AN/URT-2, -3, -4 OVERHEATING

The Bureau of Ships has received reports that Radio Transmitters AN/URT-2, AN/URT-3 and AN/URT-4 are not functioning properly because of overheating.

An investigation of this problem indicates that in a majority of cases the cabinet heaters have been inadvertently turned on instead of the crystal oven heater.

The transmitter cabinet heaters are needed only during operation under extreme cold weather conditions. The cabinet heater circuit may be disabled (on shipboard installations) by removing fuse F-3001 from the medium voltage power supply.

AN/URT–2, –3 AND –4 INSPECTION OF BRUSHES

The brushes in the Power-Amplifier Blower Motor (B-1304) require inspection after approximately 1,000 hours of operation. Unless the brushes are inspected regularly, the commutator of B-1304 will be damaged. If the blower motor fails to operate, the transmitter thermal overload will trip, rendering the transmitter inoperative.

Blower Motor B–1304 must be removed from the RFA to check the brushes. There are three mounting screws and two motor leads which must be removed before motor can be removed from the chassis.

A number of blower motors have been found in which the brushes had worn away and the motor was attempting to run on the brush spring instead of the brush. The commutator was so badily worn that the whole assembly had to be replaced.

It is recommended that field activities insure that 1000-hour brush inspection is observed as a part of preventive-maintenance routine. The filament elapsed-time meter is a convenient means for verifying 1000-hour intervals.

AN/URT–2, –3 AND –4 AN/SRT–14, –15 AND –16 CORROSION OF CABLE CONNECTORS AND RECEPTACLES

Excessive corrosion of cable connectors and receptables on rf tuners and couplers used with AN/URT-2, -3, -4 and AN/SRT-14, -15, -16 Radio Transmitters has been reported.

Upon installation of the rf tuners and couplers, a hard-film, corrosion-preventive, petrolatum compound should be applied to all portions of the connectors and receptables exposed to the weather. Care should be taken not be apply the compound to the inserts, pins, and sockets of the mating parts. The connector shoud be disassembled to the extent that the compound can also be placed on the gland housing and inside of the coupling nut.

Connectors and receptables which are corroded should be disassembled and thoroughly cleaned. This should be done by wire brushing and then polishing. After cleaning, inspect carefully for pitting. If connector or receptable is badly pitted, a new one should be insallted. If the connector or receptable is useable, the corrosion preventive should be applied as indicated above.

Corrosion-Preventive Petrolatum, Class 1 hard film compound, stock number WM8030-244-1301, is recommended for this purpose. Although this compound normally required heating and should be applied while hot, for this purpose, it is recommended that it be applied without heating in order to get the maximum protection. If this compound is not available, Dow-Corning DC-4 should be used. Regardless of which compound is used, it should be applied liberally.

AN/URT–2, –3, –4, AND AN/SRT–14, –15 AND –16 RADIO–FREQUENCY POWER AMPLIFIER

The plate-overload alarm switch S-1381 is a radiant-heat thermal switch, not a convection-heat thermal switch. Operation of switch S-1381 is dependant on the color of the 4-400A power-amplifier tube. To check for proper operation of switch S-1381, connect the radio-frequency amplifier to the extension test cable. With transmitter AN/URT-2 and AN/SRT-14 operating at the 100-watt level, or transmitter AN/URT-3, AN/URT-4, AN/SRT-15 and AN/SRT-16 operating at the 500-watt level, observe the color of the PA tube plate when the transmitter is keyed. Normal operating color is dull red at the 100-watt level, or bright red at the 500-watt level. Alarm switch S-1381 should not operate under these conditions. If the color of the PA tube plate becomes a bright orange, then the alarm should sound, indicating excessive dissipation. The following checks should then be made:

1. Operation of PA tube blower. If blower is operating, air is forced through the PA Tube chimney. Air blast may be observed by holding hand about 6 inches above the tube chimney.

2. On the AN/URT series, check PA stagetuning by placing "Operation Selector" switch (A) in the manual tuning position and manually tuning the PA state for maximum power output. Note whether returning corrects overheating of PA tube. If autotuning does not tune PA stage to maximum power output, overheating of PA tube will occur, and corrective maintenance of the PA autotune stage will be required.

3. Check fixed grid bias on the PA stage as follows:

a. Connect the dc probe of Multimeter ME-25A/U, or equivalent, to the junction of L-1311 and R-1344. Place meter onthe 250-volt scale and set meter-function selector to minus. The junction of L-1311 and R-1344 is accessible from the right side of the RFA, at the rear, beneath the PA tube socket.

b. After equipment has been tuned to carrier-ready condition, disconnect the RF extension cable from P-1301 on the AN/URT series, or turn the excitation control (ZZ) to zero excitation on the AN/SRT series.

c. At 100-watt level, adjust bias control R-1345 for a meter reading of minus 105 volts.

d. Repeat step "b" at 500-watt level. Adjust bias control R-1348 for a meter reading of minus 155 volts.

4. The 4-400A power amplifier tube may be defective. Change tube. If alarm switch S-1381 operates when the PA tube is only a bright red color, switch S-1381 is defective. Switch should not operate until tube plate becomes an orange color. Change switch if a replacement is available. Be careful in replacing the switch not to touch the black metal strip. To do so will effect switch operation. As an emergency where a replacement is not available, S-1381 may be adjusted by resetting the adjustment nut on the back of the switch as follows:

a. With equipment operating at maximum power output in the manual-tuning position, slowly detune the PA stage from maximum power output. Observe the color of the PA tube plate while detuning.

b. When plate becomes a bright-red color, turn adjustment nut on the thermal switch, S-1381, slowly clockwise until the alarm is cut off.

c. Detune PA stage until the PA tube plate becomes an orange color. Switch S-1381 should operate and sound alarm.

AN/URT-2, -3, -4 TRANSMITTING EQUIPMENT IMPROVED AUDIO RESPONSE

Improved audio response can be obtained from the low-level radio modulator if the 5814 tube, V-1121, is changed to a 12AT7 tube. Where improved audio response is required for proper operation, this change should be made.

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MORE INFORMATION ABOUT AN/URT-2, -3, -4 TRANSMITTERS

The Electronic Supply Office has initiated action to procure and stock the gaskets used in the AN/URT transmitter-series tuning units. The availability of these gaskets (Symbol H-442 and H-444) and the stock number will appear in a later issue of the EIB.

After an investigation of the above gaskets, the Electronics Technician School, Great Lakes, discovered that by tightening the connectors and the antenna-lead-in stuffing tube in the end plates of the tuning unit, the loss of pressure was practically eliminated. The gaskets on the end plates, H-442 and H-444, were not renewed and special attention was given to the antenna stuffing tube. After a maintenance overhaul of one tuning unit, the unit was pressurized at 10 lbs. The 10-lbs pressure was maintained for several weeks without loss. Before the overhaul, the unit would lose 2-1/2 to 3-lbs pressure biweekly. The above information was forwarded to the Bureau for publication by Electronics Supply Office.

AN/URT-3, AN/URT-4 AN/SRT-15, AN/SRT-16 ABNORMAL FUSE FAILURES

Performance and operational reports on the AN/URT-3, -4 and AN/SRT-15, -16 (radio transmitters) indicate abnormal, inoperative periods. Several periods have amounted to 700 hours or more. The reports usually attribute these prolonged breakdowns to the failure of primary line Fuses F-1501, F-1502 and F-1503.

Repeated fuse failures may indicate that high voltage is arcing to ground through an air path or that incorrect fuses have been used. The following procedure will aid in locating the source of trouble.

(a) Check to see that the correct fuses are in the power supply. PP-707/URT- Fuse, Cartridge; 600V; 3.2 amps; slow-blow; Buss type FRS-3-1/10. PP-1096/SRT Fuses, Cartridge; 600V; 3.5 amps; slow-blow Buss type FRS 3-1/2.

(b) With power off (Power Supply still connected to the transmitter), measure the resistance to ground at Terminal 2 of Choke L-1501, PP-707/URT: approx, 200,000 ohms; PP-1096/SRT: approx. 100,000 ohms.

(c) Disconnect the high-voltage power-supply drawer from the transmitter. Again measure the resistance to ground at Terminal 2 of Choke L-1501: This resistance should measure infinity for both power supplies. If the resistance measurements are correct, the trouble is probably due to arcing.

In many cases, arcing has occurred in the base structure of the 3B28 High Voltage Rectifier Tubes, V-1501 through V-1506. Since these tubes are used in a three-phase bridge circuit, arcing in one tube may, and probably will, damage the other tubes. DO NOT CHANGE one tube at a time, but replace all the tubes in this circuit before the equipment is energized.

Another possible cause of failure is high-voltage arcing from the filament terminals of the rectifier tube sockets to the chassis. If the underside of a socket is marked with carbon deposits, replace the socket. Finally, check and if necessary, redress the cabinet wiring at all high-voltage terminals. All cabinet wiring should be kept at least one inch away from the high-voltage terminals.

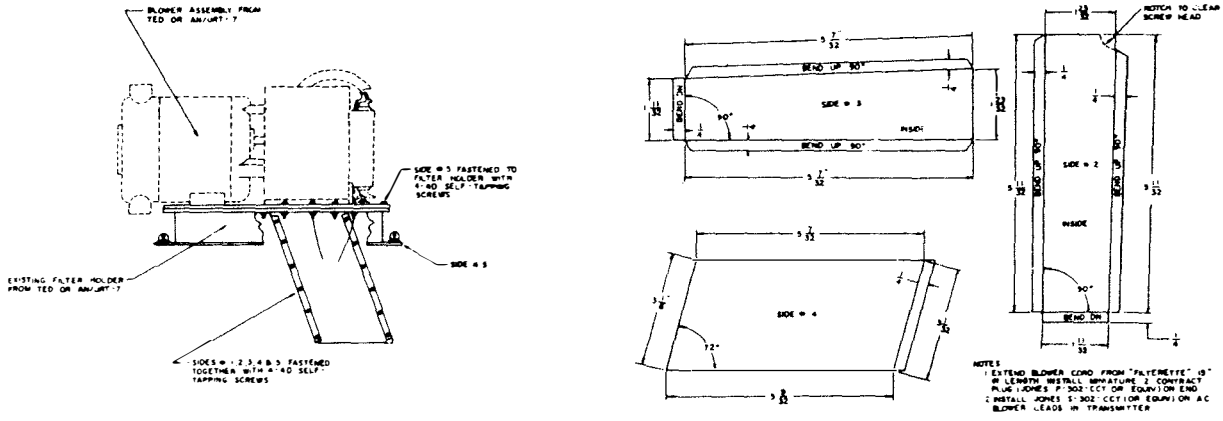
Based on material complied by O. Pedersen, Fed. Elec. Corp. F.E.

AN/URT-3, -4 HIGH VOLTAGE FUSE FAILURE DUE TO 3B24 TUBE SOCKET CARBONICATION

Fiberglass washers, 5/32-inch thick, should be substituted for the 1/16-inch washers on 3B24 Tube sockets which have become carbonized and are causing high-voltage fuse failures.

BLOWER UNIT ADAPTER FOR SERVICING TED OR AN/URT-7 TYPE TRANSMITTERS

Bench servicing of TED or AN/URT-7 Type Transmitters may be simplified by fabrication and use of the blower unit adapter shown in the accompanying sketches. The recommended material is 0.043" aluminum. It is necessary to remove the plastic impeller housing from the TED or AN/URT-7 blower unit and rotate the housing ninety degrees in order to accommodate the adapter.



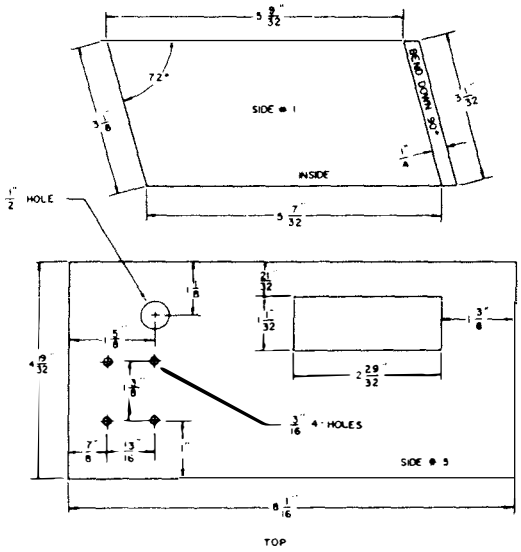


Figure 1

RADIO TRANSMITTERS AN/URT-7 THROUGH AN/URT-7C AND TED THROUGH TED-6

See article in TED section under same title.

KEY CONTROL VOLTAGE GROUND IN AN/URT-18

A recent report of difficulty in the operation of AN/URT-18 transmitters equipped with sleeve-type antennas revealed the following information.

After the installation of sleeve-type antennas at the Naval Air Station, it was found that when the AN/URT-18 transmitters were first connected to the antennas, the transmitters would not key. An investigation revealed that the sleeve antennas were not provided with a ground path for the key control voltage. The 28-volt key-control voltage from the exciter requires a path to ground through the antenna output circuit. This is a safety measure to prevent keying of the transmitters when the antennas are disconnected. The trouble was remedied by connecting an 8-ohm resistor across the circuit to ground, thus permitting the AN/URT-18 transmitters to be safely operated with the sleeve-type antennas. It should be noted that this problem does not exist when utilizing conical monopole antennas.

AN/URT-18—Key Control Voltage Ground

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AN/URC-32 & AN/URT-18 – Alinement of Reference Oscillator

See article in AN/URC-32 section under the same title. (548)

AN/URT-19( ), AN/FRT-39( ), AN/FRT-40( ), and AN/FRT-62( ), Radio Transmitters, Improved Alignment Procedure for Side-Band Exciter Model CBE-1, -2

See article in AN/FRT-39 section under the same title. (EIB 887)

AN/URT-23 TRANSMITTER – PRELIMINARY INSTALLATION DRAWINGS

Preliminary type installation drawings have been distributed by BUSHIPS letter serial 679C4s-3329 of 26 Nov. 1965. These drawings supersede BUSHIPS R&D model drawings RE 52 D 2231, RE 52 D 2232, RE 52 D 2233, RE 36 D 2165, RE 36 D 2166, and RE 36 D 2167.

The preliminary drawings are for the production version of the equipment, and are the first drawings submitted by the equipment contractor. They are to be used for equipment and system familiarization only, and should not be used for film installation planning. Final drawings will be prepared and distributed upon completion of the equipment's preproduction tests.

On preliminary drawing No. 391-0018, it should be noted that the cable for remote control use of the AN/URT-23 contains a number of conductors not normally used in existing standard radio remote control systems (i.e., C-1138/UR). Extra remote control provisions (wire nos. 8 through 14, and 20 and 21) are included for special installations or future remote control systems, wherein it is desired to have the functional control as provided in the AN/URT-23 system. For existing C-1138/UR type remote control systems, only those conductors actually required need to be connected, and a MSCA type cable having fewer conductors that the specified MSCA-30 may be used.

Antenna Coupler Group AN/URA-38 is the associated antenna tuning device used with the AN/URT-23 in surface ship installation. It is an accessory unit and not supplied as a part of the AN/URT-23 (674)

AN/URT-23(V) RADIO TRANSMITTER –GENERAL NOTES

Radio Transmitter AN/URT-23(V) is making its initial appearance in fleet use. The transmitter is a 1000-watt, 2.0 to 30 MHz USB, LSB, ISB, AM, CW and RATT equipment intended for general use and as a standardized replacement for the existing AN/WRT-2 and AN/URC-32 type of equipments. The equipment uses the T-827( )/URT (a unit that is also used in Radio Set AN/WRC-1 and Radio Transmitter AN/URT-24) as an exciter to drive a 1000-watt power amplifier. Optional selection of primary power supply units is accomplished at time of installation. Power Supply PP-3916/UR is for use with 208V/440V, 60 Hz input and the PP-3917/UR is for 115V, 400 Hz input. The PP-3916/UR is a separate unit that is stack mounted with the Exciter and RF Amplifier units; the PP-3917/UR is a "plug-in" type, installed **within** the RF Amplifier. RF output of the RF Amplifier is 50 ohms, and may be used direct into suitable antenna systems, antenna multicouplers, or an antenna. Associated Antenna Coupler AN/URA-38 is normally used in surface ships and shore stations wherein the use of an antenna tuner is specified.

The following general interest notes are provided for reference information:

Installation Plans

AN/URT-23(V) NAVSHIPS RE-B2695923 THRU D-2695928.

AN/URA-38 NAVSHIPS RE-B2695929 THRU D2695932.

Technical Manuals

AN/URT-23(V) NAVSHIPS 0967-191-7010 AND 0967-032-0010.

AN/URA-38 NAVSHIPS 0967-204-0010.

Incremental Frequency Tuning

A small quantity of the first AN/URT-23(V) equipments will be provided with the T-827/URT exciter unit. This unit is operable in 0.5 kHz incremental steps. All other equipments delivered will have the T-827B/URT that tunes in 0.1 kHz increments. A field change (to be provided later) to the AN/URT-23, AN/WRC-1 and R-1051/URR equipments will permit modification of the earlier equipments to 0.1 kHz tuning similar to later models.

Identification Plates

The nomenclature-identification plates are located on the back of the RF Amplifier unit. This is the orange colored plate. The equipment serial number is that which appears on this plate. This is the serial number that should be used in records and correspondence.

RF Amplifier Unit

The RF Amplifier, when delivered, is wired for 440V, 3 phase, 60 Hz operation. Use on other voltages requires wiring changes. This information is contained within the equipment technical manual.

The time meter located within the RF Amplifier is a resetable type. When the RF Amplifier has been operated 1000 hours, an indication will appear by lighting of the OVERLOAD light on the front panel. This is an indication only; the equipment can still be operated. The time meter may be reset with a screwdriver.

The RF Amplifier heat exhaust is in the rear of the cabinet. Tapped holes are provided to enable the attachment of a duct, if desired, for carrying away the heated air. The duct must be a flexible type so as not to impair the action of the equipment shock and vibration mount, if used.

The equipment, when delivered from the contractor, has a fixed "tune" power of 200 watts for use with associated Antenna Coupler AN/URA-38. The equipment is capable of providing a 50- to 250-watt "tune" power for other systems by a change in value of resistor A6R25 located in the PPC circuit. Information on this is in the AN/URT-23(V) technical manual

Frequency Standard Input

For maximum frequency accuracy, the ships central Frequency Standard AN/URQ-9 or AN/URQ-10 should be cabled to the T-827( )/URT external frequency standard input receptacle. This frequency is 5 MHz and should not exceed 3 volts. This reference frequency is derived from the AN/URQ-9 or AN/URQ-10 through Distribution Amplifier AM-2123 ( )/U (refer to NAVSHIPS plan RE-F2687915E).

Power Supply PP-3916/UR (60Hz)

The high-voltage power transformer in this power supply is a part of the case. Should failure occur, the sub-assembly chassis is removed and retained. A replacement case, including the component high-voltage transformer is then obtained from stock. (EIB 7(8)

RF AMPLIEIER AM-3924(XN-2)/URT-INFORMATION CONCERNING

See article under AM-3924(XN-2)/URT with the same title. (EIB 720)

R-1051/URR, T-827/URT, AN/WRC-1 SERIES, AN/URT 23 AND AN/URC-35 FAMILY EQUIPMENTS-INTERCHANGEABILITY DATA ON TRANSLATOR SYNTHESIZERS

See article under AN/WRC-1 with same title (EIB 761)

AN/WRT-2, AN/URC-32, AN/URC-35, AN/WRC-1, AN/URT-23-CARE AND FEEDING OF SSB TRANSMITTERS

See article under AN/WRT-2 with same title. (734)

AN/URT-23 Radio Transmitting Set-Electrical Shock; Warning of

Maintenance personnel have experienced an electrical shock when attempting repairs to Radio Frequency Amplifier AM-3924(P)/URT after the three-phase primary power bulkhead switch was set to the OFF position. An electrical shock hazard exists under this condition at the exposed terminals of power Input Line Filter FL1/J5 (figure 5-17) and the terminals of Operate Relay K1 (figure 5-8). This shock hazard develops as follows:

When the primary power is applied to the terminal transmitter, the capacitors inside the metal case of Line Filter FL1/J5 charge up to the line voltage used, either 115, 208 or 440 volts. These capacitors continue to remain charged indefinitely after the primary power is shut off, thereby constituting a shock hazard condition.

Maintenance personnel are therefore warned that after setting the three-phase primary power bulkhead switch to OFF, be especially sure to discharge these line filter capacitors, if either FL1/J5 or K1 is to be serviced or replaced. Discharge these capacitors by grounding the exposed terminals marked A, B, C, on the filter case, with a safety shorting probe (shorting bar). (761)

AN/URT-23(V) Radio Transmitting Set, Electrical Shock in PP-3916/UR Power Supply-Warning of

Dangerous high voltages (up to 2250 VDC) exist on the exposed terminals of terminal boards 2A1TB1 and 2A2TB1 whenever the power supply interlock switches A1S2, A1S3, and A1S4 are by-passed. (Refer to figure 5-20 in NAVSHIPS 0967-191-7010, Technical Manual for AN/URT-23(V) dated April 1967, for location of components.)

Maintenance personnel are hereby warned to use extreme caution when making test measurements or repairs to this power supply. *(808)*

AN/URT-23(V) Radio Transmitting Set - Reduce Failure of the 66-Pin Connector Plug 1A2P3; Maintenance Hint

A number of failures have occurred in the 66-pin connector plug 1A2P3 located in the case assembly for the radio frequency amplifier AM-3924(P)/URT. Connector 1A2P3 failure occurs when the insulation between the connector pins that carries the 440 VAC input power and the connector metal hood cover breaks down. To reduce arcing and probable failure of the connector, a strip of high voltage insulation tape is applied to the inside of both halves of the metal hood on connector 1A2P3.

This article applies to all AN/URT-23(V) sets.

The purpose of this maintenance hint is to provide an interim fix until further investigation of this problem results in a permanent change.

Material Required:

One roll of insulation tape, Federal Stock Number 9G5970-660-9179

Tools Required:

Screwdriver, common, 6 inch
Screwdriver, Phillips
Screwdriver, small
Knife, electricians

Procedure:

Proceed as follows to apply the insulation tape to the metal hood of the connector plug.

NOTE

Observe all safety precautions.

1. Remove primary power from the AN/URT-23(V) by placing the bulkhead switch

to the OFF position. Set the PRIMARY POWER switch 1A1S4 on the AM-3924(P)/URT Power Amplifier to the OFF position. Loosen the eight front panel screws of AM-3924(P)/URT and slide out the chassis drawer.

2. Locate connector plug 1A2P3 which is shown in figure 5-17 of the Technical Manual, NAVSHIPS 0967-191-7010, and figure 5-17 of the Technical Manual, NAVSHIPS 0967-879-5010. Remove the two Phillips screws that secure the slotted bracket to the chassis.

3. Disconnect coaxial plug 1A2P1 from J1 and 1A2P4 from J2. Disconnect plug 1A2P3 from 1A1J3 by unscrewing evenly the two jack screws. NOTE: When performing this step it may be necessary to push the chassis drawer slightly into the case to relieve the strain on the cable harness.

4. On plug 1A2P3, remove the two small Phillips screws located just below the slotted holes of the bracket. Remove the two flat head screws from the other half of the metal hood which is marked "P3."

5. At the bottom side of the plug, remove the four filister head screws and then separate and remove both halves of the metal hood.

6. Inspect each wire connection to the plug pins and push any insulation sleeving, that has worked loose, down over the pin.

7. Wrap a 6-inch length of insulation tape around the cable harness to hold the outside row of insulation sleeving in place.

8. At the location shown in figure 1, apply half the width of a 1-3/4 inch length of insulation tape to the outside of either half of the metal hood and press the tape firmly in place. Fold over the remaining portion of the tape to the inside of the metal hood and press the tape firmly in place.

9. Repeat procedure for other half of metal hood.

10. Reassemble connector plug 1A2P3 in the reverse order that it was disassembled.

11. Reconnect connector plug 1A2P3 to J3 and fasten the metal bracket to the chassis.

12. Reconnect plugs 1A2P1 to J1 and 1A2P4 to J2.

13. Push drawer into its case and fasten the eight panel screws. *(794)*

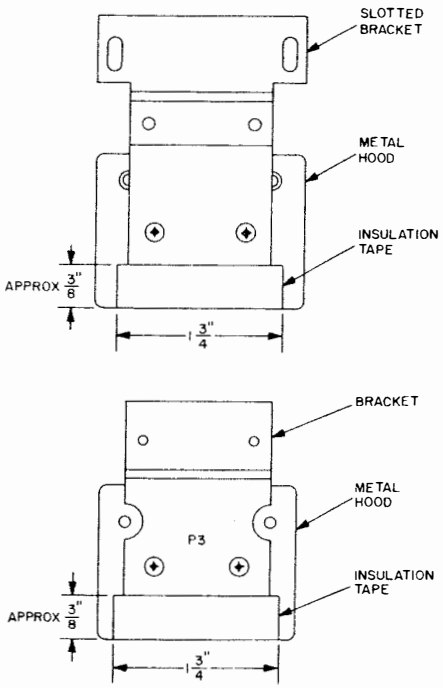


Figure 1. Method of Applying Insulation Tape to Metal Hood.

AN/URT-23(V) RF Amplifier AM-3924(P)/URT Bias Adjustments—Proper Setting of

To minimize heating effects and to maintain normal operation of the AN/URT-23(V) radio transmitting set, it is important to properly set the driver and power amplifier bias adjustment controls. An improper setting of these bias controls will cause non-linear operation in the amplifier stages with resultant distorted transmitter signals.

Improper bias settings which result in excessive plate current flow in the driver and power amplifier tubes will cause overheating of the transmitter, will place an abnormal load on the transmitter power supply, and will reduce the reliability of the transmitter set.

For optimum transmitter operation, the driver and power amplifier bias adjustments should be performed according to the instructions given in AN/URT-23(V) Technical Manual NAVSHIPS 0967-191-7010, paragraphs 5-5 through 5-8, for "A" serial sets. For "B" serial sets, follow instructions given in AN/URT-23(V) Technical Manual NAVSHIPS 0967-879-5010, paragraphs 5.2.1 through 5.2.2.

NOTE

Only authorized maintenance personnel shall perform the bias adjustments. *(EIB 859)*

AN/URT-23(V)—Final Transformer Assembly Switch Wiper Contact Arms; Proper Positioning of

Arcing of the switch contacts is a cause of failure of the final transformer assembly 1A1A2 in the RF Amplifier AM-3924(P)/URT. Arcing results when the wiper contact arms of the switch are not properly positioned on their stationary wafer contact of the switch. Each switch wiper contact arm must make full contact with its stationary wafer contact for proper operation of the 1A1A2 assembly.

As a precautionary measure, it is advisable to check each final transformer assembly for proper switch alignment. This may readily be observed by energizing the equipment in standby and setting the frequency at 28.000 MHz. Remove the final transformer assembly and note the switch position.

If the final transformer assembly switch wiper contact arms are not properly positioned, the "code deck" wafer of the driver transformer assembly switch must be adjusted, since it is the "code deck" that determines the switch position of the final transformer assembly. The "code deck" should be adjusted as per instructions in the AN/URT-23(V) technical manual NAVSHIPS 0967-191-7010, page 5-23, steps ah. thru ao. (for "A" serial sets); and technical manual NAVSHIPS 0967-879-5010, page 5-23, steps aj. thru aq. (for "B" serial sets).

If a new driver transformer assembly 1A1A4 is installed, the switch alignment of the 1A1A2 assembly should be checked and corrected if necessary before keying the transformer at full power. *(EIB 875)*

AN/URT-23(V) Radio Transmitting Set—Proper Procedure for Removal of Fixed Capacitor 1A1C4 from AM-3924(P)/URT

Difficulty in removing 1A1C4 capacitor has been experienced by some maintenance personnel. The following procedure outlines the proper method of removing the fixed, mica, capacitor 1A1C4 from Power Amplifier AM-3924(P)/URT.

WARNING

OBSERVE ALL SAFETY PRECAUTIONS

Procedures:

1. De-energize and secure all electrical power to the AN/URT-23(V).
2. Loosen eight front panel captive screws on AM-3924(P)/URT and pull chassis drawer out until chassis slides lock.
3. Remove metal protective cover from over final power amplifier tubes by removing ten screws.
4. Remove cable clamp from coaxial cable that connects to VSWR bridge assembly.
5. Disconnect cable connector 1A1A2P1 from J1 of VSWR bridge.
6. Loosen screw that secures contact strap (or solder lug) to contact block of final transformer assembly 1A1A2.
7. Carefully loosen four captive screws and lift final transformer assembly 1A1A2 from chassis.
8. Disconnect each plate cap connector from top of power amplifier tubes 1A1V1 and 1A1V2.
9. Remove the button plug located on the wall plate exposing the 3/8" hole and lower screw fastened to capacitor 1A1C4.
10. Remove the lower screw from capacitor 1A1C4.
11. Remove the two top Phillips head screws from the insulator board to which the small coil and 33 ohm resistor are connected.
12. Remove the top, rear brass screw located near rf choke 1A1L1.
13. Lift out the entire assembly to which capacitor 1A1C4 is attached.
14. Remove the top screw from capacitor 1A1C4.
15. Remove capacitor 1A1C4.
16. Replace 1A1C4 with a new one.
17. Reassemble all parts by reversing steps 3 through 15.
18. Release chassis locks and push chassis into case.
19. Secure the eight front panel screws.

(EIB 881)

AN/URT-23(V) Radio Transmitting Set; AM-3924(P)/URT RF Amplifier Case — Dislodging of Threaded Inserts and Bending of Front Panel Captive Screws

The purpose of this article is to instruct maintenance personnel in preventing the dislodgement of the threaded inserts on the RF amplifier case and the bending of front panel captive screws.

The threaded inserts located at each corner of the AM-3924(P)/URT case may become dislodged when the RF amplifier chassis drawer is pushed into its case. Dislodging of the inserts is caused by the captive screws striking the inserts when the chassis drawer is pushed into its case.

