PART 1
G175K00000-1 AND G175K00000-2 RECEIVERS

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PART 1

SECTION I

GENERAL DESCRIPTION

1-1. GENERAL

The G175K00000-1 and G175K00000-2 Receivers provide reception, amplification, and detection of AM, FM, CW and pulse signals in the 10-mc to 4-gc frequency range. This band of frequencies is covered by seven optional RF tuning heads. The G175K00000-1 Receiver is designed to accommodate RF tuners in the 10-mc to 1-gc frequency range. In addition, one of two optional wideband IF amplifiers having bandwidths of 4 mc centered at 21.4 mc and 10 mc centered at 60 mc may be included in the receiver. The G175K00000-2 Receiver is designed to accept RF tuning heads covering the 1-gc to 4-gc frequency range and accommodate a third optional wideband IF amplifier having a 160-mc center frequency and a 10-mc bandwidth. The G175K00000-2 Receiver also differs from the G175K00000-1 in that it utilizes a type 7868 AGC amplifier module in lieu of the type 7865. A type 79684 IF coupler (A113) is also used in the G175K00000-2 whereas a type 79207 IF coupler is used in the G175K00000-1. A pair of single-pole, double-throw coaxial relays used on the G175K00000-1 Receiver to route the local oscillator output signals to the rear apron are not used on the G175K00000-2 Receiver. Local oscillator outputs from the latter unit are fed directly to rear-apron connectors.

Basic G175K00000-1 and G175K00000-2 Receivers contain an IF coupler, an IF filter/switching module, a 300-kc bandwidth IF amplifier, a spectrum display unit and four plug-in modules: an audio amplifier, a video amplifier, a COR (carrier operated relay) module, and an AGC amplifier module. A pulse-AGC module is also included and is screw-mounted to the main chassis. Functional and electrical descriptions of the spectrum display unit, the IF filter/switching module and the 300-kc bandwidth IF amplifier are presented in Parts 2 through 4 of this manual, respectively. The 4-mc bandwidth IF amplifier is described in Part 5. A complete description of the 60-mc center frequency, 10-mc bandwidth IF amplifier is presented in Part 6. The 160-mc center frequency, 10-mc bandwidth IF amplifier is described in Part 7.

The design of the IF filter/switching module is such that crystal filters can be installed to provide additional narrow IF bandwidths of 10, 20, 40, or 75 kc. The desired bandwidth can be selected by a front-panel switch.

The internal spectrum display unit has selectable sweep widths of 4 mc, 300 kc, 100 kc, 50 kc, and 25 kc, and a resolution (using the 25 kc sweep width) that results in the display of two signals with at least a 6-db valley between them, when they are only 2.5 kc apart.

A BFO (beat frequency oscillator) included in the 300-kc bandwidth IF amplifier is activated when the CW mode is selected.

Signal outputs from the receivers include an audio output, a video output, an IF output (from the 300-kc bandwidth IF amplifier), a local oscillator output from each tuner, and various tuner function outputs. These latter outputs can be used to provide remote indications of the band in use, as well as the position of the tuning dial. Additional outputs provide remote indications of the operating mode and the IF bandwidth in use.

The COR circuit and its associated relay provide one pair of normally-closed contacts and one pair of normally-open contacts all of which appear at pins on a rear apron connector. An internal power supply consisting of various main chassis components provides the operating voltages.

1-2. EQUIPMENT SUPPLIED

QUANTITY	ITEM	PART NUMBER
1	Receiver	G175K00000-1
1	Receiver	G175K00000-2

1-3. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY	ITEM	PART NUMBER	RECEIVER
4	Connector	UG-21D/U	G175K00000-1
2	Connector	UG-21D/U	G175K00000-2
1	Connector	DS07-19S	Both
1	Connector	DS07-12S	Both
1	Connector	DS07-07S	Both
1	Connector	UG-88/U	Both

1-4. ELECTRICAL SPECIFICATIONS

Types of Reception:

G175K00000-1	AM, FM, CW, and Pulse
G175K00000-2	AM, FM, CW, and Pulse
Audio Output Power	100 milliwatts, minimum, into 150-ohm, unbalanced load
Audio Amplifier Response	Within 3 db from 30 cps to 25 kc
Harmonic Distortion	5%, maximum, from 50 cps to 10 kc at rated output
Video Output	AM: 3 volts, rms, into 93-ohm load, all IF bandwidths FM: 10-kc bandwidth, 1.5 volts, rms, into 93 ohm load; all other bandwidths, 2.0 volts, rms, into 93 ohm load
Video Amplifier Response	Within 3 db from 20 cps to 5 mc
Harmonic Distortion	5%, maximum, at rated output
Carrier Operated Relay:	
Sensitivity	3 db below appropriate sensitivity level for RF tuner and IF bandwidth in use
Range	Adjustable to operate over an input signal level range of 0.7 μv to 1 mv
Release Time	3, 5, 7, or 10 seconds, selected by rear-apron switch
Squelch Control	35 db of muting, minimum
Input Power Required	107.5-123 vac, 50-420 cps; 21.0-29.0 vdc
Edgelight Power Required	0 to 28 vdc
Power Consumption	25 watts, approximately

1-5. MECHANICAL SPECIFICATIONS

Weight	29.5 lbs. with 2 RF tuners and 2 IF amplifiers installed
Overall Dimensions	4.0 inches high, 18.18 inches wide, and 17.9 inches deep
Operating Temperature Limits	0° to 50°C
Altitude Limits:	
Operating	15,000 feet
Non-Operating	50,000 feet
Mounting	Shock mounted tray

SECTION II

PREPARATION FOR USE AND RESHIPMENT

2-1. GENERAL, UNPACKING AND INSPECTION

The G175K00000-1 and G175K00000-2 Receivers, and their selected subassemblies, have been thoroughly inspected and factory adjusted for optimum performance prior to shipment. The receivers are, therefore, ready for use upon receipt. As soon as the equipment has been uncrated, check the contents against the packing slip and inspect the items for possible damage incurred during shipment. Visually inspect all exterior surfaces for dents and scratches. Remove the dust covers from the equipment and visually inspect the internal components for apparent damage. Check the internal coaxial cables for loose connections.

2-2. INSTALLATION

The G175K Receivers are designed for rack mounting in a shock mounted tray. Critical dimensions of a typical receiver are shown in Figure 2-3. To install, slide the receiver partially into the tray, then attach the interconnecting cables in accordance with Figure 2-2. Slide the receiver completely into the rack until the stops are engaged. Press the release button on the top of each handle and pull the top of the handle outward. Engage the hook-shaped lower portion of the handle in the fittings provided by the slide tracks, and return the upper portion to the locked position.

2-3. INSTALLATION OF SUBASSEMBLIES

The procedure for installing the optional RF tuning heads, the spectrum display unit, and IF amplifiers into the main chassis is given in those parts of this manual applicable to the particular module.

2-4. CARRIER OPERATED RELAY DROPOUT DELAY SELECTION

A carrier operated relay circuit in the receiver provides a visible indication when a signal is being received as well as the closure of a set of normally-open contacts which are accessible at rear-apron connector J102, pins 1 and 2. The COR DELAY DISABLE indicator lamp on the front panel remains illuminated during the presence of a carrier, and for a preset delay time after the signal disappears. This delay period can be set by the COR DELAY switch on the rear apron. The switch is numbered 3, 5, 7, and 10 corresponding to delays of 3, 5, 7, and 10 seconds.

2-5. VIDEO SIGNAL AMPLITUDE ADJUSTMENT

The desired video output signal amplitude must be set before the receiver is installed in its mounting position. The VIDEO GAIN SET potentiometer mounted on the rear apron provides a means of setting the amplitude. This is a screwdriver adjusted potentiometer. The collar lock nut must be loosened before the control setting can be changed.

2-6. PREPARATION FOR RESHIPMENT

No special steps are necessary to prepare the receiver for reshipment. The units are shipped with internal components in place.

G175K RECEIVER, CONNECTOR LOCATIONS

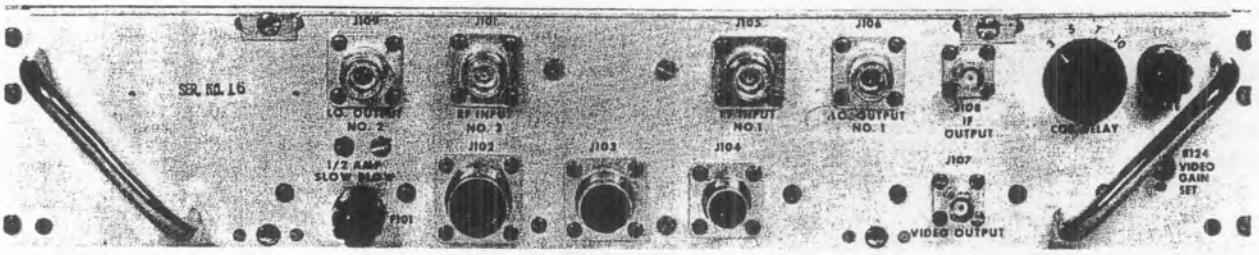


Figure 2-1

G175K RECEIVER, INTERCONNECTION DIAGRAM

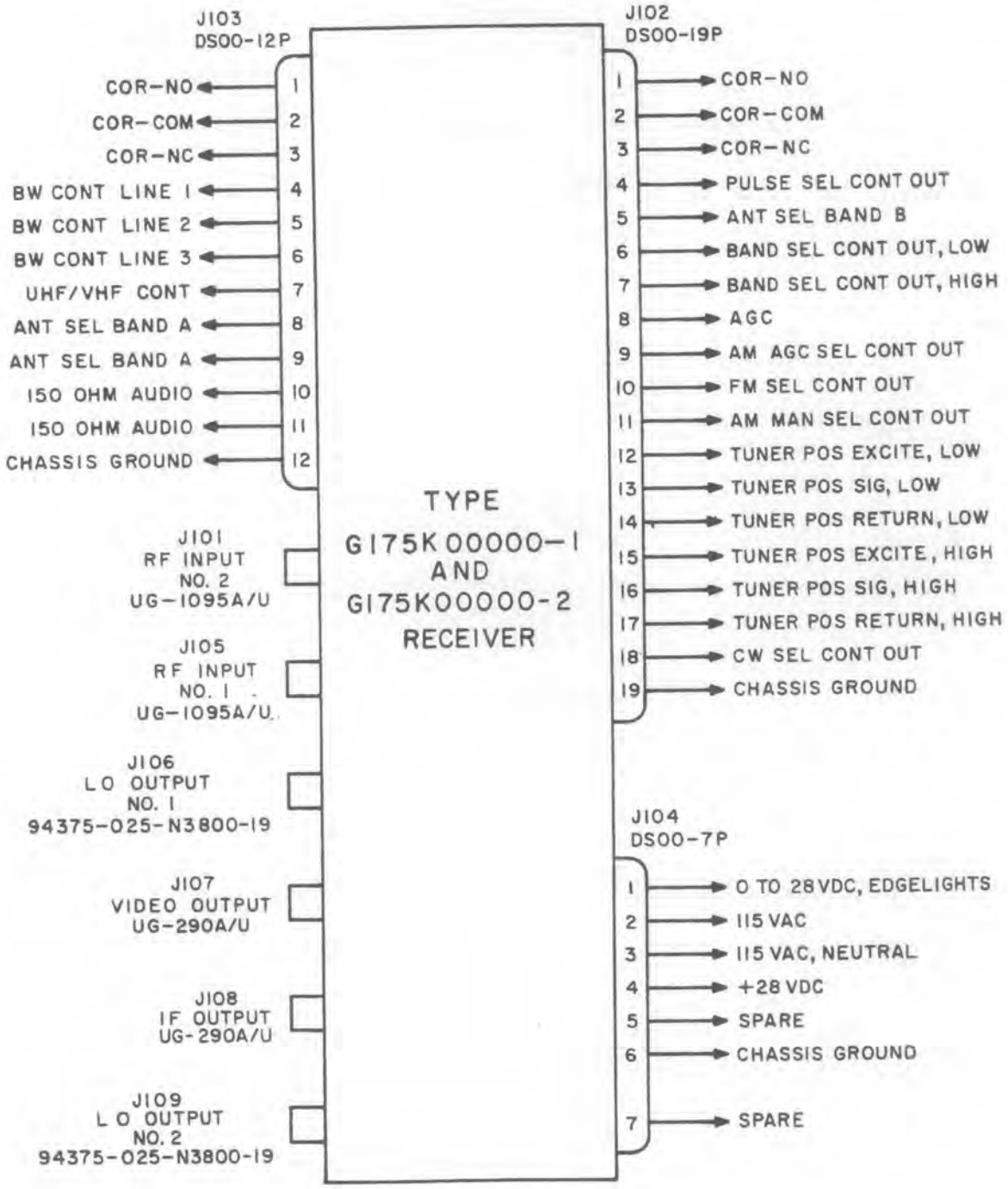
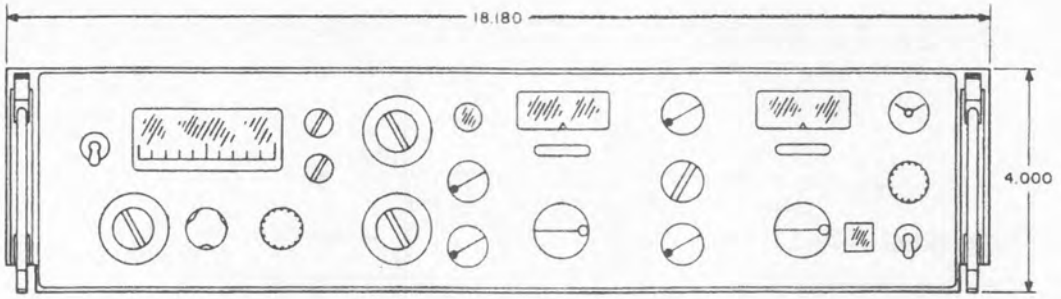
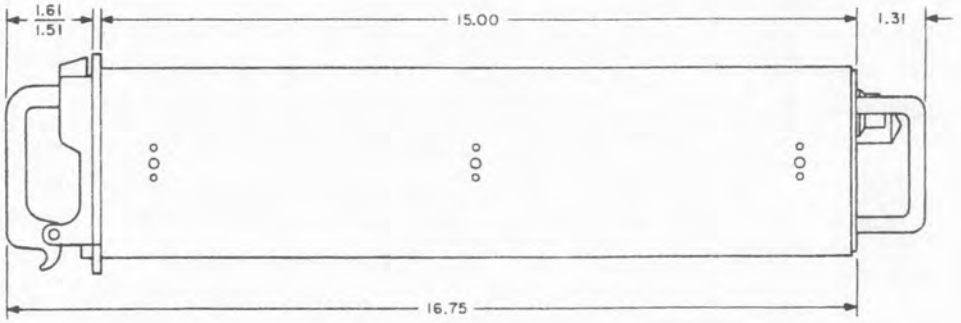


Figure 2-2

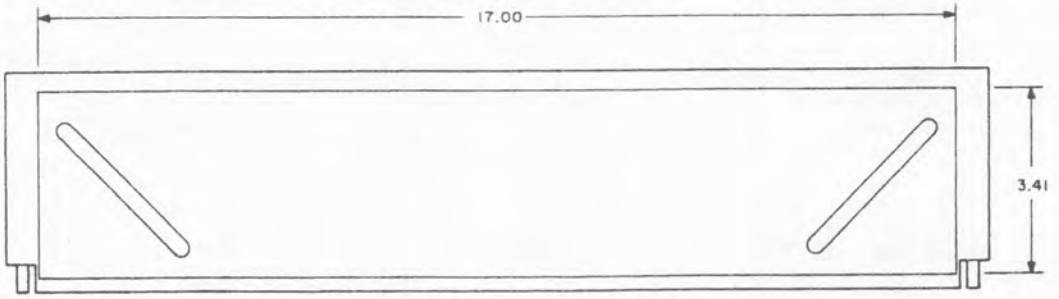
G175K RECEIVER, CRITICAL DIMENSIONS



FRONT VIEW



SIDE VIEW



REAR VIEW

Figure 2-3

SECTION III
OPERATION

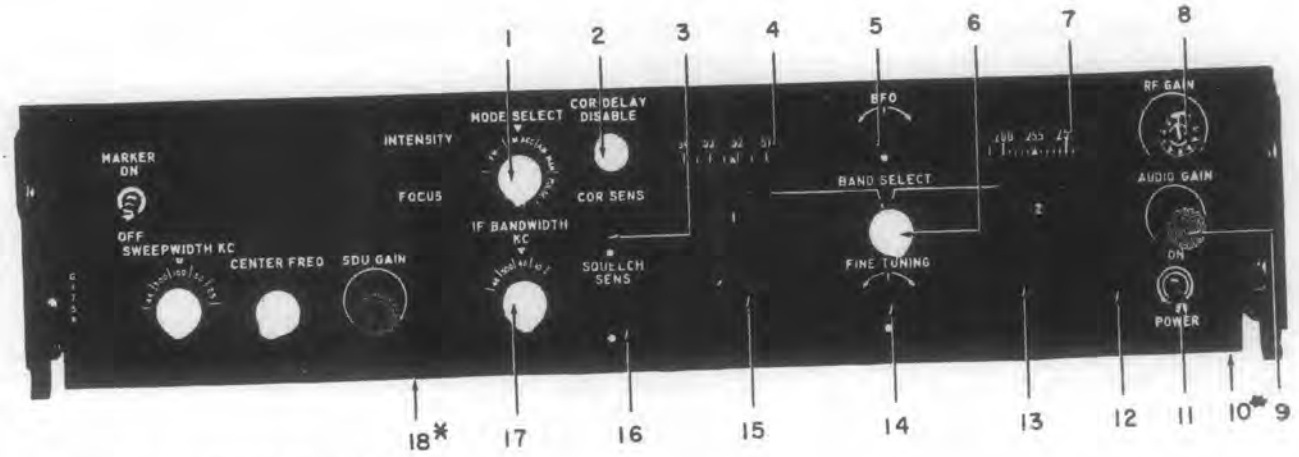
3-1. GENERAL

The G175K00000-1 and G175K00000-2 Receivers are single-channel, superheterodyne units designed for the reception of AM, FM, CW, and pulse modulated signals. The frequency coverage provided by a particular unit is determined by seven optional, plug-in, RF tuning heads, two of which can be accommodated in the receiver at a time. The G175K00000-1 Receiver can be operated with RF tuning heads which cover the 10-mc to 1-gc frequency range, and with IF bandwidths as wide as 10 mc. The frequency coverage of RF tuning heads which are normally installed only in the G175K00000-2 Receiver covers the 1-gc to 4-gc range. The optional wideband IF amplifier available for use with these tuning heads has a bandwidth of 10 mc and operates at a center frequency of 160 mc. Various front-panel controls permit selection of the mode of operation (either CW, Pulse, AM MAN, AM AGC, or FM), the sensitivity of the COR circuit, and the amplitude of the audio and video output signals. The RF/IF gain is also adjusted by means of a front-panel mounted, 10-turn indicating potentiometer. An adjustable audio squelch is incorporated in the receivers to disable the audio in the absence of an RF carrier. A beat frequency oscillator (BFO) is provided for CW operation while using IF bandwidths of 300 kc and below. When the AM MAN or CW modes are selected, the receiver gain must be controlled by the front panel RF GAIN potentiometer. Remote indications of the operating mode, IF bandwidth in use, and RF band in use, are provided at rear-apron connectors. Operation of the spectrum display unit and the controls associated with this portion of the receiver is given in Part 2 of this manual.

3-2. CONTROLS AND INDICATORS

All the controls and indicators for the G175K00000-1 and G175K00000-2 Receivers, other than the COR DELAY switch and the VIDEO GAIN SET control, are mounted on the front panel. The name and function of each is listed in Figure 3-2. These controls and indicators are shown in Figure 3-1.

G175K RECEIVER FRONT PANEL CONTROLS



* MOUNTED ON REAR APRON

Figure 3-1

G175K RECEIVER CONTROLS AND INDICATORS

FIGURE INDEX	CONTROL OR INDICATOR	FUNCTION
1	MODE SELECT Switch	Five-position rotary switch selects FM, AM MAN, AM AGC, CW, or PULSE mode of operation.
2	COR DELAY DISABLE Indicator/ Switch	Illuminates white when incoming signal amplitude is sufficient to activate COR. Extinguishes when depressed; defeats COR delay when depressed; releases COR relay.
3	COR SENS Control	Adjusts sensitivity of COR circuit; clockwise rotation increases sensitivity and allows COR to respond to lower amplitude signals.
4	Tuner Group 1 Tape Dial	Indicates tuned frequency of RF head in Tuner Group 1 position.
5	BFO Control	Changes total pitch of audio beat note when receiving CW signals.
6	BAND SELECT Switch	Two-position rotary switch used to select RF tuning head in either Tuner Group 1 or Tuner Group 2 positions.
7	Tuner Group 2 Tape Dial	Indicates tuned frequency of RF head in Tuner Group 2 position.
8	RF GAIN Control	Ten-turn indicating potentiometer used to simultaneously adjust IF and RF gain when MODE SELECT switch is set to AM MAN or CW. Control has no effect if MODE SELECT is set to AM AGC, FM, or PULSE.
9	AUDIO GAIN Control	Adjusts amplitude of audio output signal.
10	COR DELAY Control	Four-position rotary switch that sets COR dropout delay time; mounted on receiver rear apron.
11	POWER Switch	Single-pole, single-throw toggle switch that applies ac power to receiver when placed in ON position; does not operate edgelights.
12	Power Indicator Lamp	Illuminates green when power is applied to receiver.
13	Tuner Group 2 Tuning Control	Selects frequencies of RF tuning head installed in this position.
14	FINE TUNING Control	Makes small changes in local oscillator frequency for precise tuning.
15	Tuner Group 1 Tuning Control	Selects frequencies of RF tuning head installed in this position.
16	SQUELCH SENS Control	Used to mute audio output signal in the absence of a carrier.
17	IF BANDWIDTH KC Switch	Four-position rotary switch that selects desired IF bandwidth; selects 10-mc, 4-mc, 75-kc, 40-kc, 20-kc, or 10-kc bandwidth (depending on IF strip and crystal filters installed) when set to 10K, 4K, 300, 75, 40, 20, or 10 positions.
18	VIDEO GAIN SET Control	Adjust amplitude of video output signals; mounted on receiver rear apron.

Figure 3-2

3-3. SPECTRUM DISPLAY UNIT CONTROLS AND INDICATORS

An illustration and description of the controls and indicators associated with the spectrum display unit are given in Part 2, Section III of this manual.

3-4. OPERATING PROCEDURES

Prior to placing the equipment in operation, it may be necessary to install one or more of the optional plug-in subassemblies in the main chassis. Installation procedures for the particular subassembly are given in the respective parts of this manual. The operating procedures given below assume the presence of two RF tuning heads, a 4-mc bandwidth IF amplifier, and crystal filters installed in the IF filter/switching module to provide IF bandwidths of 40 kc and 10 kc. To place the receiver in operation perform the following steps:

a. Place POWER switch in ON position. Verify that green pilot lamp is illuminated.

b. Set MODE SELECT to FM, AM AGC, AM MAN, PULSE or CW according to type of reception desired.

c. Set IF BANDWIDTH KC switch to bandwidth appropriate for type of signal being received.

d. Using BAND SELECT switch, select BAND 1 or BAND 2 as desired.

e. Rotate SQUELCH SENS control fully counterclockwise.

f. Use appropriate tuning control to locate portion of the band where no signals are present.

g. Adjust AUDIO GAIN control until background noise is clearly audible.

h. Rotate SQUELCH SENS control clockwise until background noise just disappears.

i. Press and hold COR DELAY DISABLE pushbutton and adjust COR SENS control until indicator lamp is extinguished.

j. With the SDU SWEEPWIDTH KC switch set to 25 kilocycles, turn MARKER switch to ON. A marker pip will appear.

k. Adjust the spectrum display unit CENTER FREQ control until the marker pip is positioned at the center of the display screen's base line.

l. Turn the spectrum display unit MARKER switch OFF.

m. Set the spectrum display unit SWEEPWIDTH KC control to a position corresponding to a width at least as great as the bandwidth of the signal to be received. This will insure displaying the entire bandwidth of the signal when first tuned in on the receiver. Once a signal has been properly tuned in, the SWEEPWIDTH KC control may be set to a narrower position as required.

n. Tune the receiver to the desired signal.

o. Adjust the SDU GAIN control until the signal display reaches the desired vertical height on the screen.

p. The choice of either automatic gain control or manual gain control needs to be made only during reception of amplitude modulated signals. Operation with automatic gain control is recommended whenever receiving conditions permit. However, in the presence of strong interfering signals, manual gain control may be necessary. To obtain this, move the MODE SELECT switch to the AM MAN position.

SECTION IV
THEORY OF OPERATION

4-1. GENERAL

The G175K00000-1 Receiver is depicted in the functional block diagram, FO-1. This block diagram depicts a basic G175K00000-1 with no optional plug-in subassemblies installed. It is also applicable to the G175K00000-2 Receiver except that the two relays associated with the LO output signals are not used. Block diagrams for the RF tuning heads and the three wideband IF amplifiers are included in Parts 5 through 14 of this manual. Reference should also be made to the respective parts for functional and electrical information. Detailed functional and electrical descriptions of the spectrum display unit, the IF filter/switching module, and the 300-kc bandwidth IF amplifier are presented in Parts 2 through 4 of this manual, respectively. Complete information, including schematic diagrams, for the remaining subassemblies normally installed on the main chassis of the receivers is presented in this part of the manual.

4-2. FUNCTIONAL DESCRIPTION

The functional description presented in the following paragraphs covers a typical G175K00000-1 Receiver containing a Band A (30-90 mc) RF tuner, a Band B (60-260 mc) RF tuner, a 4-mc bandwidth IF amplifier, and a 300-kc bandwidth IF amplifier. Crystal filters installed in the IF filter/switching module are assumed to have bandwidths of 10 kc and 40 kc.

Incoming RF signals to the Band A tuner (see FO-2, Part 8) are amplified by V1 and V2 which are connected in a cascode configuration. The amplified output is fed through the interstage coupling network to the mixer, V3. The local oscillator in the tuner, A2V1, operates 21.4-mc higher than the incoming RF signal. It supplies three output signals: one is fed to the rear apron LO OUTPUT NO. 2 jack J109; another output is coupled to LO isolation amplifier Q1 which feeds it to LO OUTPUT NO. 1 jack J106; the third output is coupled to the mixer, V3. The 21.4-mc difference frequency produced by the mixing action, is taken from V3 and fed through output emitter follower, A1Q1, and the IF output jack on the tuner, to the input of the IF coupler subassembly, A113.

Incoming signals to the Band B tuner (FO-2, Part 9) are fed to a cascode circuit consisting of RF amplifiers V1 and V2. Amplified output signals from V2 are fed to the input of the mixer, V3, through the interstage coupling network. The local oscillator in this tuner also operates 21.4 mc above the incoming carrier. It supplies output signals to the mixer, the LO OUTPUT NO. 2 jack, and through isolation transistor Q1 to the LO OUTPUT NO. 1 jack. Output emitter follower A1Q1 couples the 21.4-mc difference frequency from V3 to the IF output jack and consequently to the IF coupler.

The IF coupler subassembly is an impedance matching device designed to supply four IF output signals from a single input; namely, the 21.4-mc signal from the RF tuner in use. One of the four outputs is fed to the input of the spectrum display unit while a second is used as the input to the IF filter/switching module. A third output appears at jack A113J6. The fourth output is fed to the input of the 4-mc bandwidth IF amplifier.

The IF filter/switching module contains three paths through which the signal from the IF coupler can be conducted to subsequent stages in the unit. Two of the paths are similar (see FO-1, Part 1) each containing an emitter follower, crystal filter, and IF amplifier. The third path consists of an emitter follower, a 300-kc IF amplifier, and a conventional LC network having a 300-kc bandpass. Two of the paths are disabled by the IF BANDWIDTH KC switch while circuits in the third path are activated, depending on whether this switch is placed in the 10 KC, 40 KC, or 300 KC position. As shown on the block diagram, crystal filters having 10-kc, 20-kc, or 40-kc bandwidths and 40-kc or 75-kc bandwidths may be placed in the first two signal paths respectively. Placing this switch in the 4K position completely disables the IF filter/switching module. The signal out of the path in operation is fed through the 300-kc output network to the input of the 300-kc bandwidth IF amplifier, A106.

Incoming signals to this IF strip are amplified by stages A1Q1, A1Q3, and A1Q5 (see FO-1, Part 1). Transistors A1Q2 and A1Q4 function as Q-multipliers and operate in conjunction with the first and second IF amplifiers.

respectively, to improve the IF response shape. The output from the third IF amplifier is applied to the AM detector and FM limiters. From the detector, the signal is fed through cascaded emitter follower stages made up of A1Q6 and A1Q7 to section S103C-W of the IF BANDWIDTH KC switch. The output from the symmetrical limiters is fed to an FM discriminator circuit which includes diodes A2CR3 and A2CR4. The demodulated output from the discriminator is coupled through cascaded complementary symmetry emitter followers, A2Q6 through A2Q9, to section S103C-X of the IF BANDWIDTH KC switch. The arm of this switch section selects either the narrowband or wideband FM video signal and applies it to the FM position on section S104A-R of the MODE SELECT switch.

The beat frequency oscillator, A2Q2, located in the 300-kc IF amplifier, is activated when the MODE SELECT switch is placed in the CW position. The tone of the CW-audio beat note signal can be changed by means of the BFO control.

The 21.4-mc input signal to the 4-mc bandwidth IF strip (see FO-1, Part 5) is fed to A1Q1, the first of four IF amplifiers. The interstage networks located between the amplifier stages are stagger tuned to establish the 4-mc bandwidth. The tuned circuits in the collectors of A1Q3 and A1Q4 affect the center of the response while the first and second tuned circuits affect the high and low sides, respectively. The amplified output from A1Q4 is simultaneously fed to the AM detector, FM limiters, and pre-detection output jack. AM detector diode A1CR3 demodulates the signal and applies it to a cascaded emitter follower circuit consisting of transistors A1Q5 and A1Q6. The AM video signal is then fed to section S103C-W of the IF BANDWIDTH KC switch.

Four FM limiter stages are used to remove amplitude variations from the incoming signal before it is applied to the FM discriminator consisting of diodes A2CR1 and A2CR2. The demodulated FM signal is then coupled through cascaded complementary symmetry emitter followers A2Q5 through A2Q8, to section S103C-X of the IF BANDWIDTH KC switch.

Selection of one of the narrow bandwidths or the wide bandwidth by means of S103 results in the application of the respective video signal to the input of the AGC and COR amplifiers. The AM video signal voltage is also fed to the squelch amplifier on the audio module. The video and consequently the audio amplifiers receive their inputs from section S104A-R of the MODE SELECT switch and the AUDIO GAIN and VIDEO GAIN SET controls.

The AGC amplifier (see FO-1, Part 1) supplies gain control voltage for both the IF and RF amplifiers when the MODE SELECT switch is placed in the AM AGC or FM positions. IF input signals to the module are taken from the arm of switch S103C-W and fed to the input stage, Q1. This stage, a voltage amplifier, drives AGC regulator Q2. The latter transistor supplies three output signals. One output is fed directly to RF AGC regulator Q3. A second output is used as the gain control voltage for the IF amplifiers when the AM AGC or FM modes are selected. The third output from Q2 is fed to emitter follower Q4 which in turn supplies the positive AGC monitor output appearing at rear-apron connector J102, pin 8. The delayed AGC voltage for the tuners is taken from Q3 and fed directly to the RF stages. Gain control of the receiver when the AM MAN or CW modes are selected is by means of the RF GAIN potentiometer on the front panel. It operates in conjunction with transistors Q2 through Q4 which function as they do during AGC action.

Input signals to the video module (see FO-1, Part 1) are amplified by transistors Q1 and Q2 which drive complementary symmetry emitter followers Q3 and Q4. A portion of the video output signal is fed through emitter follower Q5 to the audio gain control.

Front-panel SQUELCH SENS potentiometer R117 sets the level to which the incoming video signal must rise before being conducted to the audio amplifier stages. The squelch circuit located on the audio amplifier module consists of transistors Q1 and Q2. Transistors Q3 and Q4, operating in a complementary voltage amplifier configuration, drive complementary symmetry emitter followers Q5 and Q6 which provide the 150-ohm audio output.

The COR amplifier operates relay K103 when a signal of sufficient amplitude is received. Incoming signals are supplied by the AM detectors in the narrowband and wideband IF strips. Amplification of the incoming signal is performed by voltage amplifiers Q1 and Q2 which drive Q3 and Q4. These latter stages operate as a combination switch, relay driver, and time delay network. The COR SENS control sets the level that the incoming signal must reach to operate relay K103. A delay period for the relay that prevents it from becoming de-energized after the disappearance of the carrier is set by the COR DELAY switch mounted on the rear apron. The delay periods available are 3, 5, 7, and 10 seconds. Rapid release of the relay after the carrier has disappeared is accomplished by depressing the COR DELAY DISABLE switch on the front panel.

The power supply for the receiver, consisting of various main chassis components including power transformer T101, provides all the operating voltages. Power to operate the dial lamps and edgelights on both units and relays K101 and K102 on the G175K00000-1 must be supplied from an external source.

Outputs are provided on the rear apron for remote indications of the frequency band in use, the IF bandwidth in use, and the position of the tuning dial.

4-2. DETAILED THEORY

The following paragraphs present descriptions of the basic circuit sections of the receiver at the schematic diagram level. A thorough understanding of the signal flow discussion presented in paragraph 4-1 is recommended before proceeding further.

4-3. MAIN CHASSIS

The main chassis contains the supporting circuits required by the optional plug-in assemblies that comprise a complete receiver. FO-2 is the main chassis schematic diagram for the G175K00000-1 Receiver and FO-3 is the main chassis schematic diagram for the G175K00000-2 Receiver. The subassemblies mounted on the main chassis include the IF coupler (A113), the IF filter/switching module (A108), the 300-kc IF amplifier (A106), the audio module (A109), the AGC module (A111), the video module (A110), the COR module (A112) and the pulse AGC module, (A114). Various switching circuits on the main chassis are used to connect the components into various configurations such as FM, AM AGC, AM MAN, PULSE or CW modes of operation, and to select IF bandwidths from those available in the particular unit. In addition, these switching circuits provide external indications of the IF bandwidth and frequency band in use, and the position of the tuning dial. The power supply components are also mounted on the main chassis.

4-4. POWER SUPPLY

The power supply for the G175K00000-1 Receiver operates from 107.5 to 123 volts, 50 to 420 cps source. The path for the ac input is from pins 2 and 3 of jack J104, through low-pass filters FL102 and FL103, line fuse F101, and POWER switch S101, to the primary of power transformer T101. The power transformer has five secondary windings. One of these, 3-4-5, supplies the ac input to rectifier diodes CR101 and CR102 which are connected in a full-wave configuration to provide +175 vdc for the RF tuners. Filtering of the pulsating dc output is by means of dual electrolytic capacitor C101 and resistor R101. The ac output from winding 6-7-8 is rectified by diodes CR107 and CR108 before it is applied to series regulator transistor Q102. Zener diode CR111 is the fixed base reference element for Q102. Capacitor C103 filters the rectifier output while capacitor C107 prevents hum modulation on the base of Q102 from causing fluctuations in the output voltage. The regulated +24 volts supplied by this circuit is used to operate many of the semiconductor circuits within the receiver. A third winding 13-14-15, supplies ac input power to a pair of full-wave rectifiers. One rectifier circuit, consisting of diodes CR103 and CR104, supplies the input to series regulator Q101. The regulated +12 volt output from this stage is used to operate various semiconductor circuits. The second rectifier circuit, containing diodes CR105 and CR106, supplies a negative dc output that is regulated by Zener diode CR109 and filtered by capacitors C102, C104, and C114. This output is also utilized by the semiconductor circuits within the receiver. Winding 11-12 supplies filament voltage for the cathode ray tube in the spectrum display unit. The fifth winding, 9-10, supplies 6.3 vac for the power pilot lamp DS102 and for the filaments of the Nuvistors used in the RF tuners.

