AN/URC-32 – USE OF COUPLER-MONITOR CU-737/URC ACCESSORY

The Coupler-Monitor CU-737/URC (Collins model 180U-2), as accessory for Radio Set AN/URC-32 was initially procured for submarine use. This unit primarily provides circuitry for transmission line impedance matching, a monitor speaker, an RF wattmeter and is provided for use with submarine antenna tuning systems such as the AN/BRA-3 and AN/BRA-5.

There have been requirements for the AN/URC-32 to operate with transmitting antenna multicouplers and the Antenna Coupler AN/SRA-22 on surface ships.

Figure 1 provides the typical system interconnection for this purpose. The control unit for the AN/SRA-22 shall be installed in the AN/URC-32 rack in the space provided and the CU-737/URC shall be located close to the AN/URC-32 for convenience in tuning. Figure 2 indicates the preferred method of mounting, if space permits.

Since the CU-737/URC was not originally intended to perform this system function, the equipment modifications as noted on Figure 1 notes must be accomplished. When the AN/SRA-22, CU-737/URC system is used, it is preferable to provide a separate receiving antenna to the AN/URC-32 receiver antenna input. (518)

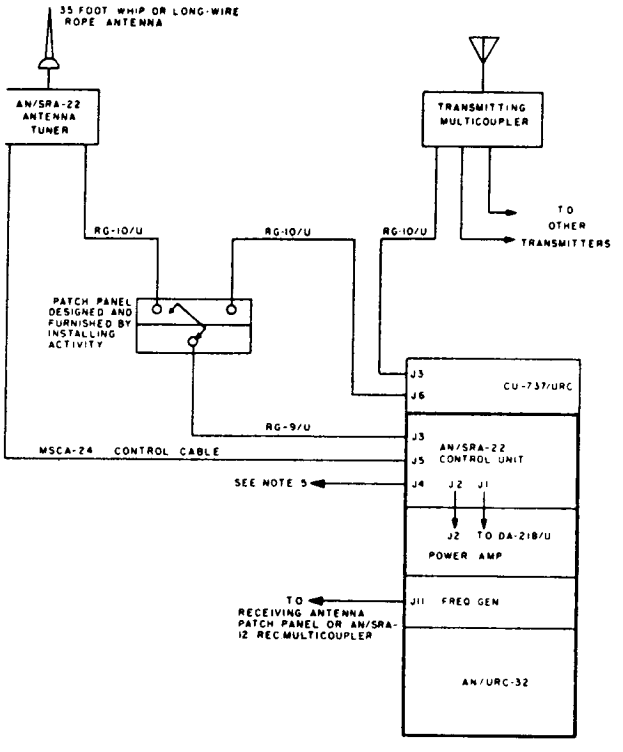

Figure 1. Typical System Interconnection Diagram

Figure 1 Notes:

1. CU-737/URC

a. Disconnect interval connections to J4 and J5. Assemble cable and connectors to connect J4 and J5 direct. Remove switch S3, associated wiring and blank-off front panel hole and switch position indicators.

b. Remove antenna relay K1, connector P1 and connect transmission line from patch panel to J6 of the CU-737/URC.

c. From terminal board J8, connect speaker leads 3 and 4 to terminals 3 and 4 of terminal board TBH in the AN/URC-32 junction box. This will provide a local speaker-monitor.

2. AN/URC-32

a. Remove 680 ohm resistor from junction box terminals G5-G6.

3. Since there are two wattmeters, one in the CU-737/URC and one in the AN/SRA-22 control unit, there will be two meter indications when the AN/URC-32 is used with the CU-737/URC-multicoupler system--only one metering system need be used for tuning.

4. The AN/SRA-32 control unit controls are only used with the associated tuner when the AN/URC-32 is patched through to the tuner.

5. The AN/SRA-22 control unit receiver output receptacle J4 may be cabled to (or through a patch system) J11 on the AN/URC-32 for receiving on the same antenna as used for transmitting.

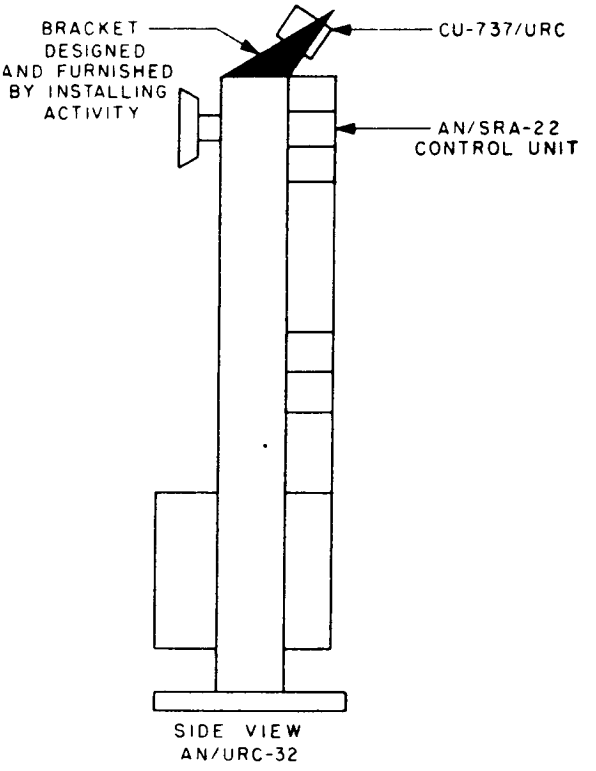

Figure 2. Preferred Method of Mounting

AN/URC-32: SHOCK AND VIBRATION MOUNT INSTALLATION

Photographs received in the Naval Ship Systems Command indicate several installations of the shock and vibration

mounting supplied with radio set AN/URC-32 have been improperly installed. These photographs show off-the-deck mounting on inverted "L" steel angles with no bed-plate.

The shock and vibration mounting unit supplied with the AN/URC-32 should be mounted on a flush surface for proper operation. If it is necessary to mount the equipment off-the-deck by means of angle supports, a steel bed-plate must be provided that will permit complete support of the entier shock and vibration mount base.

AN/URC-32 & AN/URT-18 ALINEMENT OF REFERENCE OSCILLATOR

Many of the reference oscillator plug-in (module) units of the Radio Set AN/URC-32 and Transmitter AN/URT-18 have been reported inoperable and turned in for repair. After investigation, it has been disclosed that many of these units could have been restored to service locally through an alinement process.

The equipment contractor, in conjunction with the field service engineer, has evolved an alinement procedure for application by fleet personnel. It is recommended that this alinement process be employed, if possible, prior to sending the units into a module repair activity, in order to reduce unnecessary costs and attendant problems.

TEST EQUIPMENT REQUIRED:

Oscilloscope OS-8/U, or equivalent.

AN/USM-34 vacuum tube voltmeter, or equivalent.

MK-447/URC-32 tool kit (supplied with AN/URC-32 and AN/URT-18).

PROCEDURE:

1. Measure the 100-kc. signal at J1 of the Frequency Divider Module. This level should be 1.0 to 1.5 VAC (RMS). Measure the 2400-kc. signal at J1 of the Sidestep Oscillator module. This level should be 0.5 VAC (RMS). If these values or signals are not as stated, or missing, proceed with the following alinement procedures.

NOTE: Loss of the 2400.kc. signal will cause the stabilized master oscillator to operate as a free-running oscillator, so that the equipment will be operating off frequency.

Loss of the 100-kc. signal will render the equipment inoperative except in the AM receive mode. Either of these conditions will exist if the Reference Oscillator is inoperative. A "noisy" 100-kc. signal may be noted in the AN/URC-32 receiver as excessive hash and lack of any desired receiver audio signal. Loss of the Reference Oscillator signal will cause the AC meter to remain at zero.

2. Plug in a spare operative Reference Oscillator from the MK-464/MRC kit, if available, and double check scope and ac signal levels from the operative unit.

3. Synchronize the scope for good ac display of the signal that was found improper on the inoperative Reference Oscillator module in step 1.

4. Remove the working module and reinsert the unit determined as being inoperative.

5. Using the oscillator alinement cover found in the MK-447/URC-32 tool kit, and the extension pendant cable marked for use on the Oscillator 100 kc. (Collins part number 544-9031), remove the inoperative Reference Oscillator module and place the test cable in J1 with side marked "A" to terminal "A" of J1.

CAUTION: "A" on the opposite end of the test cable must also go to terminal "A" of P1 on the Reference Oscillator module.

6. Remove the cover closest to P1 of the Reference Oscillator and place the test alinement cover on the module before attempting the variable capacitor adjustments.

7. Connect the oscilloscope to the 100-kc. and 600-kc. test points as shown in figure 1. Adjust C17 and C30 for a well-balanced 6-to-1 Lissajous figure with maximum amplitude. Tuning of C17 and C30 will readily show the position at which the best figure display will be seen. Adjust C11 for maximum amplitude of the 6-to-1 figure. Tuning of C26 will cause the figure to run off the scope to the left or right. After doing this, the proper setting of C26 will be apparent. At this setting there will also be a very slight increase in the amplitude of the 6-to-1 figure. If the 6-to-1 figute is obtained, it is known that the 2.4 mc. signal and the 100-kc. signals are present and the above adjustment will have peaked the 2.4-mc. signal.

NOTE: Only minor adjustments of these capacitors will be necessary and, if step 6 does not render the module operative, component troubles may exist and the module **should then be turned in to a supply center (see BUSHIPS Instruction 9671.22, serial 623A5-2377 of 14 September 1960), for forwarding to a module repair activity. (AN/URQ-9 only).**

8. Field alinement of L1 on the Reference Oscillator module should be attempted only when a known high stability reference signal is available (100 or 1000 kc.). If not available, the procedures listed in the equipment technical manual should not be attempted. (Refer to

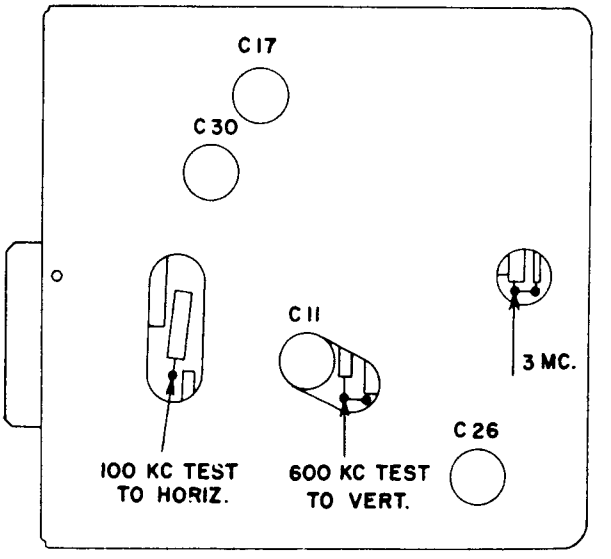

Figure 1. Test Points as Viewed Through Alignment Cover

the L1 alinement procedure as listed in the frequency comparator unit section of the manual). (548)

AN/URC-32 High Voltage Power Supply Fuse Failure

Recurring failures of fuse F3 in the high voltage power supply of AN/URC-32 has resulted in additional research by the manufacturer. It has been found that the front panel interlock shorting switch (S7) is at fault. This switch is located on the same bracket as the front panel interlock microswitch (S8). Shorting switch (S7) is directly above microswitch (S8).