To prevent dislodgement of the corner inserts, be sure to pull each front panel captive screw fully away from the front panel before pushing the amplifier chassis drawer into its case. This practice will also prevent bending of the captive screws. (EIB 921)

AN/URT-23(V) Radio Transmitting Set, Oscillations In — Maintenance Hint

The purpose of this article is to alert maintenance personnel of an undesired transmitter feedback condition.

Undesired feedback sometimes occurs when operating the AN/URT-23(V) at any frequency but especially in the 26-28 MHz band during testing of the equipment. This condition occurs only when the T-827( )/URT and AM-3924(P)/URT drawers are both open at the same time which causes an interaction feedback condition between both units. This results in a false excessive RF output meter indication on the AM-3924(P)URT unit.

This feedback condition is an inherent property of the equipment and does not indicate any failure. To prevent this undesired condition, be sure only one unit drawer is open and that the other drawer is closed and securely fastened. (EIB 921)

*AN/URT-23( )(V) Radio Transmitting Set; Air Filters 1MP1 (AM-3924( )(P)/URT) 2A1MP1 (PP-3916/UR and 2A1MP43 (PP-3916A/UR) — Maintenance Hint

The purpose of this article is to advise maintenance personnel that the filtering action of the filters may be improved by applying a filter adhesive.

Fleet activities have indicated that particles of soot and dirt enter the units through the respective air filters. The particles contaminate components and restrict the air flow through the tubes by covering the air ports in the tube socket and cooling fins.

"Filter Coat" is the trade name for a filter adhesive that has been used on the AN/URT-23( )(V) filters with a great deal of success. Instructions for the application of the adhesive are printed on the container. The periodicity of application shall be dictated by the filter cleaning schedule prescribed on Maintenance Index Page (MIP) C-364/1-26.

One pint container of "Filter Coat" may be ordered from the supply system using NSN 9G 4130-00-860-0042. (EIB 935)

AN/URT-23( )(V) Radio Transmitting Set; Diode Stack 2A1CR2/CR3 (PP-3916( )/UR) 1A1A8CR1/CR2(PP-3917( )/UR — Maintenance Hint

The purpose of this article is to advise maintenance personnel that the non-encapsulated diode stack, 1N 5961-00-140-0725, will not be available from supply until 1 June 1977 and that the installed diode stack must be repaired if a failure occurs.

Field Change 7-AN/URT-23 installed a non-encapsulated diode stack in the high voltage power supplies and the AN/URT-23(A) was delivered with a similar diode stack.

All equipments should now have a non-encapsulated type diode stack which may be disassembled and repaired during emergency conditions.

The technician should exercise extreme care when separating the three printed circuit boards that contain the diodes. The board will be damaged if too much heat is applied. A soldering iron rated at 50 watts or less is sufficient to separate the boards and remove the defective diodes.

The individual diodes are JANTX-1N5554 and may be ordered from the supply system using NSN 9N 5961-00-650-9659. (EIB 935)

AN/URT-23 Parts Support–Information Concerning

The purpose of this article is to advise maintenance personnel of an error that exists in the Allowance Parts List (APL) for the AM-3924(P)/URT and AM-3924A(P)/URT. The part number and NSN for resistors 1A1R25 thru 1A1R28 and 1A1A1R1, 1A1A1R2 are incorrect.

The resistor value is 10 ohms, 3 watt, 1% tolerance and the correct part number is RWR89S10ROFR. The applicable NSN is 5905-00-466-1487.

AM-3924(P)/URT APL #52389025, section A dated 3-1-76, section B dated 5-76, lists the NSN as 5905-00-945-7053 which identifies a 10 ohm 1 watt resistor.

AM-3924A(P)/URT APL #52389000, section A dated 3-1-76 lists the NSN as 5905-00-945-7053 and section B dated 5-76 lists the part number RW70W10ROF which identifies a 10 ohm 1 watt resistor.

Activities holding hard copies of the APL's should enter the correction; those activities that have APL's on microfiche should note the error in the parts list of the appropriate technical manual.

A revised AM-3924(P)/URT APL will be available 1 July 1977 and a revised AM-3924A(P)/URT APL will be available 1 November 1977. Both documents will contain the correct part number and NSN.

(EIB 951/955)

AN/URT-23( ) (V) Extender Boards for Printed Circuit Boards (PCB's) 1A1A5 and 1A1A6–Availability of

The purpose of this article is to advise AN/URT-23( ) maintenance personnel that extender boards for PCB's 1A1A5 and 1A1A6 are available from the Naval Electronic Systems Engineering Center (NESEC) Portsmouth P.O. Box 55, Portsmouth, VA 23705, Attn: Code 610. The extender boards position the PCB's above surrounding surfaces to permit easy access to critical test points and greatly reduce repair time.

NESEC Portsmouth had 500 sets of the extender boards made and distributed 415 sets to 334 ships and 7 shore stations. The forwarding letter (NAVAL ELECTRONIC ENGINEERING OFFICE Serial 194) that was in the shipping container had NESEC Portsmouth return address printed on the back. The letter requested the receiving activity to enter the serial numbers of installed AN/URT-23's at the bottom of the letter, fold and mail. Many activities failed to forward the equipment serial numbers and other activities have failed to forward the return receipt for registered/certified mail. NESEC Portsmouth requests all activities to review their correspondence and complete and forward the requested data. Activities that did not receive the extender boards may request the boards from NESEC Portsmouth. Note that requests must be accompanied by a serial number listing of AN/URT-23( )'s that are installed at the activity. (EIB 951)

*AN/URT-23( ), AN/WRC-1( ), AN/URC-35( ), AN/URT-24( ) Radio Sets–Maintenance Hint

The purpose of this article is to identify a simple inexpensive method of fabricating a CW test key.

Technical manuals, reference standard books and PMS procedures that are applicable to the subject equipments indicate a CW hand key is required for conducting test in the CW mode. The CW hand key is an excessively expensive item for this application and is not available in large quantities in the supply system.

A telephone plug PJ-068, NSN 9N5935-00-192-4753 may be used effectively in lieu of the hand key.

The following assembly procedure is recommended:

Using the terminals and screws supplied with the plug connect a short length of insulated wire (#20 AWG) between the TIP TERMINAL and the RING TERMINAL, refer to Figure 1. Replace the outer shell.

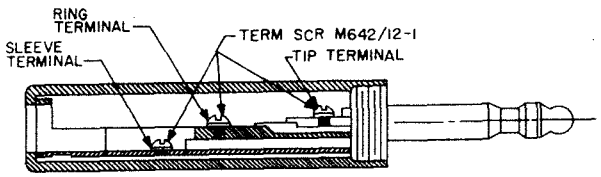


Figure 1. Fabrication of CW Test Key.

The plug may now be used to key the transmitter in local CW mode by inserting it into the CW KEY jack on the T-827( )/URT.

Mark the plug in some way (paint, tape, or label) so that it can be easily identified as a "dummy" CW key.

(EIB 951/955)

AN/WRC( ), AN/URT-24, and AN/URC-35( ) PA Tube High Voltage Protection Shield–Ordering of

See article under AN/WRC-1( ) with same title. (EIB 827)

AN/URT-24 and AN/WRC-1B Radio Sets–Identification of Installations

See article in AN/WRC-1 section under the same title. (EIB 865)

AN/URC-35, -35A, AN/URT-24, -24A; AN/WRC-1, -1B--Alteration Equivalent to Repair (AER) on DC-DC Converter Part Number 0026-2200--Information on

See article in AN/URC-25 Section under the same title. (EIB 968)

AN/WRR-7 Digital Data Receiving Set and AN/URT-30 Digital Data Transmitting Set--Limitation on Use of Maintenance Standards Books (MSB)

See article in AN/WRR-7 Section under the same title. (EIB 924)

AN/USC-2 Link Simulator Ashore

Programming centers and training activities ashore must be capable of simulating the complete operation of the AN/USC-2 link. Other activities may also find this capability useful during training operations. The AN/USC-2 link normally involves the following equipments: AN/SSW-1A, AN/SRC-17, AN/USQ-20, AN/ARC-75, and AN/ASW-13. The AN/SSW-1A test set-up involves the CV-803/ASW-13 and the Test Adapter (sometimes referred to as the End-Around-Test Box and procured under contract NOw 62-0740-d for shore activities) and simulates the AN/USC-2 link. However, this wire connected test set-up in lieu of the normal RF coupling requires a modification to the computer program to compensate for the loss of cross coupling between the transmitter and the receiver of the AN/SRC-17. Simulation of the AN/USC-2 link by use of the AN/SRC-17 and the AN/ARC-75 would overcome the programming problems but is undesirable because it requires the use of critical RF channels.

The INDMAN FIVE has successfully fabricated and used the cross coupling adapter unit shown in figure (1). This unit, when fabricated and installed as described below, will completely simulate the operation of the AN/USC-2 link and will eliminate the need for both program modification and RF radiation.

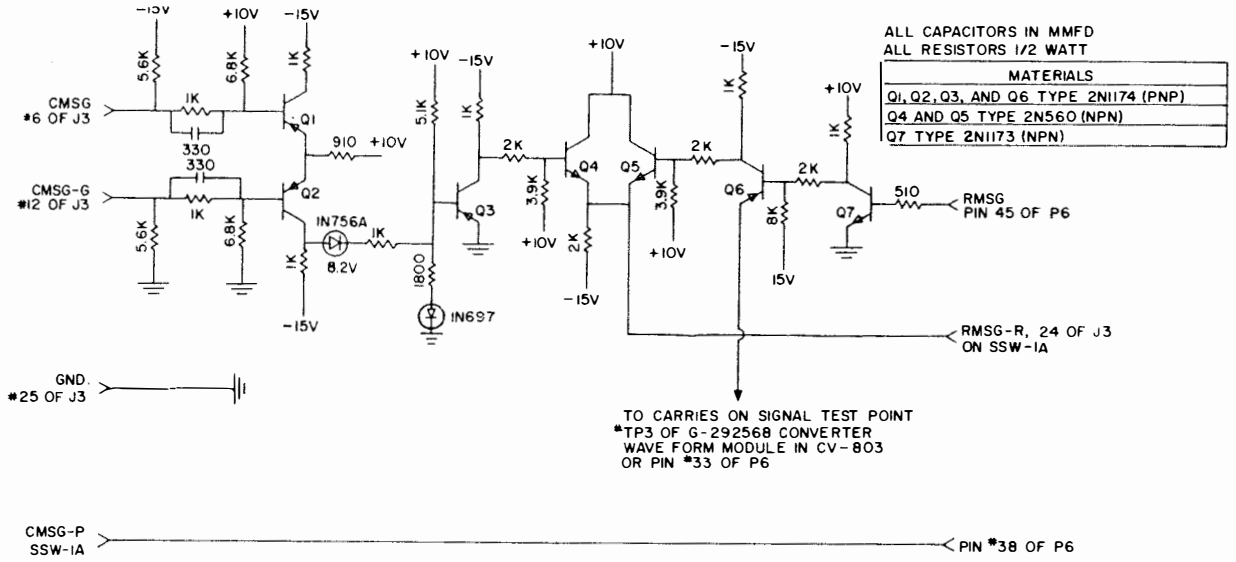


Figure 1. Cross Coupling Adapter Unit, Schematic Diagram

When coupling the AN/SSW-1A CMSG output (see figure 2) to the RMSG input, impedance and level problems exist. To overcome these problems, the circuit in figure (1) was developed and through impedance matching, level adjustment, and "OR gate" coupling, successful operation of the AN/SSW-1 test set up has been accomplished.

A separate power supply could be provided for the circuit in figure (1) or power could be obtained from the CV-803/ASW-13. The interconnection of the CV-803/ASW-13 and the AN/SSW-1A using the adapter unit is shown in figure (2) and is accomplished as follows:

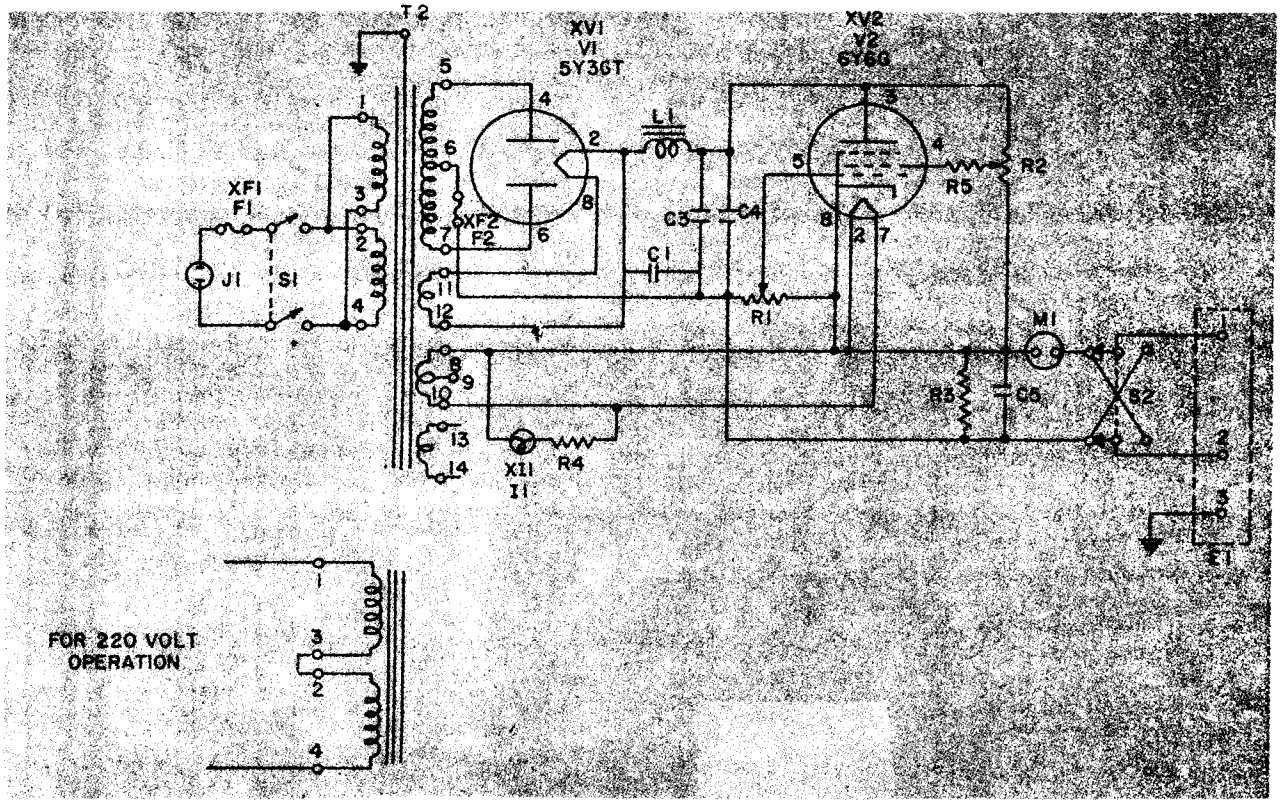


Figure 2. Interconnection Diagram for CV-803/ASW-13 and AN/SSW-1A when Using Adaptor Unit

(1) The CMSG (Control Message) lead is connected from pin 6 of J3 which is the "Radio Cable Jack" in the AN/SSW-1A, to the CMSG input in the adapter and to pin 38 of P6 which is a part of the turn around box cable assembly CX-8781/ASW-13 normally used to connect to the AN/ARC-75. This results in a circuit between test point 2 of the filter assembly in the CV-803/ASW-13, test point CMSG on the front panel of the AN/SSW-1A, and the CMSG input to the adapter. Pin 12 of J3 is also connected to the CMSG-G (Control Message-ground) input to the adapter.

(2) The RMSG (Reply Message) lead is connected from 45 of P6 (mentioned above) to the RMSG input to the adapter. This results in a circuit between test point 2 of the CV-803/ASW-13 "Filter Synchronizer" and the RMSG input in the adapter.

(3) The RMSG-R (Reply-Message-Radio) lead is connected from the RMSG-R terminal on the adapter to the RMSG input, pin 24 of J3 (mentioned above). This couples both CV-803/ASW-13 responses and CMSG signals from the AN/SSW-1A into the RMSG input of the AN/SSW-1A.

(4) All units should have adequate interchasis ground. (7S)

AN/USQ-69(V), AN/USQ-69X(V), and AN/USH-26(V)--Identification of Maintenance Hazards

See article in AN/USQ-69 Section under the same title. (EIB 972)

AN/USQ-20(V)–DATA SYSTEM GROUP; SPECIAL TOOLS

The purpose ofthis article is to provide Federal Stock Numbers for the most commly used special tools required in servicing the AN/USQ-20(V) Group in order to enable activities to cross reference between Federal Stock Numbers and manufacturer's part numbers.

The associated technical publications for the AN/USQ-20(V) Group list these special tools under Manufacturer Number only and difficulty has been experienced in procurement.

Item	Nomenclature	AWG Size	Mfg. No.	F.S.N.
1.	Taper Pin Crimp Tool	24/22	AMP-48698-3	9G-5120-662-8751
2.	Taper Pin Crimp Tool	20/18	AMP-47043	9G-5120-662-8823
3.	Taper Pin Insertion Tool	24/22	AMP-380306-2	9G-5120-522-2714
4.	Taper Pin Insertion Tool	20/18	AMP-380306-6	1A-1220-650-7922
5.	Taper Pin	24	AMP-41646	2R-5940-621-2195-E222
6.	Taper Pin	22	AMP-41649	1N-5940-874-1013
7.	Taper Pin (2 wire)	20	AMP-41652	2RS-5841-822-9510-E222
8.	Taper Pin (2 wire)	18	AMP-41658	9G-5940-561-7863

It is recommended that the above list be copied and retained within the maintenance complex for future reference. (657)

AN/USQ-20(V) (NTDS), AN/USQ-34 (IOIC), AN/UYK-5 (3M/Moonbeam/U-1500), AN/UYK-4(V), AWCLS, SINS, MPDS, IFTDS--Wire Wrapping Information

Many fleet and shore activities having maintenance responsibility of the subject systems have encountered difficulties in acquiring replacement sleeves and bits for wire wrap tool, Model 14R2, and the 24 AWG/30 AWG wire required to accomplish field changes and repairs.

The following information is provided to assist Data Systems Technicians in procurement of the required parts.

Item	FSN	Nomenclature/ Description
1	6145-401-5298	Wire, solid, 24 AWG, white, teflon coated
2	6145-401-5297	Wire, solid, 24 AWG, red, teflon coated
3	6145-255-0769	Wire, solid, 30 AWG, white, teflon coated
4	6145-255-0756	Wire, solid, 30 AWG, blue, teflon coated
5	5120-051-3858	Bit, wire wrap 24 AWG (P/N 26263, Mfg. Code 24047)
6	5130-987-7057	Sleeve, 22/24 AWG (P/N 18840, Mfg. Code 24047)
7	5133-854-9886	Bit, wire wrap, 30 AWG (P/N 504221, Mfg. Code 24047)
8	5130-731-5941	Sleeve, 30/32 AWG (P/N 500350, Mfg. Code 24047)
9	5120-104-9022	Dual, LF/RH, unwrap tool, 20/26 AWG (P/N 500130 Mfg. Code 24047)
10	5120-854-9888	Dual, LF/RH, unwrap tool, 30/32 AWG (P/N 505244 Mfg. Code 24047)
11	5130-919-3486	Tool, wire wrap, battery operated (Model 14R2) Gardner-Denver (Mfg. Code 24047). This FSN applies to the tool. Bits and sleeves are not provided. Cost approx. $95.00
12	None available	Battery, rechargeable (P/N 503885; Mfg. Code 24047, cost approximately $29.55). Available Gardner-Denver, 732 So. Sharon-Amity Rd, Charlotte, N.C.
13	None available	Tool, wire wrap, 60 hz powered (Model 14XA2) Mfg. Code 24047, cost approximately $100.00. Uses same bits and sleeves as listed in items 5, 6, 7, and 8.

(801)

RD-243/USQ-20(V), RD-261/USQ-34, RD-270(V)/UYK, RD-294(V)/UYK Magnetic Tape Recorder-Reproducer Read/Write Heads—Information on

See Article under RD-243/USQ-20(V) with same title. (753)

RD-243/USQ-20 Signal Data Recorder-Reproducer—Maintenance Hint

See Article under RD-243/USQ-20(V) with same title. (754)

AN/USQ-20(V) General Purpose Stored Program Computer Set — Maintenance Hint and Availability of

This article announces the availability of and maintenance hint for Connector Dust Caps for the AN/USQ-20(V) 90 pin connectors.

Some of the 90 pin connectors on NTDS computers and peripheral equipment are not used, such as CP-642B/USQ-20(V), CP-789(V)/UYK, CV-2036(V)/USQ-20(V) and SB-1299B/USQ-20(V) (especially on the 5 position switches). The exposed connector pins on these unused connectors are subject to damage. Also, foreign matter may collect in the connector. Dust caps can eliminate both these problems and their use is strongly recommended.

The dust caps may be obtained from NAVSECNORDIV. Letter requests must specify the required number of dust caps to protect all unused 90 pin connectors on AN/USQ-20(V) computers and peripheral equipment and should be addressed to:

Officer in Charge
Naval Ship Engineering Center,
Norfolk Division, Naval Station
Norfolk, Virginia 23511
ATTENTION: SEC 6623B

(EIB 914)

AN/USQ-69(V), AN/USQ-69X(V), and AN/USH-26(V)—Identification of Maintenance Hazards

Certain items associated with the AN/USQ-69(V), AN/USQ-69X(V), and AN/USH-26(V) are to be considered as hazardous to maintenance personnel, and are identified below. Actions are presently being taken to eliminate these hazards. These hazards are all associated with the internal parts of the devices and, as such, do not affect operational personnel.

Hazardous Items Associated with the AN/USQ-69(V) and AN/USQ-69X(V) are:

1. Exposed voltages of +400 VDC and -110 VDC exist on the high voltage power supply. These terminals are labeled +400 VDC and -110 VDC.
2. The video monitor assembly contains a 16,000 VDC supply. This potential is not removed when maintenance personnel open this assembly.
3. There are exposed sharp or rough edges in the following five (5) areas:
   a. The corners on the slides securing the circuit cards.
   b. The corners on the top lip at the video monitor assembly.
   c. The edges of the cover at the CRT shield.
   d. The front panel plates of the video monitor assembly.
   e. The front panel plates of the logic chassis assembly.
4. The exhaust fan is not guarded when the logic chassis assembly is extended. Avoid placing fingers in back of the unit behind the fan housing.
5. The shielded window mounted in front of the CRT has an EMI coating on the inside surface. This surface should not be cleaned until further notice. The outside surface may be cleaned as per instructions in the maintenance manual. Maintenance personnel should not remove the shielding window from its assembled position when cleaning the outside surface.

Hazardous Items Associated with the AN/USH-26 are:

1. The electrical connections to the on/off switch (circuit breaker) have exposed terminals containing 115 VAC or 208 VAC.

(EIB 972)

AN/UXH-2 MAINTENANCE AND TEST PROCEDURES TO IMPROVE AND DETERMINE PROPER OPERATION

Reports from the field indicate repeated failures of the stylus and belt drive of these facsimile recorders. A modification kit has been developed which replaces the present stylus and wire belt drive system. Their installation should result in greatly increased reliability and reduced maintenance requirements.

There are operational and maintenance features of the AN/UXH-2 which, if not strictly adhered to, will cause excessive failures of bands, stylii, and mechanical parts. These maintenance requirements will still exist after installation of the modification kit described. The most overlooked of the maintenance requirements are the RUN MOTOR ADJUST CONTROL settings, one for each of the three speeds.

Page 6.3-0, section 6.3-2, paragraph 1, of NAVSHIPS 93158(A) states that these adjustments are made at the factory for optimum operation under normal conditions. This statement has evidently been interpreted by operating and maintenance personnel as indicating a one-time-only adjustment. The run motor torque required to drive the mechanism when it is new and tight is excessive when the equipment has been broken in and the mechanical friction decreased. The excessive torque then places undue stress on the stylii band and causes the run motor to draw excessive current during the run mode of operation. When the run motor system is energized, the excessive current causes the run motor to drive the stylii belt drive mechanism to synchronism between the synchronous mechanism and the run mechanism, the stylic belt and the slip clutch on the run motor assembly must absorb the impact because of the excess speed of the run motor mechanism. This is the moment of greatest stress on the belt and is undoubtedly the cause of belt breakages.

The foregoing is based on an analysis of trouble reports received by the Bureau of Ships and the experience of the manufacturer, Westrex Corporation, with the AN/UXH-2 and their commercial equivalent. The following Run Motor Adjust procedure was devised jointly by BUSHIPS and Westrex engineers.

It is intended to replace the Run Motor Adjust procedures contained in section 6.3-2(b), (c), and (d), pages 6.3-0 and 6.3-1, of NAVSHIPS 93158(A). Before proceeding with the run motor adjustments, perform the semiannual equipment lubrication as shown in figures 6-1 through 6-4, and adjust the Run Motor Slip Clutch as described on page 6.3-7 and shown in figures 6-7, 6-8, and 6-9.

Refer to figures 3-1 and 6-24 of NAVSHIPS 93158(A) and perform the Run Motor adjustments as described below:

1. Remove plug J101A, signal input.
2. Set selector switch, S302, to "120 scans".
3. Set Auto/Man Switch, S305, to "man".
4. Set Gain control, R301 to "Auto".
5. Bring recorder up to "Run" as described on control panel door.
6. Open recorder as shown in figure 3-2, page 3-3.
7. Loosen three knurled screws in front center of electrical chassis and open hinged panel to expose its circuitry.
8. Connect, temporarily, a capacitor (range 0.10 to 0.50 mfd.) between TP 10 and left-hand terminal of R106 which is mounted on the resistor board under the hinged panel. A 0.10-mfd. capacitor has worked well on some sets for all three speeds. This provides a signal at sync motor frequency to secondary of input transformer, T301.
9. Set a multimeter to 100 VAC scale and connect to TP16 and TP17.
10. Move Start Record/Stop Record switch S304, to "Start Record" position momentarily. The run system should start and drive stylus band to synchronous speed.
11. Adjust 120 scan potentiometer, R132, to extreme clockwise position. This places maximum power on run motor.
12. Depress and hold Start Switch, S103, on hinged panel. This removes ground shunt from sync motor signal provided in step 8 above, and this signal is now amplified and recorded as shown in figure 1 (a).
13. Adjust 120 scan potentiometer R132 slowly in counterclockwise direction until copy becomes degraded as shown in figure 1 (b).
14. Adjust R132 slowly in clockwise direction until copy again becomes legible as upper portion figure 1 (a). Note voltmeter reading and further adjust R132 in a clockwise direction to a five-volt higher reading than noted. This is proper run motor adjustment of 120 scan speed.

Steps 1 through 14 should be repeated for testing and adjusting at 90 and 60 scans to produce copy shown in figures 2 (a), (b), and (c) and 3 (a), (b), and (c), respectively. It may be necessary to select different value capacitors within the recommended range for the 90 and 60 scan tests and adjustments.

One lead of the voltmeter should be on TP16 and the other on TP15 and TP14 for the 90 and 60 scan speeds, respectively.

Successful production of suitable test patterns as shown in figures 1 (c), 2 (c), and 3 (c) during the tests and adjustments described above proves the AN/UXH-2 recorder to be functioning properly and independently from all ancillary equipment. Copy degradation subsequent to successful completion of the above tests must be corrected in other equipments concerned with receipt of facsimile signals such as converters and radio receivers. Ships and stations having facsimile transmitters, keyers, and modulators should check these for proper operation also.

Recommend that all ships and naval facilities using the AN/UXH-2 facsimile recorder perform the maintenance and tests described herein. Their performance should result in increased maintenance capability and understanding by maintenance personnel and an overall functional improvement of equipment operation and more legible facsimile copy.

FIGURE 1A
120 SCANS
FULL RUN POWER

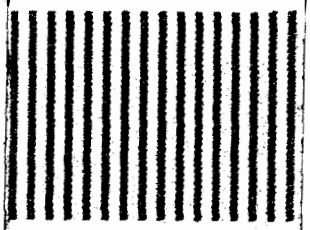


FIGURE 1B
120 SCANS
WEAK RUN POWER

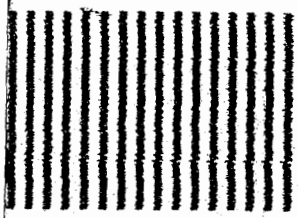


FIGURE 1C
120 SCANS
PROPER RUN POWER

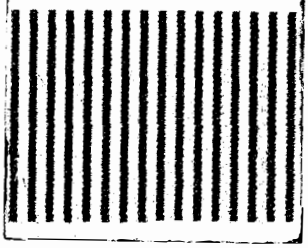


FIGURE 2A
90 SCANS
FULL RUN POWER

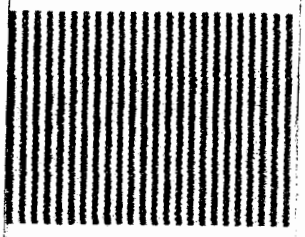


FIGURE 2B
90 SCANS
WEAK RUN POWER

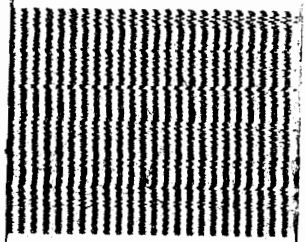


FIGURE 2C
90 SCANS
PROPER RUN POWER

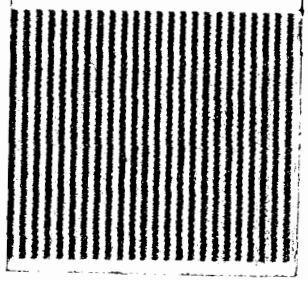


FIGURE 3A
60 SCANS
FULL RUN POWER

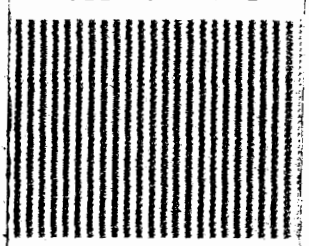


FIGURE 3B
60 SCANS
WEAK RUN POWER

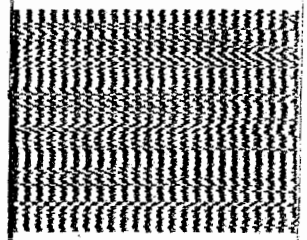


FIGURE 3C
60 SCANS
PROPER RUN POWER

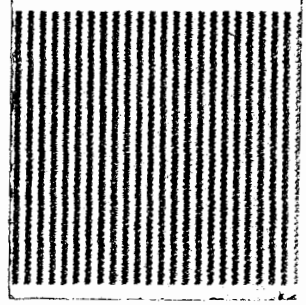


Figure 1

AN/UXH-2; FACSIMILE RECORDER IMPROVEMENTS

In response to the many inquiries received concerning progress on the long-awaited AN/UXH-2 recorder modification program being undertaken by BUSHIPS, a general summary is presented here. Modifications to AN/UXH-2 equipments in the Fleet, at overseas shore stations, and at some CONUS shore stations were regarded as being too complex for field application. This, coupled with the recognized need for a complete overhaul of the AN/UXH-2's for the first time since their issue, resulted in the present plan to return each recorder to Westrex for modification and rehabilitation. When reissued, the equipments will then be like new.

