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NAVSHIPS 0967-971-0020
(FORMERLY NAVSHIPS 94840(A), VOLUME II)

VOLUME II

OPERATOR'S HANDBOOK

for

RADIO SET AN/WRC-1
and
ANTENNA COUPLER CU-937/UR(U)

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

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LIST OF EFFECTIVE PAGES

PAGE NUMBERS	CHANGE IN EFFECT	PAGE NUMBERS	CHANGE IN EFFECT
Title Page	Change 2	3-1 to 3-8	Original
ii	Change 2	3-9	Change 2
iii to iv	Original	3-10 to 3-22	Original

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T- 4 , NAVSHIPS 0967-971-0024 Date 22 November 1971

INTERIM CHANGE T- 4 TO NAVSHIPS 0967-971-0020, TM for AN/WRC-1 and AN/WRC-1B

[XX] THIS CHANGE DOES NOT SUPERSEDE ANY OTHER CHANGE.
[ ] THIS CHANGE SUPERSEDES

This Interim Change revises the manual to reflect the equipment changes made by Field Change(s) 10-AN/WRC-1 and 2-AN/WRC-1B Field Change Bulletin NAVSHIPS 0967-971-0170. Originally published in EIB 785.

Maintenance Support Activities shall make this change in the technical manual immediately but shall keep the superseded data intact for support of equipments that have not been modified.

Holders of equipment accompanied by technical manual shall not make this change in the manual until accomplishment of the field change referenced above.

Insert this Interim Change in the manual immediately after the front cover and preceding prior changes in effect.

Make pen-and-ink changes as follows:

1. Page 3-11, table 3-3.
   a. In FUNCTION column opposite RF OUTPUT TUNE/OPERATE switch S4; change first entry to read: "Controls system keying for tuning of CU-937/UR in AM Mode."
   b. Delete information under NOTE between S4 and S5. Insert: "T-827/URT Mode Selector switch (S2) must be in AM before setting the TUNE/OPERATE switch at TUNE to key the AN/WRC-1."

U.S. GOVERNMENT PRINTING OFFICE: 1973—714-401:1719

TEMPORARY CHANGE T-1 to TECHNICAL MANUAL (Vol. II) for Radio Set AN/WRC-1, NAVSHIPS 0967-971-0020 (Formerly NAVSHIPS 94840(A) Vol. II).

This temporary change contains information originally published as a separate article (Technical Manual Corrections) in the Electronics Information Bulletin, (EIB), number 691

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 technical manual immediately behind the front cover and preceding the title page or preceding the latest change or correction in effect.

For proper emission on the desired ASSIGNED operating frequency, the dial frequency (suppressed carrier frequency) should be set 2.0 kc. LOWER than the desired ASSIGNED frequency.

The AN/WRC-1 Technical Manual (Operator's Handbook) NAVSHIPS 94840(A), Vol. II, paragraph 3-18 1.(2), Page 3-13, should be corrected to read: "Set CTR FREQ switch on top of FSK Tone Generator Electronic Assembly at desired center frequency (normally 2000 cps but there may be occasions when 2550 cps choice is necessary, e.g., when working with an aircraft or other shipboard receiver using a 2550 cps teletype converter such as an unmodified AN/UGA-17). Using the MCS, KCS, CPS controls on front panel of the T-827/URT, set dials for 2 kc/s less than the *assigned* frequency."

☆ U. S. GOVERNMENT PRINTING OFFICE: 1972-714-006/2760

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3-3. Radio Set AN/WRC-1 (AN/WRC-1), which consists of Radio Receiver R-1051/URR (R-1051/URR), Radio Transmitter T-827/URT (T-827/URT), RF Amplifier AM-3007/URT (AM-3007/URT), and Interconnection Box J-1265/U (J-1265/U), is designed to transmit and receive upper sideband (USB), lower sideband (LSB), continuous wave (CW), compatible amplitude modulated (compatible AM), and frequency shift keyed (FSK) signals in the 2.0 to 29.995-megacycle frequency range. The R-1051/URR and T-827/URT contain power supplies and can be operated as individual units or as parts of the AN/WRC-1. Antenna Coupler CU-937/UR (CU-937/UR) matches the output from the AN/WRC-1 to various antennas, increasing the over-all versatility of the AN/WRC-1. The AN/WRC-1 can also receive tone-modulated CW (MCW), facsimile, and standard AM signals.

3-4. TRANSMITTING FUNCTION.

3-5. When the AN/WRC-1 is operating in the transmit mode, audio signals from the handset are applied to the Transmitter Audio Amplifier Electronic Assembly. The signals are amplified and coupled to the balanced modulator in the Transmitter Mode Selector Electronic Assembly, where the audio signal is translated into an if. signal.

3-6. When compatible AM or CW transmission is used, the carrier is re-inserted into the signal path in the Transmitter IF. Amplifier Electronic Assembly. The output from the Transmitter IF. Amplifier Electronic Assembly is applied to the RF Translator Electronic Assembly, where it is translated to the desired rf output by mixing it with three injection frequencies in a triple conversion process. The RF Amplifier Electronic Assembly, which provides the final stages of the transmitter, is digitally tuned and provides a nominal 0.1-watt output to the AM-3007/URT.

3-7. When FSK transmission is used, the FSK Tone Generator Electronic Assembly is turned on. Loop current from the ancillary teletype (TTY) equipment produces a frequency shift output, which is centered on one of two selectable center frequencies, depending on the ancillary equipment used. The output is applied to the Transmitter Audio Amplifier Electronic Assembly, and from that point, the process is the same as described above.

3-8. The T-827/URT is tuned by setting the MCS and KCS controls and the CPS switch on the front panel at the desired frequency. An internal power supply converts the nominal 115 vac input to the necessary dc operating voltage.

3-9. The AM-3007/URT increases the rf output from the T-827/URT to 100 watts peak envelope power (PEP, SSB), 25 watts AM carrier, or 50 watts CW or FSK. Average power and peak power control signals are developed in the AM-3007/URT and applied to the T-827/URT. These control signals limit the average and peak power output from the T-827/URT to levels that are safe for use in the AM-3007/URT. The output and interstage circuits for the two amplifier tubes are tuned by means of a code generated in the T-827/URT.

3-10. RECEIVING FUNCTION.

3-11. When the AN/WRC-1 is operating in the receive mode, the signal from the antenna is applied directly through the CU-937/UR and the AM-3007/URT to the R-1051/URR. The signal passes through an overload protection circuit in the R-1051/URR to the RF Amplifier Electronic Assembly. The output from the two stages of rf amplification and digitally-tuned circuits is an amplified rf signal in the 2 to 30 megacycle range. The rf signal is triple-converted to a 500-kilocycle if. signal.

