the specific equipment installation indicated on the cover and title page. Information regarding the POMSEE Program is contained in the Electronic Installation and Maintenance Book (EIMB).

The purpose of this book is to describe a series of specially developed preventive-maintenance and performance monitoring procedures which, when performed as directed, will reveal areas of subnormal performance and provide for effective mechanical and electrical maintenance of the equipment. Those procedures designated "Reference Standards Tests" are accomplished by the installing activity when the specified equipment is operating properly to provide a series of reference standards which collectively represent normal performance. Comparison of the results of the scheduled performance monitoring procedures with the reference standards, and proper analysis and correction of any abnormal results, together with the accomplishment of scheduled preventive maintenance will insure proper equipment performance and serve to avert impending failure during the service life of the equipment.

Reference Standards Tests. - The tests for establishing the reference standards are given in the list of "Reference Standards Tests" on page x. The procedures for performing the tests are located throughout the text portion of the book, and are referred to in the list. All procedures designated by step numbers enclosed in stars are referred to in the Performance Standards Sheet for the equipment which is contained in NAVSHIPS 93000.

Preventive-Maintenance Procedures. - The preventive-maintenance and performance monitoring procedures are presented in procedural tables and are to be performed by the equipment operator or maintenance technician as scheduled; most procedures are scheduled for regular periods (daily, weekly, quarterly, etc). Accompanying each Performance Standards step, or group of steps that requires the recording of a measurement, is a two-year chart. Unscheduled procedures are to be performed when the results from a related procedure indicates trouble.

At the top of each procedural table is a list of operating conditions and control settings which apply to the entire table unless noted otherwise in the procedure given for each step. The table on page viii indicates the initial settings of operating controls for each mode of reception. After performing the procedures, return all operating controls, switches, etc, to their initial positions. Step numbers on illustrations correspond to the procedural step numbers to which they relate.

Test Equipment and the Estimated Time Required to Perform the Maintenance Schedules. - The test equipment and the estimated time required to perform the maintenance schedules are itemized on page vi.

INSTRUCTIONS

Upon Receipt of This Book. - Record on both the cover and title page the serial number, and, if applicable, the model number of the equipment to which this book is assigned.

At Time of Installation or Equipment Overhaul (To be accomplished by experienced technical personnel). - Establish the reference standards upon receipt of this book, and re-establish them after each equipment overhaul. Before establishing the reference standards, check the equipment thoroughly to insure that it is operating within the design capabilities (See Table I of the Performance Standards Sheet for this equipment). Record the input voltage and frequency to the equipment, and make the prescribed tests listed on pages x and xi. Record the results in the spaces provided in the procedural tables for the appropriate steps. Explicitly follow all instructions so that the reference standards obtained provide for valid comparisons when the preventive-maintenance values are subsequently compared with them.

INSTRUCTIONS (Continued)

NOTE: The reference standard tolerances indicate the maximum and minimum limits of a test within which satisfactory operation can be expected for units of the same model. The tolerances are not to be construed as absolute limits, since they are not necessarily developed from a complete evaluation. However, if any tolerance appears unreasonable when compared with the result of the test, the accomplishment of the test shall be certified as accurate by an Electronics Engineer, and the Bureau of Ships shall be so notified by a note on the completed Reference Standards Summary Sheet.

Transcribe all reference standards entered in the book onto the two Reference Standards Summary Sheets contained in the front of the book. Forward one completed sheet to: Fleet Electronics Effectiveness Branch, Electronics Division, Bureau of Ships, Washington 25, D. C., and retain the second sheet with this book.

Scheduled Maintenance (To be accomplished by the operating activity). - Use this book to augment the preventive-maintenance schedule.

Preventive-maintenance procedures which can not normally be performed when the ship is underway are identified by the term "IN PORT". The steps are to be accomplished during an in-port period which coincides as closely as possible with the period for which they are scheduled.

Upon completion of each performance monitoring procedure, log and/or compare the results with the reference standard. Comparison of a given indication with indications previously obtained, and with the reference standard, will quickly reveal any significant change. Significant changes or indications which vary progressively each time the check is made indicate improper equipment operation or impending failure, and corrective measures should be taken.

When the actual time to perform the tests can be determined, enter the date on page vi.

Field Changes. - Enter field change information concerning changes made on the equipment subsequent to publication of this Maintenance Standards Book on page iii. When the affected step is a reference standard test, obtain and enter a new reference standard.

Replacement Books. - When a new book is obtained, transcribe all reference standards and field change information in the replacement book.

In-Port Procedures. - Do not energize the equipment for the sole purpose of making checks. However, energize the equipment at least once a week, and at least two days before getting underway. Use ship's normal or emergency power to conduct all checks. Enter "IP" in the chart as appropriate.

When it is Impractical To Perform Scheduled Maintenance. - Enter justification or applicable code letter on the schedule, as appropriate, whenever non-compliance with the schedule is justified, and reschedule the step as early as possible.

CODE	JUSTIFICATION	CODE	JUSTIFICATION
CO	Equipment in continuous operation	RIM	For the reason stated in the margin (state reason in margin)
E	Emergency (power failure, drills, etc)	SO	Submerged operations
IP	In port	TENA	Test equipment not available
NR	Emission or mode not required	UFT	An unnecessarily frequent test; the period has been changed to a _____ check (state period of accomplishment). Report to Type Commander.
NR(H)	Not required on the basis of equipment history and usage	W	Weather conditions
O	Equipment undergoing overhaul		
R	Equipment under repair		

TEST EQUIPMENT

TEST PARAMETERS AND ACCURACIES	TEST EQUIPMENT REQUIRED			PERIOD			
	CATEGORY	RECOMMENDED	ALTERNATE	D	Q	S	U
100-110 vdc; 135-165 vdc; 160-200 vdc; 6.3 vac; 105-125 vac; ±5%	Multimeter	AN/PSM-4()	TS-352()/U				X
0.5 vdc; ±5%	Electronic Multimeter	AN/USM-116	AN/USM-34		X		
80 kc; 2-32 mc; 30% modulation, 1000 cps	R. F. Signal Generator	AN/URM-25			X	X	
1 mc; accuracy 1 part in 10 ⁸	Frequency Standard	AN/URQ-10	AN/URQ-9	X			
10-sec intervals	Stopwatch			X			

