Instruction Manual

MODEL 1115-VT(W)(70)
RF TUNER
Serial No. 213 and above

July 1976

Microdyne
Excellence In Communications Technology

U.S. Patent No. 3,703,689

Rev. July 1986

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TRADE SECRETS

Microdyne

P. O. BOX 7213, 491 OAK ROAD
SILVER SPRINGS SHORES INDUSTRIAL PARK
OCALA, FLORIDA 32672

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SECTION I
GENERAL INFORMATION

1-1 SCOPE

This manual provides information pertaining to the installation, operation, and maintenance of the Model 1115-VT(W)(70) RF Tuner designed and manufactured by Microdyne Corporation, Rockville, Maryland. A replaceable parts list and maintenance diagrams are included herein. The 1115-VT(W)(70) is covered under U.S. Patent No. 3,703,689.

1-2 PURPOSE AND DESCRIPTION

The Model 1115-VT(W)(70) RF Tuner is designed for use in Microdyne's Model 1100-LS Telemetry Receiver. The unit functions to select, amplify, and down convert signal frequencies in the range of 2200 MHz to 2300 MHz, and supply a 70 MHz intermediate frequency (i-f) for further processing. Noise figures of less than 12 dB are obtained over the entire tuning range through the use of all solid state components.

The 1115-VT(W)(70) is completely voltage tuned using voltage variable capacitance diode tuning elements which eliminate the need for electromechanical tuning components such as cavity-tuned preselectors and large capacitors. Frequency selection is accomplished through the use of either a voltage controlled oscillator (vfo) or a crystal controlled oscillator. A single tuning potentiometer is employed to set the operating frequency of the rf preselector and local oscillator during vfo operation. The same potentiometer adjusts the rf preselector only during cyrstal controlled and external source operation. All stages are tuned in an identical manner with the voltage output of the tuning potentiometer being applied to the tuning elements which control the resonant frequency of the tuned stages. Also ganged to the tuning potentiometer is the frequency indicating mechanism. This mechanism is composed of a gear-driven, taut metal strip constructed to virtually eliminate backlash.

The 1115-VT(W)(70) features the additional capability of being tuned from a remote station. With this capability, the unit can be precisely tuned by a voltage input from a computer interface or remote console. Refer to Section III for details.

The 1115-VT(W)(70) is constructed as a complete front panel plug-in module for the parent receiver. All power and signal connections between the tuner and receiver are made automatically upon installation through a push-on coaxial connector, and a miniature ribbon-type connector. A front panel receptacle is provided for mounting the crystal adapter or oven. Also located on the front panel is the remote or local tuning mode switch.

Electrical, environmental, and mechanical specifications for the tuner are given in table 1-1.

Table 1-1. Specifications

ELECTRICAL	
Operating Modes	local or remote; switch selectable.
Frequency Range	2200-2300 MHz; continuously tunable or crystal controlled.
Dynamic Range	receiver threshold to -7 dBm.
Input Impedance	operates from a 50Ω source.
Noise Figure	12 dB maximum.
Image Rejection	60 dB minimum, 80 dB typical.
IF Rejection	90 dB minimum.
Spurious Rejection	60 dB minimum.
Spurious Emission	meets or exceeds MIL-STD-461A and MIL-STD-826A.
First LO Characteristics:	
Operating Modes	continuously tunable (vfo) or crystal controlled (xtal); switch selectable. Mixer injection 70 MHz above rf input.
Stability	VFO - ±0.001% per degree Centigrade. XTAL - ±0.0005% with oven. ±0.005% without oven.
Monitor Output	submultiple (1/18) of mixer injection.
Monitor Output Level	225 mV (0 dBm) into 50 ohms.
First IF Output:	
Frequency	70 MHz.
Bandwidth	40-100 MHz.

continued

Table 1-1, continued

ENVIRONMENTAL	
Temperature Range:	
Operating	0°C to +50°C.
Storage	-62°C to +65°C.
Relative Humidity	to 95%.
Barometric Pressure:	
Operating	to 10,000 feet, (3,048 m).
Storage	to 50,000 feet, (15,240 m).
MECHANICAL	
Height	4.5 inches, (114.30 mm).
Width	4.0 inches, (101.60 mm).
Depth	15 inches, (381.00 mm).
Weight	approximately 6 pounds, (2.70 kg).

SECTION II
INSTALLATION

2-1 GENERAL

The rf tuner is shipped separately from the receiver in which it is to be installed. It is sealed in a polyethylene bag, wrapped in shock absorbing insulation, and packaged in a rugged shipping container.

2-2 UNPACKING AND HANDLING

Upon receipt of the tuner carton, cut the sealing tape and lift the package from the box. Open the bag and remove the tuner. (Do not discard the packing material if the unit is to be reshipped; see paragraph 2-6.) Check the tuner for in-transit damage; broken connectors, dents, etc. If damaged, notify the proper authority immediately.

2-3 STORAGE

Storage conditions should be within the environmental limits specified in table 1-1.

2-4 INSTALLATION

The tuner is held in place in the receiver with a module lock and spring-actuated latch handle. To install the module, move the lock portion of the mechanism up and pull the handle marked PULL forward. Insert the tuner into the receiver slot. Return the PULL handle to its original position until the lock snaps into place.

2-5 REMOVAL

To remove the tuner from the receiver, lift the module locks up to disengage the release. Pull the handles marked PULL forward and slide the tuner out of the receiver.

2-6 PACKAGING FOR RESHIPMENT

To package the tuner for reshipment, proceed as follows:

a. Place the tuner and a quantity of desiccant into a moisture-proof polyethylene bag and seal.

b. Place the unit in a cardboard container, preferably a padded type, using enough shock absorbing material to prevent any movement within the carton.

c. Seal the carton.

d. Affix the necessary "Delicate Equipment" and "Fragile" labels.

SECTION III
OPERATION

3-1 GENERAL

This section provides information on the operation of the tuner only and should be used in conjunction with the overall operating procedures given in the receiver manual.

3-2 CONTROLS AND INDICATORS

Three operating controls and one indicator are included on the tuner. These are:

TUNING	This control is employed to adjust the rf preselector local oscillator in the vfo mode, and the rf preselector in the crystal mode.
REMOTE/INTERNAL	This switch is employed to set the operating mode. When set to INTERNAL, tuning is accomplished through the front panel TUNING control. When set to REMOTE, tuning is accomplished through the application of a tuning voltage from an external source.
FREQUENCY MHz	This dial is employed to indicate the frequency to which the 1115-VT(W)(70) is tuned.
CRYSTAL/VFO	This switch is located inside the tuner (top, behind front panel) and is used to select either the VFO or crystal oscillator mode.

3-3 OPERATING PROCEDURE

The rf tuner may be operated in either an internal control mode or a remote control mode. Operating procedures for each mode are given in paragraphs 3-3.1 and 3-3.2, respectively.

3-3.1 INTERNAL OPERATION

To operate the tuner using the front panel tuning control and internal voltages, set the front panel REMOTE/INTERNAL switch to the INTERNAL position. Frequency selection in this mode is accomplished through either a voltage controlled oscillator or a crystal controlled oscillator (XTAL). Directions for operating the tuner in these modes are given in the following paragraphs.

3-3.1.1 VFO OPERATION

a. Set the internal XTAL/VFO mode switch to VFO.

b. Adjust the TUNING control until the desired frequency mark is under the dial index.

c. Readjust the TUNING control and the receiver FINE TUNE control for a zero indication on the receiver TUNING meter.

d. Refer to the receiver instruction manual OPERATION section.

3-3.1.2 CRYSTAL OPERATION. The tuner may be operated with either a CR-52A/U crystal mounted in a Microdyne 200-070 crystal adapter assembly, or a CR-65A/U crystal mounted in a Microdyne 100-001 crystal oven assembly. In any case, the operating procedure is as follows:

a. Set the internal XTAL/VFO mode switch to XTAL.

b. Adjust the TUNING control until the desired frequency mark is under the dial index.

c. Plug an adapter and crystal or an oven and crystal into the front panel socket. The formula for determining the correct crystal frequency is given below:

$$F_c = \frac{F_r + 70}{54}$$

where: F_c = crystal frequency
F_r = rf input frequency

3-3.2 REMOTE CONTROL OPERATION

For remote control operation, a control voltage derived from a remote tuning console or computer interface is employed to tune the rf preselector and local oscillator. This voltage must range from -3 volts to -11.5 volts depending on the frequency to be received. The control voltage is applied to the receiver rear apron ACCESSORIES connector and coupled to P11-13 on the tuner. To operate the tuner in this mode, proceed as follows:

a. Set the tuner INTERNAL/REMOTE switch to REMOTE.

b. Set the internal XTAL/VFO mode switch to VFO.

c. Connect a frequency counter to the receiver first l-o monitor output.

d. Connect a power supply to the remote input on the receiver ACCESSORIES connector.

e. Determine which rf carrier frequencies are to be received during the operational mission.

f. With the carriers noted, determine what voltage input level is required to adjust the tuner to each frequency. This is accomplished as follows:

(1) Monitor the input control voltage with a digital or differential voltmeter capable of indicating in millivolts.

(2) Adjust the power supply for a voltage output as indicated in figure 3-1; this is a coarse adjustment.

(3) Fine tune the power supply until the counter indicates the correct submultiple of the required local oscillator frequency. The submultiple is determined by the following formula:

$$F_o = \frac{F_r + 70}{18}$$

where: F_o = oscillator frequency
F_r = rf input frequency

This frequency should be set as accurately as possible since the control voltage is also setting the center frequency of the rf preselector.

(4) Note the voltage level required to obtain the oscillator frequency. If the receiver is to be operated in the afc mode, it will not be necessary to set the control voltage as would normally be required as the afc circuit has an acquisition range greater than ±250 kHz. It is recommended that afc operation be utilized for remote tuner operation.

g. With the tuning voltages noted, program the computer or set the tuning console to supply those voltages on command.

h. Disconnect the power supply and connect the computer or console input in its place.

i. Refer to the receiver manual OPERATION section for additional information on other receiver control adjustments.

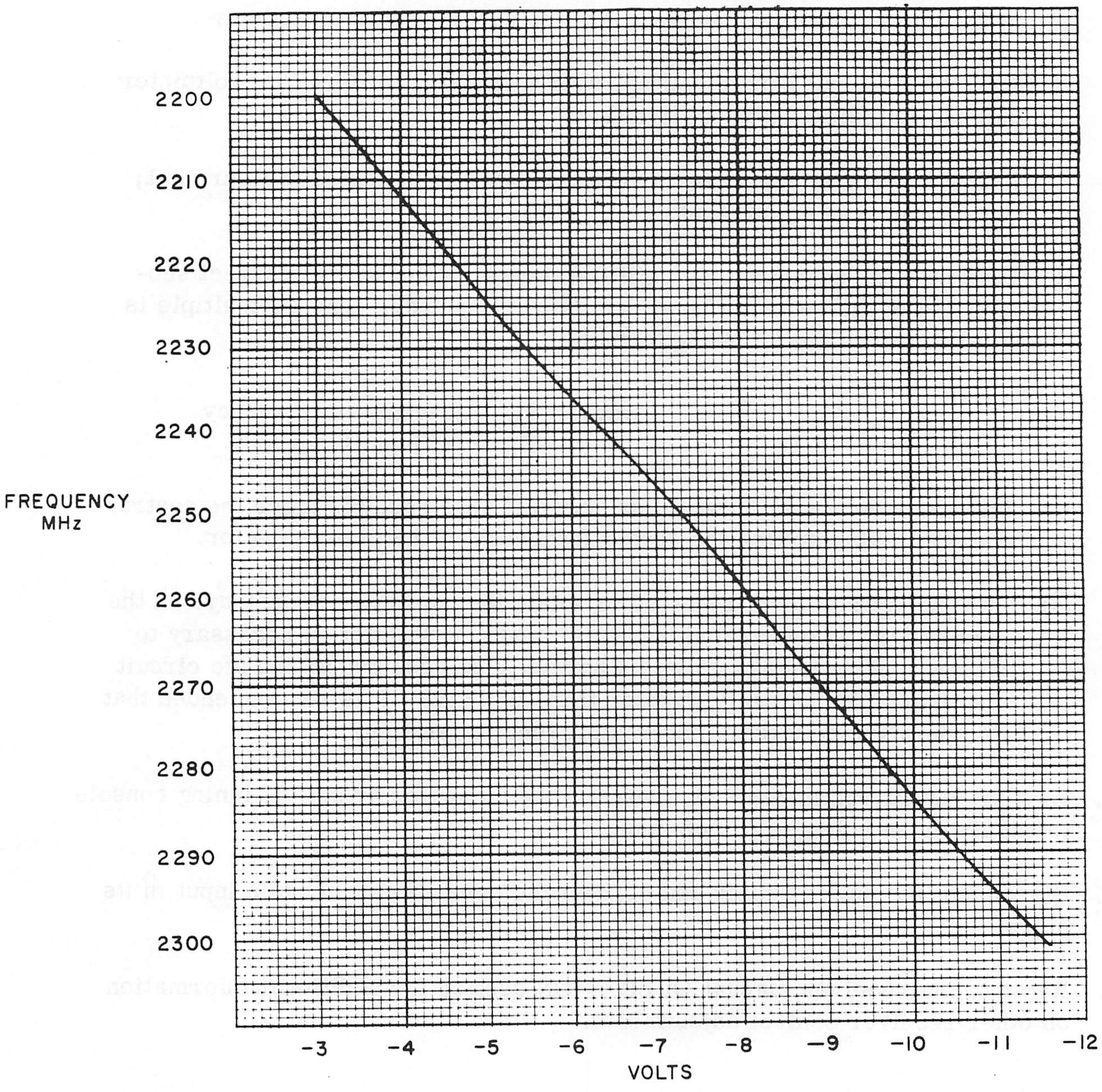


Figure 3-1. Remote Input vs. Frequency

SECTION IV
THEORY OF OPERATION

4-1 GENERAL

The 1115-VT(W)(70) tuner is utilized to select a single frequency in the 2200-2300 MHz spectrum for further processing in the receiver. The unit consists of a preamplifier, an rf preselector, mixer, i-f amplifier, a local oscillator and multiplier chain, l-o distribution amplifier, and a tuning control circuit. A wiring diagram of the 1115-VT(W)(70) is shown in figure 7-1.

The 2200-2300 MHz rf input signal is applied to the input preamplifier which is followed by a voltage-controlled, four-cavity preselector that is tuned to a specific frequency in the passband. Output from the preselector is fed to a mixer and heterodyned with a local oscillator signal to produce a 70 MHz i-f signal. This signal is then applied to an i-f amplifier for further application to the receiver i-f circuitry.

The local oscillator signal may be supplied from a voltage-controlled oscillator or a crystal oscillator as selected by the Crystal/VFO mode switch. The output of the selected oscillator is multiplied, amplified, and filtered to supply a mixer injection frequency 70 MHz above the applied rf signal.

In addition to a choice of local oscillator sources, the 1115-VT(W)(70) can be tuned either locally or remotely as selected through a front panel switch. When set to the internal tuning mode, the output of a precision potentiometer is applied to a tuning control circuit. This circuit then provides the necessary high voltage to tune the preselector in all operating modes, and the voltage-controlled local oscillator when the tuner is operated in the vfo mode. Should external tuning be desired, a control voltage from an external source is applied to the receiver rear apron and routed through the l-o distribution amplifier to the tuning control circuit. With the external source source correctly calibrated, it is then used to adjust the tuning point of the 1115-VT(W)(70).

4-2 FUNCTIONAL DESCRIPTION

Refer to the applicable schematic diagram in Section VII during the following circuit discussions.

4-2.1 A1, RF PREAMPLIFIER AND A2, PRESELECTOR

The 2200-2300 MHz rf input signal is applied through rear panel connector J1 to input preamplifier A1. In A1, the rf signal is amplified by approximately 9.5 dB and then routed to the preselector A2 (figure 7-1). This device is a voltage-controlled, four-section cavity and is used to select a specific frequency in the 2200-2300 MHz range. Tuning of the preselector is accomplished by applying a voltage between +4V and +50V dc from dc control board A4. The amplitude of the tuning control voltage is dependent on the positioning of the front panel tuning control, which is ganged to a precision potentiometer, or a voltage input from a remote source; inputs from either the tuning control or external source range between -3V and -11.5V dc. A further description of the dc control board is given in paragraph 4-2.4.

