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NAVSHIPS 0967-034-2000

TECHNICAL MANUAL

*for*

# REPAIR OF AN/WRC-1 AND R-1051/URR 2N MODULES

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# INTRODUCTION

This technical manual provides instructions for repair of the RF Amplifier Electronic Assembly A2A4 (Section I), Frequency Standard Electronic Assembly A2A5 (Section II), and Translator/Synthesizer Electronic Assembly A2A6 (Section III). The instructions are intended to aid the technician when disassembling the electronic assemblies for repair or replacement of parts. All components, with part numbers, are listed in the Maintenance Parts List in either NAVSHIPS 94840(A) or 94841(A). Diagrams for locating electrical components and test points can also be found in these technical manuals. For locating mechanical parts, appropriate illustrations have been included in this technical manual.

The Bureau of Ships no longer requires the submission of failure reports for all equipments. Failure Reports and Performance and Operational Reports are to be accomplished for designated equipments (refer to Electronics Installation and Maintenance Book, NAVSHIPS 900, 000), only to the extent required by existing directives. All failures shall be reported for those equipments requiring the use of Failure Reports.

# SECTION I

## RF AMPLIFIER ELECTRONIC ASSEMBLY

### 1-1. GENERAL.

1-2. This section provides instructions for repairing the RF Amplifier Electronic Assembly (A2A4), which is part of Radio Transmitter T-827/URT (T-827/URT) and Radio Receiver R-1051/URR (R-1051/URR). The instructions include procedures for disassembly, repair, re-assembly, and adjustment or alignment required as a result of repair. The instructions provide information required for replacing those parts that can be expected to require replacement during the service life of the equipment. These procedures are normally performed at a depot or module repair facility.

### 1-3. DISASSEMBLY.

1-4. This paragraph provides instructions for disassembling the RF Amplifier Electronic Assembly (A2A4). Major mechanical parts are identified in figures 1-1 through 1-3. Reference symbol numbers are included as applicable. In each case, the first mechanical part (MP) number listed pertains to the R-1051/URR; the second, to the T-827/URT. Part numbers and descriptions of mechanical parts are listed by reference symbol number in the Maintenance Parts List in NAVSHIPS 94840(A) or 94841(A). To disassemble the RF Amplifier Electronic Assembly, proceed as follows:

Note

Disassemble only as much of the electronic assembly as is necessary for repair.

a. With the electronic assembly placed on a work bench, remove the four dust cover screws and lift off cover.

b. Remove the four screws that secure the electronic assembly to the chassis.

c. Loosen the three screws securing the turret assembly drive motor to the base. Slide motor to one side to disengage motor gear assembly (figure 1-1). Secure motor in this position.

d. Rotate turret assembly until the contacts of adjacent megacycle strips (figure 1-1) are located at either side of the contacts of the outer stator contact strips attached to the rf section. One set of the three outer contact strips is located to the right of the ground test point on the top plate (figure 1-1). Hold the turret assembly in this position and remove the four screws from top turret ring (figure 1-1). Carefully lift off ring and remove all megacycle strips.

e. Remove two screws securing connector P2 to base (figure 1-2).

f. Loosen setscrews on each of the couplers on bottom of base. Slide couplers from shafts.

g. Carefully remove locating pin from each shaft (figure 1-3).

h. Remove three screws securing the rf section to the base (figure 1-2).

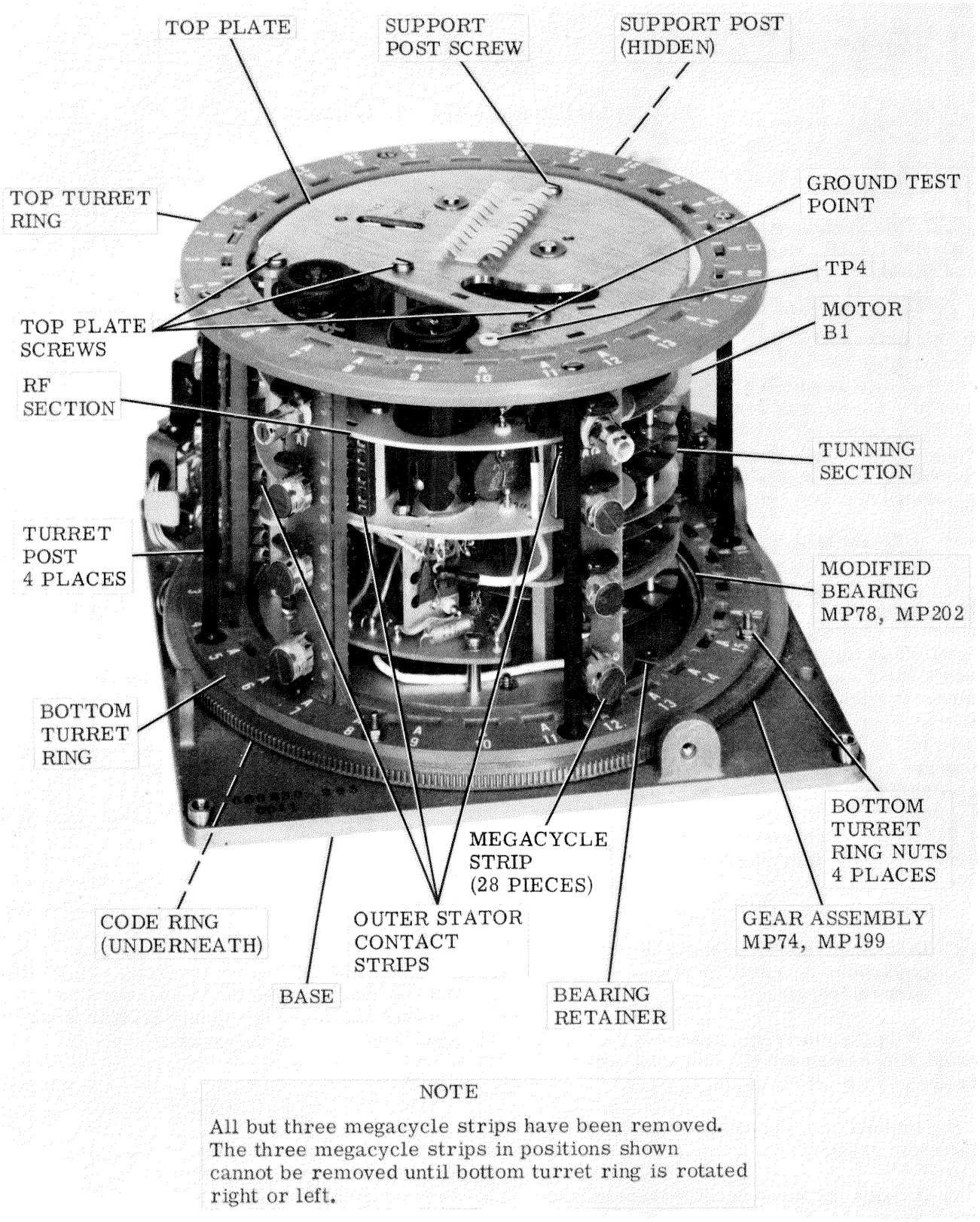
i. Remove screw securing support post to base (figure 1-2).

j. To remove the 100kc/10kc turret assembly, the rf section, and the top plate, proceed as follows:

(1) While holding the base, begin lifting the top plate. When the two sections have cleared the base, left them with both hands and place them on the bench.

CAUTION

Hold 100kc/10kc turret assembly and rf section together to avoid damaging contacts and wafers. Do not move or separate sections until placed on bench.




NOTE

All but three megacycle strips have been removed. The three megacycle strips in positions shown cannot be removed until bottom turret ring is rotated right or left.

Figure 1-1. RF Amplifier Electronic Assembly, Component Location

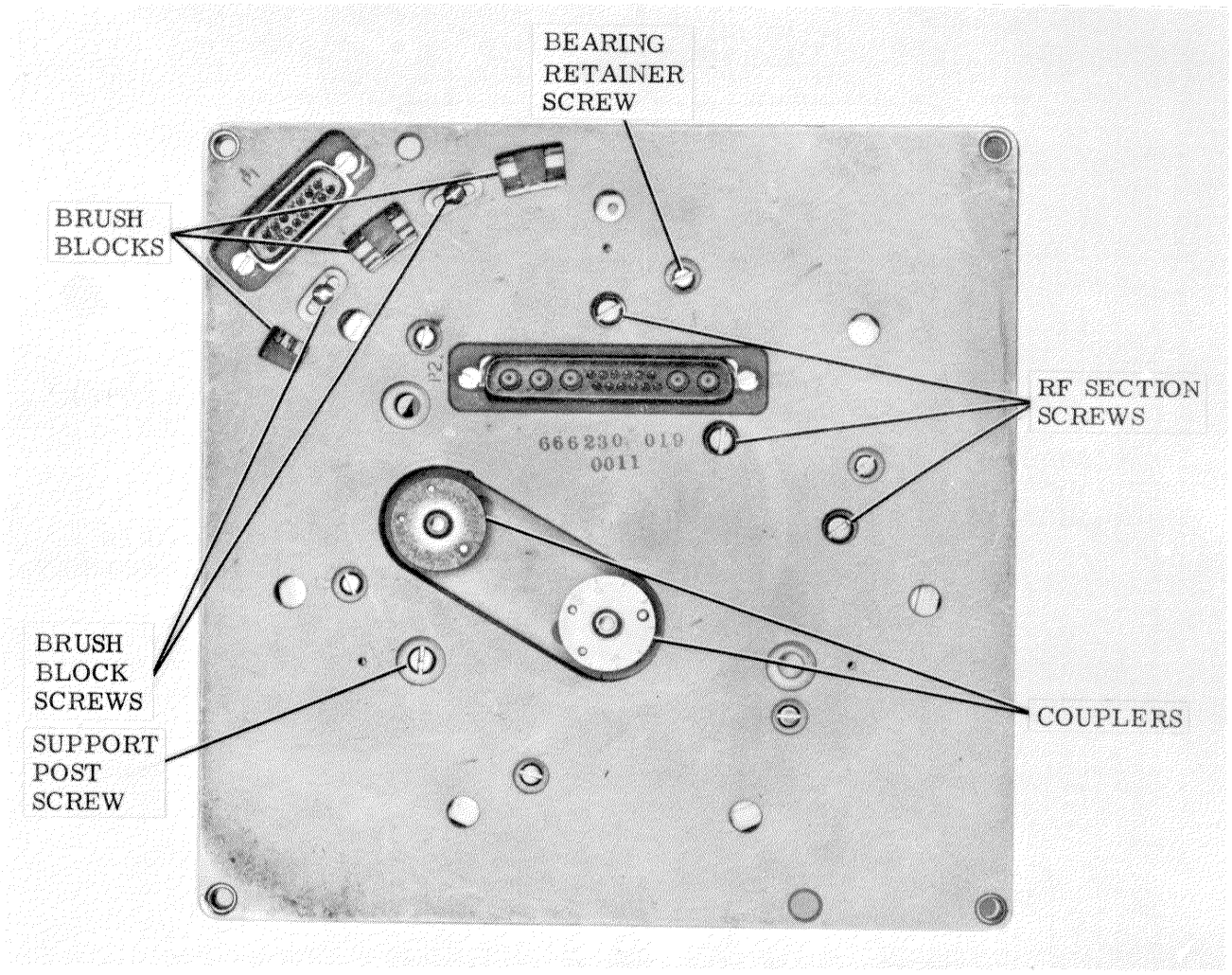



Figure 1-2. RF Amplifier Electronic Assembly, Bottom View

(2) Remove screw securing support post to top plate (figure 1-1) and remove post.

(3) Unsolder wires connecting TP4 and GRD test point. Remove the three screws securing rf section to top plate (figure 1-1) and 100kc/10kc turret assembly from top plate. Separate turret drive gear assembly (figure 1-3) from 100kc/10kc turret assembly. Carefully separate 100kc/10kc turret assembly from inside stator strips (figure 1-3) on rf section. To disassemble rf section proceed as follows (figure 1-3):

(a) Remove the top tube shields and tubes.

(b) Remove screws securing component board A38 to rf section and pull board away slightly from mounting brackets. Unsolder wires to free board for complete removal. Tag each unsoldered lead to ensure proper replacement.

(c) Starting from top, separate shields of rf section by unscrewing spacers between shields and unsoldering interconnecting wires. Do not disassemble unless the component to be replaced is not accessible without disassembly. If bottom shield is to be removed or replaced, remove two screws securing component board A1 and unsolder wires as necessary to free board.