The G175K00000-2 Receiver power supply is quite similar to the circuit described in the preceeding paragraph except that the regulated -12V network has been modified to provide improvide regulation and filtering. This is done to insure proper operation of the 10-mc bandwidth IF amplifier and the Bands F and G tuners. Zener diode CR114 and capacitors C114, C115, and C116 perform the regulation and filtering functions. Resistor R121 is added to complete the second section of the filter network.

The G175K Receiver employs an edge light panel that operates from an externally supplied voltage to illuminate the panel marking. This operating voltage is connected through pin 1 of jack J104 and filtered by FL101 before it is applied to the edge lights.

Dial lights are mounted internally on each of the optional RF tuning heads. These dial lights operate from +28 vdc that is supplied from a source external to the receiver. This +28 vdc supply is connected to pin 4 of jack J104 and filtered by FL104. From the filter, the voltage is fed to the arm of section S102B-W of the BAND SELECT switch. This switch section in turn applies the voltage to the dial lights in the tuner selected. Regulation of this dial light supply voltage is by means of Zener diode CR113. A second path for the +28 vdc supply from FL104 is to the windings of main chassis relays K101 and K102 (G175K00000-1 only) through section S102A-W of the BAND SELECT switch. These relays connect the local oscillator output signals from the RF tuner in use to the appropriate output jacks on the rear apron.

4-5. IF COUPLER (Type 79207; G175K00000-1)

FO-4 is the schematic diagram for the IF coupler used on the G175K00000-1 Receiver; its reference designation prefix is A113. The 21.4-mc IF output signals from RF Tuner Group No. 1 and RF Tuner Group No. 2 are connected to the IF coupler through jacks J1 and J2, respectively. The input signal (depending on the tuner in use) is fed directly to output jack J5 and consequently to the input of the IF filter/switching module. Output jack J4 is used to feed the signal to the input of the wideband IF amplifier. Resistor R3 provides the proper impedance match. Resistors R1 and R2 form a voltage divider from which the IF input to the spectrum display unit is taken. This output is fed to jack J3. A second resistive voltage divider made up of R4 and R5 supplies an IF output signal at jack J6. The output from this connector is not conducted to subsequent stages in the receiver. It is an auxiliary IF output.

4-6. IF COUPLER (Type 79684; G175K00000-2)

The schematic diagram for this IF coupler is FO-5; its reference designation prefix is A113. The value of resistor R2 in this coupler is 330 ohms which results in an increased IF input signal to the spectrum display unit. Only two ferrite beads are included in the tuner no. 2 input line resulting in higher amplitude IF output signals from the Bands F and G tuners. The remaining circuitry in the coupler is identical to the coupler discussed in paragraph 4-5.

4-7. AUDIO AMPLIFIER

The schematic diagram for the audio amplifier is FO-6; the reference designation prefix for this module is A109. The module consists of a squelch circuit, voltage amplifier and complementary symmetry emitter follower.

The squelch circuit mutes the audio output during the absence of an incoming signal. Under these conditions transistor Q1 is reverse biased by a negative voltage on its base. This bias voltage is supplied by the front-panel SQUELCH SENS control. With Q1 cut off, the input signal from the video amplifier (mainly noise) is effectively shorted to ground through Q2 which is conducting to saturation. Rotation of the squelch sensitivity potentiometer in the clockwise direction decreases the reverse bias on Q1 and has the same affect as a positive incoming signal through R1; namely, causing Q1 to conduct thereby biasing Q2 out of saturation due to the voltage drop across load resistor R4. The audio input may then be conducted to the base of audio amplifier Q3. This stage is connected to Q4 in a complementary voltage amplifier configuration.

Transistors Q3 and Q4 provide the necessary voltage gain to drive complementary symmetry emitter followers Q5 and Q6. The latter two transistors are biased to operate Class B. Negative dc feedback to set the overall gain of the amplifier is taken at the junction of R14 and R15 and fed to the emitter of Q3 through R10. Silicon diodes CR5 and CR6 determine the idling currents of Q5 and Q6, and eliminate crossover distortion while preventing thermal runaway. Since the transistors and diodes are made of the same material, they exhibit the same temperature coefficient of voltage characteristics. A rise in temperature lowers the base-emitter voltage drop of the transistors, tending to make them conduct harder. However, the diode voltage drop decreases by the same amount so that the voltage applied to the bases also decreases, holding the collector current nearly constant. Resistors R14 and R15 are included in the emitter circuits of Q5 and Q6 to provide additional feedback with low input signal levels. These resistors eliminate distortion introduced by the difference between the voltage drops of CR5 and CR6 and the base-emitter junctions of Q5 and Q6. With little or no input signal the drop across the resistors is a few tenths of a volt. Large inputs would cause the drop to become excessive except that CR5 and CR6 become forward biased and limit the drop to approximately 0.6 volt. The low-impedance output of the complementary-symmetry emitter followers is matched

to the higher impedance output terminals by means of T1. The resultant 150-ohm audio output signal is fed to pins 10 and 11 of rear-apron connector J103.

4-9. COR AMPLIFIER

FO-7 is the schematic diagram for this module; its reference designation prefix is A112.

The first two stages of the COR module, Q1 and Q2, form a dc amplifier. The third and fourth stages, Q3 and Q4, are a combination switch, relay driver, and time-delay circuit. Front-panel COR SENS control R116 determines the input signal level required to actuate the relay. A negative voltage from the control wiper is applied to the base of Q1 through R2, cutting the transistor off. This reverse bias must be overcome by the positive-going input signal for the relay to operate. With Q1 cut off, all the other transistors on the module are also cut off. Diode CR1 clamps the base of Q1 to prevent the voltage from ever exceeding -0.6 vdc. Diode CR2 is forward biased from the -24 vdc supply through R6, thus clamping the emitter of Q1 at -0.6 volts. Hence, the base voltage must reach 0 vdc for Q1 to conduct.

Once Q1 is driven into conduction, the negative-going voltage drop at the junction of load resistors R4 and R5 turns on Q2, a PNP transistor. With Q2 conducting the positive-going voltage drop at the junction of R7 and R8 turns on Q3 and Q4. Current now flows from ground through Q4 and the relay coil causing K103 to actuate. Transistors Q3 and Q4 are connected in a Darlington configuration to obtain the beta multiplication inherent in this circuit. This is done so that variations in transistor beta will not affect the timing of the delay circuit when this feature is used.

During normal operation relay K103 is held in the energized state for a predetermined time delay after the disappearance of a carrier. The duration of the delay depends on the charging time of a capacitance-multiplier feedback circuit. The capacitance for this circuit is selected by the COR DELAY switch on the rear apron corresponding to delays of 3, 5, 7, and 10 seconds. At the time Q3 and Q4 conducted to energize K103, the capacitance in the collector-to-base circuit discharged to ground through CR4. When the input signal cuts off, this capacitance charges through resistor R8, diode CR3, the COR DELAY DISABLE switch, and the resistance of K103's coil. This RC time constant, in parallel with the input resistance of the Q3-Q4 combination, determines the time delay period. It is the charging current through R8 which develops the base voltage to keep Q3 and Q4 conducting. Once the charging current for the selected capacitance has decreased to the point that the voltage developed across R8 is insufficient to keep the base-emitter junctions of the two transistors forward biased, they cut off and K103 is de-energized. The selected capacitor(s) holds its charge until Q3 and Q4 again conduct as the result of an input signal of sufficient amplitude to the COR module to turn on Q1. When this occurs the collector voltage of Q3 and Q4 suddenly drops. Since the voltage across the capacitor(s) cannot change simultaneously, the end connected at the junction of CR3 and CR4 swings below ground potential. This forward biases CR4 so that the selected capacitance discharges through the diode. When the DELAY DISABLE switch is depressed the capacitance discharges rapidly through R9 allowing K103 to release immediately.

4-10. VIDEO AMPLIFIER

FO-8 is the schematic diagram for the video amplifier module; its reference designation is A110. This module consists of an NPN transistor, Q1, dc coupled to Q2, a PNP transistor. These two stages provide the necessary voltage gain to drive complementary symmetry emitter followers Q3 and Q4. The latter two transistors are biased to operate Class B. Negative dc feedback to set the overall gain of the amplifier is taken at the junction of R9 and R10 and fed to the emitter of Q1 through R6. Silicon diodes CR1 and CR2 determine the idling currents of Q3 and Q4, and eliminate crossover distortion while preventing thermal runaway. Since the transistors and diodes are made of the same material, they exhibit the same temperature coefficient of voltage characteristics. A rise in temperature lowers the base-emitter voltage drop of the transistors, tending to make them conduct harder. However, the diode voltage drop decreases by the same amount so that the voltage applied to the bases also decreases, holding the collector current nearly constant. Resistors R9 and R10 are included in the emitter circuits of Q3 and Q4 to provide additional feedback with low-input signal levels. The complementary symmetry emitter follower output is conducted through two paths to subsequent stages in the receiver. One path, containing capacitor C2, resistor R11 and emitter follower Q5 feeds the video signal to the audio gain control. The other signal path includes capacitor C3, resistor R14, and a pi-network filter composed of capacitors C6 and C7 and inductor L1. The latter network attenuates any harmonics in the video output signal. The video output from pin 3 of the module is fed to VIDEO OUTPUT jack, J107, on the rear apron.

4-11. AGC AMPLIFIER (Type 7865, G175K00000-1)

The AGC amplifier controls the gain of the RF tuners and IF amplifiers in the G175K00000-1 Receiver when the MODE SELECT switch is placed in the FM or AM AGC positions. The schematic diagram for this module is FO-9. Reference designation prefix A111 is used for parts on this subassembly.

4-12. IF AGC

The AM video output from the selected IF amplifier is fed to the input stage of the AGC amplifier through pin 8 on the module. Resistor R2 and capacitor C2 form a modulation filter to remove audio variations from the dc component of the AM detector output. Additional filtering is provided by R3 and C3. By removing the modulation from the input signal, the AGC voltage varies in direct proportion to the average value of the RF carrier. Under no-signal conditions, transistor Q1 is reverse biased by the application of a positive voltage through resistor R6 to the emitter. When a signal is received, the AM detector output begins to increase in the positive direction until a point is reached where the reverse bias on Q1 is overcome and the stage conducts. The negative-going voltage on the collector, due to the drop across load resistor R4, is fed to the base of the second stage, Q2, through section S104B-F of the MODE SELECT switch. AGC voltage for the IF strips is taken from the emitter of this stage which is connected between the +12-volt supply and the base circuits of the IF amplifiers. As the incoming signal increases, the conduction through Q2 decreases and the forward bias (emitter voltage) on the IF amplifiers is reduced, thus lowering the gain of the stages. Input signals to Q2 during the reception of pulse signals is supplied by the Pulse AGC board. The emitter signal from Q2 is also fed through emitter follower Q4 to the AGC monitor output at pin 8 of jack J102.

4-13. RF AGC

Gain control voltage for the RF tuners is obtained from the collector of Q3, a PNP transistor. This stage is biased to saturation until the signal-to-noise ratio at the output of the receiver reaches approximately 30 db, thus providing a delayed AGC voltage for the tuner. Until this signal level is reached the tuner AGC output at the junction of resistors R10 and R12 is approximately 0.6 volts so that the tuner operates at maximum gain. This point is clamped by diode CR2 to prevent it from ever going more positive than 0.6 volts. When the signal-to-noise ratio reaches the proper level the positive-going collector voltage of Q2 takes control of Q3, biasing it out of saturation. As the input signal strength increases, the collector of Q2 goes more positive, a result of the decreased voltage drop across R8, further decreasing the conduction through Q3. This results in the tuner AGC voltage increasing in the negative direction from approximately 0 volts toward the -12-volt supply. Once the tuner AGC voltage is obtained the IF AGC voltage remains fairly constant so that the receiver gain is now controlled by the tuner AGC for stronger signals. A portion of the RF AGC output is fed through resistor R13 to pin 8 of J102 on the rear apron.

4-14. AGC AMPLIFIER (Type 7868, G175K00000-2)

The schematic diagram for this board is shown in FO-10; it also carries the reference designation prefix A111. The operation of this module is similar to the type 7865 amplifier described in paragraphs 4-10, 4-11, and 4-12. Notable differences exist in that the negative AGC output provided for the RF tuners in the G175K00000-1 Receiver is deleted from this module. In addition, the IF AGC output circuit contains a PNP transistor Q3 which is used as a low impedance return for the 10-mc IF bandwidth AGC line. An increase in signal strength requires that more current be extracted from the PIN diode networks in the IF amplifier. Since this circuit must also supply current for the 300-kc IF amplifier, a diode is added (CR1) to eliminate the effects of the transistor and allow current to flow in the opposite direction, namely from ground, through the base divider networks of the gain controlled stages in the IF amplifier, through CR1 and Q2, to the +12-volt supply. Transistor Q4 an emitter follower, supplies the AGC monitor signal which is fed to pin 8 of jack J102 on the rear apron.

4-15. PULSE AGC BOARD

The capability of pulse reception in the G175K receivers is provided by the pulse AGC module. This circuit permits more linear AGC operation when the PULSE mode is selected. FO-11 is the schematic diagram for this module;

its reference designation prefix is A114. Output pulse signals from the AM detector in the IF strip in use are fed through resistor R1 to the base of emitter follower Q1. The positive-going emitter signal (pulse) forward biases diode CR1 and rapidly charges capacitor C1 to the peak pulse amplitude less the voltage drop across the base-emitter junction of Q1 and CR1. During the period between pulses, capacitor C1 slowly discharges through resistor R4 as the diode is now reverse biased. The bias thus developed keeps Q2 conducting. This fast attack, slow decay type of operation permits Q2 to remain in conduction during the period between pulses thus providing a more linear AGC output. Modulation filters in the base and collector circuits of Q2, consisting of R3-C2 and R8-C4, respectively, remove any audio variations from the input pulse. The negative-going AGC output from the collector of Q2 is fed through section S104B-F of the MODE SELECT switch to transistor A111Q2 on the AGC module, and hence to the selected IF and RF amplifier stages.

SECTION V
MAINTENANCE

5-1. GENERAL

The G175K Receiver presents no special maintenance problems and normally requires no care beyond being kept clean. Down time will be minimized, should trouble occur, if the maintenance technician is familiar with Section IV of this part in which the circuits are described, and with the corresponding sections in Parts 2 through 14 of this manual. Detailed maintenance and alignment procedures for the spectrum display unit, the IF filter/switching module, the 300-kc bandwidth IF amplifier, the 4-mc bandwidth IF amplifier, the two 10-mc bandwidth IF amplifiers and the RF tuning heads are given in subsequent parts of the manual. General maintenance and repair information for the remaining subassemblies and for the main chassis of the G175K Receiver is given in this section.

Field maintenance should be confined to cleaning and the replacement of fuses, tubes, and plug-in modules. All other maintenance should be carried out in a well equipped shop and performed by trained and experienced personnel. The schematic diagrams in each part should be referred to as necessary during maintenance procedures.

5-2. ALIGNMENT

The alignment procedures given in subsequent parts of this handbook for the subassemblies listed above are suitable for use when making periodic performance checks, or when making adjustments after replacing transistors or components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the alignment of that circuit. Those controls not mentioned in any one series of steps may be left in any position. If the limits and tolerances specified cannot be obtained during the alignment procedure, then a factory alignment is necessary. Allow all equipment to warm up for at least thirty minutes before beginning the alignment. Figure 5-1 lists the test equipment necessary to obtain the voltage readings that appear in Figure 5-10 and to perform the functional tests presented in paragraph 5-9.

5-3. USE OF MARKER

A post-detection type marker adder is recommended, and the alignment procedures in this handbook assume that one is used. However, if such a marker adder is not available, the marker generator output should be loosely coupled to the sweep generator output. This can be done by connecting the marker signal source to a turn or two of insulated wire wrapped around the sweep generator lead near the point of connection to the circuit under test or by coupling to the sweep generator lead through a small capacitor. To ensure that the addition of the marker is not affecting the response curve, disconnect the marker generator and observe that no change in the curve's shape or symmetry occurs.

TEST EQUIPMENT REQUIRED

PREFERRED TYPE	SUITABLE ALTERNATE
GGS764A Stopwatch	Ducommon 140LA8
UG-274A/U Adapter	UG-274B/U
Hewlett Packard 410C VTVM	MIL-M-9996
Hewlett Packard 400H AC VTVM	MIL-V-9999
Hewlett Packard 608C Signal Generator	AN/USM-44A
Hewlett Packard 651A Test Oscillator	MIL-G-38708
Hewlett Packard 332A Distortion Analyzer	MIL-A-9998
Hewlett Packard 8616A Signal Generator	AN/URM-34
Tektronix 545B Oscilloscope	MIL-O-9960
Tektronix 1A2 Plug-In Unit	MIL-O-9960

Figure 5-1

5-4. USE OF OSCILLOSCOPE

The vertical and horizontal amplifier inputs on the oscilloscope should be set in the dc coupled mode. The dc component of the signal on the vertical input should be cancelled out by applying an equal voltage to the unused vertical differential scope input, since the dc component sometimes makes it impossible to center the signal vertically. Otherwise it will sometimes be necessary to use the ac coupled mode. A low-capacity shielded cable should be used to connect the oscilloscope, and the shield should be grounded as closely as possible to the point to which the center conductor is connected.

5-5. PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic inspections performed at daily and 100 operational-hour intervals. The shop inspection is performed when receiver malfunction is suspected.

5-6. DAILY INSPECTION

At the start of each day of use, inspect the receiver for visible signs of damage, and remove any signs of dust or dirt build-up. All cables should be checked for cleanliness, signs of damage, and proper connection. Check all mountings for looseness. Ensure that adequate ventilation is provided.

5-7. 100-HOUR INSPECTION

Perform daily inspection. Disconnect all power supply cables. Remove dust covers and blow accumulated dust from interior using dry, low pressure compressed air.

5-8. SHOP INSPECTION

At any time degraded receiver performance is suspected, remove the unit from its operating position and send it to the repair shop. Shop personnel should perform applicable portions of the daily and 100-hour inspections and the functional tests outlined in paragraph 5-9. If the receiver meets test specifications, return it to service. If performance is degraded replace only those tubes and/or components necessary to restore performance. Align the receiver and again perform the functional tests.

5-9. FUNCTIONAL TESTS

The following functional tests are designed to provide a means of checking the performance of the subassemblies and circuits normally associated with the main chassis of the G175K Receiver. At least one RF tuning head must be installed in the receiver in either the Tuner Group 1 or Tuner Group 2 position to properly perform the functional tests.

5-10. TEST CONDITIONS

The functional tests should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power of 115 ± 2.0 vac and 28 ± 1.0 vdc.

c. Equipment warmup of at least thirty minutes.

SECTION I
GENERAL DESCRIPTION

1-1. GENERAL

The G175K00000-1 and G175K00000-2 Receivers provide reception, amplification, and detection of AM, FM, CW and pulse signals in the 10-mc to 4-gc frequency range. This band of frequencies is covered by seven optional RF tuning heads. The G175K00000-1 Receiver is designed to accommodate RF tuners in the 10-mc to 1-gc frequency range. In addition, one of two optional wideband IF amplifiers having bandwidths of 4 mc centered at 21.4 mc and 10 mc centered at 60 mc may be included in the receiver. The G175K00000-2 Receiver is designed to accept RF tuning heads covering the 1-gc to 4-gc frequency range and accommodate a third optional wideband IF amplifier having a 160-mc center frequency and a 10-mc bandwidth. The G175K00000-2 Receiver also differs from the G175K00000-1 in that it utilizes a type 7868 AGC amplifier module in lieu of the type 7865. A type 79684 IF coupler (A113) is also used in the G175K00000-2 whereas a type 79207 IF coupler is used in the G175K00000-1. A pair of single-pole, double-throw coaxial relays used on the G175K00000-1 Receiver to route the local oscillator output signals to the rear apron are not used on the G175K00000-2 Receiver. Local oscillator outputs from the latter unit are fed directly to rear-apron connectors.

Basic G175K00000-1 and G175K00000-2 Receivers contain an IF coupler, an IF filter/switching module, a 300-kc bandwidth IF amplifier, a spectrum display unit and four plug-in modules: an audio amplifier, a video amplifier, a COR (carrier operated relay) module, and an AGC amplifier module. A pulse-AGC module is also included and is screw-mounted to the main chassis. Functional and electrical descriptions of the spectrum display unit, the IF filter/switching module and the 300-kc bandwidth IF amplifier are presented in Parts 2 through 4 of this manual, respectively. The 4-mc bandwidth IF amplifier is described in Part 5. A complete description of the 60-mc center frequency, 10-mc bandwidth IF amplifier is presented in Part 6. The 160-mc center frequency, 10-mc bandwidth IF amplifier is described in Part 7.

The design of the IF filter/switching module is such that crystal filters can be installed to provide additional narrow IF bandwidths of 10, 20, 40, or 75 kc. The desired bandwidth can be selected by a front-panel switch.

The internal spectrum display unit has selectable sweep widths of 4 mc, 300 kc, 100 kc, 50 kc, and 25 kc, and a resolution (using the 25 kc sweep width) that results in the display of two signals with at least a 6-db valley between them, when they are only 2.5 kc apart.

A BFO (beat frequency oscillator) included in the 300-kc bandwidth IF amplifier is activated when the CW mode is selected.

Signal outputs from the receivers include an audio output, a video output, an IF output (from the 300-kc bandwidth IF amplifier), a local oscillator output from each tuner, and various tuner function outputs. These latter outputs can be used to provide remote indications of the band in use, as well as the position of the tuning dial. Additional outputs provide remote indications of the operating mode and the IF bandwidth in use.

The COR circuit and its associated relay provide one pair of normally-closed contacts and one pair of normally-open contacts all of which appear at pins on a rear apron connector. An internal power supply consisting of various main chassis components provides the operating voltages.

1-2. EQUIPMENT SUPPLIED

QUANTITY	ITEM	PART NUMBER
1	Receiver	G175K00000-1
1	Receiver	G175K00000-2

1-3. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY	ITEM	PART NUMBER	RECEIVER
4	Connector	UG-21D/U	G175K00000-1
2	Connector	UG-21D/U	G175K00000-2
1	Connector	DS07-19S	Both
1	Connector	DS07-12S	Both
1	Connector	DS07-07S	Both
1	Connector	UG-88/U	Both

1-4. ELECTRICAL SPECIFICATIONS

Types of Reception:

G175K00000-1	AM, FM, CW, and Pulse
G175K00000-2	AM, FM, CW, and Pulse
Audio Output Power	100 milliwatts, minimum, into 150-ohm, unbalanced load
Audio Amplifier Response	Within 3 db from 30 cps to 25 kc
Harmonic Distortion	5%, maximum, from 50 cps to 10 kc at rated output
Video Output	AM: 3 volts, rms, into 93-ohm load, all IF bandwidths FM: 10-kc bandwidth, 1.5 volts, rms, into 93 ohm load; all other bandwidths, 2.0 volts, rms, into 93 ohm load
Video Amplifier Response	Within 3 db from 20 cps to 5 mc
Harmonic Distortion	5%, maximum, at rated output
Carrier Operated Relay:	
Sensitivity	3 db below appropriate sensitivity level for RF tuner and IF bandwidth in use
Range	Adjustable to operate over an input signal level range of 0.7 μv to 1 mv
Release Time	3, 5, 7, or 10 seconds, selected by rear-apron switch
Squelch Control	35 db of muting, minimum
Input Power Required	107.5-123 vac, 50-420 cps; 21.0-29.0 vdc
Edgelight Power Required	0 to 28 vdc
Power Consumption	25 watts, approximately

1-5. MECHANICAL SPECIFICATIONS

Weight	29.5 lbs. with 2 RF tuners and 2 IF amplifiers installed
Overall Dimensions	4.0 inches high, 18.18 inches wide, and 17.9 inches deep
Operating Temperature Limits	0° to 50°C
Altitude Limits:	
Operating	15,000 feet
Non-Operating	50,000 feet
Mounting	Shock mounted tray

SECTION II

PREPARATION FOR USE AND RESHIPMENT

2-1. GENERAL, UNPACKING AND INSPECTION

The G175K00000-1 and G175K00000-2 Receivers, and their selected subassemblies, have been thoroughly inspected and factory adjusted for optimum performance prior to shipment. The receivers are, therefore, ready for use upon receipt. As soon as the equipment has been uncrated, check the contents against the packing slip and inspect the items for possible damage incurred during shipment. Visually inspect all exterior surfaces for dents and scratches. Remove the dust covers from the equipment and visually inspect the internal components for apparent damage. Check the internal coaxial cables for loose connections.

2-2. INSTALLATION

The G175K Receivers are designed for rack mounting in a shock mounted tray. Critical dimensions of a typical receiver are shown in Figure 2-3. To install, slide the receiver partially into the tray, then attach the interconnecting cables in accordance with Figure 2-2. Slide the receiver completely into the rack until the stops are engaged. Press the release button on the top of each handle and pull the top of the handle outward. Engage the hook-shaped lower portion of the handle in the fittings provided by the slide tracks, and return the upper portion to the locked position.

2-3. INSTALLATION OF SUBASSEMBLIES

The procedure for installing the optional RF tuning heads, the spectrum display unit, and IF amplifiers into the main chassis is given in those parts of this manual applicable to the particular module.

2-4. CARRIER OPERATED RELAY DROPOUT DELAY SELECTION

A carrier operated relay circuit in the receiver provides a visible indication when a signal is being received as well as the closure of a set of normally-open contacts which are accessible at rear-apron connector J102, pins 1 and 2. The COR DELAY DISABLE indicator lamp on the front panel remains illuminated during the presence of a carrier, and for a preset delay time after the signal disappears. This delay period can be set by the COR DELAY switch on the rear apron. The switch is numbered 3, 5, 7, and 10 corresponding to delays of 3, 5, 7, and 10 seconds.

2-5. VIDEO SIGNAL AMPLITUDE ADJUSTMENT

The desired video output signal amplitude must be set before the receiver is installed in its mounting position. The VIDEO GAIN SET potentiometer mounted on the rear apron provides a means of setting the amplitude. This is a screwdriver adjusted potentiometer. The collar lock nut must be loosened before the control setting can be changed.

2-6. PREPARATION FOR RESHIPMENT

No special steps are necessary to prepare the receiver for reshipment. The units are shipped with internal components in place.

G175K RECEIVER, CONNECTOR LOCATIONS

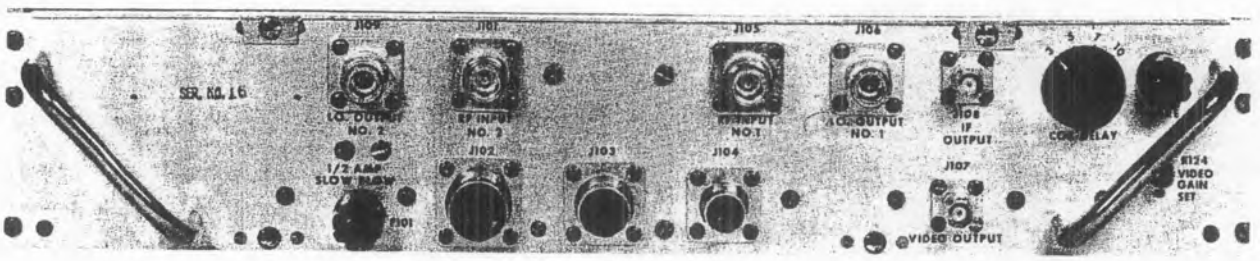


Figure 2-1

G175K RECEIVER, INTERCONNECTION DIAGRAM

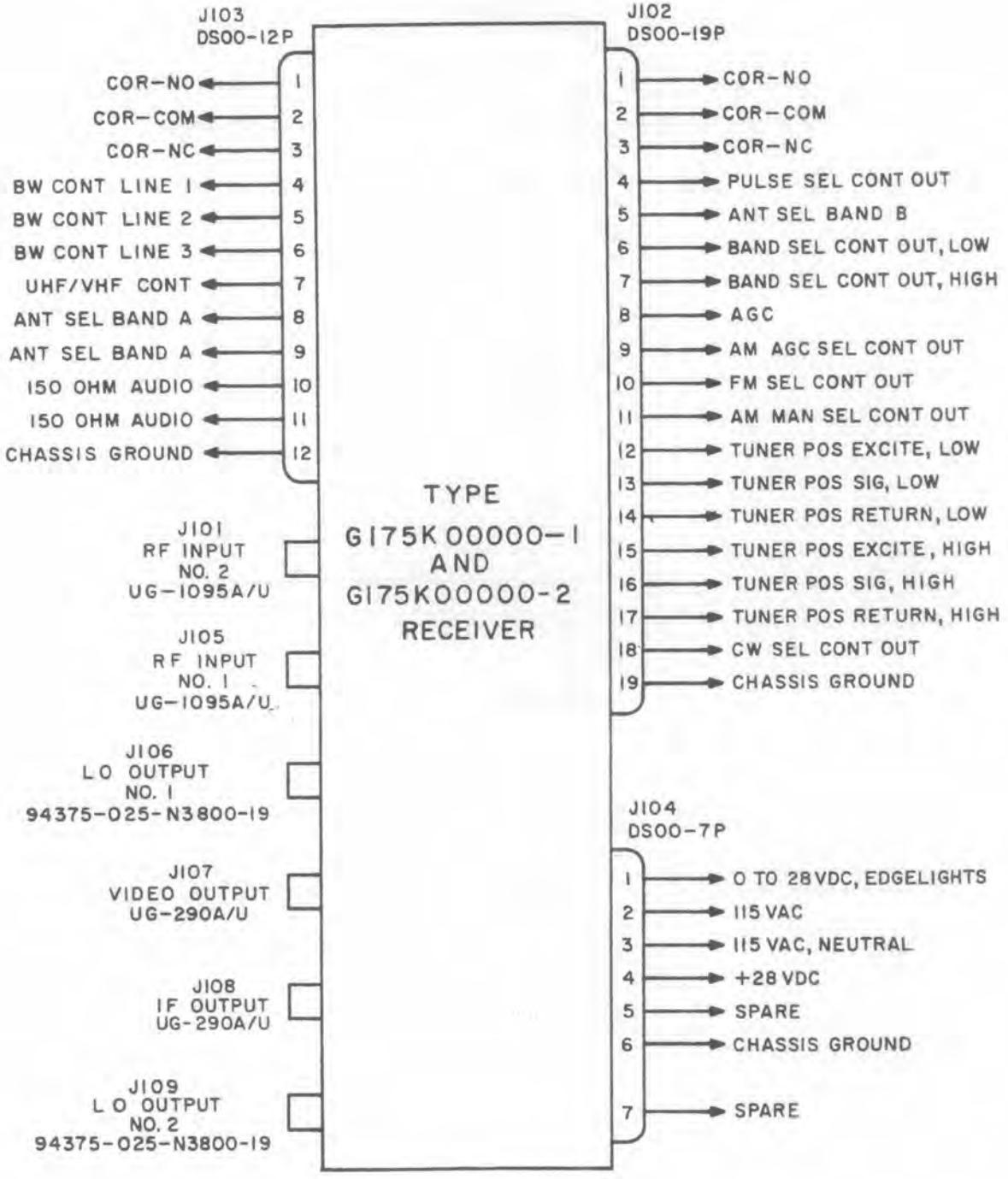
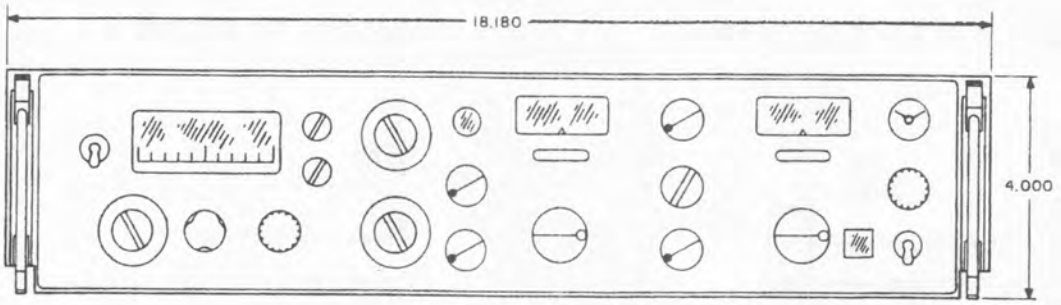
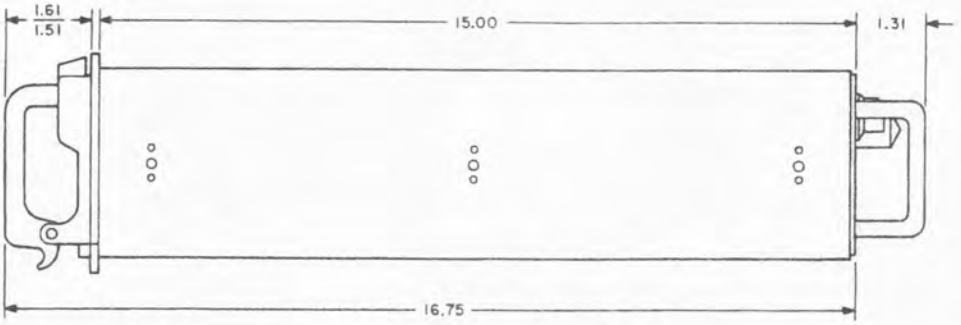


Figure 2-2

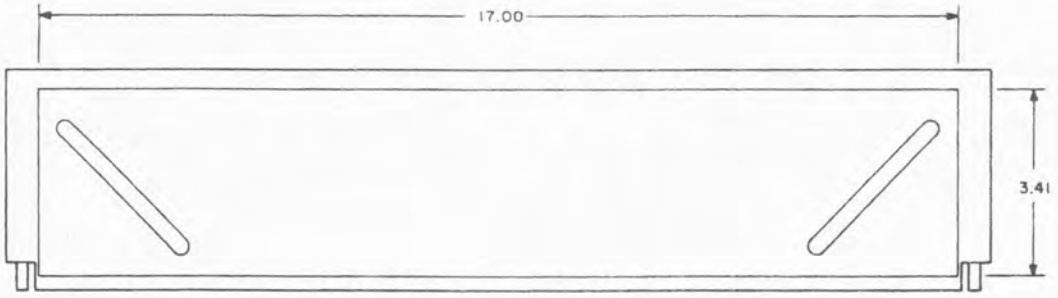
G175K RECEIVER, CRITICAL DIMENSIONS



FRONT VIEW



SIDE VIEW



REAR VIEW

Figure 2-3

SECTION III
OPERATION

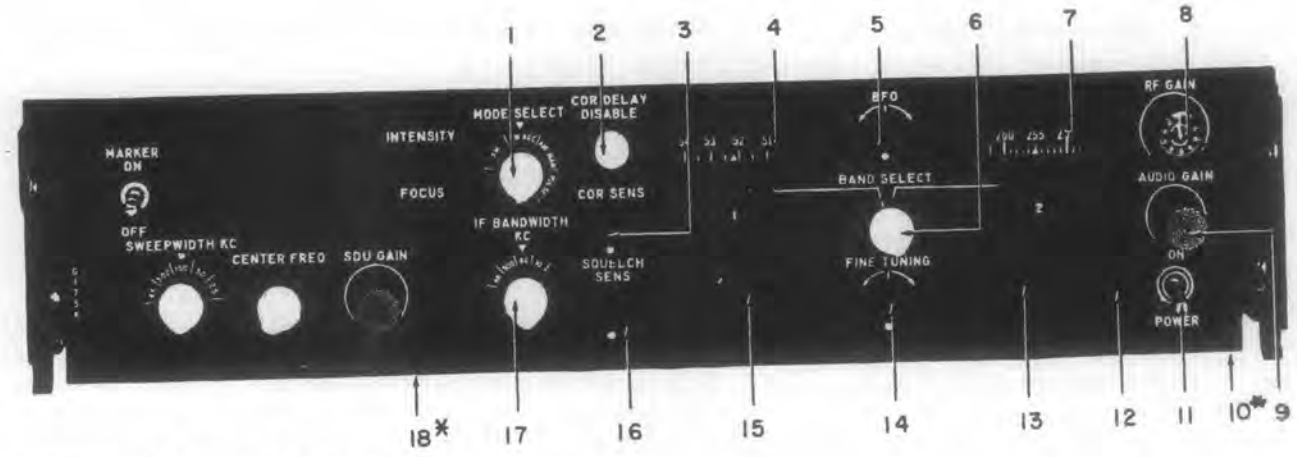
3-1. GENERAL

The G175K00000-1 and G175K00000-2 Receivers are single-channel, superheterodyne units designed for the reception of AM, FM, CW, and pulse modulated signals. The frequency coverage provided by a particular unit is determined by seven optional, plug-in, RF tuning heads, two of which can be accommodated in the receiver at a time. The G175K00000-1 Receiver can be operated with RF tuning heads which cover the 10-mc to 1-gc frequency range, and with IF bandwidths as wide as 10 mc. The frequency coverage of RF tuning heads which are normally installed only in the G175K00000-2 Receiver covers the 1-gc to 4-gc range. The optional wideband IF amplifier available for use with these tuning heads has a bandwidth of 10 mc and operates at a center frequency of 160 mc. Various front-panel controls permit selection of the mode of operation (either CW, Pulse, AM MAN, AM AGC, or FM), the sensitivity of the COR circuit, and the amplitude of the audio and video output signals. The RF/IF gain is also adjusted by means of a front-panel mounted, 10-turn indicating potentiometer. An adjustable audio squelch is incorporated in the receivers to disable the audio in the absence of an RF carrier. A beat frequency oscillator (BFO) is provided for CW operation while using IF bandwidths of 300 kc and below. When the AM MAN or CW modes are selected, the receiver gain must be controlled by the front panel RF GAIN potentiometer. Remote indications of the operating mode, IF bandwidth in use, and RF band in use, are provided at rear-apron connectors. Operation of the spectrum display unit and the controls associated with this portion of the receiver is given in Part 2 of this manual.