Modification to AN/UXH-2 will include changeover to the pressure-sensitive recording technique, thus eliminating the old electrical arcing principle whereby the image was "burned" into the paper. The modified AN/UXH-2(A) utilizes a conventional paper feed drum in combination with stylii driven from a heavy, rigid, grooved rubber belt which is both stable and, best of all, trouble-free during its long life. The three stylii press the image on the back of one-time carbon paper. This carbon paper and the plain white paper on which the image finally appears are fed from separate supply spindles to avoid the slippage and binding common with integrated paper and carbon paper feed techniques during longer periods of unattended operation.

Attention is being given to improved parts provisioning in the case of the AN/UXH-2(A), to avoid some of the problems of this nature which have so seriously detracted from the efficient employment of the AN/UXH-2 to date. In the case of the new type of paper required with AN/UXH-2(A), plans include the provision of six rolls of the new-type paper and six rolls of carbon paper with each modified recorder issued. This is approximately a one month supply. Adequate prepositioned supplies have been stocked in the supply system. The Federal Stock Number for this paper is FSN-1N7530-906-8283.

Priorities have been established for initial issue of modified equipments to those Fleet units and shore stations with the greatest operational need for them. This modification program is not underway. At this time, there is no sound estimate of the elapsed time from first AN/UXH-2 on to last AN/UXH-2(A) off the Westrex assembly line. A simple one-for-one exchange of equipments in the Fleet and at shore stations is planned; i.e., a modified and overhauled AN/UXH-2(A) will be received and the same shipping container will be utilized, for shipping the ship or station AN/UXH-2 to Westrex.

It is pointed out that shipment of cannibalized recorders will slow down the modification program. Equipments requiring major replacement parts in addition to modification and overhaul will be set aside to await future contract negotiations between BUSHIPS and Westrex. It is requested therefore that all parts of the basic equipment be shipped regardless of condition.

In addition to the action being taken to modify all AN/UXH-2 recorders as indicated above, a recently completed Westrex contract will also provide a large number of new AN/UXH-2(B) recorders for Navy use. First deliveries on this contract are due during October 1965. While first call for these recorders will go to new construction vessels, there will be some back fitting into large combatants and some will be provided to FWC/FWF's and other overseas shore stations as replacements for older gear.

Other facsimile recorders which continue in operational use include the following (note the differences in scan capabilities):

Recorder Transceiver	Scan Capability (LPM)	Associated Converter
RD-92/UX	30-60	CV-172/UX
RO-160/UX	60-120	CV-1066/UX
RO-171/UX	60-90	CV-1066/UX
RO-172/UX	90-120	CV-1066/UX
TT-41B/TXC-1B	30-60	MD-168/UX
TT-321/UX	60-120	MD-168/UX

As may be plainly seen from this summary, considerable reliance must still be placed on the older types of equipment and meteorological officers should ensure that equipment on board is compatible with that type of recorder designed to copy required broadcasts. Where either appropriate or necessary, the Communications, Electronics, or Ground Electronics Officer should be consulted in the command effort to maintain facsimile recording capability during the transition to more modern recorders.

In the RDT&E area, a great deal of atteention is being directed toward the time saving features of compressed signal transmission in connection with facsimile and other graphics. A practical means is being sought whereby the time consumed in present day transmission of the blank spaces may be eliminated and only the marks or actual intelligence pass over the transmission path. Compare the ratio of line coverage to open chart space contained in the average weather chart and the communication advantages of such a method become obvious. (666)

AN/UXH-2B FACSIMILE RECORDERS – FINAL TECHNICAL MANUAL NAVSHIPS 0967-158-6010

The above NAVSHIPS manual is applicable to all AN/UXH-2B model facsimile recorders. The early recipients of this model from contract NObsr 93420 (shown on nameplate) received two (2) copies each of a preliminary manual with order card instructions to obtain the final manual. Request that these cards be filled out and returned to expedite delivery of the final manual.

All recipients of the AN/UXH-2B model from contract NObsr 93088 (shown on nameplate) received two (2) each commercial manuals, number 180C-34-00-06. In this case, the final technical manual should be requisitioned through the regular naval supply system. Upon receipt of the final manuals, the preliminary or commercial manuals received with the AN/UXH-2B equipments should be destroyed.

NAVSHIPS 0967-098-7010 (formerly NAVSHIPS 93158(A)) and NAVSHIPS 0967-098-7013 (formerly NAVSHIPS 93158(A)-1 Supplement) are the applicable manuals for the AN/UXH-2A (factory modified) facsmile recorders. Two (2) copies of the supplemental manual NAVSHIPS 93158(A)-1 are shipped with each AN/UXH-2A recorder. When ordering technical manuals for this model recorder through the naval supply system, both manuals are required and both the current and former NAVSHIPS numbers shown above should be referenced on the ordering document.

Both the AN/UXH-2A and AN/UXH-2B facsimile recorders use the same type paper which should be ordered through regular naval supply channels under FSN IN 7530-906-8283. (EIB 724)

AN/SYA-1(V), AN/SYA-4(V), and AN/UYA-1(V) Communication Headsets--Maintenance Information

See article in AN/SYA-1(V) Section under the same title. (EIB 720)

AN/SYA-4(V), AN/UYA-1(V) and AN/UYA-4(V) Data Display Systems PC Card Repair--Maintenance Hint

See article in AN/SYA-4(V) Section under the same title. (EIB 943)

OA-7979(V)/UYA-4(V)—Maintenance Instruction

Modulation of the sweep intensity has been detected in some installations of the OA-7979(V)/UYA-4(V) Consoles. This modulation results from the coupling of the 400 cycle input power into the intensity circuits.

To detect and correct this problem, perform the following steps:

1. Turn on power to the console to be checked.
2. Select an operating radar with the antenna in a fixed position to obtain a stationary video sweep.
3. Turn down all brightness controls so that the CRT is totally blanked.
4. Slowly turn up the sweep brightness control and look for modulation in the intensity.
5. If modulation is detected, turn off power to the console and gain access to the medium/high voltage power supply (1537673) in area A12. Observe all safety precautions.
6. Locate transformer T1 in the lower right hand corner of the power supply, and reverse the leads to terminals 5 and 6.
7. Restore power and check for normal operation. (753)

PT-490/UYA-4(V)—Installation and Maintenance Instruction

This instruction is to ensure correct operation of Dimming Control (R1) of Radar Data Plotting Board PT-490/UYA-4(V).

All Radar Data Plotting Boards, PT-490/UYA-4(V) should be checked prior to installation on Display Consoles OA-7979(V)/UYA-4(V) as follows:

Inspect the Dimming Control R1 (refer to NAVSHIPS 0967-238-7010, page 5-97) to verify that the wiper, pin 2 of R1, is connected to pin 1 of DS-3.

If the above condition does NOT exist, interchange the wires at DS-3 so that pin 1 of DS-3 is wired to pin 2 of R1 and the ground side is connected to E-4. (770)

AN/USQ-20(V) (NTDS), AN/USQ-34 (IOIC), AN/UYK-5 (3M/Moonbeam/U-1500), AN/UYA-4(V), AWCLS, SINS, MPDS, IFTDS—Wire Wrapping Information

See Article under AN/USQ-20(V) with same title. (801)

AN/UYA-4(V) Data Display Group, Unattended Equipment Drain Plug--Maintenance Instruction

A reported casualty to the Analog to Digital Converter CV-2095(V)1/UYA-4(V), was attributed to a leak developing in the heat exchanger of the subject equipment that was undetectable by normal visual inspection.

Investigation by NAVSECNORDIV confirmed that the housing of the heat exchanger in the subject equipment could fill up with water and overflow into the equipment causing a serious casualty.

To prevent a reoccurence of the above problem, remove the drain plugs in the heat exchanger of the following equipment by performing the steps under procedure.

Equipment

AM-4534/UYA-4(V), Dual Pulse Amplifier/Symbol Generator
AM-4968/UYA-4(V), Single Pulse Amplifier/Symbol Generator
CV-2095(V)/UYA-4(V), Analog to Digital Converter
SB-2780/UYA-4(V), Radar Data Distribution Switchboard
SM-441(V)/UYA-4(V), Video Signals Simulator

Procedure

1. Turn off all power to the equipment. Observe all safety precautions.
2. To gain access to the drain plug, loosen the fourteen captive screws on the access plate at the top of the heat exchanger and remove the plate.
3. Remove the drain plug located in the bottom of the heat exchanger.
4. Reinstall the access plate removed in Step 2.
5. Restore power to the equipment and check for proper normal operation. (795)

AN/UYA-4(V) Trackball Assembly Micro-Switch Installation—Information Concerning

USS RICHMOND K. TURNER (DLG 20) msg 121932Z of July 1972 reported a high failure rate of OA-7979(V)10/UYA-4(V) trackball assembly (HAC P/N 360736-011) micro-switches (HAC P/N 721808-9) due to improper installation of the switches. The subject switches are also used on the following equipments:

1. OA-7979(V)12/UYA-4(V)
2. OJ-194(V)3/UYA-4(V)
3. OJ-194(V)4/UYA-4(V)
4. OJ-195/UYA-4(V)
5. OJ-197/UYA-4(V)

Holders of affected equipment are directed to refer to figure 1 and ensure that

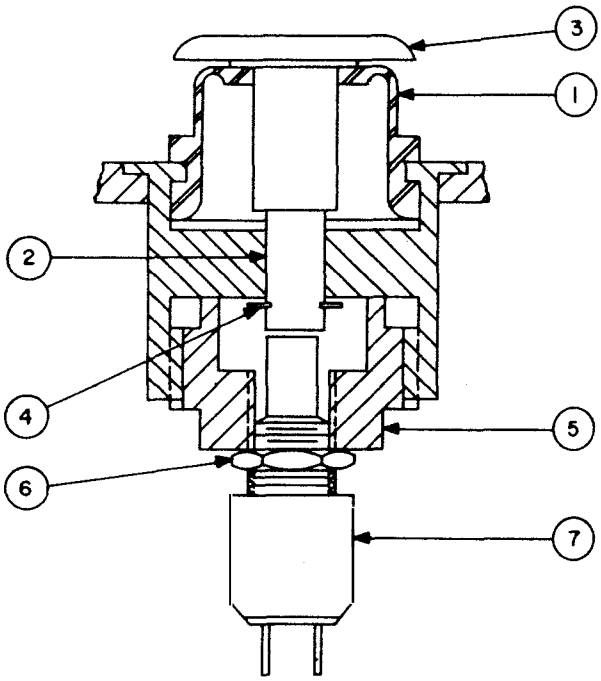


FIGURE 1.

all presently installed switches and all future replacement switches are installed in accordance with the following procedure:

1. Place rubber grommet, (1), into the switch adapter (P/O Trackball assembly cover plate).
2. Place teflon tubing, (2), on switch button assembly, (3).
3. Push switch button assembly through grommet hole to button shoulder.
4. Install ring retainer, (4).
5. Screw in switch adapter assembly bushing, (5), against adapter shoulder.
6. Mount jam nut, (6), on mounting base of switch, (7), and screw nut down to switch shoulder.
7. Holding switch button depressed solidly against adapter stop, screw switch slowly into switch adapter bushing, (5), until switch just actuates. Release switch button and screw switch in an additional 1/2 revolution to provide overtravel necessary to ensure positive switching action.
8. Screw jam nut against switch bushing to lock switch in place. *(844)*

CV-2095(V)/UYA-4(V) Servo Gear Train Assembly (581306-100)—Maintenance Instruction

Holders of the subject analog to digital converters have experienced numerous gear train assembly failures caused by contamination of the unit by filings which result from wearing of the 36 speed control transformer (CT) drive gear.

Present NTDS operations do not utilize the 36 speed capability of the servo gear train assembly; therefore, equipment holders should refer to pages 581306-5 and -6 of NAVSHIPS 0967-238-7100 dated 11 May 1972 and remove the 36 speed CT drive gear MP22 (item 52) from the assembly.

Drive gear MP22 and associated gear clamp MP22-1 (item 51) should be stored with equipment spares in the event that 36 speed capability is utilized in future operations. The 36 speed CT B3 should be retained in the servo gear train assembly and may be used as a spare for the one speed CT B2. *(EIB 858)*

OJ-194(V)/UYA-4(V) and OJ-197/UYA-4(V) Data Display Consoles, Computer Controlled Action Entry (CCAE) Panel—Maintenance Information Concerning

The purpose of this article is to announce the availability of a new ruggedized CCAE panel screen switch, to provide instructions for removal/replacement of screen switches, and to provide other useful information for performing CCAE panel maintenance.

To improve the life of CCAE panel screen switches, Industrial Electronic Engineers, Inc. has developed a ruggedized switch assembly (IEE P/N 20372-02). The new two-piece configuration of the switch uses wider conductors of beryllium copper, which has exhibited much greater resistance to wear due to excessive operator pressure, and features bonded elements providing improved light transmission in addition to ruggedized performance. Each individual switch, unlike the earlier models has two different size apertures, one of 0.375 and one of 0.250 diameter. The smaller hole working inside the larger gives uniform actuation force after extended use and a stronger switch with more durability.

The new switch has replaced the old unit in the supply system and is available under the same stock number (NSN 5930-00-197-4216). No general retrofit is recommended. Replacement of old switches should be on an on-fail basis.

The following provides instructions for replacement of the old one unit construction

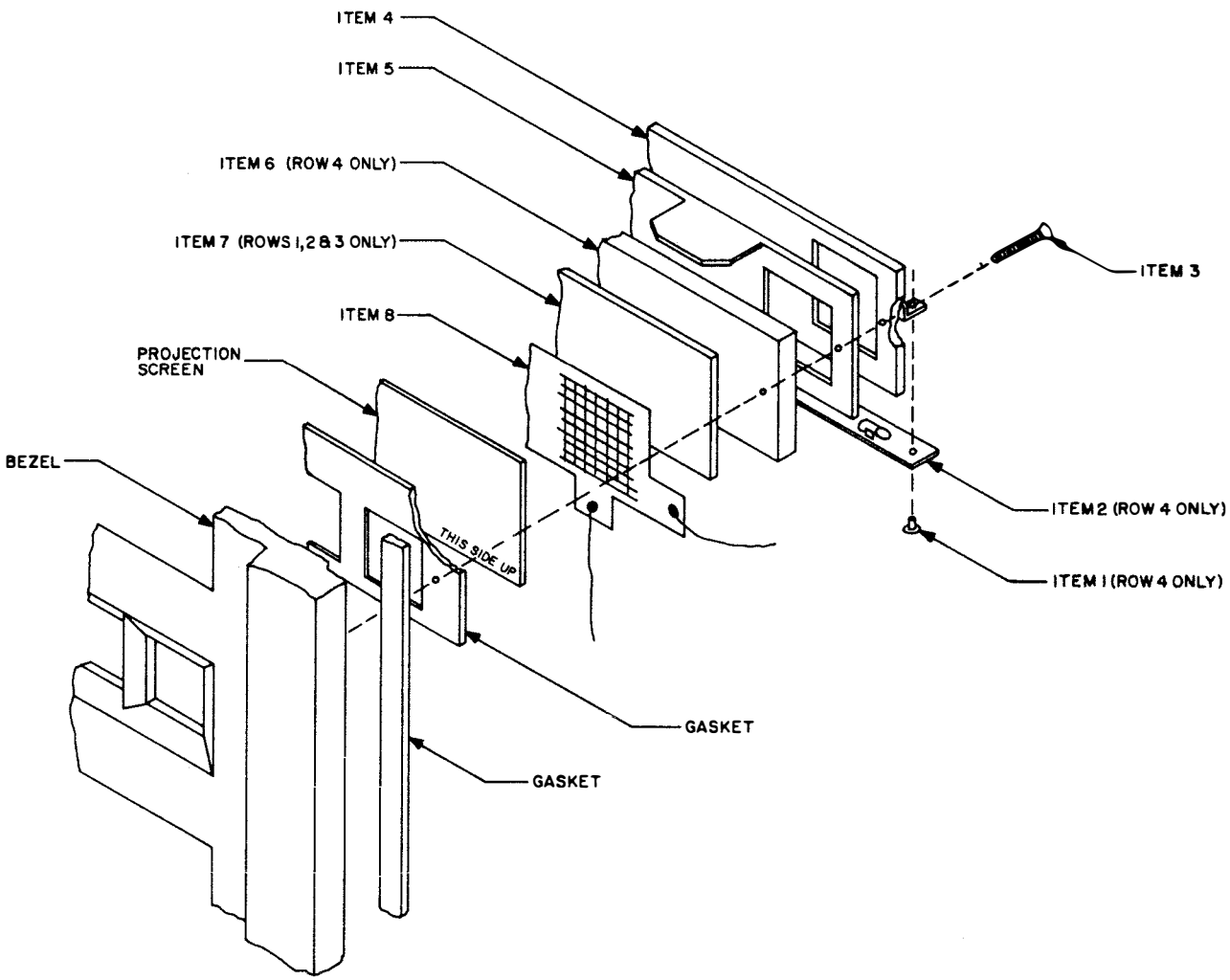


Figure 1. Screen Switch Item Identification

switch assembly IEE No. 20372-01 with the new, two piece configuration, switch assembly IEE 20372-02. See figure 1 for item identification.

1. Loosen eight screws on front of CCAE panel.

2. Pull panel approximately 1-1/2 inches away from housing and pivot panel forward on bullnose.

NOTE

With the hinge and harness being at the top, denote four rows of apertures starting with row one at the bottom and row four (static screen display) at the top.

CAUTION

Use the small 5 Watt soldering iron only when soldering/unsoldering screen switches.

3. Rows 1, 2, or 3: (See figure 1 for item identification.)

a. Remove screw, item 3, four places to remove support plate, item 4, black light shield (not shown), switch assembly locator, item 5, and clear plexiglass backup plate, item 7.

b. Fold back insulator strips (not shown) seven places. Unsolder switch assembly, item 8, and remove.

c. Install front half of new switch and solder one place. Install rear half of new switch and solder six places.

CAUTION

When screen switches are being installed, care should be exercised to insure that the projection screen (See figure 1) is installed correctly. The non-emulsion side of the screen should be installed to face the front (operator) side of the panel as indicated by inscription, "Install this side up". If the screen is incorrectly installed, the emulsion will be damaged, impairing operator viewing capability.

d. Discard clear plexiglass backup plate, item 7, and reassemble by reversing step 3a.

4. Row 4: (See figure 1 for item identification.)

a. Remove screw, item 1, three places to release lamp board assembly, item 2.

b. Remove screw, item 3, four places to remove support plate, item 4, switch assembly locator, item 5, and diffuser, item 6.

c. Fold back insulator strips (not shown) seven places. Unsolder switch assembly and remove.

d. Install front half of new switch and solder one place. Install rear half of new switch and solder six places.

e. Reassemble by reversing steps 4a and 4b.

5. Reverse steps 1 and 2 to reassemble CCAE PANEL.

The readout assemblies of the CCAE panel must be installed carefully. Careless installation could result in damage to the film shifting mechanism. When installing, do not press on the white dot on the front of the readout. A decal warns persons working on the unit not to apply pressure on the white dot which indicates the location of the relay armature. Even a slight pressure may damage the armature.

The acknowledge lamps on the CCAE panel may be set when switching on console power. The lamps should be reset with the panel master clear message that is output as a one word buffer when each console is brought on-line. If this message is not included in either the Operational Program or the POFA, it can be implemented at the Test Message Generator (TMG) in the symbol generator. The coding of the Special Purpose Readout Word is as follows:

Bits 0 through 5: Console address;
Bits 6, 18, 19, and output acknowledge: Logic "1". All remaining bits: Logic "0".

Each on-line console address must be coded sequentially from the TMG front panel switches. This message will turn off all CCAE panel readouts and acknowledge lamps. (EIB 904)

AN/UYA-4(V) Low Voltage Power Supply (360713-011) — Maintenance Hint

The purpose of this article is to correct a reassembly problem with the +5.75V SCR heat sink mounting plate in the 360713-011 low voltage power supply manufactured by Scott Electronics. The +5.75 SCR heat sink mounting plate is removed much more easily than it is replaced and the following procedures provide a correction for the reassembly problem.

NOTE

Units with 360713-021 Power Supplies manufactured by Novatronics have this maintenance hint incorporated.

The equipments affected are OA-7979(V)10/UYA-4(V), OA-7979(V)12/UYA-4(V), OA-7980A/UYA-4(V), C ser. numbers and up, and OJ-194(V)4/UYA-4(V). This modification should be accomplished when the 360713-011 power supply is removed for modification or repair.

Procedure:

NOTES

1. OBSERVE ALL SAFETY PRECAUTIONS.
2. Retain all hardware removed in the following steps for reinstallation.
3. Exercise extreme caution to avoid dropping hardware into inaccessible areas of power supply.

1. Remove nine (9) screws from the lower left perforated screen and sixteen (16) screws from the upper left perforated screen and set screens and mounting hardware aside.

2. Remove (12) screws securing the rear perforated screen to the power supply frame and set screen and mounting hardware aside.

3. Remove five (5) screws securing the cable channel bracket to the power supply frame and set cable bracket and mounting hardware aside.

4. Lay the power supply on its right side and remove eight (8) screws securing the front panel to the power supply frame. Exercise extreme caution to protect wiring and components, tip front panel forward away from the power supply frame.

5. Remove four (4) screws securing bottom perforated screen and set screen and mounting hardware aside.

6. Remove four (4) screws securing heat sink assembly HS 2(A6) to power supply frame.

7. In the lower front corner of the left side, remove ten (10) screws which secure heat sink assembly HS 4(A10) and SCR bracket assembly HS 5(A7) to their associated mounting plate depicted in figure 1. (The screws are removed from the countersunk holes indicated in the figure.)

8. Remove (6) screws and associated nuts and washers which secure the foregoing mounting plate to the power supply.

9. Remove six (6) screws securing transformer T1.

10. The mounting plate depicted in figure 1 can now be removed from the power supply by carefully pushing the plate toward the rear of the power supply while rotating it slightly clockwise.

11. Cut away the material from the mounting plate indicated by the cross-hatched areas in figure 1. Remove burrs from the edges of the reworked area.

12. Inspect the right and left plate assemblies (A2 and A4). If relays are labeled RY1-RY4 delete these designations and relabel using India ink and marking pen and add K1-K4 in their respective places.

13. Reassemble the power supply by reversing steps 1 through 10.

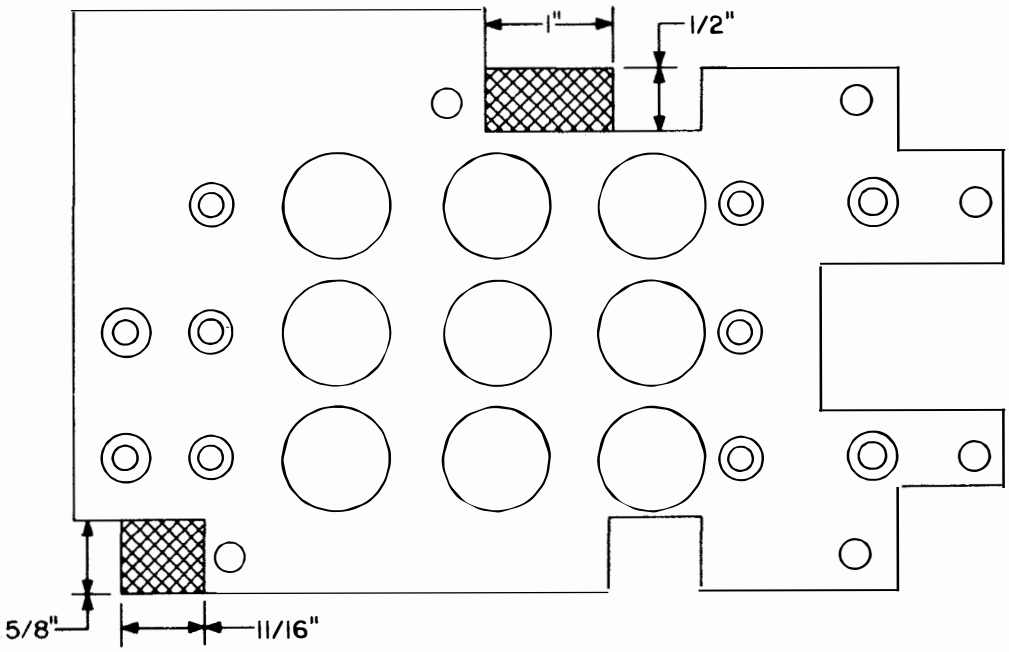


Figure 1. +5.75V SCR Heat Sink Mounting Plate.

(EIB 912/917)

AN/SYA-4(V), AN/UYA-4(V) and AN/UYA-4(V) Data Display Systems PC Card Repair--Maintenance Hint

See article in AN/SYA-4 Section under the same title. (EIB 943)

AN/UYA-4(V) Data Display System — Maintenance Aid

The purpose of this article is to provide instructions for fabricating an adaptor cable which can be used to connect the AN/UYA-4(V) test message generator to OA-7980/UYA-4(V) or OA-7980A/UYA-4(V) height size consoles without removing the console intercom station.

The adapter cable, suggested by DS2 Glen R. Sitz, USS CORAL SEA (CV 43), can be fabricated from material readily available in the Naval Supply System. The recommended cable length is approximately 12 inches, however, any convenient length may be selected.

A list of material required to fabricate the adaptor cable is provided as follows:

Item	Qty	Description	NSN
1	1	Connector	5935-00-988-1594
2	1	Connector	5935-00-988-2775
3	As Req.	22 Ga. Wire, Insulated	6145-00-729-9166
4	44	Contact Pin	5935-00-988-2721
5	44	Contact Locket	5935-00-988-2716
6	As Req.	Lacing Twine	

Using common hand tools and Universal Crimper MS 3191-4, the adaptor cable may be fabricated to the desired length by making straight through connections between corresponding pins of the two connectors, items 1 and 2, using items 3, 4 and 5. (Use contact pin item 4 with item 1 and contact socket item 5 with item 2.) Pin numbers to be connected are 1, 2, 4, 10, 12, 14, 16, 22, 24, 26, 28, 34, 36, 38, 40, 42, 43, 44, 46, 48, 50, 52, 54, 56, 58, 60, 63, 64, 66, 68, 70, 72, 74, 75, 76, 78, 80, 82, 90, 91, 92, 93, and 94.

NOTE

The pin connections specified also make the adaptor cable compatible with OA-7979(V) and OJ-194(V)/UYA-4(V) consoles.

(EIB 923)

AN/UYA-4(V) Trackball Assembly Micro-Switch Installation—Information Concerning

The purpose of this article is to disseminate important information concerning the proper installation of micro-switches (HAC P/N 721808-9) in Trackball Assemblies (HAC P/N 360736-011) used in the following equipments.

OA-7979(V)10/UYA-4(V)
OA-7979(V)12/UYA-4(V)
OA-194(V)3/UYA-4(V)
OJ-194(V)4/UYA-4(V)
OJ-195/UYA-4(V)
OJ-197/UYA-4(V)

Improper installation of the foregoing switches is likely to cause switch failure. Therefore, holders of affected equipment are directed to refer to Figure 1 and ensure that all presently installed switches and all future replacement switches are installed in accordance with the following procedure:

1. Place rubber grommet (1) into the switch adapter (P/O Trackball assembly cover plate).
2. Place teflon tubing (2) on switch button assembly (3).
3. Push switch button assembly through grommet hole to button shoulder.
4. Install ring retainer (4).
5. Screw in switch adapter assembly bushing (5) against adapter shoulder.
6. Mount jam nut (6) on mounting base of switch (7) and screw nut down to switch shoulder.
7. Holding switch button depressed solidly against adapter stop, screw switch slowly into switch adapter bushing (5) until switch just actuates. Release switch button and screw switch in an additional 1/2 revolution to provide over-travel necessary to ensure positive switching action.
8. Screw jam nut against switch bushing to lock switch in place.

(EIB 969)

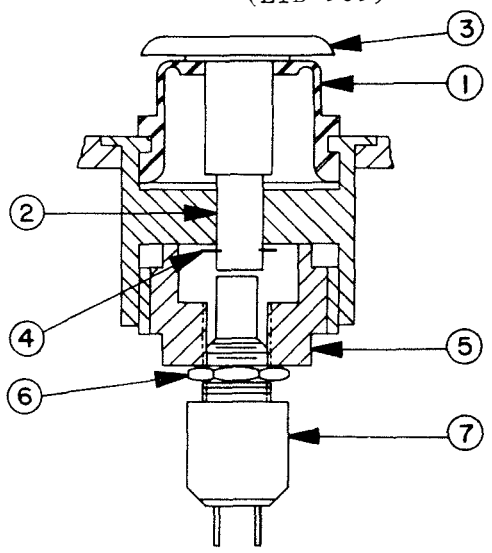


Figure 1. Trackball Assembly Micro-Switch

AN/UYK-20(V) Data Processing Set—General Information on

I. Memory Board Stiffeners/Wire Wrap Panel Alignment

Computers produced since 8/75 contain array boards with stiffeners bolted parallel to and just above the connectors. Since 1/77 control and data boards and all spare and repaired boards have the stiffeners. These stiffeners should reduce handling damage due to board flexibility and should insure better connections. However, the stiffer boards are less tolerant of a misaligned back panel than their more flexible predecessors.