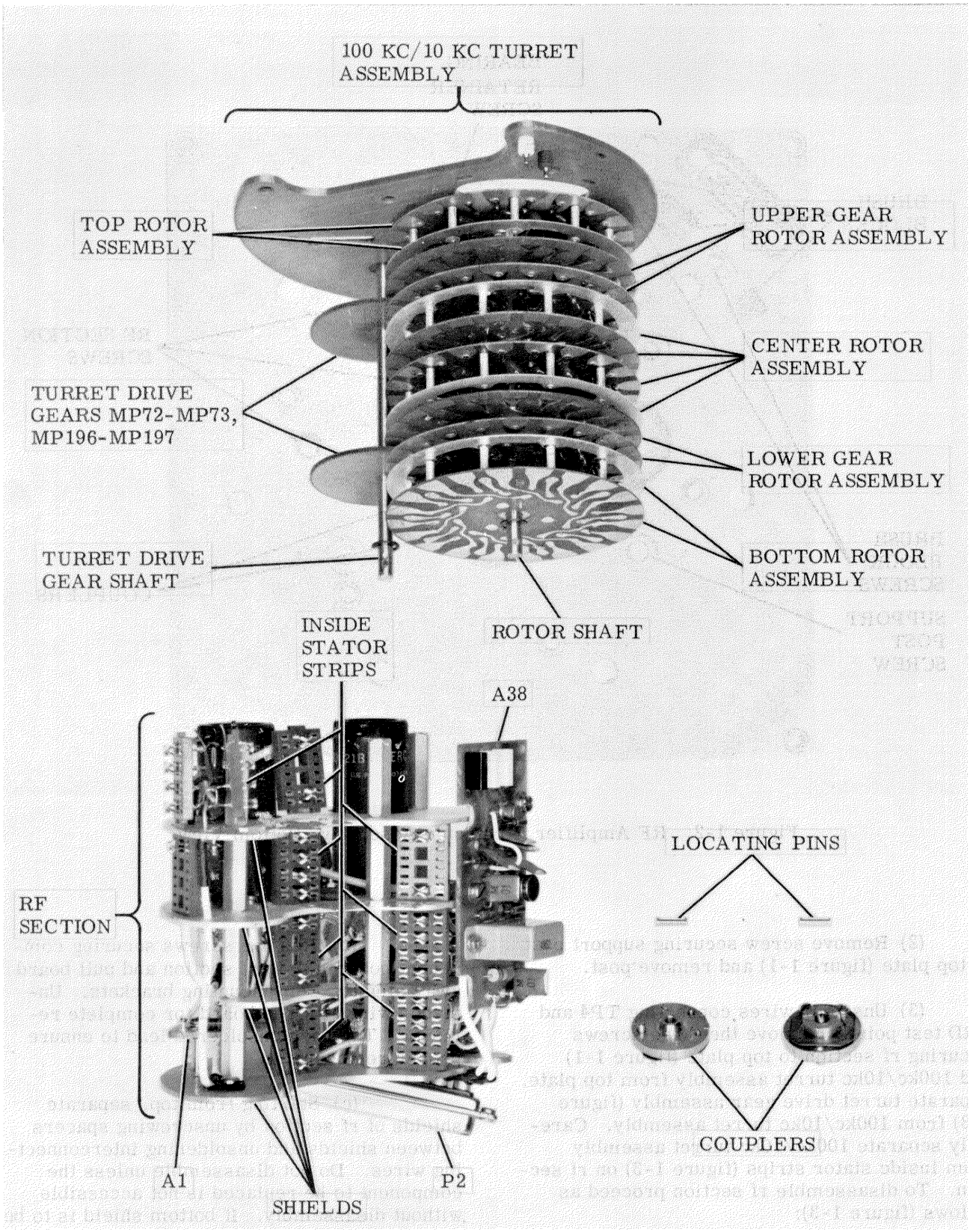



Figure 1-3. Tuning Assembly and RF Section, Component Location

(4) To disassemble the 100kc/10kc turret assembly proceed as follows:

Note

Do not disassemble 100kc/10kc turret assembly unless a component on the assembly is to be replaced. Remove only those parts necessary to replace the component.

(a) Remove the E-ring from the bottom of the shaft.

(b) Remove the top and bottom rotor assemblies by punching the roll pin out (located in each respective hub) from each assembly.

(c) Remove the next upper and lower gear rotor assemblies by removing the E-ring located on either side of each assembly on the turret shaft.

(d) Remove the center rotor assembly by punching out the roll pin (located in the hub).

(5) To remove the gears from the turret drive gear assembly, punch the roll pin out from each gear and slide gears from shaft. If only the bottom gear is to be removed, remove the E-ring from the shaft and slide the gear off from the bottom of the shaft.

Note

Do not remove the gear assembly (figure 1-1) from the base except specifically for replacing assembly or block brushes. Each time the gear assembly is removed, the brushes are exposed to dirt as well as possible damage.

## 1-5. TEST EQUIPMENT REQUIRED.

1-6. The following is a list of test equipment and special tools required to align the RF Amplifier Electronic Assembly after repair.

a. RF Signal Generator CAQI-606A.

b. Electronic Multimeter CCVO-91CA.

c. Amplifier Test Set TS-2132/WRC-1 (GD/E-666243-001).

d. Electronic Multimeter AN/USM-116.

e. Tuning Tools.

f. Wire, AWG. 16, single-strand, insulated, sixteen 5-inch lengths.

## 1-7. REPAIR.

1-8. This paragraph provides instructions for making necessary repairs to the RF Amplifier Electronic Assembly. Information required to aid in determining whether or not a component or part should be replaced is also included.

a. Inspect the entire electronic assembly for damaged or burned electrical components. Replace as necessary.

b. Inspect all wiring and solder connections. Replace broken wires; resolder loose solder connections.

c. Inspect stator contact strips. Replace strip if contacts are badly bent and cannot be straightened to accept tabs properly. All contacts should close with sufficient tension to ensure proper electrical contact.

d. Clean all mechanical parts with dry, lint-free cloth.

e. Inspect gears for damaged teeth. Replace if teeth are broken or chipped.

f. Inspect code ring on underside of gear assembly. Replace gear if code ring is broken or scratched to the extent that continuity is broken.

g. Inspect brush blocks and replace if visibly worn or chipped, or if contacts are badly bent.

h. Remove six screws securing bearing retainers to the base (figure 1-1 and figure 1-2) and remove six bearing retainers. Carefully lift gear assembly with bottom turret ring from the base.

CAUTION

When handling the gear, be extremely careful not to scratch or otherwise damage the surface of the code ring. Always place the gear on bench with code ring facing up.

i. Remove four nuts (figure 1-1) securing bottom ring to gear assembly and lift off turret ring. Separate ring bearing from gear.

j. Remove four turret posts only if necessary. To remove posts, unscrew each post.

Note

Do not remove brush block assembly (figure 1-2) from base unless the brushes are to be replaced. If brush block assembly must be replaced, remove the two screws securing the brush block assembly to the base and unsolder the six code leads (five at P1 and one at the motor relay). Normally, the leads soldered to the contact pins 1 through 13 of connector P2 and the coaxial connectors A1 through A5 snapped into connector P2, need not be removed. Should damage beyond repair occur to any of the contact pins 1 through 12, the connector P2 must be replaced. Should damage beyond repair occur to any of the coaxial connectors A1 through A5, only the damaged one should be replaced. To remove the coaxial connectors from connector P2, use cannon CET-C6A tool. To re-insert connectors, simply snap them into place.

k. Replace turret motor and motor relay as complete units if they are known to be defective. These components are not normally repaired.

l. Check that tubes seat properly in respective tube sockets. Replace tubes or tube sockets as necessary.

## 1-9. RE-ASSEMBLY.

1-10. Basically, re-assembly of the RF Amplifier Electronic Assembly is the reverse of disassembly. However, because of the many precautions and slight variations involved in the re-assembly process, the entire procedure has been included. To avoid delay in re-assembly, have all necessary tools and materials on hand from the start.

a. Re-assemble all mechanical and electrical components of rf section. Resolder all wire connections. Replace tubes and tube shields.

b. Re-assemble 100kc/10kc turret assembly using new E-rings where applicable. Ensure that all alignment holes are aligned on the right side of the flat on shaft when viewed from coupler end of shaft with flat facing down.

c. Re-assemble turret drive gear assembly. Do not replace E-ring on shaft at this time.

d. Press ring bearing into code ring and gear assembly. Replace the four turret posts. Position bottom turret ring onto gear assembly by mating roll pin on gear assembly with hole in the bottom turret ring (hole is between megacycle assembly positions A24 and A25). Secure bottom turret ring to gear assembly. Re-assemble gear assembly onto the base using the six bearing retainers (figure 1-1 and figure 1-2).

e. Mesh 100kc/10kc turret assembly wafers with inside stator contact strips of rf section as follows:

CAUTION

In following steps, do not spread contacts any more than required to slide wire through.

(1) Thread one 5-inch length of AWG. 16, single-strand insulated wire through each row of horizontal contacts on inner stator contact strips (figure 1-4). The wire should allow the contacts to open slightly in order to engage 100kc/10kc turret assembly wafers.

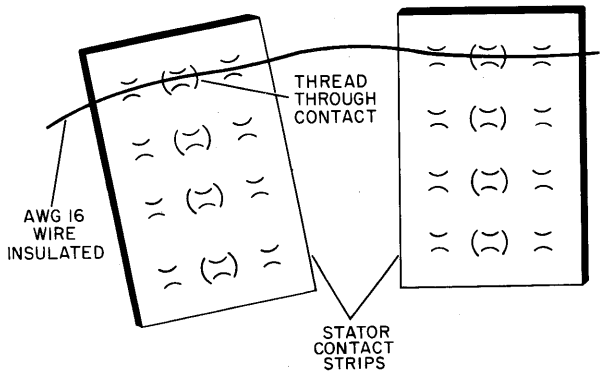



Figure 1-4. Stator Contact Strips, Contacts Open

(2) Carefully mesh wafers of the 100kc/10kc turret assembly with all contacts. The two inner stator contact strips on the upper rf section are not secured until the top plate is secured. These contact strips should be positioned in a vertical plane and then meshed with the wafers. Ensure that the shields of the rf section extend over the wafers and that the grounding springs attached to shields 2, 3, and 4 are positioned on the top side of the 100kc/10kc turret assembly.

(3) Slide wires out from contacts. Visually check that all contacts of stator contact blocks close sufficiently on wafers.

f. Mesh turret drive gear assembly with gears on 100kc/10kc turret assembly. Hold the three assemblies intact and attach the top plate to the proper ends of the three assemblies. Ensure that the tabs of the upper inner stator contact strips and the outer stator contact strips are positioned within the rectangular holes in the top plate. Secure the top plate with the three original screws.

g. Resolder the two wires to TP4 and the ground test point under the top shield.

h. Align the two flat washers with the two bearings in the base. Carefully lift the assemblies and place in position on base. Set support post in position between top shield and base. Secure support post to top shield. Secure rf section and support post to base.

i. Re-insert locating pins into shafts of 100kc/10kc turret assembly and turret drive gear assembly.

j. Slide coupler onto 100kc/10kc turret assembly shaft. Ensure that the hub of the coupler is not beyond the bottom surface of the base. Tighten setscrew on the coupler against flat of the 100kc/10kc rotor shaft (figure 1-3).

k. Rotate coupler so that 0 on coupler is opposite notch in base. Insert 4-inch, .125-inch (dia.) rod in top alignment hole on top shield. Rod should then pass through all wafers to base. If the upper rotor assembly or the lower rotor assembly (figure 1-3) has been rotated from the position established in procedure 1-10b., reposition either or both assemblies to allow the rod to pass through freely.

l. Slide coupler onto turret drive gear assembly shaft. Rotate coupler without engaging gears on 100kc/10kc turret assembly, so that 0 is opposite notch in base. Push shaft up so that gears engage and place new E-ring onto turret drive gear assembly shaft. Remove the rod.

m. Push connector P2 through slot in base and secure to base with two screws.

n. Insert any one of the 28 megacycle strips into the bottom turret ring. Position the top turret ring over the megacycle strip. Ensure that the A designation on the top turret ring corresponds to the A designation on the bottom turret ring. Secure the top turret ring using the four screws. Carefully rotate the assembly (figure 1-1) so that the megacycle strip contacts pass through the three sets of outer stator strip contacts. Ensure that there is equal distance between each set of outer stator strips and the megacycle strip. If the dimensions are not equal or should any interference exist between any one of the outer stator strips and the megacycle strip; loosen the three rf section screws (figure 1-2) and the support post screw (figure 1-2). Adjust the rf section until the spacing is equal or the interference is eliminated. Tighten the four screws. Remove the four screws securing the top turret ring and remove the ring. Remove the megacycle strip.

o. Rotate gear assembly (figure 1-1) until two adjacent rectangular slots in the bottom turret ring are located at either side of the contacts on the bottom set of outer stator strips. Hold the gear assembly in this position and insert all megacycle strips. (Prior to inserting the megacycle strips in their respective rectangular slots, inspect all contacts to ensure that they are not bent or misaligned.)

p. Position the top turret ring over the megacycle strips. Ensure that the A designation on the top turret ring corresponds to the A designations on the megacycle strips and the A designations on the bottom turret ring. Ensure that all megacycle strips are properly mated into the rectangular slots in both the top and bottom turret rings. Secure using the four original screws.

q. Loosen screws securing turret assembly drive motor and engage the gears with the gear assembly (figure 1-1). Tighten screws.

r. Replace dust cover unless adjustments are to be made. If adjustments are to be made, leave dust cover off and proceed to paragraph 1-11.

## 1-11. ADJUSTMENTS.

1-12. This paragraph provides instructions for making any adjustments required as a result of repair. Test equipment required is listed in paragraph 1-5. If any of the variable components specified in the alignment procedures is sealed or glued, break the seal, make the adjustment and reseal the component. If the equipment fails to meet the standards as specified in the procedures, further trouble-shooting may be necessary. If such is the case, refer to NAVSHIPS 94840(A) or 94841(A).

Note

Adjust only those circuits affected by repairs. All alignment procedures have been included in case of major overhaul.

## 1-13. PRELIMINARY INSTRUCTIONS.

1-14. Before beginning the alignment procedures, using test set TS-2132/WRC-1, perform the following steps:

a. Set test set OFF/STANDBY/OPERATE switch at OFF.

b. Remove four screws securing dust cover to the RF Amplifier Electronic Assembly. Remove dust cover.

c. Loosen three screws securing the turret assembly drive motor to the base. Slide the motor aside to disengage motor gear from gear assembly (figure 1-1). Rotate the turret assembly so that the megacycle strip A2 is meshed with the upper outer stator contact block (figure 1-1) located to the right of the ground test point on the top plate. Engage the turret assembly drive motor gear with the gear assembly. Tighten the three screws securing the motor.

d. Set mc control (rear) on test set at 2 and the 100kc (middle) and 10kc (front) controls at 5.

e. Rotate couplers on the bottom of the electronic assembly until position 5 is opposite the notch on the base for both couplers.

f. Place electronic assembly on top of test set so that couplers and connectors on bottom of electronic assembly are aligned with couplers and connectors on test set. Push down gently but firmly on electronic assembly base until the two guide pins on test set extend through base mounting holes and bottom of base is flush with top of test set.

g. Before securing base to test set, rotate the 100kc and the 10kc controls fully counterclockwise and then fully clockwise. While rotating the controls, observe that the 100kc rotor assembly rotates as the 100kc control is rotated and that the 10kc turret rotor assembly rotates as the 10kc control is rotated. (The 100kc rotor assembly can be observed through the elongated curved slot in the top plate and the 10kc rotor assembly can be observed by looking angularly between the two tubes and towards the center of the rf section.)

h. Secure the electronic assembly to the test set using the mounting screws attached to the electronic assembly. Set the test set at 100kc and 10kc controls at 0.

i. Set the test set OFF/STANDBY/OPERATE switch at STANDBY. The +28V ON and STANDBY indicator lamps will light.

j. Connect Multimeter AN/PSM-4 to +20 VDC test points on rear of test set. Adjust 20 V ADJ potentiometer for +20 vdc indication on multimeter.

k. Set OFF/STANDBY/OPERATE switch at OPERATE. Observe that the OPERATE and +110 VDC indicator lamps light and the STANDBY indicator lamp goes out.

l. Set multimeter to indicate 300 volts fullscale and check that +110±10 vdc is present at +110 VDC test points on test set.

m. Reverse multimeter leads and check that -30±1.5 vdc is present at -30 VDC test points on test set.