3-2. CONTROLS AND INDICATORS

All the controls and indicators for the G175K00000-1 and G175K00000-2 Receivers, other than the COR DELAY switch and the VIDEO GAIN SET control, are mounted on the front panel. The name and function of each is listed in Figure 3-2. These controls and indicators are shown in Figure 3-1.

G175K RECEIVER FRONT PANEL CONTROLS



* MOUNTED ON REAR APRON

Figure 3-1

G175K RECEIVER CONTROLS AND INDICATORS

FIGURE INDEX	CONTROL OR INDICATOR	FUNCTION
1	MODE SELECT Switch	Five-position rotary switch selects FM, AM MAN, AM AGC, CW, or PULSE mode of operation.
2	COR DELAY DISABLE Indicator/ Switch	Illuminates white when incoming signal amplitude is sufficient to activate COR. Extinguishes when depressed; defeats COR delay when depressed; releases COR relay.
3	COR SENS Control	Adjusts sensitivity of COR circuit; clockwise rotation increases sensitivity and allows COR to respond to lower amplitude signals.
4	Tuner Group 1 Tape Dial	Indicates tuned frequency of RF head in Tuner Group 1 position.
5	BFO Control	Changes total pitch of audio beat note when receiving CW signals.
6	BAND SELECT Switch	Two-position rotary switch used to select RF tuning head in either Tuner Group 1 or Tuner Group 2 positions.
7	Tuner Group 2 Tape Dial	Indicates tuned frequency of RF head in Tuner Group 2 position.
8	RF GAIN Control	Ten-turn indicating potentiometer used to simultaneously adjust IF and RF gain when MODE SELECT switch is set to AM MAN or CW. Control has no effect if MODE SELECT is set to AM AGC, FM, or PULSE.
9	AUDIO GAIN Control	Adjusts amplitude of audio output signal.
10	COR DELAY Control	Four-position rotary switch that sets COR dropout delay time; mounted on receiver rear apron.
11	POWER Switch	Single-pole, single-throw toggle switch that applies ac power to receiver when placed in ON position; does not operate edgelights.
12	Power Indicator Lamp	Illuminates green when power is applied to receiver.
13	Tuner Group 2 Tuning Control	Selects frequencies of RF tuning head installed in this position.
14	FINE TUNING Control	Makes small changes in local oscillator frequency for precise tuning.
15	Tuner Group 1 Tuning Control	Selects frequencies of RF tuning head installed in this position.
16	SQUELCH SENS Control	Used to mute audio output signal in the absence of a carrier.
17	IF BANDWIDTH KC Switch	Four-position rotary switch that selects desired IF bandwidth; selects 10-mc, 4-mc, 75-kc, 40-kc, 20-kc, or 10-kc bandwidth (depending on IF strip and crystal filters installed) when set to 10K, 4K, 300, 75, 40, 20, or 10 positions.
18	VIDEO GAIN SET Control	Adjust amplitude of video output signals; mounted on receiver rear apron.

Figure 3-2

3-3. SPECTRUM DISPLAY UNIT CONTROLS AND INDICATORS

An illustration and description of the controls and indicators associated with the spectrum display unit are given in Part 2, Section III of this manual.

3-4. OPERATING PROCEDURES

Prior to placing the equipment in operation, it may be necessary to install one or more of the optional plug-in subassemblies in the main chassis. Installation procedures for the particular subassembly are given in the respective parts of this manual. The operating procedures given below assume the presence of two RF tuning heads, a 4-mc bandwidth IF amplifier, and crystal filters installed in the IF filter/switching module to provide IF bandwidths of 40 kc and 10 kc. To place the receiver in operation perform the following steps:

a. Place POWER switch in ON position. Verify that green pilot lamp is illuminated.

b. Set MODE SELECT to FM, AM AGC, AM MAN, PULSE or CW according to type of reception desired.

c. Set IF BANDWIDTH KC switch to bandwidth appropriate for type of signal being received.

d. Using BAND SELECT switch, select BAND 1 or BAND 2 as desired.

e. Rotate SQUELCH SENS control fully counterclockwise.

f. Use appropriate tuning control to locate portion of the band where no signals are present.

g. Adjust AUDIO GAIN control until background noise is clearly audible.

h. Rotate SQUELCH SENS control clockwise until background noise just disappears.

i. Press and hold COR DELAY DISABLE pushbutton and adjust COR SENS control until indicator lamp is extinguished.

j. With the SDU SWEEPWIDTH KC switch set to 25 kilocycles, turn MARKER switch to ON. A marker pip will appear.

k. Adjust the spectrum display unit CENTER FREQ control until the marker pip is positioned at the center of the display screen's base line.

l. Turn the spectrum display unit MARKER switch OFF.

m. Set the spectrum display unit SWEEPWIDTH KC control to a position corresponding to a width at least as great as the bandwidth of the signal to be received. This will insure displaying the entire bandwidth of the signal when first tuned in on the receiver. Once a signal has been properly tuned in, the SWEEPWIDTH KC control may be set to a narrower position as required.

n. Tune the receiver to the desired signal.

o. Adjust the SDU GAIN control until the signal display reaches the desired vertical height on the screen.

p. The choice of either automatic gain control or manual gain control needs to be made only during reception of amplitude modulated signals. Operation with automatic gain control is recommended whenever receiving conditions permit. However, in the presence of strong interfering signals, manual gain control may be necessary. To obtain this, move the MODE SELECT switch to the AM MAN position.

SECTION IV
THEORY OF OPERATION

4-1. GENERAL

The G175K00000-1 Receiver is depicted in the functional block diagram, FO-1. This block diagram depicts a basic G175K00000-1 with no optional plug-in subassemblies installed. It is also applicable to the G175K00000-2 Receiver except that the two relays associated with the LO output signals are not used. Block diagrams for the RF tuning heads and the three wideband IF amplifiers are included in Parts 5 through 14 of this manual. Reference should also be made to the respective parts for functional and electrical information. Detailed functional and electrical descriptions of the spectrum display unit, the IF filter/switching module, and the 300-kc bandwidth IF amplifier are presented in Parts 2 through 4 of this manual, respectively. Complete information, including schematic diagrams, for the remaining subassemblies normally installed on the main chassis of the receivers is presented in this part of the manual.

4-2. FUNCTIONAL DESCRIPTION

The functional description presented in the following paragraphs covers a typical G175K00000-1 Receiver containing a Band A (30-90 mc) RF tuner, a Band B (60-260 mc) RF tuner, a 4-mc bandwidth IF amplifier, and a 300-kc bandwidth IF amplifier. Crystal filters installed in the IF filter/switching module are assumed to have bandwidths of 10 kc and 40 kc.

Incoming RF signals to the Band A tuner (see FO-2, Part 8) are amplified by V1 and V2 which are connected in a cascode configuration. The amplified output is fed through the interstage coupling network to the mixer, V3. The local oscillator in the tuner, A2V1, operates 21.4-mc higher than the incoming RF signal. It supplies three output signals: one is fed to the rear apron LO OUTPUT NO. 2 jack J109; another output is coupled to LO isolation amplifier Q1 which feeds it to LO OUTPUT NO. 1 jack J106; the third output is coupled to the mixer, V3. The 21.4-mc difference frequency produced by the mixing action, is taken from V3 and fed through output emitter follower, A1Q1, and the IF output jack on the tuner, to the input of the IF coupler subassembly, A113.

Incoming signals to the Band B tuner (FO-2, Part 9) are fed to a cascode circuit consisting of RF amplifiers V1 and V2. Amplified output signals from V2 are fed to the input of the mixer, V3, through the interstage coupling network. The local oscillator in this tuner also operates 21.4 mc above the incoming carrier. It supplies output signals to the mixer, the LO OUTPUT NO. 2 jack, and through isolation transistor Q1 to the LO OUTPUT NO. 1 jack. Output emitter follower A1Q1 couples the 21.4-mc difference frequency from V3 to the IF output jack and consequently to the IF coupler.

The IF coupler subassembly is an impedance matching device designed to supply four IF output signals from a single input; namely, the 21.4-mc signal from the RF tuner in use. One of the four outputs is fed to the input of the spectrum display unit while a second is used as the input to the IF filter/switching module. A third output appears at jack A113J6. The fourth output is fed to the input of the 4-mc bandwidth IF amplifier.

The IF filter/switching module contains three paths through which the signal from the IF coupler can be conducted to subsequent stages in the unit. Two of the paths are similar (see FO-1, Part 1) each containing an emitter follower, crystal filter, and IF amplifier. The third path consists of an emitter follower, a 300-kc IF amplifier, and a conventional LC network having a 300-kc bandpass. Two of the paths are disabled by the IF BANDWIDTH KC switch while circuits in the third path are activated, depending on whether this switch is placed in the 10 KC, 40 KC, or 300 KC position. As shown on the block diagram, crystal filters having 10-kc, 20-kc, or 40-kc bandwidths and 40-kc or 75-kc bandwidths may be placed in the first two signal paths respectively. Placing this switch in the 4K position completely disables the IF filter/switching module. The signal out of the path in operation is fed through the 300-kc output network to the input of the 300-kc bandwidth IF amplifier, A106.

Incoming signals to this IF strip are amplified by stages A1Q1, A1Q3, and A1Q5 (see FO-1, Part 1). Transistors A1Q2 and A1Q4 function as Q-multipliers and operate in conjunction with the first and second IF amplifiers,

respectively, to improve the IF response shape. The output from the third IF amplifier is applied to the AM detector and FM limiters. From the detector, the signal is fed through cascaded emitter follower stages made up of A1Q6 and A1Q7 to section S103C-W of the IF BANDWIDTH KC switch. The output from the symmetrical limiters is fed to an FM discriminator circuit which includes diodes A2CR3 and A2CR4. The demodulated output from the discriminator is coupled through cascaded complementary symmetry emitter followers, A2Q6 through A2Q9, to section S103C-X of the IF BANDWIDTH KC switch. The arm of this switch section selects either the narrowband or wideband FM video signal and applies it to the FM position on section S104A-R of the MODE SELECT switch.

The beat frequency oscillator, A2Q2, located in the 300-kc IF amplifier, is activated when the MODE SELECT switch is placed in the CW position. The tone of the CW-audio beat note signal can be changed by means of the BFO control.

The 21.4-mc input signal to the 4-mc bandwidth IF strip (see FO-1, Part 5) is fed to A1Q1, the first of four IF amplifiers. The interstage networks located between the amplifier stages are stagger tuned to establish the 4-mc bandwidth. The tuned circuits in the collectors of A1Q3 and A1Q4 affect the center of the response while the first and second tuned circuits affect the high and low sides, respectively. The amplified output from A1Q4 is simultaneously fed to the AM detector, FM limiters, and pre-detection output jack. AM detector diode A1CR3 demodulates the signal and applies it to a cascaded emitter follower circuit consisting of transistors A1Q5 and A1Q6. The AM video signal is then fed to section S103C-W of the IF BANDWIDTH KC switch.

Four FM limiter stages are used to remove amplitude variations from the incoming signal before it is applied to the FM discriminator consisting of diodes A2CR1 and A2CR2. The demodulated FM signal is then coupled through cascaded complementary symmetry emitter followers A2Q5 through A2Q8, to section S103C-X of the IF BANDWIDTH KC switch.

Selection of one of the narrow bandwidths or the wide bandwidth by means of S103 results in the application of the respective video signal to the input of the AGC and COR amplifiers. The AM video signal voltage is also fed to the squelch amplifier on the audio module. The video and consequently the audio amplifiers receive their inputs from section S104A-R of the MODE SELECT switch and the AUDIO GAIN and VIDEO GAIN SET controls.

The AGC amplifier (see FO-1, Part 1) supplies gain control voltage for both the IF and RF amplifiers when the MODE SELECT switch is placed in the AM AGC or FM positions. IF input signals to the module are taken from the arm of switch S103C-W and fed to the input stage, Q1. This stage, a voltage amplifier, drives AGC regulator Q2. The latter transistor supplies three output signals. One output is fed directly to RF AGC regulator Q3. A second output is used as the gain control voltage for the IF amplifiers when the AM AGC or FM modes are selected. The third output from Q2 is fed to emitter follower Q4 which in turn supplies the positive AGC monitor output appearing at rear-apron connector J102, pin 8. The delayed AGC voltage for the tuners is taken from Q3 and fed directly to the RF stages. Gain control of the receiver when the AM MAN or CW modes are selected is by means of the RF GAIN potentiometer on the front panel. It operates in conjunction with transistors Q2 through Q4 which function as they do during AGC action.

Input signals to the video module (see FO-1, Part 1) are amplified by transistors Q1 and Q2 which drive complementary symmetry emitter followers Q3 and Q4. A portion of the video output signal is fed through emitter follower Q5 to the audio gain control.

Front-panel SQUELCH SENS potentiometer R117 sets the level to which the incoming video signal must rise before being conducted to the audio amplifier stages. The squelch circuit located on the audio amplifier module consists of transistors Q1 and Q2. Transistors Q3 and Q4, operating in a complementary voltage amplifier configuration, drive complementary symmetry emitter followers Q5 and Q6 which provide the 150-ohm audio output.

The COR amplifier operates relay K103 when a signal of sufficient amplitude is received. Incoming signals are supplied by the AM detectors in the narrowband and wideband IF strips. Amplification of the incoming signal is performed by voltage amplifiers Q1 and Q2 which drive Q3 and Q4. These latter stages operate as a combination switch, relay driver, and time delay network. The COR SENS control sets the level that the incoming signal must reach to operate relay K103. A delay period for the relay that prevents it from becoming de-energized after the disappearance of the carrier is set by the COR DELAY switch mounted on the rear apron. The delay periods available are 3, 5, 7, and 10 seconds. Rapid release of the relay after the carrier has disappeared is accomplished by depressing the COR DELAY DISABLE switch on the front panel.

The power supply for the receiver, consisting of various main chassis components including power transformer T101, provides all the operating voltages. Power to operate the dial lamps and edgelights on both units and relays K101 and K102 on the G175K00000-1 must be supplied from an external source.

Outputs are provided on the rear apron for remote indications of the frequency band in use, the IF bandwidth in use, and the position of the tuning dial.

4-2. DETAILED THEORY

The following paragraphs present descriptions of the basic circuit sections of the receiver at the schematic diagram level. A thorough understanding of the signal flow discussion presented in paragraph 4-1 is recommended before proceeding further.

4-3. MAIN CHASSIS

The main chassis contains the supporting circuits required by the optional plug-in assemblies that comprise a complete receiver. FO-2 is the main chassis schematic diagram for the G175K00000-1 Receiver and FO-3 is the main chassis schematic diagram for the G175K00000-2 Receiver. The subassemblies mounted on the main chassis include the IF coupler (A113), the IF filter/switching module (A108), the 300-kc IF amplifier (A106), the audio module (A109), the AGC module (A111), the video module (A110), the COR module (A112) and the pulse AGC module, (A114). Various switching circuits on the main chassis are used to connect the components into various configurations such as FM, AM AGC, AM MAN, PULSE or CW modes of operation, and to select IF bandwidths from those available in the particular unit. In addition, these switching circuits provide external indications of the IF bandwidth and frequency band in use, and the position of the tuning dial. The power supply components are also mounted on the main chassis.

4-4. POWER SUPPLY

The power supply for the G175K00000-1 Receiver operates from 107.5 to 123 volts, 50 to 420 cps source. The path for the ac input is from pins 2 and 3 of jack J104, through low-pass filters FL102 and FL103, line fuse F101, and POWER switch S101, to the primary of power transformer T101. The power transformer has five secondary windings. One of these, 3-4-5, supplies the ac input to rectifier diodes CR101 and CR102 which are connected in a full-wave configuration to provide +175 vdc for the RF tuners. Filtering of the pulsating dc output is by means of dual electrolytic capacitor C101 and resistor R101. The ac output from winding 6-7-8 is rectified by diodes CR107 and CR108 before it is applied to series regulator transistor Q102. Zener diode CR111 is the fixed base reference element for Q102. Capacitor C103 filters the rectifier output while capacitor C107 prevents hum modulation on the base of Q102 from causing fluctuations in the output voltage. The regulated +24 volts supplied by this circuit is used to operate many of the semiconductor circuits within the receiver. A third winding 13-14-15, supplies ac input power to a pair of full-wave rectifiers. One rectifier circuit, consisting of diodes CR103 and CR104, supplies the input to series regulator Q101. The regulated +12 volt output from this stage is used to operate various semiconductor circuits. The second rectifier circuit, containing diodes CR105 and CR106, supplies a negative dc output that is regulated by Zener diode CR109 and filtered by capacitors C102, C104, and C114. This output is also utilized by the semiconductor circuits within the receiver. Winding 11-12 supplies filament voltage for the cathode ray tube in the spectrum display unit. The fifth winding, 9-10, supplies 6.3 vac for the power pilot lamp DS102 and for the filaments of the Nuvistors used in the RF tuners.

The G175K00000-2 Receiver power supply is quite similar to the circuit described in the preceeding paragraph except that the regulated -12V network has been modified to provide improvide regulation and filtering. This is done to insure proper operation of the 10-mc bandwidth IF amplifier and the Bands F and G tuners. Zener diode CR114 and capacitors C114, C115, and C116 perform the regulation and filtering functions. Resistor R121 is added to complete the second section of the filter network.

The G175K Receiver employs an edge light panel that operates from an externally supplied voltage to illuminate the panel marking. This operating voltage is connected through pin 1 of jack J104 and filtered by FL101 before it is applied to the edge lights.

Dial lights are mounted internally on each of the optional RF tuning heads. These dial lights operate from +28 vdc that is supplied from a source external to the receiver. This +28 vdc supply is connected to pin 4 of jack J104 and filtered by FL104. From the filter, the voltage is fed to the arm of section S102B-W of the BAND SELECT switch. This switch section in turn applies the voltage to the dial lights in the tuner selected. Regulation of this dial light supply voltage is by means of Zener diode CR113. A second path for the +28 vdc supply from FL104 is to the windings of main chassis relays K101 and K102 (G175K00000-1 only) through section S102A-W of the BAND SELECT switch. These relays connect the local oscillator output signals from the RF tuner in use to the appropriate output jacks on the rear apron.

4-5. IF COUPLER (Type 79207; G175K00000-1)

FO-4 is the schematic diagram for the IF coupler used on the G175K00000-1 Receiver; its reference designation prefix is A113. The 21.4-mc IF output signals from RF Tuner Group No. 1 and RF Tuner Group No. 2 are connected to the IF coupler through jacks J1 and J2, respectively. The input signal (depending on the tuner in use) is fed directly to output jack J5 and consequently to the input of the IF filter/switching module. Output jack J4 is used to feed the signal to the input of the wideband IF amplifier. Resistor R3 provides the proper impedance match. Resistors R1 and R2 form a voltage divider from which the IF input to the spectrum display unit is taken. This output is fed to jack J3. A second resistive voltage divider made up of R4 and R5 supplies an IF output signal at jack J6. The output from this connector is not conducted to subsequent stages in the receiver. It is an auxiliary IF output.

4-6. IF COUPLER (Type 79684; G175K00000-2)

The schematic diagram for this IF coupler is FO-5; its reference designation prefix is A113. The value of resistor R2 in this coupler is 330 ohms which results in an increased IF input signal to the spectrum display unit. Only two ferrite beads are included in the tuner no. 2 input line resulting in higher amplitude IF output signals from the Bands F and G tuners. The remaining circuitry in the coupler is identical to the coupler discussed in paragraph 4-5.

4-7. AUDIO AMPLIFIER

The schematic diagram for the audio amplifier is FO-6; the reference designation prefix for this module is A109. The module consists of a squelch circuit, voltage amplifier and complementary symmetry emitter follower.

The squelch circuit mutes the audio output during the absence of an incoming signal. Under these conditions transistor Q1 is reverse biased by a negative voltage on its base. This bias voltage is supplied by the front-panel SQUELCH SENS control. With Q1 cut off, the input signal from the video amplifier (mainly noise) is effectively shorted to ground through Q2 which is conducting to saturation. Rotation of the squelch sensitivity potentiometer in the clockwise direction decreases the reverse bias on Q1 and has the same affect as a positive incoming signal through R1; namely, causing Q1 to conduct thereby biasing Q2 out of saturation due to the voltage drop across load resistor R4. The audio input may then be conducted to the base of audio amplifier Q3. This stage is connected to Q4 in a complementary voltage amplifier configuration.

Transistors Q3 and Q4 provide the necessary voltage gain to drive complementary symmetry emitter followers Q5 and Q6. The latter two transistors are biased to operate Class B. Negative dc feedback to set the overall gain of the amplifier is taken at the junction of R14 and R15 and fed to the emitter of Q3 through R10. Silicon diodes CR5 and CR6 determine the idling currents of Q5 and Q6, and eliminate crossover distortion while preventing thermal runaway. Since the transistors and diodes are made of the same material, they exhibit the same temperature coefficient of voltage characteristics. A rise in temperature lowers the base-emitter voltage drop of the transistors, tending to make them conduct harder. However, the diode voltage drop decreases by the same amount so that the voltage applied to the bases also decreases, holding the collector current nearly constant. Resistors R14 and R15 are included in the emitter circuits of Q5 and Q6 to provide additional feedback with low input signal levels. These resistors eliminate distortion introduced by the difference between the voltage drops of CR5 and CR6 and the base-emitter junctions of Q5 and Q6. With little or no input signal the drop across the resistors is a few tenths of a volt. Large inputs would cause the drop to become excessive except that CR5 and CR6 become forward biased and limit the drop to approximately 0.6 volt. The low-impedance output of the complementary-symmetry emitter followers is matched

to the higher impedance output terminals by means of T1. The resultant 150-ohm audio output signal is fed to pins 10 and 11 of rear-apron connector J103.

4-9. COR AMPLIFIER

FO-7 is the schematic diagram for this module; its reference designation prefix is A112.

The first two stages of the COR module, Q1 and Q2, form a dc amplifier. The third and fourth stages, Q3 and Q4, are a combination switch, relay driver, and time-delay circuit. Front-panel COR SENS control R116 determines the input signal level required to actuate the relay. A negative voltage from the control wiper is applied to the base of Q1 through R2, cutting the transistor off. This reverse bias must be overcome by the positive-going input signal for the relay to operate. With Q1 cut off, all the other transistors on the module are also cut off. Diode CR1 clamps the base of Q1 to prevent the voltage from ever exceeding -0.6 vdc. Diode CR2 is forward biased from the -24 vdc supply through R6, thus clamping the emitter of Q1 at -0.6 volts. Hence, the base voltage must reach 0 vdc for Q1 to conduct.

Once Q1 is driven into conduction, the negative-going voltage drop at the junction of load resistors R4 and R5 turns on Q2, a PNP transistor. With Q2 conducting the positive-going voltage drop at the junction of R7 and R8 turns on Q3 and Q4. Current now flows from ground through Q4 and the relay coil causing K103 to actuate. Transistors Q3 and Q4 are connected in a Darlington configuration to obtain the beta multiplication inherent in this circuit. This is done so that variations in transistor beta will not affect the timing of the delay circuit when this feature is used.

During normal operation relay K103 is held in the energized state for a predetermined time delay after the disappearance of a carrier. The duration of the delay depends on the charging time of a capacitance-multiplier feedback circuit. The capacitance for this circuit is selected by the COR DELAY switch on the rear apron corresponding to delays of 3, 5, 7, and 10 seconds. At the time Q3 and Q4 conducted to energize K103, the capacitance in the collector-to-base circuit discharged to ground through CR4. When the input signal cuts off, this capacitance charges through resistor R8, diode CR3, the COR DELAY DISABLE switch, and the resistance of K103's coil. This RC time constant, in parallel with the input resistance of the Q3-Q4 combination, determines the time delay period. It is the charging current through R8 which develops the base voltage to keep Q3 and Q4 conducting. Once the charging current for the selected capacitance has decreased to the point that the voltage developed across R8 is insufficient to keep the base-emitter junctions of the two transistors forward biased, they cut off and K103 is deenergized. The selected capacitor(s) holds its charge until Q3 and Q4 again conduct as the result of an input signal of sufficient amplitude to the COR module to turn on Q1. When this occurs the collector voltage of Q3 and Q4 suddenly drops. Since the voltage across the capacitor(s) cannot change simultaneously, the end connected at the junction of CR3 and CR4 swings below ground potential. This forward biases CR4 so that the selected capacitance discharges through the diode. When the DELAY DISABLE switch is depressed the capacitance discharges rapidly through R9 allowing K103 to release immediately.

4-10. VIDEO AMPLIFIER

FO-8 is the schematic diagram for the video amplifier module; its reference designation is A110. This module consists of an NPN transistor, Q1, dc coupled to Q2, a PNP transistor. These two stages provide the necessary voltage gain to drive complementary symmetry emitter followers Q3 and Q4. The latter two transistors are biased to operate Class B. Negative dc feedback to set the overall gain of the amplifier is taken at the junction of R9 and R10 and fed to the emitter of Q1 through R6. Silicon diodes CR1 and CR2 determine the idling currents of Q3 and Q4, and eliminate crossover distortion while preventing thermal runaway. Since the transistors and diodes are made of the same material, they exhibit the same temperature coefficient of voltage characteristics. A rise in temperature lowers the base-emitter voltage drop of the transistors, tending to make them conduct harder. However, the diode voltage drop decreases by the same amount so that the voltage applied to the bases also decreases, holding the collector current nearly constant. Resistors R9 and R10 are included in the emitter circuits of Q3 and Q4 to provide additional feedback with low-input signal levels. The complementary symmetry emitter follower output is conducted through two paths to subsequent stages in the receiver. One path, containing capacitor C2, resistor R11 and emitter follower Q5 feeds the video signal to the audio gain control. The other signal path includes capacitor C3, resistor R14, and a pi-network filter composed of capacitors C6 and C7 and inductor L1. The latter network attenuates any harmonic [illegible] signals. The video output from pin 3 of the module is fed to VIDEO OUTPUT jack, J107, on the rear apron.

4-11. AGC AMPLIFIER (Type 7865, G175K00000-1)

The AGC amplifier controls the gain of the RF tuners and IF amplifiers in the G175K00000-1 Receiver when the MODE SELECT switch is placed in the FM or AM AGC positions. The schematic diagram for this module is FO-9. Reference designation prefix A111 is used for parts on this subassembly.

4-12. IF AGC

The AM video output from the selected IF amplifier is fed to the input stage of the AGC amplifier through pin 8 on the module. Resistor R2 and capacitor C2 form a modulation filter to remove audio variations from the dc component of the AM detector output. Additional filtering is provided by R3 and C3. By removing the modulation from the input signal, the AGC voltage varies in direct proportion to the average value of the RF carrier. Under no-signal conditions, transistor Q1 is reverse biased by the application of a positive voltage through resistor R6 to the emitter. When a signal is received, the AM detector output begins to increase in the positive direction until a point is reached where the reverse bias on Q1 is overcome and the stage conducts. The negative-going voltage on the collector, due to the drop across load resistor R4, is fed to the base of the second stage, Q2, through section S104B-F of the MODE SELECT switch. AGC voltage for the IF strips is taken from the emitter of this stage which is connected between the +12-volt supply and the base circuits of the IF amplifiers. As the incoming signal increases, the conduction through Q2 decreases and the forward bias (emitter voltage) on the IF amplifiers is reduced, thus lowering the gain of the stages. Input signals to Q2 during the reception of pulse signals is supplied by the Pulse AGC board. The emitter signal from Q2 is also fed through emitter follower Q4 to the AGC monitor output at pin 8 of jack J102.

4-13. RF AGC

Gain control voltage for the RF tuners is obtained from the collector of Q3, a PNP transistor. This stage is biased to saturation until the signal-to-noise ratio at the output of the receiver reaches approximately 30 db, thus providing a delayed AGC voltage for the tuner. Until this signal level is reached the tuner AGC output at the junction of resistors R10 and R12 is approximately 0.6 volts so that the tuner operates at maximum gain. This point is clamped by diode CR2 to prevent it from ever going more positive than 0.6 volts. When the signal-to-noise ratio reaches the proper level the positive-going collector voltage of Q2 takes control of Q3, biasing it out of saturation. As the input signal strength increases, the collector of Q2 goes more positive, a result of the decreased voltage drop across R8, further decreasing the conduction through Q3. This results in the tuner AGC voltage increasing in the negative direction from approximately 0 volts toward the -12-volt supply. Once the tuner AGC voltage is obtained the IF AGC voltage remains fairly constant so that the receiver gain is now controlled by the tuner AGC for stronger signals. A portion of the RF AGC output is fed through resistor R13 to pin 8 of J102 on the rear apron.

4-14. AGC AMPLIFIER (Type 7868, G175K00000-2)

The schematic diagram for this board is shown in FO-10; it also carries the reference designation prefix A111. The operation of this module is similar to the type 7865 amplifier described in paragraphs 4-10, 4-11, and 4-12. Notable differences exist in that the negative AGC output provided for the RF tuners in the G175K00000-1 Receiver is deleted from this module. In addition, the IF AGC output circuit contains a PNP transistor Q3 which is used as a low impedance return for the 10-mc IF bandwidth AGC line. An increase in signal strength requires that more current be extracted from the PIN diode networks in the IF amplifier. Since this circuit must also supply current for the 300-kc IF amplifier, a diode is added (CR1) to eliminate the effects of the transistor and allow current to flow in the opposite direction, namely from ground, through the base divider networks of the gain controlled stages in the IF amplifier, through CR1 and Q2, to the +12-volt supply. Transistor Q4 an emitter follower, supplies the AGC monitor signal which is fed to pin 8 of jack J102 on the rear apron.

4-15. PULSE AGC BOARD

The capability of pulse reception in the G175K receivers is provided by the pulse AGC module. This circuit permits more linear AGC operation when the PULSE mode is selected. FO-11 is the schematic diagram for this module;

its reference designation prefix is A114. Output pulse signals from the AM detector in the IF strip in use are fed through resistor R1 to the base of emitter follower Q1. The positive-going emitter signal (pulse) forward biases diode CR1 and rapidly charges capacitor C1 to the peak pulse amplitude less the voltage drop across the base-emitter junction of Q1 and CR1. During the period between pulses, capacitor C1 slowly discharges through resistor R4 as the diode is now reverse biased. The bias thus developed keeps Q2 conducting. This fast attack, slow decay type of operation permits Q2 to remain in conduction during the period between pulses thus providing a more linear AGC output. Modulation filters in the base and collector circuits of Q2, consisting of R3-C2 and R8-C4, respectively, remove any audio variations from the input pulse. The negative-going AGC output from the collector of Q2 is fed through section S104B-F of the MODE SELECT switch to transistor A111Q2 on the AGC module, and hence to the selected IF and RF amplifier stages.

SECTION V
MAINTENANCE

5-1. GENERAL

The G175K Receiver presents no special maintenance problems and normally requires no care beyond being kept clean. Down time will be minimized, should trouble occur, if the maintenance technician is familiar with Section IV of this part in which the circuits are described, and with the corresponding sections in Parts 2 through 14 of this manual. Detailed maintenance and alignment procedures for the spectrum display unit, the IF filter/switching module, the 300-kc bandwidth IF amplifier, the 4-mc bandwidth IF amplifier, the two 10-mc bandwidth IF amplifiers and the RF tuning heads are given in subsequent parts of the manual. General maintenance and repair information for the remaining subassemblies and for the main chassis of the G175K Receiver is given in this section.

Field maintenance should be confined to cleaning and the replacement of fuses, tubes, and plug-in modules. All other maintenance should be carried out in a well equipped shop and performed by trained and experienced personnel. The schematic diagrams in each part should be referred to as necessary during maintenance procedures.

5-2. ALIGNMENT

The alignment procedures given in subsequent parts of this handbook for the subassemblies listed above are suitable for use when making periodic performance checks, or when making adjustments after replacing transistors or components. Only those controls specifically referred to within a series of steps given for aligning a particular circuit affect the alignment of that circuit. Those controls not mentioned in any one series of steps may be left in any position. If the limits and tolerances specified cannot be obtained during the alignment procedure, then a factory alignment is necessary. Allow all equipment to warm up for at least thirty minutes before beginning the alignment. Figure 5-1 lists the test equipment necessary to obtain the voltage readings that appear in Figure 5-10 and to perform the functional tests presented in paragraph 5-9.

5-3. USE OF MARKER

A post-detection type marker adder is recommended, and the alignment procedures in this handbook assume that one is used. However, if such a marker adder is not available, the marker generator output should be loosely coupled to the sweep generator output. This can be done by connecting the marker signal source to a turn or two of insulated wire wrapped around the sweep generator lead near the point of connection to the circuit under test or by coupling to the sweep generator lead through a small capacitor. To ensure that the addition of the marker is not affecting the response curve, disconnect the marker generator and observe that no change in the curve's shape or symmetry occurs.

TEST EQUIPMENT REQUIRED

PREFERRED TYPE	SUITABLE ALTERNATE
GGS764A Stopwatch	Ducommon 140LA8
UG-274A/U Adapter	UG-274B/U
Hewlett Packard 410C VTVM	MIL-M-9996
Hewlett Packard 400H AC VTVM	MIL-V-9999
Hewlett Packard 608C Signal Generator	AN/USM-44A
Hewlett Packard 651A Test Oscillator	MIL-G-38708
Hewlett Packard 332A Distortion Analyzer	MIL-A-9998
Hewlett Packard 8616A Signal Generator	AN/URM-34
Tektronix 545B Oscilloscope	MIL-O-9960
Tektronix 1A2 Plug-In Unit	MIL-O-9960

Figure 5-1

5-4. USE OF OSCILLOSCOPE

The vertical and horizontal amplifier inputs on the oscilloscope should be set in the dc coupled mode. The dc component of the signal on the vertical input should be cancelled out by applying an equal voltage to the unused vertical differential scope input, since the dc component sometimes makes it impossible to center the signal vertically. Otherwise it will sometimes be necessary to use the ac coupled mode. A low-capacity shielded cable should be used to connect the oscilloscope, and the shield should be grounded as closely as possible to the point to which the center conductor is connected.

5-5. PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic inspections performed at daily and 100 operational-hour intervals. The shop inspection is performed when receiver malfunction is suspected.

5-6. DAILY INSPECTION

At the start of each day of use, inspect the receiver for visible signs of damage, and remove any signs of dust or dirt build-up. All cables should be checked for cleanliness, signs of damage, and proper connection. Check all mountings for looseness. Ensure that adequate ventilation is provided.

5-7. 100-HOUR INSPECTION

Perform daily inspection. Disconnect all power supply cables. Remove dust covers and blow accumulated dust from interior using dry, low pressure compressed air.

5-8. SHOP INSPECTION

At any time degraded receiver performance is suspected, remove the unit from its operating position and send it to the repair shop. Shop personnel should perform applicable portions of the daily and 100-hour inspections and the functional tests outlined in paragraph 5-9. If the receiver meets test specifications, return it to service. If performance is degraded replace only those tubes and/or components necessary to restore performance. Align the receiver and again perform the functional tests.

