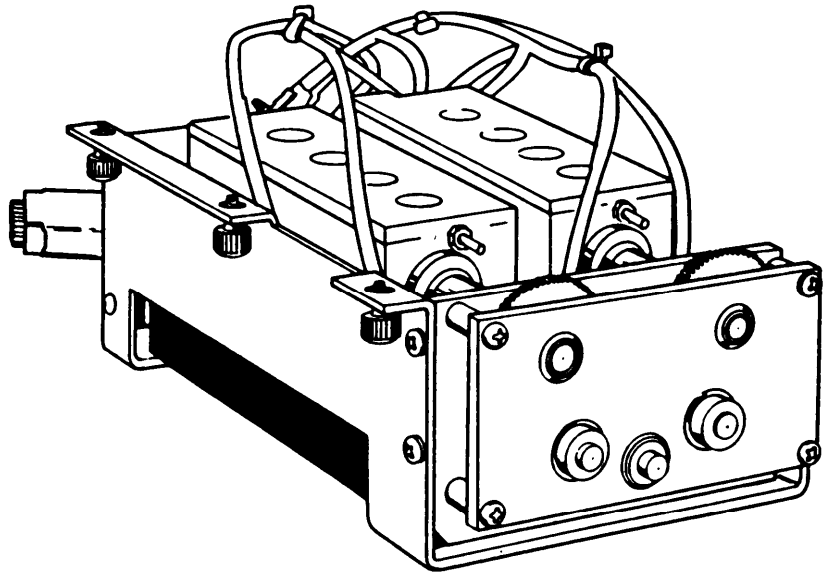
TM 11-5895-1227-14-1-2

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL



TUNER TN-584/GRR-8(V) (NSN 5895-01-075-6391)

PART OF RECEIVER, R-2200/GRR-8(V) (NSN 5895-01-060-6492)

HEADQUARTERS, DEPARTMENT OF THE ARMY **15 APRIL 1988**

WARNING

The receiver uses voltages which may be fatal if contacted. Do not be misled by the term "Low Voltage." Potentials as low as 50 volts may cause death under adverse conditions. Extreme caution should be exercised when working this equipment. Death on contact may result if personnel fail to observe safety precaution

1. Do not work on electronic equipment unless there is another person nearby who is familiar with the operation and hazards of the equipment and who is competent in administering first aid.

2. Whenever possible, turn off the power supply to the equipment before beginning maintenance on the equipment.

3. Do not remove the protective covers to the equipment unless you are authorized to do so.

4. When technicians are aided by operators, they must be warned about dangerous areas. A periodic review of safety precautions in TB 385-4, Safety Precautions for Maintenance of Electrical/Electronic Equipment, is recommended.

5. Seek advice from your supervisor whenever you are in doubt about electrical safety conditions

6. For Artificial Respiration, refer to FM 21-11.

CAUTION

Extreme caution should be used in reseating the receivers main chassis into its protective case. A problem may be caused by the failure of A9, P1-J6 to properly mate. If this problem is encountered, remove the rear mounted battery cover and reconnect the plug manually.

TECHNICAL MANUAL

NO. 11-5895-1227-14-1-2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 April 1988

Operator, Organizational, Direct Support and General Support Maintenance Manual

TUNER TN-584/GRR-8(V)
(NSN 5895-01-075-6391)

PART OF
RECEIVER AN/GRR-8(V)
(NSN 5895-01-060-6492)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Communications-Electronics Commandant Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, NJ 07703-5000. A reply will be furnished direct to you.

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Table 1-1. Type WJ-9121 20-250 MHz Tuner Assembly, Specifications

Tuning Head Range:	
Band 1	20-80 MHz
Band 2	80-250 MHz
Fine Tuning Range	0.05% of Tuned Frequency, minimum
Main Tuning Control	Approximately 40 turns from band edge to band edge
Input Impedance	50 ohms, nominal, unbalanced
Antenna Conducted LO Radiation	15 uV, maximum, across 50 ohms
Noise Figure:	
Band l	8 dB, maximum
Band 2	8 dB, maximum
IF Frequency:	
Band 1	10 MHz
Band 2	21.4 MHz
LO Radiation	15 uV, maximum, across 50 ohm load
LO Output Level	25 mV, minimum, across 50 ohm load
Dimensions	Approximately 9.5 inches long, 5 inches wide, and 2.5 inches high
Weight	3.5 lbs., approximately

SECTION O

INTRODUCTION

0.l SCOPE

0.1.1 TYPE OF MANUAL. This is an Operator, Organizational, Direct Support and General Support Maintenance commercial manual.

0.1.2 MODEL NUMBERS AND EQUIPMENT NAMES. The Tuner Assembly, TN-584/GRR-8(V), is one of three separate tuners that can be used with the AN/GRR-8(V) Receiver. The Receiver is part of the Radio Receiver Direction Finder Set, AN/PRD-11. The other units of the Direction Finder Set include Direction Finder Antennas AS-3732/PRD-11 and AS-3733/PRd-11, Processor Display Control, C-11495/PRD-11, and Panoramic Indicator IP-1355/GRR-8(V). In this manual, the TN-584/GRR-8(V) Tuner Assembly will be referred to as the WJ-9121 Tuner Assembly. The Receiver will be referred to as the receiver, Manpack Receiver or Portable Receiver, and by its manufacturers model number, WJ-8640-1. A complete cross reference of common equipment names and nomenclatures used in this manual is provided in paragraph 0.7.

0.1.3 PURPOSE OF EQUIPMENT. The TN-584/GRR-8(V) Tuner Assembly is an interchangeable assembly of the receiver. The tuner assembly allows the receiver to tune in to rf signals within the 20 to 250 MHz range in the AM, FM and CW modes.

0.2 CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes or additional publications pertaining to the equipment.

0.3 MAINTENANCE FORMS, RECORDS AND REPORTS

0.3.1 REPORTS OF MAINTENANCE AND UNSATISFACTORY EQUIPMENT. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 as contained in Maintenance Management Update.

0.3.2 REPORT OF PACKAGING AND HANDLING DEFICIENCIES. Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2/DLAR 4140.55/NAVMATINST 4355.73B/AFR 400-54/MCO 4430.3H.

0.3.3 DISCREPANCY IN SHIPMENT REPORT (DISREP)(SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP)(SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19/DLAR 4500.15.

0.4 DESTRUCTION OF ARMY ELECTRONICS MATERIEL

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

0.5 ADMINISTRATIVE STORAGE

Disassembly and repacking of equipment for shipment or limited storage are covered in section II.

0.6 TOOL AND TEST EQUIPMENT

Test equipment required for troubleshooting and maintenance of the tuner assembly is listed in paragraph 4.4 (Table 4-1).

0.7 OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS

The list below will help you identify the official nomenclature of the major equipment items used with the tuner assembly. It also provides the common name used in the manual when it is different from the official nomenclature. Official nomenclature must be used when completing forms or when looking up technical manuals.

Common Name	Official Nomenclature
Direction Finder Set Manpack Receiver, WJ-8640 Tuner Assembly, WJ-9121	Radio Receiver Direction Receiver, AN/GRR-8(V) Tuner, RF, TN-584/GRR-8(V)

0.8 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If your tuner assembly needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, NJ 07703-5000. We'll send you a reply.

0.9 WARRANTY INFORMATION

The tuner assembly is warranted by Watkins-Johnson Company for a period of 1 year following delivery. It starts on the date found in block 23, DA Form 2408-9, in the logbook. This warranty may contain repair restrictions. Report all defects in material or workmanship to your supervisor.

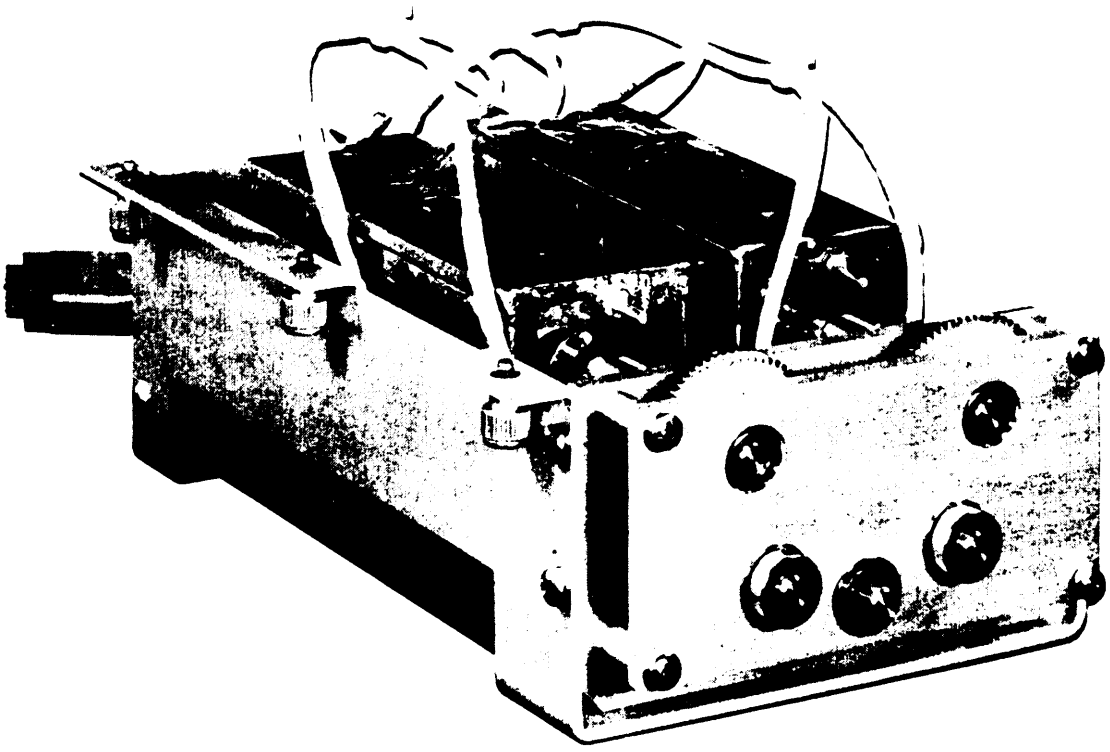

Figure 1-1. WJ-9121 20-250 MHz Tuner Assembly

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

1.1.1 The Type WJ-9121 Tuner Assembly is designed to operate with the WJ-8640, -1, -2 Manpack Receiver series. The assembly is an interchangeable drop in unit requiring simple hand tools for installation and removal. The WJ-9121 uses two separate subassemblies to cover the 20-250 MHz frequency range. Subassembly A2 (Low Band) covers the 20 to 80 MHz range, while A1 (High Band) covers the 80 to 250 MHz range. Both frequency groups are translated in single down-conversions. In the low band, 20-80 MHz, the IF provided is 10 MHz. In the high band of 80-250 MHz an D? output of 21.4 MHz is provided. A two-position rotary switch located on the associated receiver's front panel determines which band is selected. The tuning head is manually controlled by way of a coupling spring that connects the tuning shaft to its associated receiver's front panel.

1.2 MECHANICAL CHARACTERISTICS

1.2.1 The WJ-9121 Tuning Assembly was designed as an interchangeable drop-in unit for use in conjunction with the WJ-8640, -1, -2 Manpack Receiver. Its electrical connections consist of six-coaxial connector-ended inputs/outputs and a multipin connector. From the tune r's inductuner tuning shaft extends a one inch long piece of flexible coupling that connects it to the tuning knob located on the receiver's front panel. Between the inductuner and the flexible coupling is located a gear reduction network that sets a ratio of 6 to 1 which results in a band edge to band edge coverage in 40 turns. The tuned frequency is indicated on the receiver's front control panel by a six-digit LED display.

1.2.2 The main chassis of the WJ-9121 Tuner is constructed of aluminum. The two subassemblies that are mounted on the main chassis are constructed of brass. The printed circuit boards used are of the copper clad laminated epoxy-fiberglass base type.

1.3 EQUIPMENT SUPPLIED

1.3.1 This equipment consists of the WJ-9121 Tuning Head only.

1.4 EQUIPMENT REQUIRED BUT NOT SUPPLIED

The WJ-9121 Tuning Head is incapable of independent operation and therefore, requires a compatible receiver. The associated receiver will supply the required operating power and signal connections. The WJ-8640, -1, -2 series Manpack Receivers are designed to operate with this tuner.

SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

2.1.1 Examine the shipping carton for damage before the equipment is unpacked. If the carton appears to be damaged, try to have the carrier's agent present when the equipment is unpacked. If this is not possible, retain all packing material and shipping containers for the carrier's inspection if damage to the equipment is evident after it has been unpacked.

2.1.2 See that the equipment is complete as listed on the packing slip. Contact Watkins-Johnson Company, CEI Division, Gaithersburg, Maryland or your Watkins-Johnson representative for any discrepancies or shortages.

2.1.3 This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. It is, therefore, ready for use upon receipt. After uncrating and checking contents against the packing slip, inspect the unit for dents or scratches. If external damage is evident, make an internal inspection. Check the internal cables for loose connections and printed circuit boards which may have been loosened from their receptacles. If factory seals must be broken, contact your Watkins-Johnson representative before proceeding.

2.2 REMOVAL AND INSTALLATION

The following is a detailed description on the removal of the Tuner Assembly from its associated receiver:

(1) Place the receiver on a clean flat surface so that it rests on its top side.

(2) Turn the latches that hold the front panel cover to the receiver counterclockwise e. Pull the latches away from the sides of the receiver until the cover is able to be removed.

(3) Remove the four (captive type) slot screws that hold the front panel of the receiver to the outer protective cover. These screws are located on the rear corner edges of the receiver's front panel.

(4) Holding the front panel by its protective handles, pull it away from the battery pack. After removing the receiver's main chassis from its protective case (and disconnecting) its power connection) lay the receiver on a flat surface: with its protective handles nearest you and the top side down.

(5) Use an allen wrench to loosen the allen-type screw on the rear section (nearest tuner assembly) of the flexible coupling (tuning shaft-spring extender) until it can be disconnected from the tuning shaft.

(6) Disconnect the six coaxial connectors labeled J1 through J6 from the jack mounting that extends off the rear side of the tuners main frame.

(7) Remove the multipin plug P1 from the receiver receptacle J7, which is located directly behind the coaxial connector by pulling it straight up from its receptacle.

(8) Using a slot-type screwdriver, release the three spring, loaded captive screws that secure the base (right side) of the tuner to the receivers main chassis.

(9) Remove the two upper-most machine screws that are located on the left vertical side of the tuner's frame using a phillips-type screwdriver.

(10) Remove the tuner assembly from the receiver's main chassis by lifting it directly upward.

(11) To replace the Tuner reverse steps (5) through (10).

2.3 OPERATION

2.3.1 Operation of the WJ-9121 Tuner Assembly is controlled entirely by the associated receiver. Consult the receiver manual for further specifications and operation.

2.4 PREPARATION FOR RESHIPMENT AND STORAGE

2.4.1 If the unit must be prepared for reshipment, the packaging methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or will at a minimum provide guidance for the repackaging effort.