## 1-15. BRUSH BLOCK ADJUSTMENT.

1-16. To align the brush blocks and stator contacts, proceed as follows:

a. Set OFF/STANDBY/OPERATE switch at STANDBY.

b. Rotate mc control on test set to each of the 28 positions. At each position, visually check that the turret positions correctly with the appropriate megacycle strip, A2 through A29, connected at the stator contact block nearest ground test point (figure 1-2). Also, check that the blades of the megacycle strip are centered in the stator contacts. If blades are not centered, proceed as follows:

(1) Set OFF/STANDBY/OPERATE switch at OFF.

(2) Remove electronic assembly from test set, but do not disturb setting of mc control or couplers on electronic assembly.

(3) Carefully turn electronic assembly upside down. Loosen two brush block screws on bottom of base near motor mount.

(4) If turret stopped with megacycle strip blades extending too far clockwise in stator contacts, slide brush blocks slightly counter-clockwise. If turret stopped too far counter-clockwise, slide brush blocks clockwise.

(5) Tighten brush block screws. Repeat steps a. and b. with brush blocks and adjust properly.

Note

If turret does not stop rotating, troubleshoot to determine if brush blocks must be realigned or replaced.

## 1-17. OVERALL ALIGNMENT.

1-18. To align the RF Amplifier Electronic Assembly, proceed as follows:

a. Set test set controls as follows:

(1) mc control (rear): 5.

(2) 100 kc control (middle): 1.

(3) 10 kc control (front): 0.

(4) AGC GAIN control: fully counter-clockwise.

(5) EXCITE/RECEIVE switch: RECEIVE.

b. Apply power to RF Signal Generator CAQI-606A and Electronic Multimeter CCVO-91CA.

c. Set rf signal generator as follows:

(1) Frequency: 5.100 mc.

(2) Modulation: CW.

(3) Output level: 1 millivolt.

d. Connect rf signal generator to REC RF IN jack on test set.

e. Connect electronic multimeter through 50-ohm divider probe to REC RF OUT jack on test set. Change range of electronic multimeter until indication is obtained.

f. Tune the top variable transformer (T4) on megacycle strip A5 for a peak indication on electronic multimeter.

g. Count clockwise five megacycle strips to A28 and locate the second variable transformer (T3) from top on A28. Tune T3 for a peak indication on electronic multimeter.

h. Count clockwise another five strips and locate the two bottom transformers (T1 and T2) on A23. These transformers are to be swamp tuned as follows:

(1) Connect 200-ohm, 1/4-watt resistor between bottom lead of capacitor C1 (between T1 and T2) and motor relay bracket. (Select lower range on multimeter for indication.)

(2) Tune T2 for peak indication on electronic multimeter.

(3) Disconnect 200-ohm resistor and connect to top lead of C1.

(4) Tune T1 for peak indication on electronic multimeter.

(5) Disconnect 200-ohm resistor.

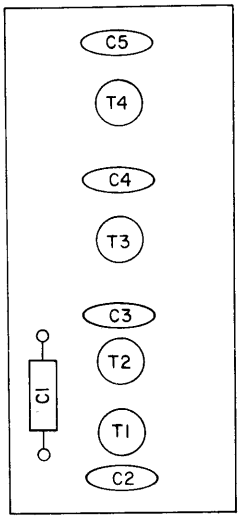
i. Retune A5T4 and A28T3 until maximum indication is obtained. Final indication should be 40±4db.

j. Repeat steps f. through h. for each of the remaining positions of the test set mc control. Refer to figure 1-5 for the location of transformers T4, T3, T2 and T1 according to the frequency selected by the test fixture mc control. The indications to be obtained upon completion of tuning at each frequency are:

(1) 2 to 20 mc: 40±4 db.

(2) 21 to 29 mc: 37±4 db.

k. Turn off power and disconnect all equipment. Remove electronic assembly from test set and replace dust cover.




| MC CONTROL SETTING | T4 | T3 | T1 & T2 | MC CONTROL SETTING | T4 | T3 | T1 & T2 |
|---|---|---|---|---|---|---|---|
| 2 | A2 | A25 | A20 | 16 | A16 | A11 | A6 |
| 3 | A3 | A26 | A21 | 17 | A17 | A12 | A7 |
| 4 | A4 | A27 | A22 | 18 | A18 | A13 | A8 |
| 5 | A5 | A28 | A23 | 19 | A19 | A14 | A9 |
| 6 | A6 | A29 | A24 | 20 | A20 | A15 | A10 |
| 7 | A7 | A2 | A25 | 21 | A21 | A16 | A11 |
| 8 | A8 | A3 | A26 | 22 | A22 | A17 | A12 |
| 9 | A9 | A4 | A27 | 23 | A23 | A18 | A13 |
| 10 | A10 | A5 | A28 | 24 | A24 | A19 | A14 |
| 11 | A11 | A6 | A29 | 25 | A25 | A20 | A15 |
| 12 | A12 | A7 | A2 | 26 | A26 | A21 | A16 |
| 13 | A13 | A8 | A3 | 27 | A27 | A22 | A17 |
| 14 | A14 | A9 | A4 | 28 | A28 | A23 | A18 |
| 15 | A15 | A10 | A5 | 29 | A29 | A24 | A19 |

Figure 1-5. Typical Megacycle Strip, Transformer Location

## SECTION II

## FREQUENCY STANDARD ELECTRONIC ASSEMBLY

### 2-1. GENERAL.

2-2. This section provides instructions for repairing the Frequency Standard Electronic Assembly (A2A5), which is part of Radio Transmitter T-827/URT (T-827/URT) and Radio Receiver R-1051/URR (R-1051/URR). The instructions include procedures for disassembly, repair, re-assembly, and adjustment or alignment required as a result of repair. The instructions provide information required for replacing those parts that can be expected to require replacement during the service life of the equipment. These procedures are normally performed at a depot or module repair facility.

### 2-3. DISASSEMBLY.

2-4. This paragraph provides instructions for disassembling the Frequency Standard Electronic Assembly (A2A5). Mechanical parts are identified in figure 2-1. Reference symbol numbers are included as applicable. In each case, the first mechanical part (MP) number listed pertains to the R-1051/URR; the second, to the T-827/URT. Part numbers and descriptions of mechanical parts are listed by reference symbol number in the Maintenance Parts List in either NAVSHIPS 94840(A) or 94841(A). To disassemble the Frequency Standard Electronic Assembly, proceed as follows:

Note

Disassemble only as much of the electronic assembly as is necessary for repair.

a. With the electronic assembly placed on a work bench, loosen two dust cover screws and lift off dust cover.

b. Remove the two screws securing the top plate to the case (figure 2-1).

c. Remove the cover assembly and oven housing. To prevent damage to the coaxial cable and the one lead connected to A2, carefully lift off the cover assembly and tilt it slightly towards A1 until the bottom of the oven housing has cleared the oven insulator in the case. Place the case and cover assembly on a flat surface.

d. Remove the four screws securing the top plate to the threaded standoffs (figure 2-1). Record the dial setting on the top plate and remove the top plate and pinion assembly (figure 2-1).

e. Remove the four screws securing A2 to the oven support plate. Carefully separate A2 from the oven support plate. Ensure that the interconnecting leads are not damaged. Do not unsolder the interconnecting leads unless it is absolutely necessary. (Mark all leads should unsoldering of the leads become necessary.)

f. Remove the three screws securing the oven support plate to the three oven cap spacers. Carefully separate oven support plate from oven cap spacers. Ensure that the leads through the oven support plate are not damaged. Do not unsolder the interconnecting leads at the oven cap terminals unless it is absolutely necessary. (Mark all leads should unsoldering of the leads be necessary.)

g. Carefully separate the oven cap insulator from the oven cap. (The top of the oven cap should now be exposed.)

h. Remove the screw and two washers securing the oven housing to A3 bracket. Carefully separate the oven housing from the oven cap. Ensure that the leads interconnecting the oven housing, the oven cap, A2, and A3 are not damaged. Do not unsolder the interconnecting leads unless it is absolutely necessary. (Mark all leads should unsoldering of the leads be necessary.

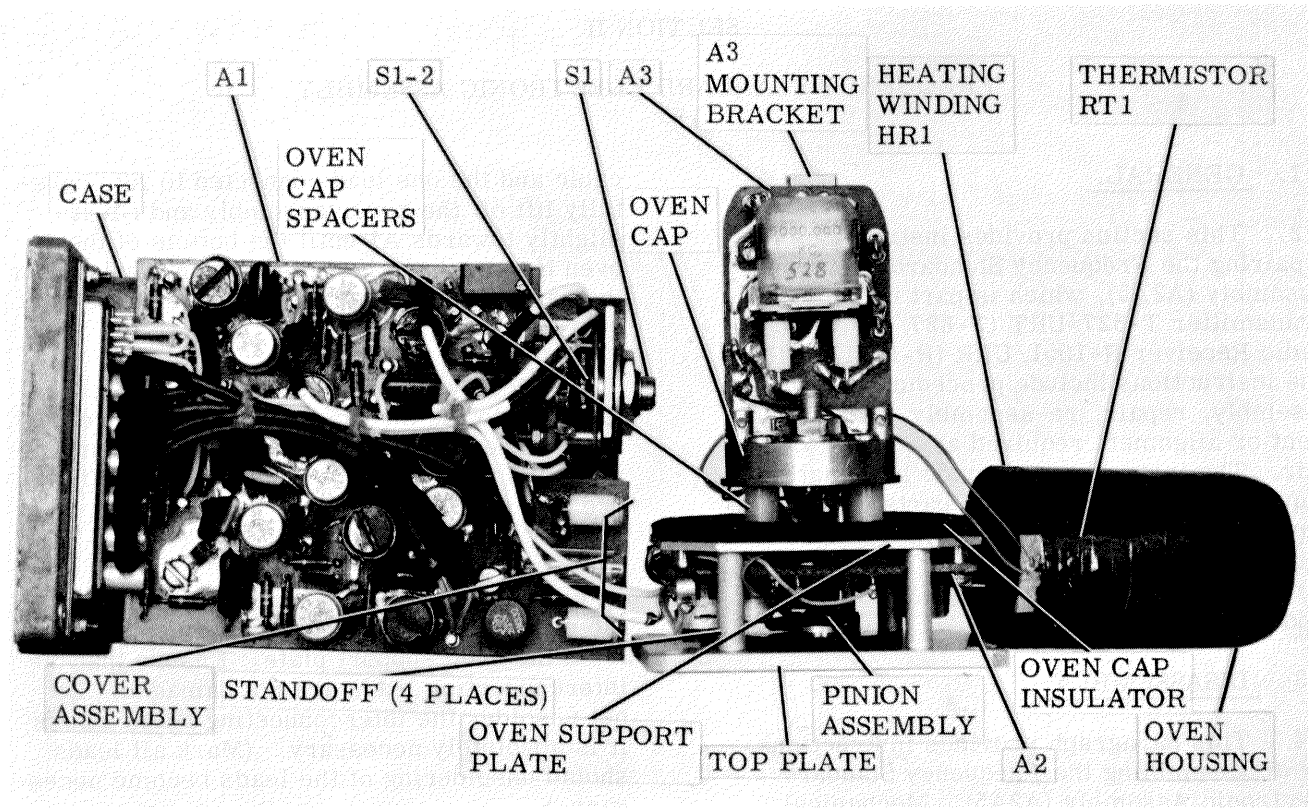



Figure 2-1. Frequency Standard Electronic Assembly, Component Location

2-5. TEST EQUIPMENT REQUIRED.

2-6. The following is a list of test equipment required for adjusting the Frequency Standard Electronic Assembly after repair.

a. Frequency Standard Test Set TS-2134/WRC-1 (GD/E 666243-003).

b. Temperature Measuring Bridge Network (paragraph 2-7).

c. Voltage Divider Network (paragraph 2-12.

d. Frequency Meter CAQI-524D.

e. Multimeter AN/PSM-4.

f. RF Signal Generator CAQI-606A.

g. Electronic Multimeter CCVO-91CA.

h. Oscilloscope, AN/USM-105A.

i. 0-30 VDC Power Supply.

j. DC Voltmeter CAQO-412A.

2-7. TEMPERATURE MEASURING BRIDGE NETWORK.

2-8. A temperature measuring bridge network must be fabricated for measuring the

oven temperature of the Frequency Standard Electronic Assembly.

2-9. MATERIALS. The materials required to fabricate the temperature measuring bridge network are listed below:

a. Minibox chassis, 3x4x5 inches, 1 required.

b. Helipot, 10K, with calibrated dial, 1 required.

c. Battery, 1.3 volt, 1 required.

d. Thermistor, Veco 51A35, 1 required.

e. Binding post, red, 3 required.

f. Binding post, black, 1 required.

g. Toggle switch, SPST, 1 required.

h. Resistor, 1.2K, 1/4 w, 1 per cent, 1 required.

i. Resistor, 2.1K, 1/4 w, 1 per cent, 1 required.

j. Resistor, 10K, 1/4 w, ww, 1 per cent, 1 required.

k. Resistor, 8.2K, 1/2 w, 5 per cent, 1 required.

l. Resistor, 10K, 1/2 w, 5 per cent, 1 required.

2-10. FABRICATION. Referring to figure 2-2, drill necessary holes and mount all hardware and components to minibox chassis. Wire components in accordance with figure 2-3.

CAUTION

Use extreme care when handling thermistor.