4-2.2 A5, MIXER AND A4, GAIN-CONTROLLED AMPLIFIER
The rf signal from the preselector and the local oscillator signal are applied to the corresponding inputs of Mixer A5. In A5, the two signals are heterodyned to produce a 70 MHz intermediate frequency which is applied to the gain-controlled amplifier A6.

Reference figure 7-6. The 70 MHz i-f signal from the mixer is applied through J1 to U1, a wideband, gain-controlled amplifier. Gain control of the amplifier is axcomplished by the agc voltage applied through FL1. This voltage is shaped by U2 and associated circuitry for use by U1. The 70 MHz signal output of U1 is applied across potentiomter R8 which is used as a level control, to the rf output of the module, J2.

4-2.3 LOCAL OSCILLATOR CIRCUITS
The local oscillator circuits consist of a voltage-controlled variable frequency oscillator and a crystal oscillator (XTAL). Selection of which oscillator is employed is made through the internal XTAL/VFO mode switch. Each of the two modes is described separately in the following paragraphs.

4-2.3.1 VOLTAGE-CONTROLLED OSCILLATOR. The voltage-controlled variable frequency oscillator is located in subassembly A3 and is shown in figure 7-3. The circuit is composed of modified Colpitts oscillator Q4 and amplifier Q5.

When the VFO mode is selected, -15V dc is applied through C39 to the oscillator circuit. With the oscillator energized, frequency selection is accomplished by a -3V to -11.5V dc input applied at C32. The voltage is supplied via the uhf dc control board (A4) from either front panel potentiometer R3, if S1 is in the internal position, or from a remote voltage source through P11-13 if S1 is in the remote position. Regardless of the source, the voltage is shaped in A4 to match the linearity curve of voltage variable capacitance diode CR2. Also applied to CR2 is a regulated reference voltage supplied by zener diode CR3 via C65, E5-R4-E12-R5-E6 on the main chassis, and C33. As the control voltage at the anode of CR2 is varied so does the capacitance of CR2; this capacitance change is inversely proportional to the control voltage change. Since CR2 is part of the oscillator tank circuit, any change in capacitance results in a change of frequency. Inductor L11 and capacitor C35 are employed to set the operating range of the oscillator between 126.11 and 131.66 MHz. The output of the oscillator is taken from the collector of Q4 and applied to the distribution amplifier through amplifier Q5 and J4.

4-2.3.2 CRYSTAL OSCILLATOR. The crystal oscillator is also shown in figure 7-3 and consists of oscillator Q6, tripler Q7, and amplifier Q8.

When the receiver first l-o mode switch is set to the XTAL position, -15V dc is applied to to the crystal oscillator circuit through C52. In this mode, the oscillator (Q6) generates an output whose frequency is determined by a quartz crystal plugged into front panel receptacle J10. Crystals used must be either CR-52A/U or an oven mounted CR-65A/U, and cut for operation between 40.37 MHz and 43.89 MHz. When installed, the selected crystal is electrically connected between the collector and base of Q6. Output from the oscillator is coupled to Q7 whose output stage is tuned so as to triple the oscillator signal. The output of Q7 ranges from 126.11 to 131.66 MHz and is applied through amplifier Q8 and J4 to the distribution amplifier.

4-2.4 LOCAL OSCILLATOR DISTRIBUTION AMPLIFIER

The distribution amplifier routes the l-o signals throughout the tuner, maintaining isolation between the l-o source and the remaining tuner circuits. The internal l-o signal is applied to J1 of the amplifier; the tuner does have the capability of using an external l-o (J2). The internal l-o signal is applied through amplifier Q2 which, with a zero input at J1, is in a saturated state, isolating this input when the receiver is operated in the external l-o mode.

The internal l-o signal is routed through a common amplifier in U1 to amplifier Q1. The signal from Q1 is outputted at J3 which drives P11-A1 and is the l-o output of the tuner. This l-o signal may be used to drive a second tuner in a slave operation.

The l-o signal is also coupled through C21 to an amplifier stage in the second half of U1. The l-o signal from the collector of this stage is routed through two tuned circuits (C24, C23 and C14, C15, L1) to power amplifier Q3. Q3 provides the drive for J4 which is the input to the multiplier chain in the oscillator/multiplier assembly.

In addition to providing drive for Q3, the second half of U1, containing a complementary amplifier, provides the drive for J5. This signal is routed through a single tuned circuit (C27, C28) and transformer coupled to J5. Transformer T1, in conjunction with the resonant circuit formed by C27 and C28, functions as an isolator between J5 and the distribution amplifier, preventing any rf signals outside the passband from feeding through the distribution amplifier.

4-2.5 LOCAL OSCILLATOR MULTIPLIER CHAIN

The 126.11 to 131.66 MHz signal from the distribution amplifier is routed through J4 and applied to transistor Q1; see figure 7-3. This circuit is tuned to a frequency of 252.22 to 263.33 MHz which effectively doubles the local oscillator signal. From Q1, the signal is amplified by Q2 and further amplified by driver Q3. The output of Q3 is then coupled to an X9 multiplier composed of step recovery diode CR1 and the following filter subassembly A6. These stages operate in conunction to pass only the ninth harmonic of the 252.22 to 263.33 MHz signal in order to supply a 2270 to 2370 MHz signal to the mixer A5. The level of the signal is applied to A5 is approximately 0 dBm.

4-2.6 A4, UHF DC CONTROL BOARD SUBASSEMBLY

The dc control board subassembly is shown in figure 7-5 and is composed of unity gain buffer U1 and operational amplifier U2-Q2 through Q5. Input to the subassembly is supplied from the internal tuning potentiometer R3 (figure 7-1) or an external source depending on the selected operating mode; voltage from either source ranges between -3V and -11.5V dc.

The -3V and -11.5V dc tuning voltage is applied to E1 and is coupled through R3 and R6 to terminal E5 for further application to the vco. Connected to the junction of R3/R6 is a shaping circuit composed of potentiometers R7, R10, R15, and diode CR1. This circuit is adjusted to shape the control voltage to compensate for the non-linearity of the vco tuning diode.

The -3V and -11.5V output at E5 is routed to unity gain operational amplifier U1. The output of the operational amplifier is passed through a second shaping network composed of R5-R12-R27-R29-CR2-CR3 to ensure tracking between the vco and preselectors. From the shaping network, the level is coupled through gain adjustment R14 to operational amplifier U2-Q2 through Q5. The output voltage is made available at terminal E8 for further application to the rf preselector and ranges from approximately +4V to +50V. Maximum and minimum voltage levels vary according to the particular tuner requirements and are adjusted by R14. Feedback is maintained between the input and output of the operational amplifier to obtain the necessary stability and shape. Diodes CR7 and CR8 are field-effect devices which function as constant current sources for the associated elements of the amplifier.

SECTION V
MAINTENANCE

5-1 GENERAL

This section provides maintenance information for the Model 1115-VT(W)(70) RF Tuner. Included herein are: the list of required test equipment, preventive maintenance instructions, voltage chart, troubleshooting data, and an alignment procedure.

5-2 TEST EQUIPMENT

The test equipment required to troubleshoot, test, and align the rf tuner is listed in table 5-1. Direct equivalents may be substituted.

Table 5-1. Test Equipment Required

RF Millivoltmeter	HP411A w/HP11024A tee/50 ohm termination
Oscilloscope	HP1202AR
Sweep Generator	Texscan VS-50, Wavetek 2001
Sweep Generator	HP8690A
RF Detector	HP8471A
UHF Noise Source	HP349A
Noise Figure Meter (10 and 50 MHz inputs)	HP340B
Power Amplifier	Boonton 230A
Signal Generator	HP608E or F
Signal Generator	HP8614A
Autovoltmeter	HP414A
RF Millivoltmeter	HP3406A
Frequency Counter	HP5245L
Counter Converter	HP5253B/HP5254B
Crystal Detector	HP423A
Detector	Aertech D-10
Power Meter	HP431C
Thermistor Mount	HP478A
Dual Directional Coupler	HP777D
Crystals (42.0370, 42.96296, and 43.88866)	
Connectors (2)	Amphenol 901-166
Power Supplies (2)	HP6205B
Digital Multimeter	Simpson 464

5-3 SPECIAL CABLES

In order to align and troubleshoot the tuner, it must be connected to the receiver through extender cables. These cables consist of an rf cable and an i-f/power cable which may be fabricated at the site or purchased from Microdyne.

To fabricate the cables, proceed as follows:

a. Obtain the following material:

(1) RG-174/U cable — length should be sufficient to make three equal-length cables approximately three feet long.

(2) RG-223/U cable, approximately three feet long.

(3) One roll of #24 insulated multistrand wire.

(4) One set Cannon DCM-25W3P and DCM-25W3S connectors with coaxial inserts.

(5) One Gremar 11749-1 and one Gremar 16908-1 connector.

b. Cut the #24 wire into twenty-two three-foot lengths and make connections between corresponding pins of the two Cannon connectors.

c. Connect the RG-174/cable between corresponding coaxial inserts in the two Cannon connectors (A1-A2-A3). These inserts should not be permanently affixed to connectors since they must be removed for alignment. This completes fabrication of the i-f/power cable.

d. Connect the Gremar 11749-1 and 16908-1 connectors to the length of RG-223/U cable. This completes fabrication of the rf cable.

If it is undesirable to fabricate the above cables, they may be purchased from Microdyne under the following part numbers:

a. RF Extender Cable - Microdyne 200-452
b. IF/Power Extender Cable - Microdyne 200-453

5-4 PERFORMANCE TESTS

5-4.1 NOISE FIGURE

The procedure for checking the tuner noise figure is given in paragraph 5-7.2.5.

5-4.2 LO FREQUENCY

The procedure for checking the frequency of the first l-o is as follows:

a. Connect the HP5245L/HP5253B counter to the receiver first l-o monitor output.

b. Check and note the frequency at the low, middle, and high ends of the band.

c. Multiply the counter indication by 18 and subtract 70 MHz. The resultant frequency should be within 0.1% of the applicable dial indication.

d. Disconnect the counter.

5-4.3 TRANSFER GAIN

To check the transfer gain, connect the tuner to the receiver with the extender cords and follow the procedure given in paragraph 5-7.2.5.

5-5 ADJUSTMENTS

No periodic adjustments are required on the tuner.

5-6 PREVENTIVE MAINTENANCE

The only preventive maintenance requirement is a periodic visual inspection of the tuner. This inspection should include a check of the connectors for looseness and corrosion, electrical components for evidence of overheating, and screws and nuts for looseness. All loose hardware should be tightened immediately. Damaged components should be replaced after determining and correcting the cause.

Lubrication is not required for any movable parts of the tuner.

5-7 CORRECTIVE MAINTENANCE

5-7.1 TROUBLESHOOTING

Troubleshooting the rf tuner consists of isolating the problem to a particular stage by signal tracing and then determining which component is at fault. An alternate method of determining the faulty stage is to attempt an alignment following the procedures in paragraph 5-7.2. Voltage charts are provided in tables 5-2 and 5-3 to aid in circuit analysis.

Table 5-2. A3, VCO, Crystal Oscillator and Multiplier, DC Voltages

Device	E	B	C	Notes	
A3Q1	0	0	+15	1ST LO MODE to OFF	
A3Q2	+2.01	+2.74	+15	1ST LO MODE to OFF	
A3Q3	+1.68	+2.39	+14.98	1ST LO MODE to OFF	
A3Q4	-8.49	-7.70	- 3.46	1ST LO MODE to VFO	
A3Q5	-8.31	-7.75	- 1.67	1ST LO MODE to OFF	
A3Q6	-8.40	-7.58	- 0.11	1ST LO MODE to XTAL)	No crystal
A3Q7	-8.62	-8.05	- 5.64	1ST LO MODE to XTAL)	installed.
A3Q8	0	0	+15	1ST LO MODE to OFF	

Table 5-3. A4, UHF DC Control Board, DC Voltages

TP	Voltage	TP	Voltage
E1*	+ 3.00	E5	+ 1.36
E2	-15.00	E6	- 6.00
E3	+15.00	E7	+77.0 **
E4	0	E8	+ 4.00

Device	1	2	3	4	5	6	7	8
U1	-15	-1.37	-1.37	-15	-15	-1.37	+15	0
U2	-15	-2.21	-2.23	-15	-15	-4.96	+15	0

Device	E	B	C
Q2	-5.97	-5.40	+ 5.34
Q3	+4.90	+5.34	+77 **
Q4	+4.32	+4.90	+77 **
Q5	+4.05	+4.31	+ 5.34

NOTE:

1. All voltages measured with a Fluke 8100A or 8300A digital voltmeter and may vary ±20% between units.
2. * +3.00V at E1 set by front panel tuning control. This level must be set to obtain all other voltages.
3. ** +77V dc dependent on receiver unregulated supply and may vary ±10%.

NOTE

After a malfunction has been located and repaired, it may be necessary to realign the circuitry in that section. Critical circuitry generally contained in rf tuners requires utmost care in this procedure, and alignment should only be attempted with the use of the proper test equipment. Since only slight adjustments are necessary after a component has been replaced, it is recommended that the alignment procedure be followed very carefully. Only realign in the area of repair; i.e., i-f amplifier, vfo. etc.

5-7.2 ALIGNMENT

To align the tuner properly, it should be connected to the receiver base unit using the two extender cables. Designations for test points referred to in the following procedures are called out on the tuner chassis. The preselector tracking and preamplifier alignment procedure should only be attempted in an emergency by experienced personnel. Microdyne recommends that the tuner be returned to the factory for repair and adjustment of the preselector and the preamplifier.

5-7.2.1 A3, VCO, CRYSTAL OSCILLATOR AND MULTIPLIER

a. Connect the tuner to the receiver base chassis using the i-f/power extender cable. Apply power to the receiver and allow 1/2 hour for warmup and stabilization.

b. Set the receiver 1ST LO MODE switch to OFF.

c. Connect the VS-50 sweep generator rf output to 1-o input P11-A2 and connect the HP8471A detector between the VS-50 video input and A3TP1.

d. Connect the HP1202A oscilloscope horizontal and vertical inputs to the respective VS-50 oscilloscope output.

e. Set the VS-50 sweep range to greater than 126.11 - 131.66 MHz and its output level to 0 dBm. Set the HP1202A controls for a convenient response amplitude.

f. Connect the HP608F signal generator output to the external marker input on the VS-50 and set the HP608F to mark 126.11 - 131.66 MHz.

g. Adjust A3T2, A3C4, and A3C7 for a maximum response amplitude centered between 252.22 and 263.33 MHz.

h. Disconnect the HP8471A input from A3TP1 and reconnect it to A3J2. Adjust A3C14 and A3C17 for a maximum response amplitude centered between 252.22 and 263.33 MHz.

i. Disconnect the VS-50 from P11-A2 and reconnect it to A3TP2. Set the VS-50 sweep range to greater than 126.11 - 131.66 MHz and the HP608F to mark 126.11 - 131.66 MHz.

j. Adjust A3L17, A3L18, and A3T2 for a maximum response amplitude centered between 252.22 and 263.33 MHz.

k. Disconnect the VS-50 from A3TP2 and reconnect it to l-o input P11-A2.

l. Disconnect the HP8471A from A3J2 and the video input on the VS-50.

m. Connect the output of the HP423A detector to the video input on the VS-50 and the HP423A input to the output of A7 (bandpass filter).

n. Connect the input of A7 to A3J3 and adjust A3C22, A3C25, A3C29, and A3C30 for a maximum amplitude response centered between 2270 and 2370 MHz (126.11 - 131.66 MHz on the HP608F marker generator and VS-50 sweep generator).

o. Disconnect the VS-50 from P11-A2 and connect the HP608F to P11-A2.

p. Disconnect the HP423A from A7 and connect A7 to the HP431C power meter through the HP478A thermistor mount.

q. Set the output level to 0 dBm on the HP608F and adjust its output frequency 126.11 through 131.66 MHz; the power reading on the HP431C should be 0 dBm, ±3 dB, over the frequency range.

r. Disconnect the HP431C from A7 and connect it to P11-A1 (l-o output). The HP431C should indicate a power level of 0 dBm, ±3 dB.

s. Disconnect the test equipment.