At the point where the wire carrying high voltage from C49 is connected to the porcelain insulator the high voltage will occasionally arc to the bracket supporting the insulator causing fuse F3 to blow. A new bracket has been devised which provides more spacing between the insulator and the bracket. These will appear on AN/URC-32, commencing with serial 360, with at least 1/8-inch spacing to prevent this arcing. To accomplish this on models prior to serial 360, the following procedure is suggested:

1. Remove from the panel the ventilating cover of power amplifier.
2. Remove two small Phillips-head screws that hold bracket to chassis. This will permit access to the screw that holds the porcelain insulator to the bracket.
3. Loosen screw holding porcelain insulator to the bracket; move insulator over as far as possible from side of bracket and tighten screw.
4. Replace bracket and switches. If clearance does not appear to be sufficient, further spacing may be gained by appling pressure between bracket and insulator, thereby slightly bending the bracket and forcing the far end of the insulator away from the bracket. (545)

AN/URC-32--General Notes

Periodically, requests for information, comments from the fleet, notes from field-engineer reports, etc., include information of general interest to all users of Radio Set AN/URC-32. The following such notes are provided for information and use.

Installation information— A list of stock numbers which may be useful in requisitioning of necessary installation material:

Equipment	Stock number
MSCA-24 Cable	G6145-184-5862 or G6145-542-6894
MSCA-10 Cable	N6145-184-5863
DSGA-9 Cable	G6145-184-5893
TTHFWA 1-1/2 Cable	G6145-184-1253
RG-10/U Cable	N6145-161-0883
RG-10A/U Cable	N6145-161-0884
RG-18/U Cable	N6145-195-8724
RG-18A/U Cable	N6145-635-9915
Type 66047 Whip Antenna	2N5985-369-5532
Type IL-18/U Insulator	N5970-681-8018
Type 61335 Insulator	N5970-284-8084

NOTE: RG-18( )/U cable is normally used on antenna runs.

Equipment warranty— The AN/URC-32, AN/SRA-22, and accessories have a manufacturer's warranty for a period of one year after delivery to the Navy. Any electrical or mechanical failure on new equipment attributed to a manufacturing defect should be reported to the Service Force Commander.

MK-446A/URC-32— This unit is used only in installations where access to the high-voltage power supply on the rear of the AN/URC-32 is not possible. This unit permits mounting the power supply remotely from the equipments mounting rack. Existing stock of the unit has been depleted. Ships and activities requiring the use of the unit may manufacture locally using BUSHIPS Plan RE 43D2024B, when the fabricated unit is not available.

Sideband selection— For proper sideband selection, operate switch on the Audio and Control Unit (AM-2002/URC) to either the Upper sideband (USB) or lower sideband (LSB) position, for operation as required by the operational communications plan. Communicating with stations on the opposite sideband is not possible.

Tool allowance— Several ships have recommended that the AN/URC-32 be supplied with a small tool such as a surgical hemostat for use in repair work and as a "heat sink." These items (hemostats) are on every Electronics Tool Allowance List. Ships not having these tools for electronics work should requisition them from the supply system.

Printed wiring boards—Use only a low-wattage soldering iron such as that supplied in the MK-447/URC-32 accessory toolkit. Solde.. ..ons or guns generate more heat than is required to melt the solder on printed wiring connections and, if used carelessly, could cause damage to the printed circuit board and components. Use 60/40-type solder. Module repair techniques are provided in the AN/URC-32 technical manual (page 49, para 5.7, NAVSHIPS 0967-066-7010 (Vol. 1), 0967-066-7020 (Vol. 2), and 0967-066-7030 (Vol. 3).

Power amplifier tubes—Ships have reported the replacement of the 4CX250B final amplifier tubes with type 4X150 in emergencies where the 4CX250( ) version was not available. This operation is possible and results in a lower power-out-put from the equipment. Temporary tubes should be replaced with the proper types, upon availability. Whenever final amplifier tubes are replaced, neutralization, bias, and balance checks should be made in accordance with the technical manual (page 4, power amplifier section of Technical manual instructions to assure proper operation.

Radio Sets AN/URC-32 being supplied under contract NObse (delivery commencing August 1960) will include type 7580 final amplifier tubes. The 7580 is a later version of the 4CX250( ) series and is interchangeable. Backfitting of the existing 4CX250( ) series is not necessary. Replacement with type 7580 is recommended, upon failure. The 7580 is a more reliable military design.

P & O reports—When submitting P & O reports on the AN/URC-32, include the associated AN/SRA-22, CU-737/URC (if used) report serial numbers. These reports may be submitted for a period of six months, then terminated, unless the equipment has unusual failures that should be brought to the attention of the Bureau. On one report, it is requested that information be included, whether the equipment was installed by ship's force or shipyard.

Equipment repair parts provisioning procedures—For information concerning procedures in obtaining equipment-onboard repair parts, reference should be made to the Electronics Supply Office publication Electronic Repair Parts Allowance List, Processing Guide, ESO Instruction 4441.17C.

Latest Allowance Parts List dates:

AN/URC-32	June 1965
AN/SRA-22	Jan. 1966
Cu-737/URC	Feb. 1962

Antenna tuners—Although the Antenna Coupler AN/SRA-22 was designed specifically for use with the AN/URC-32, it is possible to use the AN/SRA-18( ) unit. Detailed tests conducted by NEL have shown that the AN/SRA-22 is a more efficient and preferred unit. For emergency situations or when the AN/SRA-22 is not available, temporary use of the AN/SRA-18 should be considered.

Sidetone for CW operation—To adjust the audio sidetone in the CW mode, adjust the potentiometer R205 on the speaker-amplifier module contained within the AM-2062/URC (159-1 Audio and Control) chassis to the desired level (see pages 6 and 11 of the audio and control unit section, NAVSHIPS 0967-066-7010, AN/URC-32 Technical Manual.) Note also that this module contains a fuse (F201) for the 24 vdc transistor supply and should be checked when there is an indication of no audio output from this unit. Sidetone operation may be disabled, when desired, by operating the sidetone ON-OFF switch located behind the dust cover on the sideband generator (AM-2064/URC) chassis.

Issue of accessories—The current authorized allowance issue of equipment accessories is one set of spare modules (MK-464/URC, Maintenance Kit) for each three equipments installed on board and one tool kit (MK-447/URC, Maintenance Kit) per ship. Ships currently having an excess of this allowance are being directed to forward the excess to a naval supply center. The modules contained within the MK-464/URC forwarded to the supply center will be individually stocked for issue, on requisition, to ships requiring a unit to replace a defective one. Ships receiving a replacement unit will be directed to forward the defective unit to a repair facility (San Francisco, or Norfolk Naval Shipyard, Restoration Coordinator), via a supply activity for repair and return to the stock supply system.

Equipment training—Bureau of Naval Personnel Instruction 1500.25 and catalog NAVPERS 91769D contain information concerning available training courses. Quota information should be obtained from the Commanding Officer, Enlisted Personnel Distribution Office, U.S. Atlantic Fleet or U.S. Pacific Fleet, via the Type Commander. (541)

Remote operation—When remote control of the AN/URC-32 is desired in the ships-standard-radio-remote-control system it is only necessary to operate the switch marked "REMOTE-LOCAL" on the Handset Adapter Chassis C-2691/URC, to the "REMOTE" position. The switch marked "TUNE-LOCAL-EXTERNAL" on the sideband generator chassis should not be operated. Operating this switch will not permit keying of the equipment from a remote position. This switch performs the following functions:

TUNE position—Disconnects external audio input signals and reinserts a carrier signal for tuning the power amplifier.

LOCAL position—Normal operating position after equipment is tuned and ready for operation.

EXTERNAL position—Not used. This switch permits the remote operation of the receiver RF gain control and the TGC-AGC meter indicator. This capability is not available in the existing ships-standard-radio-remote-control system. DO NOT OPERATE THIS SWITCH TO "EXTERNAL" POSITION.

High replacement item stock numbers—Stock numbers for items with a high-replacement rate follow:

High-voltage fuse F3	N5920-232-3691
20-amp line fuse	N5920-296-4885
4CX250B tube	N5960-615-4376
20L diodes	N5960-542-7040

Attention is invited to the revised Parts List (APL), dated June 1965. The APL for the AN/URC-32 has been revised by ESO to include items inadvertently left out of the original issue.

Caution-antenna tuning—Reports being received indicate that some ships inadvertently are burning out receiver front-end coils by tuning up a "back-up" transmitter, in high power, and on the same frequency to which the AN/URC-32 is tuned. With the close proximity of shipboard antennas, this amounts to "pumping" a large amount of RF directly into the receiver, causing the resultant receiver-coil failures. When tuning other equipments to the same frequency, it is recommended that this be done with low or tune power, and that the receiver-antenna-input-transmission line of the AN/URC-32 be temporarily disconnected to eliminate this equipment failure. Future AN/URC-32 equipments will be provided with an antenna protective device that will disable the receiver when excessive power is encountered on the transmission line. Field change kits to back-fit equipments procured under contract NObsr 75279 have been initiated, and information on their availability will appear in the EIB.

Ships force and activities installing the AN/URC-32 equipment (and the Antenna Coupler AN/SRA-22) should investigate thoroughly the proposed antenna location to provide as wide a separation as possible between adjacent antennas. Alternately, though least desirable, due to attenuation, etc., the equipments-receiver-antenna input (on frequency-generator chassis) could be cabled to the ships-receiving-antenna-distribution system (patch panel, multicoupler, or direct).

Stock number—The stock number for the CU-737/URC Coupler-Monitor has been changed to FSN F5985-678-4053.

"Off-frequency Reports – A number of off-frequency reports received by ships have been attributed to improper switching in the CW and FSK modes. When operating in these modes, assure that the frequency-indicator dial on the frequency-generator unit is set **2kc. below the assigned frequency** for **FSK** operation, and **1 kc. below the assigned frequency** for **CW** operation, and that the appropriate position of the OSC CONTROL switch on the **CW/FSK** unit is used. Switch to the **CW 1 kc.** position when the assigned frequency is an even-numbered frequency (i.e., 3000.00 kc.) and to the **CW 1.5 kc** position for a 500 cycle-increment assignment (i.e., 3000.5 kc.)."

The instructions as provided in the Technical Manual, Operators Chart, and stenciled on the front cover of the equipments frequency-generator unit are correct.

The AN/URC-32 is capable of operation in all modes on 1 kc. increment-frequency assignments and 500-cycle increments in the **CW** mode. (541, 561)

AN/URC-32–Use of Isolation Amplifier Module

The Bureau has been receiving requisitions for the Isolation Amplifier Module as described on page 10 of the Frequency Generator section of AN/URC-32 Technical Manual. Currently, the use of this module is not required.

The Isolation Amplifier Module is to be installed only in specific equipments requiring the use of the AN/URC-32 in future, highly sophisticated, communications systems (i.e., for data handling etc.) This module is installed in the equipment in place of the existing Reference Oscillator Module and is connected to a highly stable ships-frequency source such as Standard AN/URQ-9 Frequency.

Upon avalability and installation of the AN/URQ-9, ships requiring the use of the AN/URC-32 for conventional communications (SSB, AM, CW, FSK) shall connect the AN/URQ-9 output to the AN/URC-32 frequency comparator chassis jack J2. The signal from the AN/URQ-9 shall be used as a frequency standard for calibrating the AN/URC-32 internal frequency standard, within the reference oscillator module.

The Isolation Amplifier Module has recently been assigned the nomenclature AM-1785/GRC and the Federal stock number F5820-715-6393.