A small percentage of computers produced prior to 8/75 may have inadequately aligned back panels. (Computers produced since 8/75 are checked with special tooling.) The alignment is adequate for the older, more flexible boards but not for the stiffened ones.

Univac field engineers have tooling and procedures for checking and aligning back panels. Univac field engineers will routinely check and align back panels during site visits. Tools and procedures are available on loan for those wishing to perform the alignment themselves. Contact Dave Saxerund, Univac Field Engineering, at 612-456-2334.

II. New Memory Board Shipping Container

An improved memory board shipping container has been designed and tested to MIL-P-116G. This reusable container minimizes handling damage during insertion and withdrawal of boards and provides improved protection during transit.

All memory boards have been shipped from Univac using the new containers since 1/1/77. The new container is larger than the old foam container which required added protection for shipment. The new container includes a heavy cardboard outer protective layer allowing shipment without additional protection. The inner foam is soft, allows easy insertion and withdrawal and fits all memory boards. These new containers should be retained for later use. Older containers should be destroyed.

EIB 960)

AN/UYK-20(V) and AN/UYK-20X(V) Data Processing Sets—Alteration of Memory Addresses

A design deficiency in the AN/UYK-20 7125666 memory circuit card allows a "WRITE INIT" command to be issued to the memory on power-up. This causes an alteration of a memory address. Univac ECP 0134 modifies the memory control circuit card and will prevent the "WRITE INIT" command from being issued to the memory during the power-up condition. Consequently the "WRITE INIT" flip-flop will only reset during "MA CLR" power-up.

All 7125666 circuit cards returned to Sperry Univac will be reworked, reidentified to the new 7150220 configuration and returned to the user. Return the circuit cards to:

Sperry Univac
P.O. Box 6000
State Road 584
Clearwater, FL 33518
Attn: Returned Goods Crib (EIB 972)

AN/UYK-20(V) Technical Manuals—Availability of

This article informs EIB readers that the Naval Electronic Systems Command has made its AN/UYK-20 technical manuals available through the Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

Nomenclature	Publication	Ordering Number
AN/UYK-20(V)	AN/UYK-20 Technical Manuals - Vol 1-6	NAVELEX 0967-LP-598-1000
	AN/UYK-20 Technical Manual - Vol 1	NAVELEX 0967-LP-598-1010
	Vol 2	NAVELEX 0967-LP-598-1020
	Vol 3	NAVELEX 0967-LP-598-1030
	Vol 4	NAVELEX 0967-LP-598-1040
	Vol 5	NAVELEX 0967-LP-598-1050
(EIB 960)	Vol 6	NAVELEX 0967-LP-598-1060

RE-ACTIVATING LUBRICANT IN SEALED BEARINGS OF SMALL MOTORS

A method has been submitted to prevent failure of the bearings of the genemotors of the AN/VRC-2 equipment when they have been in storage for a considerable length of time.

The genemotors and many other small motors have sealed type bearings designated by the manufacturer as lubricated for the life of the motor. However, it has been found that when the AN/VRC-2 equipment is stored for some time, the lubrication may dry out or coagulate. The bearings are thus apt to fail when the equipment is placed in operation.

To prevent this trouble, the end plates are removed—thus exposing the sealed bearings to view. When faulty lubrication is observed, it is easily corrected by placing a few drops of 3 in 1 oil (or teletype light oil) on the bearings to mix with and thin the lubricant in the bearing retainer; then, following up with lubricant, in the bearing end plate during reassembly. No lubricant failures occurred after this procedure was followed.

HASH SUPPRESSION RESISTORS

The use of higher wattage hash suppression resistors (R1 and R2) in Radio Set AN/VRC-2 has been suggested. These resistors, located in the vibrator power supply, are rated ½ watt which may prove inadequate under adverse operating conditions. Poor ventilation, high humidity and prolonged transmitting periods may cause these components to fail at an abnormal rate. This is due primarily to the resistors being operated very near maximum dissipation during the receiving periods and at or slightly above this point during transmission. The use of 2-watt resistors will correct this type of failure.

Bureau Note.—While this suggestion is another good example of failure "isolation," "investigation" and "solution," it is recommended that the 2-watt resistors be used as a replacement only when the ½-watt unit fails.

AN/VRC-16, -17, -18 ANTENNAS

Attention has been called to a discrepancy between the present installation requirements for AN/VRC-16, -17, and -18, and Bureau of Ships drawing RE52F2012. (BUSHIPS drawing RE52F2012 does not show the correct type of installation. It is being revised to show the installation requirements described below and will be ready for distribution in the near future.)

Normally, each installation of these equipments consists of one radio transmitter-receiver combination, plus one additional radio receiver. Each complete installation requires two antennas. Use a pair of AT-252/SR ship antennas cut to the length specified for the frequency coverage of each equipment. One antenna serves the radio transmitter-receiver combination and the other is for the second radio receiver. This type of installation will continue to be used until a suitable antenna multicoupler is developed permitting the use of a single antenna per installation.

Installations on submarines may deviate from shore practices. However, in such cases, the Bureau of Ships will provide instructions as to proper installation requirements.

In connection with the same equipments, Field Change No. 2, NAVSHIPS 98573, has recently been issued. (This change also applies to the AN/VRC-8, -9, and -10 equipments. The change replaces the right angle Adaptor UG-306/U and Connector Plug UG-941A/U, with right angle Radio Frequency Adaptor UG-27C/U and radio frequency Receptacle UG-58A/U. It eliminates the need for the additional Adaptor UG-349/U, and simplifies the installation. (See Field Change Distribution article in EIB 408).

AN/VRC-46 RADIO SET–HIGH FAILURE RATE OF CAPACITOR TYPE

Activities servicing Radio Sets AN/VRC-46 are advised that the 0.01μfd, fixed ceramic disc capacitors, used extensively throughout the set, have been a high failure rate item. Defective capacitors shave all been shorted and, in most cases, the capacitor is the only defective component in the affected module.

Although the capacitor is rated at 100 volts, the highest voltage applied to modules using this capacitor is 25.5 volts. In view of the applied voltage versus the rated voltage, the subject capacitor is believed to be defective in manufacture.

Defective capacitors have been replaced with fixed ceramic capacitors FSN 9N5910-061-5422 or FSN 9N5910-878-5648. No failures of replacement capacitors have occured since installation. (EIB 721)

AN/VRC-46 Radio Set–Information Concerning

The following maintenance assistance items are provided by the U.S. Army Electronics Command as a result of continuing failure analysis:

a. Resistor R-352 – Samples of the defective resistors were examined. Examination revealed that the cause of noise was insufficient pressure on the wiper arm. It is recommended that defective Resistors R-352 be replaced with new ones, using FSN 5905-853-6516. Temporary repairs may be accomplished by opening the housing and cleaning and bending the wiper to increase pressure.

b. Spring Mount, part of Matching Unit MX-6707/VRC – Review of the records at this headquarters indicates no problem with breakage of these spring mounts. An Antenna Tie Down Kit, FSN 5820-908-6416, is available for securing the antenna when not in use. Application of this tie-down may prevent spring mount breakage due to excessive whipping of the antenna.

c. Modules A-1000 and A-6000 – Intermittent output from these assemblies has been previously reported. Investigation revealed that the most probable cause of this fault is corrosion at the point where the ground wiper touches the silver plate ring. The intermittency of these modules may be corrected by applying a lubricant, Anderol Type 793A, with 10% by volume of 325 mesh mica (or equal) per MIL-S-G-23827A, to the ground rings of A-6000 (both sections) and Tuner A-1000 (four sections). After application of the lubricant, each unit should be cycled several times to clean the ground rings.

d. Matching Unit MX-6707/VRC – Several thousand of these units were made prior to a production change which corrected the problem of moisture entering the top of the unit near the mounting bolts of the spring mount. The maintenance concept for this item is being revised to require all defective units to be returned to the depot for repair. (750)

AN/VRC-46 Antenna Matching Units, Type MX-6707 - Corrosion Prevention–Recommendations for

The purpose of this article is to promulgate to the Fleet recommendations for corrosion prevention of Antenna Matching Units, MX-6707, used with the AN/VRC-46.

The coil spring should be enveloped with an elastic film approximately 1/16-inch thick. This film should be made from a high-strength elastomeric silicone resin such as Sylgard 182, FSN 9G5970-771-7670 or equivalent. A silicone primer, No. SS4004, FSN 9Q8030-083-8403 or equivalent, should be applied to the hexagon nut at the top of the coil and on top of the mounting flange. The surfaces must be thoroughly cleaned before the primer will adhere properly.

Apply a silicone compound, FSN 9G6850-880-7616 or equivalent, to the "O" Rings and bolted flanges of the top and bottom molded plastic housings. This will prevent water from accumulating between these surfaces and prevent corrosion from attacking the metallic parts. The same compound should be applied to the control shaft and electrical connector seals to resist the passage of moisture.

Cover the control cable plug and the RF cable plug with sealing compound, FSN 9Q8030-297-6677. Work the sealing compound well up around the plastic housing where the jacks are located and down the cable approximately 2-inches below the plugs. Care should be taken to insure that no pin holes exist in the finished coating.(780)

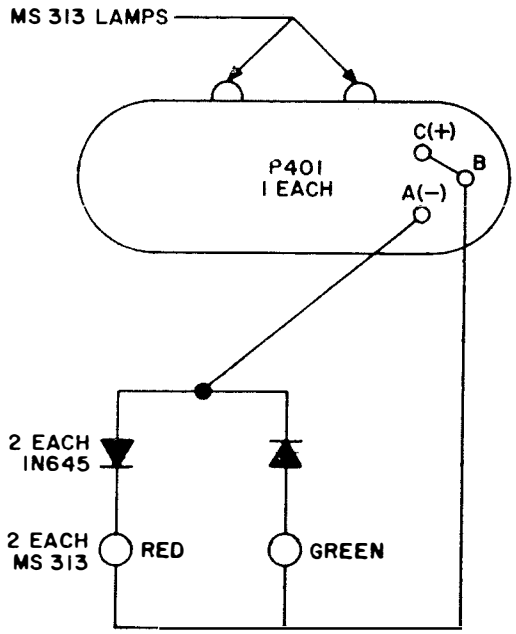
NOTE:

It has been brought to the attention of the Naval Ship Engineering Center, San Diego Division, that application of silicone compound, FSN 9G6850-880-7616, to the top and bottom flanges of the molded plastic housing of the Antenna Coupler MX-6707/VRC as described in EIB 780, fails to eliminate corrosion due to moisture and salt seepage under normal at-sea conditions.

Installation of a 1/16 inch rubber gasket as a sealant between the flanges of the molded plastic housing of the Antenna Coupler MX-6707/VRC during assembly will help to alleviate this problem. This gasket can be manufactured from bulk material, FSN 9Z5330-291-9597, using Perm-a-Tex Type 3, FSN 9Q8030-656-1426. This will reduce the possibility of minute cracks occuring in the plastic housing by over-tightening of the four bolts holding the housing together. (812)

AN/VRC-46 Radio Set—Mount Tester to Check for Correct Polarity

Activities servicing Radio Set AN/VRC-46 or other members of the AN/VRC-12 series are advised of a suggested device to aid in the installation and checkout of the equipments. According to the suggestion, ground pin (A) in the RT-524/VRC connector P401 or R-442/VRC connector P-201 (P-401) is burned off when attempting to mount the receiver-transmitter or receiver on its associated mount if the polarity was reversed to the mount. It was stated that the reverse polarity connection to the mount usually occurs at the motor pool during battery changes on tactical vehicles. A modified connector (P-401) was devised as a quick check for correct polarity. Details of this modified connector are shown on figure 1 for those interested in fabricating one of these devices. To test supply voltage polarity, insert the "test" connector into the mount connector (J-401). Correct polarity will be indicated by lighting of the green lamp, while incorrect polarity will cause the red lamp to light.



1. Lamps mounted on top of block.
2. Diodes put into block.

Parts List:

1 each P401 FSN 5935-853-6673
2 each 1N645 FSN 5960-577-6084
2 each MS 313 FSN 6240-155-8714

Figure 1. Modified Connector

(836)

AN/VRC-46, Sliding Contact Switch Assembly—Maintenance Hint

The sliding contact switch assembly in modules A-1100, A-1200, A-1300, A-6300 and A-6400 of the RT-524 are failing at an unusually high rate, necessitating replacement of the module. Activities experiencing this problem can conserve module replacement funds by repairing the sliding contact switch assembly in the following manner.

1. Remove the sliding switch plate by unscrewing the two support posts.
2. File off the broken stud flush with the switch plate. At the stud location, center and drill a .0890 inch diameter hole in the switch plate, using a #43 twist drill. Tap for a 4-40 machine screw.
3. Unsolder the electrical contacts nearest the hole. Countersink on the contact side of the switch plate to accommodate a 4-40 flat head screw.
4. Install a brass 1/4 inch 4-40 machine screw in the switch plate. Coat the screw head with glyptol or insulating varnish. Replace the electrical contacts.
5. Re-install the sliding switch plate on the printed circuit board. (822)

AN/VRC-51, AN/VRC-51X, AND VRC-52 - VHF-FM FLEETCOM MOBILE EQUIPMENT

1. - Microphone Failure:

Information received from Naval sources, and confirmed by the vendor, indicates occasional mechanical failure of the leads on the 15-mfd 15-volt capacitor on the printed circuit board in the microphone case.

In case of microphone failure, this capacitor should be checked first. FSN 1N5910-823-1053 is an equivalent replacement. Polarity may not be indicated on the printed circuit amplifier board. The positive lead of the replacement capacitor shall be connected to the same terminal as the red lead from the microphone switch. See figure MK-1-A, Page MK-3, NAVSHIPS 94121 or NAVSHIPS 94473. The negative lead goes to the terminal that is diagonally located on the printed circuit amplifier board. Remove the portions of the defective capacitor leads from the above terminals.

2. - Speaker Failure:

Information received from Fleet Activities, and confirmed by the vendor, indicates occasional mechanically induced breakage of the voice coil speaker leads on the forward side of the cone.

In case of speaker failure, replacement speaker may be ordered under FSN 5965-589-8135. This is a 3-1/2 inch, permanent-magnet type, 3.2-ohm voice coil.

AN/VRC-52,-58, and-60 – Transistor Replacement

Communication Company, Inc., (COMCO) has advised the Bureau that transistors T2042, T2044, and T2210 are no longer being manufactured by Philco. These transistors were used in the front end of RF stages of the AN/VRC-52, AN/VRC-60, and AN/VRC-58 transmitter-receivers. COMCO now advises that Sprague Electric Company is manufacturing equivalent transistors to the above Philco transistors as their 2N2360, 2N2361, and 2N2362, respectively. They have been tested and found satisfactory as direct replacements. COMCO further advises that Sprague's 2N1742, 2N1743, 2N1744 are also available and are given as a field replacement only if the 2N2360 series is not available. The above transistors are recommended only when the present stock of Philco transistors T2042, T2044 and T2210 is depleted.

AN/VRC-51, AN/VRC-51X, AND AN/VRC-52 - VHF-FM FLEETCOM MOBILE EQUIPMENT

See article in AN/VRC-51 section under the same title.

AN/VRC-52, -58, AND -60—TRANSISTOR REPLACEMENT

See article in AN/VRC-52 section under the same title.

AN/VRC-52, -58, AND -60—TRANSISTOR REPLACEMENT

See article in AN/VRC-52 section under the same title.

AN/VRC-77 Radio Set—Safety Hint

This article describes the fabrication and use of a specially designed removing tool for the R/T unit of the subject radio set. The tool is designed to prevent hand injuries.

Material Required

Flat metal, steel 1 1/2" x 20" x 1/8". This is a machine shop project. The tool must be formed into the configuration as shown in figure 1.

Procedure

1. Refer to Maintenance Manual for Radio Set AN/VRC-77 NAVELEX 0967-LP-300-7010, page six.
2. Pull the R/T unit locking handle down.
3. Hold the removing tool with the slotted ends facing downward.

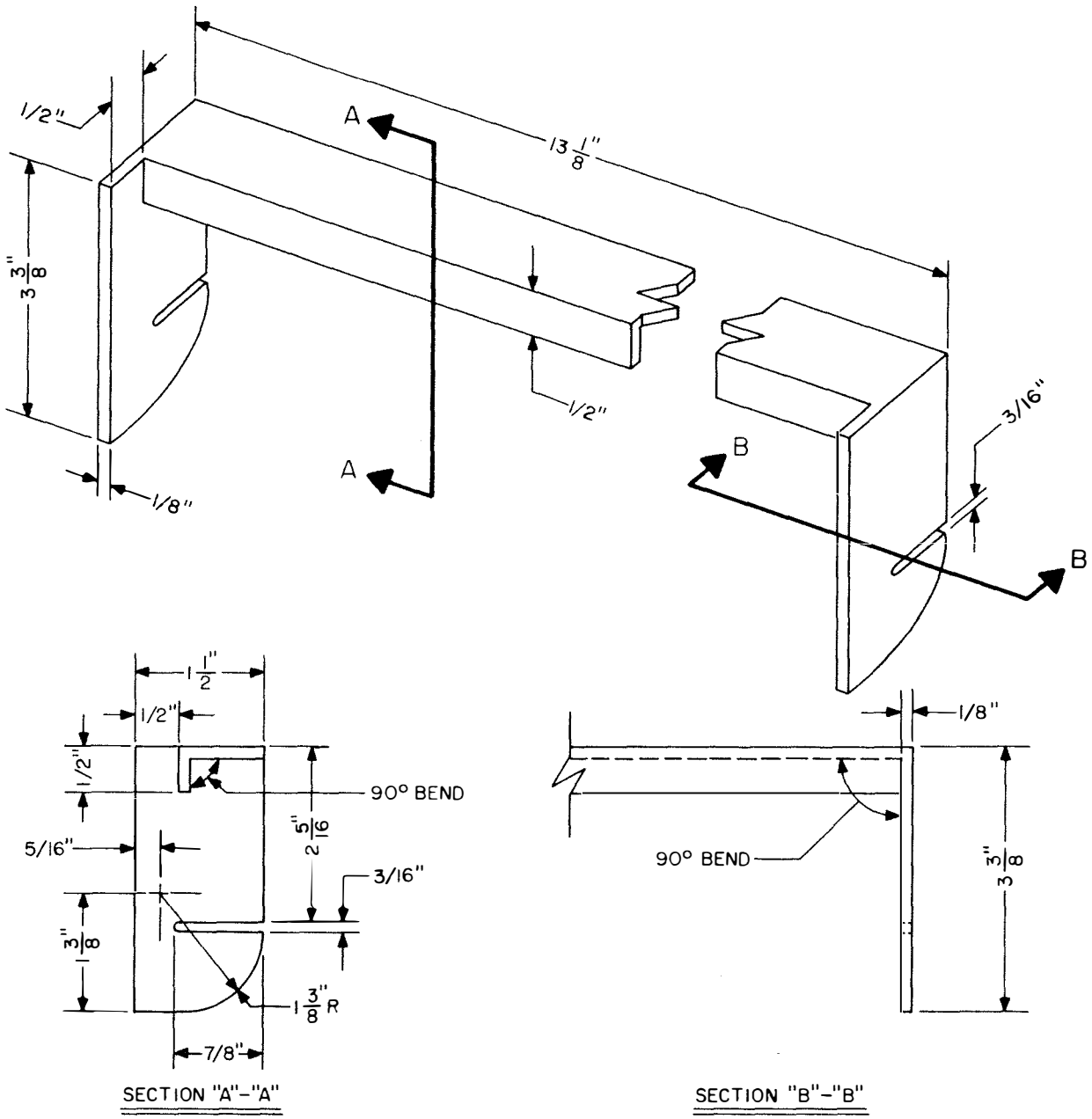


Figure 1. Removing Tool Detail Drawing

4. Place the slotted ends of the removing tool over the 90 degree bend of the R/T locking handle. The 90 degree bend is at the point where the locking handle is hinged to the equipment.

5. The R/T unit can be easily removed by pulling on the removing tool, which shields the hands of the operator from injury.

(EIB 897)

AN/WRA-1 RADIO SET GROUP – MODEL DIFFERENCES

The AN/WRA-1 equipment (TBL single sideband field change kit) was manufactured by the Long Beach Naval Shipyard. The shipyard subcontracted a quantity of equipments to the Naval Repair Facility at San Diego. During the course of manufacture, a small number of design changes were made. For the information of those concerned, the following is a tabulation of model differences:

Receiver-Transmitter RT-465/WRA-1:

Units Mfgd. by Long Beach Naval Shipyard	Units Mfgd. by Naval Repair Facility, San Diego
1. Antenna input and R.F. output coaxial receptacles are type UG-58A/U.	Type UG-291/U used.
2. Heater Power Indicator Lamp lens	Green color used.
3. Fuse in B+ line to protect silicone rectifiers.	No fuse provided.
Transmission Line Coupler CU-701/WRA-1:	
4. Tuning meter and associated circuitry added.	No tuning meter or circuitry.
5. Tube VI (amplifiers) circuit modified for tuning meter.	Not modified.
6. Value of tuning condenser and coils L4 and L5 to get proper frequency spread.	Not modified.

Of these equipment differences, items 3,4,5, and 6 should be applied to the equipments manufactured at San Diego. The Bureau is attempting to obtain detailed information and changes necessary so that all units will be similar. This information will be published as soon as it becomes available.

AN/WRA-1, TBL SINGLE SIDEBAND FIELD CHANGE KIT: OPERATING FREQUENCY, CRYSTAL FREQUENCY FORMULA

The AN/WRA-1 is currently being supplied for use as a field change to the Transmitter TBL series on specific ships and at specified shore facilities.

This equipment contains provisions for eight crystal controlled frequencies. For those concerned with requisitioning necessary crystals for this equipment, the following crystal formula is supplied:

(a) For assigned frequencies in the 2 to 8 mc range, the crystal should be the assigned frequency plus 800 KC.

(b) For assigned frequencies in the 8 to 18.1 mc range, the crystal should be the assigned frequency minus 1710 KC.

The CR-27/U type crystals are required.

AN/WRC-1 Radio Set-General Information

Radio Set AN/WRC-1, for shipboard and shore use, is capable of 2.0 to 30 mc., USB, LSB, AM, CW, FSK, and ISB transmitting-reception. The transmitter produces 100 watts P.E.P. and 50 watts average power. This equipment has been developed and service approved to meet current high-frequency communications requirements. The equipment was orginally intended as a Radio Set TCS replacement; however, because of today's communications needs, the equipment was designed for more universal use.

The AN/WRC-1 consists of a Receiver (R-1051/URR), Transmitter-Exciter (T-827/URT), RF Amplifier (AM-3007/URT), Junction Box (J-1265/U), Handset and Cord (H-169/U), set of interconnecting cables, shock and vibration mounting system (MT-3115/WRC-1), Antenna Coupler CU-937/UR and associated publications. The CU-937/UR is intended for surface ship and shore installations, is Antenna Coupler CU-937/UR.

The AN/WRC-1 equipment was initially developed with tuning in 1-kc increments. The equipments currently being delivered will provide synthesized frequencies in 0.5-kc incremental tuning steps and will have better than 1 part in 10^8 frequency stability. The R-1051/URR receiver unit will have an additional capability for continuous "vernier" tuning between 1-kc increments. New requirements specify incremental tuning in 0.1-kc steps. The R-1051B/URR and later versions of the equipment will have this capability.

The unitized makeup of the AN/WRC-1 is such as to permit separate and independent use of the various units. For example, the R-1051/URR receiver is being procured for use as a separate receiver. The T-827/URT transmitter-exciter unit will be used with a 1000-watt (AVG/PEP) RF amplifier. This 1000-watt transmitting system will be known as the AN/URT-23(V).

Many of the plug-in modules used in the T-827/URT and the R-1051/URR, aside from being interchangeable between these two units, are interchangeable with a new radio transceiver nomenclatured AN/URC-35. The AN/WRC-1 RF amplifier Unit AN-3007/URT and the CU-937/URR Antenna Coupler is also used with the AN/URC-35 equipment.

INSTALLATION PLANS:

Distribution of the following plans has been effected:

AN/WRC-1 Outline and Mounting—RE 46 D 2128D
AN/WRC-1 System Interconnection—RE 46 D 2129C
CU-937/UR Outline and Mounting—RE 50 D 2099C

TECHNICAL PUBLICATIONS:

AN/WRC-1 & CU-937/UR
Technical Manual (basic) 0967-971-0010 and 0967-971-0020—(Formerly NAVSHIPS 94840(A))
R-1051/URR
Technical Manual—NAVSHIPS 0967-970-9010 (Formerly NAVSHIPS 94841(A))
Manual for repair of 2N Type Modules—NAVSHIPS 0967-034-2000 (NAVSHIPS (Formerly 95700))

Because the large quantities of R-1051/URR being procured, it was decided to make a separate technical manual for this equipment. For a complete AN/WRC-1 equipment technical manual, the publications NAVSHIPS 94840(A) and NAVSHIPS 94841(A) are required.

Information on the repair of the non-repairable onboard (2N) modules is not provided in the AN/WRC-1, R-1051/URR Technical Manuals. This information is contained only in the publication NAVSHIPS 95700 intended for activities concerned with the detailed repair of these specific modules. This publication is not furnished with the delivered equipments; however, it is available in the publications supply system stock and may be obtained by requistion.

The delivered equipments will be provided with equipment Maintenance Standard Books and Performance Standard Sheets. Because the simplicity of operation of the equipment, an Operator's Instruction Chart has not been prepared.

The publication NAVSHIPS 94255, which was in the supply system, was the technical manual for the SERVICE TEST model of the AN/WRC-1 equipment. Copies of NAVSHIPS 94255 should be considered obsolete.

INSTALLATION ASSISTANCE/CHECKOUT/TRAINING:

NAVSEC has provided for contractor field engineering services. These services should be utilized if installation or equipment problems are encountered beyond local capability. Services may be requested from, NAVSEC 6181B.

The maintenance and training concept is similar to that of Radio Set AN/URC-32 inasmuch as both radio equipments employ single sideband techniques, transistors, synthesis of frequencies, and modular plug-in assemblies, some of which require higher echelon of repair. Plug-in assemblies will be repairable on board except for the frequency snythesizer, frequency standard, and RF tuner plug-in assemblies. These assemblies are currently designated for repair at the repair facilities located at the Norfolk and San Francisco Naval Shipyards. The allowance parts list (APL) for the AN/WRC-1 and R-1051/URR provided for spare replacement assemblies for these three non-repairable onboard (2N) assemblies SRF SUBIC and SRF YOKO.

Installation of the equipment is considered within the capability of ships force or station personnel. Installation personnel should become throughly familiar with the equipment, verify installation connections, and such prior to applying power to eliminate initial equipment damage or failure.

JUNCTION BOX J-1265/U:

The AN/WRC-1 is provided with an Interconnection Box J-1265/U for the interconnection of all units and external cabling. The interconnection box should be located in close proximity to the equipment and should be accessible. It is intended for bulkhead mounting. Interconnection cables furnished with the AN/WRC-1 are 5 feet in length. Cable slack should be allowed so that operation of the equipment's shock and vibration mount is not compromised. The equipment technical manuals and the NAVSEC installation plans provide detailed external connection and interunit

cabling information. The J-1265/U is provided with the AN/WRC-1 overall nomenclature plate and serial number.

SHOCK AND VIBRATION MOUNT MT-3115/WRC-1:

If the AN/WRC-1 equipment is to be installed in a shore installation, the equipment's shock and vibration mounting supplied with the equipment is not required and need not be installed. The unused mount should be returned to the Navy supply system for spare unit support purposes. When installing the AN/WRC-1 on the mount, allow 4 inch clearance on all sides of the equipment.

Equipment damage from extended vibration or high shock can be expected if the AN/WRC-1 equipment is installed on board ship without the shock and vibration mounting supplied. The mount has been designed to withstand the extreme conditions now required of all electronic equipment.

The Receiver R-1051/URR has a separate mount for use when it is used as a receiver only. This mount is nomenclatured MT-3114/UR.

PERFORMANCE AND OPERATIONAL REPORTS:

P&O reports on the AN/WRC-1 equipment are desired for a period of 6 months after installation and operational use of the equipment. Detailed remarks concerning the equipment, problems, performance and such are requested to provide close follow up action if necessary.

REMOTE CONTROL OPERATION:

The equipment's design is such as to permit selection of mode of operation for remote control units by switching at the ship's transmitter and receiver switchboards. The USB and LSB audio channels of the receiver are connected to switch positions on the receiver board whereby they can be routed to desired remote positions or speakers. The transmitter audio input channels are routed to the transmitter switchboard in a similar fashion. Additionally, the transmitter control circuits are carried out to the switchboard and then parallel wired at the USB and LSB audio channel switches. The control circuitry is common for USB and LSB use.

FREQUENCY STANDARD INPUT:

The AN/WRC-1 equipment is designed to permit the use of an external ship (or shore) frequency standard with an input frequency of 5 mc. This external input may be used as the equipment's frequency standard or for the purpose of calibration of the equipment's internal frequency standard. The AN/WRC-1 provides internal switching for this purpose. The T-827/URT and R-1051/URR units each have an internal frequency standard. In the event of the failure of one unit, the opposite unit may be patched over on the rear of the equipment's cabinet, thereby allowing one of the standards to be operable with both units. The frequency standard modules have a comparator device for use during recalibration.

FSK OPERATION:

The T-827/URT contains FSK transmission capability with selection of transmitted tones centered on either 2000 or 2550 cps. This feature has been included to meet differing operational circuit requirements. The T-827/URT also contains a recptacle and circuitry to permit connection of a "local" teletype if required.

TRANSMITTER EXTERNAL AUDIO INPUT:

The T-827/URT contains rear mounted audio input receptacles for direct audio connection as may be required. Each audio channel input is designed for a maximum of 250 millivolt input at 600 ohms. The audio amplifiers contain audio compression circuitry. Should the audio level input be in excess of this figure, possible distortion of output signals may be encountered, such as might occur with transmission of multiplex signals.