5-7.2.2 VFO ALIGNMENT

a. Set the receiver 1ST LO MODE switch to VFO.

b. Set the tape dial to 2200 MHz. Connect the HP414A to the variable terminal of R3 (tuning potentiometer) and adjust R3 until a reading of -3V is obtained on the HP414A meter. Tighten all set screws in potentiometer shaft coupling.

c. Connect the HP5245L frequency counter with the HP5253B converter to P11-A1 (l-o output).

d. Set A3C35 counterclockwise and adjust A3L11 until a reading of 126.11 is obtained on the HP5245L.

e. Set the tuner to 2300 MHz and the HP5245L should read 131.66 MHz. To decrease the tuning range, adjust A3L11 clockwise and then adjust A3C35 for a reading of 131.66 MHz on the HP5245L.

f. Set the tuner to 2200 MHz and the HP5245L should read 126.11 MHz. Adjust A3L11 to correct the tuning range and adjust A3C35 to reset the vfo output frequency.

g. Repeat steps e and f until the correct readings are obtained.

h. Set the tuner to 2250 MHz and the HP5245L should now read 128.888 MHz. To align this center frequency, adjust A4R7 (located on the dc control board) in small steps (clockwise to increase the center frequency and counterclockwise to decrease the center frequency).

i. After each small adjustment of A4R7, repeat steps e and f until the end frequencies (2200 and 2300 MHz) are correct.

j. Repeat steps h and i until 2200, 2250, and 2300 MHz positions on the tuner produce the correct readings (126.11, 128.888, and 131.66 MHz) on the HP5245L. Adjust A4R10 and A4R7 for best frequency linearity.

k. Disconnect the test equipment.

5-7.2.3 PRESELECTOR TRACKING

a. Connect the HP8690 sweep oscillator rf output to the HP777D directional coupler. Connect the HP8614A output to the HP777D.

b. Connect the HP777D to J1 (rf output) on the tuner.

c. Connect the HP1202A oscilloscope horizontal input to the HP8690A and the HP1202A vertical input to the HP423A detector.

d. Disconnect P8 from A5 (mixer) and connect P8 to the HP423A.

e. Set the HP8690A output level to -13 dBm and the sweep frequency to sweep 2200-2300 MHz.

f. Set the tuner tape to 2200 MHz and adjust A4R15 (uhf dc control board) until the preselector response is centered on 2200 MHz. Measure the voltage at A4E8 (preselector tuning line); it should be approximately +4V.

g. Set the tuner tape to 2300 MHz and adjust A4R14 until the preselector response is centered on 2300 MHz; it should be approximately +50V.

h. Repeat steps f and g until alignment is accomplished for both 2200 and 2300 MHz.

i. Set the tuner tape to 2250 MHz and check the preselector response alignment. To align the preselector 2250 MHz response and for best tracking, adjust A4R27 and A4R29 simultaneously in small steps (clockwise to decrease the preselector response frequency and counterclockwise to increase it).

j. After each small adjustment of A4R27 and A4R29, repeat step h.

k. Repeat steps i and j until the 2200, 2250, and 2300 MHz preselector responses are correct.

l. Disconnect the HP423A from P8 and reconnect it to P11-A3 (i-f output).

m. Reconnect P8 to A5.

n. While observing the transfer response, tune the tuner through its entire range (2200 to 2300 MHz). Slight adjustments may be necessary on the preselector couplings to obtain a maximum amplitude response over the entire tuning range.

o. Disconnect the test equipment from J1 and P11-A3.

5-7.2.4 NOISE FIGURE ALIGNMENT

a. Connect the HP340B (noise figure meter) to the Boonton 230A (power amplifier) and connect P11-A3 (i-f output) on the tuner to the 230A.

b. Connect the HP349A (uhf noise source) to J1 (rf input) on the tuner.

c. Adjust A5R2 and A5R10 (mixer bias) for the best noise figure.

d. Check the noise figure at 10 MHz intervals (12 dB maximum).

e. Check the noise figure at 2200, 2250, and 2300 MHz on crystal operation (12 dB maximum).

5-7.2.5 GAIN AND GAIN REDUCTION

a. Connect the HP8614A's rf output at -40 dBm to J1. Set its frequency to 2250 MHz. Connect the HP3406A rf millivoltmeter to P11-A3 of the rf tuner.

b. Set the agc power supply to -1.0V dc.

c. Adjust the output attenuator of the HP8614A to produce a reading of -20 dBm on the HP3406A rf millivoltmeter.

d. Note the difference between the signal generator attenuator reading and the rf millivoltmeter reading; this is the gain. Repeat at 2200 and 2300 MHz (32 (±3) dB) if the correct gain is not obtained, try adjustment of R8 on the 70 MHz i-f amplifier, A6.

e. Set the agc power supply to -5V dc. Readjust the HP8614A's attenuator to produce a -20 dBm level on the HP3406A rf millivoltmeter. Subtract the HP8614A's attenuator reading from that found in step d above. The difference is the amount of gain reduction. The gain reduction is 20 dB minimum. If this condition is not met, refer to Alignment/Test Procedure for the 70 MHz Gain-Control Amplifier, paragraph 5-7.2.6.

5-7.2.6 70 MHz GAIN-CONTROLLED AMPLIFIER

To align and/or test the amplifier it must be removed from the tuner. Due to the set up and test equipment requirements, the tuner should be rechecked to ensure a fault does not exist in the amplifier module (noting the input signal to and the output signal from the module).

a. Remove the amplifier module from the tuner. Remove the four screws from the front cover of the module and remove the amplifier from the wraparound.

b. Connect the test equipment as shown in figure 5-1.

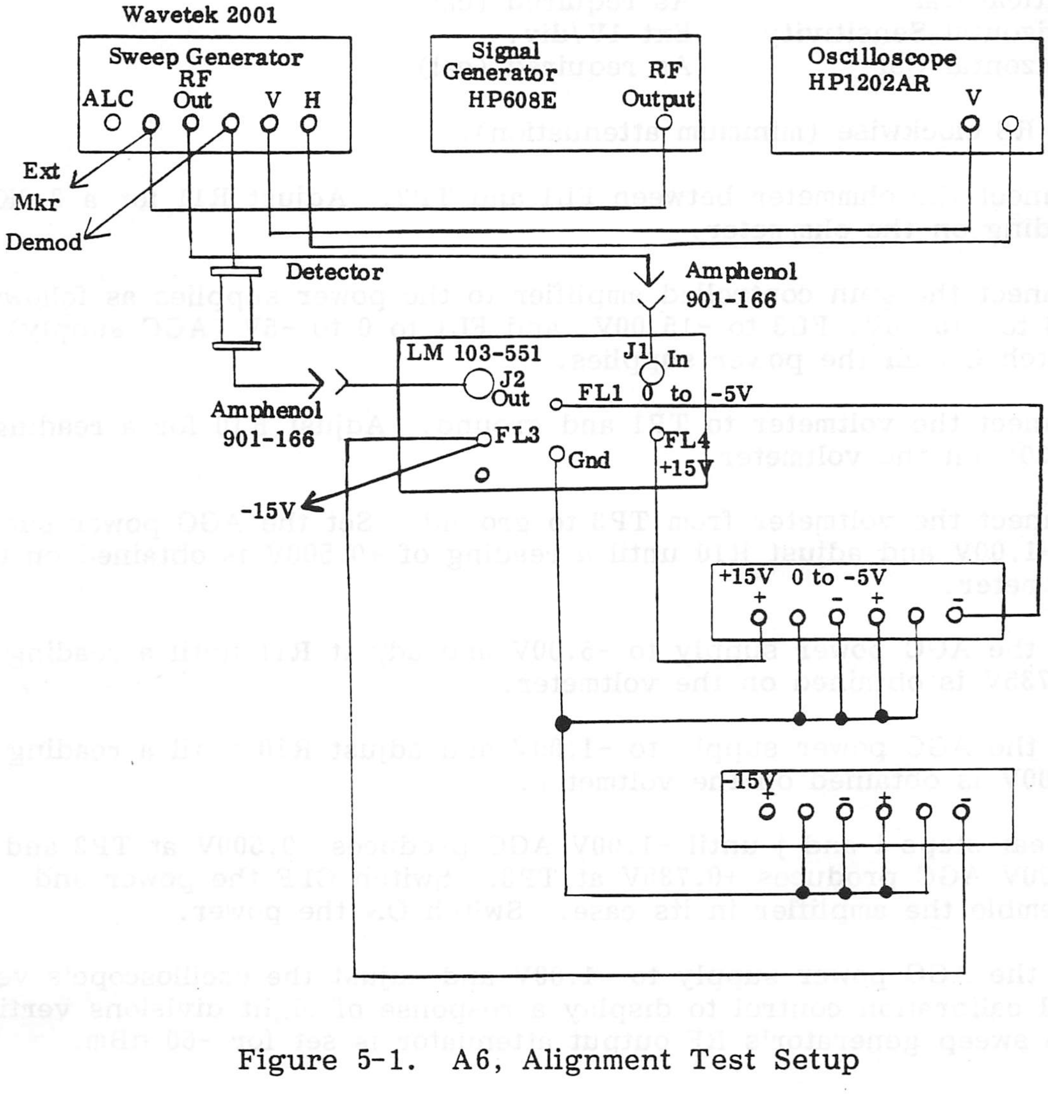


Figure 5-1. A6, Alignment Test Setup

c. Set the switches and controls on the sweep generator, the oscilloscope, the signal generator, and the frequency counter as follows:

Sweep Generator

Center Frequency	70 MHz	Mode	S/S
Band	1	ALC	INT
Sweep Time/Sec	Line	Start	22 MHz approx.
Output	-60 dBm	Stop	104 MHz approx.
Markers	As Required		

Signal Generator

Range	C	Mod Selector	CW
Frequency	As required	Attenuator	As required (-20 dBm)

Oscilloscope

Vertical Sensitivity	0.5 mV/div.
Vertical Coupling	DC
Vertical Cal	As required (cal)
Horizontal Sensitivity	Ext 1V/div.
Horizontal Cal	As required (cal)

d. Set R8 clockwise (minimum attenuation).

e. Connect the ohmmeter between FL1 and TP2. Adjust R11 for a 3.6KΩ reading on the ohmmeter.

f. Connect the gain controlled amplifier to the power supplies as follows: FL4 to +15.00V, FL3 to -15.00V, and FL1 to 0 to -5V (AGC supply). Switch ON all the power supplies.

g. Connect the voltmeter to TP1 and ground. Adjust R10 for a reading of +1.30V on the voltmeter.

h. Connect the voltmeter from TP3 to ground. Set the AGC power supply to -1.00V and adjust R10 until a reading of +0.500V is obtained on the voltmeter.

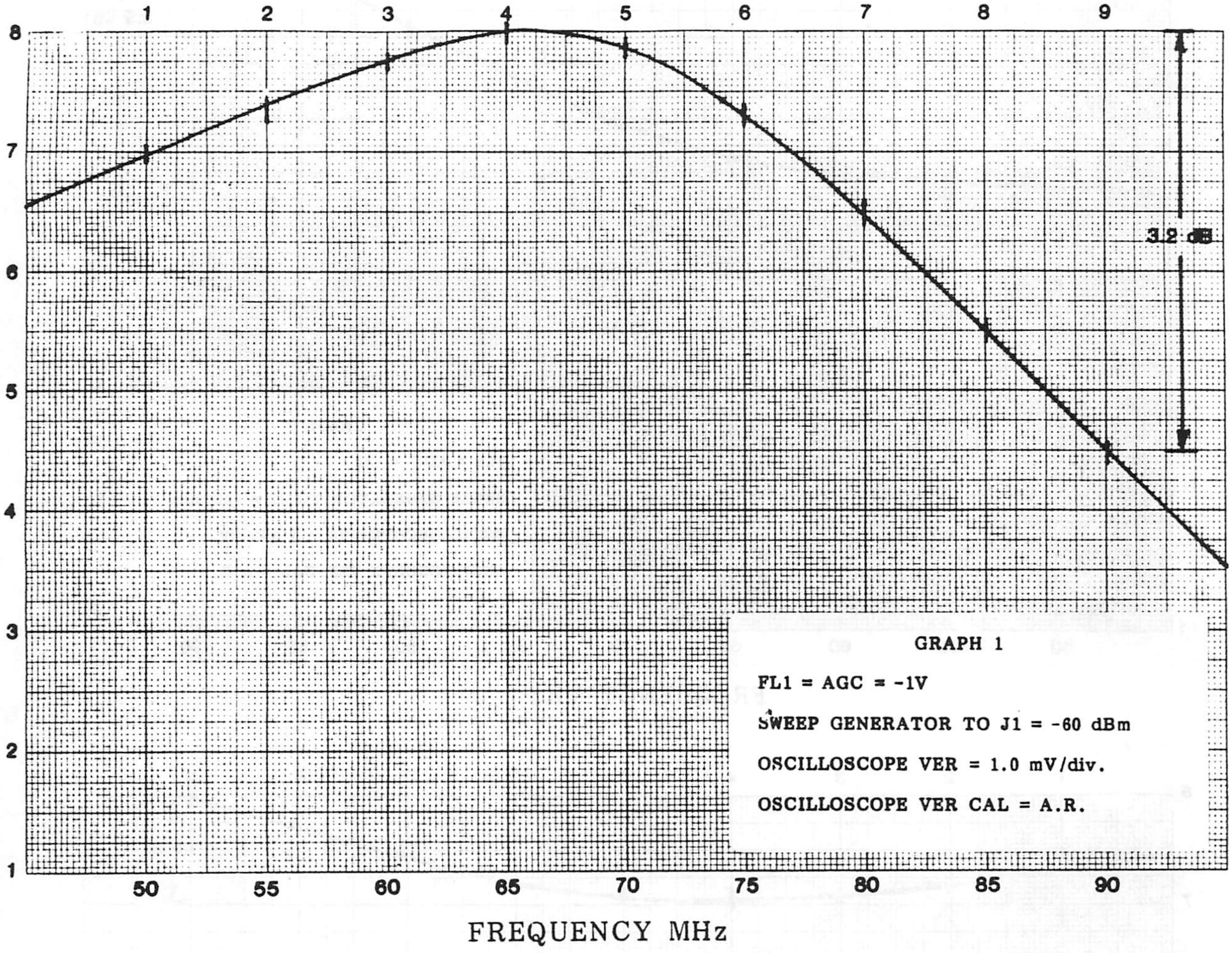
i. Set the AGC power supply to -5.00V and adjust R11 until a reading of +0.735V is obtained on the voltmeter.

j. Set the AGC power supply to -1.00V and adjust R10 until a reading of +5.00V is obtained on the voltmeter.