2-11. CALIBRATION. Prior to use, the temperature measuring bridge network must be calibrated, and a conversion chart plotted. The chart provides a quick reference to convert the helipot reading into a usable temperature reading (°C). This chart should remain with the bridge network and should be maintained until the network is recalibrated. To calibrate the temperature measuring bridge network, proceed as follows:

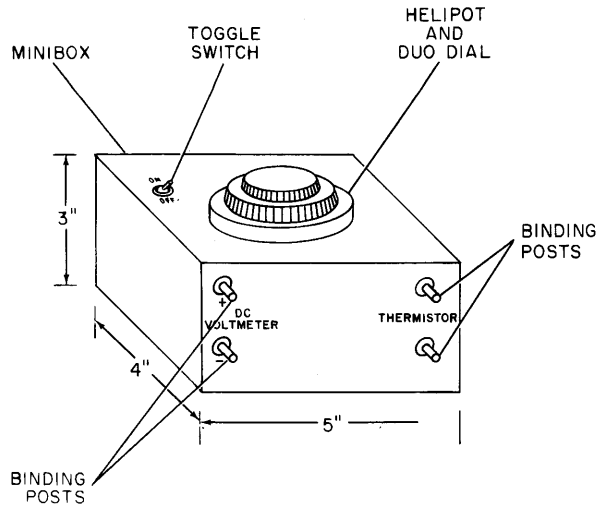



Figure 2-2. Temperature Measuring Bridge Network, Chassis Layout

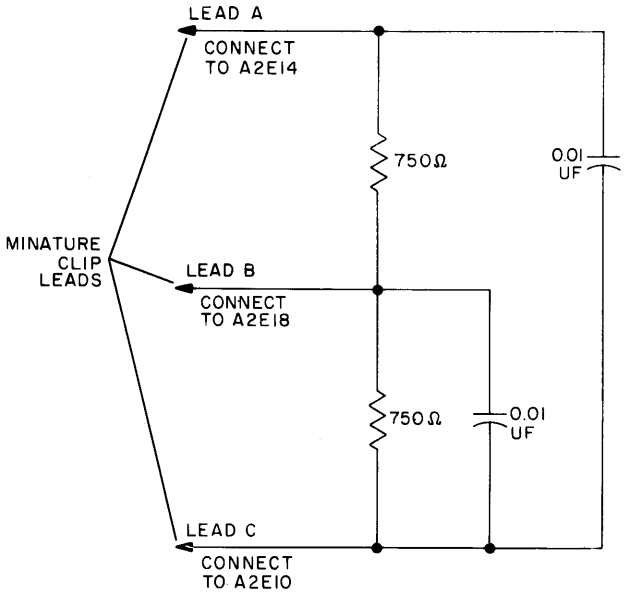



Figure 2-3. Temperature Measuring Bridge Network, Schematic Diagram

a. Heat the oil bath to 80°C, measuring the temperature of the bath with a centigrade thermometer having an accuracy of ±1 degree.

b. Connect the dc voltmeter to the DC VOLTMETER terminals on the bridge network.

c. Connect the thermistor to the THERMISTOR terminals on the bridge network.

d. Immerse the thermistor of the bridge network into the oil bath.

e. Zero-set the dc voltmeter by adjusting the helipot on the bridge network.

f. Prepare the chart as follows: Mark chart in 1-degree increments, from 80°C to 90°C, as follows:

(1) Record the helipot indication (dial setting) on the chart next to 80°C.

(2) Increase the oil bath temperature to 81°C.

(3) Zero-set the dc voltmeter using the helipot and record the helipot dial setting next to 81°C.

(4) Continue to increase the temperature, in 1-degree increments, to 90°C. At each 1-degree increment, zero-set the dc voltmeter and record the helipot dial setting next to the temperature on the chart.

2-12. VOLTAGE DIVIDER NETWORK.

2-13. A voltage divider network must be fabricated to align the 5 mc oscillator circuit in the Frequency Standard Electronic Assembly.

2-14. MATERIALS. The materials required to fabricate the voltage divider network are listed below:

a. Resistor, 750 ohms, carbon, 1/4 watt, 5 per cent, 2 required.

b. Capacitor, .01 uf, fixed, mica, 2 required.

c. Miniature clip leads, 3 required.

d. Wire and soldering materials, as required.

2-15. FABRICATION. To fabricate the voltage divider network, assemble the parts as shown in figure 2-4.

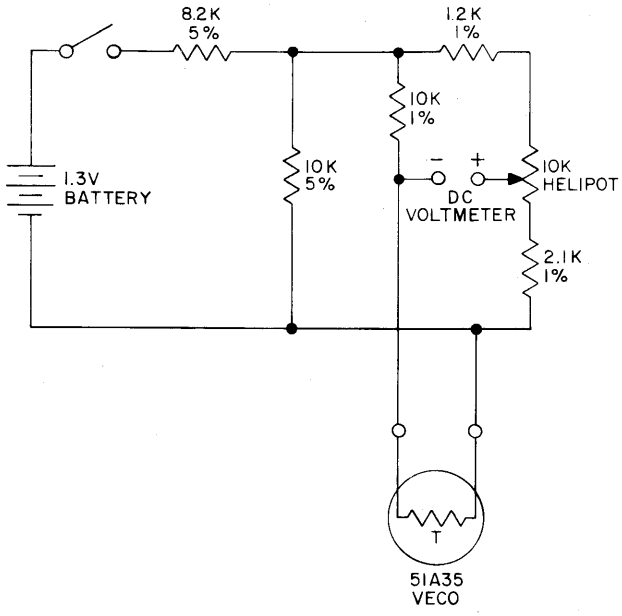



Figure 2-4. Voltage Divider Network, Schematic Diagram

2-16. REPAIR.

2-17. This paragraph provides instructions for making necessary repairs to the Frequency Standard Electronic Assembly. Information required to aid in determining whether or not a component or part should be replaced is also included.

a. Replace the cover assembly if the pinion assembly (for adjusting capacitor C1) or the indicator gear and associated parts do not function properly.

b. Replace oven housing if:

(1) Wires wound around housing are broken or burned.

(2) Thermistor secured under wires is defective.

2-18. RE-ASSEMBLY.

2-19. Basically, the re-assembly of the Frequency Standard Electronic Assembly is the

reverse of disassembly. However, there are a few exceptions, which are as follows:

a. Ensure that the holes in the oven cap insulator, the oven support plate, and A2 respectively, are aligned with respect to the piston of capacitor C1, which is secured to the oven cap.

b. When attaching the top plate to the cover assembly, observe the following:

(1) If the pinion assembly and/or capacitor C1 were not replaced, ensure that the dial is set exactly as it was when the top plate was removed. Ensure that the hex shaft at the end of the pinion assembly is engaged with the hex section of the piston of capacitor C1. To achieve the engagement, very slowly rotate the pinion assembly at its slotted end clockwise and then counterclockwise. An audible check may be heard or the drop of the hex shaft into the hex section may be felt. (It is possible that engagement may occur immediately upon insertion of the hex shaft into the piston.)

(2) If the pinion assembly and/or capacitor C1 were replaced, rotate capacitor C1 fully clockwise and rotate pinion assembly so dial is positioned at 0.

c. If resistor R1 or the oven assembly were replaced, the new resistor should not be soldered to the terminals until the temperature adjustment has been completed.

d. If capacitor C10 was replaced during repair, the new capacitor should not be soldered to the terminals until the 5 mc oscillator circuit adjustment is completed.

2-20. ADJUSTMENTS.

2-21. After repair of the Frequency Standard Electronic Assembly has been completed, the result of the repairs accomplished should be evaluated for effect upon electrical circuit operation. This is to prevent tampering with critical adjustment controls unnecessarily.

2-22. There are three major alignments or adjustments that can be made to the electronic assembly. These are output peaking, temperature adjustment, and 5 mc oscillator alignment. If the repairs affect only the output stages, then perform only that alignment. If the repairs affect the 5 mc oscillator circuit, it will be necessary to perform the 5 mc oscillator circuit alignment and output peaking, but not the temperature adjustment.

2-23. PRELIMINARY INSTRUCTIONS.

2-24. Before beginning the alignment procedures, using test set TS-2134/WRC-1, perform the following steps:

a. Set POWER switch on test set at OFF.

b. Connect 115 vac to J6 on test set.

c. Plug Frequency Standard Electronic Assembly into position marked 1 on top of test set.

Note

Remaining test positions on top of test set are for aging up to four other Frequency Standard Electronic Assemblies. This will in no way affect alignment of the electronic assembly in position 1, the only position where alignment can be performed.

d. Set OUTPUT SELECTOR switch on test set at 1.

e. Set POWER switch on test set at ON.

f. Connect Multimeter AN/PSM-4 to 20 VDC test points on rear of test set. Adjust 20 V ADJ potentiometer on rear of test set for indication of 20 vdc on multimeter.

g. Disconnect multimeter. Allow 30-minute warm-up period before proceeding to next step.

2-25. OUTPUT PEAKING ALIGNMENT.

2-26. This paragraph provides instructions for peaking the 5 mc multiplier, dividers and comparator circuits (A1). These procedures are normally required only as a result of repairs made to these circuits.

a. Set switch S1 on top of electronic assembly at EXT.

b. Connect Electronic Multimeter CCVO-91CA probe to pin 1 of S1. Ground clip lead of probe.

c. Connect RF Signal Generator CAQI-606A to 5 MC IN jack on test set. Controls should be set as follows:

(1) Frequency: 5.000000 mc ±25 cps.

(2) Output level: 50 mv.

(3) Modulation: CW.

(4) Modulation amplitude: zero per cent.

d. Tune transformer A1T6 for peak indication on electronic multimeter.

e. Set rf signal generator output at 1.5 volts and observe 90-130 millivolts on the electronic multimeter.

f. Reset rf signal generator output at 90 MV.

g. Connect electronic multimeter to 10 MC jack on test set. Tune transformer A1T4 for peak indication on multimeter. Observe 70-110 millivolts on electronic multimeter.

h. Tune rf signal generator for an output of 4.970000 mc ±25 cps.

i. Connect electronic multimeter to 1 MC jack on test set. Tune transformers A1T2 and A1T3 for peak indication on multimeter.

j. Disconnect electronic multimeter from test set. Connect CHANNEL A input of Oscilloscope AN/USM-105A to 1 MC jack on test set.

k. Vary rf signal generator frequency output from 4.96 mc to 5.04 mc and observe oscilloscope presentation. Signal should remain synchronized from 4.96 mc to 5.04 mc. If not, repeat steps h. through k. as necessary.

l. Tune rf signal generator for an output of 4.970000 mc ±25 cps.

m. Connect electronic multimeter to 500 KC jack on test set. Tune transformer A1T1 for peak indication on electronic multimeter.

n. Disconnect electronic multimeter. Connect EXT. HORIZONTAL INPUT on oscilloscope to 500 KC jack on test set. A lissajous figure as shown ∞ should be displayed on the oscilloscope. Vary the rf signal generator output frequency above and below 4.97 mc. The lissajous pattern will change in appearance but should not become fuzzy.

o. If the lissajous pattern becomes fuzzy, repeat steps l., m. and n. If repeating procedures l., m. and n does not eliminate the fuzzy appearance of the lissajous figure, repeat steps h. through n.

p. Disconnect oscilloscope. Connect electronic multimeter to the 500 KC jack on test set. Set up rf signal generator for an output of 5 mc ±100 cps at 90 mv. Observe indication of 185 to 235 mv on electronic multimeter.

q. Disconnect electronic multimeter from 500 KC jack on test set and connect it to the 1 MC jack on the test set. Set rf signal generator for an output of 5 mc ±100 cps at 90 mv. Observe indication of 350 to 550 mv on electronic multimeter.

r. Connect electronic multimeter to contact 2 of S1 on the electronic assembly. Set S1 at INT. Reset R22 for an indication of 90 mv on the electronic multimeter.

s. Disconnect electronic multimeter and connect it to the 5 MC jack on the test set. Observe indication of 450 to 750 mv on the electronic multimeter. Disconnect electronic multimeter.

t. Disconnect rf signal generator. If the oven control circuit (A2) was repaired, proceed to paragraph 2-27. If the 5 mc oscillator circuit (A3) was repaired, proceed to paragraph 2-29. Otherwise, turn off power and disconnect all equipment. Remove electronic assembly from test set, set switch S1 on top of electronic assembly at INT, and replace dust cover.

## 2-27. TEMPERATURE ADJUSTMENT.

2-28. If repairs were made to the oven control circuit (A2), proceed as follows:

a. Fabricate temperature bridge network as outlined in paragraph 2-7.

b. Remove the four screws on top plate of cover assembly and lift out cover assembly.

c. Remove screw from end of oven housing. Slide oven housing approximately 1/2 inch from oven assembly.

d. Insert thermistor or thermo-couple into hole in oven housing. Very carefully slide oven housing back onto oven assembly, but do not fasten with screw. Allow a 30-minute warm-up period before proceeding to the next step.

e. Zero-set dc voltmeter with helipot on temperature bridge network. Convert helipot dial reading to temperature using chart plotted in paragraph 2-11. Temperature should be 85 ±2°C. If it is above 87°C, replace resistor A2R1 (figure 5-68, NAVSHIPS 94840(A) ) with the next higher resistance value (do not solder until correct resistor is selected). If the temperature is below 83°C, replace resistor A2R1 with one with a lower resistance value.

f. When resistor in circuit is correct to maintain temperature of oven at 85 ±2°C, solder resistor to appropriate terminals and remove thermistor or thermocouple from oven housing.

g. If repairs were also made to the 5 mc oscillator circuit, proceed to paragraph 2-29. If not, proceed to step h.

h. Secure oven housing with screw and two washers.

i. Place oven assembly into oven and secure top plate of cover assembly.

j. Turn off power and disconnect test equipment.

k. Remove electronic assembly from test set and replace dust cover.

2-29. 5 MC OSCILLATOR CIRCUIT ALIGNMENT.