3-12. The desired, if. signal passes through the Receiver Mode Selector Electronic Assem-

bly, and depending on the mode of operation, is applied to one of two Receiver IF./Audio Amplifier Electronic Assemblies. Any undesired signals are suppressed by the Receiver Mode Selector Electronic Assembly. In the CW, AM, FSK, and USB modes, the if. signal passes through one IF./Audio Amplifier Electronic Assembly, and in the LSB mode,the if. signal passes through the other IF./Audio Amplifier Electronic Assembly. In the ISB mode, both IF./Audio Amplifier Electronic Assemblies are in operation. The if. signals are amplified and detected, and the resultant audio signals are again amplified and applied to the audio output transformers. Multiple outputs of the transformers provide a 600-ohm balanced or unbalanced output for remote listening and a local output for the headset. Overall gain is controlled by an automatic gain control (AGC) voltage developed in the Receiver IF./Audio Amplifier Electronic Assemblies.

3-13. The R-1051/URR is tuned by setting the MCS and KCS controls and the CPS switch on the front panel at the desired frequency. An internal power supply converts the nominal 115 vac input to the necessary dc operating voltage.

3-14. OPERATING PROCEDURES.

3-15. DESCRIPTION OF OPERATING CONTROLS, INDICATORS AND CONNECTORS.

3-16. All controls and indicators required for normal operation of the AN/WRC-1 system are located on the front panels of the T-927/URT (figure 3-1), the R-1051/URR (figure 3-2), and the AM-3007/URT (figure 3-3) are listed in tables 3-1 through 3-3, respectively.

3-17. TRANSMIT MODE OF OPERATION.

3-18. Operating procedures for the transmit mode of operation are as follows:

NOTE

Since the AN/WRC-1 is intended for use with a nominal 115 vac power source, the rf amplifier PRIMARY POWER selector switch (figure 3-3) should be set at AC/INT BAT position at time of initial system installation and should not be reset thereafter.

a. Set rf amplifier PRIMARY POWER circuit breaker at ON and set transmitter Mode Selector switch (figure 2-2) at STD BY. Set these switches prior to operation to allow T-827/URT frequency standard to come up to temperature. Allow a 20-minute warm-up period for general operation and at least a 60-minute warm-up period for optimum frequency stability.

b. Check line voltage indication on rf amplifier AMPLIFIER meter. Notify technician if voltage is consistently high.

c. Hold AMPLIFIER meter switch at DR CATH position. AMPLIFIER meter should indicate at DRIVER SET mark. Hold AMPLIFIER meter switch at PA PL position. AMPLIFIER meter should indicate at PA SET mark. If either indication is incorrect, proceed as follows:

(1) Disconnect cable W8 from connector J8 on rear of AM-3007/URT and connect Electrical Dummy Load DA-91A/U in its place. Loosen screws on front panel and slide chassis fully out from case. Defeat chassis interlock.

WARNING

High voltages are present in the AM-3007/URT when operated with chassis out from case.

(2) Set transmitter Mode Selector switch at USB. Set LOCAL/REMOTE switch at LOCAL position. Key the T-827/URT with the handset.

(3) Hold AMPLIFIER meter switch at DR CATH position. Adjust DRVR BIAS potentiometer on DC-to-DC Converter Electronic Assembly until AMPLIFIER meter indicates at DRIVER SET mark.

(4) Hold AMPLIFIER meter switch at PA PL position. Adjust AM/SSB BIAS potentiometer on DC-to-DC Converter Electronic Assembly until AMPLIFIER meter indicates at PA SET mark.

(5) Disconnect cable W6 from J6 on the AM-3007/URT. Set transmitter Mode Selector switch at CW position. Insert CW handkey or shorting plug in CW KEY jack on front panel of T-827/URT and key the T-827/URT.

(6) Hold AMPLIFIER meter switch at PA PL position. AMPLIFIER meter should indicate at two small (minor) divisions. If necessary, adjust CW/FSK BIAS potentiometer for this indication.

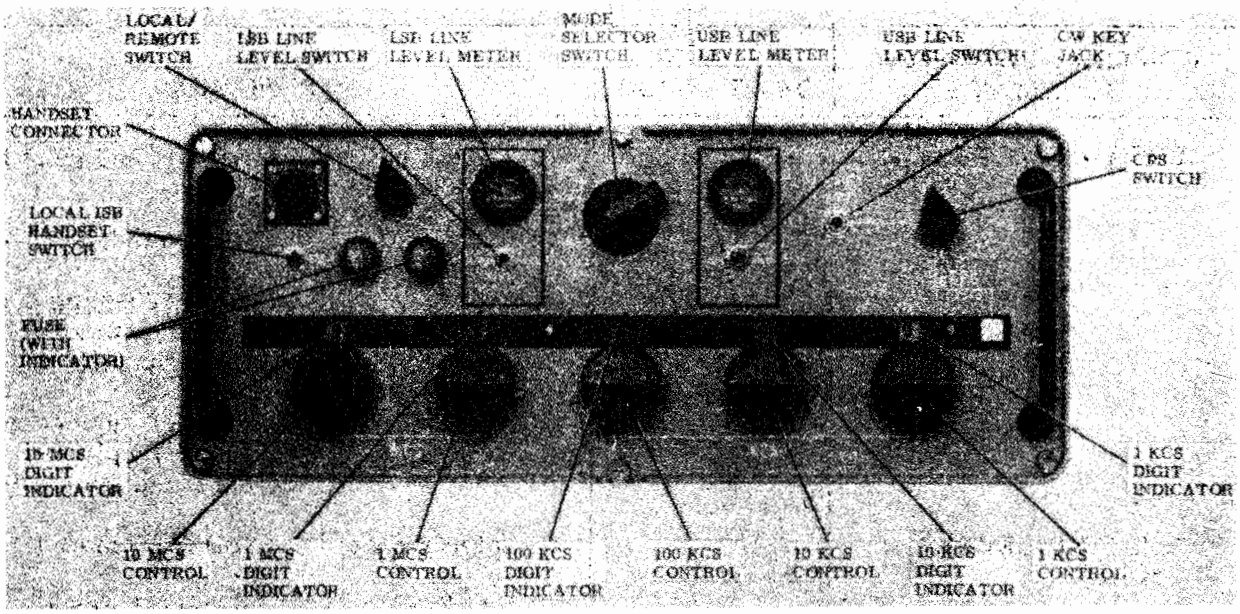

Figure 3-1. Radio Transmitter T-827/URT, Operating Controls, Indicators, and Connectors