AN/URC-32–INSTALLATION INFORMATION

Ships and activities planning the installation of Radio Set AN/URC-32 and making use of the MK-446A/URC-32 Installation Kit should ensure that the high-voltage power supply will not be located in spaces where the ambient temperature will exceed 160° F. When the MK-446A/URC-32 is used, the high-voltage power supply is removed from the equipment rack, and away from the equipment's blower system. The manufacturer has advised that this power supply will operate satisfactorily without air supply to temperatures of 160° F.

The AN/URC-32, as shipped, has the CW break-in delay control set for MAXIMUM lag. Ships and activities installing the AN/URC-32 should refer to the equipment technical manual (CW/FSK unit) and make adjustments for the desired CW break-in relay hold-in time.

To eliminate AN/SRA-22 equipment damage, a detailed verification of cable connections and continuity should be made prior to applying power.

AN/URC-32; L-32 OF RF TUNER (MODEL B) UNGROUNDED

A very small quantity of Model B RF Tuners, FSN 5820-799-7433, may have been released as spares without having L-32 grounded. These carried the manufacturer's serial numbers 101 to 130. This trouble can be identified by lower-than-normal exciter RF gain when the tuners are installed in an AN/URC-32. Also a visual inspection of L-32 can be made to determine whether or not L-32 is grounded. Ships having spare RF tuners (Model B) withing the above manufacturer's serial numbers should inspect and if necessary replace the missing ground wire. (559)

AN/URC-32–ELIMINATION OF RECEIVER INPUT INTERFERENCE

Ships have reported elimination of receiver interference (due to radar, etc.), through the use of a filter network that is in the supply system. This filter (stock No. N5915-615-5827) was originally supplied in the AN/SRA-20 antenna tuning equipment. The filter has a pass-band of 0 to 32 mc., 52 ohm impedance, insertion loss of .5 db (maximum) in the pass-band range and 100 db (normal) in the stop-band range. This filter contains BNC type connectors and may be installed in the AN/URC-32 receiver antenna input line for the attenuation of input signals above 32 mc. (560)

AN/URC-32–FACSIMILE USE

Facsimile Receive System–For reception of facsimile transmissions, the AN/URC-32 receiver output from junction-box terminals F-11, F-12, C-13, C-14 (LSB only), or C-15, C-16 (USB only) is connected through the receiver switchboard or direct to CV-172/UX (Frequency Shift Converter) and RD-92/UX or AN/UXH-2 (Facsimile Recorder).

Facsimile Transmit System–For transmission of facsimile information a scanner (TT-41B/TXC-1B), or its equivalent, is connected to a MC-168/UX modulator through the transmitter switchboard (or direct) into either the upper sideband (terminals C-1 and C-2) or lower sideband (terminals C-11 and C-12) transmitter audio input lines. In addition, a transmitter control (C-1004()/SG), or its equivalent, is connected to the transmitter for keying control and control indication. The output of the MD-168/UX unit provides a frequency shift audio of constant amplitude between 1500 and 2300 c.p.s. (560)

AN/URC-32–TEST DEVICE

Component parts for fabricating the test device as shown in NAVSHIPS 0967-066-7010, Vol. 1. page 5-83, 5-84

Figure 5-100, figure 4, page 4, of the Power Amplifier unit AM-2061/URT KEYUA-3) may be obtained from the supply system under the following stock numbers:

.01 Capacitor–N5910-678-5306 (same as part 34C1 in RF Tuner Module)

220UH Inductance–N5950-686-6425 (same as part 3A4621 in RF Tuner Module)

Diode–N5960-284-6516 (same as part 5CR2 in CS/FSK unit) (560)

AN/URC–32–MICROPHONE AMPLIFIER MODULE

The microphone amplifier module, located within the audio and control unit (AM-2062/URC), is not normally used in the AN/URC-32. An equipment field change is currently being prepared to remove this unit including the associated front panel microphone (MIC) receptacle, wiring, and transformer T6. Later production models of the AN/URC–32 will have this module removed and the modifications applied.

The microphone amplifier module is the same as the upper-sideband and lower-sideband line-amplifier modules contained within the same chassis and, pending further instructions, may be retained on board as a spare. (561)

AN/URC–32–RECURRING FAILURES

Power Amplifier Nylon Gears–Caused by misalinement of dial gears. Later production units have had this problem corrected. Field Change 1 AN/URC–32 provides new dials for the equipments earlier produced. Periodically apply lubrication to the dial plates by using the "Lubriplate" material supplied in the AN/URC–32 tool kit.

Z14, Z15, Z16 RF Tuner Coils–Caused by burnout due to Z14, Z15 and up high-level RF feed-in from antenna. This failure will be eliminated by the use of the protective device supplied in Field Change 1 AN/URC-32 for equipments (serial no. 1 through 359). Equipments with serial numbers 360 and above have this protective device installed.

R–13 in RF Tuner–Caused by excessive drive during the tuning process or the feed-back of high level RF in the receiver-antenna transmission line. This failure should be reduced when the receiver protective device is installed. Ships experiencing this failure should attempt repair on board, if possible, rather than shipping the entire assembly to a repair activity.

Fuse F3–This failure has been attributed to several causes such as shorted power-amplifier tubes, switch arcing as reported in EIB 545, and failure of C49 in power amplifier or circuit transients. The major cause of failure is believed due to the internal structure of the power amplifier tubes which is being corrected by the design of a more rugged tube.

Rattle and Binding of Frequency-Generator Frequency-Change Mechanism–Apply lubrication periodically as specified in the Technical Manual and the Maintenance Standard Book.

RF Tuner Band-Switch Shaft Binding–Apply lubrication periodically as specified in the Technical Manual and Maintenance Standard Book. Later production units have been provided with a bearing at the end of the shaft, away from the drive motor. The lubricant is provided in the AN/URC–32 tool box.

No Shift in FSK Mode–Check diodes CR2 and CR3 (1N67A or 1N198). Failures of these diodes have been caused by installation miswiring, application of too high current, failure to install 800 ohm resistor at TT–23/SG board (or in equipments junction box), and incorrect polarity of the complete teletype system.

AN/URC–32–USE ON 50–CYCLE POWER SOURCES

Occasionally information is requested on the use of the AN/URC–32 ashore where only 50-cycle power is available. The only effect of using 50-cycle power is that the equipment's blower motor will run slower causing a reduction in the amount of air supplied to each chassis. To offset any damage to the equipment's final amplifier tubes from heat, the air ports on each of the chassis should be **closed one notch** and the final amplifier air port should be **fully** opened. (See Field Change 24 AN/URC-32). (561)

ISSUE OF SUBSTITUTE EQUIPMENT KWT-6, Type 8, FOR RADIO SET AN/URC-32

Urgent requirements for procurement of commercial equipment substitutes for Radio Set AN/URC-32 and components have necessitated the installation of Collins Model KWT-6, Type 8, equipment.

Collins Model KWT-6, Type 8, equipment is exactly the same equipment as the latest models of Radio Set AN/URC-32 currently being delivered (Ser. No. 900 range). The commercial version of Antenna Tuning Group AN/SRA-22 is Collins Model 180T-2.

ESO has been continuously advised of the equipment procurements and issue so that similar material support will be provided for both the military and commercial versions of these equipments. (575)

DEFECTIVE MODULAR ASSEMBLIES IN RADIO SET AN/URC-32

During gunnery exercises at sea, the automatic frequency control (AFC) meter in Radio Set AN/URC-32 commenced to fluctuate erratically. The cause of failure and the action taken to correct this condition, are described as follows:

The difficulty was at first believed to be caused by loose modules or tubes in the frequency and carrier generator, but inspection showed that these components were intact and secure. Then, a test, using a vacuum tube voltmeter AN/USM-34, indicated that the 455-kc signal from A2J1 on the stabilized master oscillator (SMO) measured only 1.2 volts RMS instead of the required 3.5 volts RMS. As a corrective measure, a spare stabilized master oscillator module was installed and aligned in accordance with

the instruction manual. The results of this substitution were negative.

Next, a spare reference oscillator (RO) module was installed. However, a check made with a vacuum tube voltmeter AN/USM-34 indicated that there was no 100-kc output from the reference oscillator. An additional test was then conducted using the original stabilized master oscillator and the spare reference oscillator. The results were again negative.

Finally, it was determined that both the stabilized master oscillator and reference oscillator spare-module assemblies were defective and inoperative. A close visual inspection of the stabilized master oscillator inner modules revealed that a section of the insulating sleeving on the collector lead of transistor Q2 had been displaced, thereby causing a short circuit to the lead on C6. After completion of repairs to the defective insulation, the transmitter operation was normal.

In view of the foregoing, it can be seen that spare modular assemblies, regardless of outward appearance, may be defective. Despite the fact that these assemblies are painstakingly assembled and tested, the possibility to inadvertent damage or the existence of other defects must not be overlooked. Damage to modular assemblies as a result of poor handling, either prior to, or during installation, can render associated equipments useless. From the standpoint of reliability and cost, therefore, the importance of correct and careful handling of modular assemblies cannot be overemphasized. To eliminate wasted installation effort, every modular assembly should be subjected to a thorough inspection and/or test prior to installation.

Attention is directed to the excellent series of articles entitled, "Repair and Maintenance Techniques of Modular Assemblies, "in the General Maintenance Handbook, NAVSHIPS 0967-000-0160.

DAMAGE OF PRINTED CIRCUIT IN RADIO SET AN/URC-32

The accompanying illustrations show severe damage to printed circuit boards which never should have occured. An analysis of recent failures has proved conclusively that, had field changes to the AN/URC-32 equipments been accomplished, this damage would not have taken place.

Figures 1, 2, 3, and 4 show the destruction of the printed circuit boards (Signal IF Board in the Stabilized Master Oscillator Module), caused by the thermostatic switch (A1S1) sticking. If Field Change 1 had been accomplished, the damage probably would not have occurred. (See note below)

Field changes to these equipments have been published and announced repeatedly in successive issues of the EIB. It is strongly recommended that holders of equipments accomplish equipment field changes as soon as they are available.

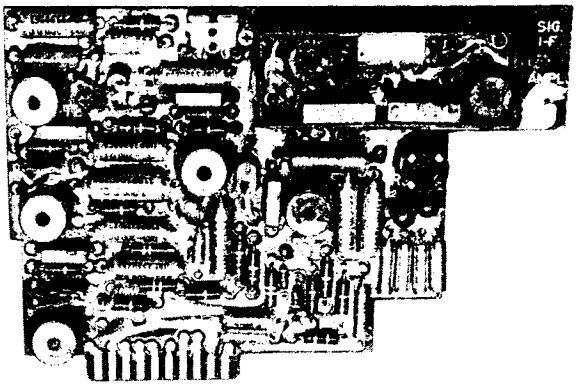

Figure 1

NOTE: Holders of Models A or B SMOS should turn same in and draw C SMOS.
All models A or B are being converted to model C by S. Fran and NORVA Module Repair Facilities as fast as they are received. No A or B are being issued by Supply.