2-30. If repairs were made to the 5 mc oscillator circuit, proceed as follows:

a. Fabricate voltage divider network as outlined in paragraph 2-15.

b. Unsolder lead of resistor A2R12 from A2E5.

c. Connect lead A of voltage divider network to A2E14 on oven control circuit; lead B to A2E18 and lead C to A2E10.

d. Connect 0-30 vdc power supply to unsoldered lead of A2R12. Adjust power supply for an output of 30 vdc.

e. Connect Electronic Multimeter CCVO-91CA to pin 2 of S1 on top of electronic assembly. Ground clip lead of probe.

f. Tune transformer A3T2 for peak indication on electronic multimeter. Adjust A1R22 to increase indication if necessary.

g. Decrease power supply output to the minimum voltage required to sustain oscillations.

h. Tune A3T2 for peak indication.

i. Repeat steps g. and h. until oscillations can be maintained with a power supply output of 15 vdc or less.

j. Disconnect power supply and voltage divider network. Resolder A2R12 to terminal A2E5.

k. Set switch S1 on top of electronic assembly at INT.

l. Connect Frequency Meter CAQI-524D to 5 MC OUT jack on test set.

m. Adjust capacitor C1 for indication of 5,000,000.0 cps ±.1 cps. The dial on top plate should indicate between 7 and 12. If not, select the proper value of capacitance for capacitor A3C10 (56, 62, 75, or 82 u uf) according to the frequency error. Replace C10 and re-adjust C11.

n. Disconnect frequency meter. Connect probe of electronic multimeter to pin 2 of S1. Ground clip lead of probe.

o. Adjust potentiometer A1R22 for indication of 90 mv on electronic multimeter.

p. Set switch S1 on top of electronic assembly at COMP. Indication lamp DS1 should light. If it does not light, refer to paragraph 2-29.

q. Connect rf signal generator to 5 MC IN jack on test set.

r. Tune rf signal generator for an output of 5 mc at 50 mv.

s. Connect electronic multimeter to contact 1 of switch S1 on top of electronic assembly.

t. Tune A1T6 for peak indication on electronic multimeter.

u. Increase rf signal generator output to 1.5 volts. Electronic multimeter will indicate 90 to 110 millivolts.

v. Turn off power and disconnect all equipment.

w. Set switch S1 on top of electronic assembly at INT. Remove electronic assembly from test set and replace dust cover.

## SECTION III

## TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY

### 3-1. GENERAL.

3-2. This section provides instructions for repairing the Translator/Synthesizer Electronic Assembly (A2A6), which is part of Radio Transmitter T-827/URT and Radio Receiver R-1051/URR. The instructions include procedures for disassembly, repair, re-assembly, and adjustment or alignment required as a result of repair. The instructions provide information required for replacing those parts that can be expected to require replacement during the service life of the equipment. These procedures are normally performed at a depot or module repair facility.

### 3-3. DISASSEMBLY.

3-4. This paragraph provides instructions for disassembling the Translator/Synthesizer Electronic Assembly (A2A6). The instructions include removal and/or disassembly procedures for the electronic subassemblies within the electronic assembly, as appropriate. Major mechanical parts are identified in figures 3-1 through 3-4. Reference symbol numbers are included as applicable. In each case, the first mechanical part (MP) number listed pertains to the R-1051/URR; the second, to the T-827/URT. Part numbers and descriptions of the mechanical parts are listed by reference symbol number in the Maintenance Parts List in either NAVSHIPS 94840(A) or NAVSHIPS 94841(A). Disassembly of the Translator/Synthesizer Electronic Assembly is accomplished in the following paragraphs.

### 3-5. 1 MC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-6. To disassemble the major mechanical parts of the 1 MC Synthesizer Electronic Subassembly (A2A6A1), proceed as follows (figures 3-1 and 3-2):

a. Turn Translator/Synthesizer Electronic Assembly upside-down. Remove six screws securing bottom plate to Translator/Synthesizer base. Remove four screws (figure 3-1) securing MC Synthesizer Electronic Subassembly to the base of the Translator/Synthesizer.

b. Separate MC/Synthesizer Assembly from the base of the Translator/Synthesizer. Remove two screws securing dust cover to the assembly and remove the dust cover.

c.

(1) Unsolder all wires (mark all wires) attached to the coding switch (figure 3-2).

(2) Unsolder coax cable at A1 (figure 3-2) terminals 1 and 2 (mark the two leads).

(3) Disconnect P1 (at end of the coaxial cable) from J1 on A2 (see dust cover). Unsolder coaxial cable shield lead from A2 terminal 2.

(4) Unsolder coaxial cable leads (mark the two leads) from A3 terminals 7 and 9.

(5) Unsolder lead from A1 terminal 5 (mark wire).

d. Remove screw securing ground strap to bracket (figure 3-2).

e. Unsolder motor leads. One lead is soldered to a ground lug located above and to the right of the connector J1 and the other lead is soldered to the positive terminal (figure 3-2).

f. Remove two screws and two nuts securing connector J1 to the base plate (figure 3-2).

g. Remove the two flat head screws securing the bracket assembly to the base plate. The bracket assembly contains A2, A3, and the motor relay. Slide the bracket assembly away from the crystal switch assembly (figure 3-2), until the two locating pins on the base plate are cleared. Carefully remove the bracket. The connector J1 will come off with bracket assembly.

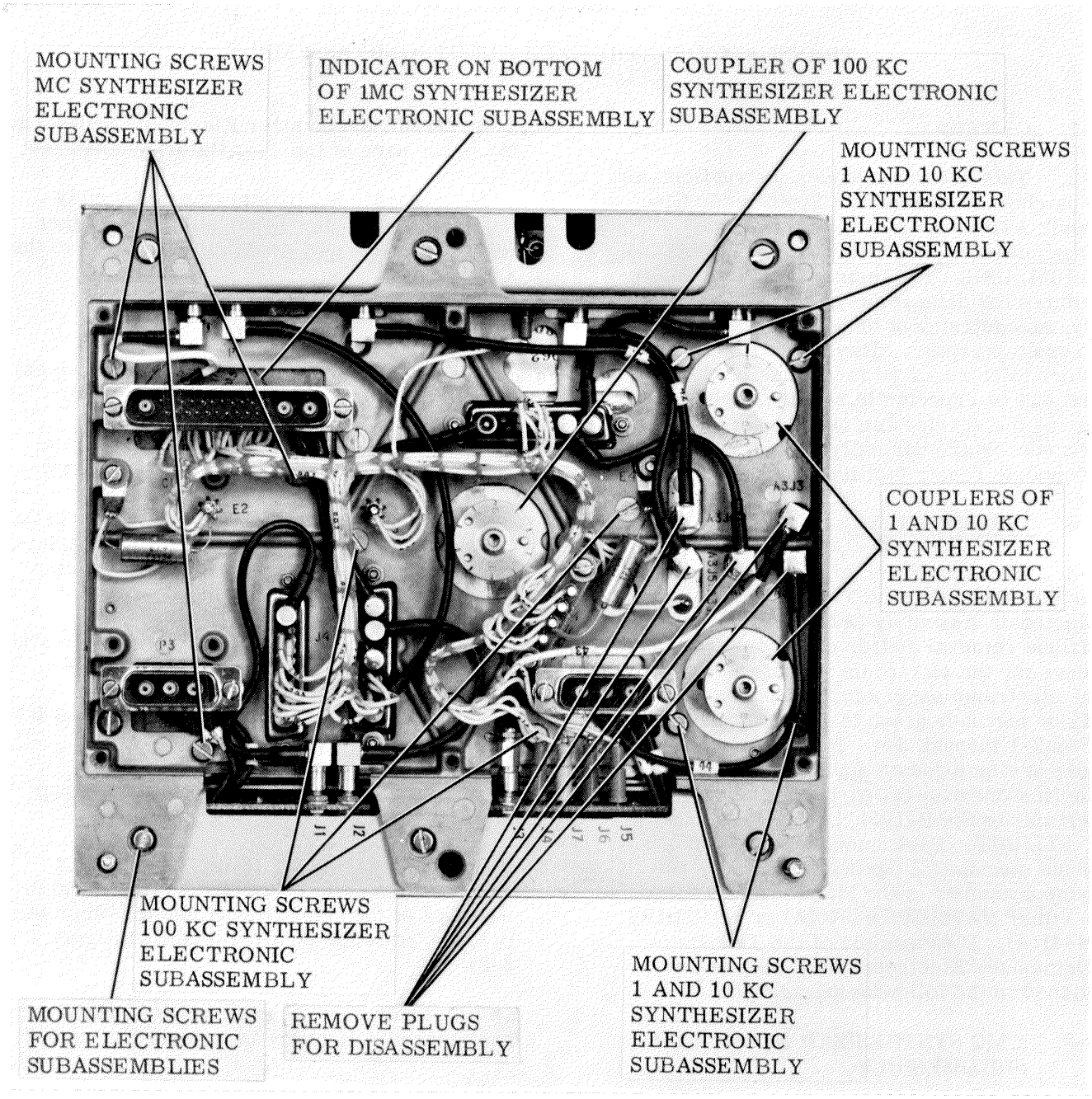



Figure 3-1. Translator/Synthesizer Electronic Assembly, Bottom View

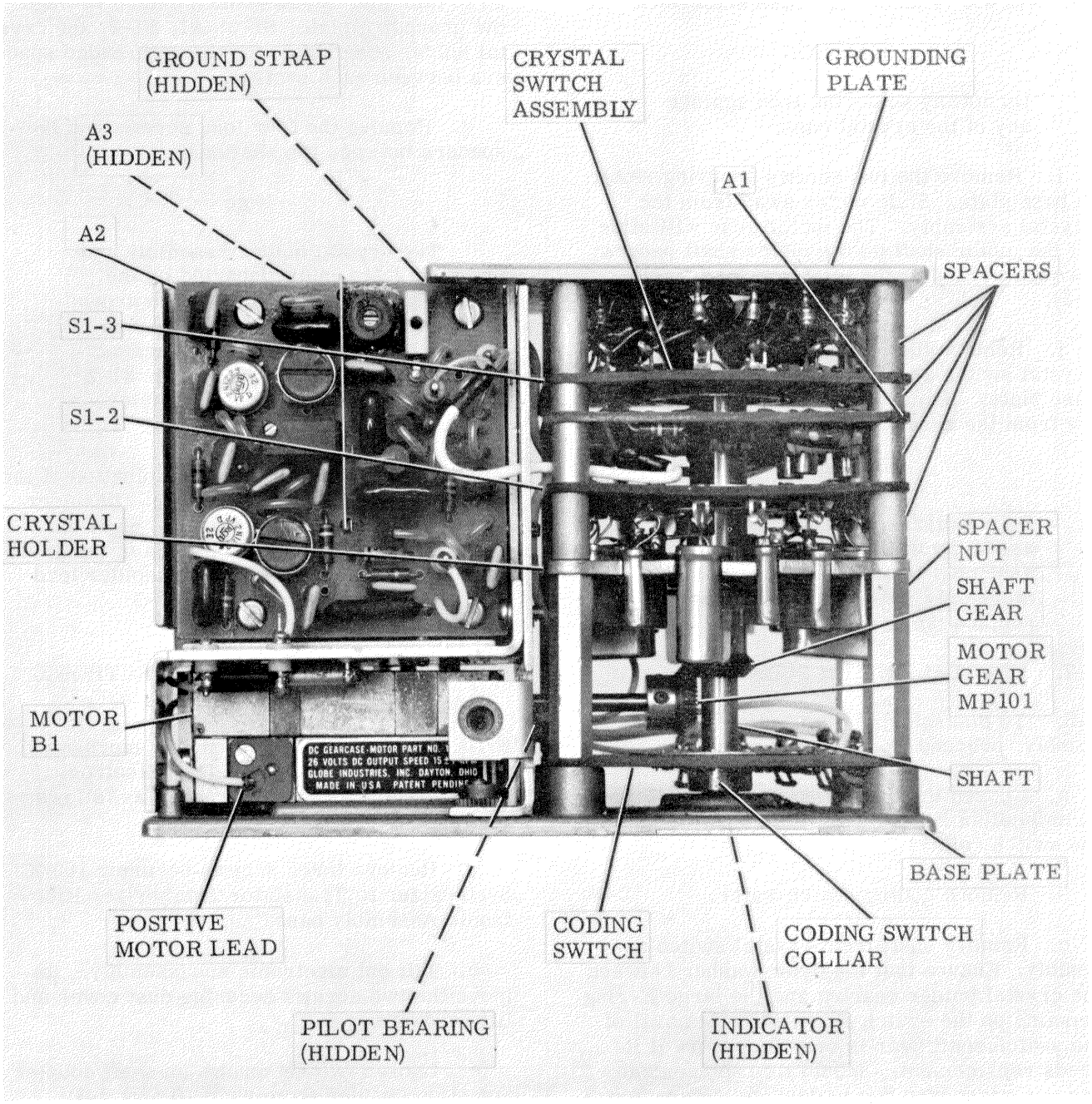



Figure 3-2. 1 MC Synthesizer Electronic Subassembly, Component Location

h. Loosen the two setscrews securing the motor gear (MP101 figure 3-2) to the motor shaft. Since these setscrews have been locktited, the application of heat from a soldering iron will aid in loosening these setscrews.

CAUTION

Do not lay soldering iron against any of the crystal cans.

i. Remove the two screws securing motor to base plate. Slide motor away from the crystal assembly. The motor gear will slide off the motor shaft as the motor shaft passes through and out of the pilot bearings (figure 3-2).

j. Remove the four screws securing the crystal switch assembly (figure 3-2) to the base plate. Remove the crystal switch assembly from the base plate.

Note

Do not disassemble crystal switch assembly unless a component on the assembly is to be replaced. Remove only those parts necessary to replace the component.

3-7. CRYSTAL SWITCH SUBASSEMBLY.

3-8. To disassemble the crystal switch assembly, proceed as follows (figure 3-2):

a. Loosen the two setscrews securing the switch collar (figure 3-2) to the shaft. Remove the switch collar.

b. Remove coding switch wafer.

c. Remove shaft from crystal switch assembly. Ensure that the nylon washer between the crystal holder bearing and the large E-ring remains on the switch shaft. The removal of the switch shaft gear is only necessary if it needs replacement. Should its replacement become necessary due to damage, the switch shaft gear and the motor gear, which are a matched set, should be replaced as such. To remove the switch shaft gear, punch out the roll pin securing it to the shaft.

d. Unsolder the two leads soldered to E9 on the crystal holder assembly. These two leads are sleeved with teflon tubing.

e. Unsolder the lead soldered to E32 on the grounding plate.

f. Remove four spacer nuts that are secured to four long screws which extend through the grounding plate, S1-3, A1, S1-2, the crystal holder assembly, and the unthreaded spacers between each section.

g. Remove the four long screws and the spacers between the sections.