2.4.2 The conditions for storage are:

(1) Maximum humidity: 97%

(2) 0°F to 150°F (-17.8°C to +65.6°C)

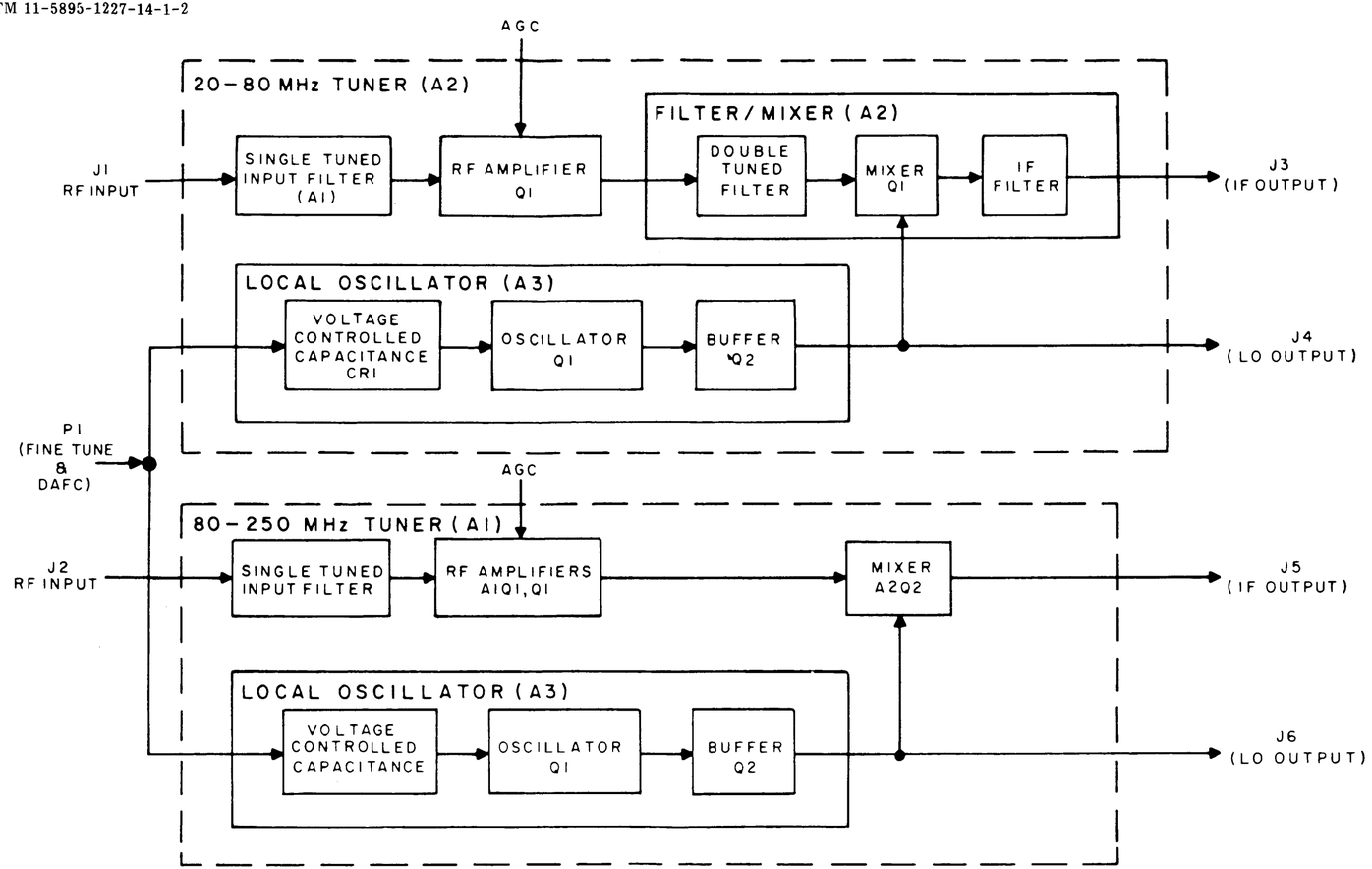

Figure 3-1. Type WJ-9121 Overall Functional Block Diagram

(2-3 blank)/3-0

SECTION III

CIRCUIT DESCRIPTION

3.1 GENERAL

3.1.1 Operation of the circuitry found in the WJ-9121 Tuner Assembly is described in the following paragraphs. Figure 3-1 is an overall functional block diagram of the WJ-9121 and should be referred to along with the schematic figures indicated in the text. Note that the unit numbering system is used for electrical components, which means that parts on subassemblies and modules carry a prefix before the usual class letter and number of the item (such as A1Q1 and A3C1). These subassembly prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

3.2 FUNCTIONAL DESCRIPTION

3.2.1 Two main subassemblies tune the RF signals in the 20 to 250 MHz range.

3.2.2 The 20-80 MHz Tuner (A2) tunes those frequencies as stated. The RF signals enter the subassembly at J1. Input Network Al functions for both matching input impedance and as the first stage of Tuner selectivity. This Input Network is tuned to pass the range of frequencies between 20-80 MHz. The dual-IGFET, Q1, is employed to insure good interdemodulation characteristics and ease of the associated receiver's automatic gain control of the stage. From the output of Q1 the RF signal passes through a doublepole bandpass filter consisting of the second and third tuned sections of the circuit. From this the signal enters the mixer, A2Q1. The local oscillator, A3Q1, controls the frequency of oscillation by way of the tuned circuits on the transistor's base circuit. This frequency of oscillation may be varied by the amount of DAFC voltage that is applied to the varactor A3CR1. The main frequency control component is A3LID which is the fourth section of the tuner's ganged inductuner. The frequency of oscillation is tuned to a constant 10 MHz above the incoming tuned RF signal. On the base of A3Q1 the signal is used to drive the common-collector buffer amplifier A3Q2. The signal is taken from the buffer's emitter and applied to the source of FET A2Q1. After mixing of the signals the IF (difference frequency) is filtered off Q1's drain and applied to the subassembly's output jack, J3.

3.2.3 The RF signals in the 80 to 250 MHz frequency range are tuned by the subassembly designated Al. After initial filtering, the RF signals in the 80-250 MHz range are applied to gate #1 of the dual IGFET, A1Q1. A1Q1 provides RF amplification of the signal while also producing good interdemodulation characteristics. With the ease of AGC in the stage, the signal is taken from the drain of A1Q1 and transformer coupled to the "N" channel MOSFET Q1 (main chassis). The MOSFET amplifies the signal and provides impedance matching of the RF signal to the double-tuned filter consisting in part of LIB and L1C. From its drain the signal is coupled to the base of A2Q1 which serves as a buffer for the mixer's input. From A2Q1 the signal is again

coupled by transformer tapping in its collector. The RF is then applied to pin #3 (gate 1) of the dual IGFET. The local oscillator is composed of A3Q1 and its associated components. The oscillators tuned circuit consists mainly of L1D (inductuner section), C20 and C21. Along with the DAFC and fine tuning voltage the frequency of oscillation may be slightly varied. The frequency of oscillation is a constant 21.4 MHz above the tuned RF input. After passing through Buffer A2Q3 the LO frequency is mixed with the RF input by A2Q2, a dual-insulated gate field-effect transistor. The drain of A2Q2 carries the array of sum, difference and harmonic frequencies of the two signals. Passing through an IF (L-C type) filter the difference frequency is coupled to subassembly output jack J2.

3.3 DETAILED CIRCUIT DESCRIPTION

3.3.1 TYPE 7143120-80 MHZ RF TUNER (A2)

3.3.1.1 The schematic diagram for this assembly is Figure 6-2, and it carries the reference designation A2.

3.3.1.2 Input Network, Part 17489-2 (A2A1)

RF input signals enter the subassembly via input jack J1. The purpose of the single-tuned input network (A1) is to provide impedance matching and present the first stage of selectivity within the tuner. The RF input signals from jack J1 enter the input network (A1) at board pin, E1. Capacitor C1 couples the signal to the first bandpass signal component, C3, which passes the 20-80 MHz frequency spectrum. The first tuned stage of the assembly consists of L1, L1A, C5 and R2. The bandwidth limited signals of the input network are coupled to the base of the RF amplifier, Q1, through C4. Biasing of the signal gate of Q1 is taken from the +15 VDC input voltage and developed across resistors R3 through R5. Transistor Q1 is a dual Insulated Gate Field-Effect Transistor (dual IGFET). The other gate of Q1 is supplied with an Automatic Gain Control (AGC) voltage. Diode CR1 prevents any AGC voltage from becoming more positive than 0.6 volts. The bias voltage of the AGC gate of Q1 (pin #2) is from the input voltage dropped across the voltage divider formed by A2R2 and A2R3. L1 provides a path for Q1's drain dc bias voltage while also functioning as an RF choke.

3.3.1.3 Interstage Mixer, Part 17490-1 (A2A2)

The amplified RF signal that is taken from the drain of the dual IGFET is applied to pin E1 of the Interstage/Mixer circuit. The RF signal is then passed through a two-stage bandpass tuning filter which passes those frequencies in the 20-80 MHz range. C3 through C5, L2 and L1B form the first filter while C10, C11, C12, R6, L4 and L1C form the second. Capacitors C6 through C8 couple the selected RF signal while components C9, L3 and R8 provide additional filtering that aids in optimum coupling across the tuner's frequency range. The RF signal is applied to Q1 which functions as the mixer.

3.3.1.4 The mixer consists of an insulated gate N-channel MOSFET A2Q1 with the RF signal being applied to its gate and the LO signal to its source. Sum and difference frequencies produced by the mixing action are taken from the drain of the MOSFET and applied through parasitic suppressor resistor A2R5 to the tuned circuit consisting of A2C15, A2C16 and A2L5. The tuned circuit extracts the difference frequency and applies it to the IF output jack, J3.

3.3.1.5 Local Oscillator, Part 17488-3 (A2A3)

The oscillator is made up of Q1 and its associated components along with the associated tuned circuit. The oscillator, Q1, is of a modified Colpitts configuration with C4 and R6 providing emitter to base regenerative feedback which helps sustain oscillations. The oscillator's tuned base circuit consists of C6 through C8, L2, L3, and LID. The frequency of oscillation may be varied slightly by adjusting the fine tune knob or locked onto automatically by use of the Digital Automatic Frequency Control (DAFC) switch, located on the receiver's front panel. When the DAFC is in the "ON" position a voltage ranging from -4V to +4V is present at the junction of R3-R4 (main chassis). Resistors R3 and R4 also serve as a voltage divider for the DAFC voltage. A3CR1 is a varactor (voltage-variable capacitor) whose capacitance decreases as the reverse-bias voltage across its pn junction increases. The zener diode, A3VR1, along with R1 and R2 place a constant voltage at the cathode of CR1. This voltage along with any fine tuning voltage sets up a reverse bias situation that effects the amount of capacitance that is present in the oscillators tuning circuit. In this manner it is possible to compensate for small changes in the frequency of oscillation due to frequency drifting. C9 couples the oscillator signal to the base of Q2. The buffer stage consisting of Q2 isolates the local oscillator from changing load impedances in the mixer and LO output circuits. The LO output signal is also coupled from the buffer’s emitter through C11 and sent through the attenuator pad made up of R5 through R7 (main chassis) to the LO output jack, J2.

3.3.2 TYPE 71360-4 80-250 MHz TUNER (A1)

3.3.2.1 The schematic diagram for this assembly is Figure 6-1; its reference designation is A1.

3.3.2.2 RF Amplifier, Part 16874 (A1A1)

The RF signal enters the 80-250 MHz Tuner assembly via jack J1. Coupled by capacitor C3 the signal is passed through a single-pole bandpass filter consisting of main chassis components C5, L2, L1A and L10, the first of a four section inductuner. Capacitor C6 couples the signal to one of the dual gates (pin #3) of A1Q1. A1Q1 is a dual Insulated Gate (N-channel) Field-Effect Transistor (dual IGFET). Resistors A1R1 and A1R2 develop self-bias and signal reduction. The second of the dual gates of A1Q1 is the receiver's AGC signal path (gate #2). Diode CR1 prevents any AGC voltage greater than +0.6 volts. The AGC signal varies between 0 V and -10 V thus controlling

the amount of amplification by A1Q1 on the RF signal. The amplified signal is taken from the dual IGFETs drain and tapped-off transformer A1T1 for proper impedance level coupling. The gain controlled RF signal is coupled by capacitor C7 (main chassis) which transfers the signal to the "N" channel Field-Effect Transistor (FET) Q1 (located on main chassis). Resistors R3 through R5 bias the device across its gate-source path where the signal taken from the amplifiers drain is sent through a double-pole tuned filter which consists of L3 through L6, LIB, L1C, C10 and C13. Capacitors C11, C12 and C14 isolate and couple the single stage bandpass filters.

3.3.2.3 Oscillator/Buffer, Part 16835 (A1A3)

Oscillator A3Q1 is of a modified Colpitts configuration with L8, L9, L1D, C21 and C24 as the tank circuit components. A3C1 though A3C4 and A3R1 through A3R4 provide the biasing for A3Q1. On the base of A3Q1 is CR2 (main chassis), a voltage-controlled capacitor (varactor). As the reverse-bias is increased across its pn junction, its capacit ante decreases. Since the fine tuning voltage varies around +9 volts and the DAFC varies between -4 volts and +4 volts, the reverse bias across CR2 can be slightly varied. With this adjustable capacitance in series with C24, the frequency of oscillation may be varied slightly. With L1D being part of the inductuner, the rate of oscillations are a constant 21.4 MHz above the RF input signal. The oscillator's signal is coupled through C20 to the base of emitter follower A2Q3. A portion of this signal is coupled by C28 to the base of buffer amplifier A3Q2. Resistors A3R5 through A3R10 are for the biasing of A3Q2. The LO output signal is capacitively coupled from the collector of A3Q2 where resistors R15 and R16 attenuate the LO signal level at ouput jack, J3. R15 and R16 also increase the reverse isolation between LO output, J3, and the oscillator circuit.

3.3.2.4 Buffer/Mixer, Part 16756-2 (A1A2)

The frequency of oscillation is applied to the base of emitter follower-buffer amplifier Q3. R7 through R9 are for amplifier biasing, A2C6 sets the collector at RF ground potential and resistor R10 (located on main chassis) is in the signal path to provide reverse isolation. The amplified oscillator signal is coupled from the emitter of A2Q3 by capacitor A2C5 to the gate (pin #2) of the dual- IGFET A3Q2. To the second gate of A3Q2 is injected the the amplified RF signal. Through mixing action the sum and difference frequencies are produced and are present at the drain of the dual IGFET (pin #1). The output signals that are produced by the mixing of A2Q2 are applied through parasitic resistor R8 (main chassis) to the tuned circuit consisting of L7, C16 and Cl 7. This tuned circuit extracts the difference frequency of 21.4 MHz and applies it to output jack, J2 (IF output). The test point that is connected to board pin #E4 (TP#1) is used to indicate the frequency response of the RF input signal present at A2Q2's RF mixing gate.

NOTE

The troubleshooting, performance checks, alignment and adjustment procedures, and subassembly removal, repair and replacement actions contained in section IV are to be performed at the depot maintenance level only.

SECTION IV

MAINTENANCE

4.1 GENERAL

4.1.1 The WJ-9121 Tuner Assembly has been designed to operate for extended periods of time with only routine maintenance. The unit requires no special attention in its care and requires only cleaning and occasional tuning drive-gear reduction lubrication. The duration between cleaning and inspection of the unit should depend on its usage and the environmental conditions. Alignment of the tuner requires a thorough understanding of the function of each subassembly and should be attempted only after repairs affecting the alignment and then only by experienced personnel in a well-equiped shop.

4.2 CLEANING AND LUBRICATION

4.2.1 The WJ-9121 Tuner Assembly should be kept free of grease, dust, dirt and foreign matter to insure trouble-free operation. If available, low pressure compressed air should be used to remove accumulated dust from the interior and exterior of the unit when needed. A clean dry cloth, a soft-bristled brush, or a cloth saturated with a cleaning solution may be used.

4.3 INSPECTION FOR DAMAGE OR WEAR

4.3.1 Many potential or existing troubles can be detected by a visual inspection of the unit. For this reason, a complete visual inspection should be made on a periodic basis, or whenever the unit is inoperative, for indications of electrical or mechanical defects. Electronic components that show signs of deterioration, such as overheating, should be checked and a thorough investigation of the associated circuitry should be made to verify proper operation. Damage of parts due to heat is often the result of other less apparent troubles in the circuit. It is essential that the cause of the overheating be determined and corrected before replacing the damaged parts. All mechanical parts should be checked for looseness, excessive wear, corrosion and other signs of deterioration.

4.4 TEST EQUIPMENT REQUIRED

EQUIPMENT TYPE	REQUIRED CHARACTERISTICS	RECOMMENDED INSTRUMENT
RF VTVM	Sensitivity: 20 mV (minimum) Freq. Range: 10 MHz to 290 MHz (50 Ω dBm scale)	Booton 92A with 91-14A Tee adapter and 91-15A (50 Ω termination)

EQUIPMENT TYPE	REQUIRED CHARACTERISTICS	RECOMMENDED INSTRUMENT
Sweep Generator	Freq. Range: 10 MHz to 260 MHz, variable attenuator	Wavetek 2001
Step Attenuator	Freq. Range: 10 to 260 MHz (50 Ω Impedance) 0 to 120 dB in 10 dB steps	HP-3550
Oscilloscope	Sensitivity: 1 mV Inputs: External Horizontal Bandwidth: dc to 500 kHz	Tektronic 503
50 Ω Detector	50 Ω input impedance	Telonic XD-3A
Frequency Counter	Freq. Range: 10 MHz to 290 MHz	HP-5245L with HP-5253B plug-in head
Wideband Amplifier	Freq. Range: 5 to 290 MHz Gain: 20 dB	HP-8447A
Signal Generator	Freq. Range: 10 MHz to 310 MHz Levels: 1 μ V to 70 mV	HP-608E, 612A
Reg. dc power supply	Range: 0 to ± 4Vdc at 100 mA	HP-721A
Power Supply (3)	Range: 0 to ± 15 Vdc at 200 mA	HP-6215A
VTVM	Range: 0.0 Vdc to ± 15 Vdc Accuracy: 3% of full scale	RCA WV-98C
Spectrum Analyzer (display section, IF section, RF section)	Sensitivity: 2 mV Range: 1 GHz	HP150T, 8552A, 8555A

4.5 TROUBLESHOOTING PROCEDURES

4.5.1 Troubleshooting the WJ-9121 should include its operating connection to the associated receiver. Initial investigation should be directed towards isolating the problem to the low or high band Tuner Assembly. Once this has been determined, efforts _. should be concentrated in localizing the trouble to a specific subassembly, and then a component. By utilizing acceptable troubleshooting techniques, inject the proper input signal and trace it back from the output. This method should identify the faulty component. Before attempting troubleshooting and repairs of the tuner, the maintenance

technician should have a thorough understanding of the tuner's operation as detailed in Section III. Reference should also be made to the functional block diagram and the schematic diagrams for the unit.