POMSEE TIME SCHEDULE*

TIME REQUIRED			TIME REQUIRED			TIME REQUIRED		
SCHED	EST	ACTUAL	SCHED	EST	ACTUAL	SCHED	EST	ACTUAL
D1	10 min		Q15	5 min		S2	5 min	
D2	20 min		Q16	5 min		S3	5 min	
Q1	5 min		Q17	5 min		S4	5 min	
Q2	5 min		Q18	5 min		S5	5 min	
Q3	5 min		Q19	10 min		S6	20 min	
Q4	5 min		Q20	10 min		S7	20 min	
Q5	5 min		Q21	10 min		S8	20 min	
Q6	5 min		Q22	10 min		U1	5 min	
Q7	5 min		Q23	10 min		U2	5 min	
Q8	5 min		Q24	10 min		U3	5 min	
Q9	5 min		Q25	10 min		U4	5 min	
Q10	5 min		Q26	10 min		U5	5 min	
Q11	5 min		Q27	10 min		U6	5 min	
Q12	5 min		Q28	10 min		U7	5 min	
Q13	5 min		Q29	35 min		U8	20 min	
Q14	5 min		S1	5 min		U9	15 min	
						U10	10 min	

TOTAL TIME**

SCHEDULE	EST	ACTUAL	SCHEDULE	EST	ACTUAL
Daily	30 min		Un-Scheduled	1-1/5 hr	
Quarterly	3-3/4 hr		Per Quarter	50-1/5 hr	
Semi-Annually	1-1/2 hr		Ave Per Day	33 min	

* Estimated time is based only on making test connections and performing the written procedures.
 ** Estimated time is based on the consecutive performance of all tests scheduled for each time period (eg, monthly); this includes time for concurrent warm-up of test equipment, calibration, and minor adjustments, but does not include time required to draw or return test equipment.

SPECIAL PROCEDURES

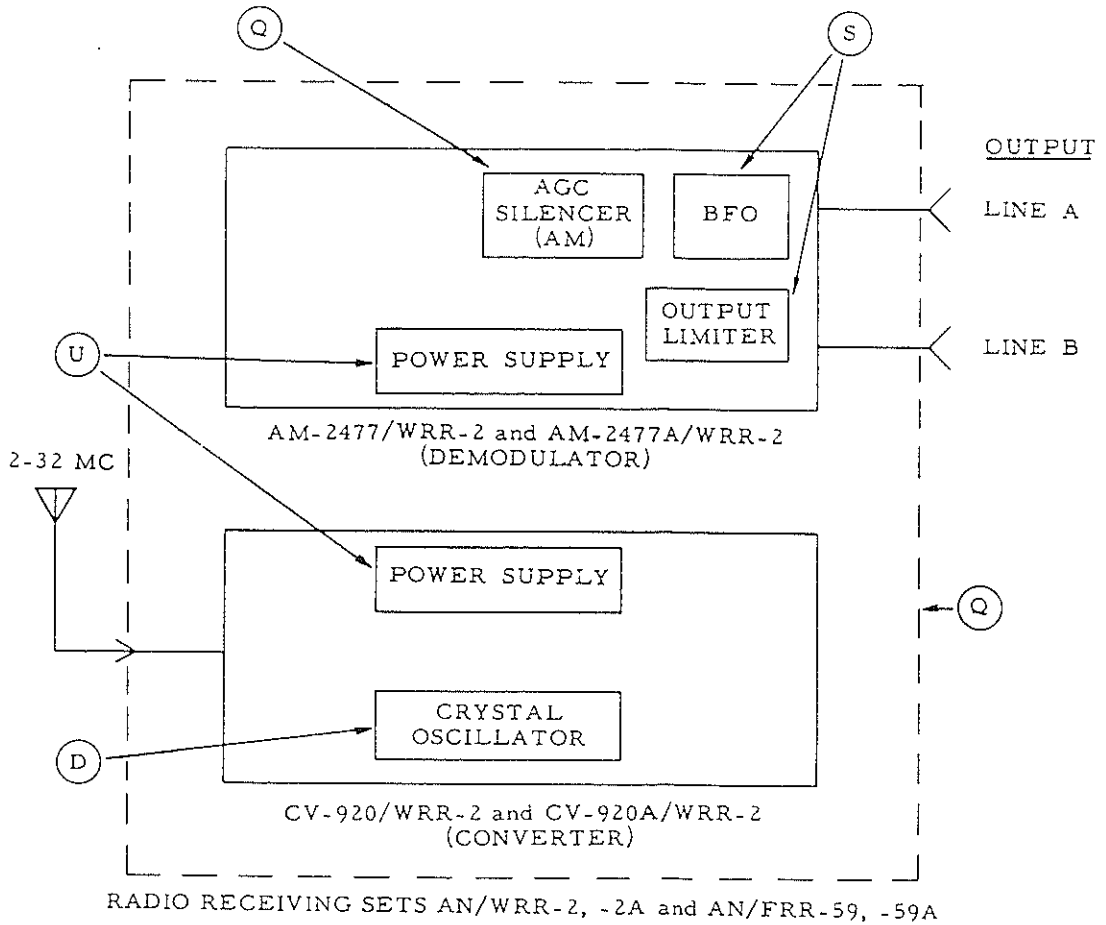
1. To energize Radio Receiving Sets AN/WRR-2, -2A and AN/FRR-59, -59A follow the instructions contained in the Technical Manual, NAVSHIPS 93550 and 94715. Before taking reference-standard measurements, allow 60 minutes warm-up time.
2. "Full Operation", unless otherwise specified, means that the equipment is operating under full load with all controls in their normal positions for the functions listed.
3. Disconnect all test equipment at the completion of a reference-standards procedure. All cables, terminal board connections, tubes, etc, which have been disconnected or removed in the course of a reference-standards procedure shall be restored to their original positions when the procedure is completed.
4. All operating controls, unless otherwise specified, shall be set as shown in the table on page viii to condition the receiver for various modes of reception. If the setting of any control is changed during a reference-standards measurement, the control shall be returned to its specified position when the reference-standard procedure is completed.
5. All receiver tuning controls (including TUNING $\Delta F = 100$ KC, TUNING (KC), H. F. ADJ., and ANT. COMP.), unless otherwise specified, are to be used in accordance with the tuning procedures contained in the Technical Manual.
6. The INT. STD. PHASE/TEMP switch, unless otherwise specified, shall be left in the TEMP position. Unless an external frequency standard is being used the FREQ. STAND. switch shall be left in the INT. STD. position.
7. Use of the signal generator for signal injection at various stage inputs presupposes proper termination of the generator output for proper signal level indications on its self-contained meter. Failure to provide a 50 ohm termination at the generator output will result in erroneous meter indications. When the generator output is applied directly to the 50 ohm antenna input terminals of the receiver, the generator is effectively terminated at 50 ohms and further loading is unnecessary.
8. In all procedures involving readings on LINE A OUTPUT meter (M651) and Line B OUTPUT meter (M652), the audio output connections must be terminated with 600-ohm noninductive resistors. Voltage measurements across these loads (made with Electronic Multimeter AN/USM-116) serve either as check on the meter readings or as an alternate procedure where marginal results are obtained with the output meters as indicators. The following lists gives the voltage equivalents of the db scale markings on the LINE A OUTPUT and LINE B OUTPUT meters.