Note

The crystal holder assembly and S1-2 are interconnected by the leads of the crystals. The grounding plate and S1-3 are interconnected by the leads of the capacitors. A lead interconnects S1-2 and A1 and a second lead interconnects S1-3 and A1.

h. Carefully spread the combination of the crystal holder and S1-2 from A1. Unsolder lead interconnecting S1-2 and A1 at S1-2. Carefully spread the combination of the grounding plate and S1-3 from A1. Unsolder lead interconnecting S1-3 to A1 at S1-3.

3-9. 100KC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-10. To disassemble the major mechanical parts of the 100KC Synthesizer Electronic Subassembly (A2A6A2), proceed as follows (figure 3-3):

a. Remove three screws securing 100KC Synthesizer to Translator/Synthesizer Electronic Assembly base.

b. Tilt out electronic subassembly. Remove the two screws securing dust cover and lift off dust cover.

c. Loosen two setscrews on shaft coupler and slide coupler from shaft (figure 3-3).

d. Remove hex nut (figure 3-3) and lock washer securing detent assembly to bottom plate (figure 3-3).

e. Unsolder lead at A1 terminal 2 (see dust cover). Unsolder lead C2 at switch wafer (figure 3-3).

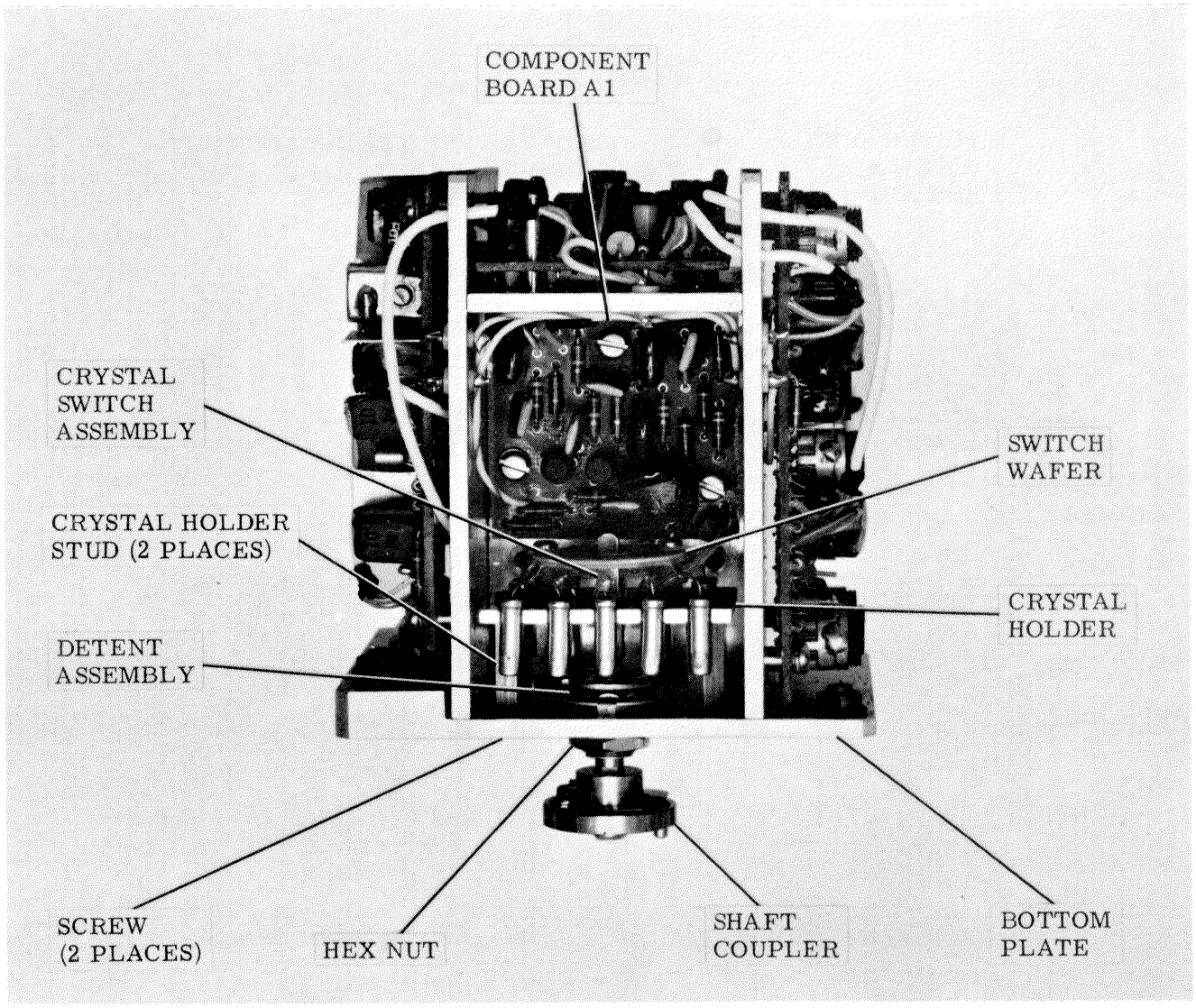



Figure 3-3. 100KC Synthesizer Electronic Subassembly, Component Location

f. Remove the two screws securing crystal holder studs to bottom plate.

g. Tilt crystal switch assembly away from A1 and lift out the assembly to remove crystal holder from assembly. Unsolder all wires interconnecting the switch wafer and the crystal holder (mark each wire to ensure proper replacement). Remove screws and spacers securing wafer to crystal holder.

3-11. 1 and 10KC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-12. To disassemble the major mechanical parts of the 1 and 10 KC Synthesizer Electronic Subassembly (A2A6A3), proceed as follows (figure 3-4):

a. Disconnect the five coaxial cables and one control lead interconnecting the 1 and 10 KC Synthesizer Electronic Assembly to the Translator/Synthesizer base.

b. Remove the four screws securing the 1 and 10KC Synthesizer to the Translator/Synthesizer base. Lift out the 1 and 10KC Synthesizer. Remove the two screws securing the dust cover and lift off the dust cover.

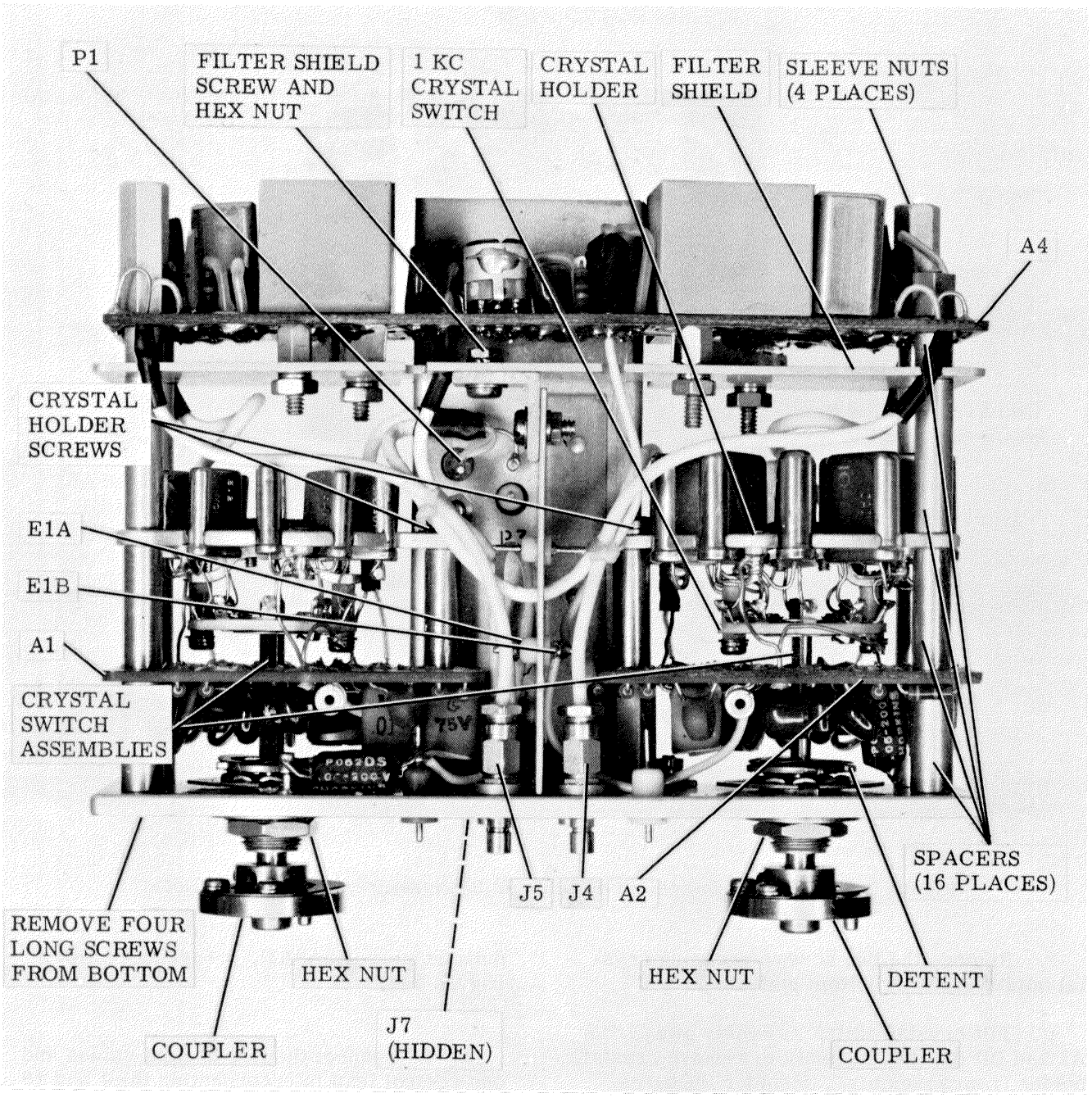



Figure 3-4. 1 And 10KC Synthesizer Electronic Subassembly, Component Location

c. Remove the hex nuts and washers securing J4, J5, and J7 to the bottom plate. Mark coaxial cables to ensure proper replacement.

d. Unsolder the following leads (mark coaxial cables to ensure proper replacement):

(1) Two leads at E1B (figure 3-4).

(2) One lead at E1A interconnecting E1A and A1 (figure 3-4).

(3) One lead at A1 terminal 7 interconnecting A1 and crystal holder.

(4) One lead at A1 terminal 1 interconnecting A1 and switch wafer.

(5) One lead at A2 terminal 7 interconnecting A2 and crystal holder.

(6) One lead at A2 terminal 1 interconnecting A2 and switch wafer.

(7) Two coaxial cable leads at A1 terminals 3 and 6 interconnecting A1 and A4.

(8) Two coaxial leads at A1 terminals 4 and 5 interconnecting A1 and P1.

(9) Two coaxial cable leads at A2 terminals 4 and 6 interconnecting A2 and P1.

(10)Two coaxial cable leads at A2 terminals 3 and 5 interconnecting A2 and A4.

e. Remove screw and hex nut securing filter shield (figure 3-4) to housing bracket.

f. Remove four sleeve nuts and washers (figure 3-4) secured to the four long screws. Do not remove the four long screws at this time.

g. Remove the combination of A4 and the filter shield. The coaxial cables (with the exception of two) and one lead will be removed with the combination. Ensure that no damage will be done to the coaxial cables or the connectors attached to them. The four spacers will also be removed with the combination.

Note

Disassembly should now be restricted to that portion of the 1 and 10KC synthesizer that requires repair or replacement.

h. Remove the long spacers.

i. Remove the crystal holder screw, washer, and the spacers.

j. Remove the combination of crystal holder assembly and switch wafer.

k. To disassemble the crystal switch assembly, proceed as follows:

(1) Unsolder the crystal leads from the switch wafer (mark all leads).

(2) Remove screws and washers securing the switch wafer to the bracket.

l. Remove the medium length spacers.

m. Remove A1 and/or A2.

n. Remove the long screws and the remaining spacers.

o. Loosen setscrews securing couplers to the shafts and remove the couplers.

p. Remove the hex nuts and washers from the detent (figure 3-4) and remove the detent.

## 3-13. TEST EQUIPMENT REQUIRED.

3-14. The following is a list of test equipment required to align the Translator/Synthesizer Electronic Assembly, entirely or by individual electronic subassembly, after repair.

a. Multimeter AN/PSM-4.

b. Frequency Meter CAQI-524D.

c. Electronic Multimeter CCVO-91CA.

d. Oscilloscope AN/USM-105A.

e. Heterodyne Voltmeter Bruel and Kjaer 2005.

f. Translator/Synthesizer Test Set TS-2133/WRC-1 (GD/E 666243-002).

g. RF Signal Generator CAQI-606A.

## 3-15. REPAIR.

3-16. This paragraph provides instructions for making all necessary repairs to the Translator/Synthesizer Electronic Assembly

and the electronic subassemblies within it. Information required to aid in determining whether or not a component or part should be replaced is also included.

a. Clean all disassembled mechanical parts with a dry, lint-free cloth.

b. Check coupler setscrews and check switch shaft. Replace setscrew if shaft is scored where coupler was attached. Repair coupler if indexing pin is bent or broken.

c. Replace switch shaft if coupler slips while secured to shaft.

d. Check that all switch detents are worn evenly. Replace if detent is bent, or if switch is not positioning fully in one or more positions.

e. Replace attaching hardware (screws, washers, nuts, etc.) when parts do not fasten properly.

f. If necessary, replace the motor in the 1 MC Synthesizer Electronic Subassembly as a complete unit; this motor is not normally repaired.

g. Install new E-ring each time one is removed.

3-17. RE-ASSEMBLY.