4.6 PERFORMANCE TESTS

The following performance checks are designed to aid in troubleshooting and evaluating the operation of the tuner. They can also serve as part of a periodic maintenance check. Before proceeding with the following, connect the tuner as in Figure 4-1.

4.6.1 TYPE 7143120-80 MHz RF TUNER (A2)

4.6.1.1 Local Oscillator Output Check

(1) Connect the RF VTVM, with 50 Ω load, to the LO output A2J2.

(2) The minimum level should be 20 mV rms into 50 Ω .

(3) Restore normal connections.

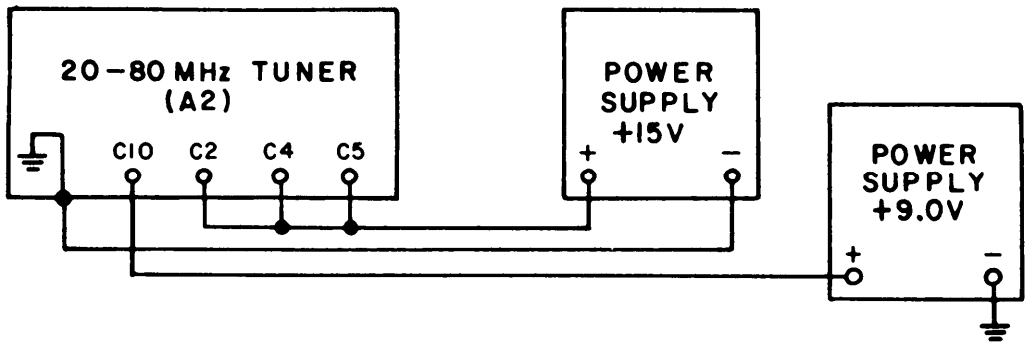

Figure 4-1. Test Setup, 20-80 MHz Tuner, Power Circuit Connection

4.6.1.2 DAFC Range Check

(1) Interconnect the equipment as shown in Figure 4-2.

(2) Set the wide band amplifier for 20 dB gain.

(3) Adjust the tuner and signal generator for 20 MHz. The LO reading on the frequency counter will be 30 MHz; 10 MHz IF offset +20 MHz tuned frequency.

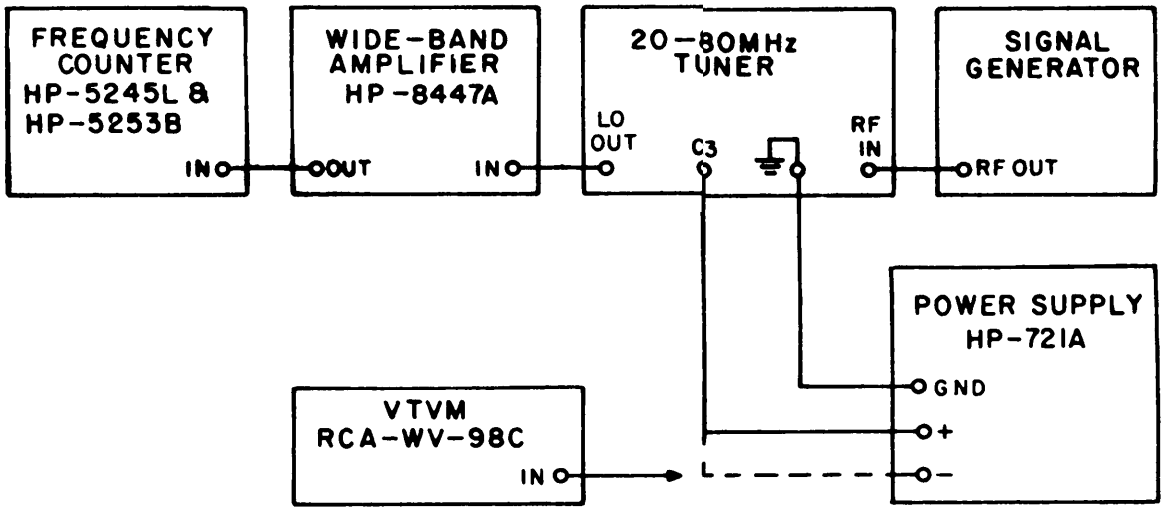

Figure 4-2. Test Setup, DAFC Range Check Circuit Connection

(4) Adjust the power supply for -4.0 Vdc using theVTVM.

(5) Connect the power supply to the DAFC input C3 on the RF Tuner.

(6) The frequency counter reading should be 30.010 MHz minimum.

(7) Change the power supply connection to produce +4.0 Vdc.

(8) The frequency counter reading should be 29.990 MHz maximum.

(9) Repeat steps (3) through (8) with the signal generator and tuner tuned to 80 MHz. The frequency counter reading at the LO output will be 90 MHz, 10 MHz IF offset +80 MHz tuned frequency.

(10) With -4.0 Vdc the frequency should be 90.040 MHz minimum, and with +4.0 Vdc the frequency should be 89.960 MHz maximum.

(11) Disconnect all equipment.

4.6.1.3 Gain Measurement

(1) Connect the circuit as shown in Figure 4-3.

(2) Set the IF marker to 10 MHz.

(3) Adjust the sweep generator and attenuator to produce an undistorted response with the marker centered on the curve.

(4) Slowly tune through the tuner's frequency range until the lowest amplitude point is found. Note the attenuator setting at this point.

(5) Connect the RF detector to the attenuator and decrease the attenuation until the scope deflection equals that noted in step (4).

(6) Compute the minimum gain by subtracting the attenuator setting in step (5) from step (4).

(7) Repeat steps (3) through (6) at the highest amplitude point of the response.

(8) Compute gain variation by subtracting the lowest gain measurement from the highest gain measurement. Gain variation across the tuning range shall be less than 10 dB.

4.6.2 TYPE 71360-4, 80-250 MHz RF TUNER (A1)

4.6.2.1 Local Oscillator Output Check

(l) Connect the RF VTVM, with 50 Ω load, to the LO output A1J3. The +9V and +15V power supply connections are C27 and C30 respectively. (see Fig. 4-1 as an example).

(2) The minimum level should be 20 mV rms into 50 Ω .

(3) Restore normal connections.

4.6.2.2 DAFC Range Check

(1) Interconnect the equipment as shown in Figure 4-2 with the following exceptions.

a. Use the 80-250 MHz Tuner (A1) in place of the 20-80 MHz Tuner.

b. Connect the positive (+) terminal of the power supply (HP-721A) to A1C22.

(2) Set the wide band amplifier for 20 dB gain.

(3) Adjust the tuner and signal generator for 80 MHz. The LO reading on the frequency counter will be 101.4 MHz; 21.4 MHz IF offset +80 MHz tuned frequency.

(4) Adjust the power supply for -4.0 Vdc using the VTVM.

(5) Connect the power supply to the DAFC input C22 on the RF Tuner.

(6) The frequency counter reading should be 101.440 MHz minimum.

(7) Change the paver supply connection to produce +4.0 Vdc.

(8) The frequency counter reading should be 101.360 MHz maximum.

(9) Repeat steps (3) through (8) with the signal generator and tuner tuned to 250 MHz. The frequency counter reading at the LO output will be 271.4 MHz, 21.4 MHz IF offset +250 MHz tuned frequency.

(10) With -4.0 Vdc the frequency should be 271.525 MHz minimum, and with +4.0 Vdc the frequency should be 271.375 MHz maximum.

(11) Disconnect all equipment.

4.6.2.3 Gain Measurement

(1) Connect the circuit as shown in Figure 4-3.

(2) Set the IF marker to 21.4 MHz.

(3) Adjust the sweep generator and attenuator to produce an undistorted response with the marker centered on the curve.

(4) Slowly tune through the tuner's frequency range until the lowest amplitude point is found. Note the attenuator setting at this point.

(5) Connect the RF detector to the attenuator and decrease the attenuation until the scope deflection equals that noted in step (4).

(6) Compute the minimum gain by subtracting the attenuator setting in step (5) from step (4).

(7) Repeat steps (3) through (6) at the highest amplitude point of the response.

(8) Compute gain variation by subtracting the lowest gain measurement from the highest gain measurement. Gain variation across the tuning range shall be less than 10 dB.

(9) The typical gain of the RF tuner is 27 dB ±5 dB.

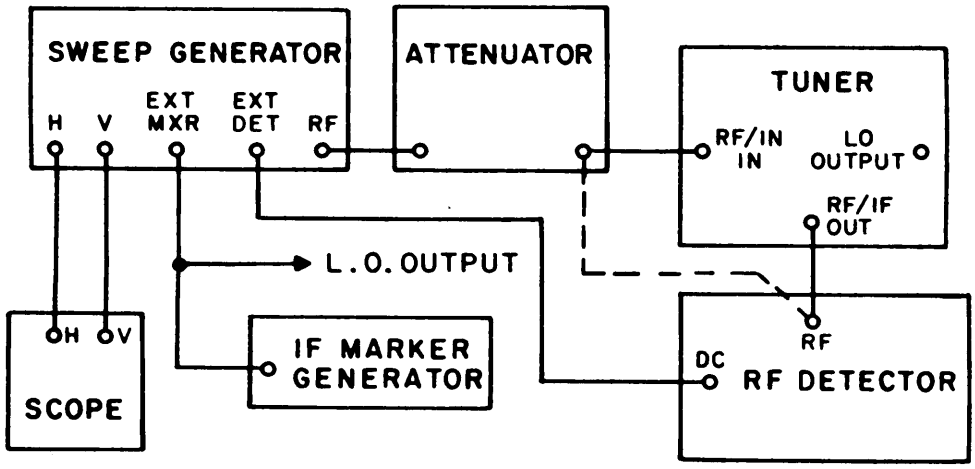

Figure 4-3. Test Setup, Gain Measurement Circuit Connection

4.7 ALIGNMENT AND ADJUSTMENT PROCEDURES

4.7.1 TYPE 71360-4, 80-250 MHZ TUNER (A1)

Alignments of these tuners should only be performed by personnel thoroughly familiar with RF tuner alignment. Component placement and lead lengths are optimized during manufacture and alignment. Any deviation from those optimum conditions will likely result in a tuner not performing to full factory standards. Therefore, neither replace a component nor make an adjustment without a specific reason. When replacing components, duplicate the original layout exactly. Adjustments should not be made without a test setup to show the affect of the adjustment. Also, read though the com-

plete alignment procedure until a complete understanding of each step and procedure is acquired. Only then should an alignment be attempted. Perform the following steps to prepare the tuner for the alignment procedure.

(1) Remove the tuner from the associated receiver's chassis (if any) according to the procedure given in paragraph 2.2.

(2) Connect the operating voltage to the tuner as shown in Figure 4-4.

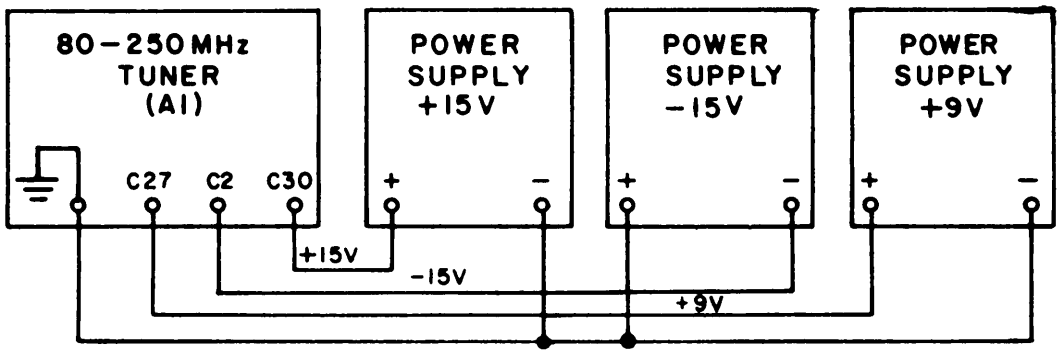

Figure 4-4. Test Setup, 80-250 MHz Tuner, Power Circuit Connection

4.7.1.1 Local Oscillator Pre-Alignment

Fine Tuning DAFC and LO Output

(1) Connect the LO output, J3, of the 80-250 MHz Tuner to the frequency counters input.

NOTE

Temporarily install the tuner cover while making measurements to insure that adequate clearance is maintained between the cover and components in both LO and RF sections of the tuner. It will be necessary to locate LO components to minimize stray capacitance, particularly L8 and L9, C20, C24 and C26.

(2) Adjust trimmer capacitor C21 to near its maximum capacitance by turning the plunger counter clockwise (CCW) until it is flush with the capacitor case.

(3) Rotate the inductuner shaft fully clockwise (CW) until the shaft hits the mechanical stop.

(4) Adjust the turns of trimmer inductor, L8, (main chassis), until the frequency counter reads 253 MHz ± 200 MHz.

(5) Rotate the inductuner shaft fully CCW until it is stopped by the mechanical shaft.

(6) Spread the turns of inductor L9 for a counter reading of 76.5 MHz ± 100 kHz.

(7) Repeat steps (3) through (6) until interaction between the components are minimized.

(8) Adjust the variable power supply for -4.0 Vdc and connect it to C22. Rotate the inductuner shaft fully CCW and note counter reading.

(9) Change the variable power supply to +4.0 Vdc and note the reading on the counter. Subtract this reading from that recorded in step (8). This is the DAFC range and shall be greater than 100 kHz.

(10) Temporarily remove the +9.0 Vdc from C27 and verify that the LO frequency changes approximately 500 kHz.

(11) Replace the Frequency Counter with an RF voltmeter.

(12) Rotate the tuner across its frequency spectrum while observing the level of the RF meter. The output level should range between 20 mV and 100 mV. If necessary replace R15 to obtain this level.

(13) Connect the Spectrum Analyzer to J3 and set it to its widest scan width. Verify that all LO harmonics are greater than 15 dB below the fundamental amplitude.

NOTE

The LO drive to the buffer must be decrased if harmonic levels are excessive. Decrease the value of C28 as necessary and repeat steps (1) through (12).

(14) Measure the LO level at pin E2 of the oscillator/ buffer (A3) using a high impedance RF VTVM. Its value should range typically between 0.5 to 1.0 Vrms.

4.7.1.2 RF Interstage Alignment

(1) Connect the circuit as shown in Figure 4-5.

(2) Set the oscilloscope to AC unless a DC offset is connected to Neg. input.

(3) Set the IF marker to 21.400 MHz.

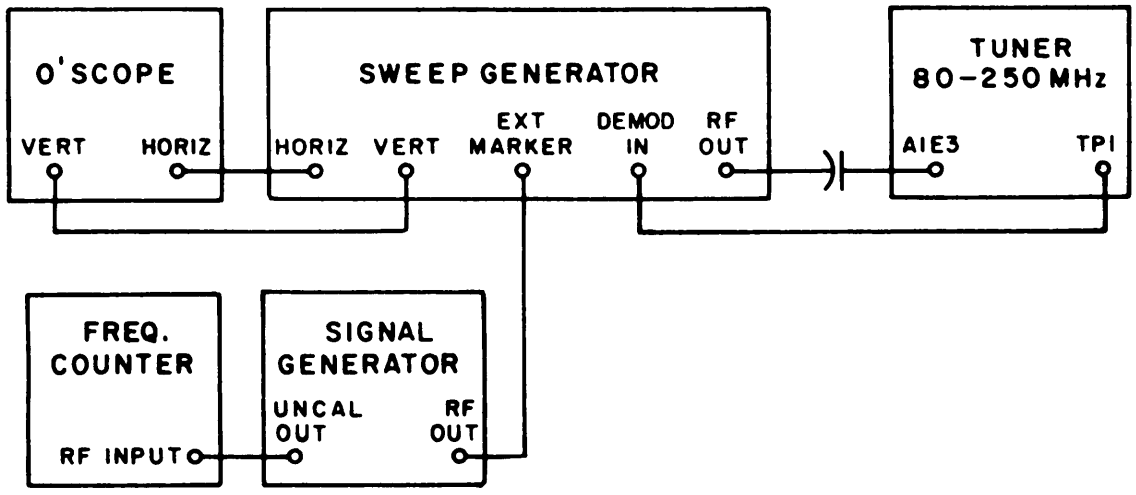

Figure 4-5. Test Setup, 80-250 MHz Tuner, RF Interstage Alignment Circuit Connection

(4) Rotate the Inductuner Shaft 2 3/4 turns CW from its fully CCW position.