<u>Scale db</u>	<u>Volts (rms)</u>
-12	0.19
-2	0.60
0	0.76
+4	1.20
+7	1.69
+8	1.90
+12	3.01
+13	3.38
+18	6.00
+22	9.52

OPERATING CONTROL ADJUSTMENTS

CONTROL	MODES OF RECEPTION					
	A1 (CW)	A2 (MCW)	A3 (AM)	F4 (FAX)	A9 (SSB)	F1 (FSK)
R. F. GAIN	As re- quired	As re- quired	Max. CW	Max. CW	Max. CW	Max. CW
TUNING switch	CONT.	CONT.	CONT.	CONT.	.5 KC *(1 KC)	CONT.
A. F. LEVEL-LINE A	Not used	Not used	Not used	Not used	As re- quired	Not used
A. F. LEVEL-LINE B	Not used	Not used	Not used	Not used	As re- quired	Not used
*(UPPER SILENCER) switch	Not used	Not used	Not used	Not used	As re- quired	Not used
*(LOWER SILENCER) switch	Not used	Not used	Not used	Not used	As re- quired	Not used
RECEPTION switch	A. M.	A. M.	A. M.	A. M.	S.S.B.	A. M.
A. G. C. UPPER-SSB switch	Not used	Not used	Not used	Not used	ON	Not used
A. G. C. UPPER-SLOW/FAST switch	Not used	Not used	Not used	Not used	FAST	Not used
A. G. C. LOWER SSB	Not used	Not used	Not used	Not used	ON	Not used

BLOCK DIAGRAM



SCHEDULED MAINTENANCE PERIODS

- | | |
|---------------|-------------------|
| D - DAILY | S - SEMI-ANNUALLY |
| Q - QUARTERLY | U - UNSCHEDULED |

REFERENCE STANDARDS TESTS

SECTION	ACTION REQUIRED	REFER TO	
		STEP	PAGE
CRYSTAL OSC.	Record accuracy of the crystal oscillator frequency.	(D1)	0
*POWER	Record primary a-c input voltage to converter power supply.	(U1)	10
	Record regulated heater supply voltage to HF oscillator.	(U2)	10
	Record regulated plate supply voltage to interpolation oscillator	(U3)	10
	Record regulated plate supply voltage to HF oscillator	(U4)	10
	Record primary a-c input voltage to IF-AF amplifier power supply	(U5)	10
	Record plate supply voltage to LSB audio section	(U6)	10
	Record plate supply voltage to BFO	(U7)	10
OVER-ALL	Record over-all sensitivity of Mode A1 at low end of the 2-4 mc band	(Q1)	2
	Repeat for high end of band	(Q2)	2
	Record over-all sensitivity of Mode A1 at low end of the 4-8 mc band	(Q3)	2
	Repeat for high end of band	(Q4)	2
	Record over-all sensitivity of Mode A1 at low end of the 8-16 mc band	(Q5)	2
	Repeat for high end of band	(Q6)	2
	Record over-all sensitivity of Mode A1 at low end of the 16-32 mc band	(Q7)	2
	Repeat for high end of band	(Q8)	2
	Record over-all sensitivity of Mode A3 at low end of the 2-4 mc band	(Q9)	3
	Repeat for high end of band	(Q10)	3
	Record over-all sensitivity of Mode A3 at low end of the 4-8 mc band	(Q11)	3
	Repeat for high end of band	(Q12)	3

* Input Voltage _____ vac. Input Frequency _____ cps (When Reference Standards Tests are performed).