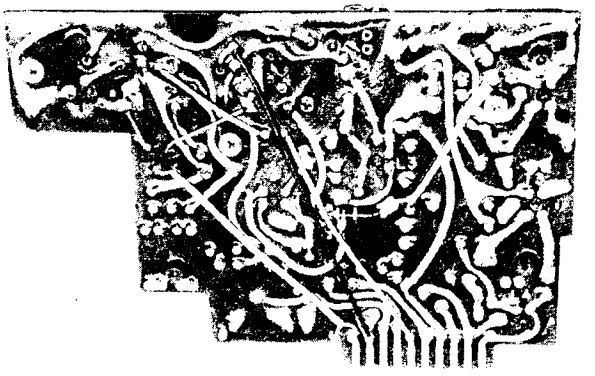

Figure 2

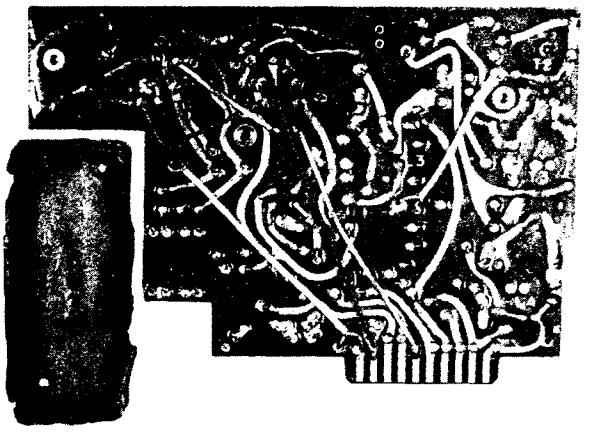

Figure 3

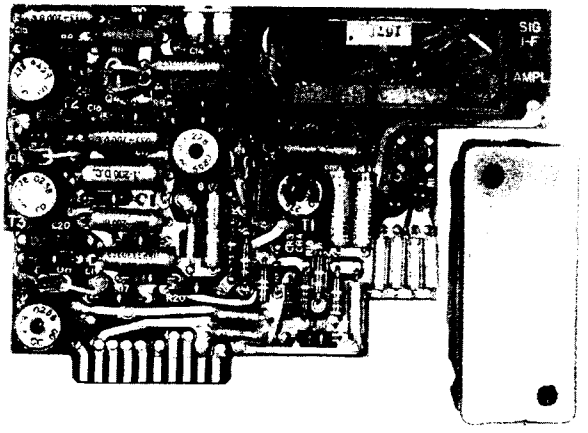

Figure 4

INSPECTION OF POWER AMPLIFIER IN AN/URC-32

Power Amplifier

Periodically inspect L-10 tune coil and coil roller adjustment for optimum performance. Dirt or arcing deposits will cause erratic power amplifier tuning.

No AM Output

Check TUNE-LOCAL-EXT. Control switch on the sideband generator unit, AM operation is not possible in the EXT. Control position.

PA Tubes

A more ruggedized tube for the AN/URC-32 power amplifier has been developed and is currently being stocked. When requisitioning new power amplifier tubes, request the new version 4CX250R(FSN N5960-738-2217), if the new version is unavailable, use the 7580 or 4CX250B type. The new RCX250R was specifically developed to reduce PA tube failure caused by mechanical shock and vibration from-operational use and shipping damages.

Tool kits and Spare Modules

Reports have shown that a number of ships have more than their authorized allowance of AN/URC-32 tool kits (MK-447/URC-32) and sets of spare modules (MK-363/URC). Because of the short supply of the AN/URC-32 and accessory items, this practice will jeopardize other ship installations that may be in critical deployment situations and do not have these items available in stock. Because of funding limitations, the Bureau has been able to procure only a minimum amount of these items to meet only planned installations. There are no spare units available in stock. Authorized allowance is one tool kit per ship and one set of spare equipment modules for each five AN/URC-32 equipments installed per ship.

Modules

Reports have been received of ships disposing of modules (**destruction** or **thrown overboard**). All of the AN/URC-32 modules are repairable, at a repair facility. These units are in very critical supply for the reasons cited above.

Blower Unit

Reported failures, inspections, and photographs received from shipyards indicate negligence in the cleaning of the equipment air filters. Newer equipments have the words, "Clean Filter Every Two Weeks-SEE INSTRUCTION BOOK," on front of the blower unit dust cover, It is recommended that this notice be affixed, if not already provided, to serve as a cleaning reminder.

Reference Oscillator Calibration

Refer to POMSEE book and AN/URC-32 Technical Manual and periodically calibrate the units L1 adjustment with frequency standard AN/URC-9. This unit may be used by connection to the equipment frequency comparator unit. Failure to calibrate L1 will result in off-frequency operation and distorted transmission and reception of signals.

Junction Box

Equipments with serial number 660 and above will have a 800-ohm resistor installed at the teletype input terminals TBD-1 and -16. Refer to the AN/URC-32 Technical Manual, figure 2-10. When installing the AN/URC-32 and connecting for teletype operation, assure that an 800-ohm resistor is either in the equipment junction box or in the TT-230/56 patch panel. Only one 800-ohm resistor across this line is required.

Operational

The AN/URC-32 is primarily a single-sideband transmitter, with the added capabilities of AM(compatible), CW, and FSK. It is preferable to use the AN/URC-32 for SSB, and other equipments, if availabe, for the other modes. The

equipments design is for high-quality SSB voice transmission and reception, exceptional frequency stability, and for future sophisticated multi-channel FSK and data handling capability.

Dummy Load

It has been reported that shipyards have been removing the DA-291/U dummy load from the AN/URC-32 air duct and installing it at an antenna patch panel for use with other equipments. This dummy load is a part of the AN/URC-32 and requires the air supply from the equipment blower to handle its rated 500 watts. Additionally, if the dummy load connection on the C-2698/SRA-22 or CU-737/URC unit, used with AN/URC-32 is not properly terminated with this dummy load as a result of this practice, then severe power amplifier unit damage may result as this unit will not operate into an open load. (565)

CHECK-OUT PROCEDURE FOR AN/URC-32 and AN/SRA-22 ANTENNA COUPLER

This procedure is written for the technician who is familiar with the AN/URC-32, at least to the point of being able to properly tune the equipment for its various modes of operation in SSB, ISB, AM, CW, and FSK. If the following step-by-step procedure is adhered to, the technician can determine whether his equipment is functioning properly.

Failure of the AN/URC-32 to give correct indications, as set forth in the following steps, may indicate a failure and should be investigated further by the technician.

If any of the following checks fail to give satisfactory results, the nature of the check being made should indicate to the technician which unit or units of the transceiver are at fault. Refer to the appropriate section of the Technical Manual for further aid in localizing troubles.

Initial Setting of Front Panel Controls

1. Low Voltage Power Supply ON/OFF Switch	OFF
2. Handset Adapter	LOCAL
3. Frequency Comparator	OFF
4. Audio Control	
a. Sideband Selector	USB Xmit
b. Microphone Gain	Fully CCW
5. CW/FSK Unit	
a. Oscillator Control Switch	OFF
b. Output Control	Fully CCW
c. Meter Multiplier	+ 8 dbm
d. Xmit/Rec/CW Test	REC
e. Meter Selector	LSB
6. Sideband Generator	
a. AM/SSB Switch	SSB
b. Tune/Local Ext. Control	LOCAL
e. Exciter RF Gain	Fully CCW
d. Receiver Gain	Fully CW
e. Multimeter Switch	TGC/AGC position
7. Frequency Generator Unit	
a. Band Change Switch	Band 1
b. Frequency Counter	5.001 MC
8. Power Amplifier Unit	
a. Fil/Tune/Operate	Operate
b. Plate on/off/key	OFF
c. Band Switch	Band 2
d. Driver Tune	Fully CCW
e. PA Tune	Fully CCW
9. Antenna Control Unit	
a. Load/Ant. Switch	Load
b. Meter Power Selector	"Forward 1000"
c. Cap Switch	Shunt 1
d. Coil Switch	Center
e. Tap Switch	Center
f. Coil Dial	100
g. Tap Dial	100

Blower Interlock Switch

Turn low Voltage Power Supply ON/OFF Switch to ON position. The blower motor should start and, after a slight delay, the RED power indicator lamp should glow, indication closure of the Air Interlock Switch which energizes the low voltage power supply. (If lamp fails to glow after blower is energized, check the air filter as it must be kept clean.) If indications above are normal, block the air intake to the transceiver by placing a sheet of paper or cardboard over air intake filter which is located directly below the low voltage power unit at the bottom of the rack amount. When the air passage through the filter is thus blocked, the RED power ON indicator lamp on the low voltage power supply should extinguish, although the blower motor will continue to run. When the air blockage is removed, the power ON indicator should light. If these indications cannot be obtained, the air interlock switch is probablu defective and further investigation will be necessary.

Low Voltage Measurements

On the sideband generator, use the meter selector switch to monitor the minus 90 volts, plus 250 volts, and the plus 130 volts setting. The meter should indicate approximately 40 db in each position of the switch.

Frequency Accuracy, Reference Oscillator, and SMO

Allow a warmup period of approximately 15 minutes before making the frequency accuracy check described below.

1. Depress the Tune-Operate switch on the frequency generator unit to Tune position and note the AFC meter on the frequency generator unit. The meter should indicate zero or center position. Release the Tune-Operate switch to Operate position and the AFC meter should indicate either to the right or left of center position. This deviation from center reading may be from a fraction of a dial division, to a maximum of 90-micro-amps. (See Technical Manual NAVSHIPS 0967-066-7010 Vol. 1, 90 μa only up to 2 MC). The meter needle should be steady and free of jitters. If the reading obtained on the AFC meter exceeds the 90 micro-amps or is unstable, one of the following modules is usually defective: SMO, frequency divider, sidestep oscillator, or reference oscillator. Refer to the Frequency Generator Section of the Technical Manual for further troubleshooting assistance. REMEMBER! When setting up a frequency control group, after locking the dial on the desired frequency,

ALWAYS momentarily depress the Tune-Operate switch to insure proper lock-in of the stabilized master oscillator. The frequency counter dial should now be set for 5.001 mc as set forth in the preliminary settings of this instruction.

2. If WWV can be received in your present location, a 1-kc audio tone should be audible at the handset. This is caused by heterodyning of WWV carrier frequency against the reinserted carrier frequency of the AN/URC-32. Any frequency deviation of the 1-kc tone will be indicative of the frequency error of the AN/URC-32, plus a slight error caused by doppler shift of the received carrier. Turn the switch on the frequency comparator to 1-kc position and adjust meter zero and gain controls to provide a visual sweep on the meter. If the AN/URC-32 is "on frequency," a slow steady sweep should be obtained on the meter. This sweep indicates the AN/URC-32 frequency error in cycles per second at the received frequency, in this case, WWV at 5.000 mc. EXAMPLE: If a sweep of 1 cps is obtained, an error of 1 cycle at 5 mc indicated. However, if you compare against WWV at 10.000 (dial reading at 10.001 mc), the sweep on the comparator should increase to 2 cps because at 10.000 mc, there would be an error of 2 cycles.

NOTE: A formula for computing the frequency difference between the AN/URC-32 and the transmitted frequency standard is given in the Instruction Manual, Section TD-112, page 4. If this check does not result in a satisfactory indication, refer to Section 111, TD-113, of the Instruction Manual and perform appropriate checks to localize the trouble.