(5) Set the sweep generator to 120 MHz; sweepwidth to 10 MHz and the output level to -15 dBm.

(6) Adjust C10 and C13 for a maximum amplitude single peak response centered about the LO/IF marker as shown in Figure 4-6.

FIGURE 4-6
FIGURE 4-7

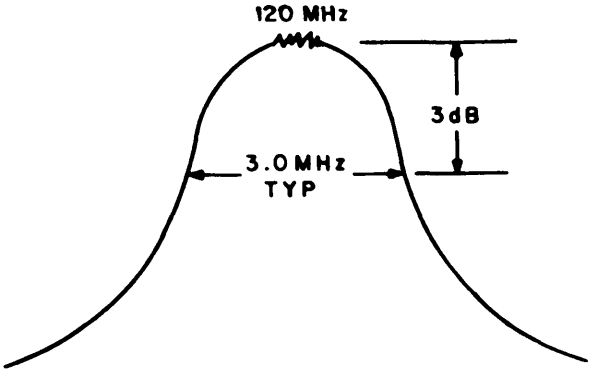

Figure 4-6. Typical, 80-250 MHz Tuner, RF Interstage Bandpass Response

(7) Readjust the sweep generator to a frequency of 253 MHz. Adjust the turns of L3 and LA for a maximum amplitude double tuned response centered about the LO/IF marker as shown in Figure 4-7.

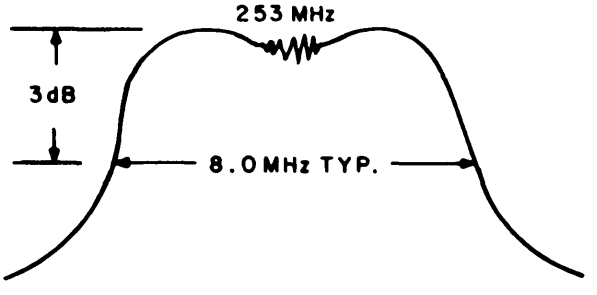

Figure 4-7. Typical, 80-250 MHz Tuner, RF Interstage Bandpass Response

(8) Repeat steps (4) through (7) until interaction between the adjustments is minimized.

4.7.1.3 Local Oscillator (Final) Alignment

(1) Connect the circuit as shown in Figure 4-5.

(2) Set the sweep generator to a frequency of 120 MHz.

(3) Rotate the Inductuner Shaft Until a response is displayed on the oscilloscope.

(4) Adjust trimmer capacitor C21 until the LO/IF marker is centered on the response curves peak.

(5) Readjust the sweep generators frequency to 80 MHz.

(6) Rotate the Inductuner Shaft fully CCW until a response is displayed on the oscilloscope.

(7) Adjust the padder inductor L9 until the LO/IF marker is centered on the response.

NOTE

To accomplish step (7) above, lift L9 away from the Tuner's chassis if more inductance is required.

(8) Repeat steps (1) through (7) until interaction between the adjustments is minimal.

(9) Readjust the sweep generator frequency to 250 MHz.

(10) Rotate the Inductuner Shaft fully CW and adjust trimmer inductor L8 until the LO/IF marker is centered on the response curve.

(11) Repeat steps (1) through (7) and (9) and (10) until interaction between the adjustments are minimized.

(12) Connect the Frequency Counter to J3 (LO output) and recheck the tuning range (section 4.7.1.1 steps 1-7).

4.7.1.4 RF Input Alignment

(1) Connect the circuit as shown in Figure 4-5 except with the following change: connect the sweep generators RF output to the tuners RF input jack, J1.

(2) Adjust the sweep generator to 250 MHz.

(3) Rotate the Inductuner Shaft fully CW and adjust C5 for a maximum amplitude response at the marker.

FIGURE 4-8

NOTE

If C5 cannot be adjusted through a peak, decrease L2 until a peaking action with C5 is obtained.

4.7.1.5 Mixer Alignment

(1) Connect the circuit as shown in Figure 4-8.

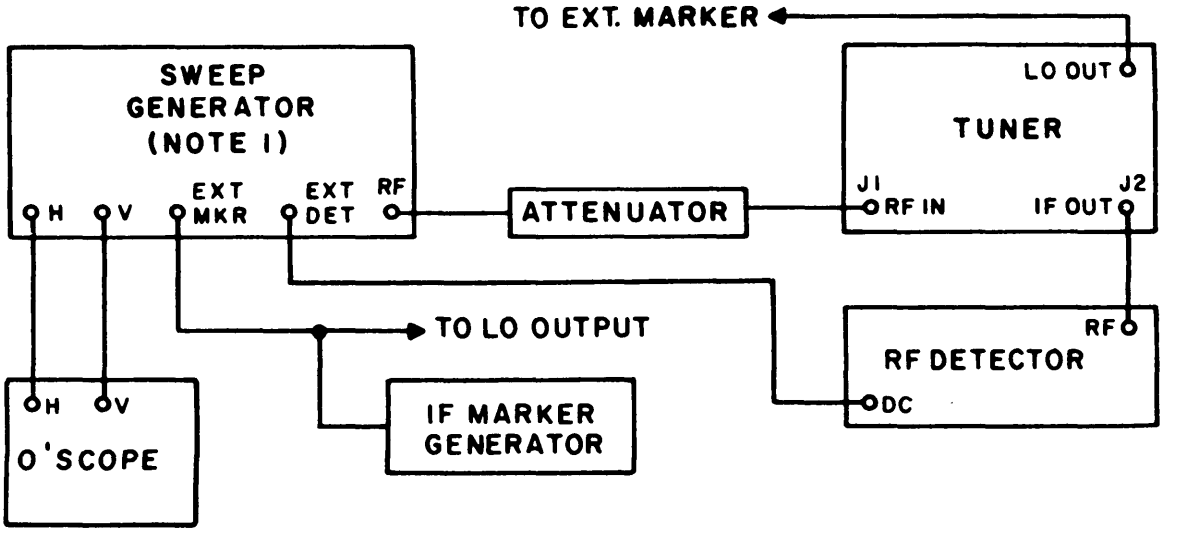

Figure 4-8. Test Setup, 80-250 MHz Tuner, Mixer Alignment Circuit Connection

NOTE

If the sweep generator does not have a calibrated output, it will be necessary to use a RF VTVM.

(2) Set the sweep generator's frequency to 80 MHz.

(3) Rotate the Inductuner Shaft fully CCW and adjust C16 for a maximum amplitude response centered about the marker as shown in Figure 4-9.

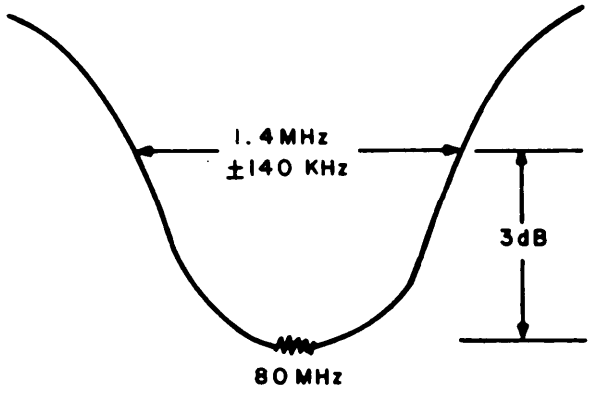

Figure 4-9. Typical, 80-250 MHz Tuner, Alignment Bandpass Response

4.7.2 TYPE 71431, 20-80 MHz TUNER (A2)

4.7.2.1 Mixer Output Alignment

(1) Connect the circuit as in Figure 4-10.

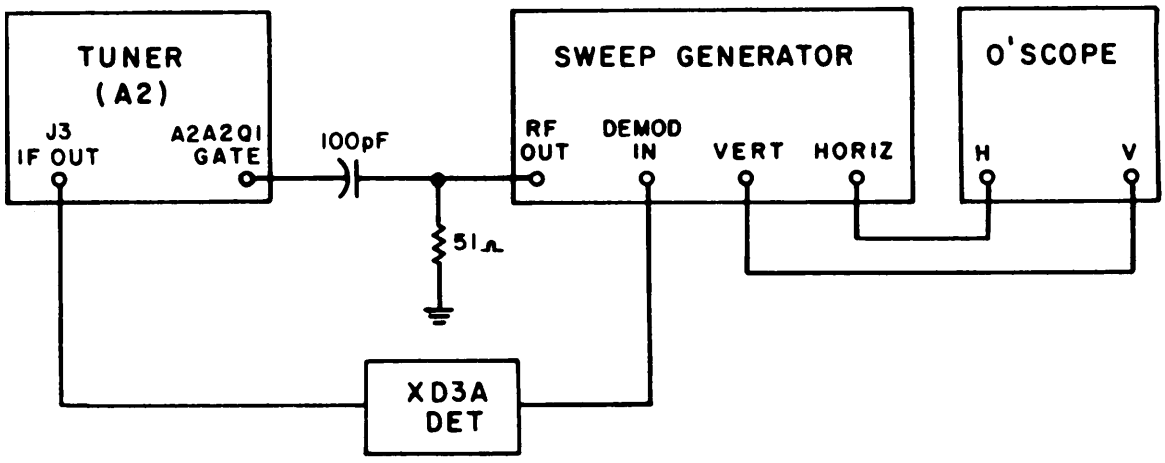

Figure 4-10. Test Setup, 20-80 MHz Tuner, Mixer Output Circuit Connection

(2) Adjust the sweep generator to produce an approximately 1 MHz wide sweep centered at 10 MHz. Use the sweep generator internal 10 MHz marker.

(3) Adjust the oscilloscope and sweep generator to display the response and center it about the 10 MHz marker.

(4) Adjust capacitor A2A2C16 to peak the response and center it about the 10 MHz marker.

(5) A typical response is shown in Figure 4-11.

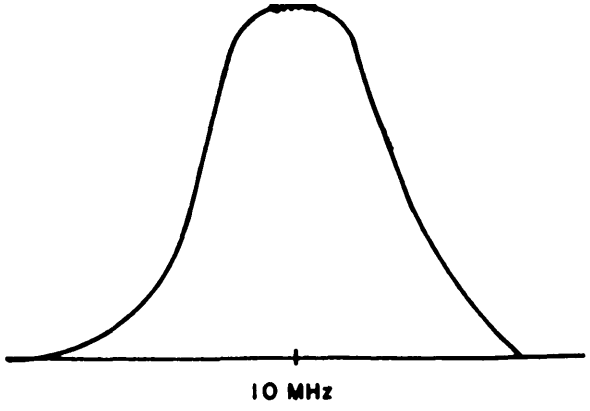

Figure 4-11. Typical, 20-80 MHz Tuner, Mixer Output Bandpass Response

4.7.2.2 RF Alignment

(1) Construct the circuit as in Figure 4-12.

(2) Adjust the tuner until an 80 MHz + 10 MHz IF offset = 90 MHZ is displayed on the frequency counter.

(3) Adjust the sweep generator and oscilloscope to display the response curve.

(4) Adjust capacitors A2A1C3, A2A2C3 and A2A2C12 for an overcoupled response centered about the 80 MHz marker. A typical response curve at 80 MHz is shown in Figure 4-13.

(5) Check the response across the band. The response shape will vary but the marker should remain on or between the peaks.

(6) Disconnect the test equipment and restore normal connections.

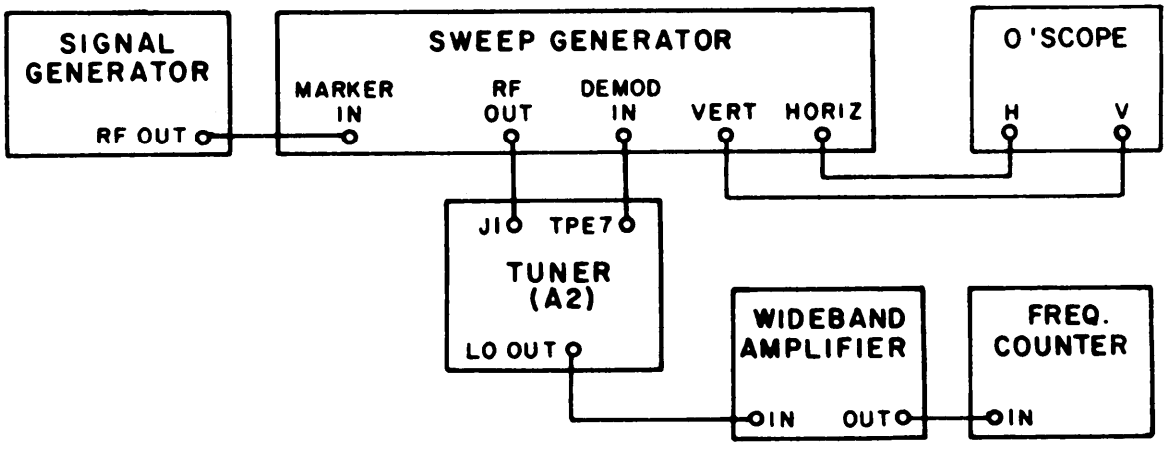

Figure 4-12. Test Setup, 20-80 MHz Tuner, Interstate Alignment Circuit Connection

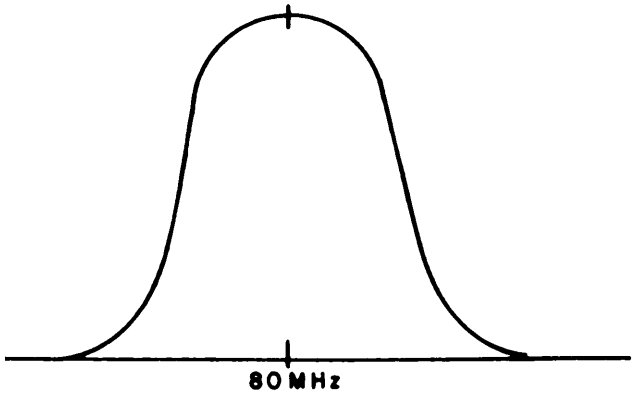

Figure 4-13. Typical, 80 MHz Response Curve

4.8 SUBASSEMBLY REMOVAL, REPAIR AND REPLACEMENT

4.8.1 Both of the tuner assemblies are mounted on printed circuit cards. Before a subassembly is removed, any coaxial cable connections or plug assemblies must be unsoldered or disconnected. Repair procedures are straightforward and conventional observing the usual precautions regarding temperature on semiconductors and damage to circuit patterns on boards.

Table 4-1. Typical Semiconductor Element Voltages

		Transistor Elements			Field Effect Transistor Elements			
Ref. Desig.	Type	Emitter	Base	Collector	Source	Gate 1	Gate 2	Drain
A1A1Q1	3N200				0.9	1.0	4.5	15.0
A1Q1	2N5397				-10.3	-11.5	---	0
A1A2Q1	2N2857	2.54	3.29	15.3				
A1A2Q3	2N2857	4.2	5.0	13.3				
A1A2Q2	3N200				0.4	0	0.4	
A1A3Q1	2N2857	6.2	7.4	15.0				
A1A3Q2	2N2857	0.6	1.4	11.3				
A2Q1	3N187				1.68	0.98	4.15	14.28
A2A2Q1	3N128				1.27	0.00	---	13.20
A2A3Q1	2N3478	8.83	9.67	14.19				
A2A3Q2	2N3478	9.45	14.44	14.44				

SECTION V

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules) and parts. An example of the unit method follows:

Subassembly Designation A1	R1 Class and No. of Item
Identify from right to left as:	First (1) resistor (R) of first (1) subassembly (A)

As shown on the main chassis schematic, components which are an integral part of the main chassis have no subassembly designation.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter (s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parenthesis within the figure titles.