REFERENCE STANDARDS TESTS (Cont)

SECTION	ACTION REQUIRED	REFER TO	
		STEP	PAGE
OVER-ALL (Cont)	Record over-all sensitivity of Mode A3 at low end of the 8-16 mc band	Q13	3
	Repeat for high end of band	Q14	3
	Record over-all sensitivity of Mode A3 at low end of the 16-32 mc band	Q15	3
	Repeat for high end of band	Q16	4
	Record over-all sensitivity of Mode A9, using upper-sideband detector-amplifier	Q17	4
	Record over-all sensitivity of Mode A9, using lower-sideband detector-amplifier	Q18	4
	Record IF bandwidth at 6 db points, using selectivity of 1.0 kc	Q19	4
	Record IF bandwidth at 60 db points, using selectivity of 1.0 kc	Q20	5
	Record IF bandwidth at 6 db points, using selectivity of 0.350 kc	Q21	5
	Record IF bandwidth at 60 db points, using selectivity of 0.350 kc	Q22	5
	Record IF bandwidth at 6 db points, using selectivity of 3.0 kc	Q23	5
	Record IF bandwidth at 60 db points, using selectivity of 3.0 kc	Q24	5
	Record IF bandwidth at 6 db points, using selectivity of 12.0 kc	Q25	5
	Record IF bandwidth at 60 db points, using selectivity of 12.0 kc	Q26	5
	AGC- SILENCER (A3)	Record AGC action between 5,000 μv and 1 μv	Q27
Record silencer action		Q28	6
OUTPUT LIMITER	Record output limiter action (A1)	S1	7
	Record output limiter action (A3)	S2	7
BFO	Prepare receiver for BFO signal-centering test	S3	7
	Check BFO signal centering	S4	7
	Check beat frequency (VAR. BFO)	S5	8

(D1)

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation
 INT. STD. PHASE/TEMP switch: PHASE (hold)
 FREQ. STAND. switch: INT. STD.
 Accuracy of frequency standard: 1 part in 10^8

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
(D1)	Record accuracy of crystal oscillator output frequency.	PHASE OR TEMP meter	_____ beats (1 beat per 10 seconds, max.)
<p>PROCEDURE: Energize equipment. Connect 1-mc output of the external frequency standard to EXT 1 MC jack (J952). Using the stopwatch, observe the number of beats indicated by deflections of the PHASE OR TEMP meter during a 10-second interval. (One beat is a full deflection and return of the meter pointer.) Record the number of beats observed.</p>			

NOTE

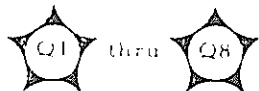
A one-hour equipment warm-up period is required for the crystal oscillator to stabilize with an accuracy of 1 part in 10^7 . A small amount of frequency drift caused by crystal aging may occur over the first year of operation; therefore, a beat count exceeding the reference standard does not necessarily indicate a malfunction. The oscillator frequency can be adjusted to the standard frequency by means of the INTERNAL STANDARD ADJUSTMENT control. See section 6 of the technical manual for details of this adjustment.

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment de-energized
 POWER ON/OFF: OFF

STEP NO.	ACTION REQUIRED
D2	Observe performance of equipment. (See table of operating controls, page viii.)
(a)	Perform preliminary adjustments of controls. PROCEDURE: Place POWER ON/OFF switch in ON position. Frequency counters should light. Set TUNING switch to 0.5 KC * (1 KC) for incremental tuning or to CONT for continuous tuning. Set all other controls for type A3 reception.
(b)	Tune receiver PROCEDURE: Set BAND switch to selected frequency range. Rotate TUNING $\Delta F = 100$ KC control until the first three digits of the frequency (megacycles and tenths of megacycles) appear on the MEGACYCLE counter. (The first digit is zero when the frequency is less than 10 mc.) Adjust for minimum indication on the 100 KC TUNING meter. Rotate the TUNING (KC) control until the kilocycle portion of the selected frequency appears on the KILOCYCLE counter. Adjust for minimum indication on the 0.5 KC * (1 KC) TUNING meter (when the TUNING switch is set to 0.5 * (1 KC). Set the H. F. ADJ. and ANT. COMP. controls for maximum indication on the RESONANCE meter.
(c)	Check AM reception PROCEDURE: Tune the receiver to the operating frequency and check the quality of reception.
(d)	Check SSB reception PROCEDURE: Set the controls as shown in the table on page viii for A9 reception. Tune the receiver to the operating frequency and check the quality of reception. De-energize the receiver by placing the POWER ON/OFF switch in the OFF position.

* Models AN/WRR-2 and AN/FRR-59



OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A1 reception.
O. L. THRESH: OFF

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
Q1	Record over-all sensitivity of Mode A1 at low end of 2-4 mc band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	*PROCEDURE: Connect signal generator to the ANT IN jack (J957). Adjust generator for a 2-mc unmodulated signal and set output at 5 μv . Set BAND selector to 2-4. Tune receiver to 2 mc and adjust the ANT COMP and HF ADJ controls for maximum indication on the RESONANCE meter. Reduce generator output to zero and adjust RF GAIN for a -2 db indication on the LINE A OUTPUT meter. Set generator output to 5 μv and adjust generator frequency for a maximum indication on the RESONANCE meter. Readjust generator output for a +18 db indication on the LINE A OUTPUT meter. Record the generator output in microvolts.		
Q2	Repeat for high end of band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Tune receiver to 4 mc and repeat step Q1.		
Q3	Record over-all sensitivity of Mode A1 at low end of 4-8 mc band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Set BAND selector to 4-8. Tune receiver to 4 mc and repeat step Q1.		
Q4	Repeat for high end of band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Tune receiver to 8 mc and repeat step Q1.		
Q5	Record over-all sensitivity of Mode A1 at low end of 8-16 mc band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Set BAND selector to 8-16. Tune receiver to 8 mc and repeat step Q1.		
Q6	Repeat for high end of band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Tune receiver to 16 mc and repeat step Q1.		
Q7	Record over-all sensitivity of Mode A1 at low end of 16-32 mc band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Set BAND selector to 16-32. Tune receiver to 16 mc and repeat step Q1.		
Q8	Repeat for high end of band.	Signal Generator AN/URM-25	$\overline{\hspace{1cm}}^{\mu\text{V}}$ (1.5 max.)
	PROCEDURE: Tune receiver to 32 mc and repeat step Q1.		

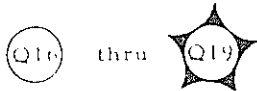
* See step 8 of SPECIAL PROCEDURES, page vii.