3-18. 1 MC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-19. Basically, the reassembly of the 1 MC Synthesizer is the reverse of the disassembly. However, there are a few precautions that must be exercised and a few additional procedures that must be performed as follows:

a. Ensure that crystal assembly components are oriented as shown in figure 3-5.

b. Ensure that the switch shaft "E" ring is seated against the nylon washer and the crystal holder bearing.

c. Ensure that the coding switch collar flats are totally inserted in the coding switch rotor.

d. After the crystal switch assembly and the coding switch have been secured to the base plate, measure the torque at the grounding plate end of the switch shaft. Torque measurement should not exceed 15 inch-ounces. Should torque measurements exceed 15 inch-ounces, slightly loosen the four screws securing the crystal switch assembly/coding switch to the base plate and the four screws through the grounding plate. Slightly rotate the combination of the grounding plate/S1-3 and the combination of the crystal holder/S1-2 clockwise and then counter-clockwise. Secure all eight screws and retake torque measurement. This process may have to be repeated several times for the proper torque measurement. When the proper measurement has been obtained, apply glyptol to the head of the screws to lock them in position.

e. Apply a small amount of silicon grease-MIL-G-3278 in pilot bearing prior to insertion of motor shaft.

f. Secure the motor to the base plate by positioning the securing screws approximately at the mid-point of the elongated slots on the base plate.

g. Slide motor gear forward until it meshes with the shaft gear. The meter peripheries of the two gears should be at a 90° alignment. Tighten the setscrews in the motor gear.

h. Series a multimeter AN/PSM-4 (to indicate current) in the positive lead of a 28 VDC power source and connect the positive lead to the positive terminal (figure 3-2) of the motor. Connect the negative lead of the power source to the negative terminal of the motor.

i. As the motor and the switch shaft rotate, observe multimeter indication. An indication of 180 mv or greater will necessitate the repositioning of the motor. Loosen the two securing screws and slide motor in the direction that decreases the current.

CAUTION

A loose meshing of the two gears may cause skipping.

3-20. 100KC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-21. Re-assembly of the 100KC Synthesizer Electronic Subassembly is the reverse of disassembly. Refer to paragraph 3-9 and perform the disassembly procedure in reverse. If alignment is to be performed, refer to paragraph 3-24. Otherwise, proceed to paragraph 3-40.

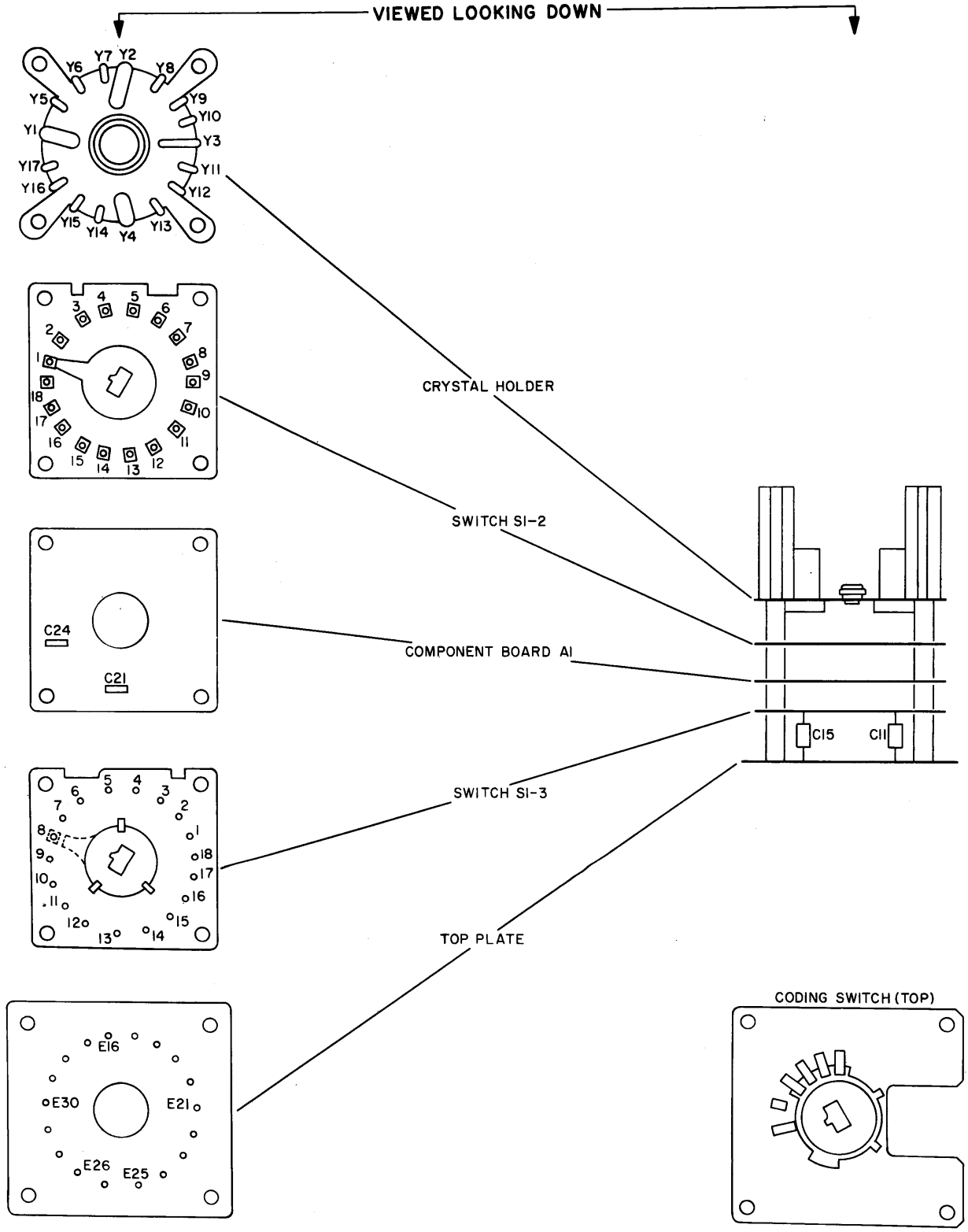



Figure 3-5. Crystal Switch Assembly, Component Orientation

3-22. 1 AND 10KC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-23. Re-assembly of the 1 and 10KC Synthesizer Electronic Subassembly is the reverse of disassembly. Refer to paragraph 3-11 and perform the disassembly procedure in reverse. If alignment is to be performed, refer to paragraph 3-24. Otherwise, proceed to paragraph 3-40.

3-24. ADJUSTMENTS.

3-25. After repairing circuits that contain variable components, it is necessary to ensure that the circuit is properly aligned. Normally, the electronic subassemblies are re-assembled in the chassis. Then, all alignment starts with the same initial procedure and continues until it has been determined that the repaired electronic subassembly is aligned properly.

3-26. PRELIMINARY INSTRUCTIONS.

3-27. Before beginning the alignment procedures, using test set TS-2133/WRC-1, perform the following steps:

a. Remove the 100KC, 500 CPS and 1 MC Synthesizer Electronic Subassemblies from the Translator/Synthesizer Electronic Assembly chassis.

b. Plug the 1 MC Synthesizer Electronic Assembly into the connector at front of test set on top panel.

c. Remove bottom cover from test set and lift out test jig.

d. Plug test jig into electronic assembly chassis where 100KC and 500 CPS Synthesizer Electronic Subassemblies were. Secure test jig to chassis with screws provided to secure electronic subassemblies.

e. Rotate couplers on bottom of Translator/Synthesizer Electronic Assembly to 0. Rotate frequency controls on test set to 2.0000 mc.

f. Plug Translator/Synthesizer Electronic Assembly into top of test set.

g. Rotate frequency controls clockwise and counter-clockwise until it is determined that couplers on electronic assembly are fully mated with those on test set.

h. Plug 100KC Synthesizer and 500 CPS Synthesizer Electronic Subassemblies into connectors on top of test jig.

i. Plug P1, on end of lead on top of test set, into A2 of J4 on Translator/Synthesizer Electronic Assembly.

j. Set 115 VAC and FREQ STD switches on test set at ON. Allow 30-minute warm-up period.

k. Connect Multimeter AN/PSM-4 to 20 VDC test points on rear of test set. Adjust 20 VDC ADJ potentiometer for 20 vdc indication on multimeter.

l. Connect Frequency Meter CAQI-524D to 5 MC OUT jack on rear of test set. Frequency should be 5,000,000.0 cps ±0.1 cps. If not, remove Frequency Standard Electronic Assembly from inside test set, and refer to appropriate test data booklet for adjustment.

3-28. ALIGNMENT OF SPECTRUM GENERATOR ELECTRONIC SUBASSEMBLY.

3-29. To align the Spectrum Generator Electronic Subassembly (A2A6A5), proceed as follows:

a. 100KC Divider Circuit.

(1) Connect Electronic Multimeter CCVO-91CA to TP1 on electronic subassembly. Tune A1L2 for a peak indication on electronic multimeter.

(2) Connect Oscilloscope AN/USM-105A to A1TP4. Adjust A1R5 until prf of signal just locks at 10 microseconds (100 kc).

(3) Counting the number of turns, continue to rotate A1R5 (same direction) until the prf just changes from 100 microseconds (100 kc). Adjust A1R5 so it is centered between the points at which the prf locks and unlocks.

(4) Connect RF Signal Generator CAQI-606A through 2K resistor to J6 on electronic subassembly. Connect electronic multimeter to J6. Tune rf signal generator for an output of 15.75 mc at 40 mv.

(5) Short A1TP2 and A1C18-R22 junction to ground. Tune A1T2 for peak indication on electronic multimeter.

(6) Remove short from A1C18-R22 junction. Tune A1L5 for minimum (dip) indication on electronic multimeter.

(7) Remove short from A1TP2. Disconnect electronic multimeter and rf signal generator.

(8) Connect Heterodyne Voltmeter Bruel & Kjaer Model 2005 to J6. Tune heterodyne voltmeter first to 15.3 mc and then to 16.2 mc and compare voltage indication at the two frequencies. Tune A1T1 for equal amplitude at both frequencies. The resulting voltage should be between 18 and 28 mv. If not, replace A1R24 with a resistor having a value between 470 ohms and 5.1K to bring the voltage to within 18 to 28 mv.

b. 10KC Divider Circuit.

(1) Connect oscilloscope to A2TP3. Adjust A2R11 so that prf just locks at 10 microseconds (10 kc).

(2) Counting the number of turns, continue to rotate A2R11 (same direction) until the waveform just changes from 10 microseconds (10 kc). Set A2R11 at the mid-point between the test points at which the signal locks and unlocks. The resulting waveform should be a square wave with a pulse width of approximately 8 usec and minimum pulse amplitude of 4 volts.

(3) Connect the heterodyne voltmeter to A2J5. Tune the heterodyne voltmeter first to 3.82 mc and then to 3.91 mc, and compare voltage indications at the two frequencies. Adjust A2T1 for equal amplitudes at both frequencies. The resulting voltage should be between 3 and 5 mv. If not, replace A2R24 with a resistor having a value between 1.0K and 8.2K to bring the voltage to within 3 to 5 mv.

c. 1KC Divider Circuit.

(1) Connect the oscilloscope to A3TP3. Adjust A3R11 so that prf just locks at 1 millisecond (1 kc).

(2) Counting the number of turns, continue to rotate A3R11 (same direction) until the prf just changes from 1 kc. Set A3R11 at midpoint between the points where the prf locks and unlocks. The resulting waveform should be between the points where the prf locks and unlocks. The resulting waveform should be a square wave with a pulse width of 100 usec and a minimum pulse amplitude of 7 volts.

(3) Connect Spectrum Analyzer TS-1379/U to A3J4 and tune to 122 kc. Measure signal amplitude.

(4) Disconnect spectrum analyzer. Connect rf signal generator to spectrum analyzer.

(5) Tune rf signal generator output to 122 kc and adjust vernier control until signal on spectrum analyzer is equal to that measured in step (3). Record setting of vernier control (millivolts).

(6) Repeat steps (3) through (5) at 131 kc and tune A3T1 until equal amplitude indications are obtained in step (5) at 122 and 131 kc. The resulting voltages should be between 9 and 16 mv. If not, replace A3R24 with a resistor having a value between 1.0K and 5.1K to bring the voltage to within 9 to 16 mv.

d. 5KC Divider Circuit.

(1) Connect the heterodyne voltmeter to A4J1. Tune the heterodyne voltmeter to 110 kc. Adjust A4T1 for indication between 56 and 68 mv on heterodyne voltmeter. Tune heterodyne voltmeter to 115 kc. Tune A4T1 for indication that is 2 db above that at 100 kc. If amplitude is not between 56 and 68 mv, replace A4R24 with a resistor having a value between 1.0K and 5.1K to bring the voltage to within 56 and 68 mv.

(2) If no other electronic subassemblies are to be aligned, disconnect all test equipment and proceed to paragraph 3-40. Otherwise, proceed to next appropriate alignment procedure.

## 3-30. ALIGNMENT OF 1 AND 10KC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-31. Accurate alignment of this electronic subassembly requires proper alignment of the Spectrum Generator Electronic Subassembly, which should be accomplished prior to performing this procedure. If this has been accomplished, proceed with this procedure. If not, refer to the Servicing Block Diagrams in NAVSHIPS 94840(A) and check all inputs to the 1 and 10KC Synthesizer Electronic Subassembly.

If the inputs are not within tolerance, refer to paragraph 3-28 in this manual and perform the procedures therein outlined. When all inputs to the 1 and 10KC Synthesizer Electronic Assembly are known to be accurate, proceed as follows:

a. Unless the procedure in paragraph 3-28 has been performed, perform steps a. through l. of paragraph 3-26.

b. Connect Electronic Multimeter CCVO-91CA to A4E13. Set the 1kc control on test set at 5. Tune transformer A2T1 for peak indication on electronic multimeter.

c. Alternate the 1kc control between 0 and 9 and adjust A2T1 for equal amplitude at both positions as indicated on electronic multimeter. Amplitude should be between 10 and 30 mv.

d. Connect the electronic multimeter to A4E2. Set the 1kc control on test set at 0, and the 10kc control at 5. Tune transformer A1T1 for peak indication on electronic multimeter.

e. Alternate the 10kc control between 0 and 9, and adjust A1T1 for equal amplitude at both positions as indicated on electronic multimeter. Amplitude should be between 10 and 30 mv.

f. Disconnect electronic multimeter. Connect Heterodyne Voltmeter Bruel and Kjaer Model 2005, tuned to 7.089 mc, to A4E6.

g. Tune transformer A4T1 for peak indication (1.5 mv min) on heterodyne voltmeter.

h. Disconnect heterodyne voltmeter. Connect electronic multimeter to J3 on electronic subassembly and set to indicate 100 mv full scale.

i. Disconnect P1 from J8 on A3. Connect RF Signal Generator CAQI-606A through 1.5K resistor to J8.

j. Tune rf signal generator for an output of 3.33 mc and adjust vernier control for half-scale deflection on electronic multimeter.

k. Short A3TP3 to ground. Tune A3T3 for peak indication on electronic multimeter.

l. Remove short from A3TP3 and short A3TP2 to ground. Tune A3L7 for minimum (dip) indication on electronic multimeter.

m. Remove short from A3TP2 and short A3TP1 to ground. Tune A3L6 for peak indication on electronic multimeter.

n. Remove short from A3TP1. Tune A3L5 for minimum (dip, very slight) indication on electronic multimeter. Final indication should be between 90 and 160 mv. If not, replace A3R52 with a resistor having a value between 12 and 39 ohms to bring the voltage to within 90 to 160 mv.

o. Disconnect all test equipment. Reconnect P1 to J8.

p. If no other electronic subassemblies are to be aligned, disconnect all test equipment and proceed to paragraph 3-40. Otherwise, proceed to the next appropriate alignment procedure.