5.3 LIST OF MANUFACTURERS

Mfr. Code	Name and Address
01121	Allen-Bradley Company 1210 South 2nd Street Milwaukee, Wisconsin 53204
01281	TRW Semiconductors, Inc. 14520 Aviation Boulevard Lawndale, California 90260
01351	Dynamic Gear Co., Inc. 175 Dixon Avenue Amityville, New York 11701
02114	Ferroxcube Corporation P.O. Box 359 Mt. Marion Road Saugerties, New York 12477
02735	RCA Corporation Solid State Division Route 202 Somerville, New Jersey 08876
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey 08530

Mfr. Code	Name and Address
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, Maryland 20878
19505	Applied Engineering Products, Co. Division of Samarius Inc. 300 Seymour Avenue Derby, Connecticut 06418
25088	Siemens American, Inc. 186 Wood Avenue S. Iselin, New Jersey 08830
33095	Spectrum Control Inc. 152 E. Main Street Fairview, Pennsylvania 06415
56878	Standard Pressed Steel Co. Box 608 Benson East Jenkintown, Pennsylvania 19046
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
73899	JFD Electronics Company 15th at 62nd Street Brooklyn, New York 11219
78189	Illinois Tool Works Inc. Shakeproof Division St. Charles Road Elgin, Illinois 60120
79136	Waldes Kohinoor Inc. 47-16 Austel Place Long Island City, New York 11101
80058	Joint Electronic Type Designation System
80121	Electronic Industries Association 2001 Eye Street, N.W. Washington, D.C. 20006
80312	Winchester Electronic Div. Litton Industries, Inc. Main Street& Hillside Avenue Oakville, Connecticut 06779
81349	Military Specifications
83086	New Hampshire Ball Bearings, Inc. Route 202 Peterborough, New Hampshire 03458
91293	Johnson Manufacturing Co. P.O. BOX 329 Boonton, New Jersey 07705
91418	Radio Material Company 4242 West Bryn Mawr Avenue Chicago, Illinois 60646
93332	Sylvania Electric Products, Inc. Semiconductor Products Div. 100 Sylvan Road Woburn, Massachusetts 01801
95121	Quality Components, Inc. P.O. Box 113 St. Mary’s Pennsylvania 15857

Mfr. Code	Name and Address
96906	Military Standards
99800	American Precision Industries Delecan Electronics Division 270 Quaker Road East Aurora, New York 14052
99848	Wilco Corporation 4030 West 10th Street P.O. Box 22248 Indianapolis, Indiana 46222

5.4 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from Watkins-Johnson Company, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in paragraph 5.3 and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may no necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military of industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semi-conductors become available, it is the policy of Watkins-Johnson to incorporate them in proprietary products. For this reason some transistors, diodes and integrated circuits installed in the equipment may not agree with those specified in the parts list and schematic diagrams of this manual. However, the semi-conductors designated in the manual may be substituted in every case with satisfactory results.

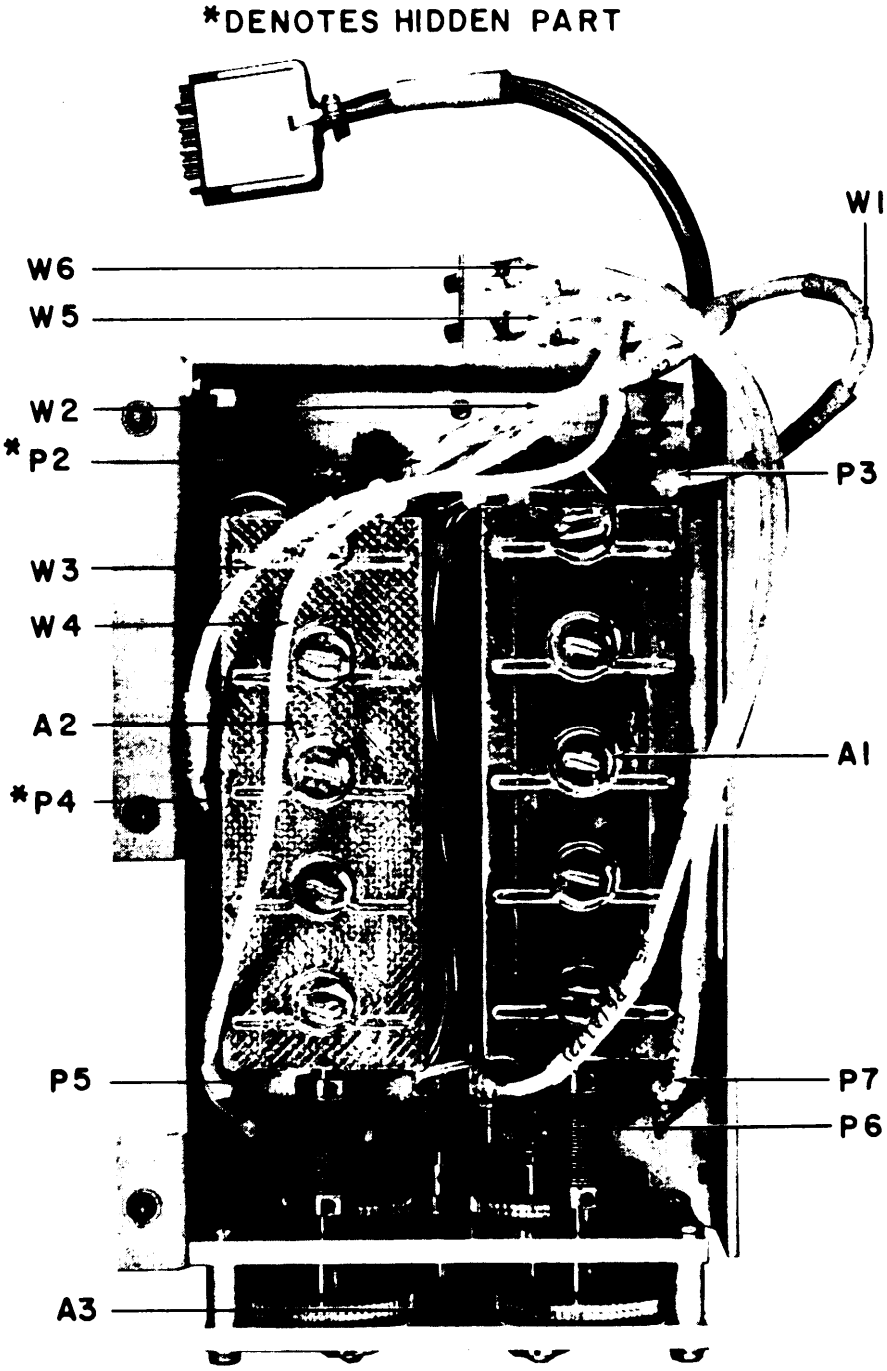

Figure 5-1. WJ-9121 20-250 MHz Tuner Assembly, Top View, Location of Components

5.5 TYPE WJ-9121 20-250 MHZ TUNER ASSEMBLY, MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	RF Tuner, 80-250 MHz	1	71360-4	14632	
A2	RF Tuner, 20-80 MHz	1	71431	14632	
A3	Tuning Drive	1	85132	14632	
J1	Connector, Receptacle: SMC Series	6	UG1468/U	80058	19505
J2 Thru J6	Same as J1				
P1	Connector, Plug: SRE Series	1	SRE20PNSSH13	81312	
P2	Connector, Plug: SMC Series	6	UG1465/U	80058	19505
P3 Thru P7	Same as P2				
W1	Cable Assembly	1	17300-103-1	14632	
W2	Cable Assembly	1	17300-103-2	14632	
W3	Cable Assembly	1	17300-103-3	14632	
W4	Cable Assembly	1	17300-103-4	14632	
W5	Cable Assembly	1	17300-103-5	14632	
W6	Cable Assembly	1	17300-103-6	14632	

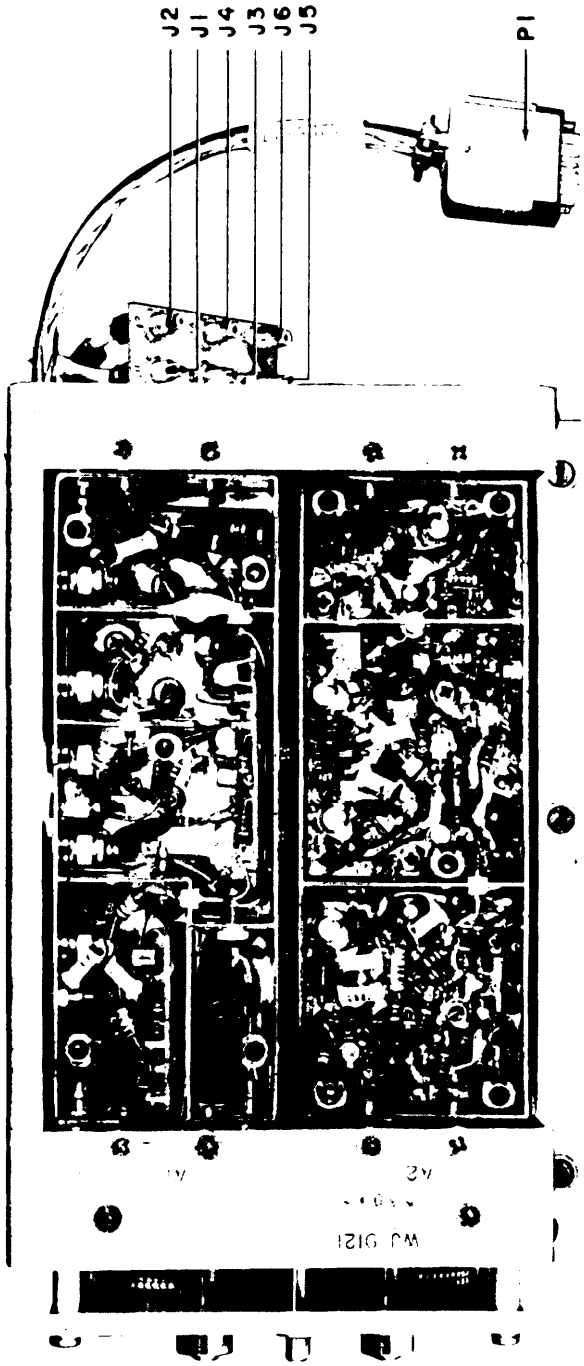

Figure 5-2. WJ-9121 20-250 MHz Tuner Assembly, Bottom View, Location of Components

5. 5.1 TYPE 71360-4 80-250 MHz TUNER ASSEMBLY REF DESIGPREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	RF Amplifier	1	16874	14632	
A2	Buffer, Mixer	1	16756-2	14632	
A3	Oscillator, Buffer	1	16835	14632	
C1	Capacitor, Ceramic, Feedthru: 1000 pF, GMV, 500 V	9	54-794-009-102W	33095	
C2	Same as C1				
C3	Capacitor, Ceramic, Tubular: 2.2 pF, 10%, 500 V	1	301-000COJO-229C	72982	
C4	Not Used				
C5	Capacitor, Variable, Air: 0.8-10.0 pF, 250 V	5	5202	91293	
C6	Capacitor, Ceramic, Tubular: 3.6 pF, .25%, 500 V	1	301-000C0J0-369C	72982	
C7	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	2	SM(1000 pF, P)	91418	
C8	Same as C1				
C9	Same as C1				
C10	Same as C5				
C11	Capacitor, Composition, Tubular: 0.22 pF, 10%, 500 V	1	QC(0.22 pF, K)	95121	
C12	Capacitor, Composition, Tubular: 3.3 pF, 10%, 500 V	2	QC(3.3 pF, K)	95121	
C13	Same as C5				
C14	Capacitor, Composition, Tubular: 0.82 pF, 10%, 500 V	1	QC(0.82 pF, K)	95121	
C15	Same as C7				
C16	Same as C5				
C17	Capacitor, Ceramic, Feedthru: 100 pF, 10%, 500 V	1	54-794-009-101K	33095	
C18	Same as C1				
C19	Same as C1				
C20	Capacitor, Composition, Tubular: 0.51 pF, 10%, 500 V	1	QC(0.51 pF, K)	95121	
C21	Same as C5				
C22	Same as C1				
C23	Capacitor, Ceramic, Standoff: 1000 pF, GMV, 500 V	1	54-803-003-102W	33095	
C24	Capacitor, Ceramic, Tubular: 1.0 pF±0.25 pF, 500 V	1	301-000U2K0-109C	72982	
C25	Not Used				
C26	Capacitor, Ceramic, Tubular: 2.4 pF±0.25 pF, 500 V	1	301-000T2J0-249C	72982	
C27	Same as C1				
C28*	Capacitor, Composition, Tubular: 0.18 pF, 10%, 500 V	1	QC(0.18 pF, K)	95121	
C29	Not Used				
C30	Same as C1				
C31	Capacitor, Ceramic, Disc: 5000 pF, 20%, 500 V	2	SM(5000 pF, M)	91418	
C32	Same as C31				
C33	Same as C12				