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A3 reception.
SILENCER: OFF

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
Q9	Record over-all sensitivity of Mode A3 at low end of 2-4 mc band.	LINE A OUTPUT meter	_____db (+8 db min.)
	*PROCEDURE: Connect signal generator to the ANT IN jack (J957). Adjust generator for a 2-mc signal, modulated 30% at 1000 cps, and set output at 10 μv. Set BAND selector to 2-4. Tune receiver to 2 mc and adjust the ANT COMP and HF ADJ controls for maximum indication on the RESONANCE meter. Remove modulation from signal generator and reduce output to 3 μv. Adjust AM AF LEVEL control for a -2 db indication on the LINE A OUTPUT meter. Add modulation from signal generator and record new indication on LINE A OUTPUT meter.		
Q10	Repeat for high end of band	LINE A OUTPUT meter	_____db (+8 db min.)
	PROCEDURE: Tune receiver to 4 mc and repeat step Q9.		
Q11	Record over-all sensitivity of Mode A3 at low end of 4-8 mc band.	LINE A OUTPUT meter	_____db (+8 db min.)
	PROCEDURE: Set BAND selector to 4-8. Tune receiver to 4 mc and repeat step Q9.		
Q12	Repeat for high end of band.	LINE A OUTPUT meter	_____db (+8 db min.)
	PROCEDURE: Tune receiver to 8 mc and repeat step Q9.		
Q13	Record over-all sensitivity of Mode A3 at low end of 8-16 mc band.	LINE A OUTPUT meter	_____db (+8 db min.)
	PROCEDURE: Set BAND selector to 8-16. Tune receiver to 8 mc and repeat step Q9.		
Q14	Repeat for high end of band	LINE A OUTPUT meter	_____db (+8 db min.)
	PROCEDURE: Tune receiver to 16 mc and repeat step Q9.		
Q15	Record over-all sensitivity of Mode A3 at low end of 16-32 mc band.	LINE A OUTPUT meter	_____db (+8 db min.)
	PROCEDURE: Set BAND selector to 16-32. Tune receiver to 16 mc and repeat step Q9.		

* See step 8 of SPECIAL PROCEDURES, page vii.



OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A3 reception.
SILENCER: OFF

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
Q16	Repeat for high end of band.	LINE A OUTPUT meter	_____ db (+8 db min.)
PROCEDURE: Tune receiver to 32 mc and repeat step Q9.			

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A9 reception. Phones (600 ohms) connected to LINE A PHONES jack (J653).
AGC UPPER SSB: OFF
AGC LOWER SSB: OFF

Q17	Record over-all sensitivity of Mode A9, using upper-sideband detector-amplifier.	Signal Generator AN/URM-25	_____ μ V (2.5 max.)
*PROCEDURE: Connect signal generator to the ANT IN jack (J957). Adjust generator for a 2 mc signal and set output at 5 μ V. Set BAND selector to 2-4. Tune receiver to 2 mc and adjust the ANT COMP and HF ADJ controls for maximum indication on the RESONANCE meter. Tune generator approximately 1 kc above 2 mc at an output level sufficient to produce signal in phones. Reduce generator output to zero and adjust AF LEVEL LINE A control for a -2 db indication on the LINE A OUTPUT meter. Increase generator output until LINE A OUTPUT meter indicates +18 db. Record generator output in microvolts.			
Q18	Record over-all sensitivity of Mode A9, using lower-sideband detector-amplifier.	Signal Generator AN/URM-25	_____ μ V (2.5 max.)
PROCEDURE: Repeat step Q17, tuning generator approximately 1 kc below 2 mc. Adjust AF LEVEL LINE B control for a -2 db indication on LINE B OUTPUT meter (at zero generator output). Complete procedure and record generator output in microvolts.			

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A1 reception.
Remove P511 of coax cable Q617 from J511 of Injection IF Amplifier.

Q19	Record IF bandwidth at 6 db points, using selectivity of 1.0 kc.	Signal Generator AN/URM-25	_____ kc (0.8 to 1.2)
PROCEDURE: Open converter drawer and raise the upper deck to 70°. Pass signal generator output cable through the air-intake behind the filter cover and connect cable to test point J505 on the injection IF amplifier in the lower deck. Lower the upper deck and close the drawer. Connect dc probe of Electronic Multimeter AN/USM-116 to test point J1610 on the AM detector-amplifier (select -1 vdc multimeter range). Tune signal generator to 80 kc (as shown by a maximum indication on the multimeter). Set generator output at 100 μ V. Adjust RF GAIN control for an indication of -0.5 vdc on the multimeter. Double the generator output (to 200 μ V) and carefully tune generator below 80 kc until the multimeter indicates -0.5 vdc, again. Note the generator frequency. Carefully tune generator above 80 kc until the multimeter indicates -0.5 vdc. Note this frequency, also. Record the difference between the two frequencies as the IF bandwidth (6 db points).			

* See step 8 of SPECIAL PROCEDURES, page vii.



OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A1 reception.
Remove P511 of coax cable W617 from J511 of Injection IF Amplifier

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
Q20	Record IF bandwidth at 60 db points, using selectivity of 1.0 kc.	Signal Generator AN/URM-25	_____kc (3.6 max.)
	PROCEDURE: Adjust generator for 100 μ v output and tune it to 80 kc. Adjust RF GAIN control for indication of -0.5 vdc on multimeter. Increase generator output 1,000 times (to 100,000 μ v) and carefully tune generator below 80 kc until multimeter indicates -0.5 vdc, again. Note the generator frequency. Carefully tune generator above 80 kc until multimeter indicates -0.5 vdc. Note this frequency, also. Record the difference between the two frequencies as the IF bandwidth.		
Q21	Record the IF bandwidth at 6 db points, using selectivity of 0.350 kc.	Signal Generator AN/URM-25	_____kc (0.30 to 0.40)
	PROCEDURE: Set the RF SELECTIVITY BW-KCS switch to .350 and repeat step Q19.		
Q22	Record IF bandwidth at 60 db points, using selectivity of 0.350 kc.	Signal Generator AN/URM-25	_____kc (1.60 max.)
	PROCEDURE: Set the RF SELECTIVITY BW-KCS switch to .350 and repeat step Q20.		
Q23	Record the IF bandwidth at 6 db points, using selectivity of 3.0 kc	Signal Generator AN/URM-25	_____kc (2.4 to 3.6)
	PROCEDURE: Set the RF SELECTIVITY BW-KCS switch to 3.0 and repeat step Q19.		
Q24	Record the IF bandwidth at 60 db points, using selectivity of 3.0 kc.	Signal Generator AN/URM-25	_____kc (9.0 max.)
	PROCEDURE: Set the RF SELECTIVITY BW-KCS switch to 3.0 and repeat step Q20.		
Q25	Record the IF bandwidth at 6 db points, using selectivity of 12.0 kc.	Signal Generator AN/URM-25	_____kc (9.6 to 14.4)
	PROCEDURE: Set the RF SELECTIVITY BW-KCS switch to 12.0 and repeat step Q19.		
Q26	Record IF bandwidth at 60 db points, using selectivity of 12.0 kc.	Signal Generator AN/URM-25	_____kc (28.8 max.)
	PROCEDURE: Set RF SELECTIVITY BW-KCS switch to 12.0 and repeat step Q20.		