CU937/UR ANTENNA COUPLER:

The transmitter power output is designed for a 50 ohm, 3:1 (maximum) VSWR antenna system, Normally, the AN/WRC-1 will be used with Antenna Coupler CU-937/UR in surface ships and shore installations. This antenna tuning device is designed for maximum efficiency when used with a standard 35-foot whip type antenna. The coupler may be used also with shorter antennas, such as 28-, 25-, or 15-foot types at some sacifice in efficiency.

The CU-937/UR "rough" tunes automatically when the associated frequency selection knobs on the AN/WRC-1 are changed. "Fine" tuning is accomplished by the operator using the knobs and VSWR meter on the AN/WRC-1 RF amplifier unit. There is a flashing red light associated with the antenna coupler comtrols that operates when antenna tuning is in process. By logging the number of flashes as explained in the equipment technical manual, it is possible to return to a previously calibrated frequency without radiating an of-the-air signal. This is advantageous during radio silence periods and also avoids disruption of circuit for lengthy tuning.

The AN/WRC-1 equipment will be delivered programmed for use with a 35 foot whip antenna. In the event that other than a 35 foot antenna is used, it will be necessary to alter the programming connections in the J-1265/U junction box as detailed in the AN/WRC-1 technical manual.

The antenna coupler should be installed within 12 inches of the base connection for the associated whip antenna. Clearance whould be provided for removal of the tuning elements from its protective case. Shock and vibration mounts are not supplied and should not be used with the CU-937/UR.

This antenna coupler is also used with Radio Set AN/URC-35. The assigned Federal Stock Number for the CU-937/UR is F5820-964-9673. Detailed information on the antenna coupler is contained in the AN/WRC-1 Technical Manual NAVSHIPS 0967-971-0010 (Formerly NAVSHIPS 94840(A)). If the CU-937/UR is not used, such as in submarine installation, it should be returned to stock under the above listed stock number. Normally, the CU-937/UR

will not be used when the AN/WRC-1 is operated directly into a 50 ohm system, i.e., antenna multicoupler, broadband antenna system.

AN/WRC-1 RADIO SET; SHOCK AND VIBRATION MOUNT

The shock and vibration mount supplied with the AN/WRC-1 was designed specifically for the weight and center of gravity for the equipment. It has come to NAVSEC'S attention that in a recent installation of the equipment, wherein it had been mounted on the deck, ship personnel were using the equipment for a seat. The additional weight loading caused by the person sitting on the equipment resulted in a damaged shock and vibration mount.

The equipment was designed for communications use—not as a device to replace a chain.

AN/WRC-1; GENERAL INFORMATION

Mode Selector Switch

It has come to NAVSEC'S attention that the mode selector switch in early models of the T-827/URT and R-1051/URR may encounter a failure after a period of operational—use cycling. This condition appeared in early serial numbered equipments delivered under contract NOBSR 87614. Although this is a standard MIL switch and had been subjected to many qualification and inspection tests, this failure had not become evident. In the event that this failure is encountered in operational use, the switch should be replaced by a stock repair unit.

Radio Teletype Use

To be operationally compatible with the various equipments used on radio teletype circuits, Transmitter Unit T-827/URT should be set 2 kc lower in frequency than the operational assigned frequency. For receiving radio teletype, Receiver R-1051/URR should be set 3 kc lower than the assigned frequency, switched to "VERNIER" position, and tuned to approximately 450 cps. This method of receiving is preferable to the use of the BFO control because of the higher stability of the vernier circuit.

CW Reception

When Receiver R-1051/URR is switched to the CW mode, the bandwidth is 7 kc. An alternate method of operation for reception of CW makes use of a 3.2-kc bandwidth filter that normally is used in single sideband mode. To copy CW in this manner, switch the emission selector to USB, tune the receiver to 2 kc lower than the assigned frequency, switch to VERNIER, and adjust the vernier control for a desired tone pitch.

In the SSB mode, a better sensitivity and an approximate 4 to 1 signal improvement will result. The equipment was designed primarily as a single sideband radio set, with the additional capability for CW and AM use. The AM 7-kc filter for the CW mode was used for the purpose of saving cost and circuitry.

Submarine Installations

The AN/WRC-1 technical manual pages 2-21, and 2-22, figure 2-7, indicates that the addition of a relay for antenna tuner bypass is essential. This is not the case. The relay need only be installed if it is desired to provide for antenna tuner bypass switching directly at the front of the AN/WRC-1 (power amplifier unit). If this feature is not desired, and if the antenna tuner control unit (C-1360/SRT or equivalent) is in the near vicinity of the AN/WRC-1, this antenna relay addition is not required.

Use of the CU-737/URC coupler-monitor with the AN/WRC-1 is not required and it should not be installed.

Nomenclature

The AN/WRC-1 equipment, as first produced, provided tuning increments of 0.5 kc. The receiver portion, R-1051/URR, additionally had provisions for continous tuning. The AN/WRC-1B and later equipment, will include the capability for tuning in 0.1-kc increments. The R-1051B/URR will also be capable of 0.1-kc synthesized increments and additionally will retain the continuous tuning capability.

AN/WRC-1 RADIO SET; RF AMPLIFIER UNIT

The RF Amplifier Unit (AM-3007/URT) of Radio Set AN/WRC-1 has been designed for interchangeable use with another equipment, nomenclature AN/URC-35. The AN/URC-35 is basically a single sideband, AM, CW transceiver version of the AN/WRC-1 radio set. The AN/URC-35 uses the same RF Amplifier AM-3007/URT as well as many of the same module assemblies and the antenna coupler unit of the AN/WRC-1 version. The AN/URC-35 is capable of operation from 115 VAC, 48-450 cps, external 24 VDC input, or from a self-contained 24 VDC battery (when installed).

The AM-3007/URT, as furnished with the AN/WRC-1 equipments, contains receptacles and circuitry that are used with the AN/URC-35 configuration when used on 24 VDC operation only. This circuitry had been included in units delivered as AN/WRC-1's for the purpose of standardization of design, common support, and interchangeability.

The AN/WRC-1 cannot be operated on 24 VDC primary power input.

AN/WRC-1, R-1051/URR SHOCK AND VIBRATION MOUNTS

The AN/WRC-1 and R-1051/URR equipments are supplied with shock and vibration mountings that have been designed specifically for each of the equipments to meet the rigorous requirements of specification MIL-E-16400. The mounts are not interchangeable, although they appear alike. The AN/WRC-1 shock and vibration mount is nomenclatured MT-3115/UR (Barry part no. 18870-6 ( )) and the R-1051/URR shock and vibration mount when used separate from the AN/WRC-1 configuration is nomenclatured MT-3114/UR (Barry part no. 18870-5 ( )).

NAVSEC has received reports that some shock and vibration mounts supplied with the AN/WRC-1, R-1051/URR equipments appeared to be interchanged. Investigation disclosed that the prime contractor, General Dynamics, had inadvertently applied nomenclature plates incorrectly; that is, applied MT-3115/UR plates to the MT-3114/UR shock and vibration mounting on an unknown number of delivered equipments.

Each of the equipment shock and vibration mountings have the associated equipment identification stenciled on

the top plate of the mounting. All activities installing these equipments should verify use of the proper mount by citing the stenciling appearing on the top plate as well as confirming the vendor's number:

Equipment	Correct Nomenclature	Correct Vendor Part Number
AN/WRC-1	MT-3115/UR	Barry no. 18870-6 ( )
R-1051/URR	MT-3114/UR	Barry no. 18870-5 ( )

Installation of the AN/WRC-1, R-1051/URR aboard ship or in vehicles without the associated shock and vibration mount can incur serious damage to the equipment if vibration and severe shock is encountered.

AN/WRC-1 INSTALLATION AND MAINTENANCE ADJUSTMENT

The attention of installing personnel is invited to the necessity for power amplifier (AM-3007/URT) bias adjustment during initial installation of the equipment as well as during periodic maintenance inspections. Adjustment information is contained in the AN/WRC-1 Operator's Handbook (NAVSHIPS 0967-971-0020), page 3-2, paragraph 3-18 (C).

Initial installation problems have been attributed to a failure in making this adjustment.

AN/WRC-1 CW BREAK-IN TIME

After a recent INSURV trial, a request concerned a change in the equipmenthold-in time during CW operation. The equipment contractor was advised that the present hold-in time is approximately one second and that this hold in time can be reduced to 0.5 second by the elimination of an existing capacitor.

Refer to AN/WRC-1 technical manual figures 5-5 and 5-29, printed circuit board A8, capacitors C10 and C11. Capacitors C10 and C11 determine the hold-in time constant. By disconnecting oneof the capacitors, the time can be decreased to approximately one-half.

The above procedure is for information only to those desiring a shorter hold-in time. A formal field change will not be published at this time.

AN/WRC-1; GENERAL NOTES

AM-3007/URT R F Amplifier.

In the event of an equipment failure having a symtom of continuous rotation of the unit's turret assembly, check relay 3A2A5K6. Welding of internal contacts will cause continuous power to be applied to the turret motor.

Reports of failure of DC-to-DC converter unit components Q1, Q2 and CR5 have been attributed to ship's external cabling problems. BUSHIPS message 031635Z June 65 advises checking of remote control unit's 12 vdc terminals and "Microphone" jack receptacle for the absence of any ground. A ground at these points will cause a direct short on the 12 vdc power supplied from the DC-toDC converter unit and resultant component failure.

Test Sets.

The AN/WRC-1 and R-1051/URR technical manuals (NAVSHIPS 94840(A) and 94841(A)) provide reference to requirements for Test Sets TS-2132/WRC-1 through TS-2135/WRC-1. These test sets are for the purpose of checking individual modules (electronic assemblies) of the AN/WRC-1 and R-1051/URR equipments. The test sets **have not** been procured for general issue as an on-board allowance item. The test sets have only been supplied to repair facilities San Francisco and Norfolk Shipyards and SRF SUBIC and YOKO.

Technical Manual Change.

CHANGE 2 to the AN/WRC-1 and R-1051/URR Technical Manuals has been published and stocked at Naval Supply Depot, Philadelphia.

Repair Manual.

The manual "Repair of AN/WRC-1 and R-1051/URR 2N Modules," NAVSHIPS 0967-034-2000, is now available at NSD, Philadelphia. This manual supersedes the earlier version NAVSHIPS 95700. The manual is intended for use in conjunction with the test sets supplied to the module repair activities, however, a bulk stock of the manual has been obtained for general reference use. Copies of NAVSHIPS 95700 should be destroyed.

R-1051/URR.

It is recommended that the receiver unit be left in a "standby" condition if not being operationally used. This will increase reliability and retain the internal frequency standards stability. When the receiver is turned completely "off" the existing front-end protective circuit (A9 subassembly) is de-energized and in the event of high-level rf feed-in on the antenna input, damage could be caused to the equipment. A field change is being investigated to assure retention of this circuit e ven though the receiver is "off."

New Production.

The AN/WRC-1B and any later production will include provisions for tuning in 0.1 KC high-stability increments in lieu of the 0.5 kc of the present AN/WRC-1 models. All modules will be interchangeable with the exception of the translator-synthesizer units. The later 0.1 kc version will be interchangeable with the 0.5 kc type of the AN/WRC-1, however, interchanging the 0.5 kc type into the AN/WRC-1A at later versions will not be possible (i.e., 0.1 kc circuitry will not be available). Depot modification of the 0.5 kc translator-synthesizer unit is under consideration and will be accomplished upon the availability of funding. (663)

AN/WRC-1 - Increased Reliability and Stability

A decrease in equipment failure and an increase in reliability and frequency stability can be realized by leaving the equipment in a power "on" status at all times. When the equipment is in a non-operational use status, the transmitter (T-827/URT) and receiver (R-1051/URR) mode selector switches should be placed in "STANDBY" position in lieu of the "OFF" position.

This applies equally to the receiver R-1051/URR, when it is installed separately as an independent receiver. (674)

AN/WRC-1; PLUG-IN ASSEMBLY (MODULE) REFERENCE INFORMATION

The following chart is provided for rapid reference purposes:

Module, Plug-In Assembly	Symbol No.	Federal Stock Number
Translator-Synthesizer	1A2A6	2N5820-078-4720
R F Amplifier	1A2A4	2N5820-078-4721
Frequency Standard	1A2A5	2N6625-078-4718
Receiver IF/Audio	1A2A2	1N5820-078-4725
Receiver Mode Selector	1A2A1	1N5895-078-4723
Transmitter Mode Selector	2A2A1	1N5820-078-4724
Transmitter IF Amplifier	2A2A10	1N5820-969-4216
FSK Generator	2A2A9	1N5820-078-4722
APC/PPC/Dir. Coupler	3A2A2	1N5820-078-4717
DC/DC Converter	3A2A5	1N5820-078-4719
AC Power Supply	3A2A3	1N6130-969-4217
Transmitter Audio Amp.	2A2A2	1N5820-078-4726

NOTE: Assemblies 1A2A6, 1A2A4, 1A2A5, 1A2A2, and 1A2A1 are used in the R-1051/URR receiver unit of the AN/WRC-1 Radio Set as well as the R-1051/URR Receiver when used separately. (661-665)

R-1051/URR Radio Receiver and T-827/URT Exciter of AN/WRC-1, Panel Lamp Replacement–Maintenance Hint

The problems encountered in the replacement of the frequency indicating panel lamps in the R-1051/URR and T-827/URT can be minimized to a great extent by using the replacement procedure provided in this article.

The subject panel lamps are a special assembly manufactured by Grimes Mfg. Co. P/N A-9906-1. They are in the federal supply system under FSN 9G6240-623-3618. Because the lamps have high internal resistance and are in parallel, if one lamp burns out, the other lamp will operate brighter. To prevent the remaining lamp from burning out shortly thereafter, replace defective lamps as soon as possible.

Procedure:

A. Replacement of panel lamps located between the 1 KC and 10 KC digit knobs.

1. Remove power to the R-1051/URR or T-827/URT.
2. Open receiver or exciter drawer.
3. Set the frequency knobs to 15.555 MC.
4. Loosen the four captive hold down screws and lift out the translator/systhesizer electronic assembly. (Suggestion: Lift the screws and turn about one-half turn into the captive nut. Then use the screws for handles to lift the assembly).

Replace defective panel lamp, assuring new lamp is tight in socket.

6. Replace translator/synthesizer.
7. Restore power and check operation.

B. Replacement of panel lamps located between 1 MC and 10 MC digit knobs.

1. Remove power to the R-1051/URR or T-827/URT.
2. Open receiver or exciter drawer.
3. Set the frequency knobs to 15.555 MC.
4. Loosen the four captive hold down screws and lift out the RF Amplifier electronic assembly.
5. Remove the two screws from the bottom of the Code Generator assembly.
6. Loosen the screw on the top of Code Generator mounting plate. This screw is somewhat difficult to locate. It is shown at the bottom of Fig. 5-102, NAVSHIPS 0967-970-9010 (formerly 9484(A), Vol. 1 (R-1051/URR)), or Fig. 5-141, NAVSHIPS 0967-971-0010 (formerly 94840(A), Vol. 1 (T-827/URT)). This screw is located about 1/2 inch directly below the fuse holder.

NOTE: In the T-827/URT unit, remove the protective support bracket, located behind the front panel, to allow access to the screw.

7. Remove the two nuts securing Code Generator plug P8 and remove plug from jack.
8. Remove the Code Generator.
9. Replace defective panel lamp, assuring the new lamp is tight in its socket.
10. Reinstall the code Generator, mounting plug, and RF Amplifier.
11. Restore power and check operation. (700)

AN/WRC-1 Radio SET–Information Concerning DC-to-DC Converter Failures

Many failures of the DC-to-DC Converter Assembly 3A2A5 in the AN/WRC-1 have been attributed to an inadvertent ground appearing in the 12 volt remote control power supply. The undesired ground is caused by missing isolation (insulating) washers on the microphone receptacle J-102 in Radio Set Control C-1138/UR series.

The missing isolation washers cause a ground to be introduced at terminal TB7-1 of the AN/WRC-1 Interconnecting Box J-1265/U. This same ground will also appear at terminal TB101-8 of the C-1138/UR.

This ground at TB7-1 causes short-circuiting of the 12 VDC power supply in the DC-to-DC Converter and results in serious damage to the assembly.

All holders of the AN/WRC-1 equipment are urged to investigate the possibility of missing isolation washers at J-102 in all Radio Set Controls C-1138/UR.

The ground condition may be checked at the C-1138/UR simply by determining whether the locknut for J-102 is grounded to the chassis. **Neither** the locknut **nor** the receptacle barrel of J-102 should be grounded. Replacement washers to isolate J-102 from ground may be fabricated from fish paper, rubber, or other similar insulating material.

The NAVSECNORDIV is currently procuring a field change kit for the AN/WRC-1 to "float" the 12 VDC remote control power supply and to provide a fuse for this supply. (702)

R-1051/URR-NOTES

Excessive RF into the front end will ruin the RF transistors in short order.

If either the upper sideband or lower sideband module goes out, either one can be inter-changed but caution should be exercised that no troubles exist in the other sections of the receiver which may have caused the original burn-out.

No attempt should be made to make any measurements except with the equipment recommended in the technical manual. Some test equipments have damaging voltages either in their probe or in the unit itself which can ruin the transistors in the R-1051/URR.

Operating the R-1051/URR without audio load can ruin the output transistors. The proper speaker impedance should also be checked for this reason.

A simple measuring device to ascertain the operation of the oscillators can be made by utilizing an R-390/URR as a sensitive "sniffer" tuning to the inoperative freqs on the R-1051/URR and then checking with a piece of coax as a probe to the guilty oscillator. It is not neccessary to make metallic contact with the suspected offender. The R-390/URR acts as a very sensitive volt-meter and actual readings on the carrier level meter will tell if this part of the circuit is or is not functioning.

AN/WRC-1B, R-1051B/URR—NEW PRODUCTION

The most recent production of the AN/WRC-1, R-1051/URR series of equipment has been assigned a "B" suffix in nomenclature (i.e., AN/WRC-1B, R-1051B/URR). The major differences in this equipment from previous production is the inclusion of 0.1 kc incremental tuning in lieu of 0.5 kc, including a change in the translator-synthesizer module assembly and the replacement of the frequency standard modular assembly with a new version.

It is requested that reference to equipment (CASREPs, NAVSHIPS 4110's etc.) include the identification of model and equipment serial number that appears on the **orange** colored nomenclature plate. (EIB 718)

AN/WRT-2, AN/URC-32, AN/URC-35, AN/WRC-1, AN/URT-23—THE CARE AND FEEDING OF SSB TRANSMITTERS

See article under AN/WRT-2 with same title. (734)

The following chart summarizes the above information:

FSN	Use
4G5820-078-4720	R-1051, T-827
4G5820-879-7577	R-1051B
4G5820-167-7673	T-827B, T-827E, R-1051B
4G5820-133-9033	AN/URC-35

RF Amplifier Module (A2A4)

There are three (3) different types of RF Amplifier modules used in this family of equipments. Each one has a different stock number. These assemblies also cannot be interchanged between certain equipments without damage to/or malfunction of the assembly or equipment.

1. FSN 4G5820-078-4721 (A2A4) RF Amplifier, GD/E (58189) P/N 666230-019, should be installed in R-1051/URR, R-1051B/URR, or T-827/URT. DO NOT INSTALL this module in any T-827B/URT, AN/URT-23 (T-827B/URT), or AN/URC-35 equipment.
2. FSN 4G5820-167-7675 (A2A4) RF Amplifier, Bendix (06845) P/N 2058994-0501, must be installed in any T-827B/URT, T-827E/URT, AN/URT-23 (T-827B/URT or T-827E/URT) or AN/WRC-1B (T-827B/URT). This module may be installed in any T-827/URT, R-1051/URR or R-1051B/URR equipment. DO NOT INSTALL this module in any AN/URC-35 equipment.
3. FSN 4G5820-133-9032 (A2A4) RF Amplifier, GD/E (58189) P/N P 69350-001, should be installed only in AN/URC-35 equipments. DO NOT INSTALL this module in any R-1051, T-827, AN/WRC-1, or AN/URT-23 equipment.

The following chart summarizes the above information.

FSN	Use
4G5820-078-4721	T-827, R-1051, R-1051B
4G5820-167-7675	T-827, T-827B, T-827E/URT, R-1051, R-1051B
4G5820-133-9032	AN/URC-35

The physical and mechanical appearances of the four Translator/Synthesizers are the same, as are the appearances of the RF Amplifiers. Caution is advised when replacing or exchanging these assemblies to ensure against damaging equipment. Only the Electronic Assembly Repair Facilities at San Francisco Bay Naval Shipyard (Hunter's Point Division) and Norfolk Naval Shipyard are presently capable of repairing these assemblies. Ships and other activities do not have the test equipment and fixtures required to align these assemblies. Exchanging of subassemblies within these assemblies requires realignment to ensure proper operation at all frequencies and is not to be done by anyone other than the above Electronic Assembly Repair Facilities. (761)

AN/WRC-1( ), AN/URT-24, and AN/URC-35( ) PA Tube High Voltage Protection Shield—Ordering of

All AM-3007/URT units manufactured as a unit of the AN/WRC-1B, AN/URC-35, AN/URC-35A and AN/URT-24 were delivered with the PA tube protective cover installed. AN/WRC-1 radio sets were back-fitted with the protective cover by Field Change Kit 2A-AN/WRC-1, FSN 2Z5820-999-8869.

This PA tube protection cover is an insulated shield for protection against high voltage shock hazards during service and maintenance of the AM-3007/URT. The cover is labeled:

DANGER HIGH VOLTAGE

and should ALWAYS be reinstalled if removed for any reason. A replacement should be ordered if the cover is lost or damaged.

The protective shield is documented as A2A1MP11, Mfr. 58189 Part Number A09448-001 in the AN/URC-35A and the AN/URT-24. The AN/URC-35 and the AN/WRC-1,-1B Technical Manuals and APL's are currently being revised and will include documentation for A2A1MP11.

Use Mfr. 58189 Part Number A09448-001 to order replacement PA tube protection covers for all AM-3007/URT RF power amplifier units.

(827)

AN/WRC-1 Radio Set—Family Installation Configuration

The purpose of this article is to identify the various mounting configurations that are applicable to AN/WRC-1 Family Equipments. When installed in a shipboard environment, any deviation from the following configurations may degrade the equipment performance below the minimum requirements of the applicable Military Specification and Reference Standard:

EQUIPMENT		MOUNTING CONFIGURATION
R-1051( )/URR	Shock Mount	MT-3114/UR
R-1051( )/URR	Equipment Cabinet	CY-4516( )/S
AN/WRC-1	Shock Mount	MT-3115/WRC-1
AN/WRC-1B	Shock Mount	MT-3115/WRC-1
AN/URC-35( )	Shock Mount	MT-3761( )/URC-35
AN/URT-24( )	Shock Mount	MT-3761( )/URC-35
*T-827/URT or T-827B/URT and AM-3007/URT	Shock Mount	MT-3761( )/URC-35 or MT-3115/WRC-1
AN/URT-23(V)	Shock Mount	MT-3399/U

*This configuration results when the R-1051 or R-1051B is removed from the AN/WRC-1 or AN/WRC-1B configuration.

Multiple unit mounting in specially constructed vertical racks as described in NAVSHIPS 0902-001-5000, general specifications for ships section 400d. is not recommended unless the applicable shock mount is used.

In addition to mounting configurations listed above, shore activities may install the equipment in electrical equipment racks meeting the requirements of MIL-STD-189. Blower motors must be provided to remove the heat if the rack is enclosed.

Special consideration must be given to compartment ventilation to displace the heat generated by a large concentration of equipments in one area of the compartment.

Technical manuals and installation control drawing will be corrected to reflect these modified mounting configurations. *(EIB 855)*

AN/WRC-1 Family Equipments, Including R-1051/URR, T-827/URT, AN/URT-23, AN/URT-24 and AN/URC-35 Series—Module Interchangeability Data

The purpose of this article is to update the information published in EIB 761 of 22 Sep 69, regarding module interchangeability of AN/WRC-1 Family equipments. The intent of this article is to provide technicians with a list to use in facilitating interim repairs with units on hand, while modules are on order.

Since EIB 761 was published, the WRC-1 Family of equipments has expanded to such an extent that there are presently 4 different receivers, 5 exciters, 3 transceivers, and 7 power amplifiers which are configured to make up the different systems that are included in the family.

The following list of module National Stock Numbers (NSN) is supplied without reference to the major systems to alleviate some of the confusion which has been encountered in replacing modules. However, every effort should be made to secure the module that is listed in the APL for the equipment being repaired. For instance, when repairing an R-1051B/URR use the type of module specified in the R-1051B/URR APL, if possible, before using another type of module. When ordering replacement modules on the other hand, requisition only the type of module listed in the APL for the equipment being repaired. As an example, when ordering a receiver mode selector for an R-1051B/URR use NSN 5895-00-078-4723 rather than one of the other mode selectors. This will prevent the supply system from becoming over drawn on any particular module for an extended period of time.

System adjustments should be checked, and made if necessary, after replacement of any module or assembly for optimum system performance. Caution should be exercised when replacing or exchanging these assemblies to insure against equipment damage. Do not make any substitutions other than those listed as follows.

MODULE NSN	USED IN
Receiver Mode Selector	
5895-00-078-4723	R-1051, R-1051B, R-1051D, R-1051E
5825-00-439-2387	R-1051, R-1051B, R-1051D, R-1051E
5820-00-168-9562	R-1051, R-1051B, R-1051D, R-1051E
Transmit Mode Selector	
5820-00-078-4724	T-827, T-827B, T-827D, T-827E, T-827F
5820-00-168-9558	T-827, T-827B, T-827D, T-827E, T-827F
Transceiver Mode Selector	
5820-00-727-8716	RT-618, RT-618A, RT-618B
5999-00-439-2374	RT-618, RT-618A, RT-618B
5820-00-168-9630	RT-618, RT-618A, RT-618B
Receiver IF/Audio Amp	
5820-00-078-4725	R-1051, R-1051B, RT-618
5825-00-439-2375	R-1051D, R-1051E, RT-618A, RT-618B
5820-00-168-9561	R-1051D, R-1051E, RT-618A, RT-618B
Transmit Audio Amp	
5820-00-078-4726	T-827, T-827B, T-827E, RT-618
5820-00-465-6241	T-827, T-827B, T-827D, T-827E, T-827F, RT-618, RT-618A, RT-618B
5820-00-168-9554	T-827, T-827B, T-827D, T-827E, T-827F, RT-618, RT-618A, RT-618B
RF Amplifier	
5820-00-078-4721	R-1051, R-1051B, T-827
5820-00-167-7675	R-1051, R-1051B, R-1051D, R-1051E, T-827, T-827B, T-827D, T-827E, T-827F, RT-618A, RT-618B

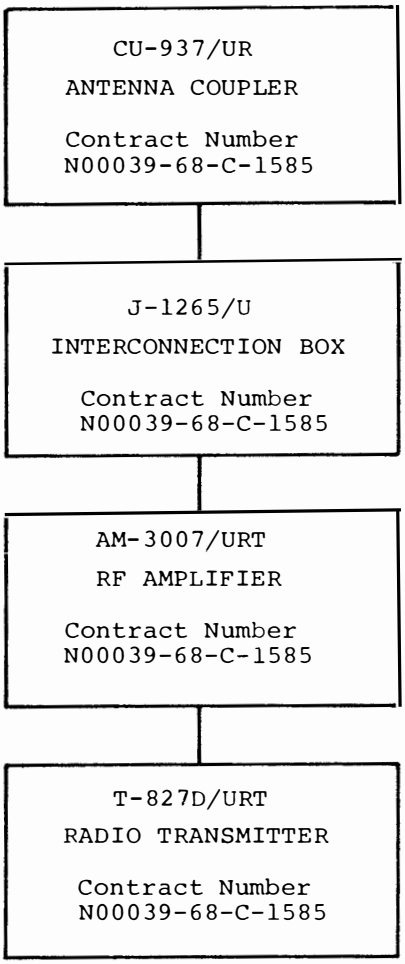
MODULE NSN	USED IN
5820-00-168-9559	R-1051, R-1051B, R-1051D, R-1051E, T-827, T-827B, T-827D, T-827E, T-827F, RT-618A, RT-618B
5820-00-133-9032	RT-618
Frequency Standard	
6625-00-078-4718	R-1051, R-1051B, R-1051D, R-1051E, T-827, T-827B, T-827D, T-827E, T-827F, RT-618, RT-618A, RT-618B
6625-00-160-0623	R-1051, R-1051B, R-1051D, R-1051E, T-827, T-827B, T-827D, T-827E, T-827F, RT-618, RT-618A, RT-618B
Translator/ Synthesizer	
5820-00-078-4720	R-1051, T-827
5820-00-879-7577	R-1051B
5820-00-133-9033	RT-618
5820-00-167-7673	R-1051B, R-1051D, R-1051E, T-827B, T-827E, T-827F, RT-618A, RT-618B
5820-00-168-9560	R-1051B, R-1051D, R-1051E, T-827B, T-827D, T-827E, T-827F, RT-618A, RT-618B
FSK Tone Generator	
5820-00-078-4722	T-827, T-827B, T-827D, T-827E, T-827F
5820-00-168-9556	T-827, T-827B, T-827D, T-827E, T-827F
Transmit IF AMP	
5820-00-969-4216	T-827, T-827B, T-827D, T-827E, T-827F, RT-618, RT-618A, RT-618B
5820-00-168-9555	T-827, T-827B, T-827D, T-827E, T-827F, RT-618, RT-618A, RT-618B
Noise Blanker	
5820-00-727-8726	RT-618, RT-618A, RT-618B
5825-00-439-2378	RT-618, RT-618A, RT-618B
5820-00-168-9629	RT-618, RT-618A, RT-618B
APC/PPC/ Directional Coupler	
5985-00-078-4717	AM-3007
5820-00-006-2031	AM-3007, AM-3007 "F" Ser, AM-3007A
5985-00-168-9635	AM-3007, AM-3007 "F" Ser, AM-3007A
AC Power Supply	
6130-00-969-4217	AM-3007, AM-3007 "F" Ser, AM-3007A
6130-00-168-8603	AM-3007, AM-3007 "F" Ser, AM-3007A
DC-DC Converter	
5820-00-078-4719	AM-3007, AM-3007 "F" Ser
5820-00-133-9034	AM-3007, AM-3007 "F" Ser
5820-00-179-8081	AM-3007, AM-3007 "F" Ser
5820-00-168-9628	AM-3007, AM-3007 "F" Ser, AM-3007A
Driver Tube Assy	
5820-00-988-7994	AM-3924, AM-3924A
Final XFMR Assy	
5820-00-836-2985	AM-3924, AM-3924A
VSWR Bridge Assy	
5820-00-988-8033	AM-3924, AM-3924A
5820-00-334-7637	AM-3924, AM-3924A
Driver XFMR Assy	
5820-00-836-9140	AM-3924, AM-3924A
Power Control PCB Assy	
5820-00-988-8039	AM-3924, AM-3924A
5820-00-334-7635	AM-3924, AM-3924A
APC/PPC PCB Assy	
5820-00-988-8043	AM-3924, AM-3924A
5820-00-334-7633	AM-3924, AM-3924A

(EIB 893)

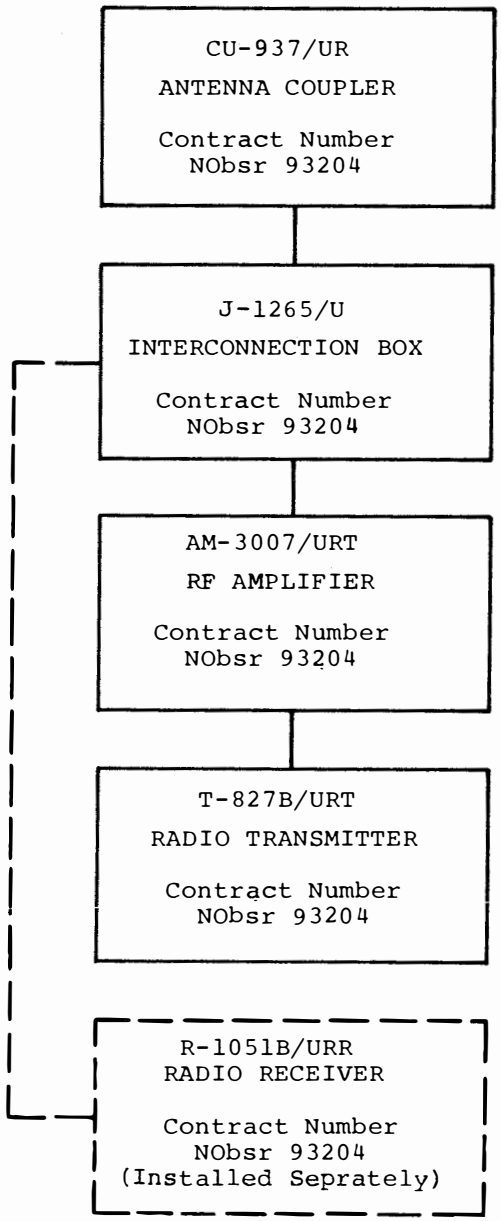
AN/URT-24 and AN/WRC-1B Radio Sets—Identification of Installations

In many instances AN/WRC-1B transmitters are installed aboard ship and the local operating position labels identify these equipments as "AN/URT-24." This causes confusion in data reporting, in the determination of field change applicability and in using the correct APL for ordering replacement parts.