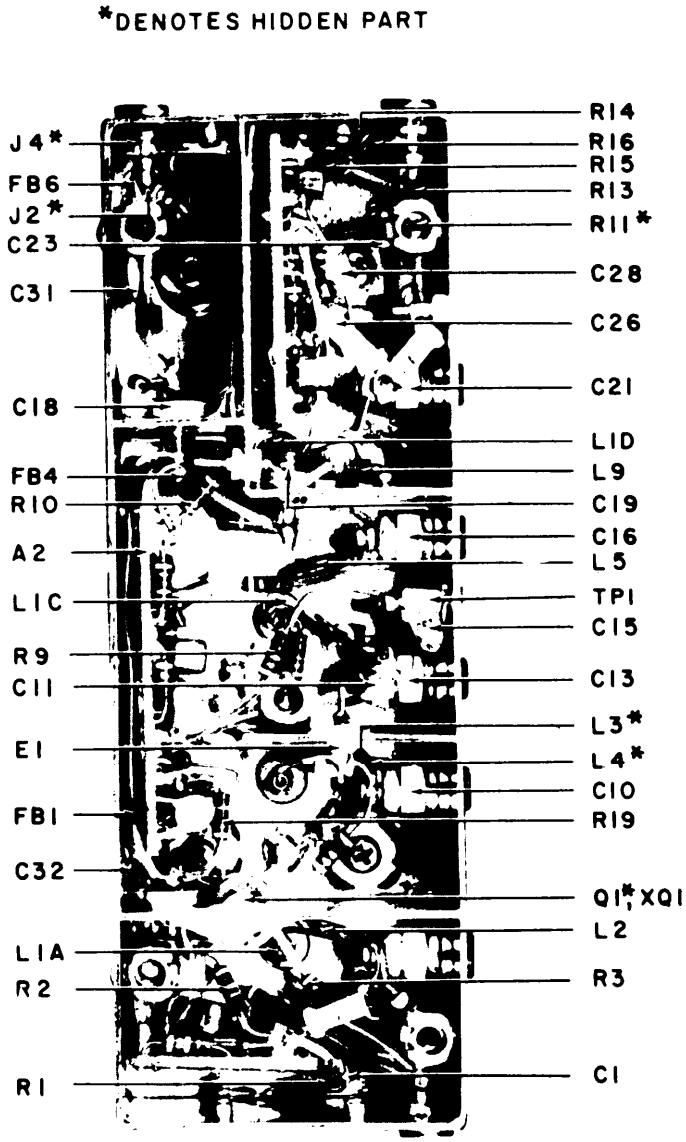

Figure 5-3. Type 71360-480-250 MHz Tuner Assembly (A1), Location of Components

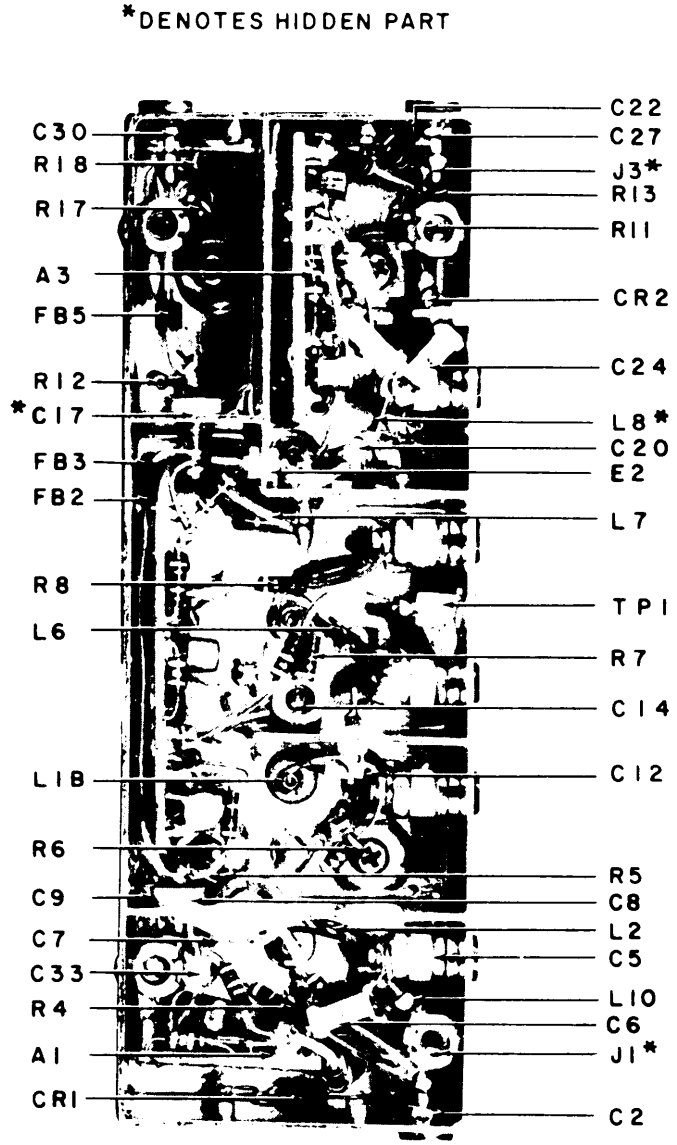

Figure 5-4. Type 71360-480-250 MHz Tuner Assembly (A1), Location of Components

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
CR1	Diode	1	1N462A	80131	93332
CR2	Diode, Varicap	1	V27E	01281	
E1	Terminal, Feedthru, Insulated	2	SFU16Y	04013	
E2	Same as E1				
FB1	Ferrite Bead	6	56-590-65-4A	02114	
FB2 Thru FB6	Same as FB1				
J1	Connector, Receptacle: SMC Series	4	10-0104-002	19505	
J2	Same as J1				
J3	Same as J1				
J4	Same as J1				
L1	Inductuner, Modified	1	33569-1	14632	
L2	Inductor	3	22292-10	14632	
L3	Same as L2				
L4	Inductor	3	21210-50	14632	
L5	Same as L4				
L6	Same as L2				
L7	Coil, Fixed: 6.8 μH, 5%	1	1537-32	99800	
L8	Inductor	1	22292-9	14632	
L9	Inductor	1	21210-165	14632	
L10	Same as L4				
MP1	Cover Marked	1	16883-4	14632	
Q1	Transistor	1	2N5397	80131	04713
R1	Resistor, Fixed, Composition: 47 kΩ, 5%, 1/4 W	2	RCR07G473JS	81349	01121
R2	Resistor, Fixed, Composition: 680 kΩ, 5%, 1/4 W	1	RCR07G684JS	81349	01121
R3	Resistor, Fixed, Composition: 1.0 kΩ, 5%, 1/4 W	1	RCR07G102JS	81349	01121
R4	Resistor, Fixed, Composition: 12 kΩ, 5%, 1/4 W	1	RCR07G123JS	81349	01121
R5	Resistor, Fixed, Composition: 36 kΩ, 5%, 1/4 W	1	RCR07G363JS	81349	01121
R6	Resistor, Fixed, Composition: 4.7 Ω, 5%, 1/4 W	1	RCR07G4R7JS	81349	01121
R7	Resistor, Fixed, Composition: 15 kΩ, 5%, 1/4 W	1	RCR07G153JS	81349	01121
R8	Resistor, Fixed, Composition: 22 Ω, 5%, 1/4 W	1	RCR07G220JS	81349	01121
R9	Resistor, Fixed, Composition: 22 kΩ, 5%, 1/4 W	1	RCR07G223JS	81349	01121
R10	Resistor, Fixed, Composition: 47 Ω, 5%, 1/4 W	2	RCR07G470JS	81349	01121
R11	Resistor, Fixed, Composition: 100 kΩ, 5%, 1/4 W	2	RCR07G104JS	81349	01121
R12	Resistor, Fixed, Composition: 1.5 kΩ, 5%, 1/4 W	1	RCR07G152JS	81349	01121
R13	Same as R1				

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
R14	Same as R11				
R15*	Same as R10				
R16	Resistor, Fixed, Composition: 56 Ω, 5%, 1/4 W	2	RCR07G560JS	81349	01121
R17	Resistor, Fixed, Composition: 68 Ω, 5%, 1/4 W	2	RCR07G680JS	81349	01121
R18	Resistor, Fixed, Composition: 100 Ω, 5%, 1/4 W	1	RCR07G101JS	81349	01121
R19	Same as R17				
TP1	Jack, Tip: Vertical	1	TJ6	04013	
XQ1	Transistor, Socket, Modified	1	16506-1	14632	
*	Nominal value, final value, factory selected.				

5.5.1.1 Part 16874 RF Amplifier

REF DESIG PREFIX A1A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	2	SM(1000 pF, P)	91418	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: 470 pF, 20%, 1000 V	1	B(470 pF, M)	91418	
Q1	Transistor	1	3N200	02735	
R1	Resistor, Fixed, Composition: 47 kΩ, 5%, 1/4 W	1	RCR07G473JS	81349	01121
R2	Resistor, Fixed, Composition: 3.3 Ω, 5%, 1/4 W	1	RCR07G3R3JS	81349	01121
R3	Resistor, Fixed, Composition: 120 kΩ, 5%, 1/4 W	1	RCR07G124JS	81349	01121
R4	Resistor, Fixed, Composition: 100 Ω, 5%, 1/4 W	1	RCR07G101JS	81349	01121
T1	Inductor	1	21818-5	14632	

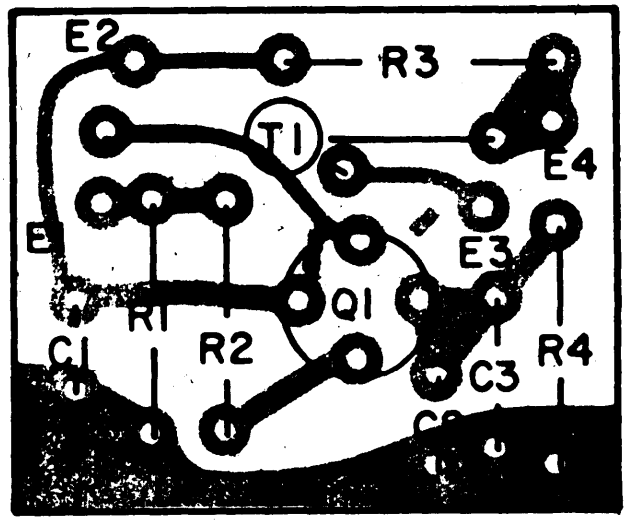

Figure 3-5. Part 16874 RF Amplifier (A1A1)
Location of Components

5. 5.1.2 Part 16756-2 Buffer/Mixer REF DESIG PREFIX A1A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	5	SM(1000 pF, P)	91418	
C2	Capacitor, Ceramic, Disc: 470 pF, 20%, 1000 V	1	B(470 pF, M)	91418	
C3 Thru C6	Same as C1				
Q1	Transistor	2	2N2857	80131	02735
Q2	Transistor	1	3N200	02735	
Q3	Same as Q1				
R1	Resistor, Fixed, Composition: 22 kΩ, 5%, 1/4 W	1	RCR07G223JS	81349	01121
R2	Resistor, Fixed, Composition: 470 Ω, 5%, 1/4 W	2	RCR07G471JS	81349	01121
R3	Resistor, Fixed, Composition: 33 kΩ, 5%, 1/4 W	1	RCR07G333JS	81349	01121
R4	Resistor, Fixed, Composition: 100 kΩ, 5%, 1/4 W	1	RCR07G104JS	81349	01121
R5	Resistor, Fixed, Composition: 330 Ω, 5%, 1/4 W	1	RCR07G331JS	81349	01121
R6	Resistor, Fixed, Composition: 270 Ω, 5%, 1/4 W	1	RCR07G271JS	81349	01121
R7	Same as R2				
R8	Resistor, Fixed, Composition: 12 kΩ, 5%, 1/4 W	1	RCR07G123JS	81349	01121
R9	Resistor, Fixed, Composition: 4.7 kΩ, 5%, 1/8 W	2	RCR05G472JS	81349	01121
R10	Same as R9				
T1	Inductor, Resistor, Form, Tapped	1	21818-4	14632	

Figure 5-6. Part 16756-2 Buffer/Mixer (A1A2), Location of Components

5.5.1.3 Part 16835 Oscillator/Buffer REF DESIG PREFIX A1A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	Capacitor, Ceramic, Tubular: 5.0 pF±0.25 pF, 500 V	1	301-000C0H0-509C	72982	
C2	Capacitor, Ceramic, Tubular: 5.6 pF±0.25 pF, 500 V	1	301-000C0H0-569C	72982	
C3	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	4	SM(1000 pF, P)	91418	
C4	Same as C3				
C5	Same as C3				
C6	Same as C3				
Q1	Transistor	2	2N2857	80131	02735
Q2	Same as Q1				
R1	Resistor, Fixed, Composition: 56 kΩ, 5%, 1/4 W	1	RCR07G563JS	81349	01121
R2	Resistor, Fixed, Composition: 1.0 kΩ, 5%, 1/4 W	1	RCR07G102JS	81349	01121
R3	Resistor, Fixed, Composition: 10 Ω, 5%, 1/4 W	1	RCR07G100JS	81349	01121
R4	Resistor, Fixed, Composition: 100 Ω, 5%, 1/4 W	2	RCR07G101JS	81349	01121
R5	Resistor, Fixed, Composition: 330 Ω, 5%, 1/4 W	2	RCR07G331JS	81349	01121
R6	Resistor, Fixed, Composition: 47 Ω, 5%, 1/4 W	1	RCR07G470JS	81349	01121
R7	Resistor, Fixed, Composition: 13 kΩ, 5%, 1/4 W	1	RCR07G133JS	81349	01121
R8	Same as R5				
R9	Same as R4				
R10	Resistor, Fixed, Composition: 1.6 kΩ, 5%, 1/8 W	1	RCR05G162JS	81349	01121

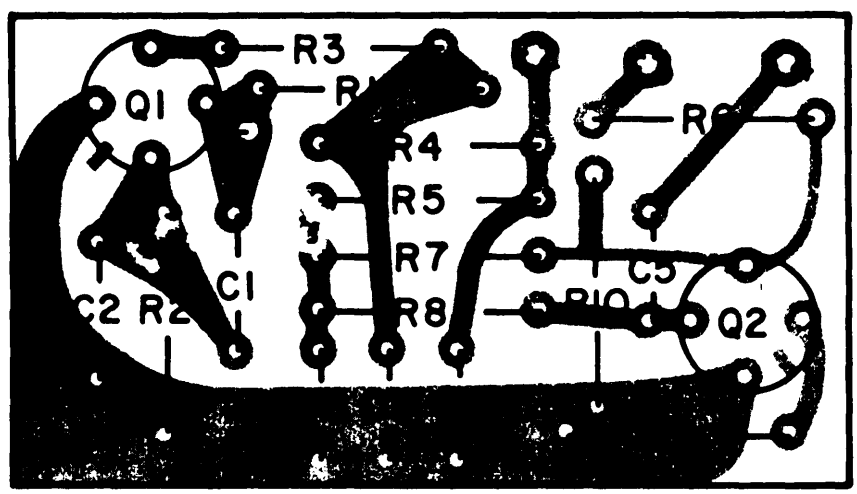

Figure 5-7. Part 16835 Oscillator/ Buffer (A1A3), Location of Components

5.5.2 TYPE 71431 20-80 MHz RF TUNER REF DESIG PREFIX A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
A1	Input Network	1	17489-2	14632	
A2	Interstage Mixer	1	17490-1	14632	
A3	Local Oscillator	1	17488-3	14632	
C1	Capacitor, Ceramic, Feedthru: 0.05 μF, GMV, 300 V	5	54-785-005-503P	33095	
C2 Thru C5	Same as C1				
C6	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	3	SM(1000 pF, P)	91418	
C7	Same as C6				
C8	Capacitor, Ceramic, Standoff: 330 pF, 10%, 500 V	1	54-803-003-3311	33095	
C9	Same as C6				
C10	Capacitor, Ceramic, Feedthru: 0.05 μF, GMV, 500 V	1	54-785-005-505P	33095	
CR1	Diode	1	1N462A	80131	93332
E1	Terminal, Feedthru, Insulated	1	SFU16Y	04013	
J1	Connector, Receptacle: SMC Series	3	10-0104-002	19505	
J2	Same as J1				
J3	Same as J1				
L1	Inductuner, Modified	1	33569-3	14632	
MP1	Cover Assembly	1	24441-1	14632	
Q1	Transistor	1	3N200	02735	
R1	Resistor, Fixed, Composition: 100 Ω, 5%, 1/4 W	3	RCR07G101JS	81349	01121
R2	Resistor, Fixed, Composition: 1.8 kΩ, 5%, 1/4 W	1	RCR07G182JS	81349	01121
R3	Resistor, Fixed, Composition: 100 kΩ, 5%, 1/4 W	1	RCR07G104JS	81349	01121
R4	Resistor, Fixed, Composition: 15 kΩ, 5%, 1/4 W	1	RCR07G153JS	81349	01121
R5	Same as R1				
R6	Resistor, Fixed, Composition: 62 Ω, 5%, 1/4 W	1	RCR07G620JS	81349	01121
R7	Same as R1				
R8	Resistor, Fixed, Composition: 47 kΩ, 5%, 1/4 W	1	RCR07G473JS	81349	01121
R9	Resistor, Fixed, Composition: 22 Ω, 5%, 1/4 W	1	RCR07G220JS	81349	01121

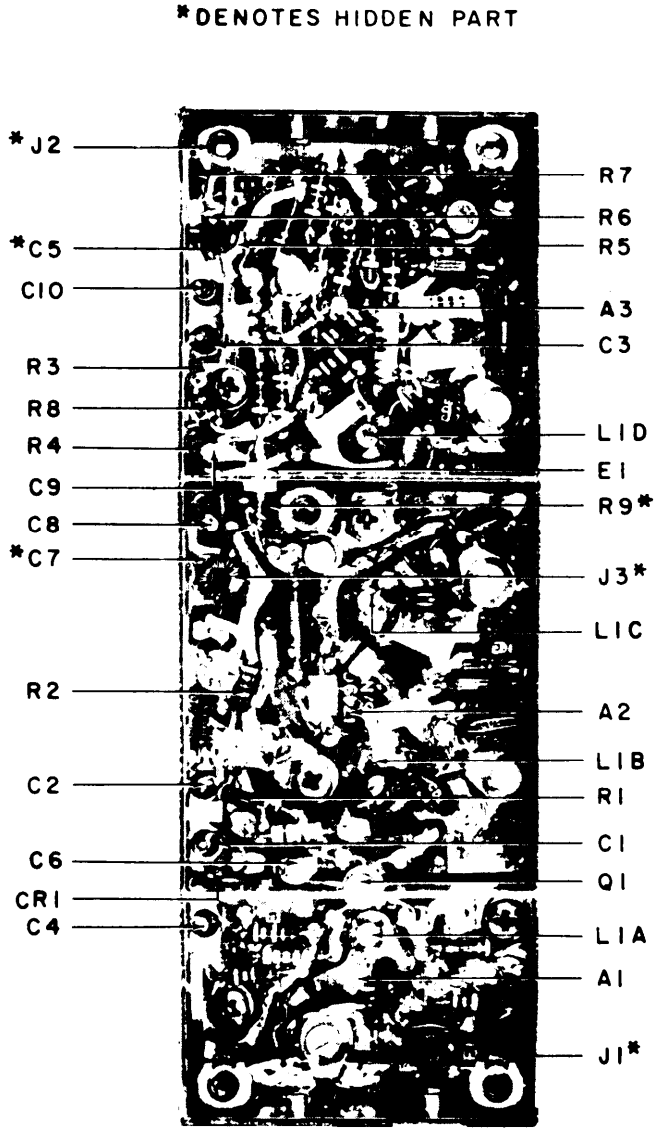

Figure 5-8. Type 71431 20-80 MHz RF Tuner (A2), Location of Components

5.5.2.1 Part 17489-2 Input Network REF DESIC, PRFFIX A2A1

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	72136
C2	Capacitor, Mica, Dipped: 51 pF, 2%, 500 V	2	CM04FD510G03	81349	72136
C3	Capacitor, Variable, Ceramic: 1.7-10 pF, 500 V	1	DVJ302A	73899	
C4	Capacitor, Mica, Dipped: 270 pF, 2%, 500 V	1	CM04FD271G03	81349	72136
C5	Same as C2				
C6	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	1	SM(1000 pF, P)	91418	
L1	Coil, Fixed	1	1129-39	14632	
R1	Resistor, Fixed, Composition: 100 kΩ, 5%, 1/4 W	1	RCR07G104JS	81349	01121
R2	Resistor, Fixed, Composition: 20 kΩ, 5%, 1/4 W	2	RCR07G203JS	81349	01121
R3	Resistor, Fixed, Composition: 270 kΩ, 5%, 1/4 W	1	RCR07G274JS	81349	01121
R4	Resistor, Fixed, Composition: 3.3 Ω, 5%, 1/4 W	1	RCR07G3R3JS	81349	01121
R5	Same as R2				
R6	Resistor, Fixed, Composition: 100 Ω, 5%, 1/4 W	1	RCR07G101JS	81349	01121