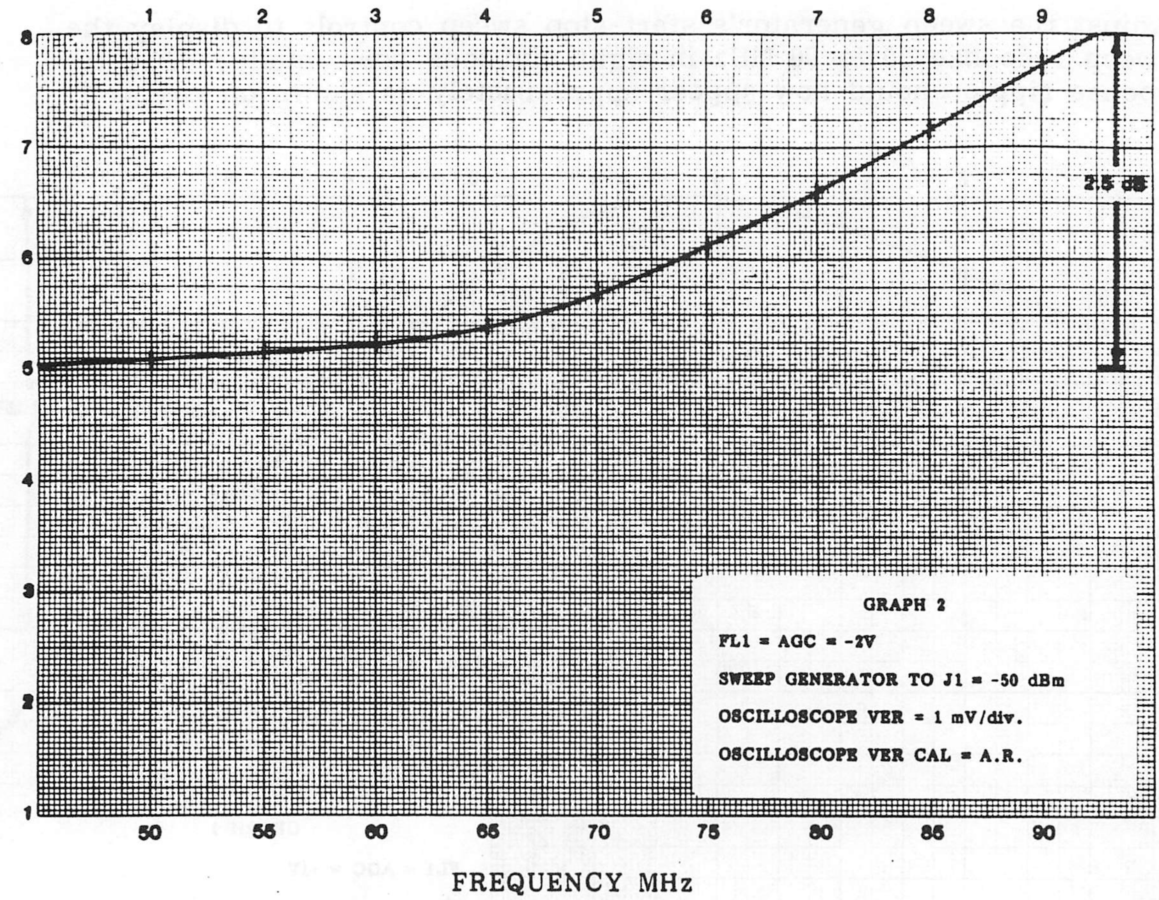
k. Repeat steps i and j until -1.00V AGC produces +0.500V at TP3 and -5.00V AGC produces +0.735V at TP3. Switch OFF the power and assemble the amplifier in its case. Switch ON the power.

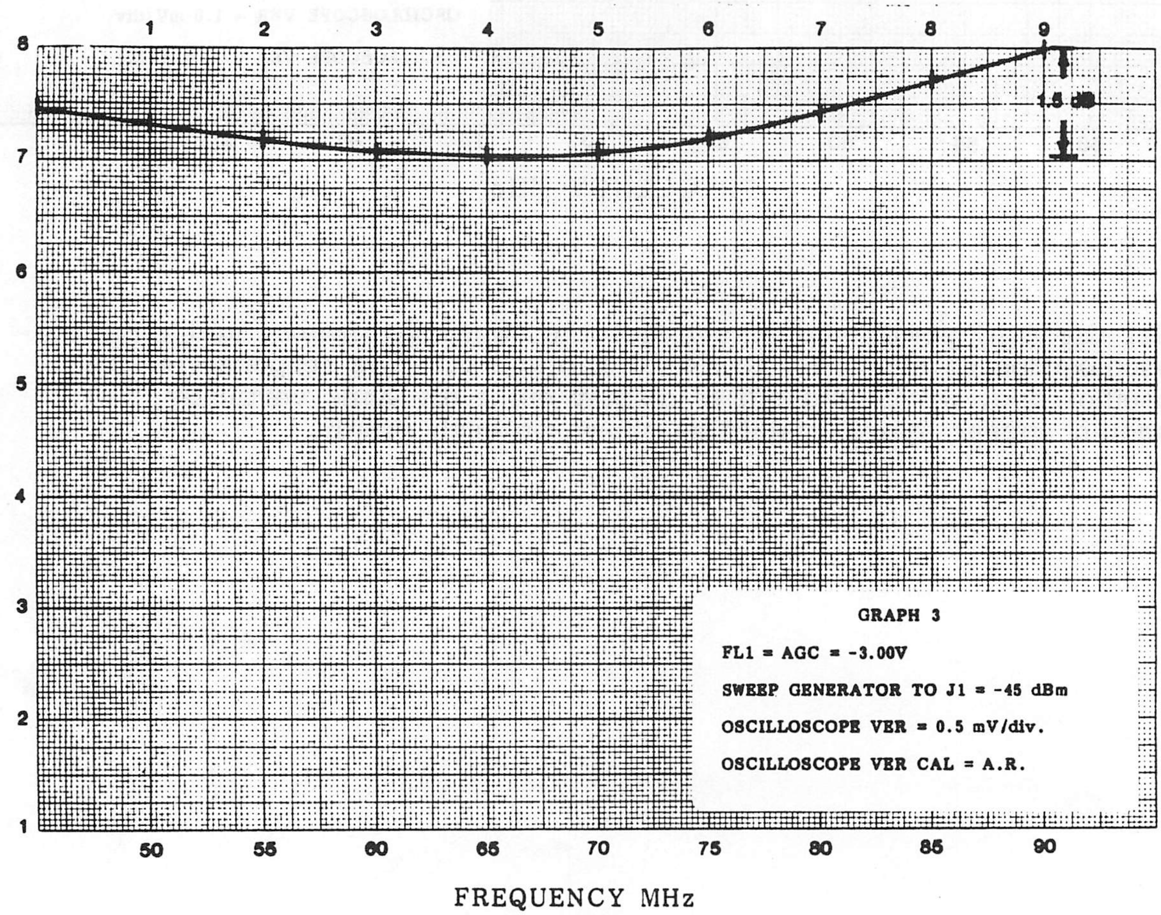
l. Set the AGC power supply to -1.00V and adjust the oscilloscope's vertical calibration control to display a response of eight divisions vertically. The sweep generator's RF output attenuator is set for -60 dBm.

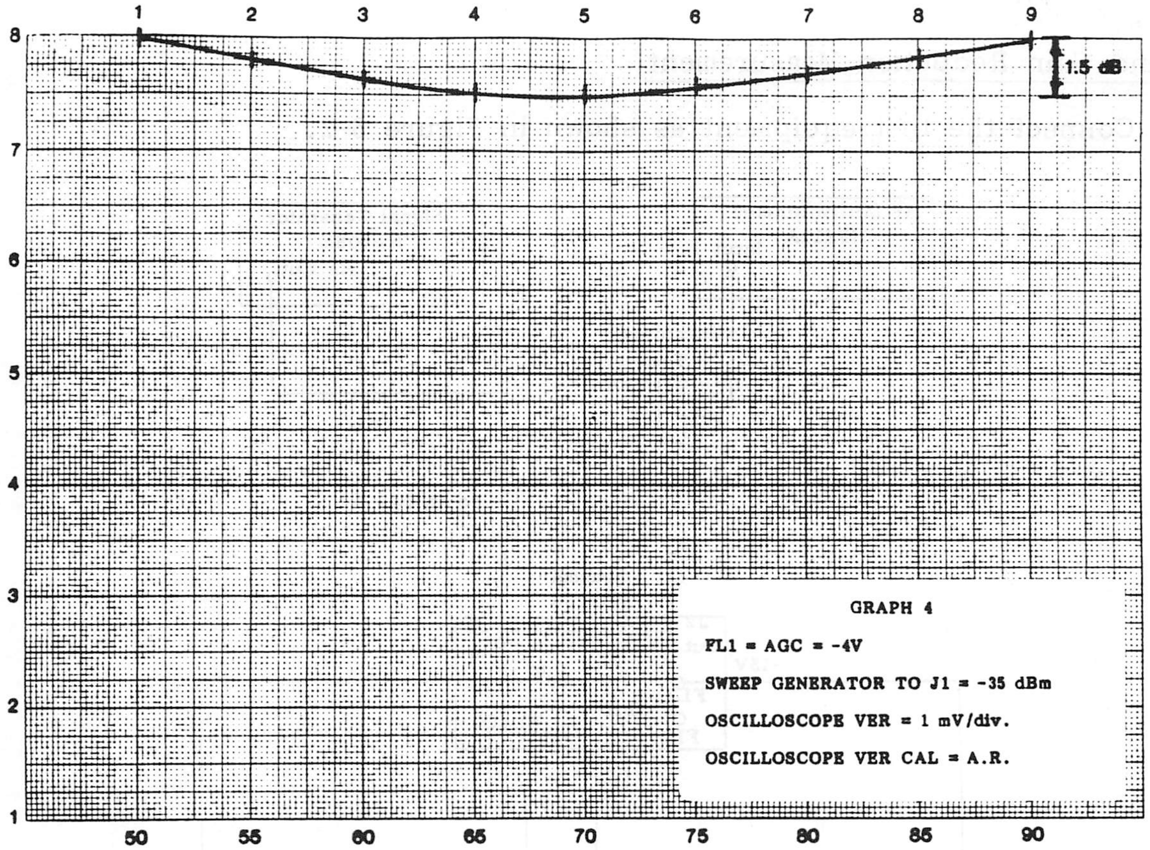
m. Adjust the sweep generator's start-stop sweep controls to display the sweep response 50 to 90 MHz in eight divisions horizontally. The response ripple should now appear approximately as shown on Graph 1.



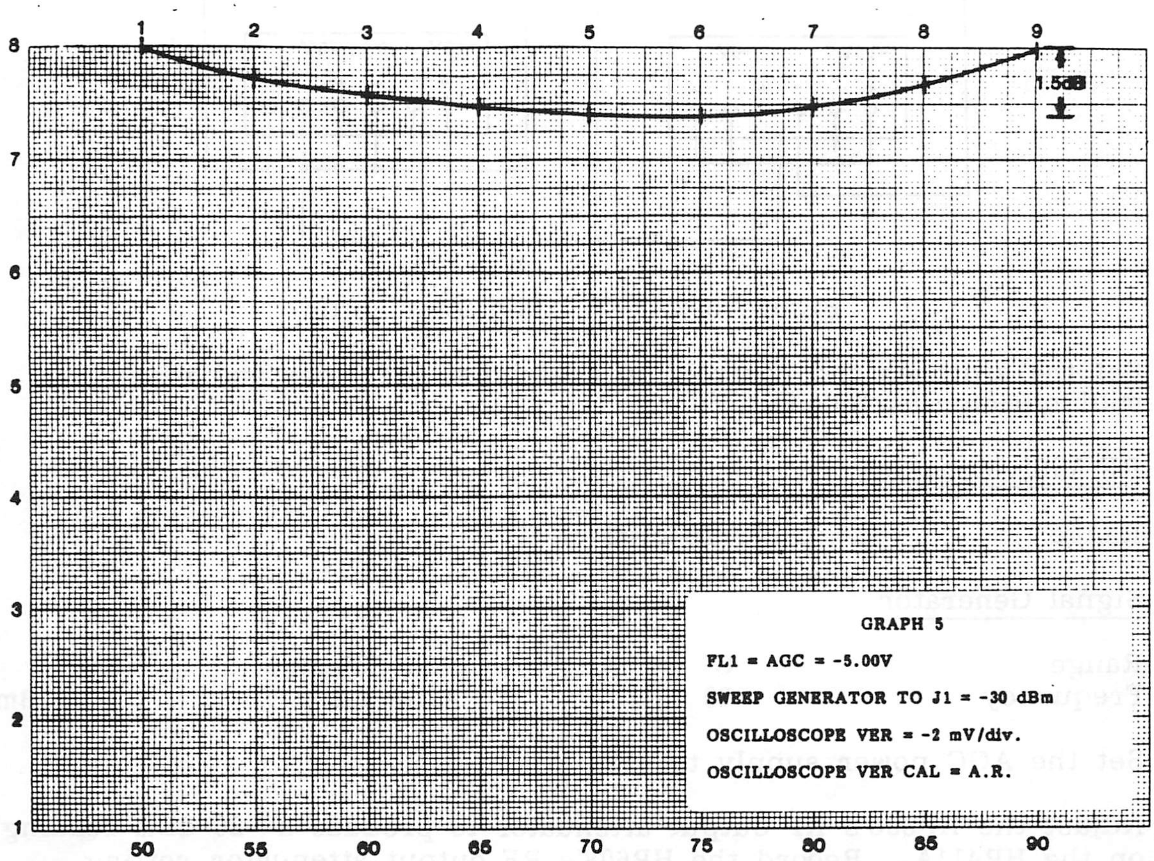
n. Set the AGC power supply voltage, the sweep generator, and the oscilloscope as shown on Graphs 2 through 5. The response on the oscilloscope, when adjusted to display eight divisions vertically, should appear approximately as shown on each graph.


2.5 dB
GRAPH 2
FL1 = AGC = -2V
SWEEP GENERATOR TO J1 = -50 dBm
OSCILLOSCOPE VER = 1 mV/div.
OSCILLOSCOPE VER CAL = A.R.
FREQUENCY MHz


1.5 dB
GRAPH 3
FL1 = AGC = -3.00V
SWEEP GENERATOR TO J1 = -45 dBm
OSCILLOSCOPE VER = 0.5 mV/div.
OSCILLOSCOPE VER CAL = A.R.
FREQUENCY MHz



FREQUENCY MHz



FREQUENCY MHz

Gain and Gain Reduction Measurement

a. Connect the test equipment as shown in Figure 5-2.

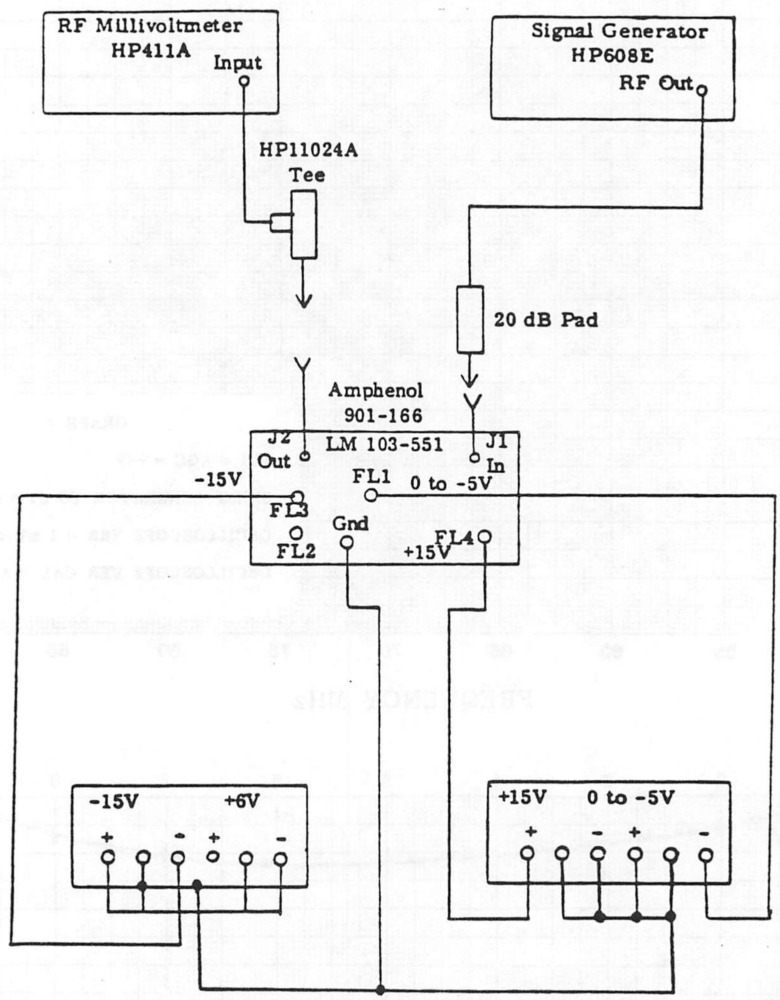


Figure 5-2. A6, Gain Test Setup

b. Set the switches and controls on the signal generator and the RF millivoltmeter as follows:

RF Millivoltmeter

Range	-20 dBm

Signal Generator

Range	C	Mod Selector	CW
Frequency	70 MHz	Attenuator	-40 dBm

c. Set the AGC power supply to -1V.

d. Adjust the HP608's RF output attenuator to produce a -20 dBm reading on the HP411A. Record the HP608's RF output attenuator setting. (The 20 dB pad connected as shown in Figure 5-2 calibrates the HP608's RF output attenuator for direct gain measurement.) The gain should measure 4- dB ±2 dB.

e. Set the HP608's RF output attenuator to -40 dBm and adjust R8 to produce a -22 dBm reading on the HP411A. The gain is now set for 38 dB.

f. Set the AGC power supply to -5V and adjust the HP608's RF output attenuator to produce a -22 dBm reading on the HP411A. Subtract the HP608's RF output attenuator reading from -40 dBm. Gain reduction should be 20 dB minimum.