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS

CONTROL/INDICATOR CONNECTOR	REFERENCE DESIGNATION	FUNCTION
LOCAL ISB HANDSET switch	S9	Selects channel of audio output Switch Position — Equipment Response LSB — Applies handset audio to LSB channel USB — Applies handset audio to USB channel
HANDSET connector	J1	Used to connect handset to T-827/URT
FUSE (with indicator)	F1, DS1	Protects T-827/URT against overload; indicator glows when fuse is open
FUSE (with indicator)	F2, DS2	Protects T-827/URT against overload; indicator glows when fuse is open

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Continued)

CONTROL/INDICATOR CONNECTOR	REFERENCE DESIGNATION	FUNCTION
LOCAL/REMOTE switch	S1	Selects local or remote key and input to T-827/URT Switch Position — Equipment Response LOCAL — T-827/URT keying and input accomplished by operator at AN/WRC-1 REMOTE — T-827/URT keying and input accomplished from a remote location
LSB LINE LEVEL switch	S10	Selects range for LSB LINE meter (M1) Switch Position — Equipment Response -10 DB — 10 db is subtracted from LSB LINE LEVEL meter (M1) indication +10 DB — 10 db is added to LSB LINE LEVEL meter (M1) indication
LSB LINE LEVEL meter	M1	Indicates LSB audio input line level
Mode Selector switch	S2	Selects T-827/URT mode of operation Switch Position — Equipment Response OFF — No power is applied STD BY — Energizes frequency standard and tube filaments LSB — T-827/URT operates in LSB mode FSK — T-827/URT operates in FSK mode AM — T-827/URT operates in AM mode CW — T-827/URT operates in CW mode USB — T-827/URT operates in USB mode ISB — T-827/URT operates in ISB mode

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Continued)

CONTROL/INDICATOR/ CONNECTOR	REFERENCE DESIGNATION	FUNCTION
Mode Selector switch (cont)		Switch Position — Equipment Response ISB/FSK — T-827/URT transmits FSK on USB and voice on LSB, simultaneously
USB LINE LEVEL switch	S11	Selects range of USB LINE LEVEL meter (M1) Switch Position — Equipment Response -10 DB — 10 db is subtracted from USB LINE LEVEL meter (M2) indication +10 DB — 10 db is added to USB LINE LEVEL meter (M2) indication
USB LINE LEVEL meter	M2	Indicates USB audio input line level
CW KEY jack	J2	Used to connect local CW hand key to T-827/URT
CPS switch	S6	Increases T-827/URT tuning capabilities Switch Position — Equipment Response 000 — T-827/URT is tuned to frequency indicated by MCS and KCS digit indicators 500 — T-827/URT is tuned 500 cps above frequency indicated by MCS and KCS digit indicators
10 mc (MCS) control	S3	Selects 10 mc digit of desired operating frequency; digit selected will be displayed in window above control
1 mc (MCS) control	S4	Selects 1 mc digit of desired operating frequency; digit selected will be displayed in window above control
100 kc (KCS) control	S5/2A2A6A2S1	Selects 100 kc digit of desired operating frequency; digit selected will be displayed in window above control

TABLE 3-1. RADIO TRANSMITTER T-827/URT, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Continued)

CONTROL/INDICATOR/ CONNECTOR	REFERENCE DESIGNATION	FUNCTION
10 kc (KCS) control	2A2A6A3S1	Selects 10 kc digit of desired operating frequency; digit selected will be displayed in window above control
1 kc (KCS) control	2A2A6A3S2	Selects 1 kc digit of desired operating frequency; digit selected will be displayed in window above control

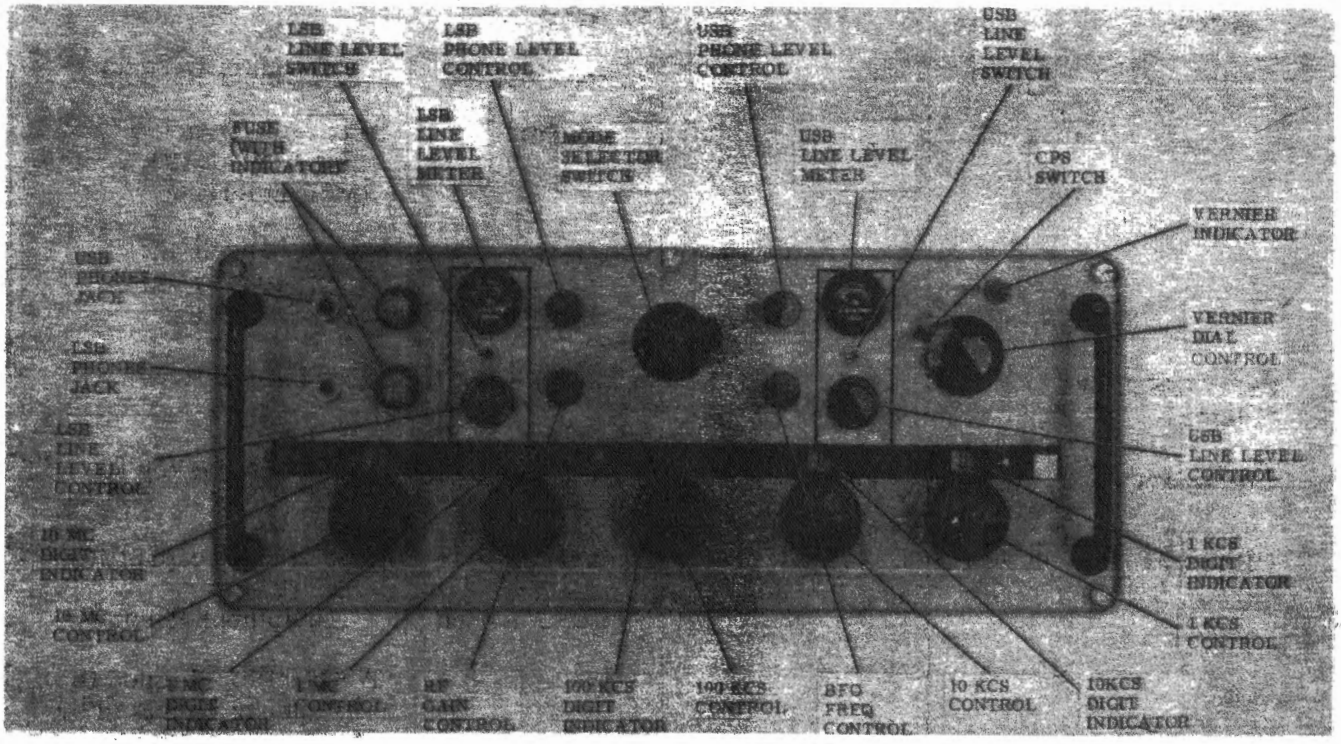

Figure 3-2. Radio Receiver R-1051/URR, Operating Controls, Indicators, and Connectors