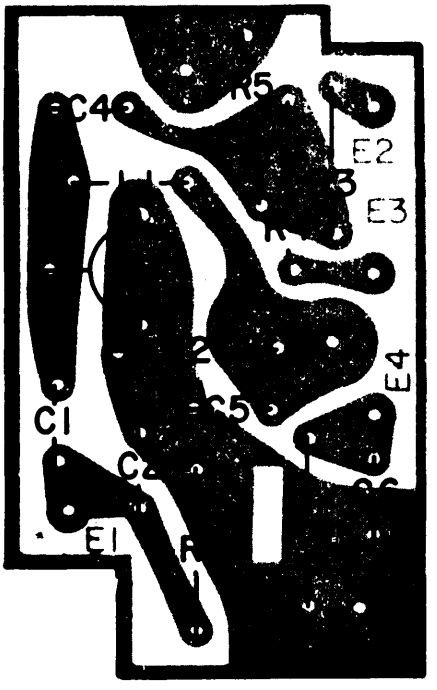

Figure 5-9. Part 17489-2 Input Network (A2A1), Location of Components

5.5.2.2 Part 17490-1 Interstatge/Mixer REF DESIG PREFIX A2A2

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	2	SM(1000 pF,P)	91418	
C2	Capacitor, Mica, Dipped: 270 pF, 2%, 500 V	1	CM04FD271G03	81349	72136
C3	Capacitor, Variable, Ceramic,: 1.0-10 pF, 500 V	2	DVJ302A	73899	
C4	Capacitor, Mica, Dipped: 27 pF, 2%, 500 V	1	CM04ED270G03	81349	72136
C5	Capacitor, Mica, Dipped: 39 pF, 2%, 500 V	2	CM04ED390G03	81349	72136
C6	Capacitor, Composition, Tubular: 1.0 pF, 10%, 500 V	1	QC(1.0 pF,K)	95121	
C7	Capacitor, Ceramic, Tubular: 5.6 pF ±0.25 pF, 500 V	2	301-000C0H0-569C	72982	
C8	Same as C7				
C9	Capacitor, Mica, Dipped: 15 pF, 5%, 500 V	1	CM04CD150J03	81349	72136
C10	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	72136
C11	Same as C5				
C12	Same as C3				
C13	Capacitor, Composition, Tubular: 3.3 pF, 10%, 500 V	1	QC(3.3 pF,K)	95121	
C14	Same as C1				
C15	Capacitor, Mica, Dipped: 18 pF, 5%, 500 V	1	CM04CD180J03	81349	72136
C16	Capacitor, Variable, Ceramic: 5-25 pF, 100 V	1	518-000A5-25	72982	
L1	Coil, Fixed: 18 μH, 10%	1	1025-50	99800	
L2	Coil	2	22292-108	14632	
L3	Inductor	1	21210-13	14632	
L4	Same as L2				
L5	Coil	1	20681-119	14632	
Q1	Transistor	1	3N128	80131	02735
R1	Resistor, Fixed, Composition: 10 Ω, 5%, 1/8 W	2	RCR05G100JS	81349	01121
R2	Resistor, Fixed, Composition: 56 kΩ, 5%, 1/8 W	1	RCR05G563JS	81349	01121
R3	Resistor, Fixed, Composition: 150 kΩ, 5%, 1/8 W	1	RCR05G154JS	81349	01121
R4	Resistor, Fixed, Composition: 1.5 kΩ, 5%, 1/8 W	1	RCR05G152JS	81349	01121
R5	Same as R1				
R6	Resistor, Fixed, Composition: 1.6 kΩ, 5%, 1/8 W	1	RCR05G162JS	81349	01121
R7	Resistor, Fixed, Composition: 22 kΩ, 5%, 1/8 W	1	RCR05G223JS	81349	01121
R8	Resistor, Fixed, Composition: 1.2 kΩ, 5%, 1/8 W	1	RCR05G122JS	81349	01121
R9	Resistor, Fixed, Composition: 2.7 kΩ, 5%, 1/8 W	1	RCR05G272JS	81349	01121
T1	Inductor	1	11464-40	14632	

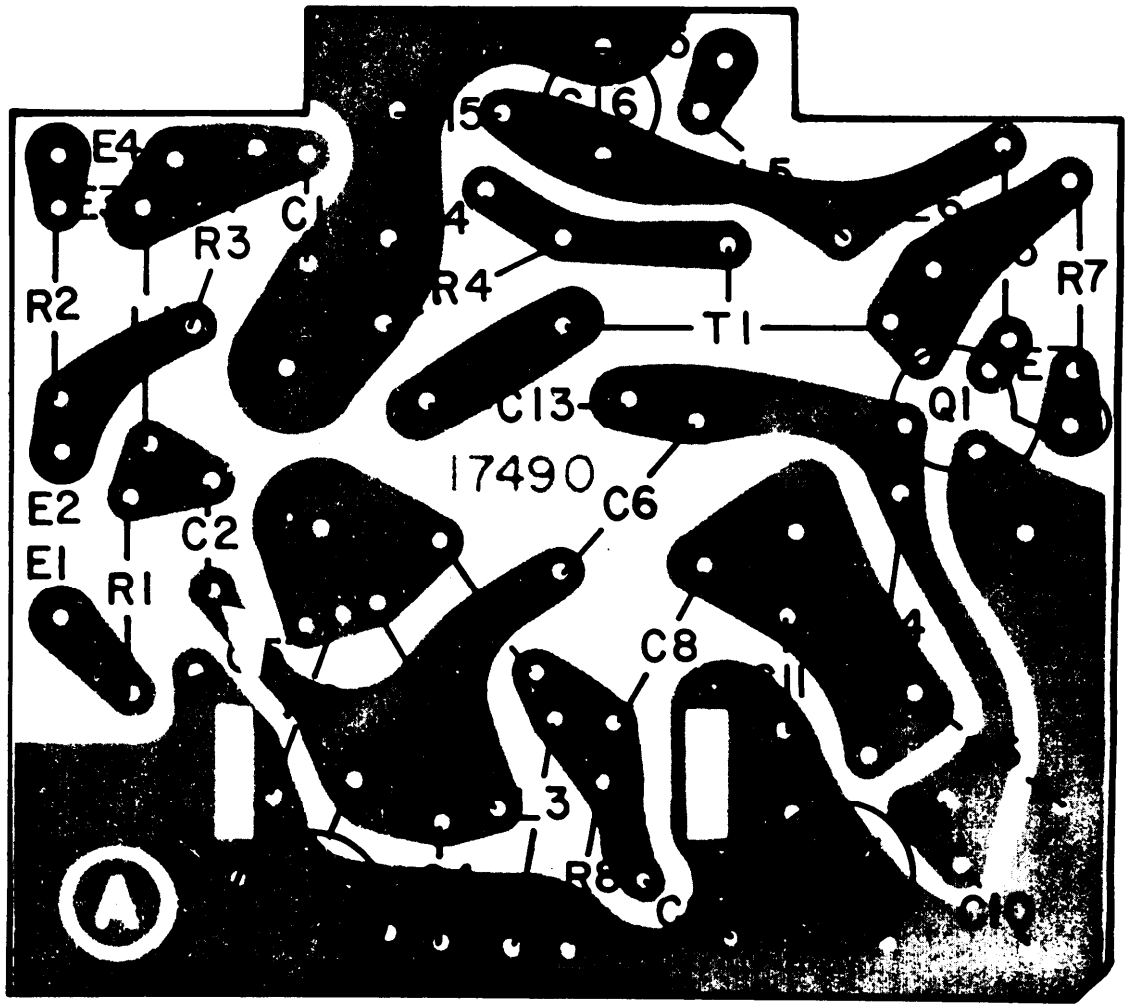

Figure 5-10. Part 17490-1 Interstage Mixer (A2A2), Location of Components

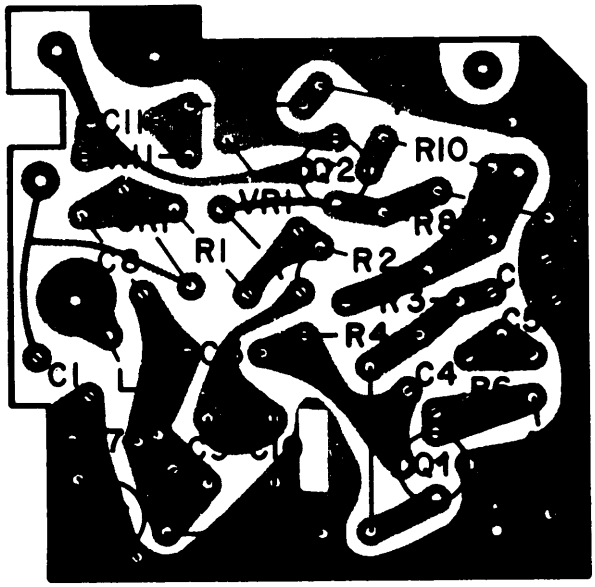

Figure 5-11. Part 17488-3 Local Oscillator (A2A3), Location of Components

3.5.2.2 Part 17488-3 Local Oscillator REF DESIG PREFIX A2A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
C1	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	3	SM(1000 pF, P)	91418	
C2	Same as C1				
C3	Capacitor, Ceramic, Tubular: 20 pF, 2%, 500 V (N750)	1	301-000U2J0-200G	72982	
C4	Capacitor, Mica, Dipped: 68 pF, 2%, 500 V	1	CM04ED680G03	81349	72136
C5	Capacitor, Mica, Dipped: 33 pF, 2%, 500 V	1	CM04ED330G03	81349	72136
C6	Capacitor, Variable, Ceramic: 1.7-10 pF, 500 V	1	DVJ302A	73899	
C7	Capacitor, Mica, Dipped: 36 pF, 2%, 500 V	1	CM04ED360G03	81349	72136
C8	Capacitor, Ceramic, Tubular: 2.4 pF±0.25 pF, 500 V	1	301-000C0J0-249C	72982	
C9	Capacitor, Ceramic, Tubular: 4.7 pF±0.25 pF, 500 V	1	301-000U2J0-479C	72982	
C10	Capacitor, Ceramic, Tubular: 10 pF±0.5 pF, 500 V	1	301-000U2J0-100D	72982	
C11	Same as C1				
CR1	Diode, Varicap	1	BB109-YELLOW	25088	
L1	Inductor	1	21209-1	14632	
L2	Inductor	1	21210-180	14632	
L3	Coil	1	1129-53	14632	
Q1	Transistor	2	2N2857/JAN	81350	
Q2	Same as Q1				
R1	Resistor, Fixed, Composition: 100 kΩ, 5%, 1/4 W	2	RCR07G104JS	81349	01121
R2	Resistor, Fixed, Composition: 2.2 kΩ, 5%, 1/4 W	1	RCR07G222JS	81349	01121
R3	Resistor, Fixed, Composition: 100 Ω, 5%, 1/4 W	1	RCR07G101JS	81349	01121
R4	Same as R1				
R5	Resistor, Fixed, Composition: 910 Ω, 5%, 1/4 W	1	RCR07G911JS	81349	01121
R6	Resistor, Fixed, Composition: 47 Ω, 5%, 1/4 W	2	RCR07G470JS	81349	01121
R7	Same as R6				
R8	Resistor, Fixed, Composition: 8.2 kΩ, 5%, 1/4 W	1	RCR07G822JS	81349	01121
R9	Resistor Fixed, Composition: 18 kΩ, 5%, 1/4 W	1	RCR07G183JS	81349	01121
R10	Resistor, Fixed, Composition: 120 Ω, 5%, 1/4 W	1	RCR07G121JS	81349	01121
R11	Resistor, Fixed, Composition: 470 Ω, 5%, 1/4 W	1	RCR07G471JS	81349	01121
R12	Resistor, Fixed, Composition: 220 Ω, 5%, 1/4 W	1	RCR07G221JS	81349	01121
VR1	Diode, Zener: 10 V, Silicon	1	1N758A	80131	04713

5.5.3 TYPE 85132 TUNING DRIVE REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY. PER ASSY.	MANUFACTURER'S PART NO.	MFR. CODE	RECM. VENDOR
1	Gear Plate, No. 2	1	25169-1	14632	
2	Gear Plate, No. 1	1	25168-1	14632	
3	Spacer	4	18668-1	14632	
4	Shaft	2	25167-1	14632	
5	Shaft	1	25167-2	14632	
6	Shaft	2	25167-3	14632	
7	Spur Gear, Anti-Backlash, 48 DP, 64T	2	20180-6	14632	
8	Spur Gear, Anti-Backlash, 48 DP, 50T	2	20180-12	14632	
9	Spur Gear, 48 DP, 20T, CRES	2	2984-55	14632	
10	Spur, Gear, 48 DP, 27T, CRES	1	2984-53	14632	
11	Retaining Ring	3	5100-25	79136	
12	Ball Bearing	10	SFR1883PP	83086	
13	Shaft Collar, 1/2 O.D.X. 250 I.D., 3/16 THK	2	11581-2	14632	
14	Thrust Washer, 1/2 O.D.X. 250 I.D., .032 THK	7	11582-14	14632	
15	Spring Washer, 1/2 O.D.X. 250 I.D.	2	3502-14-47	78189	
16	Screw, Pan Head, #6.32 X 3/8 LG	8	MS51957-28	96906	
17	Washer, Lock, Split #6	8	MS35338-136	96906	
18	Washer, Flat #6	8	MS15795-805	96906	
19	Shim Spacer	AR	SSS-31	01351	
20	Socket Set Screw 4-40 X 1/8	8	SSCR4-40X1/8 HTTR	56878	
21	Socket Set Screw 6-32 X 1/8	6	SSCR6-32X1/8 HTTR	56878	
22	Coupling	2	FC9	18469	