CW and FSK Unit

1. Turn the frequency comparator off.
2. Operate sideband selector switch USB.
3. CW/FSK unit to FSK.
4. With frequency change knob, tune in an FSK signal and vary the BFO control on the CW/FSK unit. (This should change the frequency of audible signals at the handset.)
5. Turn Xmit/Rec/CW/ test switch to Xmit on the CW/FSK unit.
6. Advance the output control on the CW/FSK unit and insure that FSK oscillator will provide over 0-db output indication on monitor meter of CW/FSK unit.
7. Turn oscillator control switch to CW 1 kc and XMIT/REC/CW TEST switch to CW TEST. Advance the output control to insure meter indication of greater than 0-db output from the CW oscillator. Intermittently key at CW rate. The transmitter should remain keyed (green light remains on) between key rate. If not, adjust CW key release time potentiometer under dust cover for approximately .5-second fallout time. Repeat this step for CW 1.5 KC and turn CW/FSK unit to OFF position with oscillator control switch. Return XMIT/REC/CW TEST switch to REC..

Power Amplifier

With TUNE/LOCAL switch on sideband generator in LOCAL and exciter gain control fully CCW, apply high voltage to the power amplifier. Turn XMIT/REC/CW TEST switch to XMIT. An indication of 150-ma static plate current should be observed on the plate meter of the power amplifier. If this value of plate current is not available, adjust bias potentiometer R-19, located behind button just above driver tune control, to obtain the 150-ma static plate current. Operate plate No. 1 and plate No. 2 switches alternately. Readings should be between 60 ma and 90 ma in each instance. If this result is not obtained, change the PA tubes to obtain a closer balance. Unkey transmitter and turn plate voltage to the OFF position.

NOTE: If tube types 4X-250, 4CX-250, 4CX-250B, 4CX-250R, or 7580 are not available, then 4X-150B may be used for power amplifiers in an emergency. If 4X-150B is used, set bias control to obtain 100 ma of static plate current with NO drive into the power amplifier.

RF Tuner Module Gain

Set the band change control on the frequency generator unit to Band 1 and set the frequency dial to 1.7 mc. On the sideband generator unit, turn the TUNE LOCAL switch to TUNE and meter switch to RF OUT. On CW/FSK unit, throw test key to XMIT. Advance the exciter gain control to a minimum of 40-db output as indicated on meter on sideband generator. Unkey the transmitter and switch to Band 2. Key the transmitter and turn up exciter gain control so that a minimum of 40-db output is again obtained. Repeat for Bands 3 and 4. After checking Band 4 output on the low end, leave exciter keyed and rotate frequency change knob across the entire band to insure a minimum of 40-db output. Check Bands 1, 2, and 3 at the high end also. Unkey the transmitter.

Sidestep Oscillator

On the frequency generator unit, turn the frequency band change control to Band 4, add 3 kc. As each 1-kc step is added, the AFC meter should deflect by approximately one small increment on the scale. This will indicate proper operation of the sidestep oscillator. An alternate method of checking the sidestep oscillator is to tune in some received signal on Band 4 that will result in a tone at the headphones or speaker and then change the ADD KC control to check that the received tones change in frequency by 1 kc each time the ADD KC control is changed.

Over-All Transmit Operation

1. Tune the transmitter to a frequency near the middle of Band 1, into the built-in dummy load for USB operation. With carrier inserted (TUNE/LOCAL switch on sideband generator in **TUNE** position), insure that 500 watts output can be obtained with 450-to 500-ma PA plate current. Reduce power output to 125 watts with the exciter gain control and switch TUNE/LOCAL switch to LOCAL. The AM/SSB switch must be in SSB position. Power output should now drop to zero watts. Return the XMIT/REC/CW/TEST switch on CW/FSK unit to REC. Turn multimeter select switch on sideband generator to AGC/TGC. Key transmitter with handset. Speak into handset in normal voice tones and advance the microphone gain control until the multimeter, located on the sideband generator, indicates in the upper portion of the red scale on average voice peaks. At this time, the power output meter should swing to approximately 300 watts on the voice peaks.

2. Switch the sideband selector on the audio and control unit to LSB and repeat step 1.

3. Turn microphone gain fully CCW and power selector switch on antenna control unit to forward 100 watts. The The TUNE/LOCAL switch on the sideband generator should still be in LOCAL. Advance exciter gain control fully CW. Cover the mouthpiece of the handset with your hand and key the transmitter; observe output power meter. No output will indicate that the LSB modulator is properly balanced.

Repeat step 3 with sideband selector in USB to check USB modulator balance. Step 3 completes the checkout of the line amplifiers, modulators, TGC, RF tuner module, and PA on Band 1. It is now only necessary to tune the transmitter on carrier frequency to check Bands 2, 3, and 4. On one of these frequencies, check the transmitter for proper operation in AM, FSK, and CW modes of operation.

NOTE: In AM operation, for rated power output, the carrier power should indicate about 125 watts without modulation. While checking the FSK mode of operation, patch a teletype signal into the transmitter, and, with the sidetone switch in the ON position, you should hear the FSK oscillator tones change from 1575 cps to 2425 cps in the headphones when inserted in the phone jack on the audio control unit.

Receiver Sensitivity

If all the previous checks give normal indications, the transceiver is probably in good condition. If the sensitivity of the receiver is in doubt, a quick check may be made by feeding a signal from the AN/URM-25 signal generator into J11 (receiver input jack), of the frequency generator unit. One or two microvolts input should result in a clear audible tone at the handset or phone jack.

Antenna Tuner Checkout AN/SRA-22

Depress the TUNE/Operate switch of the tuner control unit to TUNE. Run the coil and tap to the low end stops by operating coil and tap switches to minimum. Adjust coil and tap dials for a null on respective meters. If calibration is correct, both dials should read approximately 70. Next, run coil and tap to maximum stops and adjust dials for null on meter. Coil dial should read approximately 540 and tap dial approximately 470. Return both coil and tap dials to 100. Starting from "Shunt 1" on the capacitor switch, increase one step at a time through position 12. At each switch position, the capacitor run light should come on momentarily and go out as the capacitor motor cuts off. At position 12, switch to Series and step down, one step at a time, watching indicator light for an indication of capacitor tuning. Return to Shunt 1 home position. If all coupler motors tune properly, tune the transmitter on a frequency and load the antenna as per tuning charts. If antenna and coupler are satisfactory, the reflected power should tune out below 10 watts with 500 watts of forward power. (586)

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

The Naval Ship Systems Command has received reports and photographs which indicate that the vibration mountings supplied with AN/URC-32, AN/WRT-1, and AN/WRT-2 equipments are being installed improperly. These photographs show equipment mounted off-the-deck on inverted "L" steel angles without a bed-plate.

The shock vibration mounting unit supplied with the subject equipments should be mounted on a flush surface for proper operation. If it is necessary to mount the equipment off-the-deck by means of angle supports, a steel bedplate must be provided that will permit complete support of the entire shock and vibration mount base. (607)

UPDATING OF RADIO SETS AN/URC-32 AND AN/URC-32A

As a result of a 3-year detailed survey made of performance and operational reports, failure reports (DD-787's), and the equipment modular repair reports from the East and West Coast Navy Modular Repair Activities, changes are incorporated in the AN/URC-32A that will give a significant increase in reliability to the AN/URC-32A over that of the AN/URC-32. These changes will improve significantly the general reliability and use of the AN/URC-32A by the Fleet. The following are the major changes incorporated in the AN/URC-32A:

1. Diode 1N547 is used instead of 1N1084 in the (C-2691/URC). (Except 10CR6 and 10CR7 which are 1N3190; see FC 22-AN/URC-32). The same diode (1N547) is also used in high voltage power supply (PP-2153/U.) Such common use of the same diode will not only increase the reliability of these power supplies, but will also reduce the number of types of diodes required in stock aboard ship.

2. The limiter amplifier module (AM-3198/URC) is used instead of the former line-mike amplifier module (356C-1).

The AM-3198/URC (FSN 5820-973-2480) is a direct electrical and mechanical plug-in-replacement for the older line-mike amplifier. Its performance and characteristics were so designed that the power of each sideband is equalized automatically when both sidebands are used, such as in the simultaneous use of voice on the upper sideband with teletype (TTY) being transmitted over the lower sideband.

In addition, the limiter amplifier is capable of raising, as well as limiting, the voice excitation of the AN/URC-32A so that either a forceful talker or a weak talker speaking into the microphone will excite and drive the power amplifier at the same level. Thus all talkers transmit equal power regardless of the strength of their voices. This especially important when various talkers, using the remote control units (C-1138 ( )/UR) throughout a ship use the same AN/URC-32A for communication. For example, talkers on the bridge, CIC, or main radio will

now automatically drive the AN/URC-32A at the same levels, thus maintaining the communication power of AN/URC-32A at a constant and maximum level.

Many talkers do not understand that the output from single sideband transmitters is a function of the excitation level, and that the excitation level, when on voice, is a function of the talker's voice power. Thus, even though an SSB transmitter is capable of 500 watts output, the transmitter will not transmit its full 500 watts power if the talker does not hold the microphone properly or if he talks with a weak voice, thereby not providing sufficient drive to the power amplifier. If a man is inclined to whisper into the microphone, the power of a 500-watt power amplifier could drop to a few watts. Likewise, a forceful speaker can overdrive a transmitter to excessive power output which cause his voice to be distorted. When many different types of talkers use voice single sideband circuits, the need for a limiter amplifier, such as the AM-3198/URC, becomes very essential to ensure that each talker produces equal transmitter power. It is equally important that talkers know how to use a microphone properly.

An additional advantage of the AM-3198/URC is that its characteristics are such that the frequencies generated by the human voice are amplified and limited to ensure that the transmitter is loaded to its maximum efficiency and power output. The limiter thus raises the weak voice frequencies and yet limits the strong voice frequencies so that the overall voice power average is consistently and constantly higher than the normal voice power without the limiter. This increases the talk power of the communications net by about 3 db or twice the power. This is readily noticeable if one compares the received signal strength from a transmitter using the old line amplifier with a transmitter using the new AM-3198/URC.

All AN/URC-32's have two limiter amplifiers, one for each sideband.

3. A most significant change was made to the power amplifier (AM-2061/URT) when circuits were added. While this change was not extensive with respect to the parts change, it nevertheless added functions to the power amplifier that will result in future savings on power amplifier tube replacement. Circuits added to the power amplifier (AM-2061/URT) are as follows:

a. An automatic load control (ALC) circuit was added (F.C. 17-AN/URC-32) to allow the power amplifier to operate as closely as possible to its rated output without danger of its being overdriven (excess power output) on output) on input signal peaks. As a result of three years of detailed review of power amplifier usage, it was found that power amplifier tube manufacturers had so improved their tube characteristics during this period of production that it was possible to obtain up to 800 watts from the power amplifier. The design of the AN/URC-32 was such that it could handle this increased power but at a sacrifice of reliability in tube life, power transformers, and filter chokes. Since the gain in power of 500 to 800 watts is actually small in communicating capability, it was decided to favor the change in the interest of higher reliability of the equipment and the actual economies that could result therefrom.

The power amplifier (AM-2061/URT) now incorporates a transmit gain control (TGC) circuit, the purpose of which is to indicate when grid current occurs and to limit the exciter drive to the power amplifier when that point is reached. The setting of TGC threshold is directly dependent upon the bias setting for the final tubes, and, since this is the area where the tube characteristics have changed, TGC threshold no longer corresponds to 500 watts, but rather is normally 700 to 800 watts for new tubes.