5-9. FUNCTIONAL TESTS

The following functional tests are designed to provide a means of checking the performance of the subassemblies and circuits normally associated with the main chassis of the G175K Receiver. At least one RF tuning head must be installed in the receiver in either the Tuner Group 1 or Tuner Group 2 position to properly perform the functional tests.

5-10. TEST CONDITIONS

The functional tests should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power of 115 ± 2.0 vac and 28 ± 1.0 vdc.

c. Equipment warmup of at least thirty minutes.

5-11. SQUELCH SENSITIVITY

The following procedure for checking the sensitivity of the squelch circuit uses a Band A tuner. If a tuner other than Band A is used, refer to Figure 5-3 for proper signal generator output levels and tuner frequencies.

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

SQUELCH SENSITIVITY TEST SETUP

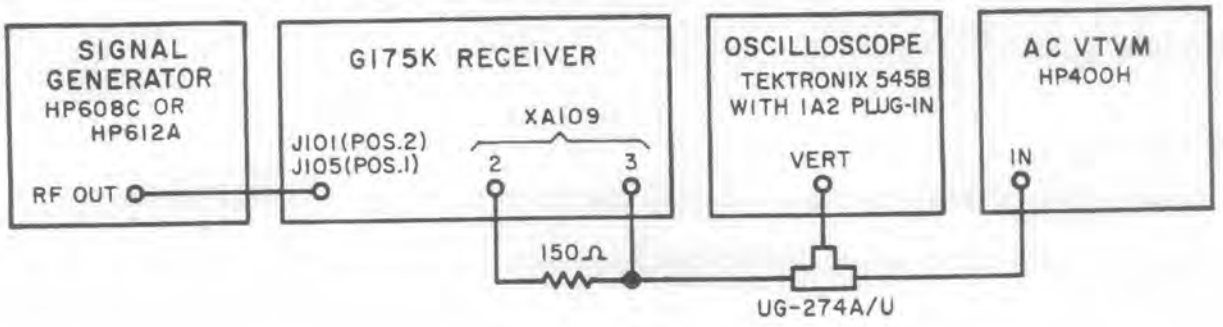


Figure 5-2

b. Place G175K Receiver BAND SELECT switch in position necessary to activate Band A tuner; tune to 60 mc.

c. Set IF BANDWIDTH KC switch to 300, MODE SELECT switch to AM AGC and rotate AUDIO GAIN control fully clockwise.

d. Tune signal generator to 60 mc and adjust controls for AM output modulated 50% by 1000-cycle tone.

e. Disconnect signal generator and adjust SQUELCH SENS control slightly below the point which will mute the receiver.

f. Reconnect signal generator and adjust output level to 4.0 μv; note that audio signal is displayed on oscilloscope.

g. Increase signal generator output level to 1.0 mv and adjust AUDIO GAIN control for 10-db reading on AC VTVM.

h. Decrease SQUELCH SENS control until audio signal is muted.

i. The muted output as read on AC VTVM should be at least 35 db below the level set in step g.

j. Use the information in Figure 5-3 for Band B, C, D, E, F, and G tuners. The muted output should be 35 db below the level set in step g. in all cases.

SQUELCH SENSITIVITY CHECK, SETUP INFORMATION

RF TUNER	IF BANDWIDTH (step c.)	SIGNAL GENERATOR OUTPUT LEVEL (step f.)	SIGNAL GENERATOR AND RF TUNER FREQUENCY
Band B	300 kc	4.5 μv	200 mc
Band C	300 kc	8.0 μv	400 mc
Band D	300 kc	8.0 μv	600 mc
Band E	300 kc	4.0 μv	20 mc

Figure 5-3

SQUELCH SENSITIVITY CHECK, SETUP INFORMATION (Cont)

RF TUNER	IF BANDWIDTH (step c.)	SIGNAL GENERATOR OUTPUT LEVEL (step f.)	SIGNAL GENERATOR AND RF TUNER FREQUENCY
Band F	10 mc (160 mc CF)	65 μv	1.0 gc
Band G	10 mc (160 mc CF)	65 μv	2.0 gc

Figure 5-3

5-12. CARRIER OPERATED RELAY (COR)

5-13. COR Sensitivity

a. Connect equipment as shown in Figure 5-2 except that AC VTVM and oscilloscope are not used.

b. Set G175K Receiver controls as described in paragraph 5-11, steps b. and c. and rotate COR SENS control fully clockwise.

c. Tune signal generator to 60 mc set for CW mode; decrease output to zero.

d. Remove input signal; simultaneously depress COR DELAY DISABLE switch and rotate COR SENS control to point where COR lamp just extinguishes.

e. Reconnect signal generator and increase output level to 4.0 μv; note that COR lamp illuminates.

f. Increase signal generator output to 1.0 mv.

g. Rotate COR SENS control fully counterclockwise and observe that COR lamp extinguishes after preset delay time.

h. Place IF BANDWIDTH KC switch in 4K position (if 4 mc IF strip is installed) and repeat steps d. through g. Use a signal generator output level of 16 μv in step e.

i. Use the information in Figure 5-4 for Band B, C, D, E, F, and G tuners.

COR SENSITIVITY CHECK, SETUP INFORMATION

RF TUNER	IF BANDWIDTH (5-13, step c.)	SIGNAL GENERATOR OUTPUT LEVEL (step e.)	SIGNAL GENERATOR FREQUENCY
Band B	300 kc	4.5 μv	200 mc
	4 mc	22.5 μv	200 mc
Band C	300 kc	8.0 μv	400 mc
	4 mc	29.0 μv	400 mc
Band D	300 kc	8.0 μv	800 mc
	4 mc	29.0 μv	800 mc
Band E	300 kc	4.0 μv	20 mc
	4 mc	22.5 μv	20 mc

Figure 5-4

COR SENSITIVITY CHECK, SETUP INFORMATION (Cont)

RF TUNER	IF BANDWIDTH (5-12, step c.)	SIGNAL GENERATOR OUTPUT LEVEL (step e.)	SIGNAL GENERATOR FREQUENCY
Band F	10 mc 4 mc	65 μv 40 μv	1.0 gc
Band G	10 mc 4 mc	65 μv 40 μv	2.0 gc

Figure 5-4

5-14. COR Dropout Delay

The COR dropout delay times may be checked using any RF tuner installed.

a. Connect equipment as shown in Figure 5-2 except that oscilloscope and AC VTVM are not used.

b. Place G175K Receiver BAND SELECT switch in position necessary to activate tuner to be used; tune associated tuning dial to approximately midband.

c. Place receiver IF BANDWIDTH KC switch in 300 position and MODE SELECT switch to AM AGC.

d. Tune signal generator to frequency shown on receiver tuning dial; adjust controls for CW mode and an output level of 10 μv.

e. Adjust COR SENS control until COR lamp just illuminates.

f. Increase signal generator output level to 100 μv.

g. Place COR DELAY switch on receiver rear apron to 3-second position.

h. Simultaneously start the stop watch and remove the signal generator output; time the dropout delay period.

i. The COR lamp should extinguish in 3 ± 0.6 seconds.

j. Repeat steps d. through i. while setting the COR DELAY switch to the three remaining positions. The COR lamp should extinguish after the following periods:

5-second delay	5 ± 1.0 seconds
7-second delay	7 ± 1.4 seconds
10-second delay	10 ± 2.0 seconds

5-15. COR Delay Disable

a. Connect equipment as shown in Figure 5-2 except that oscilloscope and AC VTVM are not used.

b. Set receiver controls as described in paragraph 5-14, steps b. and c.

c. Adjust signal generator for an AM output signal modulated 50% by a 1000-cycle tone; set output frequency to agree with frequency shown on selected receiver tuning dial; set output level to 100 μv.

d. Set rear-apron COR DELAY switch to 10-second position.

e. Remove signal generator output signal and with COR in delay mode depress COR DELAY DISABLE switch and note that COR lamp immediately extinguishes.

5-16. AUDIO OUTPUT LEVEL

Prior to the performance of the audio output level tests it should be noted that an accurately aligned IF strip is necessary to obtain the results given. Refer to Parts 3, 4, 5, 6, and 7 of this manual for IF amplifier alignment procedures.

a. Connect equipment as shown in Figure 5-5.

AUDIO OUTPUT LEVEL TEST SETUP

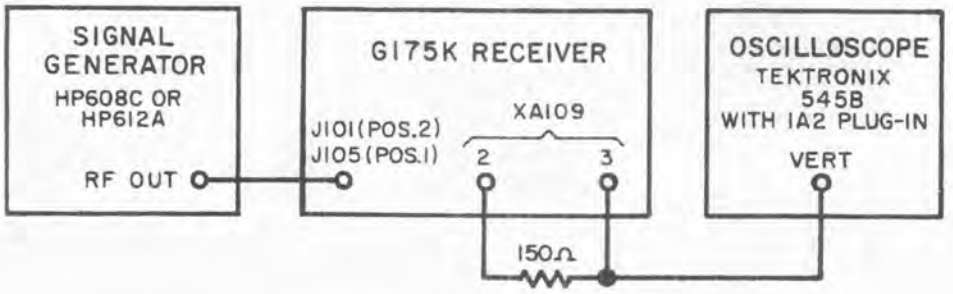


Figure 5-5

b. Place G175K Receiver MODE SELECT switch in AM AGC position; set IF BANDWIDTH KC to 300 and BAND SELECT switch in position necessary to activate tuner to be used.

c. Adjust signal generator output frequency to agree with frequency shown on selected tuning dial; set output level to 4.0 μv, AM mode, modulated 50% by 1000-cps tone.

d. Rotate the AUDIO GAIN control clockwise until at least a 7.0-volt peak-to-peak reading is obtained on the oscilloscope.

5-17. AUDIO FREQUENCY RESPONSE AND DISTORTION

a. Connect equipment as shown in Figure 5-6.

b. Place G175K MODE SELECT switch half-way between AM AGC and AM MAN; rotate AUDIO GAIN control fully clockwise and SQUELCH SENS control fully counterclockwise.

c. Tune test oscillator to 30 cps and adjust output level for an audio output of 3.9 vrms as read on HP332A meter.

d. While maintaining the input constant, vary the input frequency from 30 cps to 25 kc. The audio output shall not vary more than 3 db.

e. Adjust the HP332A controls to read distortion. Measure the distortion at frequencies of 50, 1000, and 10,000 cps. The distortion at rated output should not exceed 5%.

AUDIO FREQUENCY RESPONSE AND DISTORTION TEST SETUP

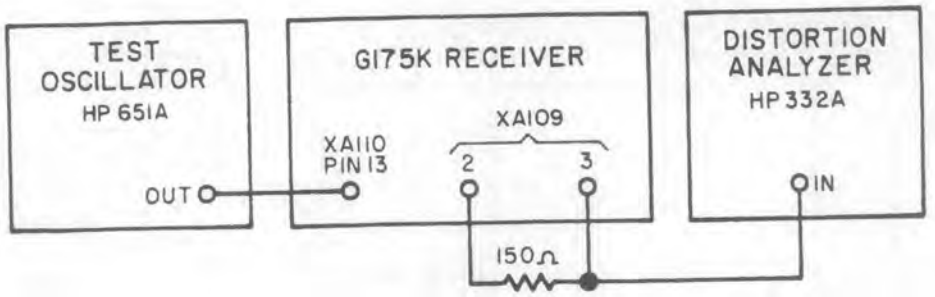


Figure 5-6

5-18. VIDEO OUTPUT LEVEL

a. Connect equipment as shown in Figure 5-7.

b. Place G175K Receiver MODE SELECT switch in AM AGC position; set IF BANDWIDTH KC switch to 300 position, and BAND SELECT switch to position necessary to activate tuner to be used.

c. Set signal generator output frequency to agree with frequency shown on selected tuning dial; adjust output level to 4.0 μv, AM mode, modulated 50% by a 1000-cycle tone.

d. Observe the oscilloscope and note that it is possible to set the VIDEO GAIN SET control so as to produce at least a 2.0 volt peak-to-peak signal.

VIDEO OUTPUT LEVEL TEST SETUP

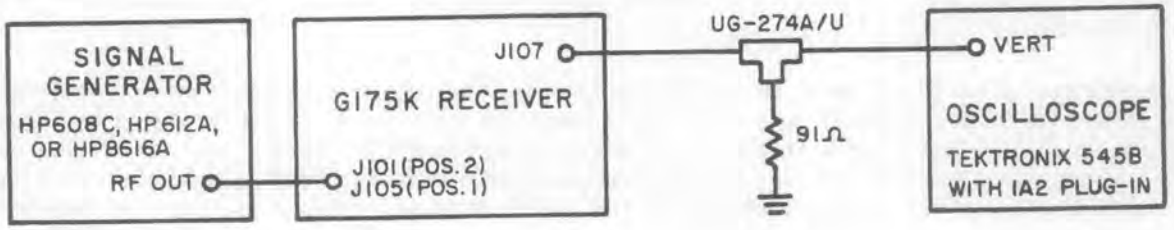


Figure 5-7

5-19. VIDEO FREQUENCY RESPONSE AND DISTORTION

a. Connect equipment as shown in Figure 5-8.

b. Place G175K Receiver MODE SELECT switch half-way between AM AGC and AM MAN; rotate VIDEO GAIN SET control fully clockwise.

c. Set test oscillator output frequency to 1000 cps and adjust level for a -1 dbm video output.

d. While maintaining the input constant, change the frequency from 20 cps to 5.0 mc; the video output should not vary more than 3 db.

VIDEO FREQUENCY RESPONSE AND DISTORTION TEST SETUP

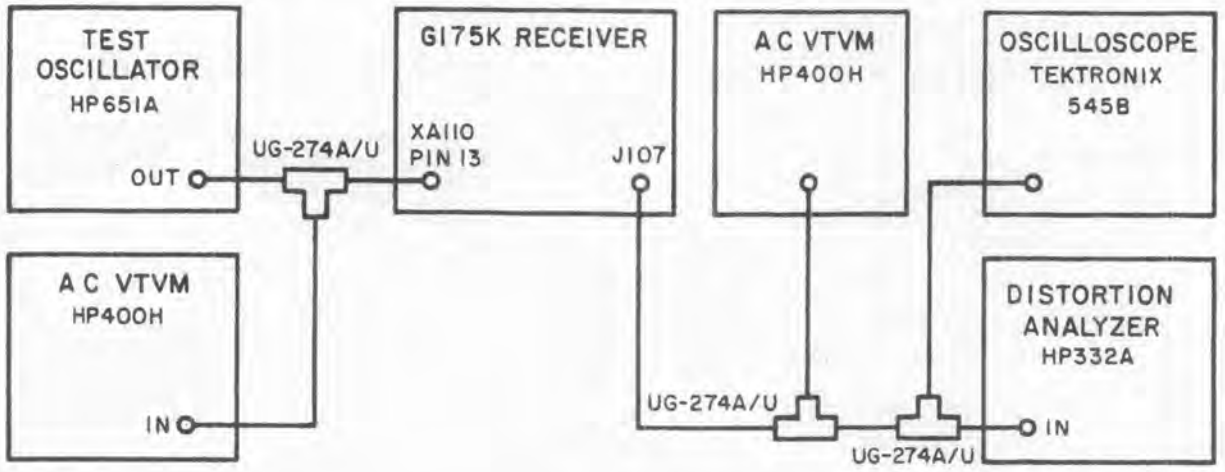


Figure 5-8

e. Adjust HP332A controls to read distortion. Measure the distortion at 20 cps, 50 cps, 1 kc, 10 kc, and 600 kc. The distortion at rated output should not exceed 5%.

5-20. UNSCHEDULED MAINTENANCE

Unscheduled maintenance on the G175K Receiver is normally confined to the correction of discrepencies noted when the unit has been checked for a previously reported trouble. Such maintenance may include the removal of an excess accumulation of dust or dirt when the receiver is in the shop due to a burned out RF amplifier tube or inoperative IF amplifier. Any such discrepencies noted during a visual inspection should be corrected before further testing is carried out.

Most troubles experienced with the receiver will be caused by failures of the fuse, vacuum tubes, transistors, or diodes. When any of these are suspected, they should be replaced with parts known to be good before attempting any other troubleshooting.

Initial troubleshooting in the G175K Receiver should be confined to localizing the trouble to a specific subassembly. In the case of the plug-in modules substitution of a spare known to be good will usually correct the fault. Elimination of the plug-in modules leaves the RF tuning heads, narrow and wideband IF amplifier, and the IF filter/switching module. A simple method of determining the faulty subassembly is to feed in a RF signal of the proper frequency at at the RF input and check for an output at each subassembly using a wideband oscilloscope. Once the subassembly is known, additional signal tracing will normally locate the defective stage. Transistor element and module pin voltages listed in Figure 5-10 of this part, and in the maintenance sections of the succeeding parts of this manual should then be used to locate the malfunctioning component. Figure 5-9 is a chart listing aids that may be helpful in troubleshooting the main chassis of the receiver.

5-21. SUBASSEMBLY REPLACEMENT

The plug-in modules can be easily removed by simply pulling them upward from the receptacles into which they are fitted. The numbers on the main chassis adjacent to the module pins correspond to the numbers indicated on the main chassis schematic diagrams, FO-2 and FO-3, at the points where the connecting leads pass through the lines outling each module. All plug-in modules have their type numbers etched on the back of the cards. By referring to the schematic diagrams, their reference designation prefixes can be found and thus their proper location

in the unit. Refer to Section V in Parts 2 through 14 for procedures on the replacement of the spectrum display unit, 300-kc bandwidth IF amplifier, 4-mc bandwidth IF amplifier, the two 10-mc bandwidth IF amplifiers, and RF tuning heads.

TROUBLESHOOTING CHART, G175K RECEIVER MAIN CHASSIS

SYMPTOM	PROBABLE CAUSE	REMEDY
Input power applied, unit fails to operate.	Blown fuse.	Locate cause of blown fuse, correct, and replace fuse.
No SDU input signal; IF input signal present.	Resistor A113R2 open.	Replace resistor.
No SDU input signal, no IF input signal.	Faulty RF tuner or converter.	Refer to respective parts of manual for maintenance data on particular unit.
SDU input signal present; IF input signal present but no audio or video output signal on one of the receiver bandwidths.	Faulty IF filter/switching module; faulty IF amplifier.	Refer to troubleshooting data in Parts 3, 4, 5, 6, and 7 of this manual respectively.
SDU input signal, IF input signal video output signal present on all IF bandwidths but no audio output.	Faulty audio module.	Replace module.
SDU input signal and audio output signal present on all IF bandwidths but no video output.	Faulty video module.	Replace module.
SDU input signal, audio and video output signals present and squelch operative but COR inoperative.	a. Faulty COR module. b. Faulty COR relay.	a. Replace module. b. Replace relay.
SDU input signal, audio and video output signals present and COR operative but squelch inoperative.	Faulty squelch circuit on audio module.	Refer to Figure 5-10 of this part for voltage measurements of audio module; locate faulty part and replace.
Audio, Video, COR outputs present; squelch operative but no SDU display.	Defective SDU subassembly.	Refer to Section V Part 2 for trouble-shooting data on SDU.

Figure 5-9

TRANSISTOR & MODULE PIN VOLTAGES, G175K MAIN CHASSIS

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
Q101	2N3055	10.4	10.9	17.6
Q102	2N3055	22.5	23.0	30.0

Type 7417 Audio Amplifier A109

Pin Number	2	3	13	14	15	16	17
Voltage	0.0	0.0	22.6	0.0	-11.7	-11.7	0.58

Type 7351 Video Amplifier A110

Pin Number	2	9	13
Voltage	0.0	22.6	0.2

Type 7865 AGC Amplifier A111 (G175K00000-1)*

Pin Number	2	3	4	5	6	7	8	9	10
Voltage	-11.7	10.5	10.3	0.5	0.5	8.0	0.2	10.0	0.0

Type 7868 AGC Amplifier A111 (G175K00000-2) *

Pin Number	2	3	4	6	7	9
Voltage	-11.6	-11.2	10.6	9.5	10.7	10.6

COR Amplifier A112

Pin Number	1	2	3	6	7	8	9	10
Voltage	0.0	22.5	0.68	-0.1	-11.6	0.6	0.0	22.5

TEST CONDITIONS: Readings are positive dc with respect to chassis unless otherwise noted. No signal input to receiver; 115 vac applied. All gain controls fully clockwise; COR DELAY switch in 10 sec. position. Readings taken with HP410C VTVM.

NOTE: * MODE SELECT in AM AGC position.

Figure 5-10

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

INTRODUCTION

PURPOSE AND FORMAT

This Illustrated Parts Breakdown lists and describes electrical and mechanical parts to assist in requisitioning, storing, and identifying spare parts. Four major parts comprise this section: (1) Introduction, (2) Group Assembly Parts Breakdown, (3) Numerical Index, and (4) Reference Designation Index.

SUMMARY OF CONTENTS

INTRODUCTION

Included in the Introduction are: (1) Purpose and Format, (2) Summary of Contents, (3) How to Use, (4) Abbreviations, and (5) List of Manufacturers' Codes and Addresses.

GROUP ASSEMBLY PARTS BREAKDOWN

The Group Assembly Parts Breakdown contains illustrations and parts lists of assemblies, and detailed parts. The illustrations and text are arranged according to function and/or next assembly. When it is necessary to show a subassembly in detail, and it is not possible to do so in the same illustration as its major assembly, it is referenced to another illustration in which the subassembly is exploded in as much detail as necessary and its component parts listed in the accompanying text.

The nomenclature of each part, the units per assembly, and the usable on code, if any, are listed to the right of the part number in the text. Next assembly sequence is determined by indenture position; that is, a part listed one column to the right of the position of the part above it is a component of that assembly or installation. Attaching parts are shown directly below in the same indenture column as the parts they attach.

When a manufacturer's part is listed, the manufacturer's code is given in the nomenclature along with any other information thought necessary or helpful. The manufacturer's name and address may be found from the code symbol by consulting the "List of Manufacturers' Codes and Addresses" in the Introduction. The codes are in accordance with Federal Supply Code for Manufacturers, Cataloging Handbook H4-1.

The following "Usable on Codes" are utilized in this publication:

A - Parts applicable to G175K00000-1 only.

B - Parts applicable to G175K00000-2 only.

The number of parts given under the column entitled "Units per Assembly" constitute that numer required to make up a single assembly.

Left- and right-hand parts are listed separately. Component parts of left- and right-hand assemblies are identified by determining next assembly order. When a left- or right-hand assembly has both left- and right-hand parts as components, the nomenclature will show the assembly to which each belongs.

NUMERICAL INDEX

Each part number appearing in the Group Assembly Parts Breakdown is listed in the Numerical Index. This index is compiled in accordance with the numerical part number filing system described below. Read part numbers from left to right, one digit at a time, to determine part number numerical arrangement. The order of precedence in part number numerical arrangement is as follows:

(1) Space (blank column)
(2) Dash (-)
(3) Letters A thru Z
(4) Numerals 0 thru 9

All part numbers are listed with the figure and index number of each appearance.

REFERENCE DESIGNATION INDEX

The Reference Designation Index includes all components of electronic equipment having reference designators.

The Reference Designation Index is divided into three columns consisting of the following: (1) REFERENCE DESIGNATION - Reference designators listed in alphanumerical order; (2) FIG. AND INDEX NO. - Used to locate the corresponding part in the Group Assembly Parts Breakdown; (3) MFR PART NUMBER - The part number assigned by the manufacturer of the part.

HOW TO USE

KNOWN ➡	MFR PART NO.	REFERENCE DESIGNATION NO. (COMPONENT NUMBERS ON SCHEMATICS)
WANT TO KNOW ➡	SEQUENCE OF ASSEMBLY	MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED
SOLUTION ➡	IN NUMERICAL INDEX FIND MFR PART NUMBER. SEQUENCE OF ASSEMBLY MAY BE FOUND ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.	IN REFERENCE DESIGNATION INDEX FIND REFERENCE DESIGNATION NUMBER. FIND MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.

ABBREVIATIONS

A	Amp
AGC	Automatic Gain Control
AP	Attaching Part
ASSY	Assembly
COR	Carrier Operated Relay
FIG	Figure
IF	Intermediate Frequency
K	Kilo (10^3)
KC	Kilocycle (10^3)
MFR	Manufacturer
mh	Millihenry (10^{-3})
NHA	Next Higher Assembly
NO	Number
PC	Percent
pf	Picofarad (10^{-12})
REF	Reference
μf	Microfarad (10^{-6})
μh	Microhenry (10^{-6})
V	Volt
W	Watt
wvdc	Working Volts Direct Current

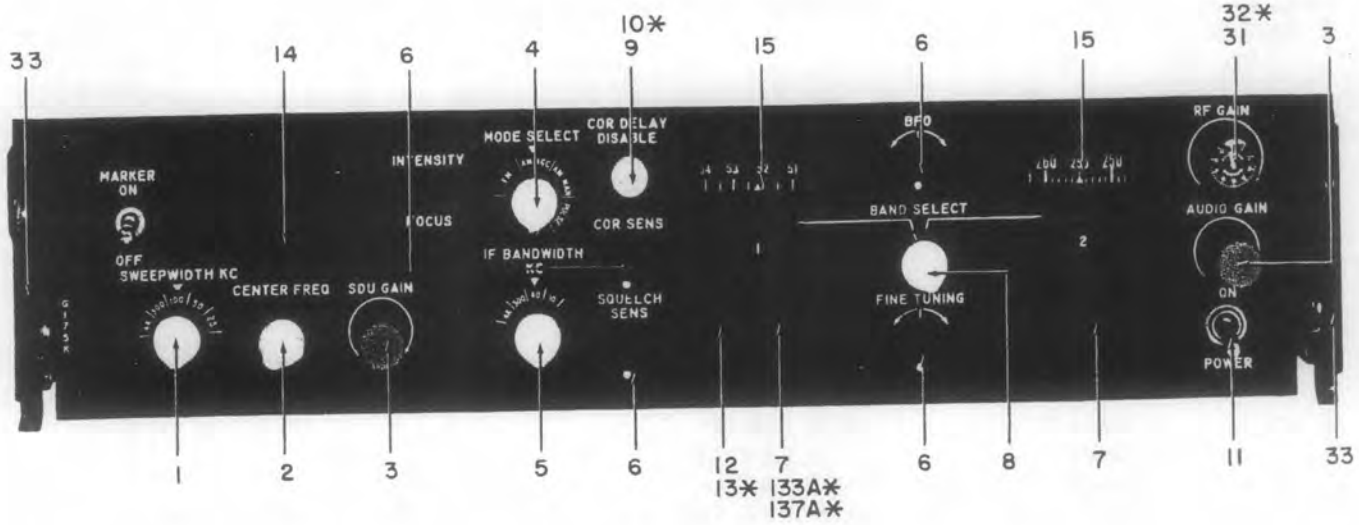
LIST OF MANUFACTURERS' CODES AND ADDRESSES

CODE	NAME AND ADDRESS
02114	Ferroxcube Corp. of America Mt. Marion Road Saugerties, New York 12477
02660	Amphenol Corporation 2801 S. 25th Avenue Broadview, Illinois 60153
06001	General Electric Company Capacitor Department P. O. Box 158 Irmo, South Carolina 29063
07047	The Ross Milton Company 511 Second Street Pike Southampton, Pennsylvania 18966
11139	Deutsch Company Electronic Components Division Banning, California 92220
12969	Unitrode Corporation 580 Pleasant Street Watertown, Massachusetts 02172
13103	Thermalloy Company 8717 Diplomacy Row Dallas, Texas 75247
14632	Watkins-Johnson Company CEI Division 6006 Executive Boulevard Rockville, Maryland 20852
15605	Cutler-Hammer Incorporated Milwaukee, Wisconsin
16179	Omni-Spectra, Incorporated 24600 Hallwood Court Farmington, Michigan 48024
16733	Phelps Dodge Electronic Products Corporation 60 Dodge Avenue North Haven, Connecticut 06473
19505	Applied Engineering Products Company Division of Samarius, Inc. 26 E. Main Street Ansonia, Connecticut 06401
27193	Cutler-Hammer, Inc. Special Products Division 4201 N. 27th Street Milwaukee, Wisconsin 53216
27925	Relay Company of America Division of Detronix Ltd. 20 Railroad Avenue East Northport, New York 11731
37942	P. R. Mallory and Company, Inc. 3029 E. Washington Street Indianapolis, Indiana 46206
56289	Sprague Electric Company Marshall Street North Adams, Massachusetts 01247
71279	Cambridge Thermionic Corporation 445 Concord Avenue Cambridge, Massachusetts 02138
71286	Camloc Division, Rex Chainbelt Inc. 22 Spring Valley Road Paramus, New Jersey 07652
71590	Globe-Union Incorporated Centralab Division P. O. Box 591 Milwaukee, Wisconsin 53201
71744	Chicago Miniature Lamp Works 4433 Ravenswood Avenue Chicago, Illinois 60640
72307	Fahnestock Electric Co., Inc. 46-44 11th Street Long Island City, New York 11101
72619	Dialight Corporation 60 Stewart Avenue Brooklyn, New York 11237

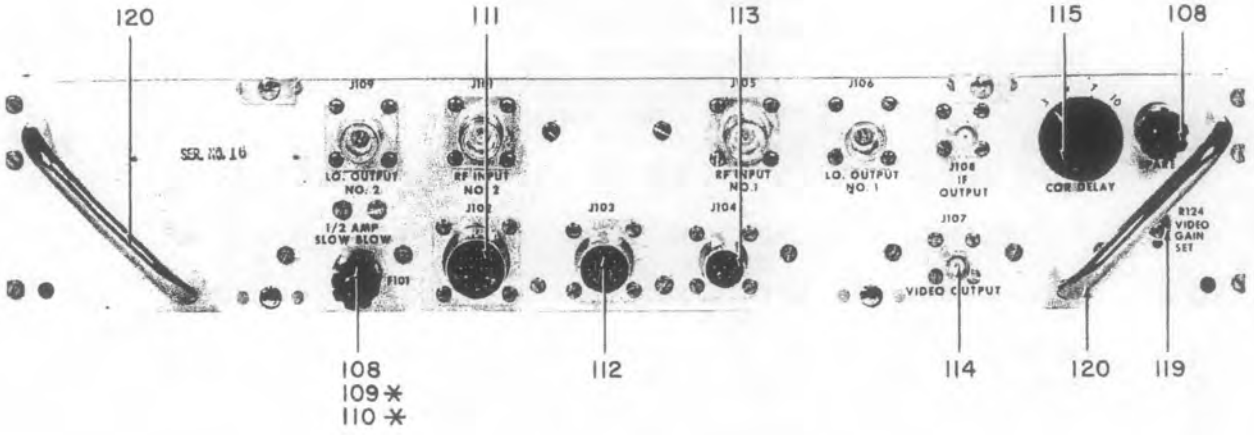
LIST OF MANUFACTURERS' CODES AND ADDRESSES (Cont)

CODE	NAME AND ADDRESS
72653	GC Electronics Company Division of Hydrometals Inc. 400 South Wyman Street Rockford, Illinois 61101
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
74868	Amphenol Corporation Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
75042	IRC Division of TRW Incorporated 401 North Broad Street Philadelphia, Pennsylvania 19108
79963	Zierick Manufacturing Corporation 83 Rockdale Avenue New Rochelle, New York 10802
80131	Electronic Industries Association 2001 Eye Street, N. W. Washington, D. C. 20006
80294	Bourns, Incorporated 1200 Columbia Avenue Riverside, California 92507
81312	Winchester Electronics Division Litton Industries, Incorporated Main Street & Hillside Avenue Oakville, Connecticut 06779
83330	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, Illinois 60646
91506	Augat, Incorporated 33 Perry Avenue Attleboro, Massachusetts 02703
91637	Dale Electronics, Inc. P. O. Box 609 Columbus, Nebraska 68601
91662	Elco Corporation Maryland Rd. & Computer Avenue Willow Grove, Pennsylvania 19090
92825	Whitso Incorporated 9330 Byron Street Schiller Park, Illinois 60176
94144	Raytheon Company Lexington, Massachusetts 02173
94375	Automatic Metal Products Company 315-323 Berry Street Brooklyn, New York 11211
99378	Atlee Corporation 2 Lowell Avenue Winchester, Massachusetts 01890

TYPES G175K00000-1 AND G175K00000-2 RECEIVERS



FRONT VIEW

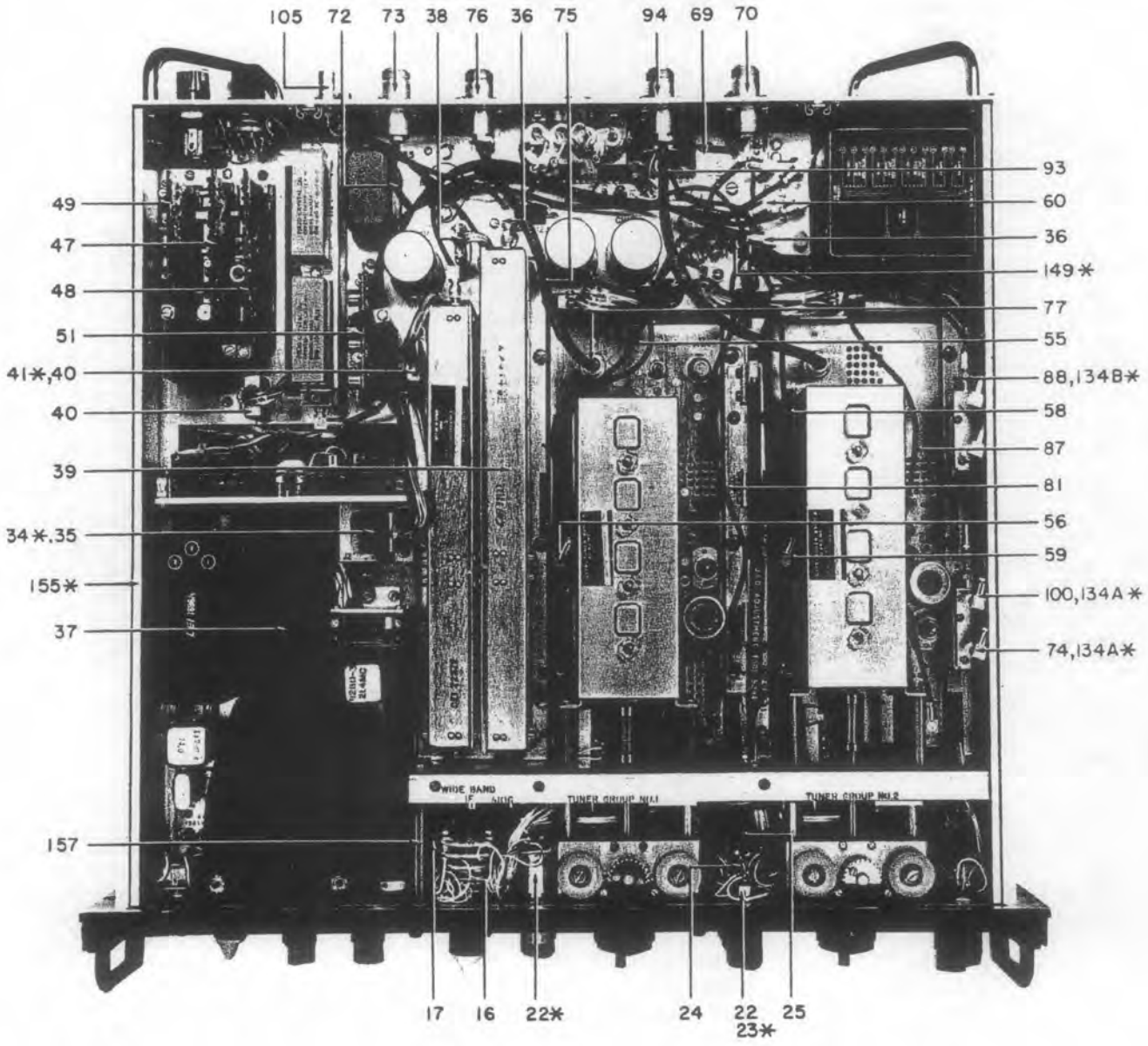


REAR VIEW

Figure 6-1 (Sheet 1)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	G175K00000-1	RECEIVER, RADIO	1	A
	G175K00000-2	RECEIVER, RADIO	1	B
	30625-2	. COVER, TOP -14632-	1	
	5S5-8	. . STUD, TURNLOCK FASTENER -71286-	2	
	5S3-1	. . WASHER, SPLIT -71286-	2	
	30625-3	. COVER, BOTTOM -14632-	1	
	5S5-8	. . STUD, TURNLOCK FASTENER -71286-	2	
	5S3-1	. . WASHER, SPLIT -71286-	2	
-1	12781	. KNOB -14632-	1	
	AN565DC6-2	. SETSCREW (AP)	2	
-2	70-2-2G2	. KNOB -94144-	1	
	AN565DC4-2	. SETSCREW (AP)	2	
-3	70-2-2G4	. KNOB -94144-	2	
	AN565DC4-2	. SETSCREW (AP)	4	
-4	13347	. KNOB -14632-	1	
	AN565DC6-2	. SETSCREW (AP)	2	
-5 *	12782-1	. KNOB -14632-	1	
	AN565DC6-2	. SETSCREW (AP)	2	
-6	70-2WD-1G	. KNOB -94144-	4	
	AN565DC4-2	. SETSCREW (AP)	8	
-7	1914-2	. KNOB -14632-	2	
	AN565DC8-3	. SETSCREW (AP)	4	
-8	1447-1	. KNOB -14632-	1	
	AN565DC4-2	. SETSCREW (AP)	2	
-9	192-0304-1475-604	. SWITCH, PUSH -72619-	1	
-10	345	. . LAMP, INCANDESCENT, 6V, 0.04A -80131-	1	
-11	8803K6	. SWITCH, TOGGLE, SPST -27193-	1	
-12	40514	. EDGE-LITE PANEL -14632-	1	
	MS35231-28	. SCREW, MACHINE (AP)	8	
-13	CM8-683	. . LAMP, INCANDESCENT, 5V, 0.063A -71744-	32	
-14	1425	. FILTER, LIGHT -14632-	1	
-15	12750	. WINDOW	2	
-16	PA117-539-0AA	. SWITCH, ROTARY, 4 SECTION, 8 POLE, 5 POSITION -71590-	1	
-17	C023B101L503M	. CAPACITOR, FIXED, CERAMIC, 0.05 μf, 20 pct, 100 wvdc -56289-	1	
-18	PA117-498-0AA	. SWITCH, ROTARY, 3 SECTION, 9 POLE, 4 POSITION -71590-	1	
-19	RCR07G273JS	. RESISTOR, FIXED, COMPOSITION	1	
-20	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	1	
-21	3635-45	. COIL, RADIO FREQUENCY, 4.7 mh -71279-	2	
-22	RV6NAYSD504A	. RESISTOR, VARIABLE	3	
-23	RCR07G105JS	. RESISTOR, FIXED, COMPOSITION	1	
-24	1128-46	. SWITCH, ROTARY, 2 SECTION, 8 POLE, 2 POSITION -14632-	1	
-25	1N4734	. SEMICONDUCTOR DEVICE, DIODE, SILICON ZENER -80131-	1	
-26	RV6NAYSD104A	. RESISTOR, VARIABLE	2	
-27	RCR07G513JS	. RESISTOR, FIXED, COMPOSITION	1	
-28	RCR07G184JS	. RESISTOR, FIXED, COMPOSITION	1	
-29	1N979A	. SEMICONDUCTOR DEVICE, DIODE, SILICON ZENER -80131-	1	
-30	TAO-1UFZ	. CAPACITOR, FIXED, CERAMIC, 0.1 μf, -20+80 pct, 100 wvdc -91418-	1	
-31	3600S1-103	. RESISTOR, VARIABLE, 10K, ±5 pct, 1-1/2W -80294-	1	
-32	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	