Q27 thru Q29

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A3 reception.
SILENCER: OFF

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
Q27	Record AGC action for input signal range from 5,000 μ v to 1 μ v.	LINE A OUTPUT meter	_____ db change (10 db)
<p>*PROCEDURE: Connect signal generator to the ANT IN jack (J957). Adjust generator for a 5-mc signal, modulated 30% at 1000 cps, and set output at 5 μv. Set BAND selector to 4-8 and tune receiver to 5 mc. Adjust ANT COMP and HF ADJ controls for a maximum indication on the RESONANCE meter, at the same time reducing the RF GAIN control setting to permit the meter to indicate a peak reading during control adjustment. Increase generator output to 5,000 μv and retune for maximum indication on the RESONANCE meter, while readjusting the RF GAIN control to permit a peak indication. Reset the RF GAIN control to maximum clockwise position. Adjust the AM AF LEVEL control for a +18 db reading on the LINE A OUTPUT meter. Reduce generator output to 1 μv and record the change in the LINE A OUTPUT meter reading.</p>			
Q28	Record AM silencer action.	Signal Generator AN/URM-25	_____ μ v (10 max.)
<p>*PROCEDURE: Connect signal generator to the ANT IN jack (J957). Adjust generator for a 5-mc signal at a level which provides a convenient indication on the LINE A OUTPUT meter. Tune receiver to 5 mc and readjust generator frequency for maximum meter indication. Reduce generator output to zero. Advance SILENCER control until receiver noise just cuts off (LINE A OUTPUT meter indicates zero output). Increase generator output until LINE A OUTPUT meter indicates a reading (threshold point). Record the generator output in microvolts.</p>			
Q29	Clean and recharge air filter.		
<p>PROCEDURE: Remove filter from panel cover. Clean it by applying a stream of cold water at a pressure of 60 to 80 psi. Allow it to dry thoroughly. Recharge by treating the filter with an oil containing an approved, nontoxic, tacky, water-emulsifiable additive (MIL-L-15016, or a similar agent). Remove excess oil and replace filter in filter panel. (Spare filters are shipped without oil treatment and are not to be treated until the filter is to be installed in the receiver.)</p>			

*See step 8 of SPECIAL PROCEDURES, page vii.

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A1 reception.
O. L. THRES: OFF

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
(S1)	Record output limiter action (A1).	LINE A OUTPUT meter	_____db (13 max)
	*PROCEDURE: Connect signal generator to the ANT IN jack (J957). Adjust generator for a 5-mc signal. Tune receiver to 5 mc. Increase generator output and adjust for maximum indication on the LINE A OUTPUT meter. Adjust the ANT COMP and HF ADJ controls for maximum meter indication. Retune generator for maximum indication on the RESONANCE meter, and set output at 1 μ v. Adjust RF GAIN control for an +8 db indication on the LINE A OUTPUT meter. Advance the O. L. THRES. control clockwise from OFF position until the meter reads +7 db. Slowly increase the generator output to 100,000 μ v. Record the indication on the LINE A OUTPUT meter.		
(S2)	Record output limiter action (A3).	LINE A OUTPUT meter	_____db (13 max)
	*PROCEDURE: Adjust receiver and generator for A1 reception with the O. L. THRES. control OFF, at 5 mc as described in step S1. Place B. F. O. switch in OFF position. Set the RF SELECTIVITY BW-KCS switch to 3.0. Adjust generator for an output of 1 μ v, modulated 30% at 1000 cps. Repeat remainder of step S1 and record indication on the LINE A OUTPUT meter for a generator output of 100,000 μ v.		
OPERATING CONDITIONS AND CONTROL SETTINGS:			
Equipment in full operation and conditioned for A1 reception. B. F. O. *(SELECTOR) switch: ON			
(S3)	Prepare receiver for check of BFO signal centering.		
	PROCEDURE: Open the converter drawer and raise its upper deck. Connect a coax cable to test point J702 on the upper panel and pass the other end of the cable through the air intake. Connect the cable to J52 on the preselector first RF amplifier in the lower deck. Lower the upper deck, taking care not to pinch the cable between decks, and close the drawer.		
OPERATING CONDITIONS AND CONTROL SETTINGS:			
Equipment in full operation and conditioned for A1 reception. TUNING switch: 0.5 kc *(1 kc). VAR. B. F. O.: Zero			
(S4)	Check BFO signal centering.		
	PROCEDURE: With coax cable connected as described in step S3, insert the phones (600 ohms) into the LINE A PHONES jack (J653). Set the BAND switch to 2-4. Set the MEGACYCLE counter to 02.0 and the KILOCYCLE counter at 000. (Make final tuning adjustments for dips on the TUNING meters.) Set the BFO switch to ON and listen in the phones. A zero beat carrier hiss (no audible tone) should be heard. If not, adjust the trimmer capacitor designated VAR (on the cover of the BFO assembly) for a zero beat.		