The automatic load control (ALC) addition will sample the plate RF output voltage, and generate an exciter clamping bias when rated output is reached. This limiting action is not dependent upon the final tube characteristics. ALC will limit the RF output to no more than 1.2 db increase when audio inputs increase to any level above rated input. A front subpanel screwdriver adjustment will set the ALC to control the RF output level at any level between 50 watts and maximum capable power. Normally, the ALC threshold will set to allow maximum RF output at 500 watts ±10 percent.

b. Added screen voltage tap switches (FC 17-AN/URC-32) will allow any 4CX250R (or equivalent tube) with widely varing characteristics to be used as a pair in the AM-2061/URT. In the AN/URC-32, the only variable control for setting the operating point of each tube is a single bias control which affects both tubes simulataneously. To assure a sufficient balance of operation two tubes must be selected so that the difference in static plate current is liss than 30.

The amount of signal distortion is directly affected by the amount of unbalance between tubes. With adjustable screen voltage for each tube, two tubes, formerly impossible to use as a pair because of unbalance, can now be closely balanced and used as a pair. This will assure longer tube life. Presently, the tube with lower emission works the least, allowing the better tube to deteriorate faster than it should. With adjustable screen voltage, the balanced tubes would share the load equally and distortion would be reduced.

The screen voltage tapping switches are mounted at the rear of the power amplifier with the screwdriver-adjusted switch shafts extending through the back cover. Five voltage selections are available for each tube to vary the screen voltages from 320 to 400 volts.

In checking Fleet experience with the use as well as with the failure rates of the 4CX250B, 7580, and 4CX25PR tubes, it was found that many power amplifier tube replacements had to be made in pairs because tubes, in order to load equally, had to be within 30 milliamperes of each other in their static plate current measurements. This requirement made it almost impossible to match a used tube with a new tube. Also, it was found that even the tube characteristics of new tubes varied to such an extent that at times it was possible to get only two tubes out of a group of six that would reasonably match in static plate

current. Thus, in many instances, tubes were discarded even before their useful life period ended. Power amplifier tubes are expensive and a discarded tube represents $30.00 to $40.00. However, now that the screen voltage of each tube can be controlled independently, it is possible to mix old tubes with new tubes or to use new tubes with greatly different static plate currents.

The saving to the Fleet resulting from a much improved utilization of the power amplifief tubes can be very significant when one considers that there are now in excess of 1200 AN/URC-32's operating in the Navy, each having two power amplifier tubes with a yearly replacement cost near $425,000. By thd end of 1963, there will be about 2000 AN/URC-32's and AN/URC-32A's in the Fleet, making it most important that steps be taken to get full effective power amplifier tube utilization.

The tube manufacturer actually guarantees the power amplifier tubes for only 1000 hours. Experience to date with the changes incorporated in the power amplifier of the AN/URC-32A, that is, the ALC circuit and the screen voltage tap switches, indicates that it now is possible for ships to obtain at least 3000 to 3500 hours of operating life from existing production power amplifier tube as well as to reduce the tube changes to only those of complete failure.

The Bureau of Ships is currently preparing a field Change for the earlier mode 1 AN/URC-32 power amplifiers to modify them to the equivalent of the AN/URC-32A described above.

At the request of CNO, the Bureau of Ships is procuring later models of AN/URC-32 that will have a capability of 1 KC incremental tuning in lieu of the 1 KC tuning of the AN/URC-32 and AN/URC-32A. It is expected that these equipments will be assigned the nomenclature Radio Set AN/URC-32B. Planning includes the procurement of necessary Field Change Kits (FC 23-AN/URC-32) to back fit all earlier delivered equipments. Therefore, when the AN/URC-32 has had all existing Field Changes applied and is furnished with a 0.1 KC modification kit, these equipments will then be equivalent to the later model AN/URC-32B and may be renomenclatured. (612)

AN/URC-32 POWER AMPLIFIER

Frequent reports of erratic power output and tuning difficulties in Radio Frequency Amplifier AM-2061/URT have been traced to dirt deposits or defective front and rear wipers which make contact with the front and rear shafts of coil assemblies L4 and L10. The wipers should be inspected in addition to the cleaning of the coils and rollers. (605)

AN/URC-32; No Drive to Power Amplifier

When there is no drive to the equipment power amplifier (AM-2061/URT) when operating in the TUNE position, check the carrier reinsert adjustment and consult the AN/URC-32 technical manual for proper adjustment. (605)

AN/URC-32 - High Voltage Power Supply Capacitors

The Collins Radio Company has advised that capacitors C3 and C4 in the AN/URC-32A and AN/URC-32B High Voltage Power Supply (PP-2153/U) have been eliminated in recent production of this equipment. It has been determined that these capacitors are unnecessary.

A field change will not be issued for the earilier versions of the AN/URC-32 series of equipments for the elimination of these capacitors. Ships and activities encountering a failure in these components may remove them from the circuit without replacement. Correct Technical Manual, NAVSHIPS 0967-066-7010, Vol. 1, 0967-066-7020, Vol. 2, and0967-066-7030, Vol. 3, by deleting these capacitors from schematics and parts lists when C3 and C4 are removed from the power supply. (615-619)

AN/URC-32( ), Dummy Load DA-218/U Resistance Change

A significant change in value of the AN/URC-32 Dummy Load DA-218/U has been reported. An analysis indicates that the particular equipment had been tuned at full power in excess of 500 watts into this dummy load for a lengthy period. This caused a decrease in its resistance value in excess of the rated 50 ohms ±10 percent.

This is the first reported failure of this type. Ships and stations should periodically confirm the DA-218/U resistance value during AN/URC-32 POMSEE checks. This checkpoint will be made a part of any subsequent revision to the AN/URC-32 POMSEE publications.

AN/URC-32--POWER AMPLIFIER TUBE LIFE

Recent tests of final amplifier tubes 4CX250( ) in Radio Frequency Amplifier AM-2061/URT indicate that when the filiment voltage is not allowed to exceed 6 volts, extended tube life results. Periodic measurements of the filament voltage should be made. If the filament supply is consistently high (above 6 volts) because of ship power voltage, transformer T1 (Collins part No. 622-0261-00) of the amplifier should be changed as follows:

Change the connection from pin 7 to pin 8 and the connection from pin 3 to pin 4.

This will reduce the filament voltage. Recheck periodically to verify filament voltage condition. The filament voltage can be measured at the test points on left front panel of the amplifier unit near the PLATE ON-OFF KEY switch.

Evaluation of a device for automatically regulating the filament voltage supply under conditions of varying input

supply is being conducted by the Navy Electronics Laboratory. If these tests prove acceptable, information will be promulgated concerning availability for equipment field change installation. (See FC 24-AN/URC-32)

The Naval Ship Systems Command continues to receive reports indicating that equipment having the new 4CX250R tube installed are capable of 700 to 900 watts output. Although the new tubes have improved power handling capability, the bility, the equipment should **not** be tuned to **exceed** the **500-watt output level** Specified in the technical manuals and operator charts. Continued operation at the higher output levels will reduce tube life and may result in damage to Antenna Coupler Group AN/SRA-22.

Additional field changes to increase the amplifier reliability, and Radio Set AN/URC-32 in general, are being investigated. These changes include an electronic load control circuit that automatically limits the amplifier plate current to a value which provides a maximum output of 500 watts ± 10 percent. Provisions will be included to bypass the automatic control circuit when special circumstances require maximum output capability.

Another change to improve operation of the AN/URC-32 is being studied and will be incorporated in the AN/URC-32A. This change includes provisions for adjustment of the screen grid circuit of the amplifier, and will enable operating personnel to make adjustments to compensate for variations in the screen grid voltage requirements of tubes with different characteristics. This adjustment will permit equalizing the power output of each amplifier tube and give added tube life. Also to be included is a bias control which provides an increase in the range of biasing voltage supplied the amplifier tubes. The bias control will permit immediate and adequate compensation for variations in tube characteristics. These controls in the screen grid and bias circuits will extend the range of tube types and tube characteristics that may be used in the amplifier. (602)

AN/URC-32A, AN/URC-32B – SHOCK AND VIBRATION MOUNTING ASSEMBLY

In the AN/URC-32A and AN/URC-32B equipments, the shock and vibration mounting assembly is slightly different than that in the earlier AN/URC-32 version of the equipment. The newer shock and vibration mount assembly is of simpler construction and lesser cost, and it still meets the technical characteristics of the earlier unit.

The major difference in the assemblies is the location of the bolt holes used in installing the equipment. The newer unit requires only 4 bolts in the base assembly and 4 bolts in the sway brace assembly. The earlier units required 8 bolts in each assembly. Figure 1 provides mounting hole locations for the newer assembly. Figure 2 provides mounting hole locations for the earlier AN/URC-32 version.

When a new AN/URC-32( ) equipment is received, detailed step-by-step instructions are provided and packed with the supplied shock and vibration mount assembly. (614)

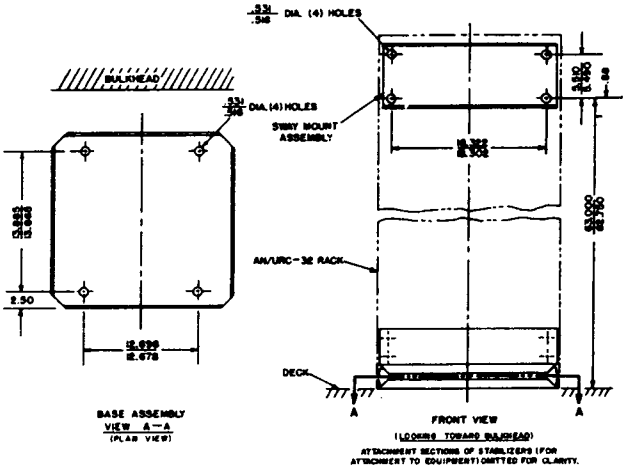

Figure 1. Mounting Hole Loaction for Newer Assembly

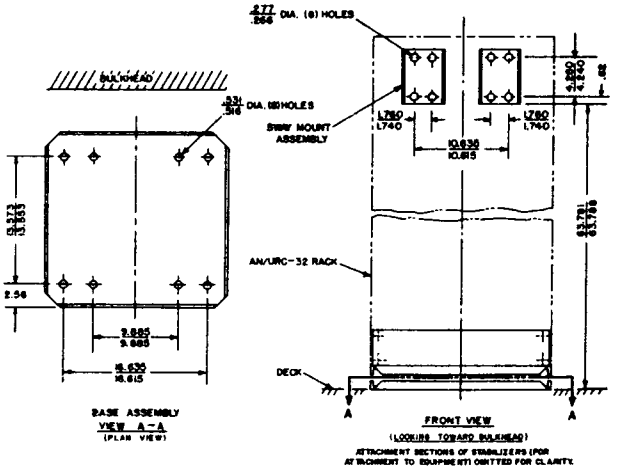

Figure 2. Mounting Hole Location for Earlier AN/URC-32 Version

AN/URC-32 Radio Set, Maintenance Article (High Voltage Interlock Switch Adjustment)

Boston Naval Shipyard reported that, because of vibration, the interlock switch (S-1) in the high voltage power supply, AN/URC-32, operates intermittently.

When this occurs, secure the primary input voltage at the power distribution panel and then remove the cover from the high voltage power supply. Remove the two screws that hold the interlock switch (S-1) bracket. Elongate the mounting holes in the bracket to allow it to be moved forward. Move the bracket only to the extent that assures a snug fit of the cover on the switch. (629–633)

AN/URC-32, -32A, -32B, AND KWT-6(8) RADIO SETS - ARCING IN THE POWER AMPLIFIER

This article is to advise maintenance technicians that, because of improper maintenance procedures, arcing can result in the power amplifier (AM-2061/URT). This malfunction can be caused by the following sequence of events.