TYPE G175K00000-1 RECEIVER

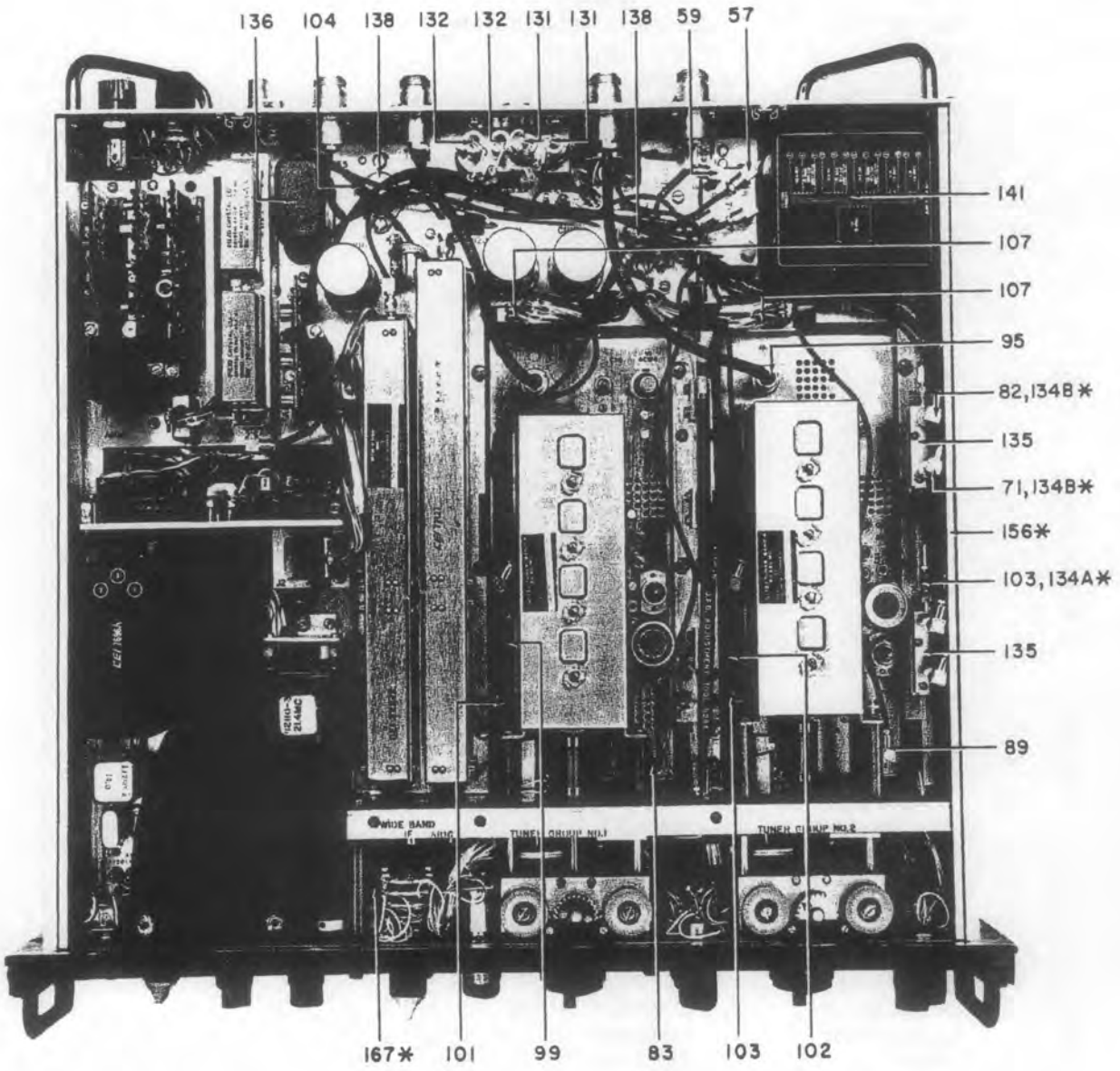


TOP VIEW

Figure 6-1 (Sheet 2)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1-33	35L22-3	. HANDLE, LATCH TYPE -71286-	2	
	MS35250-70	. SCREW, MACHINE (AP)	4	
-34	SM2P	. CONNECTOR, PLUG, ELECTRICAL -81312-	1	
-35	SLE7SNSS	. CONNECTOR, RECEPTACLE, ELECTRICAL -81312-	1	
-36	UG1466U	. CONNECTOR, PLUG, ELECTRICAL	6	
-37	79198	. SPECTRUM DISPLAY UNIT -14632- (FOR BREAKDOWN SEE PART 2, FIGURE 6-1)	1	
	MS35233-13	. SCREW, MACHINE (AP)	5	
	MS35338-78	. WASHER, LOCK (AP)	5	
-38	SLE7PNSS	. CONNECTOR, PLUG, ELECTRICAL -81312-	1	
-39	72127	. 300 KC IF AMPLIFIER -14632- (FOR BREAKDOWN SEE PART 4, FIGURE 6-1)	1	
	MS35233-26	. SCREW, MACHINE (AP)	4	
-40	SLE14PNSS	. CONNECTOR, PLUG, ELECTRICAL -81312-	2	
-41	RCR07G912JS	. RESISTOR, FIXED, COMPOSITION	1	
-42	30020-538	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	
-43	UG1466U	. CONNECTOR, PLUG, ELECTRICAL	2	
-44	79193	. IF FILTER/SWITCHING MODULE -14632- (FOR BREAKDOWN SEE PART 3, FIGURE 6-1)	1	
	MS35233-13	. SCREW, MACHINE (AP)	4	
-45	12746	. CLIP, PC BOARD -14632-	4	
	MS35233-13	. SCREW, MACHINE (AP)	4	
-46	12747-1	. POST -14632-	4	
	MS35233-14	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LCOK (AP)	4	
	MS15795-804	. WASHER, FLAT (AP)	4	
-47	7417	. AUDIO MODULE -14632- (FOR BREAKDOWN SEE FIGURE 6-2)	1	
-48	7351	. VIDEO MODULE -14632- (FOR BREAKDOWN SEE FIGURE 6-3)	1	
-49	7865	. AGC MODULE -14632- (FOR BREAKDOWN SEE FIGURE 6-4)	1	A
-50	7868	. AGC MODULE -14632- (FOR BREAKDOWN SEE FIGURE 6-5)	1	B
-51	7508A	. COR MODULE -14632- (FOR BREAKDOWN SEE FIGURE 6-6)	1	
-52	00-5002-018-103-002	. CONNECTOR, RECEPTACLE, ELECTRICAL -91662-	1	
-53	00-5002-014-103-002	. CONNECTOR, RECEPTACLE, ELECTRICAL -91662-	1	
-54	00-5002-010-103-002	. CONNECTOR, RECEPTACLE, ELECTRICAL -91662-	2	
	MS35233-14	. SCREW MACHINE (AP)	8	
	MS35338-78	. WASHER, LOCK (AP)	8	
	MS15795-804	. WASHER, FLAT (AP)	8	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	8	
-55	30020-536	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	
-56	1202-188	. . CONNECTOR, PLUG, ELECTRICAL -16733-	1	
-57	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL -16733-	1	
-58	30020-537	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	
-59	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL	2	
-60	79207	. IF COUPLER -14632- (FOR BREAKDOWN SEE FIGURE 6-7)	1	A
-61	79684	. IF COUPLER -14632- (FOR BREAKDOWN SEE FIGURE 6-8)	1	B
	MS35233-12	. SCREW, MACHINE (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-62	13440	. PULSE AGC BOARD -14632- (FOR BREAKDOWN SEE FIGURE 6-9)	1	

TYPE G175K00000-1 RECEIVER

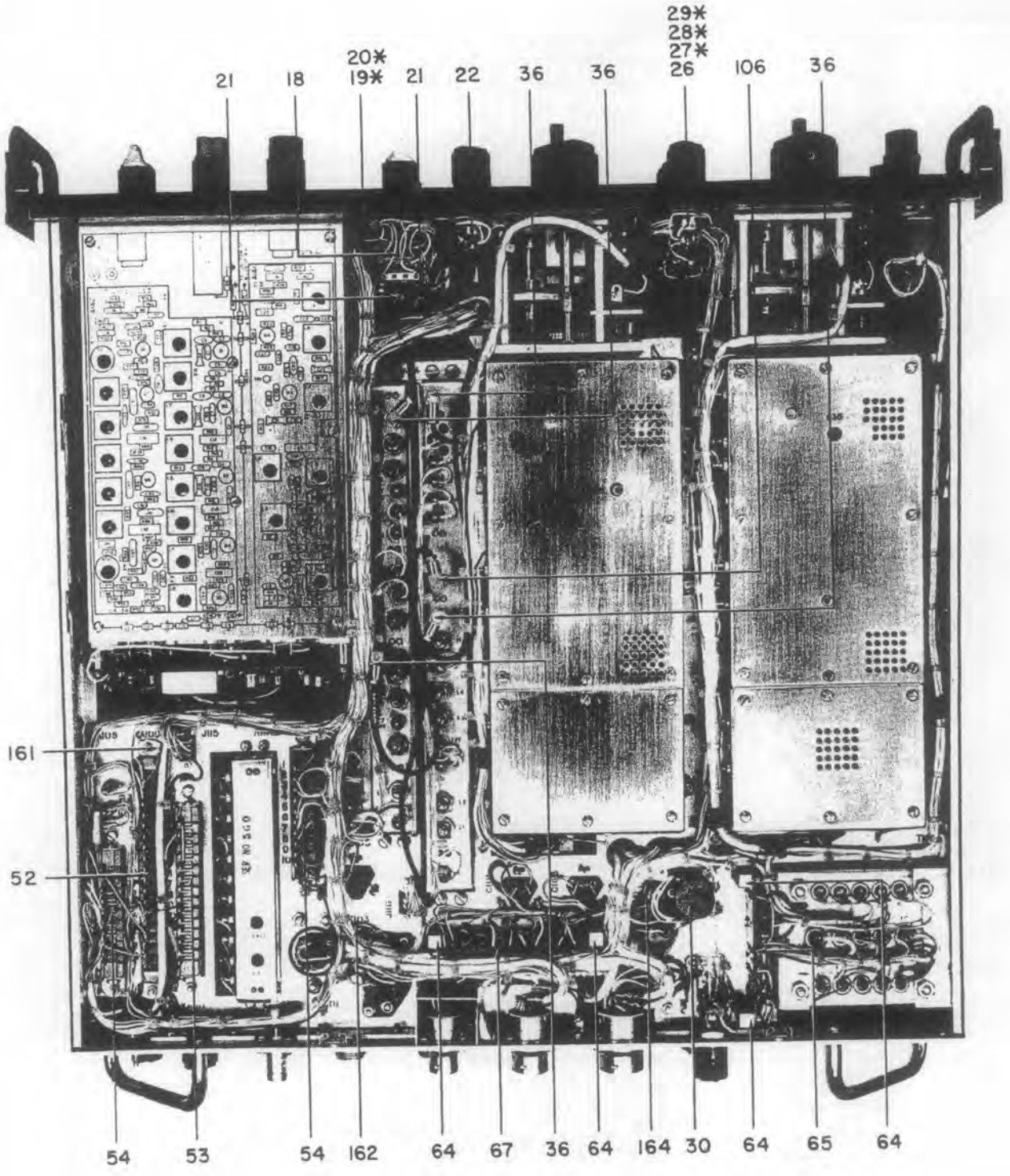


TOP VIEW

Figure 6-1 (Sheet 3)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	MS35233-13	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS15795-804	. WASHER, FLAT (AP)	4	
-63	13437	. POST -14632-	2	
	MS35249-21	. SCREW, MACHINE (AP)	2	
-64	1100-1	. POST -14632-	4	
	MS35233-13	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
-65	12963	. POWER RECTIFIER BOARD -14632- (FOR BREAK-DOWN SEE FIGURE 6-10)	1	A
-66	15875	. POWER RECTIFIER BOARD -14632- (FOR BREAK-DOWN SEE FIGURE 6-11)	1	B
	MS35233-15	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS15795-804	. WASHER, FLAT (AP)	4	
-67	13235	. POWER SUPPLY BOARD -14632- (FOR BREAKDOWN SEE FIGURE 6-12)	1	A
-68	15878	. POWER SUPPLY BOARD -14632- (FOR BREAKDOWN SEE FIGURE 6-13)	1	B
	MS35233-15	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS15795-804	. WASHER, FLAT (AP)	4	
-69	30020-528	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-70	025N3800-19	. . CONNECTOR, RECEPTACLE, ELECTRICAL -94375-	1	A
-71	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL -94375-	1	A
-72	30020-529	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-73	025N3800-19	. . CONNECTOR, RECEPTACLE, ELECTRICAL -94375-	1	A
	MS35233-13	. . SCREW, MACHINE (AP)	4	
	MS35338-78	. . WASHER, LOCK (AP)	4	
	MS35649-44	. . NUT, PLAIN, HEXAGON (AP)	4	
-74	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL	1	A
-75	30020-530	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-76	UG1095AU	. . CONNECTOR, RECEPTACLE, ELECTRICAL	1	A
	MS35233-13	. . SCREW, MACHINE (AP)	4	
	MS35338-78	. . WASHER, LOCK (AP)	4	
	MS35649-44	. . NUT, PLAIN, HEXAGON (AP)	4	
-77	UG88U	. . CONNECTOR, PLUG, ELECTRICAL	1	A
-77A	1132-6001	. ADAPTER, CONNECTOR -95077-	1	B
	MS35233-13	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	4	
-77B	Part of CP102	. . CONNECTOR, RECEPTACLE, N SERIES	1	B
-78	Part of CP102	. . CONNECTOR, RECEPTACLE, OSM SERIES	1	B
-79	22420	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	B
-80	201-1	. . CONNECTOR, PLUG, ELECTRICAL -16179-	2	B
-81	30020-531	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-82	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL	1	A
-83	1202-188	. . CONNECTOR, PLUG, ELECTRICAL -16733-	1	A
-84	30020-1159	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	B
-85	13764	. . CONNECTOR, RECEPTACLE, ELECTRICAL -14632-	1	B
	MS35233-13	. . SCREW, MACHINE (AP)	4	
	MS35338-78	. . WASHER, LOCK (AP)	4	
	MS35649-44	. . NUT, PLAIN, HEXAGON (AP)	4	
-86	501-1	. . CONNECTOR, PLUG, ELECTRICAL -16179-	1	B
-87	30020-532	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-88	1202-188	. . CONNECTOR, PLUG, ELECTRICAL -16733-	1	A
-89	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL	1	A

TYPE G175K00000-1 RECEIVER

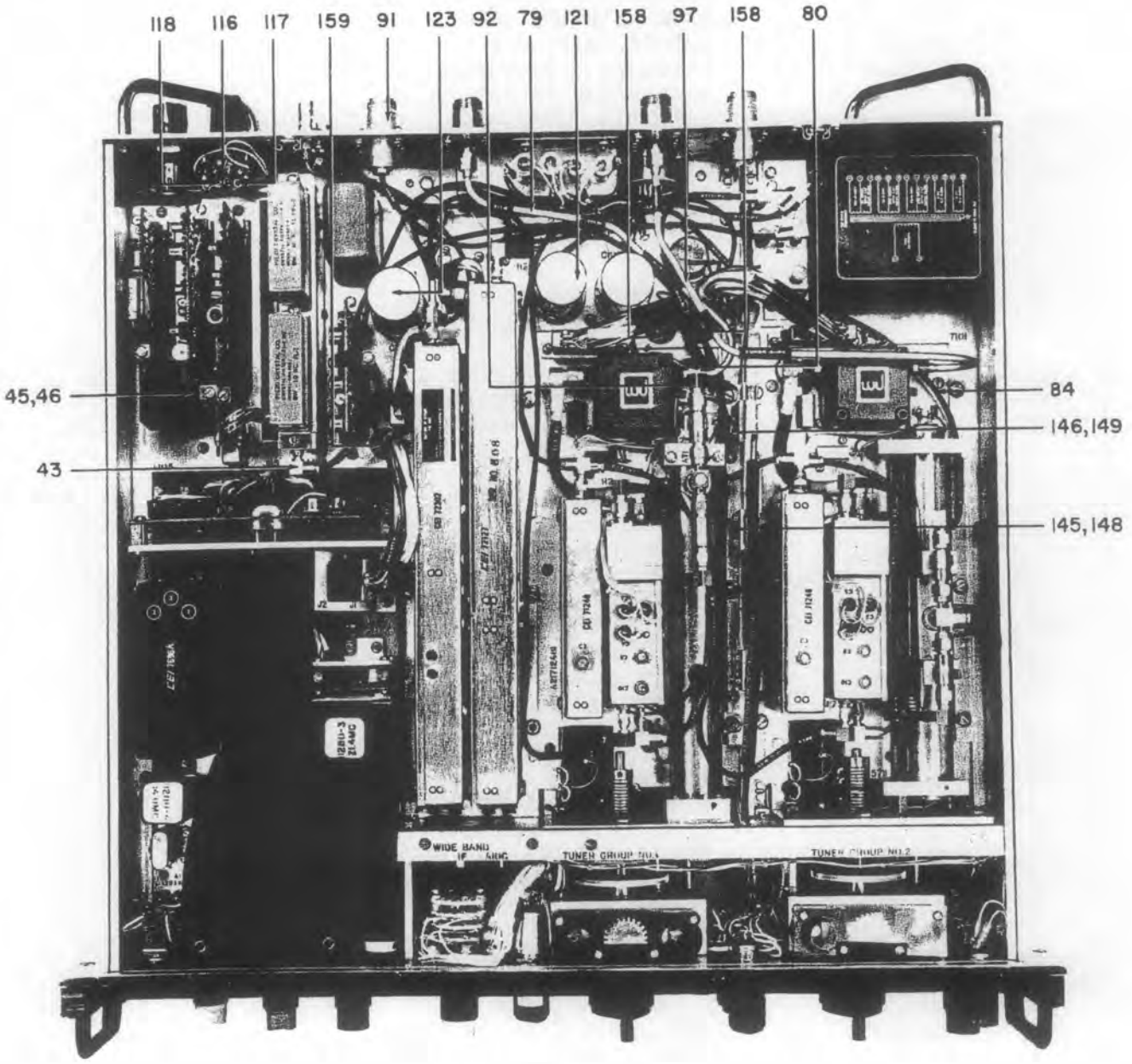


BOTTOM VIEW

Figure 6-1 (Sheet 4)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1-90	30020-1160	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	B
-91	13764	. . CONNECTOR, RECEPTACLE, ELECTRICAL -14632-	1	B
	MS35233-13	. . SCREW, MACHINE (AP)	4	
	MS35338-78	. . WASHER, LOCK (AP)	4	
	MS35649-44	. . NUT, PLAIN, HEXAGON (AP)	4	
-92	501-1	. . CONNECTOR, PLUG, ELECTRICAL -16179-	1	B
-93	30020-533	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-94	UG1095AU	. . CONNECTOR, RECEPTACLE, ELECTRICAL	1	A
	MS35233-13	. . SCREW, MACHINE (AP)	4	
	MS35338-78	. . WASHER, LOCK (AP)	4	
	MS35649-44	. . NUT, PLAIN, HEXAGON (AP)	4	
-95	UG88U	. . CONNECTOR, PLUG, ELECTRICAL	1	A
-95A	1132-6001	. ADAPTER, CONNECTOR -95077-	1	B
	MS35233-13	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	4	
-95B	Part of CP101	. . CONNECTOR, RECEPTACLE, N SERIES	1	B
-96	Part of CP101	. . CONNECTOR, RECEPTACLE, OSM SERIES	1	B
-97	22421	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	B
-98	201-1	. . CONNECTOR, PLUG, ELECTRICAL -16179-	2	B
-99	30020-534	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-100	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL	1	A
-101	1202-188	. . CONNECTOR, PLUG, ELECTRICAL -16733-	1	A
-102	30020-535	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	A
-103	1202-188	. . CONNECTOR, PLUG, ELECTRICAL -14632-	2	A
-104	30020-539	. CABLE ASSEMBLY, RADIO FREQUENCY -14632-	1	
-105	31-203-1004	. . CONNECTOR, RECEPTACLE, ELECTRICAL -74868-	1	
	MS35233-13	. . SCREW, MACHINE (AP)	4	
	MS35338-78	. . WASHER, LOCK (AP)	4	
	MS35649-44	. . NUT, PLAIN, HEXAGON (AP)	4	
-106	UG1466U	. . CONNECTOR, PLUG, ELECTRICAL	1	
-107	SLE26SNSS	. CONNECTOR, PLUG, ELECTRICAL -81312-	2	
-108	342004	. FUSEHOLDER -75915-	2	
-109	F02B250V1-2A	. FUSE, CARTRIDGE	1	A
-110	F02B250V3-4A	. FUSE, CARTRIDGE	1	B
-111	DS00-19P	. CONNECTOR, RECEPTACLE, ELECTRICAL -11139-	1	
	MS35233-14	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	4	
-112	DS00-12P	. CONNECTOR, RECEPTACLE, ELECTRICAL -11139-	1	
	MS35233-14	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	4	
-113	DS00-7P	. CONNECTOR, RECEPTACLE, ELECTRICAL -11139-	1	
	MS35233-14	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	4	
-114	31-203-1004	. CONNECTOR, RECEPTACLE, ELECTRICAL -74868-	1	
	MS35233-13	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	MS35649-44	. NUT, PLAIN, HEXAGON (AP)	4	
-115	70-3-2G	. KNOB -94144-	1	
	AN565DC4-2	. SETSCREW (AP)	2	
-116	11292	. SWITCH, ROTARY, 1 SECTION, 1 POLE, 2-12 POSITION -14632-	1	
-117	CS13BE106K	. CAPACITOR, FIXED, ELECTROLYTIC	2	

TYPE G175K00000-2 RECEIVER

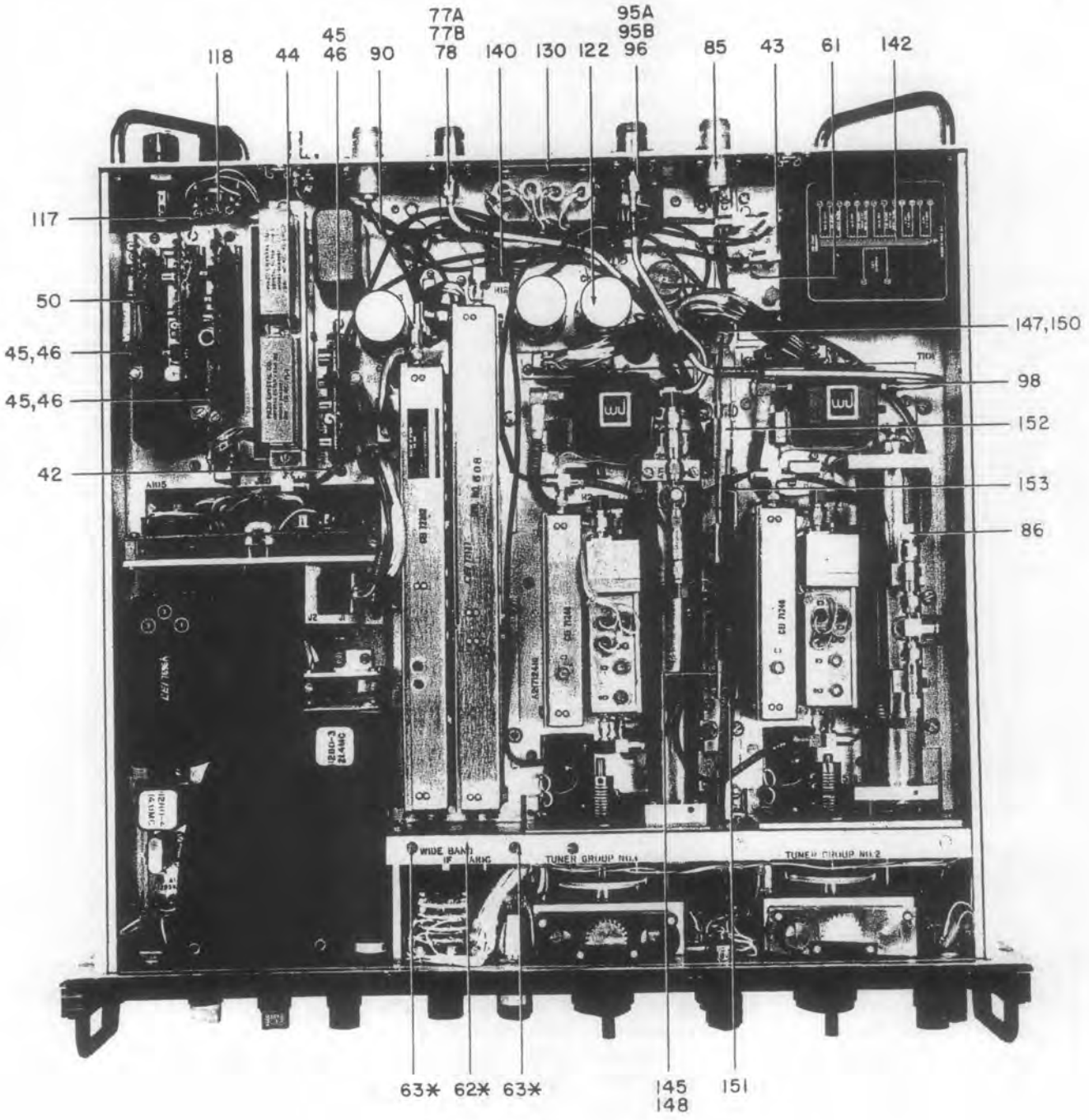


TOP VIEW

Figure 6-1 (Sheet 5)

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
1-118	CS13BF685K	. CAPACITOR, FIXED, ELECTROLYTIC	2	
-119	RV6LAYSA102A	. RESISTOR, VARIABLE	1	
-120	1252-1	. HANDLE, BOW -71279-	2	
	MS35233-43	. SCREW, MACHINE (AP)	4	
	MS35338-80	. WASHER, LOCK (AP)	4	
-121	43F2299BB1	. CAPACITOR, FIXED, ELECTROLYTIC, 15/15 µf, -10 +100 pct, 350 wvdc -06001-	1	
-122	43F2300BB1	. CAPACITOR, FIXED, ELECTROLYTIC, 100/100 µf, -10 +250 pct, 50 wvdc -06001-	1	
-123	43F8123BA2	. CAPACITOR, FIXED, ELECTROLYTIC, 500 µf, -10 +250 pct, 25 wvdc -06001-	1	
-124	MTP207M015P1C	. CAPACITOR, FIXED, ELECTROLYTIC, 200 µf, 20 pct, 15 wvdc -37942-	1	
-125	Deleted			
-126	CS13BF476K	. CAPACITOR, FIXED, ELECTROLYTIC	1	B
-127	MTP207M015P1C	. CAPACITOR, FIXED, ELECTROLYTIC, 200 µf, 20 pct, 15 wvdc -37942-	1	B
-128	UZ815	. SEMICONDUCTOR DEVICE, DIODE -12969-	1	B
-129	56-590-65-4A	. FERRITE BEAD -02114-	8	B
-130	20962	. FILTER SHIELD -14632-	1	
	MS35233-27	. SCREW, MACHINE (AP)	2	
	MS35338-79	. WASHER, LOCK (AP)	2	
-131	1200-022	. LINE FILTER -72982-	2	
-132	9400-000-0002	. LINE FILTER -72982-	2	
-133	SMRE14SG	. CONNECTOR, RECEPTACLE, ELECTRICAL -81312-	2	
-133A	Part of Front Panel	. CONNECTOR, RECEPTACLE, ELECTRICAL	1	
-134	SLE7SNSS	. CONNECTOR, RECEPTACLE, ELECTRICAL -81312-	1	
-134A	Part of K101	. CONNECTOR, RECEPTACLE, ELECTRICAL -74868-	3	A
-134B	Part of K102	. CONNECTOR, RECEPTACLE, ELECTRICAL -74868-	3	A
-135	335-10871-11	. RELAY, COAXIAL SWITCH -74868-	2	A
	MS35233-4	. SCREW, MACHINE (AP)	6	
	MS35338-77	. WASHER, LOCK (AP)	6	
-136	TR3E90022	. RELAY, ARMATURE -27925-	1	
	MS35338-79	. WASHER, LOCK (AP)	3	
	MS35649-64	. NUT, PLAIN, HEXAGON (AP)	3	
-137	126-215	. CONNECTOR, PLUG, ELECTRICAL -02660-	1	
-138	2N3055	. TRANSISTOR, NPN, SILICON	2	
-139	8038-1G1	. SOCKET, TRANSISTOR -91506-	2	
	MS35233-29	. SCREW, MACHINE (AP)	4	
	MS35338-79	. WASHER, LOCK (AP)	4	
-140	RH5-201F	. RESISTOR, VARIABLE, 200 ohms, 1 pct, 5W -91637-	1	
	MS35233-3	. SCREW, MACHINE (AP)	2	
	MS35338-77	. WASHER, LOCK (AP)	2	
	MS35649-24	. NUT, PLAIN, HEXAGON (AP)	2	
-141	12900	. TRANSFORMER, POWER -14632-	1	A
-142	15682	. TRANSFORMER, POWER -14632-	1	B
	MS35338-80	. WASHER, LOCK (AP)	4	
	MS35649-84	. NUT, PLAIN, HEXAGON (AP)	4	
-143	12907	. TRANSFORMER BRACKET -14632-	1	
	MS35233-14	. SCREW, MACHINE (AP)	3	
	MS35338-78	. WASHER, LOCK (AP)	3	
	MS15795-804	. WASHER, FLAT (AP)	3	
-144	12909	. TRANSFORMER PLATE -14632-	1	
	MS35233-14	. SCREW, MACHINE (AP)	3	
	MS35338-78	. WASHER, LOCK (AP)	3	
	MS15795-804	. WASHER, FLAT (AP)	3	
-145	13214	. TOOL CLIP MOUNTING PLATE -14632-	2	