*See step 8 of the SPECIAL PROCEDURES, page vii.
**Models AN/WRR-2 and AN/FRR-59

S5 thru S8

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for A1 reception.
B. F. O. switch: ON
TUNING switch: 0.5 kc *(1 kc)

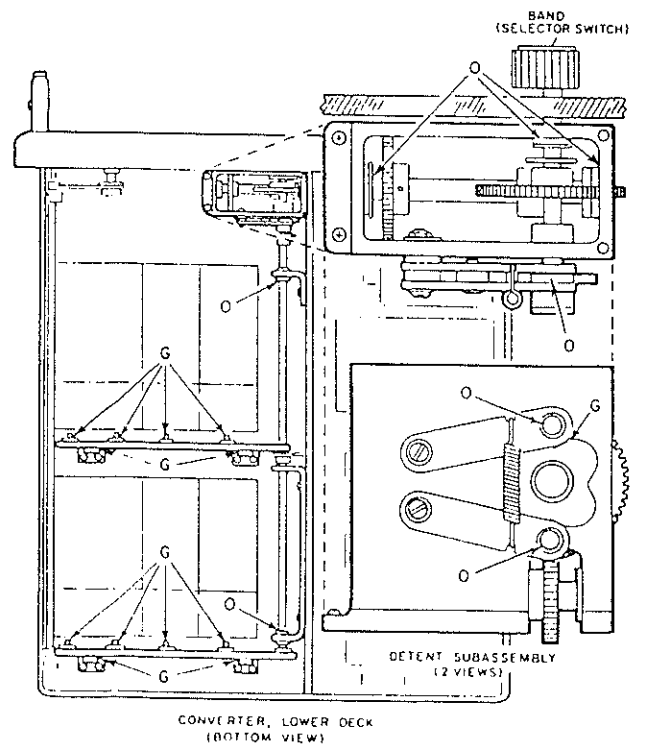
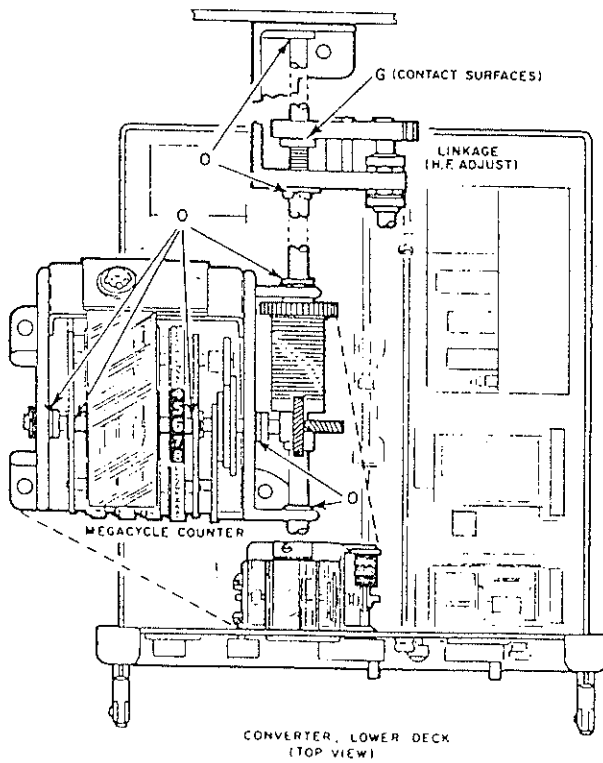
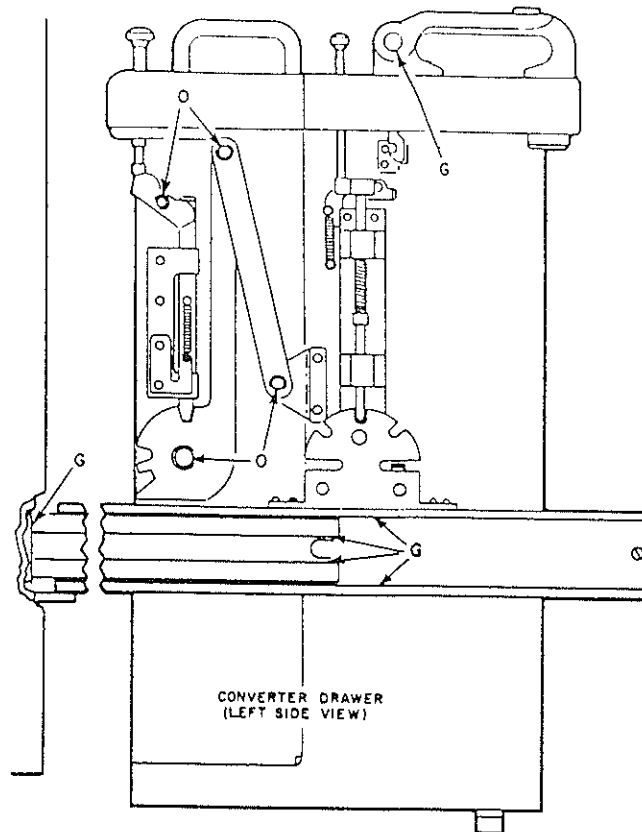
STEP NO.	ACTION REQUIRED
S5	Check beat frequency control Var. B. F. O.
	PROCEDURE: Set the BFO *(SELECTOR) switch to ON, the RF SELECTIVITY I:W-KCS to 12.0, and the KILOCYCLE counter to 030. Rotate the pitch-control knob (VAR. B. F. O.) clockwise towards 10 until zero beat is obtained in the phones. Change the KILOCYCLE counter setting to -970 and rotate the VAR. B. F. O. control counterclockwise towards 10 until zero beat is again obtained. If zero beat occurs on only one side of zero (on the control panel) refer to the technical manual (NAVSHIPS 94715) for alignment of the BFO circuit.

OPERATING CONDITIONS AND CONTROL SETTINGS:

Disconnect POWER IN plug (P1808).
Extend converter drawer and tilt as necessary for access.