THE SIGNIFICANT DATA ARE THE CONTRACT NUMBERS ON THE NAMEPLATES.



AN/URT-24 CONFIGURATION



AN/WRC-1B CONFIGURATION

(Local Operating Positions labeled "AN/URT-24")

(EIB 865)

AN/WRC-1 Family Including AN/WRC-1( ), AN/URT-23( ), AN/URT-24( ), AN/URC-35( ), and R-1051( )/URR Series—Configuration Control of and Unauthorized Alterations to

With the rapid growth of this family of equipments and with emphasis being placed on configuration control, it has become necessary to correctly identify equipment installations at the local operating positions.

The purpose of this article is to provide significant characteristics and instructions by which the equipment may be identified and redesignated at the local position.

It has been brought to the attention of NAVELEX that there is a great deal of confusion in the Fleet concerning the maintenance of AN/WRC-1 family equipment. Most of this confusion stems from the fact that the local operating positions of the equipment are in many cases mislabeled. The prime example of this is the AN/WRC-1B labeled as AN/URT-24. In many instances the AN/WRC-1B's were separated by removing the receiver and installed as an AN/URT-24, which it is not. This action causes confusion among the maintenance personnel in that the AN/URT-24 APL's, field changes, and technical documentation do not apply to the AN/WRC-1B transmitter that they are attempting to maintain.

An article in EIB 865 identified the difference between the AN/WRC-1B and the AN/URT-24 configurations. The article did not however, give instructions for redesignating the local operating position of the AN/WRC-1B transmitter to alleviate the problem.

Since the family has expanded to include different models of each system which are not identical, from the support aspect, it is also necessary to redesignate them as to their respective configurations. For instance the AN/URC-35, AN/URC-35A, and AN/URC-35B all differ to some degree. However, when installed, all are normally labeled AN/URC-35. This labeling fallacy applies to all series of the family. There are circuitry differences between these various models which may cause irreparable damage to some of the modules if installed in the wrong model. In order to preclude this occurrence, a strict program of configuration control must be established, and this redesignation process is one of the first steps to that end.

The intent of the relabeling process is not to change the scheme of radio room status boards or operating procedures, but to identify equipment for maintenance, accountability and data reporting purposes. It is realized that the hardware and documentation required to correct the situations existing at some activities may be extensive. It must be understood by the using activities that any additional documentation such as APL's, MRC's, or manuals may be in short supply for some equipment. Hardware, in this case "local operating position labels," may be manufactured by the using activity.

The equipments of the AN/WRC-1 family are, therefore, to be identified and labeled at the local operating positions to reflect their true configuration. By referring to the Integrated Logistic Support Plan (ILSP) for the AN/WRC-1 Family Radio, (NAVELEX P4110.45 of Aug 1974) the different configurations may be identified by using Appendix B, Technical Documentation. Appendix B lists each system configuration as well as separate units such as the R-1051( )/URR series. When using Appendix B, the significant data is the contract number column. The equipment nameplate also bears the contract number for that particular model. By matching the numbers, the system may be identified and labeled.

Refer to pages 12 and 13 of the ILSP for the identification of AN/WRC-1B which has been separated and the AN/URT-24. Local operating positions for the AN/WRC-1B from which the R-1051B/URR has been removed, should be redesignated "AN/WRC-1B Transmitter Only" vice "AN/URT-24". Likewise, AN/WRC-1 radio sets which have the respective R-1051/URR removed should be redesignated "AN/WRC-1 Transmitter Only" at the local operating position.

This process should also be followed to identify and label all series of the family including R-1051, -B, -D, -E, URT-23, -23A, URT-24, -24A, URC-35, -35A, -35B and WRC-1, -1B.

Appendix B of the ILSP also lists other pertinent data such as applicable APL's, and manuals for each respective equipment. Once an installation has been identified and redesignated by the contract number as to its configuration, Appendix B should be used to verify that applicable APL's and manuals are on hand for maintenance.

It should be pointed out that there are two different AN/URT-23(V) configurations. The "A" serial AN/URT-23's have either T-827/URT, T-827B/URT, or T-827E/URT exciters with an "A" serial AM-3924. The "B" serial AN/URT-23's have a T-827D/URT exciter and a "B" serial AM-3924. This difference is pointed out at this time because there have been numerous instances where parts ordered from the AN/URT-23 "A" serial APL's will not work in "B" serial equipment. APL's should be acquired to support the particular serial of AN/URT-23(V) installed.

(EIB 898)

*AM-2123( )/U RF Amplifier—5MHz Output Levels Lowered to Meet AN/WRC-1 Family Communication Requirements

The purpose of this article is to inform all activities utilizing the 5MHz outputs of the AM-2123( )/U RF amplifiers for supplying AN/WRC-1 family equipments with a 5MHz reference frequency, that there are new output level requirements. Each activity should insure that the new levels are maintained by performing the corrective action provided in this article which will insure that the equipment frequency standard compare lamp circuitry operates regardless of which type of replacement A2A5 internal frequency standard may be installed in the equipment. Currently the ships frequency distribution system consists of a frequency standard (AN/URQ-9, 10, or 10A) which provides 0.1MHz, 1MHz, and 5MHz outputs to a distribution RF amplifier (AM-2123/U, AM-2123(V)/U, or AM-2123A(V)/U) which provides isolated outputs in various quantities as required by specific equipment installations. The minimum output level requirements of the distribution amplifiers has been 4.00V RMS into 50 ohm termination. With higher termination impedance, the outputs may increase up to approximately 10V RMS on certain type distribution amplifiers. Unnecessarily high external reference inputs erroneously indicate module failure due to apparent compare circuitry malfunction within the module. It may also produce undesirable RFI conditions. Attenuators have been placed inline between the distribution amplifier and equipment to lower the levels but they present some installation and logistic support problems and are costly. The AM-2123( )(V)/U installation control drawing, NAVSHIPS drawing 80064 RE-D2687915 REV K is being revised to reflect a change for 5MHz ouputs which will preclude the use of inline attenuators.

Due to various equipment interface and module interchangeability conditions, activities utilizing the various type A2A5 internal frequency standards should insure that the distribution amplifier 5MHz output level is between 1.00 and 2.00V RMS, with and then without 50 ohm termination. The only corrective action required for the AM-2123/U or AM-2123(V)/U is resetting the 5MHz input level adjustment in accordance with the procedure provided below. The corrective action required for the AM-2123A(V)/U is the installation of Field Change 1-AM-2123A(V)/U.

AM-2123/U, AM-2123(V)/U RF Amplifier 5MHz Input Level Adjustment

These type amplifiers have input level adjustments for each input frequency on the rear apron of the amplifier. The 5MHz input level adjustment R10 should be made in accordance with the following procedure:

1. Insure the RF amplifier is operational in accordance with the Technical Manual NAVSHIPS 0967-139-1010.
2. Check that all RF amplifier output cables connected to J4 through J15 are labeled, or tag each with the corresponding jack number, and then disconnect all 5MHz output cables from the respective jacks.
3. Connect BNC T adapter (UG-274C/U) to one of the 5MHz output jacks. Connect a 50 ohm termination to one end of the BNC T and an RF voltmeter to the other end of the T adapter. Set the 5MHz input level adjust for 1.00V RMS on the voltmeter. Check and re-adjust level to obtain 1.00V RMS minimum from all 5MHz output jacks.
4. Remove the 50 ohm termination from the BNC T adapter and observe that no 5MHz output jack measures more than 2.00V RMS. NOTE: Adequate results without using an RF voltmeter may be obtained by observing that the front panel meter reads between 20 and 40 microamps on each 5MHz output channel, with and then without 50 ohm termination.
5. Remove any inline attenuators on the 5MHz output cables between the amplifier and the equipment. Remove the BNC T adapter and reconnect the cables to the corresponding jacks. (EIB 907)

AN/URC-35, -35A; AN/URT-24, -24A; AN/WRC-1, -1B--Alteration Equivalent to Repair (AER) on DC-DC Converter Part Number 0026-2200--Information on

See article in AN/URC-35 Section under the same title. (EIB 968)

Field Change 5-R-1051/URR, 1-R-1051B/URR, 9-AN/WRC-1, 1-AN/WRC-1B and/or 2-AN/URC-35 entitled: Improved Antenna Overload Circuitry--Installation Information Concerning

See article in R-1051/URR Section under the same title. (EIB 890/945)

Field Change 8-AN/WRC-1 — Information Concerning

The purpose of this article is to clarify the status of Field Change 8-AN/WRC-1: "Improve Switching Circuit Reliability in the DC-DC Converter." The NSN of the affected DC-DC converter assembly is 5820-00-078-4719. The NSN of this converter is changed to 5820-00-179-8081 when Field Change 8-AN/WRC-1 is installed.

Field Change 8-AN/WRC-1 was originally procured in kit form in 1970 for accomplishment by forces afloat. At that time the DC-DC converter was a "1N" cognizant item, meaning it was an organizational level (shipboard) maintainable assembly. The DC-DC converter has since been changed to a depot repairable "4G" (turn-in) item. This means that all users are directed to requisition a DC-DC converter to replace a failed assembly and to turn the defective assembly in to the Navy Supply System for induction into the repair cycle.

Depot Repair Facilities are installing Field Change 8-AN/WRC-1 to the 5820-00-078-4719 assembly during the repair cycle. The depots are using parts from bulk storage instead of field change kits.

In view of the foregoing information, Field Change 8-AN/WRC-1 will no longer be stocked in the Navy Supply System.

Organizational level users are advised to continue to use the 5820-00-078-4719 DC-DC converter until it becomes defective. At this time requisition a replacement using NSN 5820-00-179-8081 and turn the defective assembly in to the nearest Navy Supply Activity.

(EIB 919)

AN/WRC-1 Radio Set — Publications Corrections

The purpose of this article is to revise the AN/WRC-1 Technical Manual, NAVELEX 0967-LP-971-0010, to reflect the equipment changes made by Field Change 14-AN/WRC-1.

Refer to NAVELEX 0967-LP-971-0010 (formerly NAVSHIPS 94840 (A)), Volume 10 with Permanent Change 2 dated 12 August 1966; and make the following corrections.

NOTE: Record these actions by inserting the notation "EIB 921" on the margin of each page opposite the pen and ink correction. On Page iii just at the end of the LIST OF EFFECTIVE PAGES table, enter the following information.

Page Numbers	Change In Effect
5-91	EIB 921
6-4	EIB 921
6-92	EIB 921

1. Figure 5-26, Page 5-91:
   a. At extreme left center of illustration, draw asterisk (*) at "K4" label.
   b. In space at bottom of illustration, add "* New type K4 is mounted on two 1/2" hex spacers instead of the bracket mounted relay shown in illustration."
2. Table 6-2, Page 6-4:
   a. In NOTES column opposite 2A2K4, add "* See Below."
   b. At bottom of page, add:

"* 2A2K4 is no longer in production, replace with:
Relay, 12 volt, DPDT, contact rating 2 amps at 30 VDC, MFR 02289, Part Number 2BA1B112, 14304 Dwg. 0026-1402. (Refer to Field Change 14-AN/WRC-1 in EIB 921.)"

(EIB 921/940)

AN/WRC-1 Family Equipment Including R-1051/URR, T-827/URT, AN/URT-23, AN/URT-24 and AN/URC-35 Series — Module Interchangeability Data — Correction to EIB 893

The purpose of this article is to update and correct information published in EIB 893 of 18 Nov/2 Dec 1974.

Refer to EIB 893 and correct the Module Interchangeability article as follows, and record the corrections in margin adjacent to the pen and ink corrections.

1. On page 3 of the EIB under Translator/Synthesizers, add "T-827D" to list of equipment for NSN 5820-00-167-7673.
2. On page 4 of the EIB under APC/PPC PCB assy delete, "AM-3924A" beside the first NSN 5820-00-988-8043.
3. On page 4 of the EIB, under APC/PPC PCB assy delete "AM-3924" beside the second NSN 5820-00-334-7633.

All holders of the INTEGRATED LOGISTIC SUPPORT PLAN for the AN/WRC-1 FAMILY RADIO, ELEX 4042 publication ELEX P4110.45 dated April 1975 should make the foregoing corrections to their ILSP as well as EIB 893.

Make the pen and ink corrections to the ILSP and record the correction in the margin adjacent to the change.

1. In APPENDIX A on page A1-2, item 8 Translator/Synthesizer, add "T-827D" to the list of equipment for NSN 5820-00-167-7673.
2. On page A1-4, item 20 AM-3924 ( ) APC/PPC PCB assembly, delete "AM-3924A" beside the first NSN 5820-00-988-8043.
3. On page A1-4, item 20 AM-3924 ( ) APC/PPC PCB assembly, delete "AM-3924" beside the second NSN 5820-00-334-7633.

EIB 940/944)

AN/WRN-5(V) Radio Navigation Set—Safety Precaution/ Maintenance Hint

The filter capacitors in the AN/WRN-5(V) power supply (1A1A4) are designed to hold a voltage and therefore do not incorporate bleeder resistors. As mentioned in NAVELEX-SYSENGCEN San Diego msg. 281422Z of Feb 74, personnel should be cautioned to the fact that injury could result when coming into contact with the capacitors C3, C4 and C4A.

Warning labels have been mailed to all holders of the AN/WRN-5(V). These labels should be attached to the top of the power supply next to the identification labels at the first opportunity.

When maintenance requires that the power supply be removed, the capacitors must be discharged. Discharge the capacitors using a 500 ohm 10 watt resistor. Attempts to discharge the capacitors by shorting them to ground may cause component damage due to the high current generated. (EIB 888)

*AN/WRN-5 Radio Navigation Set—SATNAV Maintenance Hints

The following maintenance hint is recommended for all AN/WRN-5 users.

1. Clean front panel air filters monthly, vice quarterly, in order to minimize heat buildup in the cabinet and possible resultant module or component damage. Table 4-1 on page 4-1 of NAVELEX 0967-LP-453-9010 should be amended to show monthly cleaning.

2. Prior to removal or installation of any cards in the power supply, capacitors 1A1A4C3, 1A1A4C4, and 1A1A4C4A should be discharged. This procedure is recommended to preclude board damage caused by transients from any residual charge in the capacitors.

(EIB 897)

CORRECTING INTERNAL WIRING IN CRYSTAL OSCILLATOR OF AN/WRR-2

A report has been received indicating difficulty with the internal wiring of the crystal oscillator subassembly in some AN/WRR-2 equipments. This difficulty concerns the shielding on two leads which shorts out the control grid on the oscillator tube, with the result that the crystal is damaged by the drawing of excessive current. Each equipment should be checked to see if the condition exists. It may be corrected as follows:

1. Remove subassembly A-19966 from upper deck of converter unit.
2. Remove two shield cables located in under side of subassembly.
3. Sleeve shield cables with insulation material in a manner permitting restoration of grounding of cable shielding at same joints as originally provided.
4. Replace insulated shielded cables.

AN/WRR-2, -2A, AN/FRR-59M -59A COMMUNICATION EQUIPMENTS; ELIMINATION OF METER FAILURES IN

The Bureau has recently been informed that the replacement of certain tubes can result in meter failures in Radio Sets AN/FRR-59 and AN/WRR-2 if these tubes are replaced while either of the sets are energized. Like failures can occur, for the same reason, in Radio Sets AN/FRR-59A and AN/WRR-2A. The contributing cause for the reported potential meter failures can be eliminated simply and effectively in the field, as described below:

AN/FRR-59 and AN/WRR-2

Observe "Caution" notice on page 3-12 of NAVSHIPS 93550(A). Refer to figure 6-16 of NAVSHIPS 93550(A). Connect a jumper between pins 2 and 7 of V-505 and another jumper between pins 2 and 7 of V-508. In the absence of the jumper connections, the removal of tubes V-505 and V-508, when the receiver is energized, results in excessive currents flowing through meters M-603 and M-604, to the extent of causing their permanent damage. Although suchdamage is avoided if the foregoing "Caution" notice is observed, the addition of the specified jumper connections affords positive protection of meters M-603 and M-604 when the "Caution" notice is overlooked and tubes V-505 and V-508 are removed when the set in which they are installed is energized.

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

Observe the same corrective actions as described above for Radio Sets AN/FRR-59 and AN/WRR-2, except that the "Caution" notice on page 3-12 and figure 6-16 of NAVSHIPS 94715 are applicable. In this latter instance, the circuit symbols for the electron tubes and meters in question are the same as those indicated for radio sets AN/FRR-59 and AN/WRR-2. (EIB 644)

AN/WRR-2, -2A, -2B and AN/FRR-59, -59A, -59B Receivers, Relocation of Test Points on the IF Amplifier — Maintenance Hint

The purpose of this article is to provide repairing activities with a method of relocating test points J502 through J506 for easier accessibility when measuring signal levels and making adjustments. It has been noted that without special test probes these test points are not accessible and that electrical shorts could occur when making measurements.

Approximately 3 hours should be allowed to accomplish the relocation. Tools and material needed are as follows:

Pliers, diagonal
Pliers, long nose
Screwdriver, flat tip
Drill, portable, electric
Drills, twist 11/64" and 1/4"
Soldering iron
Solder, resin core

Refer to Technical Manual NAVELEX 0967-137-3010 (formerly NAVSHIPS 94715) and proceed as follows:

1. Set POWER ON-OFF switch to OFF.
2. Remove the injection IF amplifier assembly per procedure in paragraph 6-5b(4)(a) of foregoing to technical manual.
3. Remove the top cover from the IF amplifier assembly, retain screws.
4. Unsolder leads from the existing test point jacks J502 through J506.
5. Remove and retain jacks. Hint: Test jacks can be removed more easily by pushing out the metal connector from the plastic body, then pressing the plastic body out of the chassis.
6. Drill five (5) holes in the chassis with the 11/64 inch drill bit at locations shown in Figure 1.
7. Install test jacks removed in step 5 in the new holes.
8. Drill five (5) holes in the chassis cover which was removed in step 3 with the 1/4 inch drill bit at locations shown in Figure 1.

NOTE

These holes must clear the test jack heads.

9. Letter test jacks on cover for identification as in Figure 1. Rubber stamping may be used, but should be covered with a coat of clear laquer.

10. Reconnect wiring to test points. Use insulated hook-up wire as necessary.

11. Replace cover plate with screws removed in step 3.

12. Reinstall injection IF amplifier as per paragraph 6-5b(4)(c) of the foregoing technical manual.

13. Restore power to the receiver and check for proper operation. Check test points for presence of proper voltages.

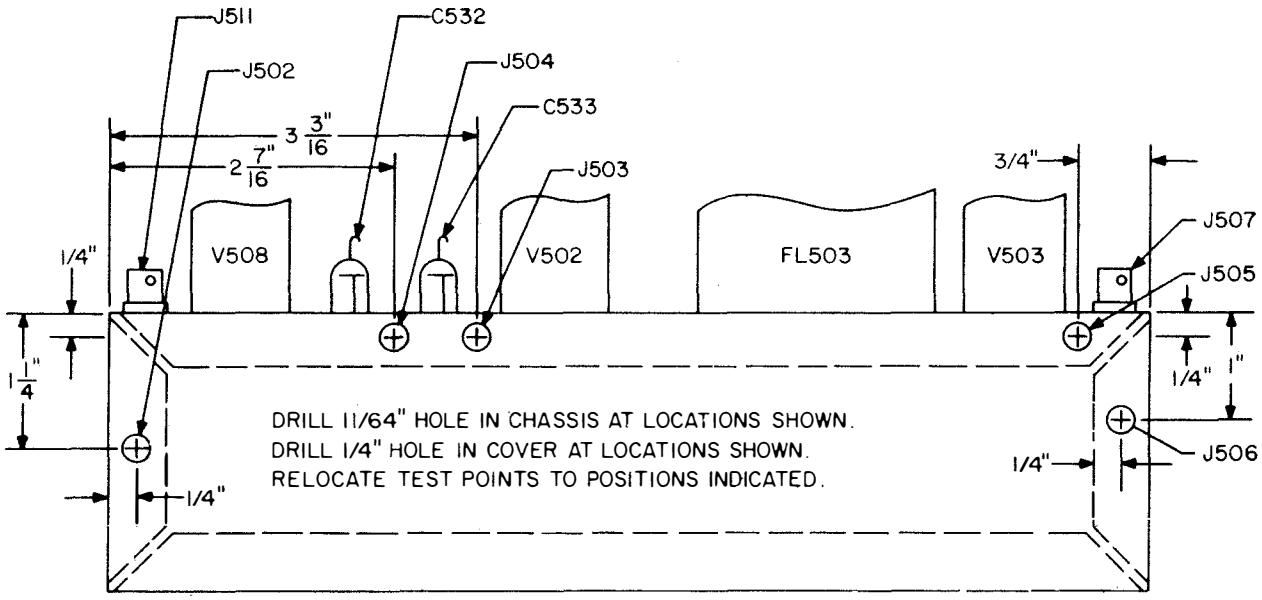


Figure 1. Top View of Injection IF Amplifier as Installed in CV-920/WRR-2 converter. Relocated test points J502 through J506.

(EIB 935)

AN/WRR-3 Receivers—Front Panel Fuse Marking

The fuse size, in some of the older AN/WRR-3 receivers, has not been noted next to the fuse holder on the front panel. This necessitates checking the technical manual to determine the size before the replacement can be made.

To solve this problem, the following action is recommended.

1. Determine the size and value of the fuse.
2. Print this information on a tapewriter and attach it to the front panel adjacent to the fuse(s)

(753)

AN/WRR-7 Digital Data Receiving Set and AN/URT-30 Digital Data Transmitting Set — Limitation on Use of Maintenance Standards Books (MSB)

The purpose of this article is to avoid inconsistencies which will arise if the MSBs issued with AN/WRR-7 (NAVELEX 0967-LP-421-9090) and the AN/URT-30 (NAVELEX 0967-LP-421-9100) are used to check out VERDIN equipment containing updated software.

These MSBs, intended for use in checkout and validation of VERDIN equipment during original installation, contain several procedures which are inconsistent with the updated software now being deployed to VERDIN equipment in the Fleet and should not be used for checkout of such equipment.

Special Operating Instructions Manuals NAVELEX 0967-LP-462-3010 (Rev 2) (AN/WRR-7) and NAVELEX 0967-LP-462-3040 (Basic) (AN/URT-30) to be distributed to the Fleet in June 1976 will contain updates to and will supersede current MSBs. (EIB 924)

AN/WRR-7 Digital Data Receiving Set and AN/ART-50 Digital Data Transmitting Set — Calibration Unit

The purpose of this article is to provide a procedure for avoiding a loss of time during calibration of the O-1612/URC and the O-1622/ARC rubidium frequency and time standards.

The O-1612/URC and O-1622/ARC occasionally lose one second in time when the SYNC button is depressed. To avoid this time loss, these standards should be synchronized before setting the second hand of the mechanical clock. The hour and minute hands can then be set.
(EIB 924)

AN/WRR-7 Digital Data Receiving Set and AN/URT-30 Radio Transmitting Set—Maintenance Hint

The purpose of this article is to provide aid in the maintenance of the noise diverter shroud on the MD-855/WRR-7 Demodulator-Power Supply and the C-8979/URT-30 Control-Power Supply.

1. A visual check of the honeycomb filter should be made daily if the MD-855/WRR-7 is located in the vicinity of a paper shredder. Dust from the paper shredder has been found to be a major cause in clogging the air filter, resulting in the overheating of the units.

2. Before replacing the noise diverter shroud on either the MD-855/WRR-7 or the C-8979/URT-30, coat each screw with Molykote or a similar product (see MIL-A-907D). Coating the screws will lessen the chance of screw damage and aid in future removal of the noise diverter shroud.
(EIB 983)

ADJUSTING THE AN/WRT-1 FOR RADIO TELETYPE (FSK) KEYING SPEEDS IN EXCESS OF 60 WORDS PER MINUTE

Difficulty has been experienced in keying Radio Transmitting Set AN/WRT-1 in the Radio Teletype (FSK) mode at speeds in excess of 60 words per minute (wpm).

The AN/WRT-1 is capable of keying speeds in the FSK mode up to and including 300 wpm. The only adjustment needed to accomplish satisfactory keying in the FSK mode at speeds higher than 60 wpm is the advancement of the wave shaping control, S450, to a higher speed setting.

Since the equipment specifications only call for a keying speed of 60 wpm in FSK mode, the speed markings of control S450 do not agree with the FSK keying speeds. In general, the wave shaping control should be advanced one step higher than the FSK keying speed, as shown in the following table: (608)

FSK KEYING SPEED	WAVE SHAPING CONTROL SETTING
60 wpm	FSK
100 wpm	Multiplex or 200 wpm
200 wpm	400 wpm
300 wpm	400 wpm

To obtain optimum performance, the adjustments described above must be made and the instructions given in the Technical Manual, NAVSHIPS 0966-050-5010, paragraph 3-26(5), step 4, should be followed to adjust the Deviation Calibrate Potentiometer for minimum indication on the Calibrate Zero Adjust Meter, M601. This adjustment is to be made while the transmitter is being keyed to FSK. In addition, and particularly in the lower frequency ranges (300 to 500 kc), the antenna must be resonated precisely at the center frequency (midway between the mark and space frequencies). This is accomplished by tuning the transmitter in the CW mode and carefully adjusting for minimum VSWR indication prior to switching to the FSK mode.

SHOCK VIBRATION MOUNT INSTALLATION: AN/WRT-1, AN/URC-32, AND AN/WRT-2

See article in AN/URC-32 section under the same title.

CABLE HARNESS ON AN/WRT-1

Relays K-101 and K-102 are both mounted behind the radio frequency amplifier deck. Each of these relays has multiwire cabling running to it. Installation of a cable clamp on each cable to hold the cables down and to one side will eliminate the danger of pinching or cutting the wire on the protruding drawer edge. (579)

PROGRAM TO ELIMINATE BAND-SWITCH CORROSION IN TRANSMITTERS AN/WRT-1 AND AN/WRT-2

Reports of corrosion of the band switches located in the temperature-controlled oven compartments of the RF Oscillators and Frequency Control Group of Transmitters AN/WRT-1 and AN/WRT-2 have been received from the Fleet. The source of this corrosion has been isolated to a neoprene coating found on some of the glass fiber insulating batts used in the oscillator ovens of these transmitters.

Neoprene-coated glass fiber batts have been detected in a fairly large percentage of the earlier WRTs (Serial No. 1 through 120, AN/WRT-1, and Serial No. 1 through 253, AN/WRT-2). In addition, such batts have been found in a much smaller percentage of the later sets (Serial No. 121 through 155, AN/WRT-1, and Serial No. 264 through 417, AN/WRT-2). It is relatively certain that no sets above Serial No. 156 of the AN/WRT-1 and Serial No. 418 of the AN/WRT-2 contain neoprene-coated oven insulation.

It should be pointed out that not all sets within the above serials contain the neoprene-coated glass fiber. Each set will have to be examined and evaluated individually. The neoprene coating can be readily recognized visually; it appears as a relatively smooth, firm coating on one surface only of the glass fiber insulating batt. The actual color varies from light tan in new sets to various stages of brown on sets with one week or more of service, to black, depending upon the age of the set and the temperature to which the coating has been subjected. In any case, a definite difference can be detected between the clean yellow color of the uncoated surface and the above described coated surface.