Noise Figure Measurement

a. Connect the test equipment as shown in Figure 5-3.

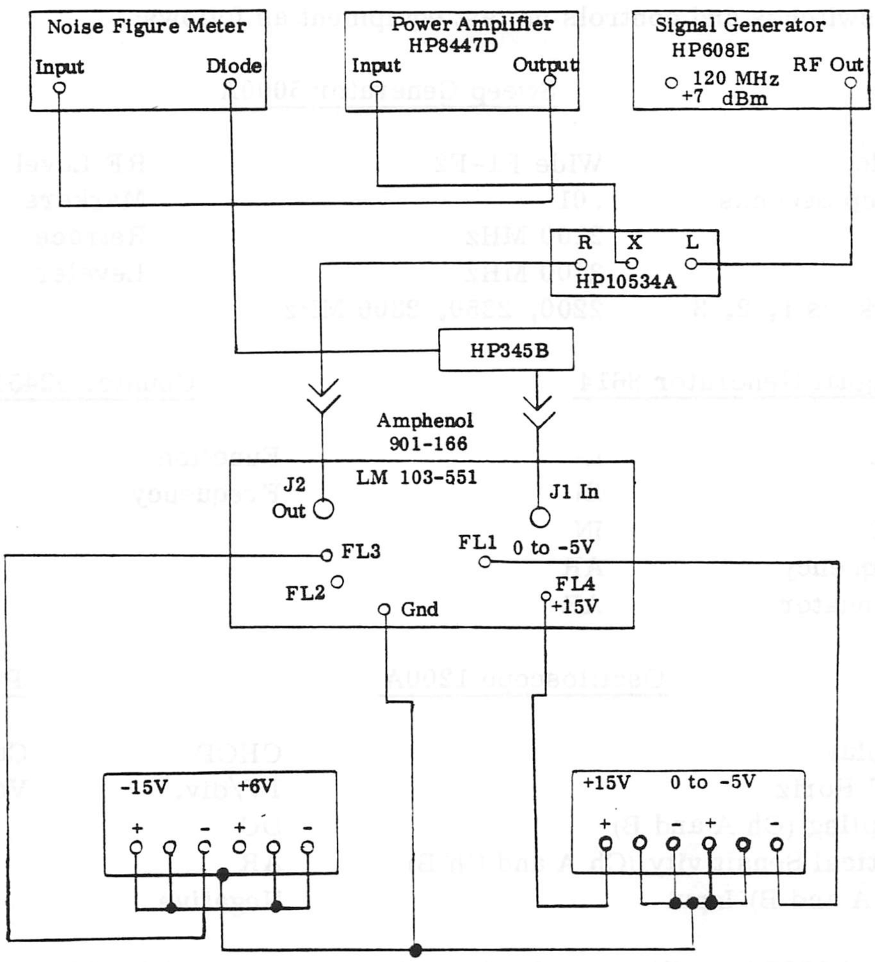


Figure 5-3. Noise Figure Test Setup

b. Set the switches and controls on the noise figure meter as follows:

Noise Figure Meter

Meter Function	As Required	Noise Source	Diode
Input	50 MHz	Current	Diode
IF Noise Source	50 MHz and 100Ω		As Required

c. Set the AGC power supply to -1V.

d. Calibrate the noise figure meter setup.

e. Maximum noise figure should be 4 dB.

5-7.2.7 PREAMPLIFIER ALIGNMENT. This alignment is required only when a repair is made to the preamplifier and should be attempted only in an emergency; see paragraph 5-7.2.

Preliminary Setup

a. Set up test equipment as shown in Figure 5-4.

b. Set switches and controls on test equipment as follows:

Sweep Generator 5000A

Mode	Wide F1-F2	RF Level	6 nw
Sweep Seconds	.01	Markers	ON
F1	2100 MHz	Retrace	OFF
F2	2400 MHz	Leveler	INT
Markers 1, 2, 3	2200, 2250, 2300 MHz		

Signal Generator 8614

Line	IN
RF	IN
ALC	IN
Frequency	AR
Attenuator	AR

Counter 5245L

Function	Freq
Frequency	AR

Oscilloscope 1200A

Display	CHOP
EXT Horiz	1V/div.
Coupling (Ch A and B)	DC
Vertical Sensitivity (Ch A and Ch B)	AR
Ch (A and B) Input	Negative

Power Supply 721A

Current	25 mA
Volts	15V DC

c. Adjust 1200A oscilloscope horizontal vernier control for 10 cm of horizontal base line deflection.

d. Adjust Channel B vertical sensitivity for 4 cm of vertical deflection.

e. Remove detector from dual directional coupler and replace with 2.0:1 mismatch.

f. Adjust Channel A vertical sensitivity for 4 cm of vertical deflection.

g. Remove 2.0:1 mismatch and replace with 1.5:1 mismatch. Observe this deflected level and trace with grease pencil on oscilloscope screen for later reference.

h. Check accuracy of internal markers using signal generator and counter.

This concludes the preliminary setup of test equipment.

Alignment

i. Replace the bottom cover on the unit with a test cover. Connect J1 of preamplifier to output of directional coupler using short length of SMA to type N test cable.

j. Connect J2 of preamplifier to HP423A detector using second SMA to type N cable.

k. Insert 10 dB precision pad between dual directional coupler and 6 dB pad.

l. Apply -15V DC to preamplifier.

m. Adjust C1, C2, and C3 for maximum amplitude (approx. 4 cm) and flat top response centered at 2250 MHz on Channel B.

n. Readjust C3 for minimum deflection on Channel A (must be less than 4 cm from 2200 to 2300 MHz).

o. Reserve J1 and J2 preamplifier connections and adjust C1 and C2 for minimum deflection on Channel A. (Must be less than reference set up in step g.)

p. Repeat steps m, n, and o for best overall performance. Remove the test cover and reinstall the standard bottom cover on the preamplifier.

Gain Check

q. Using setup as in Figure 5-4, connect RF power meter to directional coupler output.

r. Set Mode switch on sweep generator to CW position and adjust level control for -10 dBm as read on RF power meter.

s. Connect J1 of preamplifier to directional coupler output and RF power meter to J2.

t. Measure the gain at 2200, 2250, and 2300 MHz (8.5 - 10.5 dB).