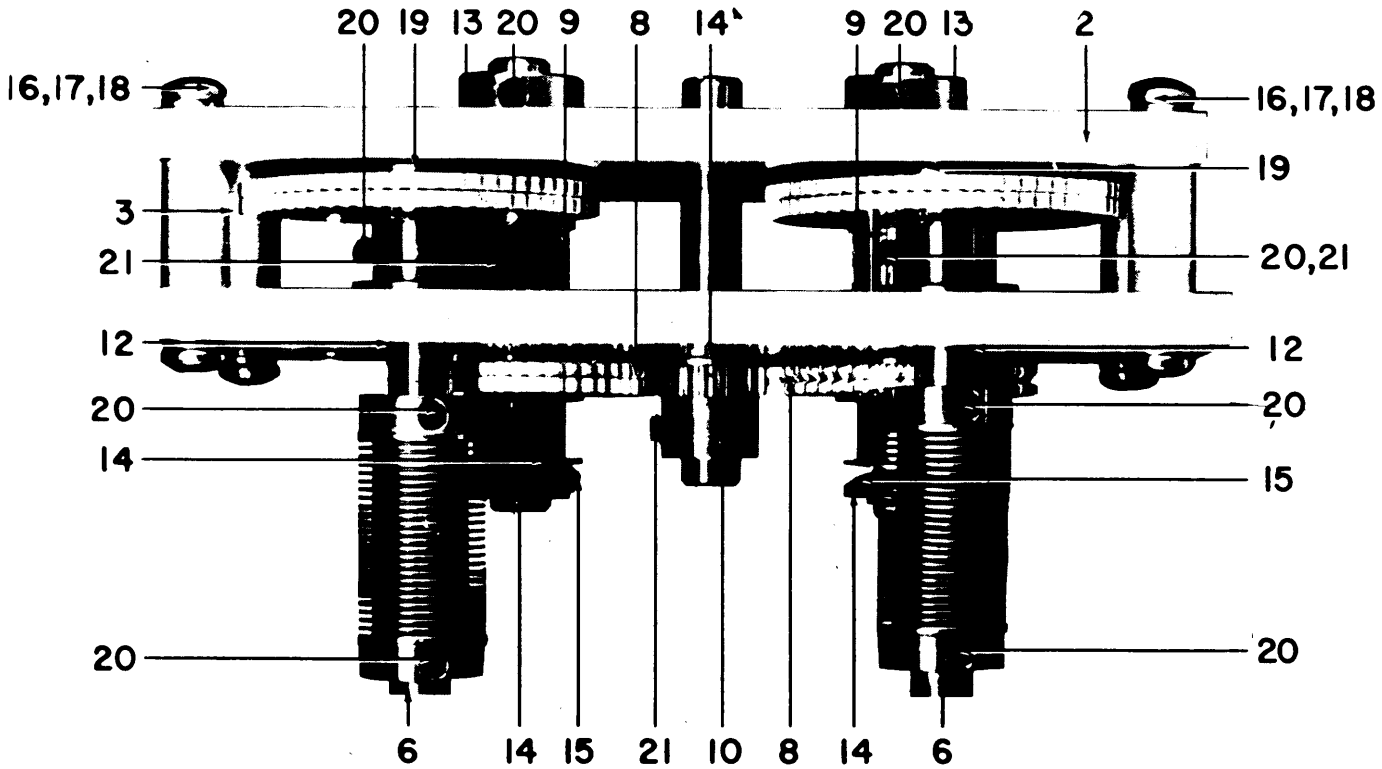

Figure 5-12. Type 85132 Tuning Drive (A3), Location of Components

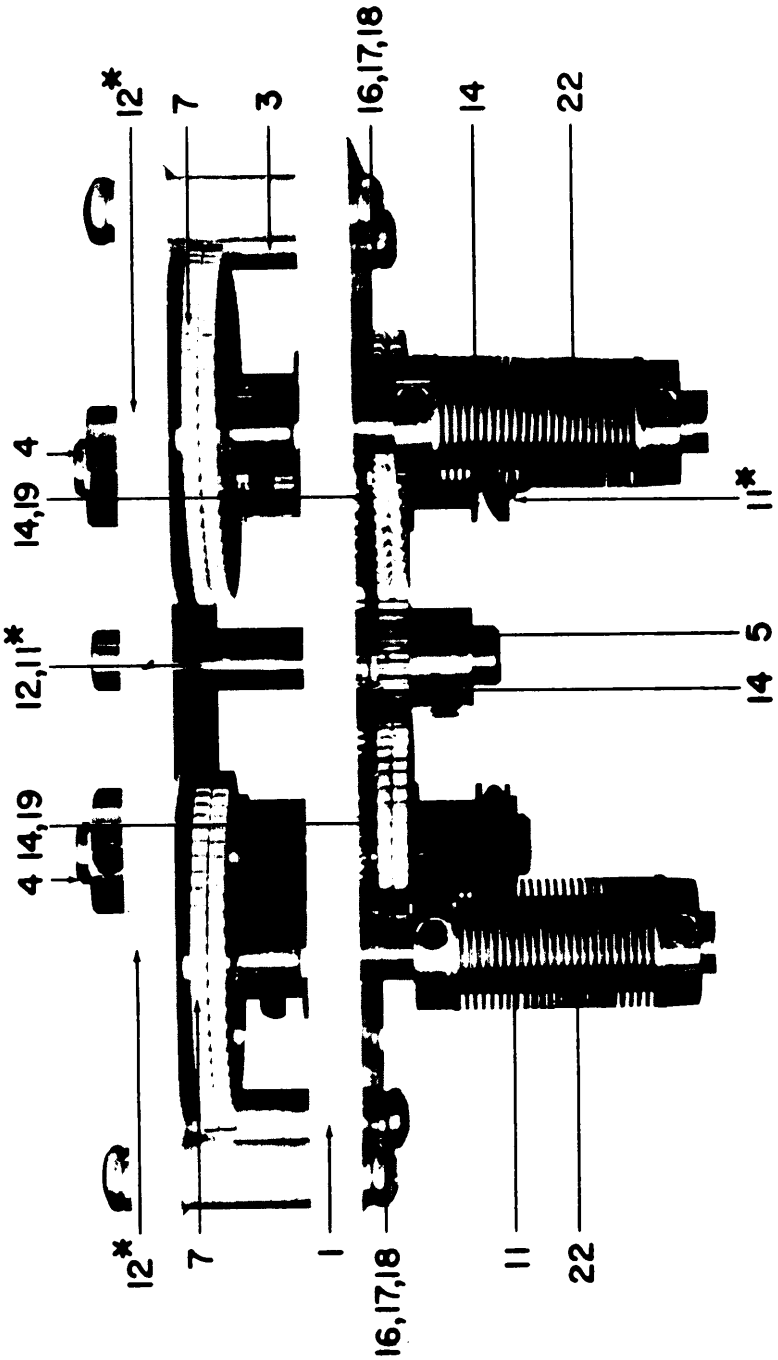

Figure 5-13. Type 85132 Tuning Drive (A3), Location of Components

SECTION VI
SCHEMATIC DIAGRAMS

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS IN pF.
   c) INDUCTANCE IS IN uH.
2. L1A THRU L10 ARE GANGED SECTIONS OF INDUCTUNER L1.
3. NOMINAL VALUE. FINAL VALUE FACTORY SELECTED.
4. HEAVY LINE DENOTES MAIN SIGNAL PATH.
5. DIFFERENCE BETWEEN TYPES IS SHOWN IN TABLE A.

TABLE A

TYPE NUMBER	FREQUENCY RANGE	MECHANICAL DIFFERENCES ARE
71360-1	80-250 MHz	STANDARD
71360-2	80-250 MHz	RFI SHIELDING
71360-3	80-250 MHz	RFI SHIELDING, MOUNTING HOLES FOR PLANETARY DRIVE BRACKET.
71360-4	80-250 MHz	PLANETARY DRIVE NOT USED

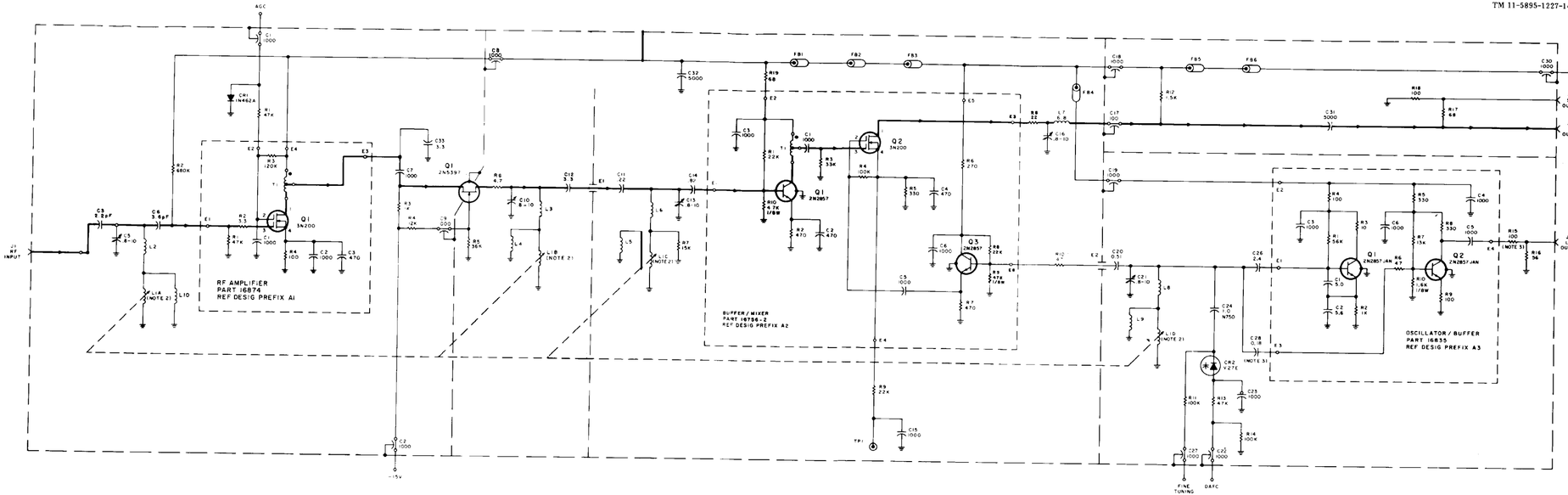

Figure 6-1. Type 71360-4 80 - 250 MHz Tuner (A1), Schematic Diagram 6863

NOTES:
1. UNLESS OTHERWISE SPECIFIED
   a) RESISTANCE IS IN OHMS, 5%, 1/4W.
   b) CAPACITANCE IS IN μF.
2. $L1_A$ THRU $L1_D$ ARE GANGED SECTIONS OF INDUCTUNER L1 SECTIONS ARE NOT PHYSICALLY LOCATED ON P.C. ASSEMBLIES.

HIGHEST REF DESIG USED	REF DESIG NOT USED
A3	–
C10 A1C6 A2C16 A3C11	– – – –
CR1 A3CR1	– –
E1 A1E4 A2E7 A3E4	– – – –
J3	–
L1 A1L1 A2L5 A3L3	– – – –
Q1 A2Q1 A3Q2	– – –
R9 A1R6 A2R8 A3I2	– – – –
A2T1	–
A3VR1	–

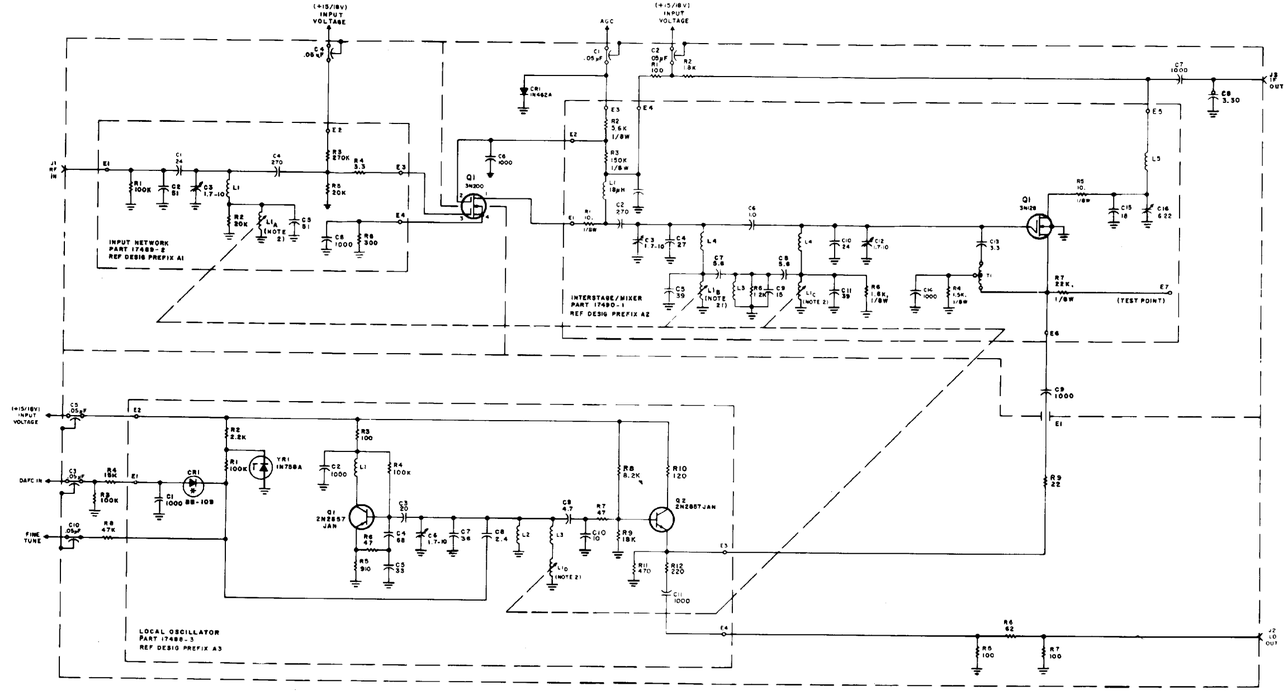

Figure 6-2. Type 71431 20 - 80 MHz RF Tuner (A2), Schematic Diagram 61217

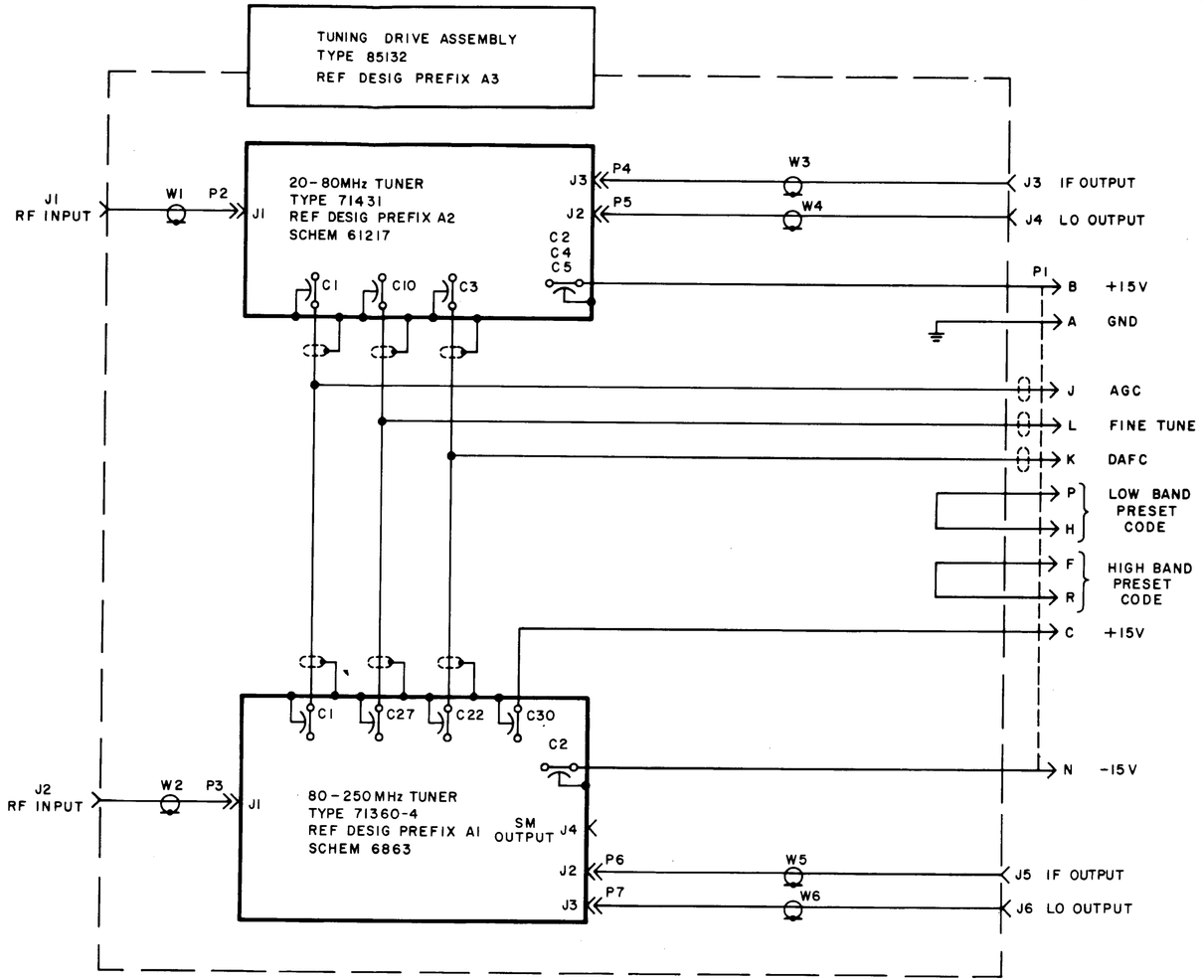

Figure 6-3. WJ-9121 20 - 250 MHz Tuner Assembly, Main Chassis, Schematic Diagram 43630

APPENDIX A

REFERENCES

Refer to TM 11-5895-1227-14-1 for references.

APPENDIX B

MAINTENANCE ALLOCATION CHART

NOTE

The Tuner, TN-584/GRR-8(V), is an assembly of the Receiver, AN/GRR-8(V). The Maintenance Allocation Chart covering maintenance actions on the tuner is located in TM 11-5895-1227-14-1, Operator, Organizational, Direct Support and General Support Maintenance Technical Manual.

APPENDIX C

BASIC ISSUE ITEMS LIST

NOTE

The Tuner, TN-584/GRR-8(V), is an assembly of the Receiver, AN/GRR-8(V). The Basic Issue Items List covering the basic issue items for the receiver to help you inventory items required for safe and efficient operation on the tuner is located in TM 11-5895-1227-14-1, Operator, Organizational, Direct Support and General Support Maintenance Technical Manual.

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10 July 1975

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TM 11-5840-340-12	23 Jan 74	Radar Set AN/PRC-76

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PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
2-25	2-28		
3-10	3-3		3-1
5-6	5-8		
		F03	

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°.

REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.

Item 5, Function column. Change "2 db" to "3db."

REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.

Add new step f.1 to read, "Replace cover plate removed in step e.1, above."

REASON: To replace the cover plate.

Zone C 3. On J1-2, change "+24 VDC to "+5 VDC."

REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

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SSG I. M. DeSpiritof

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