It is possible that in a few extreme cases, oscillator bad switches will require replacement because of having been damaged to such an extent by the corrosion or cleaning efforts that reliable operations will no longer be obtained. Kits of material will be made available for band-switch replacement where needed; however, switch changes will not be required in most instances.

In the near future, change material for the AN/WRT-1 and AN/WRT-2 will be available, with detailed procedures for the replacement of the glass fiber oven-insulating material and band switches.

The following steps should be taken to examine each AN/WRT-1 and AN/WRT-2 transmitter and to evaluate the glass fiber and band-switch situation in each:

1. Check the serial number of the set to determine whether it is within the affected groups AN/WRT-1, Serial No. 1 through 155, and AN/WRT-2, Serial No. 1 through 417.

2. Check the batts of insulating material in both oscillator ovens of the transmitter for the brown (black) neoprene coating.

> Note: If the coated glass fiber batts are found only on the oven top or bottom covers, complete disassembly of the oven will not be required, since these covers can be removed without removing the oven from the drawer. If one or more coated batts are found in the side walls of the oven, the oven will have to be removed from the drawer and completely disassembled.

3. Examine the band switch for evidence of severe corrosion or physical damage resulting from prior cleaning efforts. An effort should be made to clean the band switch with an approved contact cleaner such as Cramolin. If the switch fails to respond to normal cleaning, then replacement of the band switch is indicated. (572)

AN/WRT-1 – REPLACING SOLID COPPER WIRE WITH SILVER RIBBON

It has been reported to the Bureau that the No. 10 solid wire used for interconnection to glass vacuum relays K-3501 and K-3502 in the AN/WRT-1 Coupler CCU-760/WRT-1) places excessive strain on the relay terminals and may cause the glass envelopes to fracture.

This design defect can be corrected by replacing the solid copper wire with silver ribbon. The silver ribbon can be ordered under FSN KZ9545-649-7822, length 19 feet. The 19-foot length will be sufficient for approximately 10 couplers. (648)

AN/WRT-1, AN/WRT-2 – MAINTENANCE HINT

Maintenance personnel are advised that transistor Q502 (2N95), FSN 5961-583-1976, has been superseded by type 2N1323, FSN 9N5961-814-1204.

If Q502 (2N95) fails, it should be replaced with one of the following transistors: 2N1323, 2N1330.

Replacement parts may be procured under the following stock numbers:

Transistor, Type 2N1323, FSN 9N5961-814-1204
Transistor, Type 2N1330, FSN 9N5961-810-9912
Transistor 2N95 is used in:
AN/WRT-1, sets serials 1 through 141
AN/WRT-2, sets serials 1 through 263 (EIB 717)

AN/WRT-1 AND AN/WRT-2 SERIES TRANSMITTERS – MAINTENANCE HINT

The purpose of this article is to inform the maintenance personnel of the correct method for installing the air filter in the AN/WRT-1 and AN/WRT-2 series transmitters. Figure 1 illustrates the correct positioning of the air filter and guide bar before being inserted into the cabinet. The filter should be positioned in the cabinet with the direction of the air flow downward. The guide bar should be inserted below the angle as shown by the arrow marked "A" in figure 1. clean the air filter weekly. (EIB 727)

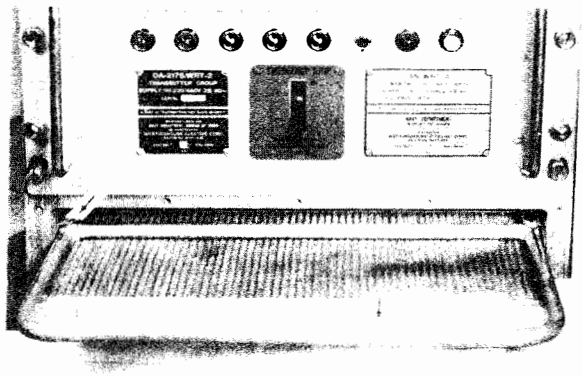


Figure 1. Correct Position of Air Filter and Guide Bar before Insertion in Cabinet.

AN/WRT-1, AN/WRT-2 Tuners - Procurement Information for Nylon Ball used in S-3306 of the Blower Motor

The nylon ball used with the centrifugal switch in the TN-342 and TN-345 blower motor control circuitry is a non-support item and has to be manufactured or procured on open purchase when found to be defective. A replacement ball can be purchased from Winfred M. Berg Inc., 499 Ocean Avenue, Long Island, N. Y. 11518, telephone AC516 599-5010. The part number is PT-1-8 and the cost is fourteen cents each. The nylon ball as delivered does not have a hole in it, but it can be drilled in the shop with a No.52 drill bit. (803)

AN/WRT-1 Radio Transmitting Set--FSK Alignment Procedures

Naval Commands are encouraging Fleet and Shore Activities to utilize medium frequency (MF) (300 to 500 kHz) transmitters for ship/ship and ship/shore narrow shift teletype (FSK) circuits in an attempt to partially eliminate the excessive demand for frequencies in the 2 to 30 MHz high frequency (HF) spectrum.

The AN/WRT-1( ) is the primary shipboard transmitter capable of covering the MF spectrum. The AN/WRT-1( ) possesses several inherent characteristics which limits its operational capability as a FSK transmitter unless the characteristics are understood and dealt with accordingly.

The purpose of this article is to describe improved alignment procedures associated with the FSK circuitry and to discuss methods of improving the operational capability of the transmitter when used in the FSK mode.

The narrow shift FSK communication circuit performs satisfactorily when the distortion at the receiver site is 15 percent or less. The transmitter may contribute significantly to this distortion level unless the following parameters are maintained:

a. Carrier Frequency Error, ±100 Hz
b. Mark Frequency Error, -35 to +50 Hz
c. Space Frequency Error, -35 to +50 Hz

To achieve these tolerances, it is desirable to monitor the frequency each time the operating frequency is changed and readjust as required.

The following instructions describe the method for properly adjusting the carrier frequency and the mark and space frequencies to the tolerances required:

a. Control Settings
   (1) Amplifier Power Supply (AM-2198/WRT-1)
      (a) Filament power switch to "ON"
      (b) Press plate power "ON" button
      (c) Power selector switch to "Tune"
      (d) Emission selector switch to "CW"
   (2) Radio Frequency Oscillator (O-621/WRT-1)
      (a) Wave shaping switch to "400 WPM"
      (b) Set shift dial (E) to "200"
   (3) Tune transmitter to assigned frequency (example frequency 450 kHz) up to but excluding the power amplifier controls.

b. Frequency Accuracy Test:
   (1) Carrier Frequency Adjust:
   Using a frequency counter, check the frequency at J-301 or T-301, terminal 3. If the frequency counter does not read 450 kHz (example frequency), adjust controls "A" and "B" on the electrical frequency control drawer until it is obtained within ±10 Hz.
   (2) Mark Frequency Adjust:
      (a) Turn emission selector switch to "FSK"
      (b) Turn FSK test switch to "Mark"
      (c) Adjust Mark adjust potentiometer R-462 for a reading of 450,100 Hz on the frequency counter.
   (3) Space Frequency Adjust
      (a) Turn FSK test switch to "Space"
      (b) Adjust space adjust potentiometer R-460 for a reading of 449,900 Hz on the frequency counter
      (c) Return FSK switch to "Line"

c. AN/WRT-1 FSK Wave Shaping Adjustment:
(This adjustment is not required during each frequency change, but incorrect setting of R-483 will contribute most to a high distortion level at the receiving station.)
   (1) Test equipment (or equivalent) to be used:
   Oscilloscope - AN/USM-140
   Test Set, Telegraph - AN/UGM-8
   (2) Test Set, Telegraph Setup:

Loop Adjust	Fully counter-clockwise
Loop Bat.	Ext. Neut.
Speed (bauds)	75
Distortion(%)	0
Code	7
Sig. Pattern	Stdy Mark

   (3) Oscilloscope Setup:

Input	AC
Sensitivity	.1 volt/cm
Polarity	+ up
Trigger Source	Internal
Trigger Slope	-(negative)
Sweep Mode	Preset
Sweep Time	5 MS/cm
Sweep Magnified	X2

   (4) Patch the Test Set AN/UGM-8 low Z output to the loop of the AN/WRT-1 with a teletype patch cord and adjust the loop Adjust on the AN/UGM-8 for a reading of 50 ma. on the meter.
   (5) Place the Sig. Pattern switch on the AN/UGM-8 to REVSL

(6) Connect the AN/USM-140 to TB-450 terminal 14 and ground and adjust the scope trigger level control until a stable sweep is present. Adjust the scope horizontal position control so that the beginning of the sweep is at the left edge of the graticule. Refine the trigger level control to display a negative going transition at the beginning of the sweep. Under this condition the first portion of the sweep will display a space signal.

(7) Measure in centimeters the duration of the space signal (such as 3 cm) which represents one space baud.

(8) Set the scope trigger slope to + (positive). Adjust the trigger level control to display a positive going transition at the beginning of the sweep. A mark signal will now be displayed at the beginning of the sweep.

(9) Measure in centimeters the duration of the mark time (such as 2 cm) which represents one mark baud.

(10) Add the durations for Mark and Space times and divide by 2.
Example:

$$\frac{TM + TS}{2} = \frac{2\text{ cm} + 3\text{ cm}}{2} = \frac{5\text{ cm}}{2} = 2.5\text{ cm}$$

(11) With the scope trigger slope set to + (positive) and the trigger level control adjusted to display the positive going transition at the beginning of the sweep, adjust R-483, FSK waveshaping, for a signal of 2.5 cm (example) time duration.

(12) Set the scope trigger slope to - (negative) and adjust the trigger level control to display the negative going transition at the beginning of the sweep. The signal displayed should have a time duration of 2.5 cm (example), if not, a slight re-adjustment of R-483 is necessary and repeat step 10.

(13) Remove all test equipment and tune the transmitter for the assigned operating frequency using operating instructions outlined in the Technical Manual for AN/WRT-1, with the following exceptions:
(a) Set waveshaping switch to "400 WPM"
(b) Set shift dial (E) in accordance with the overall frequency shift as outlined by the ships frequency plan.
(c) Set deviation calibrate for minimum deviation as indicated by meter M-601 on the electrical frequency control drawer while being keyed with a teletype signal. *(820)*

AN/WRT-1( ) Radio Transmitting Sets, Tone Modulated Continuous Wave (MOD CW) Operation—Information Concerning; also Correction to Field Change 10-AN/WRT-1, NAVSHIPS 0967-050-5110

The purpose of this article is to describe the proper operation of the transmitter when adjusted for MOD CW operation (A2 emission), clarify the effect on nomenclature when Field Change 10-AN/WRT-1 is installed, describe the procedure for correctly wiring the transmitter for MOD CW operation and publish a procedure for determining if the transmitter operates in the MOD CW mode as described.

1. OPERATION--The MOD CW mode of emission is intended to adapt the AN/WRT-1 for medium frequency (MF) Aircraft Homing Beacon operation. The transmitters carrier frequency is keyed continuously when the EMISSION SELECTOR switch, S-508, is positioned to MOD CW and the 1000 Hz tone, produced by the tone generator, modulates the carrier with a predetermined code programed on the code wheel of the KY-122/U keyer.

2. NOMENCLATURE--The MOD CW mode was installed in all serial numbered AN/WRT-1A, AN/WRT-1B transmitters by the manufacturers. Installation of Field Change 10-AN/WRT-1 modified all designated serial numbered transmitters for MOD CW operation. Installation of Field Change 10-AN/WRT-1 does not change the nomenclature of the equipment to AN/WRT-1A. A new nameplate was not supplied with the field change kit and the statement under ROUTINE INSTRUCTIONS, paragraph 1 of Field Change Bulletin, NAVSHIPS 0967-050-5110(a), indicating that the nomenclature was changed, is in error.

3. WIRING CHANGES--The originally designed method for keying the tone oscillator was not compatible with the keyline configuration of the shipboard remote system and required a wiring change within the AN/WRT-1( ). Field Change 1-AN/WRT-1A, NAVSHIPS 0967-972-0050, published in EIB 688 and 697, and an errata sheet, NAVSHIPS 0967-050-5111 to the field change bulletin for Field Change 10-AN/WRT-1 contained the wiring change information. Recent ship visits indicate all equipments with the tone generator installed do not have the required

wiring changes. Activities with the tone generator installed should inspect their equipment to see if a jumper is installed between terminals 19 and 26 of TB-501C, located in the Amplifier Power Supply AM-2198( )/WRT-1. If the jumper is not installed, it may be assumed that the wiring change has not been made and the following procedure should be followed:

(a) Remove primary power from the equipment and observe all safety precautions.

(b) Locate and remove the jumper between S-508A-5 and S-508A-3 in the AM-2198( )/WRT-1. The "A" section of S-508 is nearest the front panel.

(c) Connect a jumper between S-508A-1 and S-508A-5.

(d) Connect a jumper between terminals 19 and 26 of TB-501C.

(e) Return equipment to normal operation.

These wiring changes will be reflected in the next permanent change to the technical manual.

4. MOD CW OPERATIONAL TEST

(a) Adjust the transmitter for 500 watts output in the CW mode.

(b) Set emission selector switch to MOD CW.

(c) Adjust DRIVE ADJUST control for 125 watts indication on the RF OUTPUT meter.

(d) Set OUTPUT METER control to RF SET.

(e) Adjust RF SET FOR MOD control until RF OUTPUT meter indicates full scale, RF SET.

(f) Set OUTPUT METER control to % MOD.

(g) Adjust LOCAL/REMOTE switch to REMOTE.

(h) Patch AN/WRT-1( ) to a CW operator position.

(i) Intermittently key the AN/WRT-1( ) from the CW position and verify that the RF OUTPUT meter indicates 90 to 100% modulation.

(j) Return AN/WRT-1( ) to normal operation.

This procedure is being incorporated in the applicable Maintenance Requirement Card (MRC) and will be available in the near future. *(EIB 879)*

AN/WRT-1( ) Radio Transmitting Set, AM-2197/WRT-1 Radio Frequency Amplifier Standoff Insulators—Information Concerning

The purpose of this article is to provide a Federal Stock Number (FSN) and identify a replacement insulator for several insulators not identified by the AN/WRT-1( ) technical manuals or APL.

The standoff insulators are located in the AM-2197/WRT-1, drawer. Two insulators are located on the left rear wall of the Power Amplifier (PA) tube compartment and supports R-839. One insulator is located on the right rear vertical wall of the main chassis and supports one lead of L-813 and the red high voltage lead from the main cable harness. The other two insulators are located in the right side of the PA tube compartment and support the leads from V-805 thru V-808 plate tube clamps. None of these insulators have a FSN or circuit symbol number assigned.

An adequate replacement for these insulators is the insulator used in the Power Supply, PP-2222/WRT and identified by circuit symbol number E-210 thru E-215. The FSN for this insulator is 9G5970-151-8012.

When an activity requisitions a replacement insulator for the ones that support R-839 or the red high voltage lead, they should also requisition a 8-32X 3/8 inch flat head screw using FSN 9Z5305-958-5473.

Technical manual and APL corrections will be accomplished during planned permanent changes. (EIB 885)

AN/WRT-1( ), AN/WRT-2 Radio Transmitting Sets, High Voltage Power Supply PP-2222/WRT, Relays K-201, K-202, K-203, K-204—Maintenance Information Concerning

The purpose of this article is to provide a procedure for modifying the contact arrangement of K-201 so that it may be used in the circuit of K-203. The normal contact arrangement of K-201 is three normally open sets of contacts and one normally closed set, while K-203 has four normally open sets of contacts.

The Defense Electronics Supply Center (DESC), Dayton, Ohio has advised Naval Ship Engineering Center, Norfolk Division (NAVSECNORDIV) that relays K-203, and K-204, FSN 9N5945-708-9690 and K-201, K-202, FSN 9N5945-789-7932 are no longer being manufactured. DESC reports a zero balance for FSN 9N5945-708-9690 and a limited quantity of FSN 9N5945-789-7932.

Reference to the relays circuit symbol number will be limited to K-201 and K-203 for simplification, however, the following information is also applicable to K-202 and K-204.

Activities requiring a replacement for K-203 should use FSN 9N5945-789-7932 and when the relay is received, perform the following modification to the contact assembly:

1. Refer to figure 1, remove screws "A" and "B" that secure the contact assembly to the relay.

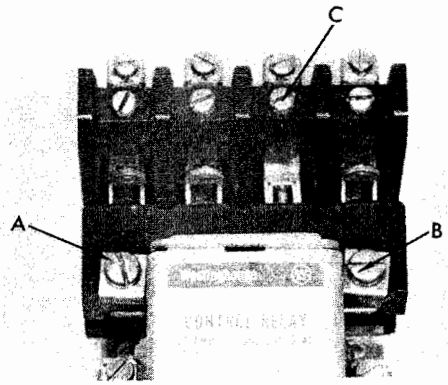


Figure 1. Unmodified Relay

2. Carefully withdraw the assembly. The assembly should appear as shown in figure 2.

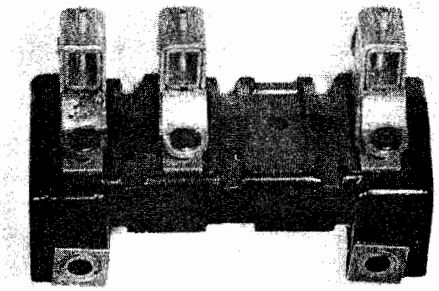


Figure 2. Contact Assembly Unmodified

3. Refer to figure 1, remove screw "C" which retains the forward fixed contact. Remove the contact.

4. Remove screw "D", located on top of relay, not shown in figure 1, which retains the spring loaded contact.

5. Install the spring loaded contact removed in step 4 on the contact assembly removed in step 2. The contact assembly should appear as shown in figure 3.

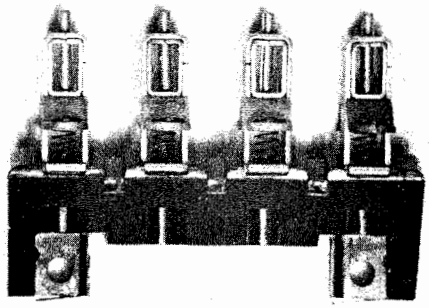


Figure 3. Contact Assembly Modified

6. Reinstall the fixed contact removed in step 3.

7. Carefully reinstall the contact assembly removed in step 2.

Due to the scarcity of relays in the supply system, activities that replace a relay should retain the defective relay for parts. Contacts and the coil are interchangeable between K-201, K-202, K-203, and K-204.

(EIB 887)

PROGRAM TO ELIMINATE BAND-SWITCH CORROSION IN TRANSMITTERS AN/WRT-1 AND AN/WRT-2

See Article in AN/WRT-1 section under the same title.

SHOCK VIBRATION MOUNT INSTALLATION AN/URC-32, AN/WRT-1, AND AN/WRT-2

See article in AN/URC-32 section under the same title.

AN/WRT-2 TRANSMITTING SET; VOICE LEVEL SETTINGS FOR ISB EMISSION

The procedure for setting voice levels of the AN/WRT-2 for ISB emission is given in Technical Manual NAVSHIPS 93319a. This procedure was based on the premise that all voice peaks will be kept within the 1000 watts peak-envelope power rating of the transmitter and the IM distortion will be held to -40db. The level of voice to develop this peak power was determined by the following:

When two or more tones of equal amplitude are combined, the probable distribution of the resultant instantaneous amplitude can be used to calculate a peak factor (PF).

The peak factor (PF) is the ratio of the instantaneous peak voltage to the r.m.s. voltage that is not exceeded some small percentage of the time. A commonly used percentage is .003 percent.

The PF for a two-tone signal is 2/1 or 6 db.

The equivalent PF for voice, although not as well defined, is generally conceded to be 16 to 20 db.

The average power output for voice transmission under these conditions would be 50 to 80 watts but the peak power would reach the 1000 watt rating of the transmitter and the -40db limit on distortion would be maintained.

Under certain operating conditions, it may be very desirable to use an average power output on voice (ISB) transmissions from 4 to 6 (110 to 300 watts average) higher than obtained with the above procedure. This would generally be true in any situation in which the radiated power is more important than adjacent channel interference. For example, if the AN/WRT-2 were being used on a single voice channel (ISB Emission) to make a long distance contact, it would be desirable to operate at the higher average power. However, in a situation in which there is a voice channel on each sideband on a medium distance contact, it may be desirable to operate with the lower average power to minimize adjacent channel interference.

Setting the voice levels 4 to 6 db higher than the "voice" mark on the modulation level meter causes the following conditions in the transmitter:

1. The PEP increases slightly to approximately 1100 watts. Peaks above this level are flattened because of grid current in the final tubes.
2. The average power increases 4 to 6 db.
3. The intermodulation distortion increases. Measurements are difficult to make on voice transmissions, but, on similar tests on two-tone signals, the distortion products (3rd order) increase from -40 db to -20 db.
4. There is no discernible audio distortion in the received signal.

Since the PEP only rises slightly, it is safe to operate the transmitter and antenna tuner under these conditions.

In cases of extreme need, the average power on voice (ISB emission) could be increased to 500 watts average power. Intermodulation distortion will again be increased but there will be no discernible increase in audio distortion. In some cases, the maximum average power may be limited by the maximum audio that is available.

AN/WRT-2 RADIO TRANSMITTING SET—REPLACEMENT OF 1 MC OSCILLATORS IN ELECTRICAL FREQUENCY CONTROL C-2764/WRT-2

Confusion has arisen on several occasions in the field when it has been necessary to replace one or more units of the Electrical Frequency Control C-2764/WRT-2. This confusion stems from the fact that there have been two types of 1-mc oscillators used in this transmitter.

The oscillator used in sets carrying serial numbers 1 through 294 consists of three units: E1304, 1-mc oscillator board; Z1301, proportional oven; and Z1302, oven control unit. This oscillator is known as the "Manson Oscillator." Any one of these three units is replaced independently.

NOTE

When replacing either E1304 or Z1301, it may be necessary to change the value of C11316 in parallel with the log dial trimmer capacitor to the next higher or next lower standard capacitor size in order to pull the the oscillator to exactly 1-mc.

The oscillator used in sets carrying serial numbers 295 and up consists of three units: E1304 Alt. A., 1-mc oscillator board; Z1301 Alt. A., proportional oven; and Z1302 Alt. A., oven control unit. This oscillator is known as the "Reeves-Hoffman Oscillator." The 1-mc oscillator board, E1304 Alt. A., may be replaced independently. The proportional oven, Z1301 Alt. A., and oven control unit, Z1302 ALT, A., are manufactured as a matched set and should be replaced in pairs when either one fails. In the process of manufacturing, these units are adjusted in matched sets to obtain maximum frequency stability versus temperature. Therefore, if they were not replaced in pairs, the stability of the 1-mc. oscillator would suffer.

NOTE

It is not possible to interchange units of the two sytles of 1-mc oscillators.

To assist those in the field in obtaining the correct replacement unit when servicing this portion of the AN/WRT-2, the listings are included to provide symbol designation, Westinghouse Drawing Number, Federal Stock Number, and description for both styles of oscillators.

Old Style 1-MC Oscillator (Manson OSC) Used in Sets, SN 1 through 294

Symbol	Description	Mfgr.	Westinghouse Drawing No.	FSN
E1304	1-mc board	Westinghouse	336C762G01	1N5820-701-0070
Z1301	Proportional Oven	Manson	152A919H01	1N5820-715-4032
Z1302	Oven Control Unit	Manson	152A919H02	1N5820-668-3419

New Style 1-MC Oscillator (Reeves-Hoffman) Used in Sets, SN 295 and up

Symbol	Description	Mfgr.	Westinghouse Drawing No.	FSN
Z1301 Alt. A.	Proportional Oven	Reeves Hoffman	378A349H01	*N5955-446-0069
Alt. A.				
E1304	1-mc board	Reeves Hoffman	378A349H03	1N5820-856-0534
Z1302 Alt. A.	Oven Control Unit	Reeves Hoffman	378A349H02	*N5955-446-6572
A1301	Matched Set (Proportional Oven and Oven Control Unit)	Reeves Hoffman	378A349G01	1N5820-855-9412

* These Federal Stock Numbers were originally assigned to the individual units but they are stocked only as matched sets under FSN 1N5820-855-9412.

AN/WRT-2 RADIO TRANSMITTER – HIGH VOLTAGE GROUNDING CIRCUITS

This article discusses a little known but very important part of the AN/WRT-2 Transmitter—the high voltage grounding circuits.

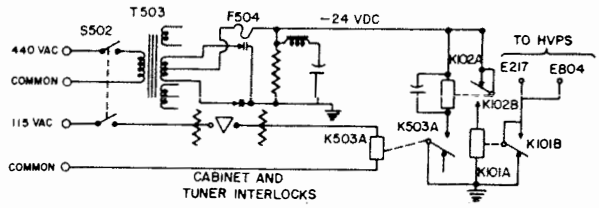
Two circuits are provided for high-voltage grounding in this transmitter. The first is a mechanical shorting bar which grounds the high-voltage supply whenever the Power Supply (PP-2222/WRT) drawer is withdrawn from the cabinet. This shorting bar is shown schematically on the high-voltage power supply schematic, Figure 6-29 (Change 3) in NAVSHIPS 93319(A).

> CAUTION: The "Plate Power On" button should not be energized while the power supply drawer is withdrawn from the cabinet. Any attempt to do so will result in blowing two or more of the main fuses F201, F202, or F203.

The second high voltage grounding circuit consists of relays of K101 and K102. These relays are mounted on the rear wall of the Electrical Equipment Cabinet (CY-2558/WRT-2) and are shown only on the cabinet wiring diagram; Figure 6-47 (Change 1). This wiring diagram is seldom used in shipboard maintenance. It is possible that personnel who are not thoroughly familiar with the AN/WRT-2 may not be aware of the existence of K101 and K102 or of their intended function.

A simplified schematic of this high voltage grounding circuit is shown in Figure 1.

Figure 1



It can be seen from Figure 1 that, upon start up, relay K503A is energized from 115 VAC through the Equipment Cabinet and Tuner interlocks. Contact K503B then closes to energize K102A from the -24-volt power supply. The normally open contact of K102B then is closed, completing the circuit from -24 volts through K101A coil to ground. When K101A is energized, one of the normally closed contacts on this relay removes the ground from the high-voltage lead which runs between E217 in the Power Supply drawer and E804 in the Radio Frequency Amplifier drawer through the cabinet harness.

If any drawer is withdrawn from the Equipment Cabinet, or if the Filament Power switch is turned off, K503 is de-energized, which in turn de-energizes K102. Capacitor C102, across the coil of K102, provides a sufficient amount of time delay to prevent the operation of K101 (the high

voltage grounding relay) until the high voltage power contactors in the high voltage power supply have dropped out. This prevents the application of the short on the cabinet high voltage lead before power is removed from the high voltage power supply.

Note that relays K101 and K102 are operated from the -24-volt supply. The loss of this supply voltage either from failure of F504 (-24-volt control fuse) or any other reason will result in the cabinet **high voltage bus being grounded continuously.** This could lead to an erroneous conclusion that the high voltage lead in the cabinet harness had arced or otherwise acquired an **Unwanted ground.** Again, any attempt to energize the high-voltage power supply with the transmitter in this condition will result in blowing two or more of the main-line fuses F201, F202, or F203.

On AN/WRT-2 Transmitters, Serial 1 through 263 an indicating type fuse is used at F504. It is important that exact replacement fuses be used and that they be installed in the fuseholder properly (red plunger visible through the clear plastic cap). On AN/WRT-2, serials B1 through B151 and serials C1 through C458, a fuseholder with a built-in neon indicator lamp is used. These indicators should largely eliminate the possibility of overlooking a blown F504 fuse. (656)

AN/WRT-2 RF TUNERS-RECOMMENDED PROCEDURE FOR MAINTENANCE OF BLOWER MOTORS IN "C" SERIES

Unreliable bearings were furnished with the "C" series TN-342/WRT-2 blower motors, B3302. It is recommended that, upon failure, these blower motors be replaced rather than repaired.

Reports received from Forces Afloat during the past year indicated an excessively high failure rate of the TN-342/WRT-2 blower motor, B3302.

A statistical analysis of these failures and physical examination of many of the failed motors showed conclusively that the failures were predominant in the RF tuners serially numbered C1 through C458. The blower motor in the "C" series production run shows a Mean Time Between Failure (MTBF) of 11,374 hours vice the 150,000 to 200,000 hours required for this type of application.

The primary cause of failure in the "C" series production run is attributed to a less reliable bearing than was used in previous runs. A negligible number of B3302 failures have occurred in those TN-342 RF tuners manufactured prior to the C1-C458 series.

The smaller type bearings installed in the "C" series blower motors can be identified by the dimensions, 5/8" diameter x 3/16" thickness. The bearing in the previous production series are 3/4" diameter x 1/4" thickness.

For increased equipment reliability and long range economy, the Naval Ship Engineering Center, Norfolk Division (NAVSECNORDIV) recommends that defective blower motors B3302 in the "C" series RF tuners be replaced with item FSN 9G4140-709-0762. These replacement motors are furnished with the larger, more reliable bearings. Replacement of the smaller bearings in the "C" series B3302's should not be effected unless dictated by the exigencies of operations.

AN/WRT-1, AN/WRT-2-MAINTENANCE HINT

See article under AN/WRT-1 with the same title (EIB 717)

AN/WRT-1 AND AN/WRT-2 SERIES TRANSMITTERS-MAINTENANCE HINT

See article under AN/WRT-1 with the same title (EIB 727)

AN/WRT-2 TRANSMITTER-TONE MULTIPLEXING

Whenever the AN/WRT-2 transmitter is modulated with tone multiplex equipment, such as the AN/UCC-1, care must be exercised to insure that the transmitter peak envelope power rating is not exceeded. If the peak envelope power rating is exceeded in multitone operation, the level of the intermodulation distortion will become excessive and result in a deterioration of radiated signal.

The peak envelope power rating of the AN/WRT-2 is 1 KW, but its average power rating is 500 watts. It must be noted that the output power meter on the AN/WRT-2 indicates **average** power and not peak envelope power.