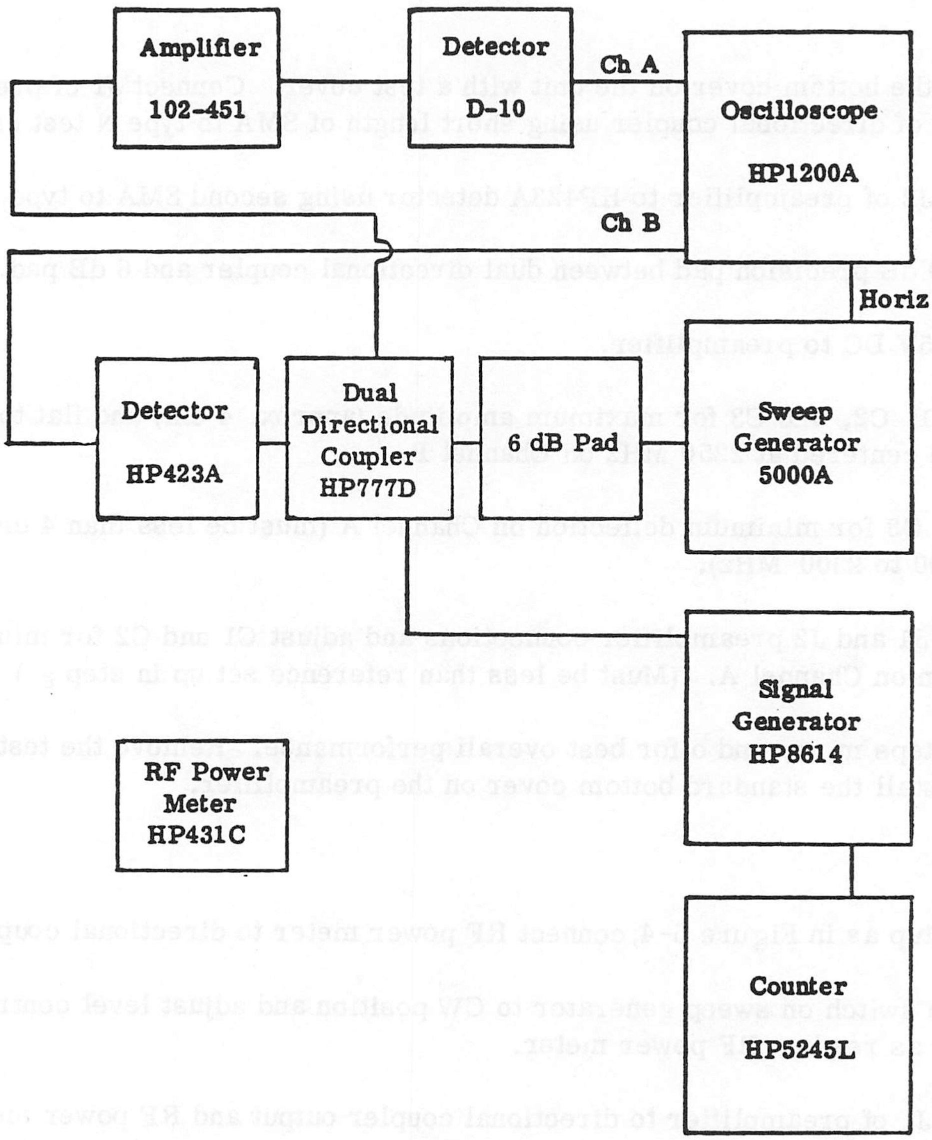


Figure 5-4. Test Equipment Setup

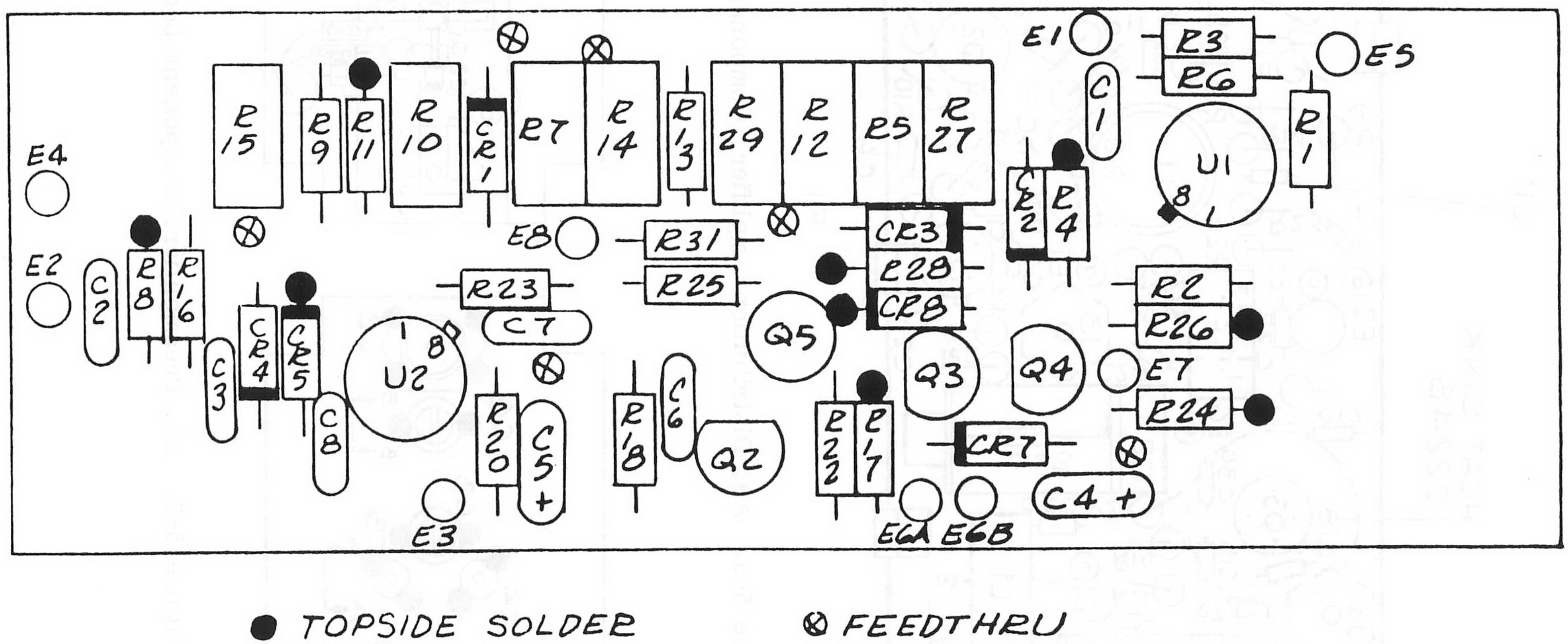


Figure 5-5. A4, UHF DC Control Board, Component Location

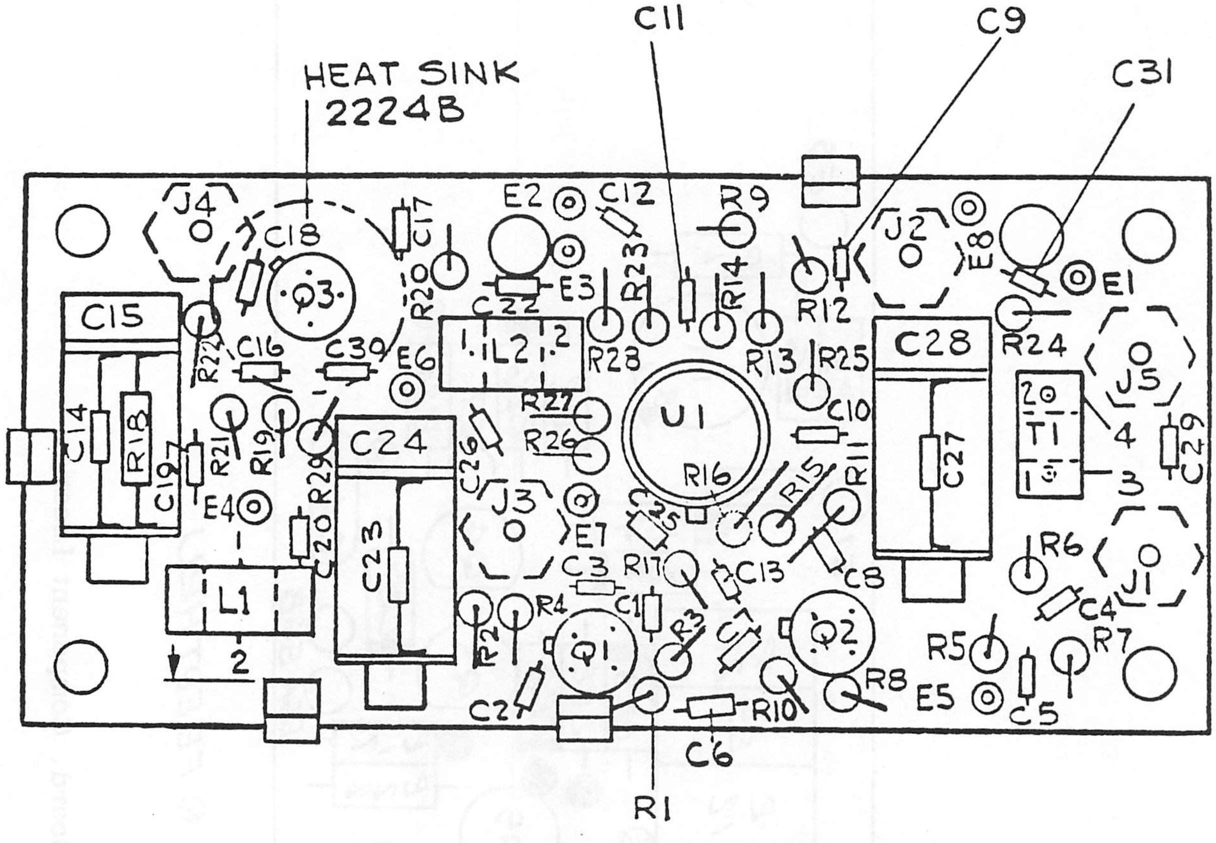


Figure 5-6. A8, Distribution Amplifier, Component Location

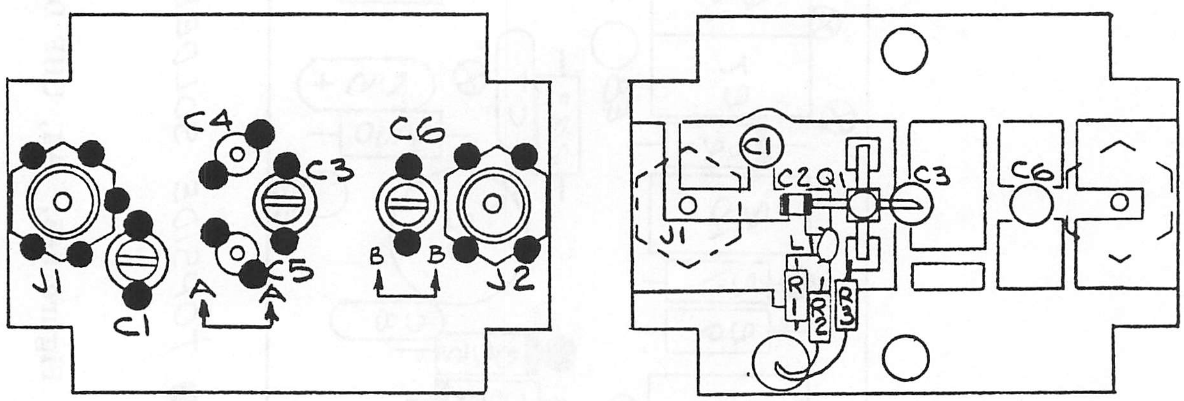


Figure 5-7. A1, Preamplifier, Component Location

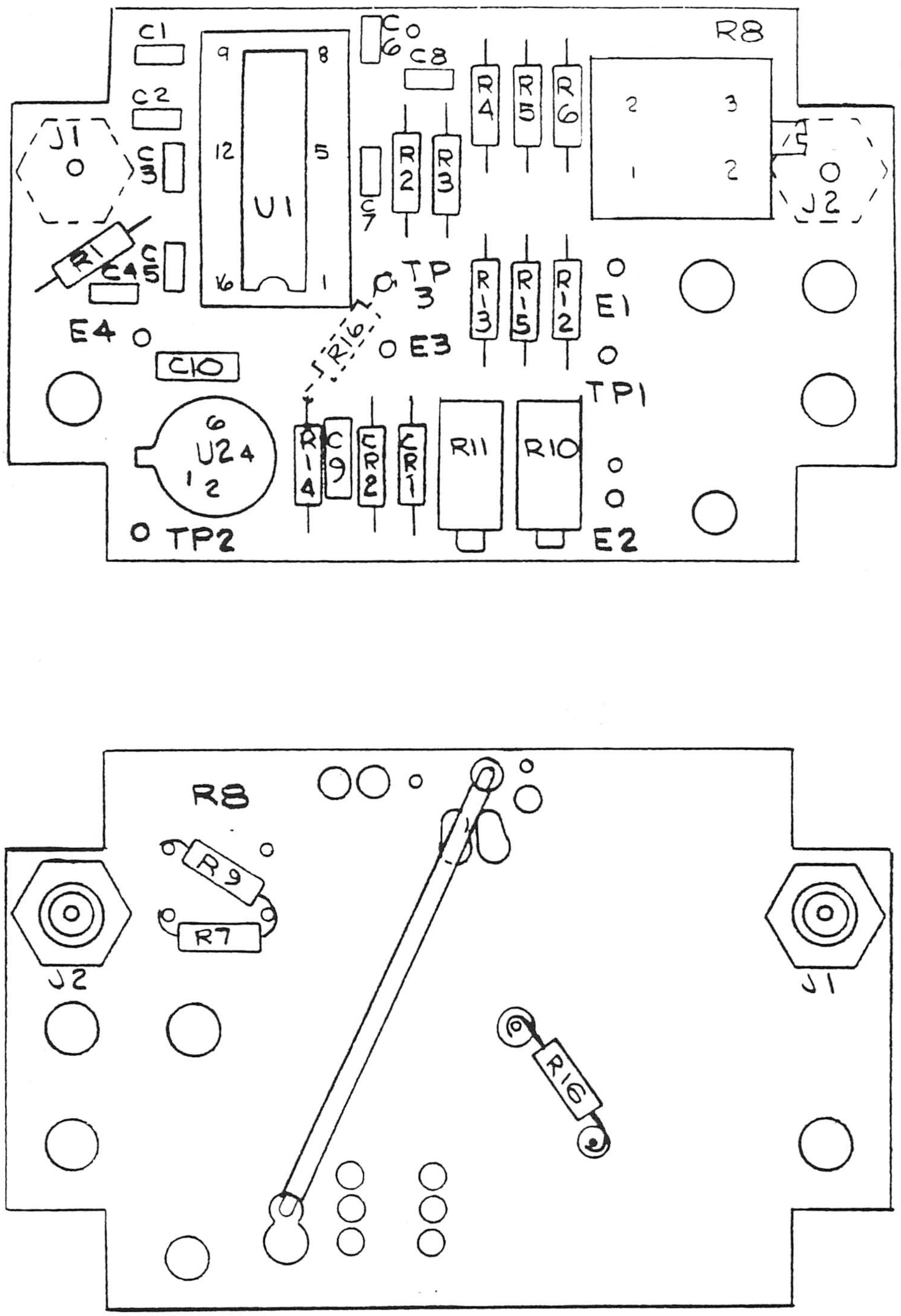


Figure 5-8. A6A1, 70 MHz Gain Controlled Amplifier
Printed Circuit Board,
Component Location Diagram

SECTION VI
REPLACEABLE PARTS LIST

6-1 GENERAL

This section contains the replaceable parts list for the 1115-VT(W)(70) RF Tuner and all subassemblies contained therein. Components are listed alphanumerically by subassembly and provide the reference designator, value, tolerance, manufacturer, and manufacturer's part number. Include all part information when ordering spare or replaceable components.

6-2 MAIN CHASSIS

Reference Designation	Description
A1	Preamplifier, Microdyne 103-123; see paragraph 6-3 for breakdown listing
A2	Preselector, Microdyne 101-284-1/5271; nonrepairable
A3	VCO, Crystal Oscillator and Multiplier, Microdyne 101-065-2; see paragraph 6-4 for breakdown listing
A4	UHF DC Control Board, Microdyne 101-154; see paragraph 6-5 for breakdown listing
A5	Mixer, Anaren 70580; nonrepairable
A6	70 MHz Gain-Controlled Amplifier, Microdyne 103-551; see paragraph 6-6 for breakdown listing
A7	Tubular Filter Assembly, 2270-2370 MHz, Microdyne 301-289/5272; nonrepairable
A8	Distribution Amplifier, Microdyne 101-492; see paragraph 6-7 for breakdown listing
C1	Capacitor, ceramic, 0.33 μF ±20%, 100V, Erie 8131-100-651-334M
C2	Not Assigned
C3	Not Assigned
C4	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
E1 thru E16	Termination, standoff, teflon, Sealectro ST-SM-1
J1	Connector, p/o W1, Gremar 16908-1
P1	Connector, p/o W1, Phelps Dodge 522-004
P2	Connector, p/o W2, Phelps Dodge 522-004
P3	Connector, p/o W2, Phelps Dodge 522-004
P4	Connector, p/o W3, Phelps Dodge 522-004
P5	Connector, p/o W3, Phelps Dodge 522-004

Replaceable Parts List - Main Chassis, cont'd.

Reference Designation	Description
P6	Connector, p/o W4, Phelps Dodge 546-001
P7	Connector, p/o W4, Phelps Dodge 546-001
P8	Connector, p/o W5, Phelps Dodge 546-001
P9	Connector, p/o W6, Phelps Dodge 522-004
P10	Connector, p/o W6, Phelps Dodge 524-001
P11	Connector, Cannon DCM25W3P
P11A1	Insert, p/o W5, Cannon DM53740-1
P11A2	Insert, p/o W10, Cannon DM53741-1
P11A3	Insert, p/o W11, Cannon DM53741-1
P12	Connector, p/o W7, Phelps Dodge 524-001
P13	Connector, p/o W7, Phelps Dodge 522-004
P14	Connector, p/o W8, UG1465/U
P15	Connector, p/o W8, UG1465/U
P16	Connector, p/o W9, UG1465/U
P17	Connector, p/o W9, UG1465/U
P18	Connector, p/o W10, UG1465/U
P19	Connector, p/o W11, UG1465/U
R1	Not Assigned
R2	Not Assigned
R3	Potentiometer, 10K ±10%, Bourns 3501S-1-103
R4	Resistor, fixed composition, 4.7KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4725
R5	Resistor, fixed composition, 4.7KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4725
R6	Not Assigned
R7	Not Assigned
R8	Factory selected value
R9	Factory selected value
S1	Switch, C&K 7101 w/blue cap and dress nut
S2	Switch, C&K 7101 w/red cap
W1	Cable Assembly, semi-rigid, Microdyne
W2	Cable Assembly, semi-rigid, Microdyne
W3	Cable Assembly, semi-rigid, Microdyne
W4	Cable Assembly, Microdyne 203-159-7
W5	Cable Assembly, Microdyne 201-782-9
W6	Cable Assembly, semi-rigid, Microdyne
W7	Cable Assembly, semi-rigid, Microdyne
W8	Cable Assembly, Microdyne 201-941-8
W9	Cable Assembly, Microdyne 201-941-8
W10	Cable Assembly, Microdyne 202-884-22
W11	Cable Assembly, Microdyne 202-884-22

Replaceable Parts List, continued

6-3 A1, PREAMPLIFIER

Reference Designation	Description
A1	Printed Circuit Board Assembly, Microdyne 103-122
FL1	Filtercon, Erie 1250-003

6-3.1 PRINTED CIRCUIT BOARD ASSEMBLY

Reference Designation	Description
C1	Capacitor, variable, 0.6 - 4.5 pF, Johanson 7275
C2	Capacitor, ceramic, 47 pF ±10%, 50V, Mono Die 500R15N-470KP
C3	Capacitor, variable, 0.6 - 4.5 pF, Johanson 7275
C4	Capacitor, ceramic, 0.01 μF ±20%, Mono Die CF14-04
C5	Capacitor, ceramic, 0.01 μF ±20%, Mono Die CF14-04
C6	Capacitor, variable, 0.6 - 4.5 pF, Johanson 7275
J1	Connector, Microdyne 202-997
J2	Connector, Microdyne 202-997
L1	Inductor, 35 μH, Piconics 5350K
Q1	Transistor, npn, Hewlett Packard HP35866E
R1	Resistor, fixed composition, 3.3KΩ ±5%, 1/8w, Allen Bradley BB3325
R2	Resistor, fixed composition, 1.0KΩ ±5%, 1/8w, Allen Bradley BB1025
R3	Resistor, fixed composition, 300Ω ±5%, 1/8w, Allen Bradley BB3015

Replaceable Parts List, continued

6-4 A3, VCO, CRYSTAL OSCILLATOR AND MULTIPLIER

Reference Designation	Description
*C1	Capacitor, ceramic, 3.6 pF ±0.25 pF, 100V, Erie 8101-100-COG-369C
C2	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C3	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C4	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C5	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C
C6	Capacitor, ceramic, 1.5 pF ±0.1 pF, 100V, Erie 8101-100-COG-159B
C7	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C8	Capacitor, ceramic, 3.9 pF ±0.25 pF, 100V, Erie 8101-100-COG-399C
C9	Capacitor, ceramic, 4.7 pF ±0.25 pF, 100V, Erie 8101-100-COG-479C
C10	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8111-100-X5R-102M
C11	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C12	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C13	Capacitor, ceramic, 3.9 pF ±0.25 pF, 100V, Erie 8101-100-COG-399C
C14	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C15	Capacitor, ceramic, 1.5 pF ±0.1 pF, 100V, Erie 8101-100-COG-159B
C16	Capacitor, ceramic, 3.3 pF ±0.1 pF, 100V, Erie 8101-100-COG-339B
C17	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
*C18	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8111-100-X5R-102M
C19	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C20	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C
C21	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C22	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C23	Capacitor, ceramic, 2.0 pF ±0.1 pF, 100V, Erie 8101-100-COG-209B
C24	Capacitor, ceramic, 3.3 pF ±0.1 pF, 100V, Erie 8101-100-COG-339B
C25	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
*C26	Capacitor, ceramic, 6.2 pF ±0.25 pF, 100V, Erie 8101-100-COG-629C
C27	Capacitor, ceramic, 6.8 pF ±0.25pF, 100V, Erie 8101-100-COG-689C
C28	Capacitor, ceramic, 10 pF ±5%, 100V, Erie 8101-100-COG-100J
C29	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C30	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C31	Capacitor, ceramic, 1.0 pF ±10%, Quality Components MC-1.0
C32	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C33	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
*C34	Capacitor, ceramic, 100 pF ±5%, 100V, Erie 8131-100-COG-101J
C35	Capacitor, glass, variable, 0.8-8.5 pF, Voltronic TM-9G or LRC 682237
C36	Capacitor, ceramic, 5.6 pF ±0.25 pF, 100V, Erie 8101-100-COG-569C
C37	Capacitor, ceramic, 47 pF ±5%, 100V, Erie 8131-100-COG-470J
C38	Capacitor, ceramic, 15 pF ±5%, 100V, Erie 8111-100-COG-150J
C39	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C40	Capacitor, ceramic, 12 pF ±5%, 100V, Erie 8111-100-COG-120J

*Nominal value

Replaceable Parts List - A3, VCO, Crystal Oscillator & Multiplier, continued

Reference Designation	Description
C41	Not Assigned
C42 thru C44	Capacitor, feedthru, 0.001 pF, 1000V, GMV, Erie 2482-001-W5T-102P
C45	Capacitor, ceramic, 6.2 pF ±0.25 pF, 100V, Erie 8101-100-COG-629C
C46	Capacitor, ceramic, 10 pF ±5%, 100V, Erie 8101-100-COG-100J, nominal value
C47	Not Assigned
C48	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C49	Capacitor, ceramic, 15 pF ±5%, 100V, Erie 8111-100-COG-150J, nominal value
C50	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8111-100-X5R-102M
C51	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8111-100-X5R-102M
C52	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C53	Capacitor, ceramic, 39 pF ±5%, 100V, Erie 8121-100-COG-390J
C54 thru C56	Capacitor, ceramic, 1000 pF ±20%, 100V, Erie 8111-100-X5R-102M
C57	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C58	Capacitor, ceramic, 3.3 pF ±0.1 pF, 100V, Erie 8101-100-COG-339B
C59	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C
C60	Capacitor, ceramic, 1.2 pF ±0.1 pF, 100V, Erie 8101-100-COG-129B
C61	Capacitor, ceramic, 4.7 pF ±0.25 pF, 100V, Erie 8101-100-COG-479C
C62	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C63	Capacitor, tantalum, 47 μF ±20%, 20V, Kemet T362C476M020AS
C64	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C65	Capacitor, feedthru, 0.001 μF, 1000V, GMV, Erie 2482-001-W5T-102P
C66	Capacitor, ceramic, 4.7 pF ±0.25 pF, 100V, Erie 8101-100-COG-479C
C67	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C, nominal value
C68	Capacitor, ceramic, 4.7 pF ±0.25 pF, 100V, Erie 8101-100-COG-479C
C69	Capacitor, ceramic, 3.9 pF ±0.25 pF, 100V, Erie 8101-100-COG-399C
CR1	Diode, Step recovery, HP HPA0112
CR2	Diode, voltage variable, MSI S324
CR3	Diode, zener, Motorola 1N759A
E1	Termination, feedthru, Sealectro FT-SM-1
E2	Termination, feedthru, Sealectro FT-SM-1
E3 thru E7	Termination, standoff, Sealectro ST-SM-1