TYPE G175K00000-2 RECEIVER

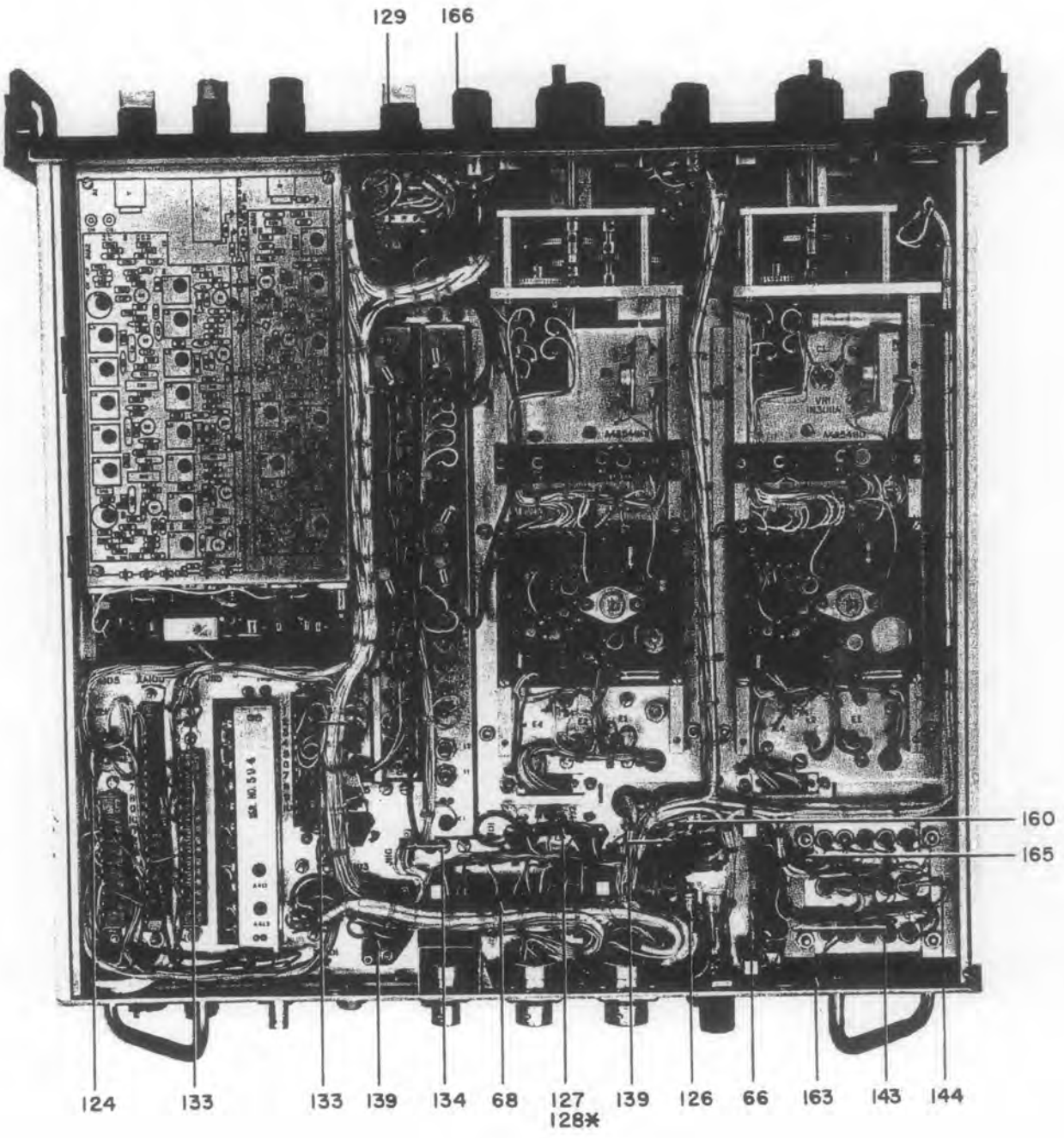


TOP VIEW

Figure 6-1 (Sheet 6)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	MS35233-14	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
-146	13215	. TOTAL CLIP MOUNTING PLATE -14632-	1	
	MS35233-14	. SCREW, MACHINE (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-147	13216	. TOOL CLIP MOUNTING PLATE -14632-	1	
	MS35233-14	. SCREW, MACHINE (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-148	45	. TOOL CLIP -72307-	2	
	MS35233-12	. SCREW, MACHINE (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-149	100-200-4A13	. TOOL CLIP -99378-	2	
	MS35233-2	. SCREW, MACHINE (AP)	4	
	MS35338-77	. WASHER, LOCK (AP)	4	
-150	100-200-4-9	. TOOL CLIP -99378-	1	
	MS35233-2	. SCREW, MACHINE (AP)	2	
	MS35338-77	. WASHER, LOCK (AP)	2	
-151	13892	. ALIGNMENT TOOL -14632-	1	
-152	8196	. ALIGNMENT TOOL -72653-	1	
-153	2033-1	. ALIGNMENT TOOL -71279-	1	
	341	. KEY, SOCKET HEAD SCREW -83330-	1	
	342	. KEY, SOCKET HEAD SCREW -83330-	1	
	343	. KEY, SOCKET HEAD SCREW -83330-	1	
-154	30702-1	. SLIDE ASSEMBLY -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	5	
	MS35338-78	. WASHER, LOCK (AP)	5	
	MS15795-804	. WASHER, FLAT (AP)	5	
-155	30702-2	. SLIDE ASSEMBLY -14632-	2	
	MS35233-13	. SCREW, MACHINE (AP)	10	
	MS35338-78	. WASHER, LOCK (AP)	10	
	MS15795-804	. WASHER, FLAT (AP)	10	
-156	30702-3	. SLIDE ASSEMBLY -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	5	
	MS35338-78	. WASHER, LOCK (AP)	5	
	MS15795-804	. WASHER, FLAT (AP)	5	
-157	20755-35	. SPACER -14632-	2	
	MS35233-27	. SCREW, MACHINE (AP)	4	
	MS35338-79	. WASHER, LOCK (AP)	4	
	MS15795-805	. WASHER, FLAT (AP)	4	
-158	2174	. GROMMET -83330-	2	
-159	2170	. GROMMET -83330-	2	
-160	7A1A1	. TERMINAL, STANDOFF -92825-	4	
-161	505-0-120	. TERMINAL, LUG -79963-	19	
-162	505-0-144	. TERMINAL, LUG -79963-	1	
-163	505-0-169	. TERMINAL, LUG -79963-	2	
-164	11A	. TERMINAL, LUG -79963-	2	
-165	379-0-50	. TERMINAL, LUG -79963-	1	
-166	355-0-250	. TERMINAL, LUG -79963-	6	
-167	IRC-QCL	. TERMINAL, LUG -75042-	3	

TYPE G175K00000-2 RECEIVER



BOTTOM VIEW

Figure 6-1 (Sheet 7)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE

* IF Bandwidth Knob is optional and is selected to correspond with bandwidths used. The following are available:

12782-1	10-40-300-4K
12782-2	10-40-300
12782-3	20-40-300
12782-4	10-75-300
12782-5	20-75-300
12782-6	40-75-300
12782-7	20-40-300-4K
12782-8	10-75-300-4K
12782-9	20-75-300-4K
12782-10	40-75-300-4K
12782-11	10-40-300-10K

TYPE 7417 AUDIO MODULE

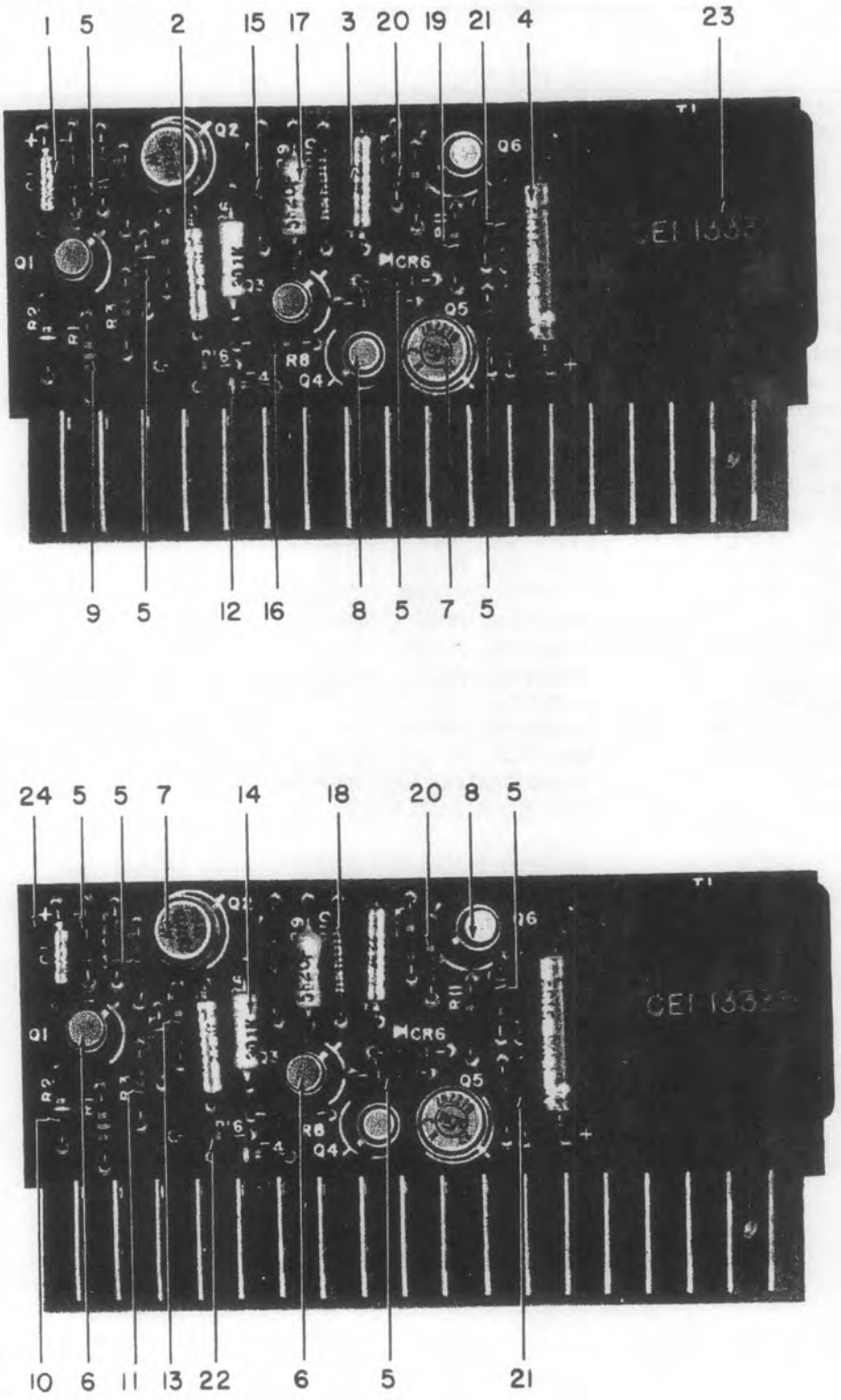
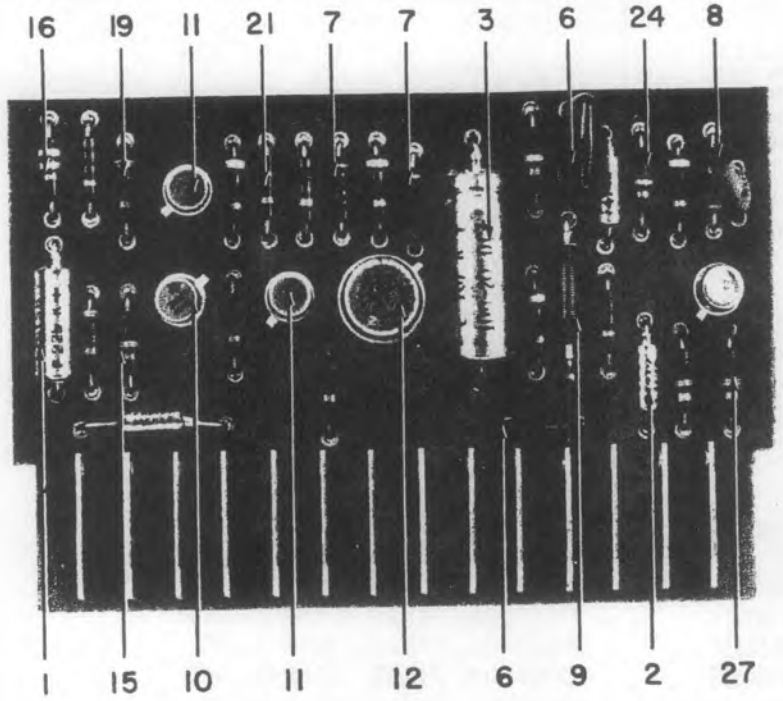


Figure 6-2

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2	7417	AUDIO MODULE -14632- (FOR NHA SEE FIGURE 6-1)	REF	
-1	CS13BC475K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-2	CS138BF225K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-3	CS13BD226K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-4	CS13BE107K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-5	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	8	
-6	2N929	. TRANSISTOR, NPN, SILICON -80131-	2	
	10036DAP	. INSULATOR, DISK -07047-	4	
-7	2N2270	. TRANSISTOR, NPN, SILICON -80131-	2	
	10028DAP	. INSULATOR, DISK -07047-	2	
-8	2N3251	. TRANSISTOR, PNP, SILICON -80131-	2	
-9	RCR07G134JS	. RESISTOR, FIXED, COMPOSITION	1	
-10	RCR07G334JS	. RESISTOR, FIXED, COMPOSITION	1	
-11	RCR07G203JS	. RESISTOR, FIXED, COMPOSITION	1	
-12	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	1	
-13	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-14	RN60D3013F	. RESISTOR, FIXED, FILM	1	
-15	RN60D2002F	. RESISTOR, FIXED, FILM	1	
-16	RCR07G202JS	. RESISTOR, FIXED, COMPOSITION	1	
-17	RN60D5620F	. RESISTOR, FIXED, FILM	1	
-18	RN60D1002F	. RESISTOR, FIXED, FILM	1	
-19	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	1	
-20	RCR07G152JS	. RESISTOR, FIXED, COMPOSITION	2	
-21	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	2	
-22	RCR07G155JS	. RESISTOR, FIXED, COMPOSITION	1	
-23	13335	. TRANSFORMER, AUDIO FREQUENCY -14632-	1	
-24	12724	. PRINTED WIRING BOARD -14632-	1	

TYPE 7351 VIDEO MODULE



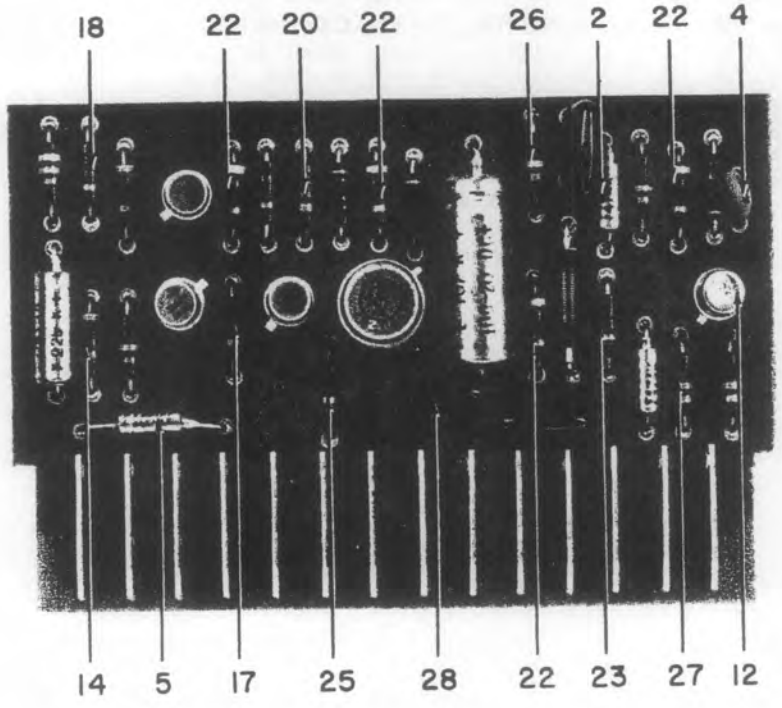


Figure 6-3

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
3	7351	VIDEO MODULE -14632- (FOR NHA SEE FIGURE 6-1)	REF	
-1	CS13BF225K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-2	CS13BF474K	. CAPACITOR, FIXED, ELECTROLYTIC	2	
-3	CS13BE107K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-4	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1,000 pf, GMV, 500 wvdc -91418-	1	
-5	CS13BF105K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-6	CM05FD131J03	. CAPACITOR, FIXED, MICA	2	
-7	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	
-8	1N914A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	
-9	21210-11	. COIL, RADIO FREQUENCY -14632-	1	
-10	2N929	. TRANSISTOR, NPN, SILICON -80131-	1	
-11	2N3251	. TRANSISTOR, PNP, SILICON -80131-	2	
-12	2N706	. TRANSISTOR, NPN, SILICON -80131-	1	
	10036DAP	. INSULATOR, DISK -07047-	4	
-13	2N2270	. TRANSISTOR, NPN, SILICON -80131-	1	
	10028DAP	. INSULATOR, DISK -07047-	1	
-14	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	1	
-15	RCR07G184JS	. RESISTOR, FIXED, COMPOSITION	1	
-16	RCR07G243JS	. RESISTOR, FIXED, COMPOSITION	1	
-17	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-18	RCR07G681JS	. RESISTOR, FIXED, COMPOSITION	1	
-19	RCR07G472JS	. RESISTOR, FIXED, COMPOSITION	1	
-20	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	1	
-21	RCR07G272JS	. RESISTOR, FIXED, COMPOSITION	1	
-22	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	4	
-23	RCR07G271JS	. RESISTOR, FIXED, COMPOSITION	1	
-24	RCR07G624JS	. RESISTOR, FIXED, COMPOSITION	1	
-25	RCR07G100JS	. RESISTOR, FIXED, COMPOSITION	1	
-26	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	1	
-27	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	2	
-28	14382	. PRINTED WIRING BOARD -14632-	1	

TYPE 7865 AGC AMPLIFIER

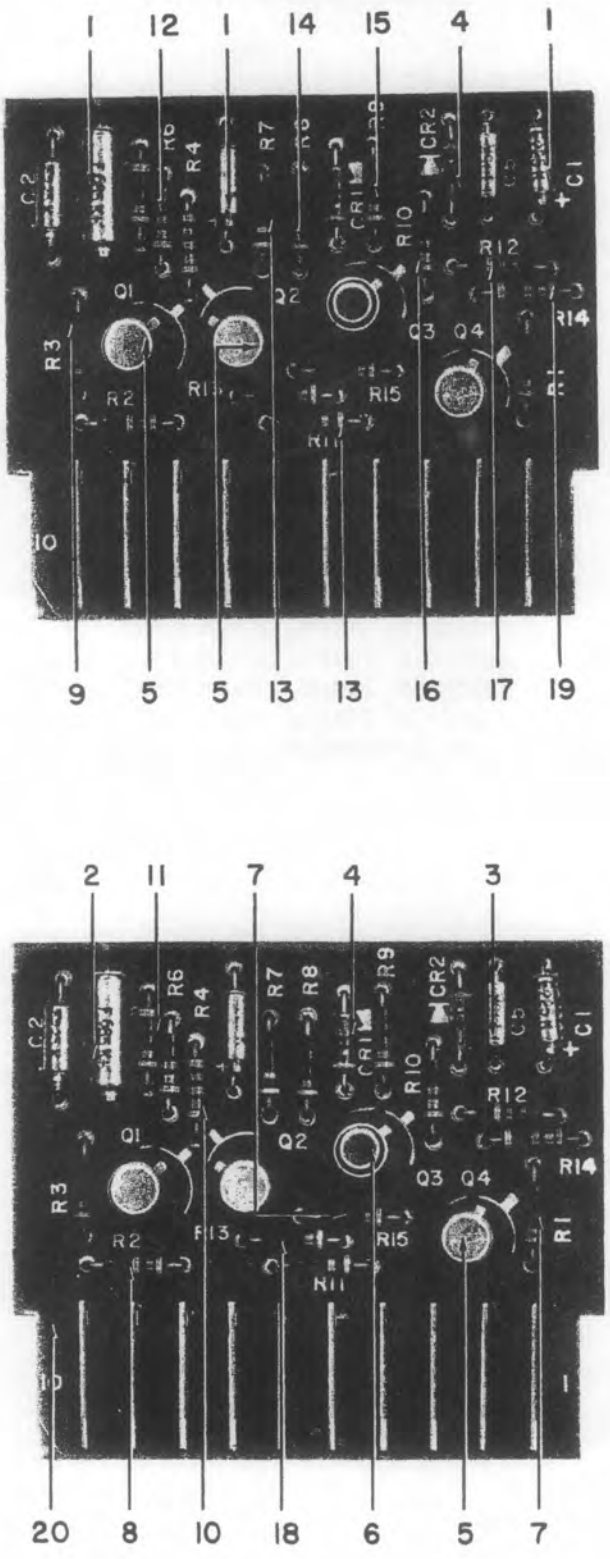


Figure 6-4

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
4	7865	AGC AMPLIFIER -14632- (FOR NHA SEE FIGURE 6-1)	REF	A
-1	CS13BE225K	. CAPACITOR, FIXED, ELECTROLYTIC	3	A
-2	CS13BF685K	. CAPACITOR, FIXED, ELECTROLYTIC	1	A
-3	CS13BF105K	. CAPACITOR, FIXED, ELECTROLYTIC	1	A
-4	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	A
-5	2N4074	. TRANSISTOR, NPN, SILICON -80131-	3	A
-6	2N3251	. TRANSISTOR, PNP, SILICON -80131-	1	A
	7717-115DAP	. INSULATOR, DISK -13103-	4	A
-7	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	2	A
-8	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	1	A
-9	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	1	A
-10	RCR07G333JS	. RESISTOR, FIXED, COMPOSITION	1	A
-11	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	1	A
-12	RCR07G183JS	. RESISTOR, FIXED, COMPOSITION	1	A
-13	RCR07G202JS	. RESISTOR, FIXED, COMPOSITION	2	A
-14	RCR07G271JS	. RESISTOR, FIXED, COMPOSITION	1	A
-15	RCR07G681JS	. RESISTOR, FIXED, COMPOSITION	1	A
-16	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	1	A
-17	RCR07G243JS	. RESISTOR, FIXED, COMPOSITION	1	A
-18	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	A
-19	RCR07G473JS	. RESISTOR, FIXED, COMPOSITION	1	A
-20	15687	. PRINTED WIRING BOARD -14632-	1	A

TYPE 7868 AGC AMPLIFIER

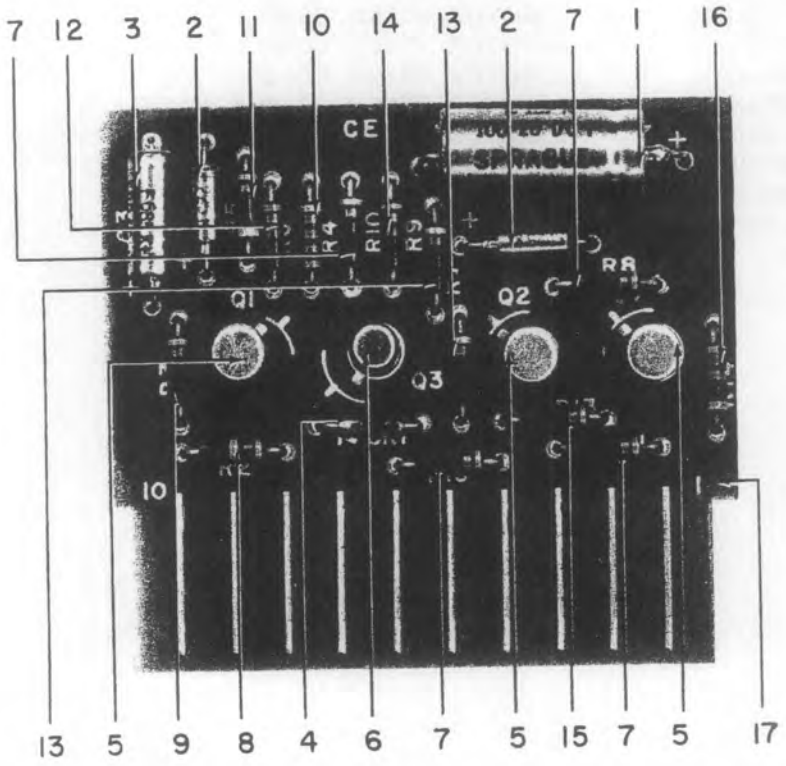


Figure 6-5

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5	7868	AGC AMPLIFIER -14632- (FOR NHA SEE FIGURE 6-1)	REF	B
-1	CS13BE107K	. CAPACITOR, FIXED, ELECTROLYTIC	1	B
-2	CS13BE225K	. CAPACITOR, FIXED, ELECTROLYTIC	2	B
-3	CS13BF685K	. CAPACITOR, FIXED, ELECTROLYTIC	1	B
-4	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	B
-5	2N4074	. TRANSISTOR, NPN, SILICON -80131-	3	B
-6	2N3251	. TRANSISTOR, PNP, SILICON -80131-	1	B
	7717-115DAP	. INSULATOR, DISK -13103-	4	B
-7	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	4	B
-8	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	1	B
-9	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	1	B
-10	RCR07G333JS	. RESISTOR, FIXED, COMPOSITION	1	B
-11	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	1	B
-12	RCR07G183JS	. RESISTOR, FIXED, COMPOSITION	1	B
-13	RCR07G202JS	. RESISTOR, FIXED, COMPOSITION	2	B
-14	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	1	B
-15	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	B
-16	RCR07G473JS	. RESISTOR, FIXED, COMPOSITION	1	B
-17	15862	. PRINTED WIRING BOARD -14632-	1	B

TYPE 7508A COR MODULE

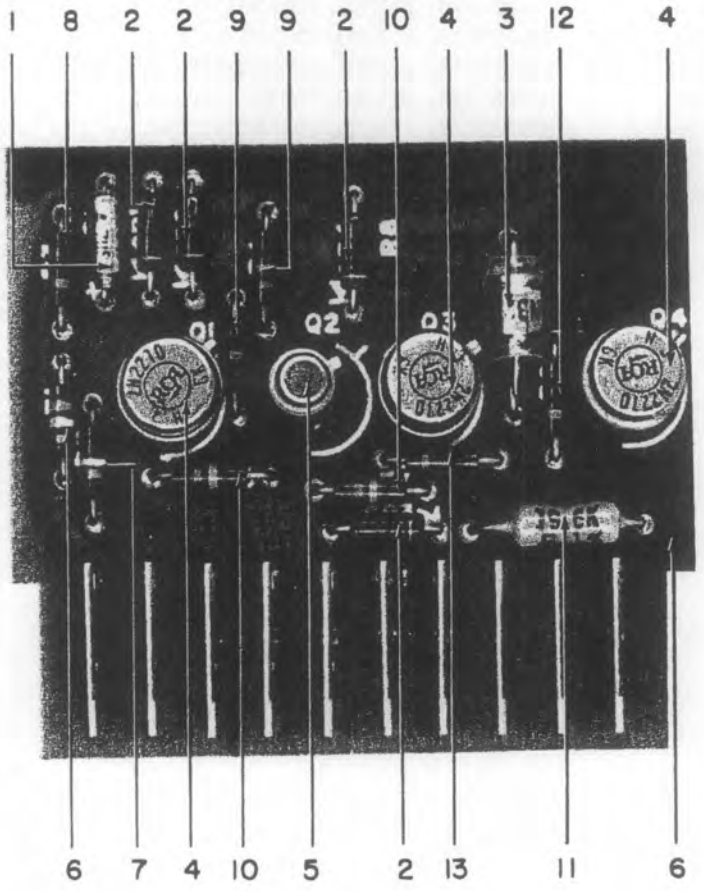


Figure 6-6

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6	7508A	COR MODULE -14632- (FOR NHA SEE FIGURE 6-1)	REF	
-1	CS13BC475K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-2	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	4	
-3	1N3253	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	
-4	2N2270	. TRANSISTOR, NPN, SILICON -80131-	3	
	10028DAP	. INSULATOR, DISK -07047-	3	
-5	2N3251	. TRANSISTOR, PNP, SILICON -80131-	1	
	10036DAP	. INSULATOR, DISK -07047-	1	
-6	RCR07G134JS	. RESISTOR, FIXED, COMPOSITION	1	
-7	RCR07G514JS	. RESISTOR, FIXED, COMPOSITION	1	
-8	RCR07G515JS	. RESISTOR, FIXED, COMPOSITION	1	
-9	RCR07G203JS	. RESISTOR, FIXED, COMPOSITION	2	
-10	RCR07G204JS	. RESISTOR, FIXED, COMPOSITION	2	
-11	RN60D1962F	. RESISTOR, FIXED, COMPOSITION	1	
-12	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-13	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	1	
-14	12697	. PRINTED WIRING BOARD -14632-	1	

TYPE 79207 IF COUPLER

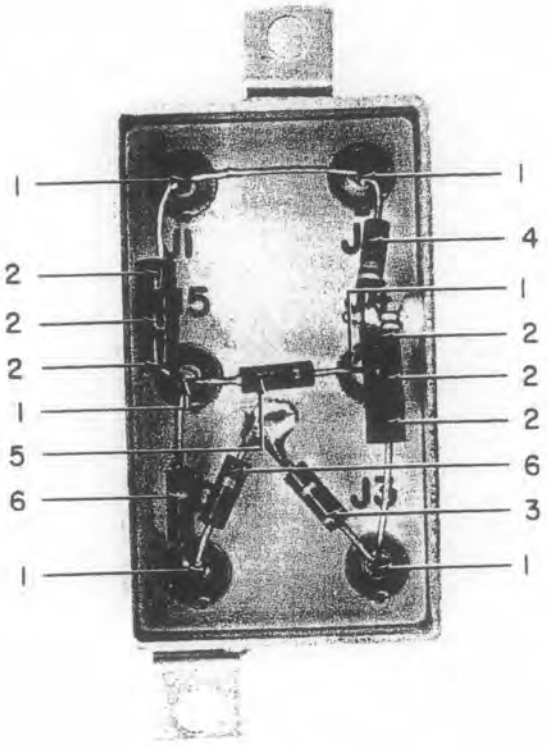


Figure 6-7

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
7	79207	IF COUPLER -14632- (FOR NHA SEE FIGURE 6-1)	REF	A
-1	27-9	. CONNECTOR, RECEPTACLE, ELECTRICAL -74868-	6	A
-2	56-590-65-4A	. FERRITE BEAD -02114-	6	A
-3	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	1	A
-4	RCR07G431JS	. RESISTOR, FIXED, COMPOSITION	1	A
-5	RCR07G510JS	. RESISTOR, FIXED, COMPOSITION	1	A
-6	RCR07G151JS	. RESISTOR, FIXED, COMPOSITION	2	A

TYPE 79684 IF COUPLER

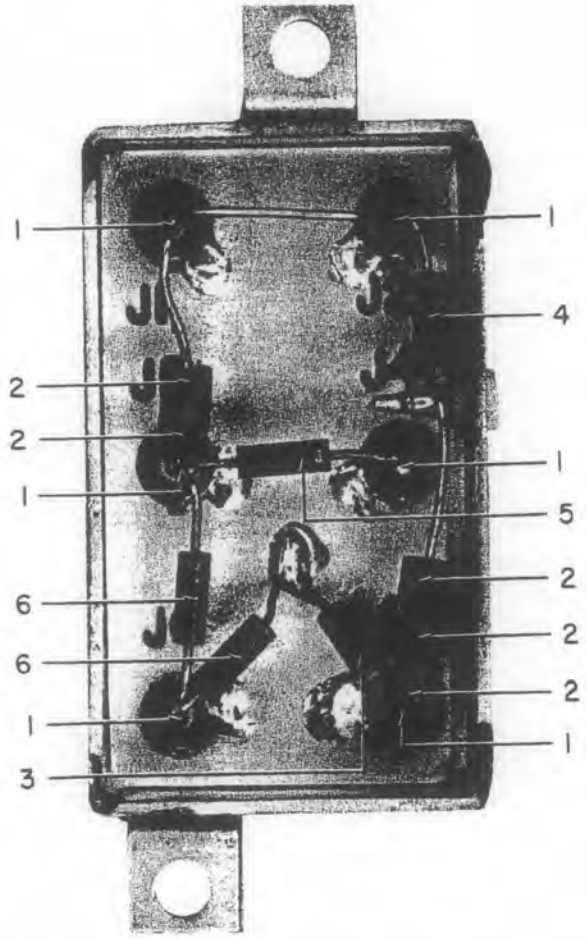


Figure 6-8

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
8	79684	IF COUPLER -14632- (FOR NHA SEE FIGURE 6-1)	REF	B
-1	10-0104-002	. CONNECTOR, RECEPTACLE, ELECTRICAL -19505-	6	B
-2	56-590-65-4A	. FERRITE BEAD 02114-	5	B
-3	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	1	B
-4	RCR07G331JS	. RESISTOR, FIXED, COMPOSITION	1	B
-5	RCR07G510JS	. RESISTOR, FIXED, COMPOSITION	1	B
-6	RCR07G151JS	. RESISTOR, FIXED, COMPOSITION	2	B

PART 13440 PULSE AGC BOARD

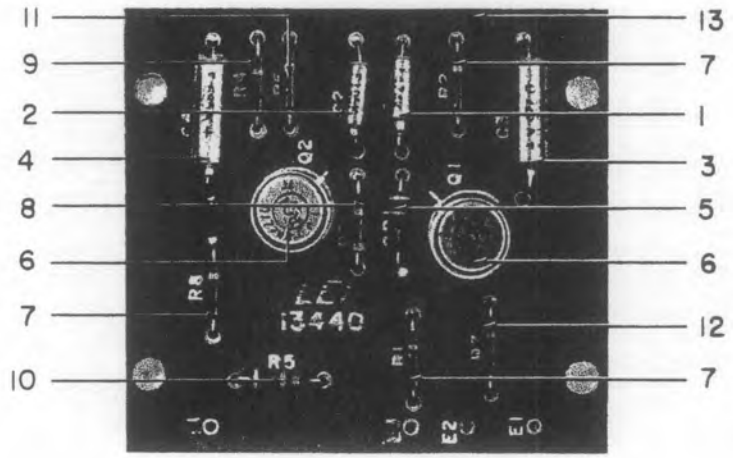


Figure 6-9

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
9	13440	PULSE AGC BOARD -14632- (FOR NHA SEE FIGURE 6-1)	REF	
-1	CS13BF474K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-2	CS13BF105K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-3	CS13BD226K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-4	CS13BF685K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-5	1N914A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	
-6	2N2270	. TRANSISTOR, NPN, SILICON -80131-	2	
	10028DAP	. INSULATOR, DISK -07047-	2	
-7	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	3	
-8	RCR07G361JS	. RESISTOR, FIXED, COMPOSITION	1	
-9	RCR07G205JS	. RESISTOR, FIXED, COMPOSITION	1	
-10	RCR07G473JS	. RESISTOR, FIXED, COMPOSITION	1	
-11	RCR07G152JS	. RESISTOR, FIXED, COMPOSITION	1	
-12	RCR07G201JS	. RESISTOR, FIXED, COMPOSITION	1	
-13	13439	. PRINTED WIRING BOARD -14632-	1	

PART 12963 POWER RECTIFIER BOARD

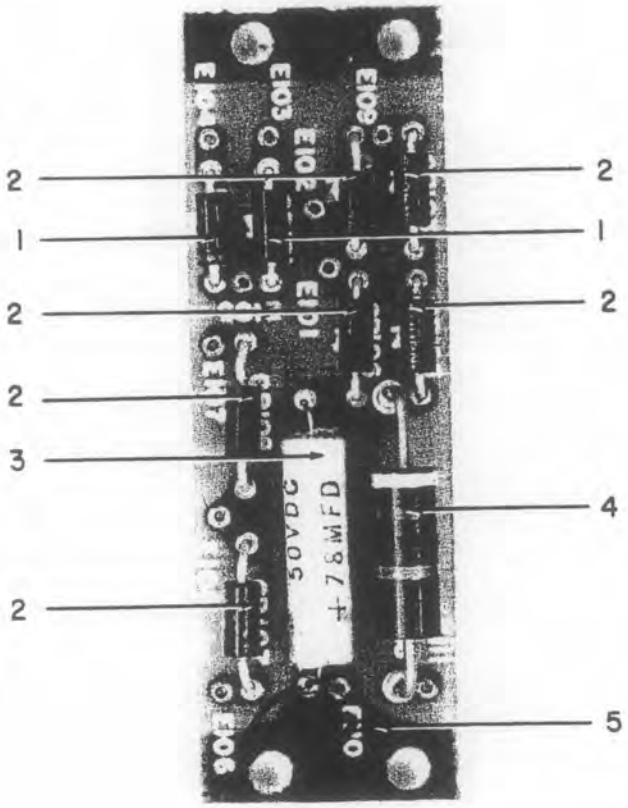


Figure 6-10

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
10	12963	POWER RECTIFIER BOARD -14632- (FOR NHA SEE FIGURE 6-1)	REF	A
-1	1N4005	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	A
-2	1N4003	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	6	A
-3	MTP786M050P1C	. CAPACITOR, FIXED, ELECTROLYTIC, 78 μf, 20 pct, 50 wvdc -37942-	1	A
-4	RCR32G470JS	. RESISTOR, FIXED, COMPOSITION	1	A
-5	12962	. PRINTED WIRING BOARD -14632-	1	A

PART 15875 POWER RECTIFIER BOARD

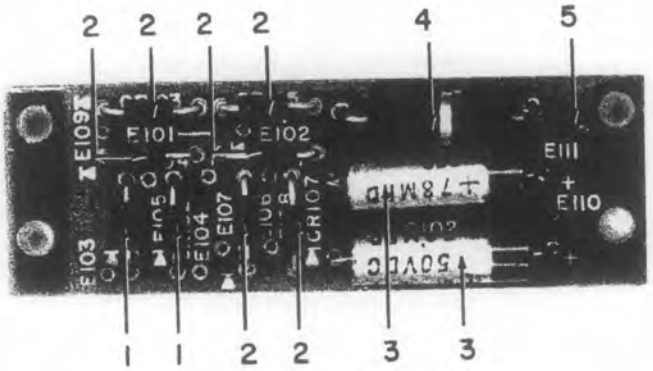


Figure 6-11

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
11	15875	POWER RECTIFIER BOARD -14632- (FOR NHA SEE FIGURE 6-1)	REF	B
-1	1N4005	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	B
-2	1N4003	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	6	B
-3	MTP786M050P1C	. CAPACITOR, FIXED, ELECTROLYTIC, 78 μf, 20 pct, 50 wvdc -37942-	2	B
-4	RCR32G220JS	. RESISTOR, FIXED, COMPOSITION	1	B
-5	15874	. PRINTED WIRING BOARD -14632-	1	B