TABLE 3-2. RADIO RECEIVER R-1051/URR, OPERATING CONTROLS, INDICATORS, AND CONNECTORS

CONTROL/INDICATOR CONNECTOR	REFERENCE DESIGNATION	FUNCTION
LSB PHONES jack	J1	Used to connect headset to LSB receiver output
USB PHONES jack	J2	Used to connect headset to USB receiver output
FUSE (with indicator)	F1, DS1	Protects R-1051/URR against overload; indicator glows when fuse is open

TABLE 3-2. RADIO RECEIVER R-1051/URR, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Continued)

CONTROL/INDICATOR/ CONNECTOR	REFERENCE DESIGNATION	FUNCTION
FUSE (with indicator)	F2, DS2	Protects R-1051/URR against overload; indicator glows when fuse is open
LSB LINE LEVEL control	R1, R11	Used to adjust volume of remote audio for LSB and ISB (LSB) operation
LSB LINE LEVEL switch	S1	Selects range for LSB LINE LEVEL meter (M1) Switch Position — Equipment Response 0DB — Reading of LSB LINE LEVEL meter (M1) is taken directly +20DB — 20 db is added to indication of LSB LINE LEVEL meter (M1)
LSB LINE LEVEL meter	M1	Indicates level of audio supplied to LSB remote lines
RF GAIN control	R3	Used to control gain of rf and if. amplifiers
LSB PHONE LEVEL control	R4	Used to adjust volume of audio applied to headphone in LSB and ISB (LSB) operation
Mode Selector switch	S2	Selects R-1051/URR modes of operation Switch Position — Equipment Response OFF — No power is applied STD BY — Energizes frequency standard and tube filaments LSB — R-1051/URR operates in LSB mode FSK — R-1051/URR operates in FSK mode AM — R-1051/URR operates in AM mode CW — R-1051/URR operates in CW mode USB — R-1051/URR operates in USB mode

TABLE 3-2. RADIO RECEIVER R-1051/URR, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Continued)

CONTROL/INDICATOR/ CONNECTOR	REFERENCE DESIGNATION	FUNCTION
Mode Selector switch (cont)		Switch Position — Equipment Response
		ISB — R-1051/URR operates in ISB mode
BFO FREQ control	R6	Used to adjust pitch of audio output tone when receiving CW
USB PHONE LEVEL control	R5	Used to adjust volume audio applied to phones in USB, ISB (ISB), FSK, CW and AM operation
USB LINE LEVEL control	R2, R12	Used to adjust volume of remote audio for USB, ISB (USB), FSK, CW and AM operation
USB LINE LEVEL switch	S5	Selects range for USB LINE LEVEL meter (M2)
		Switch Position — Equipment Response
		0DB — Reading of USB LINE LEVEL meter (M2) is taken directly
		+20DB — 20 db is added to indication of USB LINE LEVEL meter (M2)
USB LINE LEVEL meter	M2	Indicates level of audio applied to USB remote lines
CPS switch	S6	Increases R-1051/URR tuning capabilities
		000 — R-1051/URR is tuned to frequency indicated by MCS and KCS digit indicators
		500 — R-1051/URR is tuned 500 cps above frequency indicated by MCS and KCS digit indicators
		VERNIER — R-1051/URR may be tuned continuously (with VERNIER control) between any two 1-kc steps

TABLE 3-2. RADIO RECEIVER R-1051/URR, OPERATING CONTROLS, INDICATORS, AND CONNECTORS (Continued)

CONTROL/INDICATOR/ CONNECTOR	REFERENCE DESIGNATION	FUNCTION
VERNIER control	R7	Used to provide continuous tuning between any two 1-kc increments
VERNIER indicator	DS5	Indicator flashes to indicate that CPS switch is in VERNIER position
10 mc (MCS) control	S3	Selects 10 mc digit of desired operating frequency; digit selected will be displayed in window above control
1 mc (MCS) control	S4	Selects 1 mc digit of desired operating frequency; digit selected will be displayed in window above control
100 kc (KCS) control	S5/A2A6A2S1	Selects 100 kc digit of desired operating frequency; digit selected will be displayed in window above control
10 kc (KCS) control	A2A6A3S1	Selects 10 kc digit of desired operating frequency; digit selected will be displayed in window above control
1 kc (KCS) control	A2A6A3S2	Selects 1 kc digit of desired operating frequency; digit selected will be displayed in window above control