1. During removal of V3 and V4 (4CX250R PA Tubes), it is necessary to move Z3 and Z4 to come into contact with C10.
2. When V3 and V4 are replaced, technicians have neglected to restore Z3 and Z4 to the original position, resulting in arcing from the plate circuit to ground of the PA tubes, possible destroying tube sockets.

To preclude this malfunction, personnel must ensure that the clearance between Z3 and Z4 and capacitor C10 is of the same amount as it was prior to the removal of V3 andV4. (653)

RADIO SET AN/URC-32( ) – MAINTENANCE HINT

The purpose of this article is to provide installation and maintenance personnel with the necessary information to determine if Coil 2L8, located in the Radio Frequency Amplifier AM/2061/URT, has been properly installed.

Coil 2L8 has two terminal posts mounted on the coil form. One terminal is located 3/16 inch from the end of the coil form and the other terminal is located 3/8 inch from the opposite end of the coil form (refer to figure 1). The coil form flush mounts to the top of the chassis of the AM/2061/URT and is identified by the circuit symbol number printed on the chassis adjacent to the coil form. High level d-c and rf voltages are present on these two terminals. If the terminal that is 3/16 inch from the end of the coil form is mounted adjacent to the chassis, there is the probability that the voltages present will arc to chassis ground.

Figure 1. Coil 2L8.

Personnel are directed to inspect Coil 2L8 to ensure that the coil is mounted in such a manner that the terminal that is 3/8 inch from the end of the coil form is mounted adjacent to the chassis. The manufacturer did not attempt to position the coil form in the prescribed manner; therefore, it is mandatory that all equipments are inspected and corrected if required. (668)

AN/URC-32 and AN/URT-18—Alinement of Stabilized Master Oscillator

NOTE: The terminology as applied to the AN/URC-32 and AN/URT-18 plug-in (Module) units has been redefined. These units (Reference Oscillator, Stabilized Master Oscillator, etc.) are to be identified in correspondence, EIB articles, etc., as **Electronic Assembly.** Although the equipments, technical manuals, and "POMSEE" publications currently make reference to the term "Modules" for these units, it is desired that the terminology "Electronic Assembly" be applied.

Many of the Stabilized Master Oscillator electronic assemblies of the Radio Set AN/URC-32 and Transmitter AN/URT-18 have been reported inoperable and turned in for repair. After investigation, it has been disclosed that many of these units could have been restored to service locally through an alinement process.

The equipment contractor, in conjunction with the field service engineers, has evolved an alinement procedure for application by fleet personnel. It is recommended that this alinement process be employed, if possible, prior to sending the units into a module repair activity, in order to reduce unnecessary costs and attendant problems.

Test Equipment Required

R-390/URR Receiver or Equivalent
AN/USM-34 VTVM or Equivalent
MK-447/URC-32 tool kit (supplied with AN/URC-32 and AN/URT-18)

Procedure

Set the Frequency Generator, CV-731/URC, to Band 1. Monitor the Stabilized Master Oscillator (SMO) frequency (300 kc. above the Frequency Generator dial setting) on a communication receiver such as the R-390/URR. Distinct 500 cps. steps should be heard as the SMO frequency is changed. This check should be made at 1.7 mc., 2.7 mc. and 3.699 mc. In all cases the frequency change of the SMO should be very **sharp** 500 cps. steps.

If the frequency change of the SMC is garbled or is sharp only when tuned in one direction, in all probability the Master Oscillator (MO) is not phaselocked. This can be caused by any or a combination of the following:

A. Loss of signal.
B. Excessive interpolation oscillator error.
C. Excessive master oscillator error.
D. Discriminator center off.

1. Using a DC VTVM, measure the AGC voltages at test points A2J2 and A7J2. These readings should be not more than +0.55 VDC. A reading of more than +0.55 VDC at A2J2 would indicate a weak signal and the MO may need alinement. A reading of more than +0.55 VDC at A7J2 could indicate a weak signal or excessive interpolation oscillator error.

2. **Interpolation Oscillator.** To check the Interpolation Oscillator (IO) frequency it will be necessary to have a communications receiver that can be calibrated, or a frequency counter. An R-390/URR receiver is recommended. If a receiver is used, loosely couple the antenna input to the Reference IF board near the front and near the Interpolation Oscillator. A short piece of coax with 2 inches of braid removed may be used and laid alongside the mechanical filter above A7J2. **Be careful not to make a metallic connection to the printed circuit.**

Calibrate the receiver at 600 kc. and set to read 637.4 kc. Set the AN/URC-32 Frequency Generator dial to 4.102 mc. (SMO Freq. = 2.201 mc). The IO frequency at this point should be 637.0 kc. to 637.5 kc. If the IO frequency is less than 637.0 kc. or more than 637.5 kc., remove the SMO module and connect to an extension cable supplied in the AN/URC-32 tool kit. Adjust A5L2 through hole "A" on IO cover for 637.4 kc. If the IO frequency is within the above limits, set the Frequency Generator dial to 4.107 mc. (SMO freq. = 2.2035). The IO frequency at this point should be 617.0 kc. to 617.5 kc. If the frequency is less than 617.0 kc. or more than 617.5 kc., remove the SMO and adjust A5L7 through hole "B" in the IO cover for 617.4 kc. Repeat the above procedure for the following frequencies:

Frequency Generator Dial	SMO Freq.	Receiver	IO Freq.	Adjust
4.112 mc.	2.206 mc.	597.4	NLT 597.0 kc. NMT 597.5 kc.	"C"
4.117 mc.	2.2085 mc.	577.4	NLT 577.0 kc. NMT 577.5 kc.	"D"
4.122 mc.	2.211 mc.	557.4	NLT 557.0 kc. NMT 557.5 kc.	"E"

NLT–Not less than
NMT–Not more than

If a frequency counter is used, the SMO must be attached with an extension cable and the counter connected to J8, Pin F, with as short a length of coax cable as possible. The above frequencies may then be read directly on the counter.

3. Turn SMO through its frequency range (2-4 mc.), observing AFC meter on front panel of the Frequency Generator (CV-731/URC). Note the amount of deflection of the meter from zero (center scale). If the IO is sitting in the

proper position with respect to the MO, the average deflection either side of zero should be equal across the band. If the average deflection is concentrated to one side or the other, remove the SMO and connect an extension cable and remove front cover. The MO should be disengaged by loosening the MO shaft gear. Turn shaft of MO slightly (as in ±) in the direction that causes the AFC meter to move in the direction for shaft gear clamp and turn MO in a direction to decrease reading of AFC meter a few microamperes. Tighten clamp and listen to SMO output around this point again. Repeat until distict 500 cps. steps are heard in the SMO output. Recheck the AFC meter excursions across the rest of the band.

4. Since the discriminator center adjustment on the earlier delivered units (with a d.c. amplifier-type discriminator) is a critical adjustment, field adjustment is limited. However, after it has been ascertained that the oscillator errors are within limits and all correct signals are present in the SMO, some adjustment of the discriminator center is possible. The signal IF and Discriminator must be removed with an extension cord and the SMO frequency set to a particular place where it does not phase-lock. The balance pot A2R3 of the Signal IF board may be adjusted not more than ±20° to obtain a complete lock. After adjustment the SMO should be tuned through its range 2-4 mcs. or at least checked at 2 mc., 3 mc., 3.995 mc. to assure proper operation using a receiver and noting the distinct 500 cps. steps when tuned in both directions.

AN/URC-32( ) RADIO SETS, MAINTENANCE ARTICLE (HIGH R.F. ARC-OVER IN THE S-6A SECTION OF THE AM-2061/URT, S-6 AND S-5 SWITCH ASSEMBLY).

Richard J. Dobrowolski, ETN3, aboard the USS TANNER, has reported that several failures of the TANNER's AN/URC-32( ) Radio Sets have occurred as a result of arcing between the metal strip wafer switch terminal connector and the wafer spacer depicted in figure 1.

The arc-over was due to the flat metal strip being routed too close to the metal wafer spacer. Investigations by the Naval Ship Engineering Center, Norfolk Division, have revealed that some of these switch sections have the metal strip connector routed as close as 1/16th of an inch to the spacer.

It is recommended that switch section S-6A be examined at the earliest opportunity by maintenance personnel to ensure that the foregoing condition does not exist. If it is found that the flat metal strip is routed too close to the spacer (less than 1/4") due to the strip being too long, which in turn necessitated a large bend in the strip in order to make the connection to the soldered terminal, the strip should then be un-soldered from the solder terminal and shortened so as to obtain 1/4" to 5/16" clearance between the strip and spacer, then resolder the strip to the solder terminal. In some instances the strip can be pushed away from the spacer to obtain the desired clearance. This is permissable as long as a smooth, even bend or curve can be maintained over the length of the connector strip; otherwise, unsolder and shorten, as above.

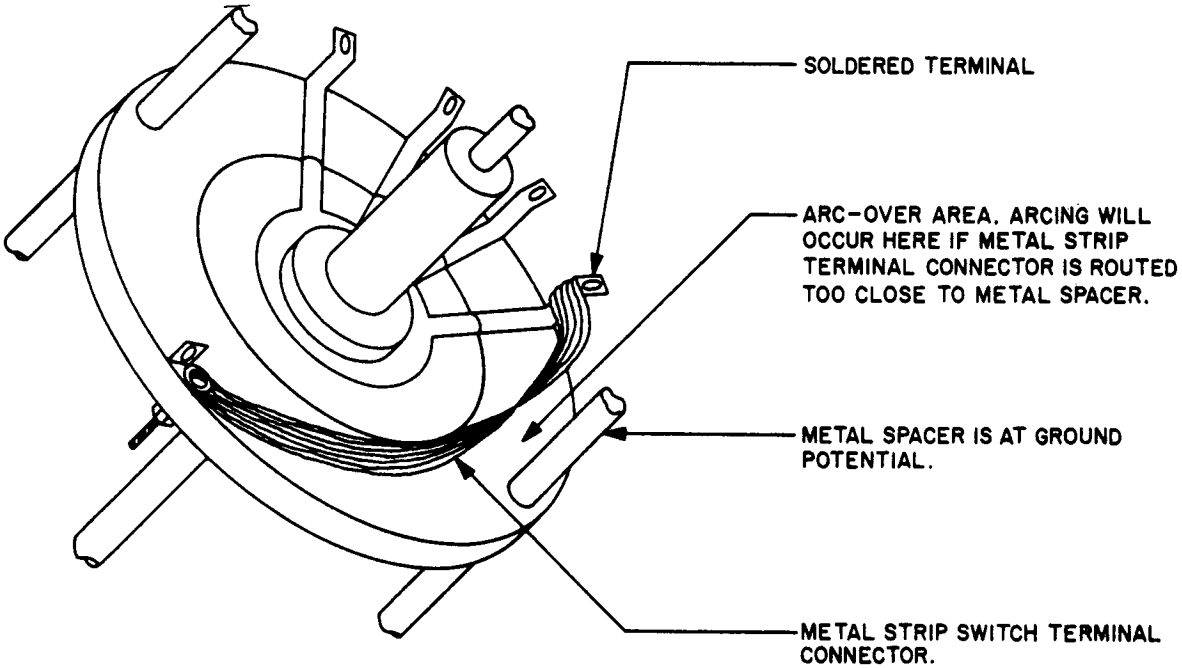

Figure 1. S-6A Section of AM-2061/URT, S-6 and S-5 Switch Assembly

AN/URC-32, AN/URC-32A, AN/URC-32B AND KWT-6(8)–BLOWER UNIT MAINTENANCE PROCEDURE

This article advises maintenance personnel of a procedure that is recommended for accomplishment before a suspected bad Air Pressure Switch S1 is replaced in the AN/URC-32( ) blower unit compartment.