PART 13235 POWER SUPPLY BOARD

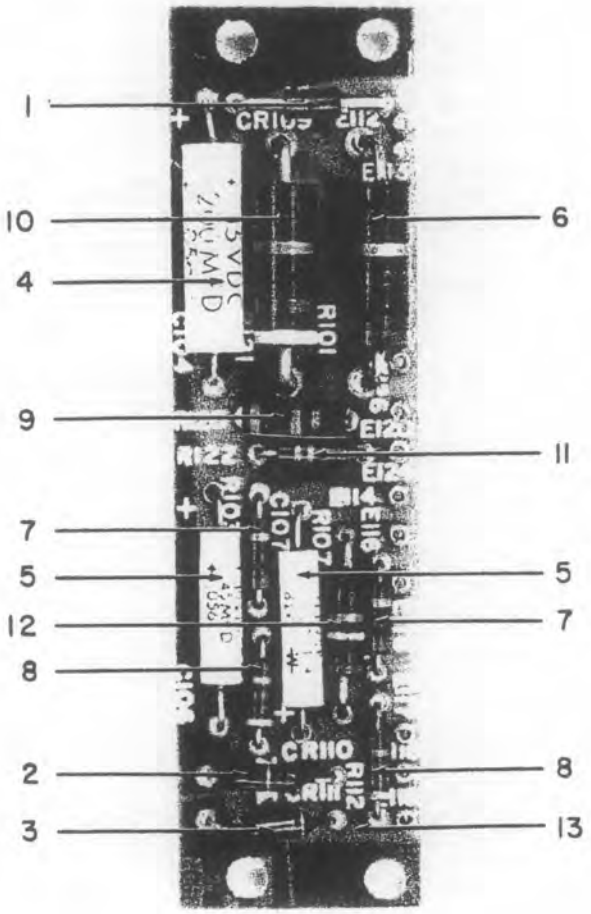


Figure 6-12

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
12	13235	POWER SUPPLY BOARD -14632- (FOR NHA SEE FIGURE 6-1)	REF	A
-1	1N4742A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	A
-2	1N759A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	A
-3	1N970B	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	A
-4	MTP207M015P1C	. CAPACITOR, FIXED, ELECTROLYTIC, 200 μf, 20 pct, 15 wvdc -37942-	1	A
-5	MTP456M030P1B	. CAPACITOR, FIXED, ELECTROLYTIC, 45 μf, 20 pct, 30 wvdc -37942-	2	A
-6	RCR32G102JS	. RESISTOR, FIXED, COMPOSITION	1	A
-7	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	2	A
-8	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	2	A
-9	RCR20G120JS	. RESISTOR, FIXED, COMPOSITION	1	A
-10	RCR32G470JS	. RESISTOR, FIXED, COMPOSITION	1	A
-11	RCR07G5R6JS	. RESISTOR, FIXED, COMPOSITION	1	A
-12	RCR20G823JS	. RESISTOR, FIXED, COMPOSITION	1	A
-13	13234	. PRINTED WIRING BOARD -14632-	1	A

PART 15878 POWER SUPPLY BOARD

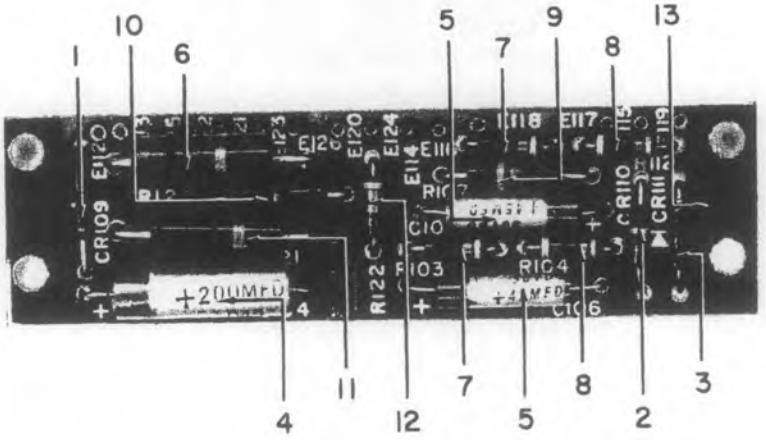


Figure 6-13

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
13	15878	POWER SUPPLY BOARD -14632- (FOR NHA SEE FIGURE 6-1)	REF	B
-1	UZ812	. SEMICONDUCTOR DEVICE, DIODE -12969-	1	B
-2	1N759A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	B
-3	1N970B	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	B
-4	MTP207M015P1C	. CAPACITOR, FIXED, ELECTROLYTIC, 200 μf, 20 pct, 15 wvdc -37942-	1	B
-5	MTP456M030P1B	. CAPACITOR, FIXED, ELECTROLYTIC, 45 μf, 20 pct, 30 wvdc -37942-	2	B
-6	RCR32G102JS	. RESISTOR, FIXED, COMPOSITION	1	B
-7	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	2	B
-8	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	2	B
-9	RCR20G823JS	. RESISTOR, FIXED, COMPOSITION	1	B
-10	RCR20G120JS	. RESISTOR, FIXED, COMPOSITION	1	B
-11	RCR32G220JS	. RESISTOR, FIXED, COMPOSITION	1	B
-12	RCR07G5R6JS	. RESISTOR, FIXED, COMPOSITION	1	B
-13	15877	. PRINTED WIRING BOARD -14632-	1	B

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	UNITS PER ASSEMBLY
AN565DC4-2	1-	2
AN565DC6-2	1-	2
AN565DC8-3	1-	4
CM05FD131J03	3-6	2
CM8-683	1-13	32
CS13BC475K	2-1	1
CS13BD226K	2-3	1
CS13BE105K	1-117	2
CS13BE107K	2-4	1
CS13BE225K	4-1	3
CS13BF105K	3-5	1
CS13BF225K	2-2	1
CS13BF474K	3-2	2
CS13BF476K	1-126	1
CS13BF685K	1-118	2
C023B101L503M	1-17	1
DS00-12P	1-112	1
DS00-19P	1-111	1
DS00-7P	1-113	1
F02B250V1-2A	1-109	1
F02B250V3-4A	1-110	1
G175K00000-1	1-	1
G175K00000-2	1-	1
IRC-QCL	1-167	3
MS15795-804	1-	4
MS15795-805	1-	4
MS35231-28	1-	8
MS35233-12	1-	2
MS35233-13	1-	5
MS35233-14	1-	4
MS35233-15	1-	4
MS35233-2	1-	4
MS35233-26	1-	4
MS35233-27	1-	2
MS35233-29	1-	4
MS35233-3	1-	2
MS35233-4	1-	6
MS35233-43	1-	4
MS35249-21	1-	2
MS35250-70	1-	4
MS35338-77	1-	6
MS35338-78	1-	5
MS35338-79	1-	2
MS35338-80	1-	4
MS35649-24	1-	2
MS35649-44	1-	8
MS35649-64	1-	3
MS35649-84	1-	4
MTP207M015P1C	1-124	1
	12-4	1
	13-4	1
MTP456M030P1B	12-5	2
	13-5	2
MTP786M050P1C	10-3	1
	11-3	2
PA117-498-0AA	1-18	1
PA117-539-0AA	1-16	1
RCR07G100JS	3-25	1
RCR07G101JS	2-19	1
RCR07G102JS	1-32	1
RCR07G103JS	3-27	2
RCR07G104JS	2-12	1
RCR07G105JS	1-23	1
RCR07G134JS	2-9	1
RCR07G151JS	7-6	2
RCR07G152JS	2-20	2
RCR07G155JS	2-22	1
RCR07G183JS	4-12	1
RCR07G184JS	1-28	1
RCR07G201JS	9-12	1
RCR07G202JS	2-16	1
RCR07G203JS	2-11	1
RCR07G204JS	6-10	2
RCR07G205JS	9-9	1
RCR07G243JS	3-16	1
RCR07G271JS	3-23	1
RCR07G272JS	3-21	1
RCR07G273JS	1-19	1
RCR07G331JS	8-4	1
RCR07G333JS	4-10	1
RCR07G334JS	2-10	1
RCR07G361JS	9-8	1
RCR07G431JS	7-4	1
RCR07G470JS	2-21	2
RCR07G471JS	3-14	1
RCR07G472JS	3-19	1
RCR07G473JS	4-19	1
RCR07G5R6JS	12-11	1
RCR07G510JS	7-5	1
RCR07G512JS	1-20	1
RCR07G513JS	1-27	1
RCR07G514JS	6-7	1
RCR07G515JS	6-8	1
RCR07G624JS	3-24	1
RCR07G681JS	3-18	1
RCR07G912JS	1-41	1
RCR20G120JS	12-9	1
RCR20G823JS	13-9	1
RCR32G102JS	12-6	1
RCR32G220JS	11-4	1
RCR32G470JS	10-4	1
RH5-201F	1-140	1
RN60D1002F	2-18	1
RN60D1962F	6-11	1

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	UNITS PER ASSEMBLY
RN60D2002F	2-15	1
RN60D3013F	2-14	1
RN60D5620F	2-17	1
RV6LAYSA102A	1-119	1
RV6NAYSD104A	1-26	2
RV6NAYSD504A	1-22	3
SLE14PNSS	1-40	2
SLE26SNSS	1-107	2
SLE7PNSS	1-38	1
SLE7SNSS	1-35	1
	1-134	1
SMRE14SG	1-133	2
SM001GMV	3-4	1
SM2P	1-34	1
TAO-1UFZ	1-30	1
YT3E90022	1-136	1
UG1095AU	1-76	1
	1-94	1
UG1466U	1-36	6
	1-43	2
	1-57	1
	1-59	2
	1-71	1
	1-74	1
	1-82	1
	1-89	1
	1-100	1
	1-106	1
UG88U	1-77	1
	1-95	1
UZ812	13-1	1
UZ815	1-128	1
00-5002-010-103-002	1-54	2
00-5002-014 -103-002	1-53	1
00-5002-018-103-002	1-52	1
025N3800-19	1-70	1
	1-73	1
1N3253	6-3	1
1N4003	10-2	6
	11-2	6
1N4005	10-1	2
	11-1	2
1N462A	2-5	8
	3-7	2
	4-4	2
	5-4	1
	6-2	4
1N4734	1-25	1
1N4742A	12-1	1
1N759A	12-2	1
	13-2	1
1N914A	3-8	1
	9-5	1
1N970B	12-3	1
	13-3	1
1N979A	1-29	1
10-0104-002	8-1	6
100-200-4-9	1-150	1
100-200-4A13	1-149	2
10028DAP	2-	2
	3-	1
	6-	3
	9-	2
10036DAP	2-	4
	3-	4
	6-	1
11A	1-164	2
1100-1	1-64	4
1128-46	1-24	1
11292	1-116	1
1132-6001	1-77A	1
	1-95A	1
1200-022	1-131	2
1202-188	1-56	1
	1-83	1
	1-88	1
	1-101	1
	1-103	2
1252-1	1-120	2
126-215	1-137	1
12697	6-14	1
12724	2-24	1
12746	2-45	4
12747-1	2-46	4
12750	1-15	2
12781	1-1	1
12782-1	1-5	1
12900	1-141	1
12907	1-143	1
12909	1-144	1
12962	10-5	1
12963	1-65	1
	10-	REF
13214	1-145	2
13215	1-146	1
13216	1-147	1
13234	12-13	1
13235	1-67	1
	12-	REF
13335	2-23	1
13347	1-4	1
13437	1-63	2
13439	9-13	1
13440	1-62	1

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	UNITS PER ASSEMBLY
	9-	REF
13764	1-85	1
	1-91	1
13892	1-151	1
1425	1-14	1
14382	3-28	1
1447-1	1-8	1
15682	1-142	1
15687	4-20	1
15862	5-17	1
15874	11-5	1
15875	1-66	1
	11-	REF
15877	13-13	1
15878	1-68	1
	13-	REF
1914-2	1-7	2
192-0304-1475-604	1-9	1
2N2270	2-7	2
	3-13	1
	6-4	3
	9-6	2
2N3055	1-138	2
2N3251	2-8	2
	3-11	2
	4-6	1
	5-6	1
	6-5	1
2N4074	4-5	3
	5-5	3
2N706	3-12	1
2N929	2-6	2
	3-10	1
201-1	1-80	2
	1-98	2
2033-1	1-153	1
20755-35	1-157	2
20962	1-130	1
21210-11	3-9	1
2170	1-159	2
2174	1-158	2
22420	1-79	1
22421	1-97	1
27-9	7-1	6
30020-1159	1-84	1
30020-1160	1-90	1
30020-528	1-69	1
30020-529	1-72	1
30020-530	1-75	1
30020-531	1-81	1
30020-532	1-87	1
30020-533	1-93	1
30020-534	1-99	1
30020-535	1-102	1
30020-536	1-55	1
30020-537	1-58	1
30020-538	1-42	1
30020-539	1-104	1
30625-2	1-	1
30625-3	1-	1
30702-1	1-154	1
30702-2	1-155	2
30702-3	1-156	1
31-203-1004	1-105	1
	1-114	1
335-10871-11	1-135	2
341	1-	1
342	1-	1
342004	1-108	2
343	1-	1
345	1-10	1
35L22-3	1-33	2
355-0-250	1-166	6
3600S1-103	1-31	1
3635-45	1-21	2
379-0-50	1-165	1
40514	1-12	1
43F2299BB1	1-121	1
43F2300BB1	1-122	1
43F8123BA2	1-123	1
45	1-148	2
5S3-1	1-	2
	1-	2
5S5-8	1-	2
	1-	2
501-1	1-86	1
	1-92	1
505-0-120	1-161	19
505-0-144	1-162	1
505-0-169	1-163	2
521-1	1-80	1
	1-98	1
56-590-65-4A	1-129	8
	7-2	6
	8-2	5
7A1A1	1-160	4
70-2-2G2	1-2	1
70-2-2G4	1-3	2
70-2WD-1G	1-6	4
70-3-2G	1-115	1
72127	1-39	1
7351	1-48	1
	3-	REF
7417	1-47	1

NUMERICAL INDEX

PART NUMBER		FIGURE & INDEX NO.	UNITS PER ASSEMBLY	PART NUMBER		FIGURE & INDEX NO.	UNITS PER ASSEMBLY
		2-	REF				
7508A		1-51	1				
		6-	REF				
7717-115DAP		4-	4				
		5-	4				
7865		1-49	1				
		4-	REF				
7868		1-50	1				
		5-	REF				
79193		1-44	1				
79198		1-37	1				
79207		1-60	1				
		7-	REF				
79684		1-61	1				
		8-	REF				
8038-1G1		1-139	2				
8196		1-152	1				
8803K6		1-11	1				
9400-000-0002		1-132	2				

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
A105	1-37	79198
A105P1	1-34	SM2P
A105P2	1-35	SLE7SNSS
A106	1-39	72127
A106P1	1-36	UG1466U
A106P2	1-36	UG1466U
A106P3	1-106	UG1466U
A106P4	1-36	UG1466U
A108	1-44	79193
A108P1	1-43	UG1466U
A109	1-47	7417
A109CR1	2-5	1N462A
A109CR2	2-5	1N462A
A109CR3	2-5	1N462A
A109CR4	2-5	1N462A
A109CR5	2-5	1N462A
A109CR6	2-5	1N462A
A109CR7	2-5	1N462A
A109CR8	2-5	1N462A
A109C1	2-1	CS13BC475K
A109C2	2-2	CS13BF225K
A109C3	2-3	CS13BD226K
A109C4	2-4	CS13BE107K
A109Q1	2-6	2N929
A109Q2	2-7	2N2270
A109Q3	2-6	2N929
A109Q4	2-8	2N3251
A109Q5	2-7	2N2270
A109Q6	2-8	2N3251
A109R1	2-9	RCR07G134JS
A109R10	2-18	RN60D1002F
A109R11	2-19	RCR07G101JS
A109R12	2-20	RCR07G152JS
A109R13	2-20	RCR07G152JS
A109R14	2-21	RCR07G470JS
A109R15	2-21	RCR07G470JS
A109R16	2-22	RCR07G155JS
A109R2	2-10	RCR07G334JS
A109R3	2-11	RCR07G203JS
A109R4	2-12	RCR07G104JS
A109R5	2-13	RCR07G102JS
A109R6	2-14	RN60D3013F
A109R7	2-15	RN60D2002F
A109R8	2-16	RCR07G202JS
A109R9	2-17	RN60D5620F
A109T1	2-23	13335
A110	1-48	7351
A110CR1	3-7	1N462A
A110CR2	3-7	1N462A
A110CR3	3-8	1N914A
A110C1	3-1	CS13BF225K
A110C2	3-2	CS13BF474K
A110C3	3-3	CS13BE107K
A110C4	3-4	SM001GMV
A110C5	3-5	CS13BF105K
A110C6	3-6	CM05FD131J03
A110C7	3-6	CM05FD131J03
A110C8	3-2	CS13BF474K
A110L1	3-9	21210-11
A110Q1	3-10	2N929
A110Q2	3-11	2N3251
A110Q3	3-13	2N2270
A110Q4	3-11	2N3251
A110Q5	3-12	2N706
A110R1	3-14	RCR07G471JS
A110R10	3-22	RCR07G470JS
A110R11	3-23	RCR07G271JS
A110R12	3-24	RCR07G624JS
A110R13	3-25	RCR07G100JS
A110R14	3-22	RCR07G470JS
A110R15	3-26	RCR07G104JS
A110R16	3-22	RCR07G470JS
A110R17	3-27	RCR07G103JS
A110R18	3-27	RCR07G103JS
A110R2	3-15	RCR07G184JS
A110R3	3-16	RCR07G243JS
A110R4	3-17	RCR07G102JS
A110R5	3-18	RCR07G681JS
A110R6	3-19	RCR07G472JS
A110R7	3-20	RCR07G101JS
A110R8	3-21	RCR07G272JS
A110R9	3-22	RCR07G470JS
A111	1-49	7865
A111	1-50	7868
A111CR1	4-4	1N462A
A111CR1	5-4	1N462A
A111CR2	4-4	1N462A
A111C1	4-1	CS13BE225K
A111C1	5-1	CS13BE107K
A111C2	4-1	CS13BE225K
A111C2	5-2	CS13BE225K
A111C3	4-2	CS13BF685K
A111C3	5-3	CS13BF685K
A111C4	4-1	CS13BE225K
A111C4	5-2	CS13BE225K
A111C5	4-3	CS13BF105K
A111Q1	4-5	2N4074
A111Q1	5-5	2N4074
A111Q2	4-5	2N4074
A111Q2	5-5	2N4074
A111Q3	4-6	2N3251
A111Q3	5-6	2N3251
A111Q4	4-5	2N4074
A111Q4	5-5	2N4074

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
A111R1	4-7	RCR07G101JS
A111R1	5-7	RCR07G101JS
A111R10	4-16	RCR07G103JS
A111R10	5-7	RCR07G101JS
A111R11	4-13	RCR07G202JS
A111R11	5-13	RCR07G202JS
A111R12	4-17	RCR07G243JS
A111R12	NOT USED	
A111R13	4-18	RCR07G102JS
A111R13	5-15	RCR07G102JS
A111R14	4-19	RCR07G473JS
A111R14	5-16	RCR07G473JS
A111R15	4-7	RCR07G101JS
A111R15	5-7	RCR07G101JS
A111R2	4-8	RCR07G104JS
A111R2	5-8	RCR07G104JS
A111R3	4-9	RCR07G512JS
A111R3	5-9	RCR07G512JS
A111R4	4-10	RCR07G333JS
A111R4	5-10	RCR07G333JS
A111R5	4-11	RCR07G471JS
A111R5	5-11	RCR07G471JS
A111R6	4-12	RCR07G183JS
A111R6	5-12	RCR07G183JS
A111R7	4-13	RCR07G202JS
A111R7	5-13	RCR07G202JS
A111R8	4-14	RCR07G271JS
A111R8	5-7	RCR07G101JS
A111R9	4-15	RCR07G681JS
A111R9	5-14	RCR07G103JS
A112	1-51	7508A
A112CR1	6-2	1N462A
A112CR2	6-2	1N462A
A112CR3	6-2	1N462A
A112CR4	6-2	1N462A
A112CR5	6-3	1N3253
A112C1	6-1	CS13BC475K
A112Q1	6-4	2N2270
A112Q2	6-5	2N3251
A112Q3	6-4	2N2270
A112Q4	6-4	2N2270
A112R1	6-6	RCR07G134JS
A112R10	6-13	RCR07G101JS
A112R2	6-7	RCR07G514JS
A112R3	6-8	RCR07G515JS
A112R4	6-9	RCR07G203JS
A112R5	6-10	RCR07G204JS
A112R6	6-9	RCR07G203JS
A112R7	6-10	RCR07G204JS
A112R8	6-11	RN60D1962F
A112R9	6-12	RCR07G102JS
A113	1-60	79207
A113	1-61	79684
A113FB1	7-2	56-590-65-4A
A113FB1	8-2	56-590-65-4A
A113FB2	7-2	56-590-65-4A
A113FB2	8-2	56-590-65-4A
A113FB3	7-2	56-590-65-4A
A113FB3	8-2	56-590-65-4A
A113FB4	7-2	56-590-65-4A
A113FB4	8-2	56-590-65-4A
A113FB5	7-2	56-290-65-4A
A113FB5	8-2	56-590-65-4A
A113FB6	7-2	56-690-65-4A
A113J1	7-1	27-9
A113J1	8-1	10-0104-002
A113J2	7-1	27-9
A113J2	8-1	10-0104-002
A113J3	7-1	27-9
A113J3	8-1	10-0104-002
A113J4	7-1	27-9
A113J4	8-1	10-0104-002
A113J5	7-1	27-9
A113J5	8-1	10-0104-002
A113J6	7-1	27-9
A113J6	8-1	10-0104-002
A113P1	1-57	UG1466U
A113P2	1-59	UG1466U
A113P3	1-36	UG1466U
A113P5	1-43	UG1466U
A113R1	7-3	RCR07G470JS
A113R1	8-3	RCR07G470JS
A113R2	7-4	RCR07G431JS
A113R2	8-4	RCR07G331JS
A113R3	7-5	RCR07G510JS
A113R3	8-5	RCR07G510JS
A113R4	7-6	RCR07G151JS
A113R4	8-6	RCR07G151JS
A113R5	7-6	RCR07G151JS
A113R5	8-6	RCR07G151JS
A114	1-62	13440
A114CR1	9-5	1N914A
A114C1	9-1	CS13BF474K
A114C2	9-2	CS13BF105K
A114C3	9-3	CS13BD226K
A114C4	9-4	CS13BF685K
A114Q1	9-6	2N2270
A114Q2	9-6	2N2270
A114R1	9-7	RCR07G102JS
A114R2	9-7	RCR07G102JS
A114R3	9-8	RCR07G361JS
A114R4	9-9	RCR07G205JS
A114R5	9-10	RCR07G473JS
A114R6	9-11	RCR07G152JS

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
A114R7	9-12	RCR07G201JS
A114R8	9-7	RCR07G102JS
CP101	1-95A	1132-6001
CP102	1-77A	1132-6001
CR101	10-1	1N4005
CR101	11-1	1N4005
CR102	10-1	1N4005
CR102	11-1	1N4005
CR103	10-2	1N4003
CR103	11-2	1N4003
CR104	10-2	1N4003
CR104	11-2	1N4003
CR105	10-2	1N4003
CR105	11-2	1N4003
CR106	10-2	1N4003
CR106	11-2	1N4003
CR107	10-2	1N4003
CR107	11-2	1N4003
CR108	10-2	1N4003
CR108	11-2	1N4003
CR109	12-1	1N4742A
CR109	13-1	UZ812
CR110	12-2	1N759A
CR110	13-2	1N759A
CR111	12-3	1N970B
CR111	13-3	1N970B
CR112	1-29	1N979A
CR113	1-25	1N4734
CR114	1-128	UZ815
C101	1-121	43F2299BB1
C102	10-3	MTP786M050P1C
C102	11-3	MTP786M050P1C
C103	1-122	43F2300BB1
C104	12-4	MTP207M015P1C
C104	13-4	MTP207M015P1C
C105	1-123	43F8123BA2
C106	12-5	MTP456M030P1B
C106	13-5	MTP456M030P1B
C107	12-5	MTP456M030P1B
C107	13-5	MPT456M030P1B
C108	1-117	CS13BE106K
C109	1-118	CS13BF685K
C110	1-118	CS13BF685K
C111	1-117	CS13BE106K
C112	1-30	TAO-1UFZ
C113	1-17	C023B101L503M
C114	1-124	MTP207M015P1C
C115	11-3	MTP786M050P1C
C116	1-127	MTP207M015P1C
C117	1-126	CS13BF476K
DS101	1-10	345
DS102	1-13	CM8-683
DS103	1-13	CM8-683
DS104	1-13	CM8-683
DS105	1-13	CM8-683
DS106	1-13	CM8-683
DS107	1-13	CM8-683
DS108	1-13	CM8-683
DS109	1-13	CM8-683
DS110	1-13	CM8-683
DS111	1-13	CM8-683
DS112	1-13	CM8-683
DS113	1-13	CM8-683
DS114	1-13	CM8-683
DS115	1-13	CM8-683
DS116	1-13	CM8-683
DS117	1-13	CM8-683
DS118	1-13	CM8-683
DS119	1-13	CM8-683
DS120	1-13	CM8-683
DS121	1-13	CM8-683
DS122	1-13	CM8-683
DS123	1-13	CM8-683
DS124	1-13	CM8-683
DS125	1-13	CM8-683
DS126	1-13	CM8-683
DS127	1-13	CM8-683
DS128	1-13	CM8-683
DS129	1-13	CM8-683
DS130	1-13	CM8-683
DS131	1-13	CM8-683
DS132	1-13	CM8-683
DS133	1-13	CM8-683
FB101	1-129	56-590-65-4A
FB102	1-129	56-590-65-4A
FB103	1-129	56-590-65-4A
FB104	1-129	56-590-65-4A
FB105	1-129	56-590-65-4A
FB106	1-129	56-590-65-4A
FB107	1-129	56-590-65-4A
FB108	1-129	56-590-65-4A
FL101	1-131	1200-022
FL102	1-132	9400-000-0002
FL103	1-132	9400-000-0002
FL104	1-131	1200-022
F101	1-109	F02B250V1-2A
F101	1-110	F02B250V3-4A
J101	1-94	UG1095AU
J101	1-95B	Part of CP101
J102	1-111	DS00-19P
J103	1-112	DS00-12P
J104	1-113	DS00-7P
J105	1-76	UG1095AU
J105	1-77B	Part of CP102
J106	1-73	025N3800-19
J106	1-91	13764

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REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
J107	1-114	31-203-1004
J108	1-105	31-203-1004
J109	1-70	025N3800-19
J109	1-85	13764
J110	NOT USED	
J111	NOT USED	
J112	NOT USED	
J113	1-133	SMRE14SG
J114	1-133A	Part of Front Panel
J115	1-133	SMRE14SG
J116	1-134	SLE7SNSS
J117	1-134A	Part of K101
J118	1-96	Part of CP101
J118	1-134A	Part of K101
J119	1-78	Part of CP102
J119	1-134A	Part of K101
J120	1-134B	Part of K102
J121	1-134B	Part of K102
J122	1-134B	Part of K102
K101	1-135	335-10871-11
K102	1-135	335-10871-11
K103	1-136	TR3E90022
L101	1-21	3635-45
L102	1-21	3635-45
P101	NOT USED	
P102	NOT USED	
P103	NOT USED	
P104	NOT USED	
P105	NOT USED	
P106	NOT USED	
P107	NOT USED	
P108	NOT USED	
P109	NOT USED	
P110	NOT USED	
P111	NOT USED	
P112	NOT USED	
P113	1-40	SLE14PNSS
P114	1-137	126-215
P115	1-40	SLE14PNSS
P116	1-38	SLE7PNSS
P117	1-74	UG1466U
P118	1-103	1202-188
P119	1-100	UG1466U
P120	1-71	UG1466U
P121	1-88	1202-188
P122	1-82	UG1466U
Q101	1-138	2N3055
Q102	1-138	2N3055
R101	12-6	RCR32G102JS
R101	13-6	RCR32G102JS
R102	1-19	RCR07G273JS
R103	12-7	RCR07G102JS
R103	13-7	RCR07G102JS
R104	12-8	RCR07G471JS
R104	13-8	RCR07G471JS
R105	1-22	RV6NAYSD504A
R106	1-23	RCR07G105JS
R107	12-12	RCR20G823JS
R107	13-9	RCR20G823JS
R108	1-28	RCR07G184JS
R109	1-26	RV6NAYSD104A
R110	1-27	RCR07G513JS
R111	12-7	RCR07G102JS
R111	13-7	RCR07G102JS
R112	12-8	RCR07G471JS
R112	13-8	RCR07G471JS
R113	1-31	3600S1-103
R114	1-32	RCR07G102JS
R115	1-26	RV6NAYSD104A
R116	1-22	RV6NAYSD504A
R117	1-22	RV6NAYSD504A
R118	10-4	RCR32G470JS
R118	11-4	RCR32G220JS
R119	1-20	RCR07G512JS
R120	12-9	RCR20G120JS
R120	13-10	RCR20G120JS
R121	12-10	RCR32G470JS
R121	13-11	RCR07G220JS
R122	12-11	RCR07G5R6JS
R122	13-12	RCR07G5R6JS
R123	1-140	RH5-201F
R124	1-119	RV6LAYSA102A
R125	1-41	RCR07G912JS
S101	1-11	8803K6
S102	1-24	1128-46
S103	1-18	PA117-498-0AA
S104	1-16	PA117-539-0AA
S105	1-116	11292
S106	1-9	192-0304-1475-604
TUNER 1-P1	1-77	UG88U
TUNER 1-P1	1-80	201-1
TUNER 1-P2	1-56	1202-188
TUNER 1-P3	1-83	1202-188
TUNER 1-P3	1-86	501-1
TUNER 1-P4	1-101	1202-188
TUNER 1-P6	1-107	SLE26SNSS
TUNER 2-P1	1-95	UG88U
TUNER 2-P1	1-98	201-1
TUNER 2-P2	1-59	UG1466U
TUNER 2-P3	1-89	UG1466U
TUNER 2-P3	1-92	501-1
TUNER 2-P4	1-103	1202-188
TUNER 2-P6	1-107	SLE26SNSS
T101	1-141	12900

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER	REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
T101	1-142	15682			
WB IF-P3	1-36	UG1466U			
WB IF-P4	1-36	UG1466U			
W101	1-69	30020-528			
W102	1-72	30020-529			
W103	1-75	30020-530			
W103	1-78	22420			
W104	1-81	30020-531			
W104	1-84	30020-1159			
W105	1-87	30020-532			
W105	1-90	30020-1160			
W106	1-93	30020-533			
W106	1-96	22421			
W107	1-99	30020-534			
W108	1-102	30020-535			
W109	1-55	30020-536			
W110	1-58	30020-537			
W111	1-42	30020-538			
W112	NOT USED				
W113	1-104	30020-539			
XA109	1-52	00-5002-018-103-002			
XA110	1-53	00-5002-014-103-002			
XA111	1-54	00-5002-010-103-002			
XA112	1-54	00-5002-010-103-002			
XF101	1-108	342004			
XF102	1-108	342004			
XQ101	1-139	8038-1G1			
XQ102	1-139	8038-1G1			

PART 2

TYPE 79198 SPECTRUM DISPLAY UNIT

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PART 2

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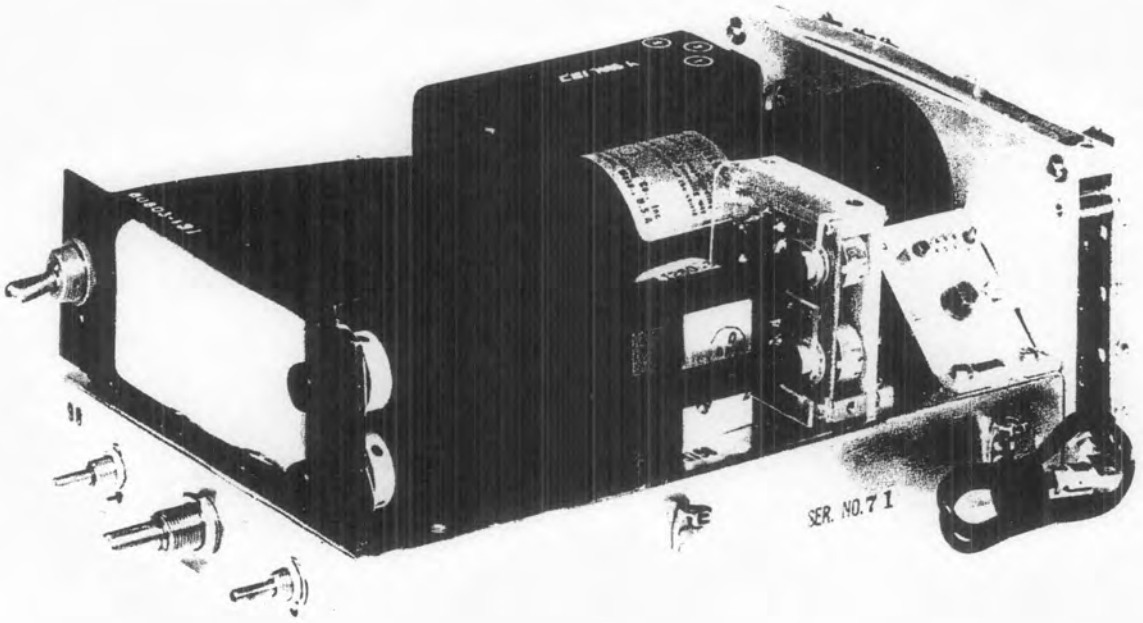
PART 2

LIST OF ILLUSTRATIONS

PART 2

TYPE 79198 SPECTRUM DISPLAY UNIT



SECTION I
GENERAL DESCRIPTION

1-1. GENERAL

The type 79198 Spectrum Display Unit is designed for use in the types G175K00000-1 and G175K00000-2 Receivers to provide a visual display of signals present at or near the frequency to which the unit is tuned. Such a display is an aid in analyzing signals intercepted by the receiver, and can be used to determine such things as the frequency, amplitude, and type of modulation. Sweep widths of 4 mc, 300 kc, 100 kc, 50 kc, and 25 kc are selectable by a front-panel switch. The SDU has a sensitivity which produces at least a one-inch vertical deflection with an SDU input signal level of 10 microvolts. The resolution of the unit, when using the most narrow sweep width, is such that two signals 2.5 kc apart will be displayed with at least a 6-db valley between them. All active elements in the spectrum display unit are solid state with the exception of the cathode ray tube. Operating voltages for the unit are supplied by the receiver's power supply.

1-2. EQUIPMENT SUPPLIED

QUANTITY	ITEM	PART NUMBER
1	Spectrum Display Unit	79198

1-3. ELECTRICAL SPECIFICATIONS

Number of Inputs	One, Signal Input
Input Impedance	50 ohms, nominal
Input Center Frequency	21.4 mc ± 0.1%
Range of Center Frequency Control	±400 kc
Flatness of Response	±2 db
Sweep Widths	25 kc, 50 kc, 100 kc, 300 kc, 4 mc
Sweep Linearity	Linear overall to within ±5% of the sweep width
Sweep Rate	25 cps ±5 cps
Resolution	Using 25-kc sweep width, two signals 2.5 kc apart will be displayed with at least a 6-db valley between the peaks
IF Frequencies	13 mc, 1 mc, and 205 kc
Oscillator Frequencies:	
1st Local Oscillator	34.4 mc ±1/2 sweep width
2nd Local Oscillator	14.0 mc, crystal controlled
3rd Local Oscillator	1.205 mc, crystal controlled

Image Rejection	60 db, minimum
IF Rejection	50 db, minimum
Sensitivity	10 μv input at 21.4 mc produces at least one inch vertical deflection on the CRT
Gain Control Range	60 db, minimum
Vertical Display Response	Linear
Marker Frequency	21.4 mc ±0.01%
CRT Display Type	3XP1
Front Panel Controls	Center Frequency, Sweep Width, SDU Gain, Focus, Intensity, Marker On/Off

1-4. MECHANICAL SPECIFICATIONS

Over-all Dimensions	2.95 inches high, 4.85 inches wide, and 10.0 inches deep
Operating Temperature Limits	0° to 50° C
Altitude Limits:	
Operating	15,000 feet
Non-operating	50,000 feet
Mounting	Screw mounted to receiver main chassis

SECTION II

PREPARATION FOR USE AND RESHIPMENT

2-1. UNPACKING AND INSPECTION

When shipped from the factory the spectrum display unit is installed in the main chassis of the G175K Receiver. The instructions given for unpacking and inspection of the receiver in Section II, Part 1 of this manual are, therefore, applicable to the SDU.