With multitone modulation, the average power output will be much less than the peak envelope power; for example, with two tone modulation, the average power output will be equal to one half the peak envelope power. To understand this, one must realize the difference between average and peak envelope power.

Peak envelope power is defined as the rms power developed at the crest of the modulation envelope when the transmitter is modulated with multiple audio frequencies.

If an SSB transmitter is modulated with two audio tones of equal amplitude, and an oscilloscope is connected to the output load, lets say a 50-ohm resistive load, a two tone test pattern may be observed. (See figure 1.) The peak envelope power of this transmitter may be computed by measuring the rms voltage (.707 of peak), squaring this value, and Dividing it by the 50-ohm resistance ($P=E^2/R$).

A transmitter must divide its power among the tones modulating it. The accompanying spectrum diagrams will clarify this and also illustrate the difference between average and peak envelope power. To calculate the average power of the transmitter or the average power per tone for n number of tones input, the following formulas may be used:

$$\text{Avg. Pwr} = \frac{\text{PEP}}{n}; \quad \text{Pwr per Tone} = \frac{\text{PEP}}{n^2}$$

Refer to figure 2. Assume that a transmitter is modulated with two tones of equal amplitude and its output is terminated into a resistive load of 50 ohms. The voltage in each output frequency is measured and found to be 112 volts rms. (See figure 2a.) Squaring the voltage in each output frequency and dividing that by 50 reveals the power in each output frequency to be 250 watts. The sum of these two is 500 watts, which is the average output power of the transmitter. When these two output frequencies fall in

phase with each other, the crest of the modulation envelope is reached and the voltages add to 224 volts. Square 224 and divide by 50 to obtain the PEP of 1 KW. (See figure 2c.) From this illustration, we see that average power is equal to one half PEP with tone modulation. Make the same comparison with 4, 8, and 16 tone modulation. (Study figures 3, 4, and 5).

In figure 5, we see that a transmitter modulated with sixteen tones would have a theoretical average power output of only 64 watts with peak envelope power output of 1 KW. In practice however, it has been found that this theoretical average limit can be exceeded by approximately twice this value without realizing an appreciable amount of distortion.

Over driving a linear amplifier generates intermodulation distortion. These distortion products result from harmonics of the desired frequencies mixing with fundamentals and other harmonics, as illustrated in figure 6. The power usurped by these undersirable products is taken from the desired intelligence frequencies and decreases the effective radiated intelligence. Figure 6 illustrates the output spectrum of an SSB transmitter at 2 MHz. The USB is modulated with audio tones of 2000 and 2500 Hertz. Intermodulation products are marked.

When tuning the power amplifier, AM-2121/WRT-2, the operator should pay particular attention to the PA screen current meter to insure that the PA screen current is zero or negative. Positive screen current indicates non-linear operation which results in distortion. These distortion products will increase when tones are applied.

When using the AN/WRT-2 in conjunction with the AN/UCC-1 or other tone multiplex equipment, it is recommended that the transmitter be tuned in the prescribed manner for CW operation and then switched to the ISB mode of operation with carrier completely suppressed. Set DRIVE ADJUST control on RFA to "0", adjust the appropriate MOD LEVEL AMP control to "6", and use the associated INPUT LEVEL AMP control to set the VU level meter to the number of tones being used. If 16 channels are used, there will be 16 tones modulating the transmitter and the INPUT LEVEL AMP control should be set for a reading of 16 on the VU meter.

NOTE

If the channels are being keyed, a variation or fluctuation may be noted in the audio level.

If the audio signal fluctuates, set the center of the fluctuation to the 16 tone mark. Key the transmitter and adjust the DRIVE ADJUST control on the RFA for a power output indication of between 64 and 125 watts. (64 watts is the theoretical average power output limit for 16 tone modulation and 125 is the practical average power output level that should be used for 16 tone modulation.) If the output power fluctuates, set the DRIVE ADJUST control so that the center of fluctuations occur at the selected average power output limit.

Tone channels applied to the transmitter should contain intelligence; idle tone channels must be turned off. This practice will ensure that the transmitter power will be distributed to each intelligence frequency. Transmitter output power should never exceed the level required to maintain communication. Excessive power levels will damage components in the AM-2121/WRT.

Refer to Table I for average power limits when using multiple tone modulation.

Table I. Average Power Output Limits for Multiple Tones

Number of Modulating Tones	Max. Averate Output Power (Read on M805)
2	500
4	250
8	125-175
16	64-100

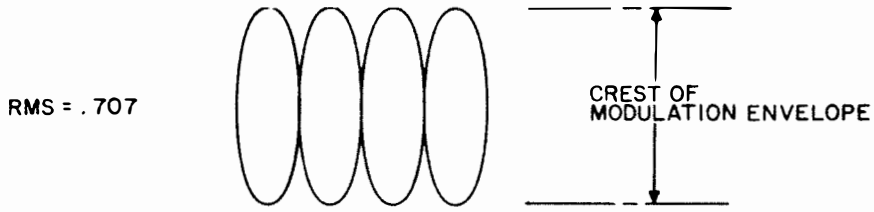


Figure 1. Two-Tone Test Pattern

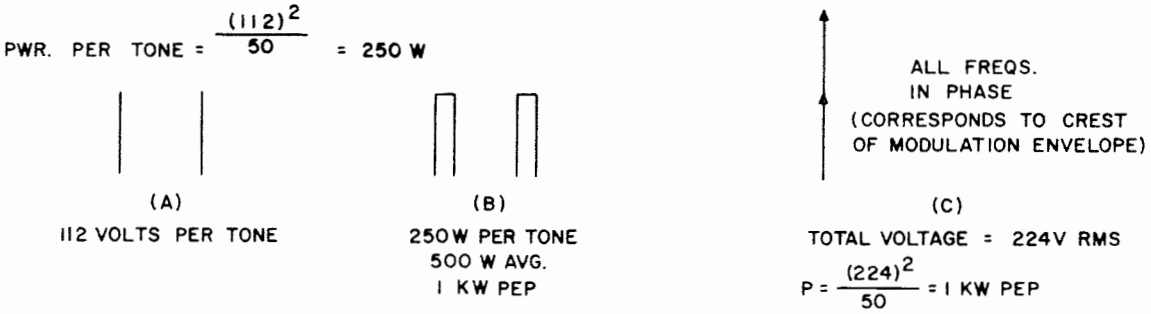


Figure 2. Calculating Average Power and Peak Envelope Power for Two-Tone Modulation

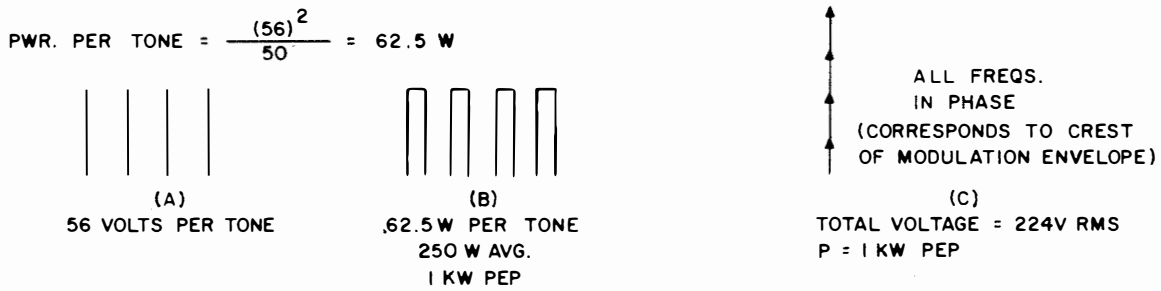


Figure 3. Calculating Average Power and Peak Envelope Power for Four-Tone Modulation

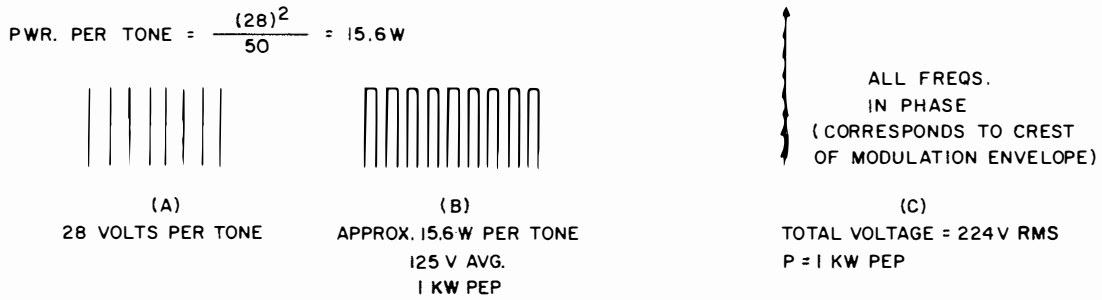


Figure 4. Calculating Average Power and Peak Envelope Power for Eight-Tone Modulation

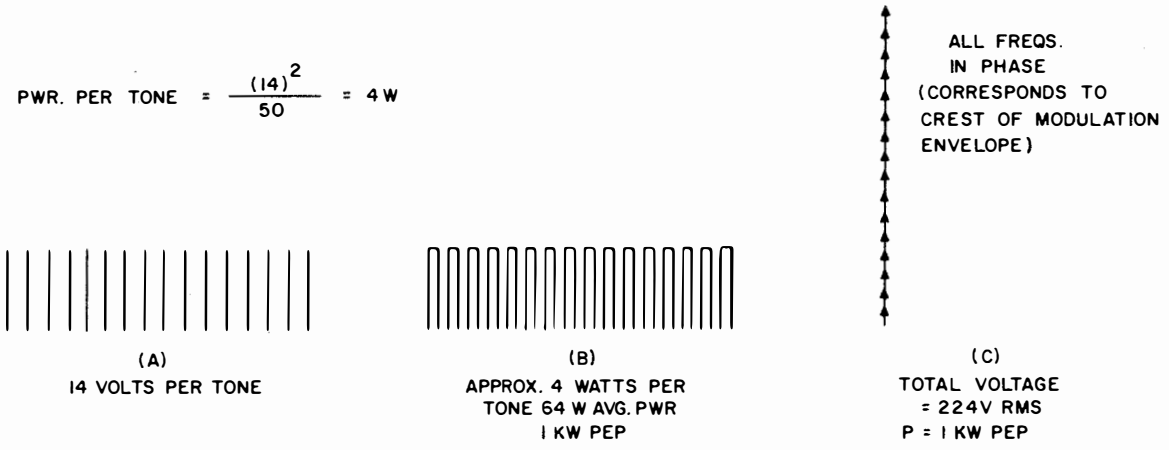
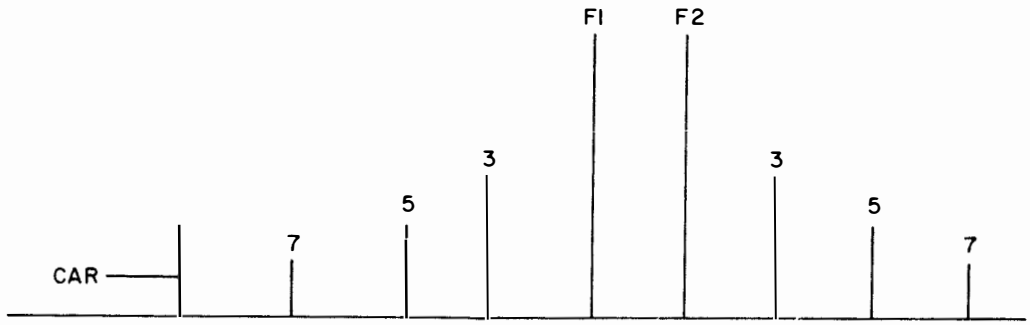


Figure 5. Calculating Average Power and Peak Envelope Power for 16-Tone Modulation



3RD ORDER = 2F1 - F2 = 4.004 - 2.0025 = 2.0015 MHZ
5TH ORDER = 3F1 - 2F2 = 6.006 - 4.005 = 2.001 MHZ
7TH ORDER = 4F1 - 3F2 = 8.008 - 6.0075 = 2.005 MHZ

ALSO:
3RD ORDER = 2F2 - F1
5TH ORDER = 3F2 - 2F1
7TH ORDER = 4F2 - 3F1

Figure 6. Output Spectrum of an SSB Transmitter at 2 MHz

AN/WRT-2, AN/URC-32, AN/URC-35, AN/WRC-1, AN/URT-23—THE CARE AND FEEDING OF SSB TRANSMITTERS

The introduction of single sideband to the fleet has brought out a new generation of transmitter equipment. Examples of this equipment are AN/WRT-2, AN/URC-32, AN/URC-35, AN/WRC-1, and AN/URT-23. Single sideband transmitters use what is termed a linear amplifier for developing power vice the Class "C" amplifiers which were common to older equipment. The linear amplifier is what places a special requirement on "Care and Feeding" of SSB transmitters.

Linear power generating devices are limited by their peak power handling capability. The average undistorted power output of a single sideband transmitter is limited by the type of signal that it is amplifying and by characteristics of the antenna with which it is being used. In technical terms, it is limited by the peak-to-average power ratio of the modulation envelope and by the voltage standing wave ratio of the antenna. The transmitter is physically capable of putting out up to one half the peak power for which it is rated, based on its heat dissipation capabilities. Old transmitters that we had in the Navy used what are called Class "C" amplifiers and were limited in power output by how well an operator could "tweak" them up. If you try "tweaking" a single sideband transmitter to get maximum indicated power output, you get some disconcerting results.

Let us observe what happens to the transmitter output when modulated by a multiplex teletype signal. If a single sideband transmitter is modulated the to the limit of its peak power capability, the signal will be at least 35 decibels over the noise that the transmitter is also generating. This condition corresponds to the transmitter putting out about 120 watts of average power. If the transmitter output is doubled, the signal spectrum power is increased by 3 decibels. The noise power is increased by 25 decibels or by a power ratio of 32. When the transmitter power output is increased to its maximum capability of 320 watts, we have a situation where the noise power again is increased by an additional factor of about 32 and there is no noticeable change in the power of the signal.

This increase of noise output means that the transmitter is not putting out a narrow signal of 3 khz with some small additional noise within 10 khz of the assigned frequency. The transmitter is now putting out significant noise within hundreds of kilohertz of the assigned frequency. That transmitter also putting out very large signals at its harmonics. If several transmitters are being keyed simultaneously, then intermodulation products are showing up as large signals throughout the spectrum and the ship no longer has a chance of receiving anything but a strong signal.

The same considerations apply to voice circuits as to multiplex teletype circuits because the transmitter sees the same peak to average power ratios with multiplex teletype signals as with voice signals. During BASE LINE II, it was the rule and not the exception that voice transmissions were distorted to various degrees by over-modulation. This was more so the case when single sideband transmitters were used in the amplitude modulation mode than it was when they were used in single sideband modulation mode. Thirty percent of the stations on one BASE LINE II amplitude modulation net were overmodulating to the point where their voice quality was seriously degraded. Nearly all the transmitters on this net were identified as SSB type by the characteristic absence of one sideband on the spectrum analyzer display.

What effect does overmodulation have on the performance of voice circuits in the fleet? You can bet, with an almost perfect degree of accuracy, that, when you hear a transmitter on a voice circuit that sounds like the operator is speaking with a mouthful of mush, the sound is because of overmodulation and not because the operator in fact has a mouthful mush. The overmodulation can be due to many causes; the main one is the inability of the transmitter to compensate for differences in voice levels arriving at the transmitters because of differences in voice handsets or speech levels used by operators.

Now that we have hung black crepe on all single sideband equipment we should confirm the obvious; and that is, despite the problems involved in the "care and feeding" of single sideband equipment, the performance of single sideband circuits is much better than amplitude modulated voice circuits. The reasons are Many: first, there is a definite power advantage; second, the problem of feedback squeels is virtually eliminated; third, single sideband voice must be within narrow frequency tolerance to be useable and therefore the receivers can be built with superior noise eliminating features; and fourth, if somebody accidentally keys a single sideband transmitter, there is no carrier frequency transmitted that would disrupt the entire net.

When you are using an AN/WRT-2 transmitter, the following should be consider to be the MAXIMUM power capabilities of the transmitter as indicated by the power output meter:

CW—500 watts
FSK—400 watts
SSB Voice—500 watts
AM Phone—300 watts
16 Channel Multiplex—140 watts
8 Channel Multiplex—180 watts

For AN/URC-32 transmitters, the maximum power output is somewhere around one-half of those listed in the previous paragraph. In virtually all cases, the tuning procedure in the Technical Manual should be followed and the previously specified limits used as a check. Because of the VSWR of the antenna and aging of transmitter output tubes, however, the correct tuning procedures may result in substantially less power output than those previously stated. (734)

Field Change 17-AN/WRT-2, NAVSHIPS 0967-073-3180—Installation Note Concerning TN-342/WRT-2 Coil Form

The following installation information was submitted by the Puget Sound Naval Shipyard, BREM.

A limited number of field change kits have been shipped with an excessive length of wire extending from the stop ball inside the L3302 coil form. When RF power is applied to the coil it creates an arc from the excess wire to the RF cable that is clamped to the center board mounted in the coil from. Personnel installing this field change are directed to inspect the coil and cut off excess wire flush with the stop ball and smooth with a fine file or sandpaper. (749)

AN/WRT-2 Radio Transmitting Set—Troubleshooting Hint

The purpose of this article is to simplify troubleshooting the 10:1 frequency divider circuit in the Electrical Frequency Control C-2764/WRT-2.

Most technicians find troubleshooting the 10:1 frequency divider very difficult. This circuit is composed of two circuit boards (E 1301 and E 1303). These boards each contain two transistor multivibrator circuits. In addition, the E 1301 board has a transistorized 100 Khz amplifier circuit.

The difficultly in troubleshooting the circuit board is caused by the feedback loops in the counter circuits that are necessary to make the divider count 10:1 instead of 16:1 that would normally be obtained from a four stage binary divider. The problem with this feedback arrangement is that a casualty in any of the last three stages (the feedback counter, Q 1315 and Q 1316; Binary No. 2, Q 1307 and Q 1308; or Binary No. 3, Q 1313 and Q 1314) will generally lock up all three stages and produce no output. In other words, all three stages have to be working properly to get any single stage to produce an output. It is very easy to remove the feedback loops making it possible to troubleshoot each stage independently of the other stages.

To remove the feedback loops, unsolder the wires connected to terminals 1 and 2 on circuit board E 1301. Install a jumper from terminal 1 to 5 on the same board. This will cause the divider to be wired as shown in figure 1.

Using a 10:1 oscilloscope probe, the collectors of each transistor may then be viewed on an oscilloscope. The waveform should be a square wave of 6 to 8 volts amplitude at the frequency as shown on the diagram. Any stage that has an input and does not have an output is defective and conventional voltage and resistance checks should be made on that stage. After repairing the faulty circuit, the E 1301 circuit board should have the jumper from terminals 1 to 5 removed and the previously unsoldered wires should be resoldered to terminals 1 and 2. E 1301 terminal 10 should now be checked to insure that the output of the 10:1 divider is a 100 Khz sine wave with a minimum amplitude of 22 VPP.

A note of caution, when troubleshooting the 10:1 divider, the following may save the technician from extra work. Always use a 10:1 oscilloscope probe so that transistors will not be damaged by circuit loading. Be very careful that the probe doesn't slip and short something out when taking measurements in close quarters. Use a small pencil type soldering iron when repairing circuit boards. If a high wattage soldering iron must be adapted for circuit board repairs, refer to NAVSHIPS 0967-000-0160, General Handbook, page 6-45 and insure that the tip of the soldering iron is grounded. (784)

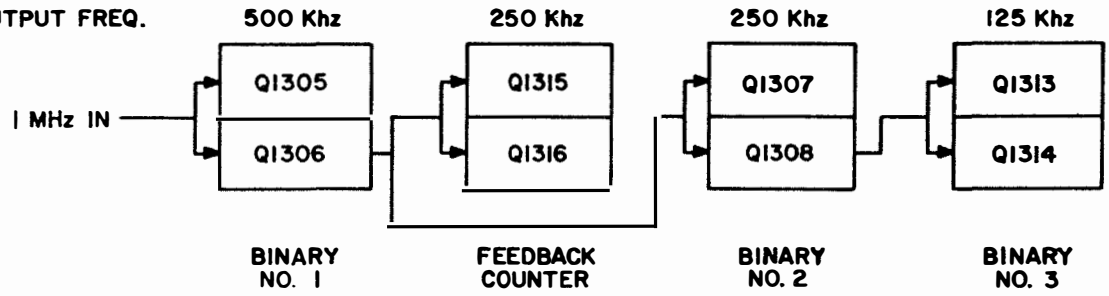


Figure 1. Divider Wiring Diagram.

AN/WRT-2 Radio Frequency Transformers–Repair of

The purpose of this article is to inform technicians of a method of repairing broken adjustment shafts on tunable R.F. Transformers T-1205 through T-1215 in the O-581/WRT-2 drawer of the AN/WRT-2.

If the slot in the end of the shaft is broken off, there is no means of adjustment except by using pliers which will destroy the threads on the shaft, render the transformer useless and require replacement.

The shaft may be repaired by soldering a 4-40, quarter inch (.25) brass nut to the broken end of the shaft. This may be done without removal of any transformer from the circuit.(787)

AN/WRT-1, AN/WRT-2 RF Tuners – Procurement Information for Nylon Ball used in S-3306 of the Blower Motor.

See Article under AN/WRT-1 with same title. (EIB 805)

AN/WRT-2 Radio Transmitter–Maintenance Hint

The purpose of this article is to inform technicians of a method to eliminate the possibility of heat damage to the wiring routed along the side of R-218 in the Power Supply PP-2222/WRT.

The current flow through resistor R-218 (10 ohm 25 watt potentiometer) causes enough heat dissipation to damage the insulation on the wiring from relay K-203 which is routed between R-218 and K-203.

This problem may be eliminated by re-routing the affected wiring to the front of relay K-203 and tie in place with lacing cord. *(805)*

AN/WRT( ), AN/WRT-2 Radio Transmitting Sets, High Voltage Power Supply PP-2222/WRT, Relays K-201, K-202, K-203, K-204–Maintenance Information Concerning

See article in AN/WRT-1 section under the same title. (EIB 887)

AN/WRT-2 Radio Transmitting Set, Transformer T-1206–Information Concerning

Two different physical shapes of transformer T-1206 were used during the production of the AN/WRT-2. Serial numbered equipments 1 thru 444 contain a cylindrical shaped transformer while all other serial numbered equipments contain a square shaped transformer.

The cylindrical shaped transformer is identified by Westinghouse part number 223B057-1-1. The square shaped transformer is identified by Westinghouse part number 377A709H01 or Cosmos Industries, Inc. part number 279B4599. (EIB 885)

AN/WSC-3 Minimum Output Problem

This article is applicable only to single AN/WSC-3 installations that are unable to reduce effective isotropic radiated power (EIRP) below 13 dBW. The purpose of this article is to identify a problem in minimum power output from the RT-1107/WSC-3 and to provide the recommended corrective action to compensate for this situation.

The problem arises during SATCOM operation with GAPSAT where EIRP must be maintained at 13 dBW or below for proper power balancing of the satellite system. Due to antenna system gain, required transmitter output level may be below the adjustable range of the unit. This problem is not present in multiple AN/WSC-3 installations and in ships where inherent losses in the antenna systems will allow the AN/WSC-3 to operate at a higher output level. This problem will also not be present during FLTSAT operation which requires a higher transmitter output level.

For those ships that have this problem, insertion of approximately 6 dB of attenuation into the transmit line will allow for the transmitter to operate at a higher level. This can be achieved by use of a high power UHF in-line attenuator (NARDA Model 766-6 or equivalent). If an attenuator is not available aboard ship, it is recommended that a fixed length of RG-58A/U, RG-58B/U, or RG-58C/U coaxial cable be used in accordance with the following:

Cable Type	Approximate Loss Per 100 ft at 300 MHz	Length Required
RG-58/U or RG-58B/U	9.6 dB	63 ft
RG-58A/U or RG-58C/U	11.5 dB	52 ft

The connectors required for one cable are UG-536B/U, N Type male, quantity 2; or UG-88B/U, BNC Type male, quantity 2 with UG-201B/U, N to BNC adaptor, quantity 2. Stock number and costs are listed below:

Connector Type	NSN	Cost
UG-536B/U	9N 5935-00-660-4296	$1.06
UG-29B/U	9N 5935-00-643-9875	1.14
UG-88B/U	9N 5935-00-823-0487	0.36

So that line of sight (LOS) operation is not affected, this attenuation must be placed in the SA-2000 or SA-2000A antenna switching unit of the OE-82B/WSC-1 or OE-82C/WSC-1 antenna in the transmit line (cable No. W8).

To install attenuator cable, remove cover plate to the antenna switching unit. Disconnect W8 and replace with neatly coiled and ty-wrapped length of attenuator cable. Replace cover plate. After installation, power calibration should be conducted in coordination with the area NAVCAMS.

The replaced W-8 cable shall be retained and secured inside the switching unit for reinstallation when the attenuation is removed for full FLTSAT operation. During the overlap period where GAPSAT and FLTSAT are both operational, computation for minimum FLTSAT EIRP as promulgated in NTP-2, Section IIB should include allowance for this attenuation in the line. (EIB 964/970)

AN/WSC-3 Minimum Output Problem—Correction to EIB 964

This article provides information to revise the subject article published in EIB 964.

Refer to EIB 964, dated 12 December 1977, page 3, and make the following revisions to the article entitled "AN/WSC-3 Minimum Output Problem."

1. Third paragraph, last sentence: Insert "RG-142B/U," before "RG-58A/U,".

2. Add the following in the first table: "RG-142B/U" under Cable Type, "7.0 dB" under Approximate Loss, "85 ft" under Length Required.

3. Add the following information: "Cable type RG-142B/U cable is preferred; however, RG-58A/U, RG-58B/U or RG-58C/U will be acceptable provided that the power output meter on the AN/WSC-3 indicates less than 17 dBW (50 watts). The approximate EIRP should be the wattmeter reading plus (5) dB."

Record this action adjacent to the pen and ink corrections by inserting this EIB number (970).

AN/WSC-3 Satellite Communication Set—Module Damage Assessment

This article describes mechanical damage which has been found on "whiskey three" Power Supply and Transmitter MODULES received at the repair depot. Mounting ears are bent down at crazy angles for no apparent reason (see Figure 1). Packing containers show no signs of mishandling and packaging methods appear to be sufficient to protect the MODULES in transit. Most damage can be corrected with minimum cost, but, some damage is so severe that the entire case must be replaced. Severe damage has a

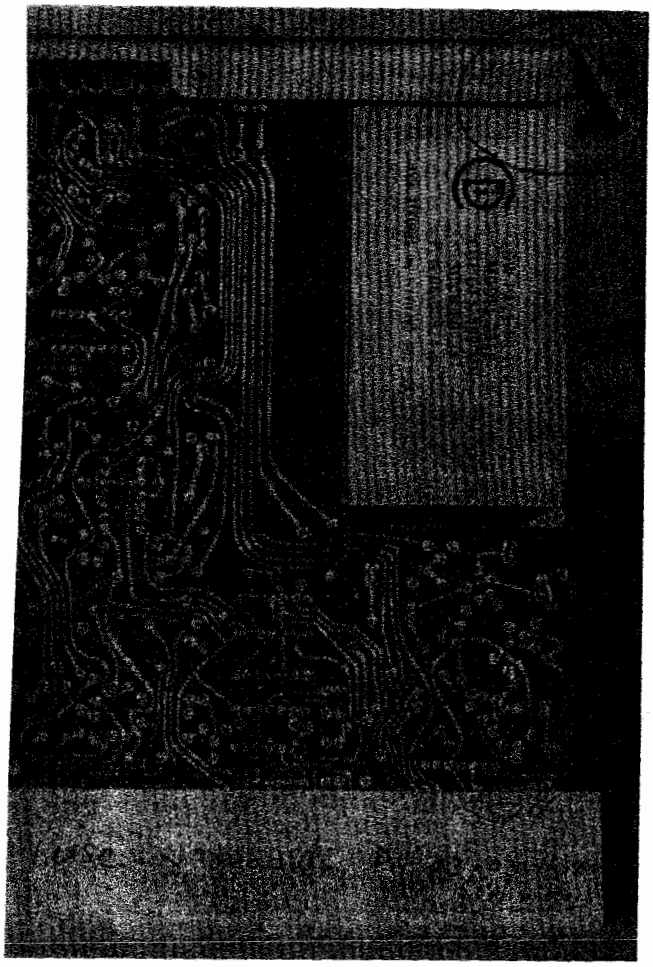


Figure 1. AN/WSC-3 Module PN 03-03246-001.

high cost impact in labor charges because of many solder connections.

Fleet users of the "whiskey three" are requested to be on the alert for any conditions which could cause such damage and to advise the NAVELEX FLTSATCOM ILS Manager of any recommendations to keep this from happening. All formal or informal correspondence should be addressed to: Department of the Navy, Naval Electronic Systems Command, Washington, D.C. 20360, Attn: PME 106-1BL. All ideas are welcome.

(EIB 976)

Proper Storage and Packaging of Modules for AN/WSC-3

1. A substantial number of defective modules, which show evidence of physical damage due to improper storage or packaging, have been returned to the factory repair depot for repair. Examples of the damage are bent castings, cracked printed circuit boards, and other types of damage that would not have occurred if the spare modules had been retained in the plastic bubble wrap bags inside the cardboard boxes as shipped from the factory.

2. CAUTION - Do not remove the spare modules from the plastic bags and boxes until they are needed for replacement in the AN/WSC-3. When defective modules are to be sent to the depot for repair, they should be shipped in the packaging and packing material received with the module or equivalently cushioned boxes, not envelopes. These modules are expensive and typically cost over $1,000 each.

3. The modules, packed in plastic bags and cardboard boxes, should be stowed in an area that is protected from the weather and salt spray. Even though the modules have a corrosion-resistant finish, extended exposure to salt spray will result in corrosion.

4. The modules should not be removed from the plastic bags and cardboard boxes and placed in bins for stowage. If the unprotected modules are stowed in bins, damage and misalignment can result.

5. This notice is being published because of the high monetary value of AN/WSC-3 modules and the requirement for high operational availability for satellite communications.

(EIB 982)