Replaceable Parts List - A3, VCO, Crystal Oscillator & Multiplier, continued

Reference Designation	Description
J1	Not Assigned
J2	Connector, Sealectro UG-1619/U
J3	Connector, OSM 211
J4 thru J6	Connector, Sealectro UG-1619/U
L1	Inductor, fixed, 0.33 μH, Jeffers 4425-1M
L2 thru L4	Inductor, variable, Microdyne 200-324
L5	Inductor, fixed, 10 μH, Jeffers 4445-2K
L6 thru L8	Inductor, variable, Microdyne 200-324
L9	Inductor, variable, Microdyne 200-713
L10	Inductor, variable, Microdyne 200-714
L11	Inductor, variable, LRC 681209
L12	Inductor, fixed, 160 μH ±5%, Jeffers 1315-17J
L13	Not Assigned
L14	Not Assigned
L15	Inductor, fixed, 0.33 μH ±20%, Jeffers 4425-1M
L16	Inductor, fixed, 0.68 μH ±10%, Jeffers 4425-4K
L17	Inductor, variable, Microdyne 202-746
L18	Inductor, variable, Microdyne 202-747
L19	Inductor, part of R11
L20	Inductor, fixed, 2.7 μH, Jeffers 4425-11K
Q1	Transistor, npn, RCA 2N5179
Q2	Transistor, npn, RCA 2N5187
Q3	Transistor, npn, RCA 2N5187
Q4 thru Q8	Transistor, npn, RCA 2N5179
R1	Resistor, fixed composition, 100Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1015, nominal val.
R2	Resistor, fixed composition, 1.5KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1525
R3	Resistor, fixed composition, 6.2 KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB6225
R4	Resistor, fixed composition, 10Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1005
R5	Resistor, fixed composition, 100Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1015, nominal val.
R6	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025

Replaceable Parts List - A3, VCO, Crystal Oscillator & Multiplier, continued

Reference Designation	Description
R7	Resistor, fixed composition, 4.7KΩ ±5%, ¼w, Allen Bradley CB4725
R8	Resistor, fixed composition, 100Ω ±5%, ¼w, Allen Bradley CB1015, nominal value
R9	Resistor, fixed composition, 3KΩ ±5%, ¼w, Allen Bradley CB3025, nominal value
R10	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R11	Resistor, fixed composition, 22MΩ ±5%, ¼w, Allen Bradley CB2265
R12	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R13	Resistor, fixed composition, 10KΩ ±5%, ¼w, Allen Bradley CB1035
R14	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R15	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R16	Resistor, fixed composition, 510Ω ±5%, ¼w, Allen Bradley CB5115
R17	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R18	Resistor, fixed composition, 2.4KΩ ±5%, ¼w, Allen Bradley CB2425
R19	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R20	Resistor, fixed composition, 510Ω ±5%, ¼w, Allen Bradley CB5115
R21	Resistor, fixed composition, 560Ω ±5%, ¼w, Allen Bradley CB5615
R22	Resistor, fixed composition, 24Ω ±5%, ¼w, Allen Bradley CB2405
R23	Resistor, fixed composition, 2.4KΩ ±5%, ¼w, Allen Bradley CB2425
R24	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R25	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R26	Resistor, fixed composition, 10Ω ±5%, ¼w, Allen Bradley CB1005
R27	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R28	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R29	Resistor, fixed composition, 560Ω ±5%, ¼w, Allen Bradley CB5615
R30	Resistor, fixed composition, 510Ω ±5%, ¼w, Allen Bradley CB5115
R31	Resistor, fixed composition, 20Ω ±5%, ¼w, Allen Bradley CB2005
R32	Resistor, fixed composition, 620Ω ±5%, ¼w, Allen Bradley CB6215
R33	Resistor, fixed composition, 82Ω ±5%, ¼w, Allen Bradley CB8205
R34	Thermistor, 50KΩ, Fenwal GA45P2
R35	Resistor, fixed composition, 390Ω ±5%, ¼w, Allen Bradley CB3915
R36	Resistor, fixed composition, 51Ω ±5%, ¼w, Allen Bradley CB5105
R37 thru R39	Resistor, fixed composition, 1KΩ ±5%, ¼w, Allen Bradley CB1025
R40	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
R41	Resistor, fixed composition, 4.3KΩ ±5%, ¼w, Allen Bradley CB4325
T1	Transformer, Microdyne 202-775
T2	Transformer, Microdyne 202-776

Replaceable Parts List - A3, VCO, Crystal Oscillator & Multiplier, continued

Reference Designation	Description
TP1	Connector, Sealectro UG-1619/U
TP2	Connector, Sealectro UG-1619/U
XQ1	Transistor, socket, Augat 8060-1G8
XQ2	Transistor, retainer, IERC TXP1803B
XQ3	Transistor, retainer, IERC TXP1803B
XQ4 thru XQ8	Transistor, socket, Augat 8060-1G8

6-5 A4, UHF DC CONTROL BOARD

Reference Designation	Description
C1	Capacitor, ceramic, 0.33 μF ±20%, 100V, Erie 8131-100-651-334M
C2	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C3	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C4	Capacitor, tantalum, 47 μF ±20%, 20V, Kemet T362C476M020AS
C5	Capacitor, tantalum, 47 μF ±20%, 20V, Kemet T362C476M020AS
C6	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M, nominal value
C7	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
C8	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V-103M
CR1 thru CR5	Diode, JEDEC 1N914
CR6	Not Assigned
CR7*	Diode, Motorola 1N5285
CR8*	Diode, Motorola 1N5285
E1 thru E8	Termination, AMP 61067-1
Q1	Not Assigned
Q2 thru Q4	Transistor, Motorola 2N4410
Q5	Transistor, Sprague 2N4384

*May be replaced by 1N5283 thru 1N5290

Replaceable Parts List - A4, UHF DC Control Board, continued

Reference Designation	Description
R1	Resistor, fixed composition, 10KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1035
R2	Resistor, fixed composition, 10KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1035
R3	Resistor, fixed composition, 47KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4735
R4	Resistor, fixed composition, 10KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1035
R5	Potentiometer, 10KΩ, Beckman 66XR10K
R6	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025
R7	Potentiometer, 200KΩ, Beckman 66XR200K
R8	Resistor, fixed composition, 200KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2045
R9	Resistor, fixed composition, 3.9KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB3925
R10	Potentiometer, 2KΩ, Beckman 66XR2K
R11	Resistor, fixed composition, 3.9KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB3925
R12	Potentiometer, 10KΩ, Beckman 66XR10K
R13	Resistor, fixed composition, 100KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1045
R14	Potentiometer, 200KΩ, Beckman 66XR200K
R15	Potentiometer, 200KΩ, Beckman 66XR200K
R16	Resistor, fixed composition, 200KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2045
R17	Resistor, fixed composition, 10Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1005
R18	Resistor, fixed composition, 47KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4735
R19	Not Assigned
R20	Resistor, fixed composition, 10Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1005
R21	Not Assigned
R22	Resistor, fixed composition, 91KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB9135
R23	Resistor, fixed composition, 1.3MΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1355
R24	Resistor, fixed composition, 130KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1345
R25	Resistor, fixed composition, 620Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB6215, nominal value
R26	Resistor, fixed composition, 1.5KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1525
R27	Potentiometer, 50KΩ, Beckman 66XR50K
R28	Resistor, fixed composition, 3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB3025
R29	Potentiometer, 50KΩ, Beckman 66XR50K
R30	Not Assigned
R31	Resistor, fixed composition, 100KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1045
U1	Integrated Circuit, Fairchild μA741
U2	Integrated Circuit, Fairchild μA741

Replaceable Parts List, continued

6-6 A6, 70 MHz GAIN-CONTROLLED AMPLIFIER

Reference Designation	Description
A1	70 MHz Gain-Controlled Amplifier Printed Circuit Board, Microdyne 103-290; see breakdown listing below
CR1	Diode, 1N4735A
FL1 thru FL4	Filtercon, Erie 1250-003
R1	Resistor, fixed composition, 220Ω ±5%, 1/2w, Allen Bradley EB2215

6-6.1 A6A1, 70 MHz GAIN-CONTROLLED AMPLIFIER PRINTED CIRCUIT BOARD

Reference Designation	Description
C1 thru C8	Capacitor, ceramic, 0.01 μF ±20%, 100V, Erie 8131-B106-X5V0-103M
C9	Capacitor, ceramic, 0.33 μF ±20%, 100V, Erie 8131-100-651-334M
C10	Capacitor, ceramic, 0.33 μF ±20%, 100V, Erie 8131-100-651-334M
CR1	Diode, JEDEC 1N914
CR2	Diode, JEDEC 1N914
E1 thru E4	Termination, AMP 61067-1
J1	Connector, Omni-Spectra OSM 211
J2	Connector, Omni-Spectra OSM 211
R1	Resistor, fixed composition, 30Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB3005
R2	Resistor, fixed composition, 510Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5115
R3	Resistor, fixed composition, 62Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB6205
R4	Resistor, fixed composition, 68-Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB6815
R51	Resistor, fixed composition, 18Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1805
R6	Resistor, fixed composition, 680Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB6815
R7	Resistor, fixed precision, 75Ω ±1%, RN55D75R0F
R8	Potentiometer, 75Ω ±20%, Allen Bradley BT4B750P
R9	Resistor, fixed precision, 75Ω ±1%, RN55D75R0F
R10	Potentiometer, 5K, Beckman 66XR5K
R11	Potentiometer, 5K, Beckman 66XR5K

Replaceable Parts List, continued

Reference Designation	Description
R12	Resistor, fixed composition, 6.8KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB6825
R13	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025
R14	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025
R15	Resistor, fixed composition, 2KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2025
R16	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025
TP1 thru TP3	Test Point, AMP 60167-1
U1	Wideband Amplifier, Plessey SL 550
U2	Amplifier, μA741
XU1	Socket, Augat 516AG11D

6-7 A8, DISTRIBUTION AMPLIFIER

Reference Designation	Description
A1	Printed Circuit Board Assembly, Distribution Amplifier, Microdyne 101-476
FL1	Filtercon, Erie 1203-050
FL2	Filtercon, Erie 1203-050

6-7.1 A8A1, PRINTED CIRCUIT BOARD ASSEMBLY, DISTRIBUTION AMPLIFIER

Reference Designation	Description
C1	Capacitor, ceramic, 110 pF ±5%, 100V, Erie 8121-100-COG-111J
C2	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C3	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C4	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C
C5	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C6	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C7	Capacitor, ceramic, 3 pF ±0.1 pF, 100V, Erie 8101-100-COG-309B
C8	Capacitor, ceramic, 15 pF ±5%, 100V, Erie 8111-100-COG-150J

Replaceable Parts List - A8A1, Printed Circuit Board Assembly, Distribution Amplifier, continued

Reference Designation	Description
C9 thru C13	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C14	Capacitor, ceramic, 5.1pF ±0.25 pF, 100V, Erie 8101-100-COG-519, nominal value
C15	Capacitor, variable, 0.8-8.5 pF, Voltronics TP-9G
C16	Capacitor, ceramic, 5.1 pF ±0.25 pF, 100V, Erie 8101-100-COG-519C
C17	Capacitor, ceramic, 110 pF ±5%, 100V, Erie 8121-100-COG-111J
C18	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C19	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C20	Capacitor, ceramic, 2.4 pF ±0.1 pF, 100V, Erie 8101-100-COG-249B, nominval value
C21	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C22	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C23	Capacitor, ceramic, 10 pF ±5%, 100V, Erie 8101-100-COG-100J, nominal value
C24	Capacitor, variable, 0.8-8.5 pF, Voltronics TP-9G
C25	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C26	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
C27	Capacitor, ceramic, 10 pF ±5%, 100V, Erie 8101-100-COG-100J, nominal value
C28	Capacitor, variable, 0.8-8.5 pF, Voltronics TP-9G
C29	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 811-100-X5R-102M
C30	Capacitor, ceramic, 10 pF ±5%, 100V, Erie 8101-100-COG-100J
C31	Capacitor, ceramic, 0.001 μF ±20%, 100V, Erie 8111-100-X5R-102M
E1 thru E8	Termination, AMP 61067-1
J1 thru J5	Connector, Sealectro UG-1619/U
L1	Inductor, Microdyne 201-900
L2	Inductor, Microdyne 201-900
Q1	Transistor, npn, RCA 2N5179
Q2	Transistor, npn, RCA 2N5179
Q3	Transistor, npn, Fairchild MT-1061A

Replaceable Parts List - A8A1, Printed Circuit Board Assembly, Distribution Amplifier, continued

Reference Designation	Description
R1	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R2	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R3	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R4	Resistor, fixed composition, 470Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB4715
R5	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R6	Resistor, fixed composition, 100Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB1015
R7	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R8	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R9	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R10	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025
R11	Resistor, fixed composition, 510Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5115
R12	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R13	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R14	Resistor, fixed composition, 910Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB9115
R15 thru R17	Resistor, fixed composition, 510Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5115
R18	Resistor, fixed composition, 1.5KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1525, nominal value
R19	Resistor, fixed composition, 2.2KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2225
R20	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R21	Resistor, fixed composition, 2.2KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB2225
R22	Resistor, fixed composition, 300Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB3015
R23	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5105
R24	Resistor, fixed composition, 1KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1025, nominal value
R25	Resistor, fixed composition, 51Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB5115
R26	Resistor, fixed composition, 750Ω ±5%, $\frac{1}{4}$w, Allen Bradley CB7515
R27	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R28	Resistor, fixed composition, 4.3KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB4325
R29	Resistor, fixed composition, 1.5KΩ ±5%, $\frac{1}{4}$w, Allen Bradley CB1525, nominal value
T1	Transformer, Microdyne 201-901
U1	Integrated Circuit, RCA CA3049

SECTION VII
MAINTENANCE DIAGRAMS

7-1 INTRODUCTION

This section of the manual contains the schematic-wiring diagrams for the 1115-VT(W)(70) RF Tuner. Unless otherwise specified, the following information applies to each schematic diagram:

a. Capacitor values greater than 1.0 are in picofarads.

b. Capacitor values less than 1.0 are in microfarads.

c. Inductor values are in microhenrys.

d. Resistor values are in ohms: k = x 1000; m = x 1,000,000.

e. * denotes selected value.

f. -⊂⊃- ferrite bead.