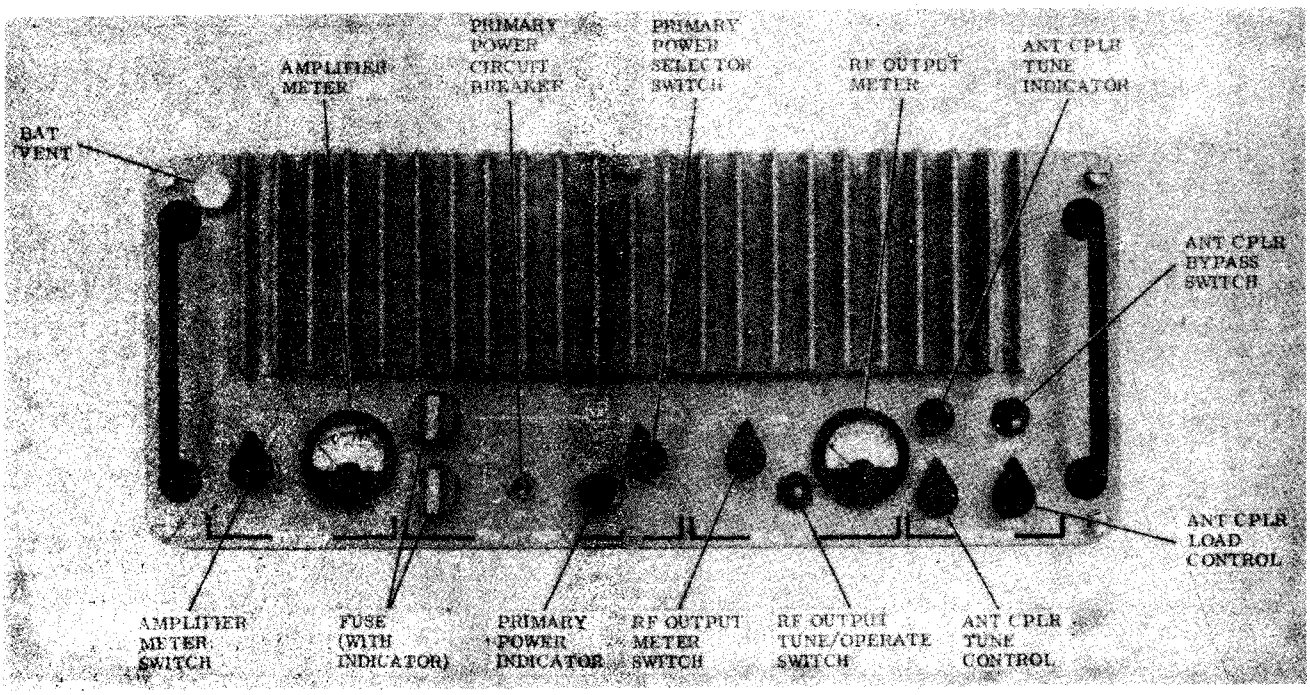

Figure 3-3. RF Amplifier AM-3007/URT, Operating Controls and Indicators

TABLE 3-3. RF AMPLIFIER AM-3007/URT, OPERATING CONTROLS AND INDICATORS

CONTROL/INDICATOR CONNECTOR	REFERENCE DESIGNATION	FUNCTION
BAT VENT		Not used in AN/WRC-1
AMPLIFIER meter switch	S1	Selects circuits to be monitored by AMPLIFIER meter (M1) Switch Position — Equipment Response DR CATH — Meter M1 indicates driver cathode current LINE — Meter M1 indicates input line voltage PA PL — Meter M1 indicates power output stage plate current
AMPLIFIER meter	M1	Provides indications of driver cathode current, equipment input line voltage, and power output stage plate current, circuit selected by switch S1
PRIMARY POWER 4A, 115V AC fuse (with indicator)	F1, DS3	Protects AM-3007/URT against overload; indicator glows when fuse is open
PRIMARY POWER circuit breaker	CB1	Used to control primary power input of AN/WRC-1 system Switch Position — Equipment Response OFF — No primary power applied to AN/WRC-1 ON — Primary power applied to AN/WRC-1
PRIMARY POWER indicator	DS1	Glows to indicate that power is applied to AN/WRC-1 system
PRIMARY POWER selector switch	S2	Selects primary power for AM-3007/URT Switch Position — Equipment Response AC/INT BAT. — AM-3007/URT operates from nominal 115 vac external power source. EXT DC — AM-3007/URT operates from an external +28 vdc power source

TABLE 3-3. RF AMPLIFIER AM-3007/URT, OPERATING CONTROLS AND INDICATORS (Continued)

CONTROL/INDICATOR CONNECTOR	REFERENCE DESIGNATION	FUNCTION
RF OUTPUT meter switch	S3	Selects ranges for RF OUTPUT meter (M2) Switch Position — Equipment Response 100 W REFL — Meter M2 indicates reflected power 100 watts full scale 30 W REFL — Meter M2 indicates reflected power, 30 watts full scale 100 W FWD — Meter M2 indicates transmitted (forward) power, 100 watts full scale
RF OUTPUT meter	M2	Provides indication of transmitted and reflected power output from AM-3007/URT in ranges selected by switch S3
RF OUTPUT TUNE/ OPERATE switch	S4	Controls system keying for tuning of CU-937/UR Switch Position — Equipment Response TUNE — AN/WRC-1 system is keyed in AM so that CU-937/UR can be tuned using AM carrier OPERATE — All AM-3007/URT circuits are connected for normal operation.
NOTE If T-827/URT is in any mode except CW or FSK setting TUNE/ OPERATE switch at TUNE will automatically key the AN/WRC-1 in AM mode. If T-827/URT is in CW or FSK mode, transmitter Mode Selector switch (S2) must be set at some other mode to tune CU-937/UR.		
ANT CPLR TUNE control	S5	Used in conjunction with ANT CPLR LOAD control (S6) to fine tune CU-937/UR, activates motor-driven variable inductor
ANT CPLR LOAD control	S6	Used in conjunction with ANT CPLR TUNE control (S5) to fine tune CU-937/UR; activates motor-driven variable inductor

TABLE 3-3. RF AMPLIFIER AM-3007/URT, OPERATING CONTROLS AND INDICATORS (Continued)

CONTROL/INDICATOR CONNECTOR	REFERENCE DESIGNATION	FUNCTION
ANT CPLR TUNE indicator	DS2	Indicator flashes while CU-937/UR is rough-tuned after a frequency change; when lamp goes out, CU-937/UR is rough-tuned and may be fine-tuned
ANT CPLR BYPASS switch	S7	Switches CU-937/UR elements into and out from receiver antenna rf line Switch Position — Equipment Response BYPASS — CU-937/UR elements are bypassed in receive mode NORMAL — CU-937/UR elements are inserted in receiver antenna rf line

(7) Remove CW handkey or shorting plug from CW KEY jack. Reconnect cable W6. Set transmitter Mode Selector switch at STD BY position.

(8) Release slide lock and slide AM-3007/URT chassis back into case and tighten screws on front panel. Disconnect dummy load and reconnect cable W8 to connector J8 on rear of AM-3007/URT.

d. Set rf amplifier ANT CPLR BYPASS switch at position desired. When switch is set at BYPASS, CU-937/UR tuning elements are bypassed in receive mode. When switch is set at NORMAL, CU-937/UR tuning elements are inserted between T-827/URT and antenna.

e. Set transmitter Mode Selector switch at USB, LSB, or AM position for voice transmission.

f. Using MCS controls, KCS controls, and CPS switch on front panel of T-827/URT, select desired operating frequency.

Note

If operating in duplex mode, R-1051/URR and T-827/URT frequencies must be displaced by at least 15 per cent. For example, if one unit is tuned to 06.010 mc, other unit should be tuned to a frequency at least 00.901 mc above or below 06.010 mc; that is, it can be operated on any frequency from 02.000 to 05.009 mc, and from 06.911 to 29.999 mc, but not between 05.009 and 06.911.