Secure and tag main power to the AN/URC-32( ).

OBSERVE ALL APPLICABLE SAFETY PRECAUTIONS.

1. Remove the front cover and filter from the blower compartment. Determine that the filter is clean.

2. Remove the clamps and rubber hose which connect the air pressure switch input port to the blower unit output port.

3. Obtain a piece of No. 22 gauge wire, or equivalent, and determine that both the input port to the air pressure switch and the output port from the blower unit are both open and free of lint or dirt.

4. Remove the clamps and hose which connect the output port of the pressure switch to the output port of the blower compartment. Determine that both output ports are open and free of lint or dirt.

5. Clean interior of both hoses and check for air leaks. If any leaks are detected replace the faulty hose.

6. Reinstall both hoses and their respective clamps.

7. Return power to the AN/URC-32( ) and check for proper operation.

The foregoing procedure will, in most instances, save replacing Air Pressure Switch S1. (EIB 724)

AN/URC-32( ) Series Radio Set–Maintenance Hint

The 0.1KC Tuning Unit, CV-1749( )/UR, is keyed by the "Transmit 130VDC". Numerous naval activities have reported a main chassis wiring error in the Converter-Oscillator CV-731/URC. The wiring error applies the "Key-line" ground to the CV-1749( )/UR instead of the "Transmit 130VDC".

Correct wiring may be verified by determining if continuity exists between 3J8-1 and 3C17. Further action is not required if this condition exists.

Absence of continuity between 3J8-1 and 3C17 indicates that the wiring terminates between 3J8-1 and 3C5. This should be verified by measuring for continuity. Remove the lead from 3C5 that connects to 3J8-1 and connect to 3C17. This action corrects the wiring error.

Activities desiring documentation that will reflect the wiring error correction may order a copy of field change bulletin NAVSHIPS 0967-066-7300, and retain the bulletin with the AN/URC-32 technical manual. (733).

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

See article in AN/WRT-2 under same title. (733)

AN/URC-32( ) Series Radio Sets: Possibility of Radiation from Some 11T1 Power Transformers Degrading Output Transmissions--Information Concerning

This article provides maintenance and operating personnel of AN/URC-32( ) radio sets with information relative to the possibility of transmissions being degraded due to excessive radiation from some 11T1 transformers appearing in the equipment's transmitted output. This article resulted from a beneficial suggestion submitted by Messrs. Terrence C. Kennedy and Luis Beria of Long Beach Naval Shipyard.

Due to the adjacent locations of the Control-Power Supply, C-2691/U (Unit 9) and the Low Voltage Power Supply, PP-2154/U (Unit 11) within AN/URC-32( ) radio sets, electromagnetic radiation from power transformer 11T1 will be present in various degrees in the equipment's transmitted output. 11T1 is basically an OPEN-FRAME type of transformer which is located above the PP-2154/U chassis. The shielding between the C-2691/U and PP-2154/U chassis is not sufficient in all cases to prevent radiation from some 11T1 transformers from FINDING its way to the PA at a sufficient level so as to result in degradation of normal transmissions. The radiation from 11T1 is induced into the components of the C-2691/U chassis which feeds the radiation to the PA via the line amplifiers, balanced modulators and RF tuner. When some AN/URC-32( ) radio sets are subjected to MAXIMUM DRIVE conditions, 11T1 radiation from the output of the RF tuner may be at such a level as to result in an SSB output from the PA of 100 watts or greater. This can occur without any audio tones or intelligence being applied to the equipment from normal sources.

In order to determine if this specific radiation is excessive for a particular 11T1 power transformer, the following generalized procedure should be performed.

1. Select any of the low frequencies which produces the greatest drive. Drive in excess of 100db (meter will peg) is preferred from the RF tuner in "TUNE" when the "EXCITER RF GAIN" control is rotated

to its maximum clockwise position. (PA "PLATE" switch is in its "OFF" position for this check.)

2. Use 50 ohm dummy load (the equipment's internal load is preferred) and tune the equipment for 500 watts output in the "TUNE" mode ("TUNE-LOCAL-EXTERNAL CONTROL" switch in "TUNE" position). Reduce the output to zero watts and unkey the equipment.

3. Set-up the equipment for SSB transmit operation. The "SSB-AM" switch should be in the "SSB" position, and the "TUNE-LOCAL-EXTERNAL CONTROL" switch should be in the "LOCAL" position.

4. Check that the FSK/CW switch is in its "OFF" position. Also, check that no audio tones or intelligence are being applied from any source. Disconnect any handset that may be connected to the equipment.

5. Check that the "LOCAL-REMOTE" switch is in the "LOCAL" position.

6. Key the equipment and rotate the "EXCITER RF GAIN" and "MIC GAIN" controls to their maximum clockwise positions.

7. Check the wattmeter indication with the "SIDEBAND SELECTOR" switch in both the "LSB" and "USB" positions. Vary the "MIC GAIN" control and check if the wattmeter indication is variable with rotation of the "MIC GAIN" control. If an output wattage was indicated and it was variable with the "MIC GAIN" control, radiated interference from 11T1 was indicated.

Zero wattage outputs are desirable, however, outputs obtained which do not exceed 10 watts under the maximum gain conditions of "STEP 6" should not be cause for undue alarm. The transmitted spectrum will be within normal limits when the equipment is operated with normal drive settings and inputs. Outputs in excess of 10 watts obtained under the maximum gain conditions of "STEP 6" will degrade transmissions when the equipment is returned to normal operation. The degree of severity will depend upon the amount of output produced in excess of 10 watts.

There are several conditions, other than the 11T1 transformer, which can aggravate the situation and result in excessive 11T1 radiation finding its way to the PA. These conditions are as follows and should be checked and corrected as necessary:

a. Carrier reinsert misadjusted.

b. Misadjusted balanced modulators, or faulty balanced modulator mechanical filters.

c. R10 misadjusted in AM-3198/URC line amplifiers -- or R109 misadjusted in 356C-1 line amplifiers. (The R10 adjustment in AM-3198/URC modules is critical relative to this problem.)

d. Line levels set improperly.

e. Covers not in place in the equipment.

If accomplishment of the foregoing does not result in decreasing the maximum gain output to a zero watt indication, the positions of the C-2691/U control-power supply and the CM-126/UR comparator may be switched in the AN/URC-32( ) rack. The swapping of positions between these two units usually will bring the output down to zero watts and in most all cases excessive outputs will be decreased to an acceptable level of less than 10 watts, negating the purchase of a new 11T1 for replacement. *(801)*

AM-2061/URT, Radio Frequency Amplifiers (PA), Unit 2 of AN/URC-32( ) Series Radio Sets, Overheating of P.A.--Suggestions and Comments Concerning

Recent reports received by NAVSECNORDIV from forces afloat indicate that various ships are experiencing AM-2061/URT overheating difficulties resulting in damage to their power amplifiers. Additionally requests have been received for the development of design changes, improvements, etc. relative to the overheating difficulties.

Due to the basic equipment's age (12 years) the AN/URC-32( ) equipments are approaching obsolescence, and are to be replaced by AN/URT-23(V)'s. No further expenditures of funds for any changes or improvements to the AN/URC-32( ) equipments are planned.

The AN/URC-32( ) equipments were designed for extensive constant key use at an output of 500 watts. These equipments have and will operate at their 500 watt rated output without PA damage. The following checks and suggestions should be helpful in reducing power amplifier damage as a result of overheating:

1. Check the airport settings on the rear of the following units: adjust if necessary to prevent starving air flow to the PA.

PA (2 air vents) --------	position 8
Frequency Generator -----	position 3
Amplifier, Converter Modulator ----------	position 2
Amplifier Control -------	position 2
Converter Monitor -------	position 2
Power Supply (low voltage) ----------	position 3.5
Power Supply (high voltage) ----------	position 4

2. Check that the air supply duct and blower compartment are clean and that no air leaks exist.

3. Check that the air filter is clean and maintained in a clean condition. Additional cleaning periods may be necessary other than MRC requirements. The air pressure actuated switch in the blower compartment should be adjusted to drop out when two-thirds to three-quarters of the air filter intake is blocked.

4. Load the equipment into a dummy load and determine that the equipment's wattmeter is indicating correctly. When 157 to 160 V RMS is measured across the dummy load, the wattmeter should indicate approximately 500 watts. Load equipment into its associated antenna system and determine VSWR. Ideal reflected power is zero. A ratio of less than 1.5 to 1 is desirable.

5. Check that the operators are tuning the PA properly and that the antenna system is being tuned for the absolute minimum reflected power obtainable.

6. Check that the ALC adjustment has been properly set so as to prevent the equipment from exceeding 500 watts output on the frequencies in use. (F.C. No. 17-AN/URC-32 or F.C. No. 3-AN/URC-32A, Serials 1 thru 90, with corrections appearing in EIB's 727 and 734.)

7. Check that the PA tubes dynamic balance adjustments have been properly made to maintain plate currents within 10 ma of each other. (Screen adjust pots - F.C. No. 17-AN/URC-32 or F.C. No. 3-AN/URC-32A, Serials 1 thru 90, with corrections appearing in EIB's 727 and 734.)

8. Check that the 2V3 PA Tube Socket has been rotated to reduce arc-over possibilities. (F.C. No. 26-AN/URC-32, F.C. No. 12-AN/URC-32A or F.C. No. 9-AN/URC-32B in EIB 713.)

9. Check PA 2S6-2S5 for an arc-over possibility in accordance with EIB 731.

10. Check PA 2C50 replacement information in reference to EIB 755. 2C50 originally was a dual 20MFD capacitor which was parallel to form a 40 MFD capacitor at 450 WVDC. When a 2C50 failure occurs it should be replaced with the EIB 755 replacement, which is a single section 40 MFD capacitor rated at 500 WVDC.

11. The preferred tube type for 2V3 and 2V4 application is the 7580W. No other tube type numbers such as 4CX250B/7580W or 4CX250R/7580W should appear on these tubes. See EIB 713.

12. Check that the filament voltage to 2V3 and 2V4 is maintained between 5.8 and 6.1V AC. F.C. No. 24-AN/URC-32, F.C. No. 10-AN/URC-32A, F.C. No. 7-AN/URC-32B. See correction appearing in EIB 746 or 748.

13. Maintain the internal compartments of the AM-2061/URT in a clean and dust free condition. Dirt and soot accumulations prevent proper heat dissipation and result in unnecessary arc-overs. Additional cleaning periods may be warranted other than the MRC requirements.

14. Check that tne line voltage to the equipment is maintained at 115V AC ±10%.

15. It may be that due to the long service of some of these equipments, a complete PA overhaul is required before satisfactory performance will be obtained. If overhauls are required, arrangements should be made with the Hunters Point Naval Shipyard, Norfolk Naval Shipyard or U.S. Naval Ship Repair Facility, GUAM for accomplishment of any required overhaul by their AN/URC-32( ) Module Repair Facilities.(787)