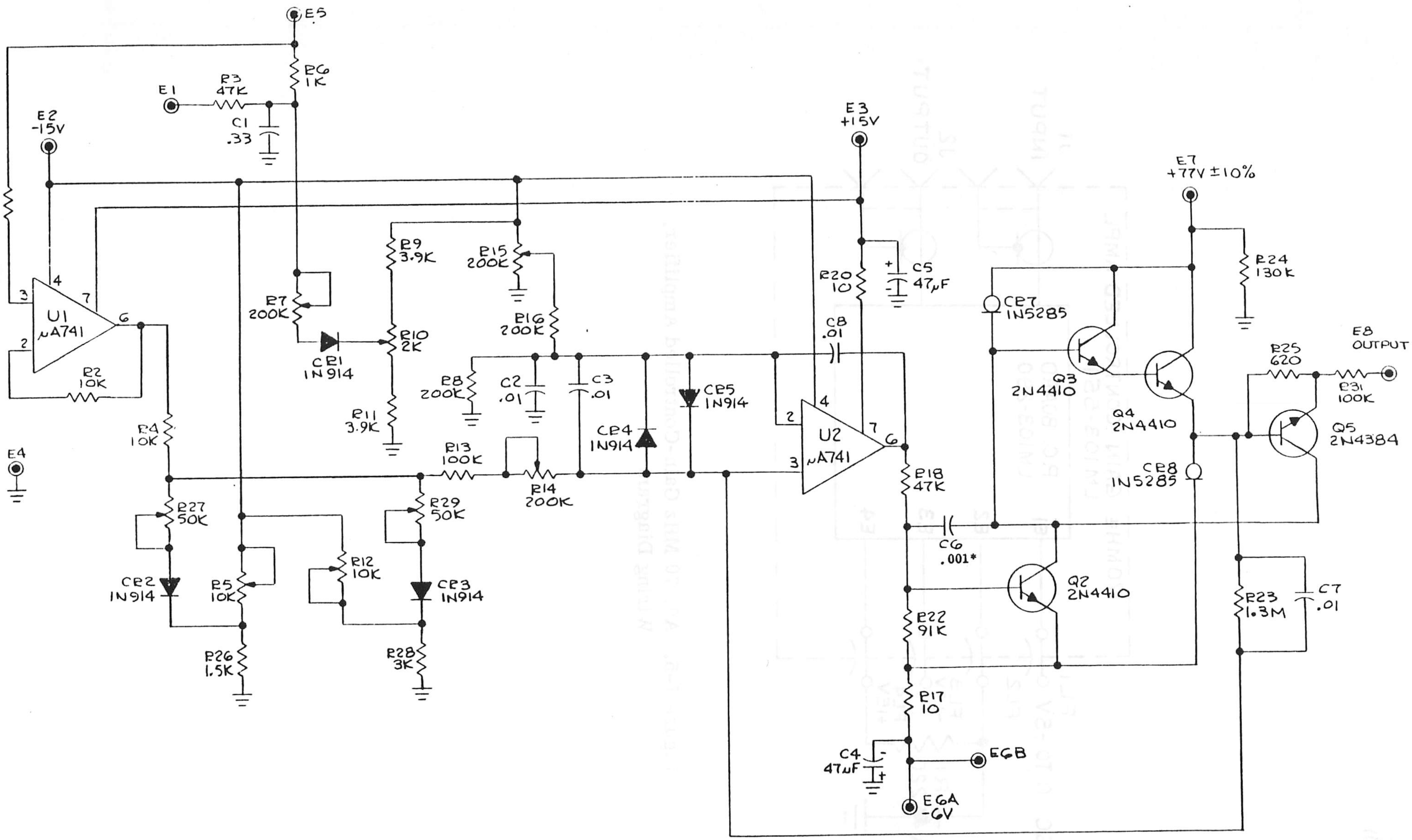


Figure 7-4. UHF DC Control Board, Schematic Diagram

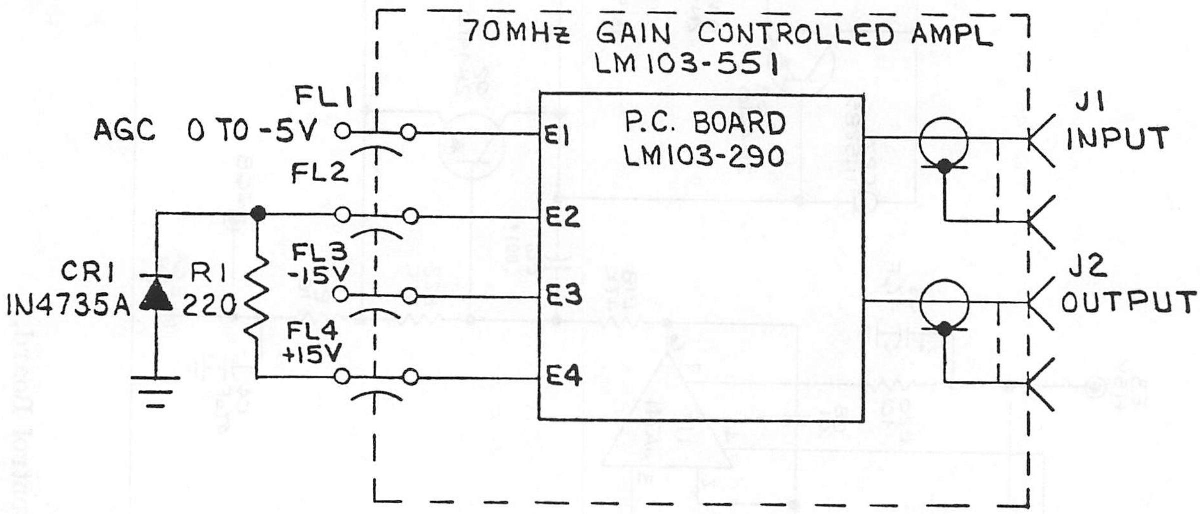


Figure 7-5. A6, 70 MHz Gain-Controlled Amplifier, Wiring Diagram

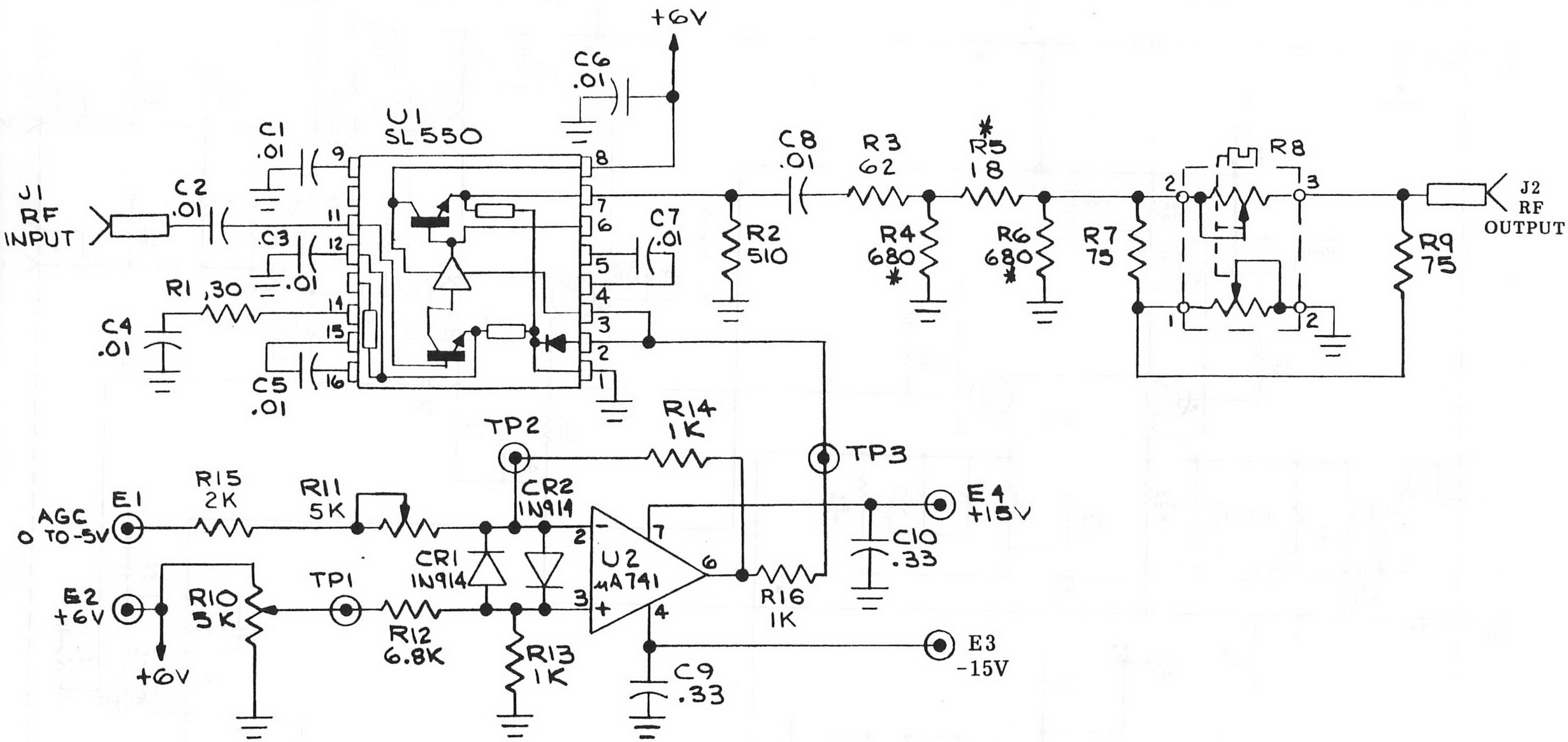


Figure 7-6. A6A1, 70 MHz Gain Controlled Amplifier, Schematic Diagram (203-585)

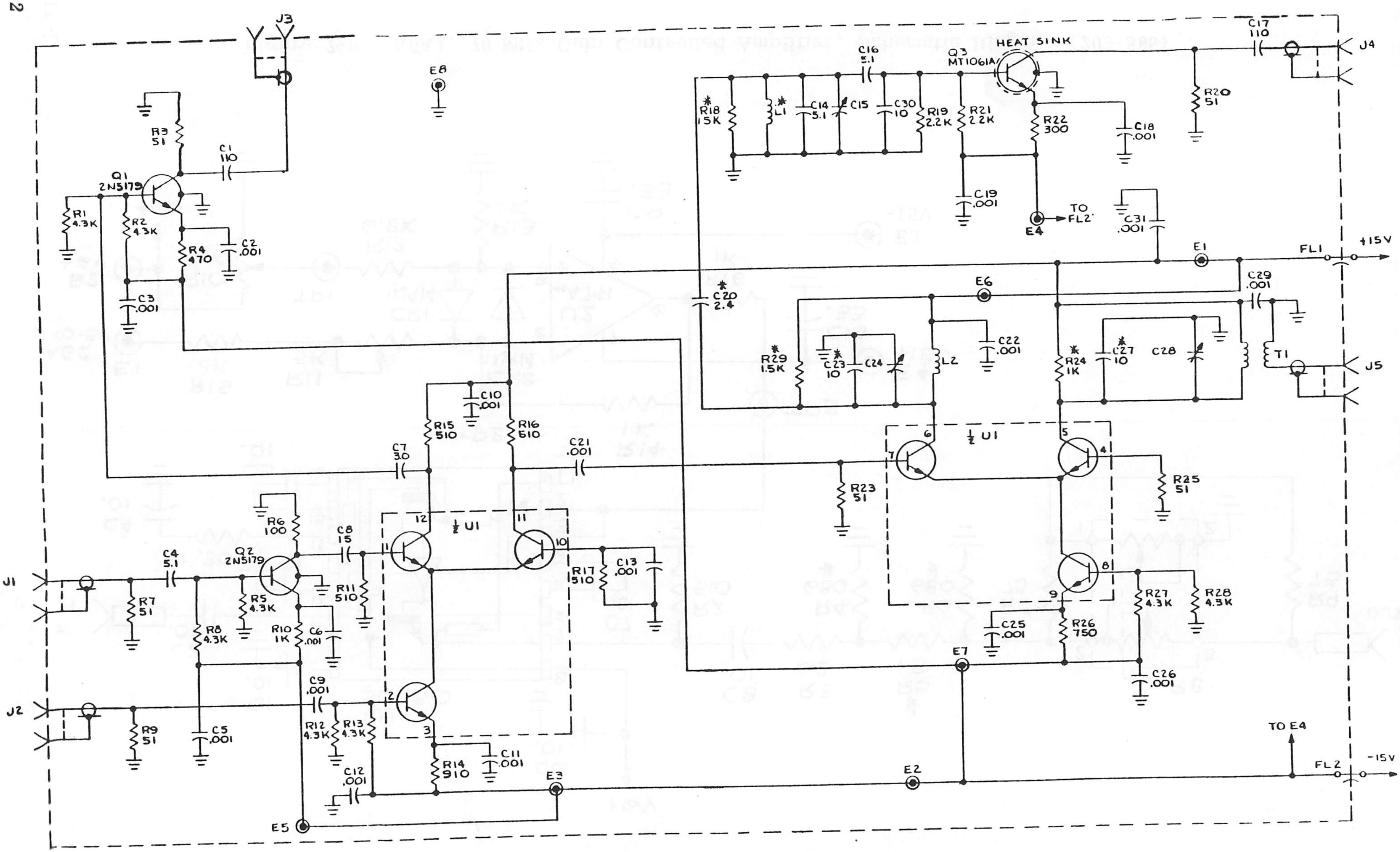


Figure 7-7. A8, Distribution Amplifier, Schematic Diagram

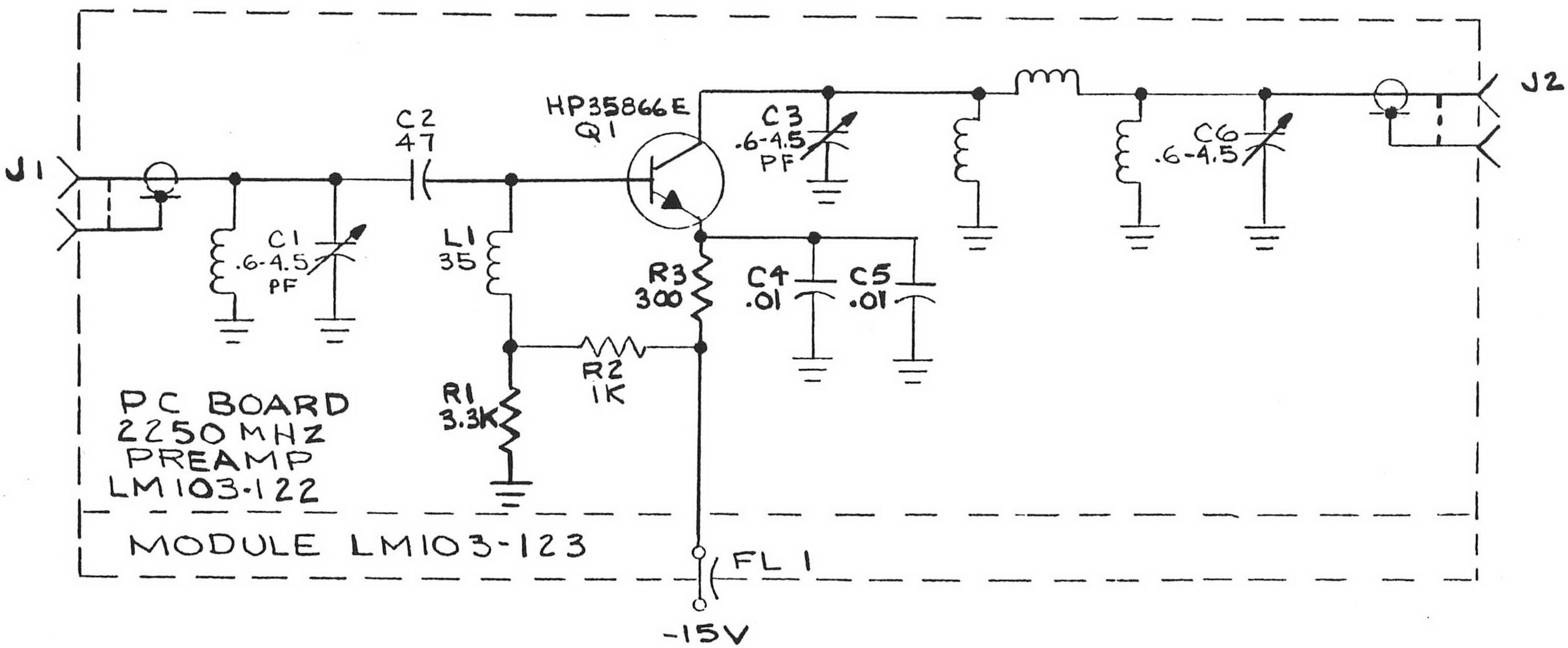


Figure 7-2. A1, RF Preamplifier, Schematic Diagram