Note

When operating frequency selected differs sufficiently from one previously used, the AM-3007/URT will be retuned and CU-937/UR will be rough-tuned to new frequency automatically. The rf amplifier ANT CPLR TUNE indicator will go out when this reprogramming is completed.

g. Fine-tune the CU-937/UR to the selected operating frequency as follows:

Note

Until operator becomes proficient at fine tuning procedure, complete CU-937/UR tuning cycle should be preformed for any frequency change of 100 kc or more. This is initiated by rotating transmitter 10 mc (MCS) control one position. When the ANT CPLR TUNE indicator lights, set control back to desired position. Wait until ANT CPLR TUNE indicator extinguishes; then, start fine tuning procedure below.

(1) If a 15-foot whip antenna is used, refer to table 3-4 (table 3-5, for 25-foot antenna; table 3-6, for 35-foot antenna) and locate frequency closest to selected operating frequency.

(2) Hold rf amplifier ANT CPLR LOAD switch at LO for required number of flashes of ANT CPLR TUNE indicator listed in LOAD column of table.

(3) Hold rf amplifier ANT CPLR TUNE switch at position indicated in table for required number of flashes at ANT CPLR TUNE indicator listed in table.

(4) Set rf amplifier RF OUTPUT meter switch on rf amplifier at 100 W REFL.

(5) Hold rf amplifier RF OUTPUT TUNE/OPERATE switch at TUNE and minimize indication on RF OUTPUT meter by adjusting ANT CPLR TUNE control (HI and LO) and ANT CPLR LOAD control (HI and LO). Alternately adjust both controls until indication on RF OUTPUT meter nulls.

Note

When specific frequencies are to be used often and to permit tuning under radio silence conditions, time and effort can be saved by developing the logging chart shown in figure 3-4. This is accomplished by noting exact number of light flashes and direction of tuning in appropriate columns for each switch as nulling procedure is performed. Place a copy of the logging chart near the AM-3007/URT for reference.

(6) Set RF OUTPUT meter switch at 30 W REFL.

(7) Repeat step (5) until meter pointer rests in small black area at left of meter scale.

(8) Set RF OUTPUT TUNE/OPERATE switch at OPERATE.

h. Connect handset to HANDSET connector on front panel of T-827/URT.

i. To transmit, depress push-to-talk switch on handset.

j. To transmit on independent sideband, set transmitter Mode Selector switch at ISB and set transmitter LOCAL ISB HANDSET switch at either LSB or USB, according to channel desired.

k. To transmit on CW, set transmitter Mode Selector switch at CW and connect CW key to CW KEY jack on front panel of T-827/URT and depress key.

l. To transmit FSK with local teletype equipment, set transmitter Mode Selector switch at FSK and connect teletypewriter loop and key lines to LOCAL FSK IN connector (J7) on rear of T-827/URT case. (For remote operation, these connections are made through the J-1265/U and transmitter LOCAL/REMOTE switch is set at REMOTE.) When these procedures are completed, proceed as follows:

(1) Loosen screws on front panel of T-827/URT and pull chassis out fully on slides.

(2) Set CTR FREQ switch on top of FSK Tone Generator Electronic Assembly at desired center frequency (2000 or 2550 cps). The FSK Tone Generator Electronic Assembly is located just left of center at rear of chassis.

(3) Release slide locks, slide chassis back into case, and secure it.

m. To transmit FSK and voice simultaneously, set transmitter Mode Selector switch at ISB/FSK. (FSK will be on USB; voice, on LSB.) If operating locally, set LOCAL ISB HANDSET switch at USB.

n. To transmit two simultaneous voice or other audio transmissions from a remote location, set transmitter Mode Selector switch at ISB. One voice transmission will be on USB; the other voice transmission will be on LSB.

o. To transmit voice on different channels locally, set transmitter Mode Selector switch at ISB and alternate LOCAL ISB HANDSET switch between USB and LSB as desired to change channels.

3-19. REMOTE OPERATION.

3-20. Remote operation of AN/WRC-1 is accomplished as follows:

a. Set transmitter and receiver LOCAL/REMOTE switches (figures 3-1 and 3-2) at REMOTE, and follow procedures outlined in paragraph 3-16 and 3-18.

TABLE 3-4. ANTENNA COUPLER CU-937/UR, TUNING CHART FOR 15-FOOT WHIP ANTENNA

FREQ. (MC)	TUNE	LOAD	FREQ. (MC)	TUNE	LOAD
2.00	7 HI	10 LO	14.00	5 HI	16 LO
2.49	5 LO	12 LO	15.00	3 HI	17 LO
2.50	1 HI	12 LO	15.99	1 HI	16 LO
2.99	6 LO	13 LO	16.00	1 HI	16 LO
3.00	9 HI	12 LO	17.00	O	15 LO
3.49	4 HI	13 LO	17.99	O	15 LO
3.50	4 HI	13 LO	18.00	O	15 LO
3.99	1 HI	14 LO	19.00	1 LO	16 LO
4.00	1 HI	14 LO	19.99	1 LO	16 LO
4.99	4 LO	14 LO	20.00	3 HI	5 LO
5.00	4 LO	14 LO	21.00	1 HI	14 LO
5.99	7 LO	14 LO	21.99	O	14 LO
6.00	12 HI	14 LO	22.00	3 LO	17 LO
6.99	6 HI	14 LO	23.00	3 LO	18 LO
7.00	6 HI	14 LO	23.99	3 LO	18 LO
7.99	O	15 LO	24.00	2 LO	16 LO
8.00	O	15 LO	25.00	3 LO	16 LO
9.00	7 LO	15 LO	25.99	4 LO	18 LO
9.99	12 LO	14 LO	26.00	4 LO	18 LO
10.00	1 HI	15 LO	27.00	4 LO	16 LO
11.00	5 LO	14 LO	27.99	5 LO	17 LO
11.99	5 LO	13 LO	28.00	5 LO	17 LO
12.00	9 HI	16 LO	29.00	6 LO	17 LO
13.00	5 HI	15 LO	29.99	6 LO	18 LO
13.99	1 HI	14 LO			