## 3-32. ALIGNMENT OF THE 500 CPS SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-33. Accurate alignment of this electronic subassembly requires proper alignment of the Spectrum Generator and the 1 and 10KC Synthesizer Electronic Subassemblies. If these alignments have been accomplished, proceed with this procedure. If these alignments have not been accomplished, refer to the Servicing Block Diagrams in NAVSHIPS 94840(A) and check all inputs to the 500 CPS Synthesizer Electronic Subassembly (A2A6A4). If the inputs are not within tolerance, refer to paragraphs 3-28 through 3-31 in this manual and perform the procedures therein outlined. When all inputs to the 500 CPS Synthesizer Electronic Subassembly are known to be accurate, proceed as follows:

a. Unless the alignment procedures in paragraphs 3-28 through 3-31 have just been performed, perform steps a. through l. of paragraph 3-26.

b. Remove dust cover from electronic subassembly.

c. Connect Oscilloscope AN/USM-105A probe in A3E5. Connect vertical output of oscilloscope to input of Frequency Meter CAQI-524D.

d. Set 000/500/VERNIER switch on test set at VERNIER. Rotate VERNIER control fully counter-clockwise.

Note

The following steps should be accomplished only when component board A3 is attached in mounting frame.

e. Indication on frequency meter should be 122 kc ±300 cps. If not, replace A3C10 with a capacitor having a value between 10 and 39 uuf.

f. Rotate the VERNIER control on test set fully clockwise. Adjust potentiometer R6 for indication on frequency meter of 108 kc ±300 cps.

g. Disconnect A3P1 from A3J1 on electronic subassembly. Connect a +20 vdc power source to A3J1 (clip leads can be used).

h. Connect oscilloscope to A3P1 with controls set as follows:

(1) Type of input: DC.

(2) Vertical deflection: 2 v/cm.

(3) Sweep speed: 1 ms/cm.

i. Vary test set VERNIER control until waveform of a frequency between 50 and 100 cps appears on oscilloscope.

j. Adjust potentiometer A3R16 for peak-to-peak waveform with an amplitude of 5 volts as indicated on oscilloscope.

k. Connect oscilloscope to A3E5 or A2E2. Frequency meter indication should be 110 kc ±2 kc.

l. Connect oscilloscope A3TP1. Rotate test set VERNIER control clockwise and counter-clockwise very slightly while observing for change in dc level on oscilloscope. Note that rotating VERNIER control a great amount in either direction causes the dc level to change to a sinusoidal waveform (oscillator unlocks). Adjust potentiometer R3R16 so that the lowest level at which the oscillator unlocks is between 1 and 1.5 vdc. The highest level at which the oscillator unlocks should then be 6 vdc.

m. Disconnect oscilloscope. Connect Heterodyne Voltmeter Bruel and Kjaer Model 2005 to A1TP5. Tune heterodyne voltmeter to 7.1 mc.

n. Tune A1T1 for peak indication on heterodyne voltmeter. Adjust A1R16 for indication of 8 mv on heterodyne voltmeter.

o. If no further alignment is to be performed, disconnect all test equipment and proceed to paragraph 3-40. Otherwise, proceed with next appropriate alignment procedure.

Note

When the Translator/Synthesizer Electronic Assembly is placed back into Radio Receiver R-1051/URR or Radio Transmitter T-827/URT, further adjustment of the 500 CPS Synthesizer Electronic Subassembly may be required. The voltage divider circuit mounted to the chassis must be adjusted for proper operation using the front panel controls.

## 3-34. ALIGNMENT OF 100KC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-35. Accurate alignment of this electronic subassembly requires proper alignment of the Spectrum Generator, 1 and 10KC, and 500 CPS Synthesizer Electronic Subassemblies. If these alignments have been accomplished, proceed with this procedure. If not, refer to the Servicing Block Diagrams in NAVSHIPS 94840(A) and check all inputs to the 100KC Synthesizer Electronic Subassembly. If the inputs are not within tolerance, refer to paragraphs 3-28 through 3-33 in this manual and perform the procedures therein outlined. When all inputs to the 100KC Synthesizer Electronic Subassembly are known to be accurate, proceed as follows:

a. Unless the alignment procedures in paragraphs 3-28 through 3-33 have just been performed, perform steps a. through l. of paragraph 3-26.

b. Set FREQ STD switch on test set at OFF.

c. Set mc control on test set at 6, and the remaining controls at 0.

d. Connect RF Signal Generator CAQI-606A through a 2.2K resistor to A4TP3. Tune rf signal generator for an output of 32.875 mc ±25 kc. Set rf signal generator for CW modulation, zero per cent modulation amplitude.

e. Connect Electronic Multimeter CCVO-91CA to A4TP3. Adjust rf signal generator vernier control for 50 mv indication on electronic multimeter.

f. Short A4TP2 to ground. Tune A4T1 for peak indication on electronic multimeter.

g. Remove short from A4TP2 and short A4TP1 to ground. Tune A4L2 for minimum (dip) indication on electronic multimeter.

h. Remove short from A4TP1. Tune A4L1 for peak indication on electronic multimeter.

i. Disconnect rf signal generator and electronic multimeter.

j. Set mc control on test set at 2.

k. Connect rf signal generator through the 2.2K resistor to A4TP6. Tune rf signal generator for an output of 22.875 mc ±25 kc.

l. Connect electronic multimeter to A4TP6. Adjust rf signal generator vernier control for 50 mv indication on electronic multimeter.

m. Short A4TP5 to ground. Tune A4T2 for peak indication on electronic multimeter.

n. Remove short from A4TP5 and short A4TP4 to ground. Tune A4L5 for minimum (dip) indication on electronic multimeter.

o. Remove short from A4TP4. Tune A4L4 for peak indication on electronic multimeter.

p. Connect rf signal generator to A3TP1. Tune rf signal generator for an output of 17.847 mc ±200 cps.

q. Connect electronic multimeter to A3TP2. Tune A3T1 for peak indication on electronic multimeter.

r. Tune rf signal generator for an output of 15.800 mc ±200 cps at 2 volts. Tune capacitor A3C8 for null on electronic multimeter.

s. Tune rf signal generator for an output of 17.847 mc ±200 cps. Adjust rf signal generator vernier control for 100 mv indication on electronic multimeter.

t. Tune rf signal generator first to 17.817 mc and then to 17.877 mc, and observe db indication on electronic multimeter. Tune A3T2 so that indication at both frequencies is at least 17 db down from 100 mv.

u. Set mc control on test set at 6.

v. Tune rf signal generator for an output of 27.847 mc ±200 cps. Connect rf signal generator to A3TP2.

w. Connect electronic multimeter to A3TP4. Tune A3T3 for peak indication on electronic multimeter.

x. Tune rf signal generator for an output of 30.000 mc ±200 cps at 2 volts.

y. Adjust capacitor A3C9 for null indication on electronic multimeter.

z. Tune rf signal generator for an output of 27.847 mc ±200 cps. Adjust rf signal generator vernier control for 100 mv indication on electronic multimeter.

aa. Tune rf signal generator first to 27.817 mc and then to 27.877 mc. Adjust A4T4 so that indication at both frequencies is at least 17 db down from 100 mv.

ab. Set the FREQ STD switch on test set at ON. Set 100 kc control on test set at 4.

ac. Connect electronic multimeter to A2TP1. Tune A2T2 and A2T3 for peak indication on electronic multimeter.

ad. Connect electronic multimeter to A5E8. Adjust A5R13 for 120 mv indication on electronic multimeter.

ae. Set mc control on test set at 2. Electronic multimeter should indicate between 100 and 140 mv.

af. Connect Heterodyne Voltmeter Bruel and Kjaer Model 2005 to A5E8. Tune heterodyne voltmeter to 17.847 mc. Tune A4L6 for minimum (dip) indication (100 uv) on heterodyne voltmeter.

ag. Set mc control on test set at 6. Tune heterodyne voltmeter to 24.547 mc. Tune

A4L3 for minimum (dip) indication (100 uv) on heterodyne voltmeter.

ah. If no further alignment is to be performed, disconnect all test equipment and proceed to paragraph 3-40. Otherwise, proceed with next appropriate alignment procedure.

3-36. ALIGNMENT OF 1 MC SYNTHESIZER ELECTRONIC SUBASSEMBLY.

3-37. Alignment of the 1 MC Synthesizer Electronic Subassembly is not affected by any of the other electronic subassemblies of the Translator/Synthesizer Electronic Assembly. To align this electronic subassembly, proceed as follows:

a. Perform steps a. through l. of paragraph 3-26.

b. Set FREQ STD switch on test set at ON. Allow 5-minute warm-up period.

c. Connect RF Signal Generator CAQI-606A through 1.5K resistor to A3E5. Tune rf signal generator for an output of 1.498 mc to 50 mv.

d. Connect Electronic Multimeter CCVO-91CA to A3E5. Short A3TP1 to ground. Tune A3T1 for peak indication on electronic multimeter.

e. Remove short from A3TP1. Tune A3L4 for minimum indication on electronic multimeter. Disconnect electronic multimeter.

f. Rotate A3L2 into shield until it bottoms.

g. Disconnect A2P1 from A2J1. Short A2P1 to ground.

h. Disconnect A2P2 from A2J2. Set mc control on test set at 2, set 100 kc control at 5, and set 10 kc control at 0.

i. Connect Oscilloscope AN/USM-105A probe to A2TP3. A sine wave will appear on oscilloscope, with clipping at top. If clipping also appears at bottom, adjust potentiometer A2R6 until clipping at bottom disappears.

j. Tune A2T1 for maximum amplitude waveform on oscilloscope. Re-adjust A2R6 if clipping appears at bottom.

k. Tune A2T2 for maximum amplitude waveform on oscilloscope. Re-adjust A2R6 to eliminate any clipping at bottom.

l. Retune A2T1 and A2T2 until maximum signal is obtained without clipping at bottom.

m. Adjust A3L3 for maximum amplitude waveform. Re-adjust A2R6 if clipping appears at bottom. Adjust both A3L3 and A2R6 until maximum un-clipped (at bottom) waveform is obtained.

n. Rotate mc control to each of the remaining positions. Adjust A2R6 so that over all positions of the mc control, between 10 and 20 per cent clipping appears in the lowest amplitude waveform.

o. Remove short from A2P1. Reconnect A2P1. Reconnect A2P1 to A2J1 and A2P2 to A2J2.

p. Connect Heterodyne Voltmeter Bruel and Kjaer Model 2005 to A2TP3. Tune heterodyne voltmeter to 1.5 mc.

q. Tune A2L4 for minimum indication on heterodyne voltmeter.

r. If no further alignment is to be performed, disconnect all test equipment and proceed to paragraph 3-40. Otherwise, proceed with next appropriate alignment procedure.

3-38. ALIGNMENT OF RF TRANSLATOR ELECTRONIC SUBASSEMBLY.

3-39. Accurate alignment of the RF Translator Electronic Subassembly (A2A6A6) requires proper alignment of the Spectrum Generator, 1 and 10KC, 500CPS, 100KC, and 1MC Synthesizer Electronic Subassemblies. If these alignments have been accomplished, proceed with this procedure. If these alignments have not been accomplished, refer to the Servicing Block Diagrams in NAVSHIPS 94840(A) and check all inputs to the RF Translator Electronic Subassembly. If the inputs are not within tolerance, refer to paragraphs 3-28 through 3-37 in this manual and perform the procedures therein outlined. When all inputs to the RF Translator Electronic Subassembly are known to be accurate, proceed as follows:

a. Unless the alignment procedures in paragraphs 3-28 through 3-37 have just been

performed, perform steps a. through l. of paragraph 3-26.

b. Remove dust cover from RF Translator Electronic Subassembly.

c. Connect RF Signal Generator CAQI-606A to RECEIVE RF IN jack on test set. Tune rf signal generator for an output of 17.999 mc. Set the modulation at CW with zero per cent modulation amplitude.

d. Set test set controls as follows:

(1) mc control: 17.

(2) 100kc control: 9.

(3) 1 and 10kc control: 9.

(4) 000/500/VERNIER switch: 000.

(5) EXCITE/RECEIVE switch: RECEIVE.

e. Connect Heterodyne Voltmeter Bruel and Kjaer Model 2005 to TP5 on electronic subassembly. Tune heterodyne voltmeter to 17.999 mc.

f. Adjust rf signal generator vernier control for a 10 mv indication on heterodyne voltmeter.

g. Connect heterodyne voltmeter to RECEIVE IF OUT jack on test set. Tune heterodyne voltmeter to 500 kc. Adjust R4 on electronic subassembly for slight indication on heterodyne voltmeter.

h. Tune T1 for peak indication on heterodyne voltmeter.

i. Adjust R4 for 50 mv indication on heterodyne voltmeter.

j. Disconnect all test equipment and proceed to paragraph 3-40.

3-40. RE-ASSEMBLING THE TRANSLATOR/SYNTHESIZER ELECTRONIC ASSEMBLY.

3-41. When all alignment procedures have been completed as required, proceed as follows:

a. Remove power from test set.

b. Remove plug from J4 on chassis.

c. Remove 500 CPS and 100KC Synthesizer Electronic Subassemblies from the test jig.

d. Remove 1 MC Synthesizer Electronic Subassembly from test set.

e. Remove Translator/Synthesizer Electronic Assembly from test set.

f. Replace all dust covers (as applicable).

g. Remove screws that secure adapter to chassis and lift out adapter.

h. Replace each electronic subassembly into chassis and secure to chassis with appropriate screws.

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