STEP NO.	ACTION REQUIRED
S6	Lubricate counter mechanisms.
	PROCEDURE: Lubricate the sleeve bearings of the MEGACYCLE counter mechanism, including the main shaft bearings and those of all four counter shafts (only one is shown). Lubricate the shaft bearings of the INT. STD. LOG counter (not shown) and the HF ADJ. linkage. Grease all worms and pinions (not shown) associated with the tuning mechanism.
S7	Lubricate BAND selector switch.
	PROCEDURE: Lubricate detent assembly on the BAND selector. Apply grease sparingly between the rollers and lobe cam. Rotate the BAND selector through all positions to distribute the grease. Lubricate shaft sleeve bearings and sliding arms of band switching mechanism.
S8	Lubricate drawer mechanisms.
	PROCEDURE: Lubricate the points shown on all slide and tilt mechanisms, including the pivot points of the drawer handles, bracket and index pivots, tumblers, chassis tracks, and the corresponding rails inside the cabinets.

* Models AN/WRR-2 and AN/FRR-59



O - OIL - MIL-L-6085 (1-2 DROPS)
G - GREASE - MIL-G-16908 (VERY LIGHT COAT)

ORIGINAL

U1 thru U7

OPERATING CONDITIONS AND CONTROL SETTINGS:

Equipment in full operation and conditioned for AM reception.

STEP NO.	ACTION REQUIRED	READ INDICATION ON	REFERENCE STANDARD
U1	Record primary a-c input voltage to converter power supply.	Multimeter AN/PSM-4	_____vac (105-125) (See note)
	PROCEDURE: Connect multimeter between terminals 14 and 16 of TB605. Record meter reading.		
U2	Record regulated heater supply voltage to HF oscillator.	Multimeter AN/PSM-4	_____vac (6.3 ±10%)
	PROCEDURE: Connect multimeter between terminal 8 of TB605 and chassis ground. Record meter reading.		
U3	Record regulated plate supply voltage to interpolation oscillator.	Multimeter AN/PSM-4	_____vdc (100-110)
	PROCEDURE: Connect positive lead of multimeter to terminal 4 of TB605 and negative lead to chassis ground. Record meter reading.		
U4	Record regulated plate supply voltage to HF oscillator.	Multimeter AN/PSM-4	_____vdc (100-110)
	PROCEDURE: Connect positive lead of multimeter to terminal 6 of TB605 and negative lead to chassis ground. Record meter reading.		
U5	Record primary a-c input voltage to IF-AF amplifier power supply.	Multimeter AN/PSM-4	_____vac (105-125) (See note)
	PROCEDURE: Connect multimeter between terminals 12 and 14 of TB1201. Record meter reading.		
U6	Record plate supply voltage to LSB audio section.	Multimeter AN/PSM-4	_____vdc (135-165)
	<p>PROCEDURE: Place the RECEPTION switch in SSB position. Connect the positive lead of the multimeter to terminal 2 of TB1201 and the negative lead to chassis ground. Record the meter reading.</p> <p style="text-align: center;">NOTE</p> <p>The primary a-c input voltage measurements (U1, U5) are based on an average value of 115 volts. Power supply transformers (T901 and T1201) are connected for this input voltage prior to shipment of receiver.</p>		
U7	Record plate supply voltage to BFO.	Multimeter AN/PSM-4	_____vdc (160-200)
	PROCEDURE: Connect positive lead of multimeter to terminal 5 of TB1201 and negative lead to chassis ground. Record meter reading.		

AN/WRR-2, -2A
AN/FRR-59, -59A

NAVSHIPS 94715.42

UNSCHEDULED
U8 thru U10

OPERATING CONDITIONS AND CONTROL SETTINGS:

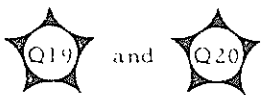
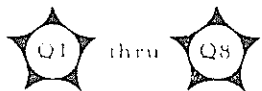
Equipment de-energized.
AC power plug (P1808) removed from POWER IN jack (J1808).
Drawers extended (in turn) from cabinet.
Decks tilted or separated to gain access.

STEP NO.	ACTION REQUIRED
U8	Clean equipment PROCEDURE: Clean cabinets and chassis with vacuum cleaner. Check air filter; clean and recharge if necessary (see Quarterly Step Q29).
U9	Perform mechanical inspection.

TIME SCHEDULE
QUARTERLY STEPS

NAVSHIPS 94715-42

AN/WRR-2, -3A
AN/FRR-59, -60A



TIME SCHEDULE: Record and initial.

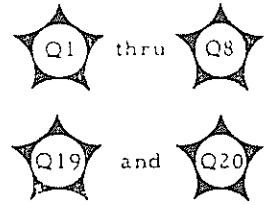
1ST YEAR OF OPERATION

1. Date			2. Date			3. Date			4. Date		
No.	μv	Init.	No.	μv	Init.	No.	μv	Init.	No.	μv	Init.

1ST YEAR OF OPERATION

1. Date			2. Date			3. Date			4. Date		
No.	kc	Init.	No.	kc	Init.	No.	kc	Init.	No.	kc	Init.

TIME SCHEDULE
QUARTERLY STEPS



TIME SCHEDULE: Record and initial.

2ND YEAR OF OPERATION

1. Date			2. Date			3. Date			4. Date		
No.	μv	Init.	No.	μv	Init.	No.	μv	Init.	No.	μv	Init.
Q1											
Q2											
Q3											
Q4											
Q5											
Q6											
Q7											
Q8											

2ND YEAR OF OPERATION

1. Date			2. Date			3. Date			4. Date		
No.	kc	Init.	No.	kc	Init.	No.	kc	Init.	No.	kc	Init.
Q19											
Q20											

ORIGINAL

BLANK

NAVSHIPS 94715.42

AN/WRR-2, -2A
AN/FRR-59, -59A

USER ACTIVITY TECHNICAL MANUAL COMMENT SHEET
NAVSHIPS 4914 (19062)
(COG 1 - 11-DIGIT STOCK NUMBER: 0105-503-9850)

NAVSHIPS NO. _____

VOLUME NO. _____

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