TABLE 3-5. ANTENNA COUPLER CU-937/UR, TUNING CHART FOR 25-FOOT WHIP ANTENNA

FREQ. (MC)	TUNE	LOAD	FREQ. (MC)	TUNE	LOAD
2.00	1 HI	11 LO	14.00	O	15 LO
2.49	7 LO	13 LO	15.00	1 LO	16 LO
2.50	8 HI	12 LO	15.99	1 LO	16 LO
2.99	2 HI	12 LO	16.00	4 HI	15 LO
3.00	2 HI	12 LO	17.00	2 HI	15 LO
3.49	1 LO	13 LO	17.99	1 HI	16 LO
3.50	1 LO	13 LO	18.00	1 HI	16 LO
3.99	5 LO	13 LO	19.00	O	16 LO
4.00	5 LO	13 LO	19.99	O	18 LO
4.99	9 LO	13 LO	20.00	O	18 LO
5.00	9 HI	13 LO	21.00	1 LO	18 LO
5.99	1 LO	11 LO	21.99	2 LO	18 LO
6.00	1 LO	11 LO	22.00	2 LO	18 LO
6.99	9 LO	10 LO	23.00	3 LO	18 LO
7.00	27 HI	14 LO	23.99	4 LO	18 LO
7.99	20 HI	13 LO	24.00	4 LO	18 LO
8.00	13 HI	15 LO	25.00	4 LO	18 LO
9.00	9 HI	14 LO	25.99	6 LO	17 LO
9.99	6 HI	11 LO	26.00	5 HI	18 LO
10.00	6 HI	11 LO	27.00	4 HI	17 LO
11.00	5 HI	11 LO	27.99	3 HI	16 LO
11.99	3 HI	13 LO	28.00	2 HI	18 LO
12.00	3 HI	13 LO	29.00	1 HI	17 LO
13.00	2 HI	15 LO	29.99	1 HI	17 LO
13.99	O	15 LO			

TABLE 3-6. ANTENNA COUPLER CU-937/UR, TUNING CHART FOR 35-FOOT WHIP ANTENNA

FREQ. (MC)	TUNE	LOAD	FREQ. (MC)	TUNE	LOAD
2.00	1 HI	9 LO	14.00	1 HI	16 LO
2.49	----	----	15.00	3 LO	11 LO
2.50	----	----	15.99	3 LO	16 LO
2.99	1 HI	10 LO	16.00	3 LO	16 LO
3.00	1 HI	10 LO	17.00	5 LO	15 LO
3.49	----	----	17.99	6 LO	13 LO
3.50	----	----	18.00	O	17 LO
3.99	5 LO	10 LO	19.00	1 LO	17 LO
4.00	9 HI	10 LO	19.99	2 LO	17 LO
4.99	8 LO	8 LO	20.00	2 LO	17 LO
5.00	3 HI	9 LO	21.00	3 LO	17 LO
5.99	9 LO	6 LO	21.99	3 LO	17 LO
6.00	27 HI	13 LO	22.00	3 LO	17 LO
6.99	19 HI	9 LO	23.00	3 LO	17 LO
7.00	2 HI	11 LO	23.99	4 LO	18 LO
7.99	4 LO	8 LO	24.00	8 LO	14 LO
8.00	4 LO	8 LO	25.00	8 LO	15 LO
9.00	1 HI	9 LO	25.99	9 LO	16 LO
9.99	3 LO	13 LO	26.00	9 LO	16 LO
10.00	12 HI	10 LO	27.00	9 LO	16 LO
11.00	9 HI	15 LO	27.99	10 LO	16 LO
11.99	O	8 LO	28.00	10 LO	16 LO
12.00	O	8 LO	29.00	10 LO	16 LO
13.00	3 HI	16 LO	29.99	10 LO	15 LO
13.99	1 HI	16 LO			

b. Set transmitter and receiver Mode Selector switches at desired mode of operation.

c. Notify remote operator that AN/WRC-1 is ready for remote operation.

Note

Separate Radio Set Controls C-1138/UR (or equivalents) must be connected to USB and LSB remote transmitter audio input and receiver audio output lines at ship's transmitter and receiver switchboards if both USB and LSB remote operation is intended.

3-21. ANTENNA COUPLER CU-937/UR OPERATION.

3-22. The CU-937/UR is designed to match an antenna to the 50-ohm transmission line from the AM-3007/URT. Digital code information from the AM-3007/URT automatically programs motor-driven switches during initial tuning. Power and control signal connections are made to connectors mounted on one end of the unit. The antenna is connected to the antenna terminal mounted on the other end of the unit. For manual fine-tuning the variable inductors in the CU-937/UR, refer to paragraph 3-18g.

3-23. RECEIVE MODE OF OPERATION.

3-24. Operating procedures for the receive mode of operation are as follows:

Note

Since the AN/WRC-1 is intended for use with a nominal 115 vac power source, the rf amplifier PRIMARY POWER selector switch (figure 3-3) should be set to AC/INT BAT position at time of initial system installation and should not be reset thereafter.

a. When the AN/WRC-1 is to be operated in duplex mode, loosen fastening screws on front panel of R-1051/URR, pull chassis out approximately six (6) inches, and set SIMPLEX DUPLEX (S9) toggle switch at left rear of front panel at DUPLEX. Slide chassis into case and tighten front panel screws. A separate receiving antenna is required for duplex operation, and the sidetone audio lines must be disconnected at TB2 of J-1265/U.

b. Set rf amplifier PRIMARY POWER switch at ON, and set receiver Mode Selector switch (figure 3-2) at STD BY. These switches should be set prior to operation to allow frequency standard to come up to temperature. Allow a 20-minute warm-up period for general operation and at least a 60-minute warm-up period for optimum frequency stability.

c. Check line voltage indication on rf amplifier AMPLIFIER meter. Notify technician if voltage is consistently high.

Note

When the AN/WRC-1 is used with the CU-937/UR, the system interlock is connected through the CU-937/UR when rf amplifier ANTENNA INTERLOCK switch is in NORMAL position. If system is being used without the CU-937/UR. ANTENNA INTERLOCK switch must be set at OVERRIDE. This switch is located at right rear of front panel of the AM-3007/URT and is normally set at time of installation.

d. When the CU-937/UR is used, set rf amplifier ANT CPLR BYPASS switch at position desired. When switch is set at BYPASS position, CU-937/UR tuning elements are bypassed in receive mode. When switch is set at NORMAL position, CU-937/UR tuning elements are inserted between antenna and R-1051/URR. When ANT CPLR BYPASS switch is set to BYPASS position, disregard all following steps referring to CU-937/UR operation in receive mode.

Note

Operation with ANT CPLR BYPASS switch set at BYPASS will overcome signal strength loss that might occur if system is operated in simplex mode, but with different transmitting and receiving frequencies.

e. Set receiver Mode Selector switch at desired mode of operation.

f. Using MCS controls, KCS controls, CPS switch, and VERNIER control on front panel of R-1051/URR, select desired operating frequency.

Note

When operating in duplex mode, R-1051/URR and T-827/URT frequencies must be displaced by at least 15 percent. For example, if one unit is tuned to 06.010 mc, other unit should be tuned to a frequency at least 00.901 mc above or below 06.010 mc; that is, it can be operated on any frequency from 02.000 to 05.009 mc, and from 06.911 to 29.999 mc, but not between 05.009 and 06.911 mc.

g. Fine tune CU-937/UR to selected operating frequency as follows:

(1) If a 15-foot whip antenna is used, refer to table 3-4 (table 3-5 for 25-foot antenna; table 3-6 for 35-foot antenna) and locate frequency closest to selected operating frequency.

(2) Hold rf amplifier ANT CPLR LOAD control at LO for required number of flashes of ANT CPLR TUNE indicator listed in LOAD column of table.

(3) Hold rf amplifier ANT CPLR TUNE control at position indicated in table for required number of flashes of ANT CPLR TUNE indicator listed in table.

(4) Set rf amplifier RF OUTPUT TUNE/OPERATE switch at TUNE and minimize indication on RF OUTPUT meter by adjusting ANT CPLR TUNE control (HI and LO) and ANT CPLR LOAD control (HI and LO). Alternately adjust both controls until indication on RF OUTPUT meter nulls.

Note

When specific frequencies are to be used often and to permit tuning under radio silence conditions, time and effort can be saved by developing logging chart shown in figure 3-4. This is accomplished by noting exact number of light flashes and direction of tuning in appropriate columns for each switch as nulling procedure is performed. Place a copy of the logging chart near the AM-3007/URT for reference.

(6) Set rf amplifier RF OUTPUT meter switch at 30 W REFL.

(7) Repeat step (5) until meter pointer rests in small black area at left of meter scale.

(8) Set rf amplifier RF OUTPUT TUNE/OPERATE switch at OPERATE.

h. Connect headset to LSB PHONES jack or USB PHONES jack on front panel of R-1051/URR (choice of connector depends upon previously selected mode of operation).

i. Adjust receiver LSB LINE LEVEL control or LSB PHONE LEVEL control for desired lower sideband headset volume level.

j. Adjust receiver USB LINE LEVEL control or USB PHONE LEVEL control for desired upper sideband headset volume level.

Note

If installation includes provision for remote operation, initially set remote audio line level to required value with USB LINE LEVEL control or LSB LINE LEVEL control. Thereafter, all local headset volume should be adjusted only with USB PHONE LEVEL control or LSB PHONE LEVEL control.

k. When CW is being received, adjust receiver BFO FREQ control to vary pitch of received signal.

l. Rotate receiver RF GAIN control fully clockwise. When strength of received signal is extremely high, better reception may be achieved by varying RF GAIN control to reduce gain.

Note

This will desensitize the R-1051/URR. Whenever operating channels or frequencies is changed, rotate receiver RF GAIN control back to fully clockwise position.

m. When receiving from a transmitter that is not tuned to same frequency as the R-1051/URR use VERNIER control to tune-in received signals.

	FREQUENCY (MC)	TUNE	LOAD	

Figure 3-4. Antenna Coupler CU-937/UR, Logging Chart

n. When FSK ancillary equipment designed for only a 2550 cps center frequency is used, a special tuning procedure is required if it is necessary to receive FSK transmissions using a 2000 cps center frequency. In this case, proceed as follows:

(1) If FSK transmissions are on LSB channel, use VERNIER control to tune R-1051/URR 550 cps above frequency selected with MCS and KCS controls.

(2) If FSK transmissions are on USB channel, set 1 kc (KCS) control down one digit from assigned frequency; use VERNIER control to tune R-1051/URR 450 cps above new frequency.

3-25. SHUTDOWN PROCEDURE.

3-26. Shut-down of the AN/WRC-1 is accomplished as follows:

a. Set transmitter and receiver Mode Selector switches (figures 3-1 and 3-2) at OFF.

b. Set rf amplifier PRIMARY POWER circuit breaker at OFF.

Note

When it is desired to eliminate required warm-up period, the rf amplifier PRIMARY POWER circuit breaker must be left at ON and both receiver and transmitter Mode Selector switches must be left at STD BY.

3-27. OPERATOR'S MAINTENANCE.

3-28. OPERATING CHECKS AND ADJUSTMENTS.

3-29. When a system malfunction is encountered, the operator should perform the following steps to determine the cause of the trouble.

a. Check to see that T-827/URT and R-1051/URR are set at proper frequency.

b. Check to see that power is applied to system by observing indication on rf amplifier AMPLIFIER meter with AMPLIFIER meter selector switch at LINE.

c. Check to see that rf amplifier PRIMARY POWER indicator is lighted.

d. Check all fuses; if any are open, associated indicator will light. Replace open fuses.

e. Check all cables for breakage and check connectors for proper locations and proper seating.

f. Check indications of rf amplifier AMPLIFIER meter with AMPLIFIER meter selector switch at DR CATH and then at PA PL. Incorrect readings indicate malfunction in rf amplifier.

g. Request a radio check from a party other than the one presently in contact.

h. If operator cannot locate trouble, refer problem to maintenance personnel.

3-30. PREVENTIVE MAINTENANCE.

3-31. Preventive maintenance that can be performed by the operator is listed in table 3-7.

3-32. EMERGENCY MAINTENANCE.

3-33. If the system malfunctions while a technician is not available, the operator should perform the following emergency repair procedures:

a. Try another mode of operation.

b. Perform steps a through g of paragraph 3-29.

c. Replace any damaged cables.

d. Loosen screws on front panels of the T-827/URT, R-1051/URR, and AM-3007/URT and pull chassis out from cases. Perform following checks:

(1) Check all electronic assemblies for proper seating.

(2) Check vacuum tubes to see that filaments are lighted. If tubes in T-827/URT or R-1051/URR RF Amplifier Electronic Assembly should be replaced, remove tube shield and pull tube out with a tube puller, using steady pressure straight up. The dust cover over the electronic assembly may be removed if necessary. Do not attempt to remove tubes from the AM-3007/URT.

TABLE 3-7. RADIO SET AN/WRC-1, OPERATOR'S PREVENTIVE MAINTENANCE CHECKS

INSPECT FOR	REMEDY
Dust	Clean exterior with soft, lint-free cloth. Clean interior with brush, cloth, or compressed air
Nicks, burrs, dents, scratches, or rust spots	Smooth burrs with a file. Sandpaper corrosion, rust, or scratches and refinish
Loosen handles, mounting screws, or other hardware	Tighten loose hardware
Chain drive tension on binding	Oil lightly
Cable assemblies broken, frayed, or damaged	Repair or replace