2-2. INSTALLATION

To install the spectrum display unit in the main chassis of the G175K Receiver, proceed as follows:

a. Remove the top and bottom dust covers, if installed.

b. Place the receiver on its left side.

CAUTION

Exercise extreme care during the installation of the SDU to prevent damage to the pins on the cathode ray tube socket.

c. From the bottom of the receiver, guide the SDU control shafts into the proper holes on the front panel, and center the subassembly in its mounting position.

d. Install five 4-40, 1/4-inch pan head machine screws in the holes provided on the main chassis. These screws should be installed from the top side of the receiver. Tighten the screws.

e. Check the control shafts and marker switch to insure proper mechanical operation. The screen of the CRT should be centered in its slot.

f. Carefully install plug A105P2 into jack A105J2. Do not exert excessive pressure to make this connection as damage to the jack may result.

g. Install plug A105P1 into jack A105J1.

h. Using the Allen wrench supplied, install the following knobs:

1. Install the white bar tactile knob on the SWEEPWIDTH KC switch shaft. Rotate switch to extreme counterclockwise position.
2. Loosen the set screws on this knob and align "25" mark with panel indicator; tighten setscrews.
3. Install a red tactile knob on the SDU GAIN control shaft.
4. Install orange tactile knob on CENTER FREQ control shaft.

2-3. PREPARATION FOR RESHIPMENT

No special procedures are necessary to prepare the spectrum display unit for reshipment. The subassembly is shipped in place on the receiver main chassis.

SECTION III

OPERATION

3-1. GENERAL

The spectrum display unit provides a visual display of signals around the frequency to which the receiver is tuned. The bandwidth of the display can be set to 25 kc, 50 kc, 100 kc, 300 kc, or 4 mc. The display can be used to determine the nature of the signal being received. Triple conversion is used in the unit to provide a resolution such that two signals 2.5 kc apart (with 25-kc sweep width) will be displayed with at least a 6-db valley between them. The SDU sensitivity is such that a one-inch vertical deflection is produced with an input signal level of 10 microvolts.

3-2. SPECTRUM DISPLAY UNIT CONTROLS

The operating controls for the spectrum display unit are mounted on the front panel of the G175K Receiver, as shown in Figure 3-1. The name and function of each is listed in Figure 3-2.

SDU FRONT PANEL CONTROLS

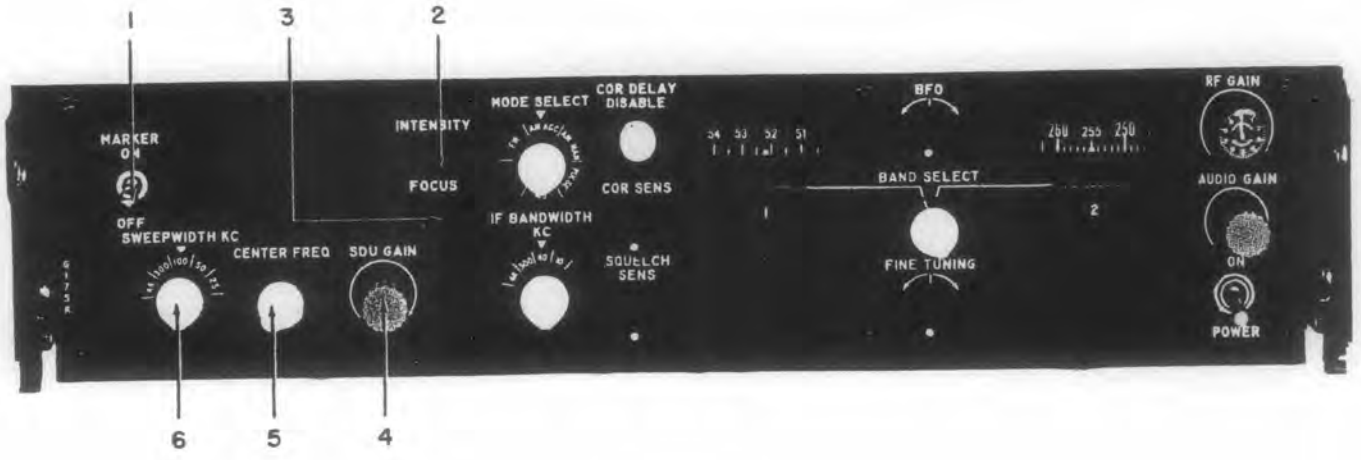


Figure 3-1

SPECTRUM DISPLAY UNIT CONTROLS AND INDICATORS

FIGURE INDEX	CONTROL	FUNCTION
1	MARKER Switch	Places marker pip on screen when set to ON position
2	INTENSITY Control	Varies brilliance of CRT trace; clockwise rotation increases brilliance
3	FOCUS Control	Used in conjunction with INTENSITY to obtain sharp CRT trace
4	SDU GAIN Control	Varies amplitude of signals being displayed; clockwise rotation increases gain
5	CENTER FREQ Control	Used to position marker pip in center of screen
6	SWEEPWIDTH KC Switch	Five position rotary switch used to set SDU sweepwidths of 25 kc, 50 kc, 100 kc, 300 kc, or 4 mc when placed in the 25, 50, 100, 300, or 4K positions.

Figure 3-2

3-3. OPERATING PROCEDURES

Operating procedures for the spectrum display unit are fully described in paragraph 3-18, Part 1 of this manual.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL

A functional description of the circuits in the spectrum display unit is given in the following paragraphs using the functional block diagram, FO-1, and the schematic diagrams FO-2 through FO-6. Reference should also be made to the main chassis schematic diagrams FO-2 and FO-3, Part 1.

The spectrum display unit (A105) receives its input signal from the IF coupler subassembly, A113. This signal is the 21.4-mc IF output from the RF tuning head in use. It is fed to the IF amplifier in the SDU through input connector A113P3, and then to the base of A1A1Q1, the first of two shaping amplifiers. Interstage coupling between the first and second shaping amplifier (A1A1Q2) is by means of a double-tuned LC circuit. The output of A1A1Q2 is fed to the first mixer through a second double-tuned network. The response of the shaping amplifiers, when combined with that of the mixer in the RF tuning head in use, is an essentially flat, 4-mc response.

A sawtooth waveform originates in the sweep generator and horizontal deflection amplifier module, A2. The sawtooth generator, A2Q1, produces a waveform at a frequency of 25 ±5 cps. The waveform is coupled through emitter follower A2Q3 and phase inverter A2Q4 to one contact on sweep reversal relay A2K1. This relay is controlled by a section of the BAND SELECT switch on the front panel of the receiver. The relay is included in the circuit to reverse the direction of the sweep oscillator due to double conversion of the incoming signals in particular RF tuners. This is done so that the left to right trace will always indicate low frequency to high frequency for either single or double conversion. Insertion of an RF tuning head that utilizes double conversion will automatically complete the circuit that controls the relay. The arm of the relay obtains the sawtooth waveform from either the phase inverter, A2Q4, when in the energized state, or from a dc amplifier consisting of transistors A2Q6 and A2Q7 when the relay is de-energized. The signal from the relay arm is then fed through sweep calibration potentiometer A2R22 to a second dc amplifier made up of transistors A2Q11 and A2Q12. The sawtooth output from the latter circuit is fed to a resistive voltage divider that is tapped to provide proper amplitude sawtooth signals that correspond to the selected sweep widths of 25 kc, 50 kc, 100 kc, 300 kc, and 4 mc. These taps are selected by a section of the SWEEPWIDTH KC switch, A105A1S1, and applied through the switch arm to the input of the sawtooth wave-shaping network. The modified sawtooth output from the shaping circuit is then coupled to the sweep oscillator, A1A1Q4, in the IF amplifier.

The sawtooth waveform produced by A2Q1 is also used to drive the horizontal deflection plates in the CRT. The path for the horizontal deflection voltage includes horizontal width potentiometer A2R12, emitter follower A2Q5, and a horizontal output amplifier consisting of transistors A2Q8, A2Q9, A2Q10, and A2Q13. The resultant deflection voltage from the latter network is applied to the horizontal deflection plates of the cathode ray tube. The fact that the waveform controlling the horizontal trace and the sweep oscillator is derived from a common source explains how synchronization is obtained between the various signals in the incoming RF spectrum and their position on the CRT trace. A horizontal positioning control located in the horizontal deflection amplifier circuit provides a means of centering the trace on the CRT screen.

The sweep oscillator, A1A1Q4, has a normal center frequency of 34.4 mc. This is 13 mc higher than the incoming 21.4 mc IF signal. Selecting the maximum sweep width (4 mc) and having the combination of an incoming signal frequency of 19.4 mc and a sweep oscillator frequency of 32.4 mc results in a 13-mc output from the mixer. This then is the first IF frequency for the spectrum display unit. An incoming signal of 23.4 mc and an oscillator frequency of 36.4 mc also combine to produce a 13-mc difference frequency. These conditions are noted to explain the relationship between the SDU IF, the sweep oscillator frequency, and the position of a signal in the incoming spectrum. The modified waveform from the sawtooth shaping network is applied to a voltage variable capacitor (Varicap) in the sweep oscillator circuit. The capacitance of the Varicap is changed by the impression of the modified sawtooth waveform, thus causing the sweep oscillator frequency to move up and down in conformance with the amplitude of the impressed wave. Therefore, a 13-mc signal is developed in the first mixer output circuit as the sweep oscillator changes in frequency and differs from the incoming signal by exactly 13 mc. Since the horizontal movement of the trace on the CRT is controlled by this same sawtooth wave, the signals from the mixer ultimately appear as vertical pips across the face of the tube in a position which corresponds to their original position in the input spectrum.

The 13-mc IF signal from the first mixer is fed through IF amplifier A1A2Q1 and applied to the second mixer, A1A2Q2. The output of the crystal-controlled 14-mc oscillator, A1A4Q1, is also applied to the second mixer. The 1-mc difference frequency produced is amplified by two narrowband IF amplifiers, A1A2Q3 and A1A2Q4, before being applied to the 1-mc output amplifier which drives the push-pull detector. This signal path is utilized only when the SWEEPWIDTH KC switch is in the 4K position. Placing the SWEEPWIDTH KC switch in any of the four remaining positions activates a second signal path containing a third mixer, A1A2Q7, two IF amplifiers, A1A2Q8 and A1A2Q9, and a third oscillator, A1A2Q6. This second path provides a more narrow IF bandwidth to obtain the required resolution for the four narrow sweep widths.

The 1-mc IF signal and the 1.205-mc crystal oscillator signal are applied to the third mixer. The output is a 205-kc third IF signal which is passed through the two IF amplifiers to the push-pull detector. The output from the detector consists of two equal signals of opposite polarity which are applied to the vertical deflection plates of the CRT.

The gain of the spectrum display unit is controlled by the front-panel SDU GAIN control which varies the bias on the base of the 21.4-mc shaping amplifiers. Controlling the gain of these stages sets the amplitude of the pips on the screen of the CRT. The vertical position of the trace on the CRT screen is adjusted by the vertical position control which functions in conjunction with the push-pull detector circuit. The marker switch activates the 21.4-mc marker oscillator, A1A3Q1, and results in a pip on the CRT screen which represents the center of the SDU response. This aids in receiver tuning and in determination of incoming signal frequency. The center frequency control varies the bias level on the varactor modulator to provide vernier control of the sweep oscillator center frequency. High voltage for the CRT is provided by a dc-to-dc converter, PS1, which is located on the SDU chassis. The remaining voltages required for operation of the unit are provided by the receiver power supply.

4-2. DETAILED THEORY

The following paragraphs present descriptions of the basic circuit sections of the spectrum display unit at the schematic diagram level. A thorough understanding of the signal flow discussion presented in paragraph 4-1 is desirable before proceeding further.

4-3. IF AMPLIFIER

The IF amplifier used in the spectrum display unit contains four etched circuit boards. One board contains the shaping amplifiers, the first mixer and the sweep oscillator. The schematic diagram for this board if FO-4, and its reference designation prefix is A1. The second board contains the 1.205 mc crystal oscillator, the second and third mixers and associated amplifiers, and the push-pull detector. FO-5 is the schematic diagram for this board; its reference designation prefix is A2. The 21.4-mc marker oscillator is contained on a third etched circuit board and its reference designation prefix is A3. The 14-mc crystal oscillator circuit for the second mixer is also mounted on an etched board and its reference designation prefix is A4. The overall schematic diagram for the IF amplifier assembly is FO-3; the reference designation prefix for the IF amplifier is A105A1.

4-4. Shaping Amplifiers

The incoming signal from the RF tuner in use is fed through dc-blocking capacitor C1 to the base of A1Q1, the first of two 21.4-mc shaping amplifiers. Resistor A1R1 terminates the input. The signal from the collector of A1Q1 is fed through a double-tuned, over-coupled network to the base of the second shaping amplifier A1Q2. The tuned circuit in the collector of A1Q1, consisting of capacitors A1C4, A1C5, and inductor A1L1 has the junction of A1C4 and A1C5 grounded to provide a signal voltage at the junction of A1C5 and A1L1 that is out of phase with the input signal. This signal voltage is fed back to the base of A1Q1 through capacitor A1C2 to neutralize the stage. This same method of neutralization is used for A1Q2. Resistors A1R5 and A1R11 in the collectors of A1Q1 and A1Q2, respectively, are parasitic suppressors. The bandwidth of the response produced by the two shaping amplifiers when combined with that of the mixer output in the RF tuner is a flat, 4-mc wide response. A high-impedance detector is included in the collector circuit of A1Q2 to provide a signal voltage at test point A1TP1 that can be viewed on an oscilloscope as an aid in alignment of the interstage network. The output from A1Q2 is fed through the second double-tuned network to the source of the first mixer, A1Q3.

4-5. Sweep Oscillator

The sweep oscillator, A1Q4, is basically a Clapp circuit that has its output frequency swept across a maximum range of 4 mc. The oscillator center frequency is 34.4 mc. The frequency variation is controlled by voltage-variable capacitor varactor, A1CR2, whose capacitance varies inversely with the reverse voltage applied across its terminals. Thus, as the voltage across A1CR2 increases, its capacity decreases; a decrease in voltage increases the capacity. The varactor is connected in series with the oscillator tank circuit and controls the oscillator frequency by varying its tank circuit capacitance. The bias voltage for the varactor is obtained from CENTER FREQ potentiometer, A1R3. The varying voltage applied to the anode terminal of the varactor has a modified sawtooth waveform. The sawtooth voltage is derived from the sweep generator, A2Q1, and is fed through two emitter followers, the sweep calibration control, A2R22, a dc amplifier, and a section of the front-panel SWEEPWIDTH KC switch, to the sawtooth shaping network. This network in effect distorts the linear sawtooth waveform to compensate for the non-linear changes in capacity of the varactor with respect to the applied voltage. By making the sawtooth voltage change at a non-linear rate, the sweep oscillator frequency is made to vary at a linear rate. The output of the sweep oscillator is taken at the base of A1Q4 and coupled through A1C18 to the gate of the mixer.

4-6. First Mixer and 13-mc IF Amplifier

The first mixer, A1Q3, beats the input signal from the shaping amplifiers with the sweep oscillator signal to produce the 13-mc first IF frequency. The mixer utilizes a type 3N128 MOS field-effect transistor (FET). A FET is used as the mixer to minimize the generation of spurious signals in the mixing process. The IF signal is applied to the source element and the sweep oscillator signal is applied to the gate. The 13-mc first IF frequency is taken from the drain and coupled through a double-tuned over-coupled network to the base of the 13-mc IF amplifier, A2Q1. The output from A2Q1 is coupled through a second double-tuned network to the base of the second mixer, A2Q2.

4-7. 14-mc Oscillator

The 14-mc oscillator, A4Q1, operates in a simple crystal-controlled circuit. The output signal (see FO-3) is taken from the junction of A4C3 and A4C5 and injected by means of A4C2 into the double-tuned circuit between the first IF amplifier, A2Q1, and the second mixer, A2Q2.

4-8. Second Mixer

The second mixer, A2Q2, receives both the 13-mc IF signal and the 14-mc oscillator signal at its base. The mixer heterodynes these signals to produce the 1-mc second IF frequency. This 1-mc output is coupled through a double-tuned network to the base of the first 1-mc IF amplifier, A2Q3, and through capacitor A2C30 to the base of the third mixer, A2Q7.

4-9. 1-mc IF Amplifier

The 1-mc IF amplifiers, A2Q3 and A2Q4, are narrowband stages providing additional amplification for the 1-mc IF signal from the second mixer and the selectivity necessary for good resolution when using the 4-mc sweep width. Bias voltage is applied to the bases of the 1-mc amplifiers when the SWEEPWIDTH KC switch, S1, is placed in the 4K position. If S1 is placed in the 25, 50, 100, or 300 positions, the 1-mc IF amplifiers are disabled and the bias voltage is applied to the two 205-kc IF amplifiers (paragraph 4-13). The bandwidth of the interstage networks between the 1-mc IF amplifiers is 15 kc. The output signal from A2Q4 is coupled through a capacitive impedance-matching network to the base of the output amplifier, A2Q5.

4-10. Output Amplifier and Push-Pull Detector

The collector of the output amplifier, A2Q5, is single tuned by inductor A2L8. The amplified signal is coupled to the push-pull detector made [illegible] diodes A2CR4 through A2CR5. The push-pull detector produces two signals of

equal amplitude but of opposite polarity. The positive output is taken from A2CR4 and fed through A2R55 to one vertical deflection plate in the CRT; the negative output is taken from diode A2CR5 and fed through A2R57 to the other vertical deflection plate. A positioning voltage is connected from potentiometer A2R56 to one of the vertical deflection plates to provide vertical positioning of the trace on the CRT screen.

4-11. 1.205-mc Oscillator

The 1.205-mc oscillator, A2Q6, operates in a crystal-controlled Colpitts circuit. The crystal, A1Y1, is mounted on top of the IF amplifier brass chassis. Regenerative feedback is supplied through A2R29 and A2C26 to sustain oscillation. The output signal is taken from the emitter of A2Q6 and coupled through capacitor A2C29 to the base of the third mixer, A2Q7.

4-12. Third Mixer

The third mixer, A2Q7, receives the 1-mc IF signal and the 1.205-mc oscillator signal on its base. The mixer beats these signals to produce the 205-kc third IF frequency. The 205-kc signal is then coupled through a double-tuned network to the base of the first 205-kc IF amplifier, A2Q8.

4-13. 205-kc IF Amplifier

The input to the first 205-kc IF amplifier is from a capacitive impedance-matching network consisting of capacitors A2C35 and A2C36. Potentiometer A2R42 sets the gain of the stage by varying the amount of bias voltage on the base. This bias voltage is applied through a section of the SWEEPWIDTH KC switch when the 25, 50, 100, or 300 KC positions are selected. The gain control is used to equalize the gain through the 205-kc signal path with that of the 1-mc path. The output signal from the collector of A1Q8 is fed through another double-tuned network to the base of the second 205-kc IF amplifier, A2Q9. The over-all bandwidth of this signal path is 2.5 kc. The output from the collector of A2Q9 is fed to the push-pull detector. The 205-kc IF amplifiers thus provide the selectivity necessary for good resolution with the more narrow sweep widths.

4-14. Marker Oscillator

The marker oscillator, A3Q1, provides a reference pip on the CRT trace to indicate the center of the SDU band-pass. The marker oscillator is contained in a shielded module mounted on the IF amplifier chassis. The marker oscillator is crystal controlled and operates at 21.4 mc. Potentiometer A2R48 is used to set the amplitude of the marker pip by varying the supply voltage to A3Q1. The output from A3Q1 is fed through A3C2, and A3E1, to the source element of the first mixer, A1Q3.

4-15 SWEEP GENERATOR AND HORIZONTAL DEFLECTION AMPLIFIER

The schematic diagram for the sweep generator and horizontal deflection amplifier is presented in FO-6; its reference designation prefix for the subassembly is A2.

4-16. Sawtooth Generator

The sawtooth waveform which is used to control the horizontal CRT trace and the sweep oscillator frequency is provided by the sawtooth generator, A2Q1, a unijunction transistor. Capacitor A2C1 charges from the +24-volt supply through A2Q2, a constant current generator to maximize the linearity of the sawtooth. Capacitor A2C1 charges to a sufficient level to trigger A2Q1. The charging action produces the leading edge of the sawtooth waveform. When A2Q1 conducts, A2C1 rapidly discharges through the unijunction to ground, creating the trailing edge of the sawtooth waveform. The peak voltage to which A2C1 will charge is determined by the resistive voltage divider consisting of A2R1, A2R2, and A2R3. This network compensates for variations in electrical characteristics

of various unijunction transistors. The sawtooth waveform is fed through emitter follower A2Q3 to the base of A2Q4 and through A2R14 to the horizontal width control, A2R12. Transistor A2Q3 isolates the sawtooth generator circuits from changing load conditions.

4-17. Phase Inverter and DC Amplifier

The sawtooth waveform from A2Q3 is applied directly to the base of phase inverter A2Q4. The positive-going emitter signal is fed directly to one contact on relay A2K1. The negative collector signal developed across load resistor A2R10 is fed directly to the base of dc amplifier A2Q6 which is coupled to the base of A2Q7 in a complementary configuration. The latter circuit is included so that signals of equal amplitude appear at the arm of A2K1, despite the 180-degree phase difference. The dc amplifier circuit gain is precisely controlled by the use of precision resistors in the emitter and collector circuits of both stages. The collector signal from A2Q7 is fed to the remaining contact on relay A2K1.

4-18. Sweep Reversal

Relay A2K1 provides the SDU with the capability to display the spectrum, low frequency to high frequency, from left to right on the trace, regardless of the number of conversions used in the associated RF tuner before the SDU output point. The relay is de-activated when RF tuning heads utilizing double conversion are installed and selected for use by the BAND SELECT switch. The sawtooth wave from the relay arm is fed through the sweep calibration potentiometer, A2R22, to a second complementary-connected voltage amplifier made up of A2Q11 and A2Q12. The collector signal from the output stage of this circuit is fed through coupling capacitor A2C3 to a section of the SWEEPWIDTH KC switch S1. This switch section applies the wave train to the sawtooth shaping network.

4-19. Sawtooth Shaping Network

As described in paragraph 4-5, the sweep oscillator action is controlled by a varactor. The capacitance-versus-voltage curve for varactors is extremely non-linear at low voltages. To compensate for this non-linearity, the sawtooth voltage must be modified before it is applied to the varactor. This is done by passing the sawtooth wave train through a diode-resistive compensating network which rounds off both positive-going and negative-going peaks (See FO-6). As the sawtooth voltage goes positive, diode A2CR4 conducts. As the voltage goes still more positive, Zener diode A2CR5 conducts, resulting in the positive peaks of the sawtooth wave being rounded off. When the sawtooth voltage goes negative, diode A2CR1 conducts followed by Zener diodes A2CR2 and A2CR3. The shunting effect of A2R42 and A2R43 across A2R44 modifies the sawtooth on negative excursions. The modified wave train from the shaping network is coupled to the sweep oscillator circuit in the IF amplifier.

4-20. Horizontal Output Amplifier

The sawtooth wave train from A2Q3 is fed to the horizontal width control, A2R12. This control varies the amplitude of the sawtooth input signal to the horizontal output amplifier to provide a means of adjusting the width of the sweep trace so that it extends across the entire face of the CRT. Transistors A2Q8 and A2Q13 form a differential amplifier which directly drives the horizontal CRT deflection plates. High-voltage transistors are used for this circuit to provide sufficient output voltage to deflect the electron beam across the face of the CRT without using a step-up transformer. Transistors A2Q9 and A2Q10 provide ac and dc coupling, respectively, between the two stages of the differential amplifier. This circuit arrangement makes it possible to vary the horizontal position control, A2R33, without changing the gain of the differential amplifier. Both A2Q9 and A2Q10 are connected as emitter followers. The sawtooth input to the amplifier is fed through A2Q5 which functions as a low-impedance source driver. The sawtooth developed across load resistor A2R19 is directly coupled to both A2Q8 and A2Q9. During the positive-going ramp of the sawtooth A2Q8 conducts harder, causing a drop in the voltage developed across load resistor A2R20. Simultaneously, the sawtooth output from A2Q9 is fed through A2R24 to the emitter of A2Q13. Since the base of this transistor is held at a fixed potential, the positive-going voltage applied to the emitter drives it toward cut off. As a result, the collector voltage swings in the positive direction toward the +200-volt source. Since the CRT horizontal deflection plates are connected directly to the collectors

of A2Q8 and A2Q13, the electron beam is attracted across the face of the CRT toward the deflection plate connected to A2Q13. Retrace of the beam occurs on the trailing edge of the sawtooth when the input voltage suddenly drops. The collector voltage of A2Q8 rises rapidly and that of A2Q13 drops as this transistor now conducts heavily. The resulting change in potential on the horizontal deflection plates returns the electron beam to the opposite side of the screen. By adjusting A2R33 the horizontal position of the sweep trace can be changed. This control determines the quiescent current through A2Q8 and A2Q13, and thus the no-signal voltage on the deflection plates. Assuming A2R33 is rotated in the clockwise direction, the voltage on the bases of A2Q10 and A2Q13 goes more positive, causing both transistors to conduct harder. This causes the collector voltage of A2Q13 to decrease, and the emitter voltage of A2Q10 to increase in the positive direction. The voltage increase is fed through A2R25 to the emitter of A2Q8 so that the conduction of the transistor decreases, resulting in an increase in collector voltage. The sweep trace will now shift in the direction of the deflection plate attached to A2Q8. If A2R33 is rotated in the counterclockwise direction, the effect will be opposite, with the sweep trace shifting in the direction of the deflection plate attached to A2Q13. Resistors A2R35, A2R36, and A2R37 form a current divider which maintains the emitter-to-base ac impedance of A2Q13 constant as A2R33 is varied, thus holding the gain of the transistor constant regardless of the position of the horizontal position control.

4-21. POWER SUPPLY

The low voltages required by the spectrum display unit are provided by the receiver power supply. The high voltage required by the CRT, and its associated circuits, is provided by the high voltage supply, PS1. It is a dc-to-dc converter contained in a sealed module mounted on the SDU chassis. The input voltage is +24 vdc and the output voltage is -1800 volts.

4-22. CATHODE RAY TUBE

The CRT, V1, provides a visual display of the input signal spectrum. The CRT has a rectangular face with a green plexiglass overlay which is inscribed with a horizontal base line, a vertical center marker, and five smaller vertical markers on each side of the center. These markers are not calibrated in any specific units but are supplied for reference purposes only. The -1800-volt output from power supply PS1 is applied to the control grid of the tube and to a voltage divider consisting of resistors A3R1 through A3R6. The voltage divider provides reduced voltage outputs for the various CRT operating functions. The intensity of the light beam on the face of the CRT is adjusted by the INTENSITY control, A3R2, which varies the accelerator voltage applied to the cathode. The FOCUS control, A3R4, is utilized to obtain a sharp waveform on the CRT screen by varying the potential on the focusing element. The FOCUS and INTENSITY controls are front-panel adjustments, and are constructed so that it is necessary to use a screwdriver to change their settings.

SECTION V
MAINTENANCE

5-1. GENERAL

The spectrum display unit presents no special maintenance problems, and normally requires no care beyond being kept clean. General maintenance procedures and inspections should be performed at the same time they are done on the entire G175K Receiver. Refer to Section V, Part 1, for pertinent maintenance procedures. The maintenance technician should be thoroughly familiar with Section IV of this part in which the circuits are described before beginning any troubleshooting.

5-2. ALIGNMENT

The spectrum display unit must be installed in its operating position on the main chassis of the G175K Receiver before proper alignment can be accomplished. Refer to Section V, Part 1 for general alignment procedures. The test equipment necessary to perform the complete spectrum display unit alignment and functional tests is listed in Figure 5-1. Before beginning the alignment, remove the brass cover from the bottom of the SDU chassis.

TEST EQUIPMENT REQUIRED

PREFERRED TYPE	SUITABLE ALTERNATE
Telonic SM2000 Sweep Generator	Jerrold 900B
Telonic LH-2 Plug-In Head	None
Telonic SH-1 Plug-In Head	None
Hewlett Packard 410C VTVM	MIL-M-9996
Hewlett Packard 5245L Frequency Counter	MIL-C-9988
Tektronix 545B Oscilloscope	MIL-O-9960
Tektronix 1A2 Plug-In Unit	MIL-O-9960
General Radio 1432X Decade Resistor	General Radio 1432J
Hewlett Packard 606A Signal Generator	AN/URM-25D
Hewlett Packard 608C Signal Generator	AN/USM-44A
Hewlett Packard 8616A Signal Generator	AN/URM-34A
UG-914A/U and UG-274A/U Adapters	UG-492A/U and UG-274B/U Adapters
Hewlett Packard 355D Attenuator	Telonic TAB-50

Figure 5-1

5-3. GENERAL

The SDU alignment should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power of 115 ± 2.0 vac and 28 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

5-4. POSITIONING OF CRT TRACE

After the receiver has had time to warm up, increase the front-panel INTENSITY control to produce a trace. Note that the trace is coincident with the horizontal base line on the plexiglass overaly. If not, proceed with the following steps.

a. Place the SDU SWEEPWIDTH KC control in the 4K position.

b. Adjust INTENSITY and FOCUS controls for usable trace.

c. Set the CENTER FREQUENCY control to midrange (5 turns from either end).

d. From the bottom of the chassis, rotate the vertical position potentiometer, A1A2R56, fully counterclockwise. This control is the small trimpot located at the right rear corner of the larger printed circuit board.

e. On the left side of the sweep generator and horizontal amplifier board at the rear of the SDU, note four binding posts.

f. If a jumper wire is present between two of the posts, unsolder it and, using a small clip lead, short across one pair of posts while observing the position of the CRT trace. Select the pair of binding posts that places the CRT trace nearest vertical center and solder a jumper between them.

g. Readjust the vertical position trimpot, A1A2R56, to position the trace coincident with the horizontal base line.

5-5. 2.5-KC BANDWIDTH AND 15-KC BANDWIDTH IF AMPLIFIER ALIGNMENT

a. Place SDU SWEEPWIDTH KC switch in 25 position.

b. Using the frequency counter, calibrate the HP-606A signal generator output frequency to 1.000 mc CW mode.

c. Connect the signal generator output to test point A105A1TP1, the feedthrough insulator mounted on the center partition of the chassis.

d. Increase the output level of the signal generator to produce a slight positive (vertical) shift in the CRT trace.

e. Adjust inductors A1A2L13, A1A2L12, A1A2L11, A1A2L10, A1A2L9 in the order given for a maximum positive shift of the CRT trace. Decrease the output level of the signal generator to keep the CRT trace on the screen.

f. Place the SDU SWEEPWIDTH KC switch in the 4K position.

g. Adjust A1A2L8, A1A2L7, A1A2L6, A1A2L5, A1A2L4, and A1A2L3 for maximum positive shift of the CRT trace. Decrease the signal generator output level as necessary to keep the trace on the screen.

5-6. SWEEP OSCILLATOR ADJUSTMENT

a. Rotate the SDU CENTER FREQ control to midrange (five revolutions from one end); place the SWEEPWIDTH KC switch to the 25 position and turn the MARKER ON.

b. Adjust inductor A1A1L9 until a marker pip appears at the center of the screen.

NOTE

To obtain a suitable marker it may be necessary to increase the marker amplitude by rotating A2R48, located on the sweep generator and horizontal amplifier board, in the clockwise direction.

c. Adjust A1A2L2, A1A2L1, A1A1L8, and A1A1L7, in the order given, for maximum vertical deflection of the marker pip.

5-7. INPUT SHAPING NETWORK ALIGNMENT

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

INPUT SHAPING NETWORK ALIGNMENT TEST SETUP

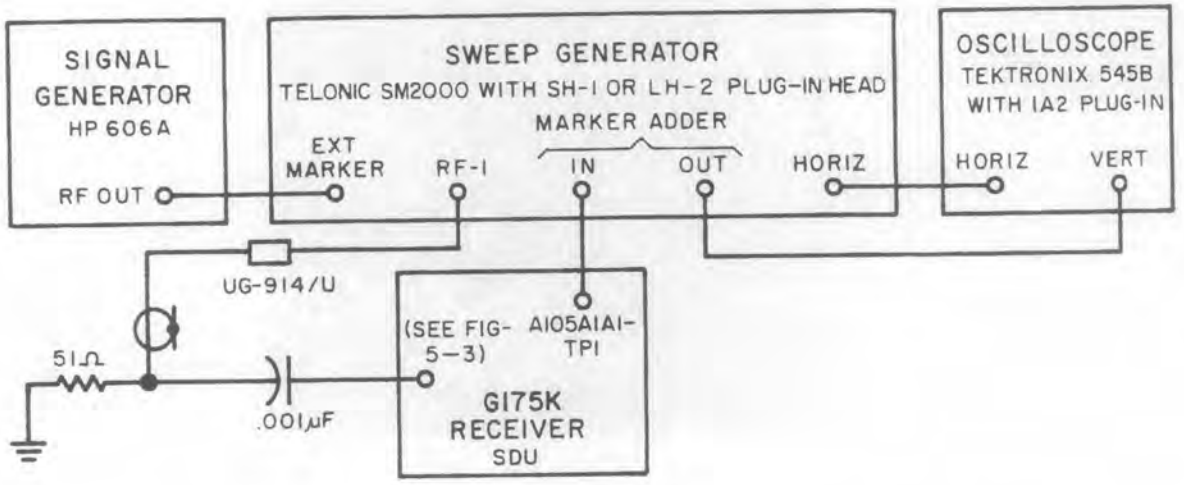


Figure 5-2

b. Figure 5-3 lists the output frequencies for the sweep generator and the points of connection to the receiver for the various RF tuning heads available.

INPUT SHAPING NETWORK ALIGNMENT SETUP INFORMATION

RF TUNER	SWEEP GENERATOR FREQUENCY	POINT OF CONNECTION
Band A	21.4 mc	RF mixer, V3, pin 4
Band B	21.4 mc	RF mixer, V3, pin 4
Band C	60.0 mc	A2J1 (60-21.4 mc converter input)
Band D	60.0 mc	A2J1 (60-21.4 mc converter input)
Band E	60.0 mc	A1J5 (60-21.4 mc converter input)
Band F	160.0 mc	A2J1 (160-21.4 mc converter input)
Band G	160.0 mc	A2J1 (160-21.4 mc converter input)

Figure 5-3

c. Select the frequency from Figure 5-3 to be used and tune the sweep generator to this frequency.

d. Set the output frequency of the signal generator to 21.4 mc, CW mode.

e. Rotate the SDU GAIN control fully clockwise.

f. Adjust sweep generator and oscilloscope controls to display a response curve.

g. Adjust A1A1L6, A1A1L4, A1A1L3, and A1A1L1 for a maximum amplitude symmetrical response centered about the 21.4-mc marker. Use the signal generator to check for 3 db response at 19.4 mc and 23.4 mc. The response ripple should be less than 2 db. A typical response is shown in Figure 5-4.

TYPICAL RESPONSE, SHAPING NETWORK

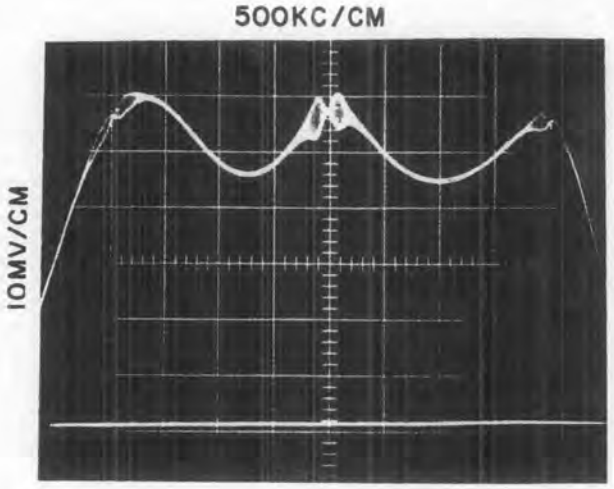


Figure 5-4

5-8. SHAPING NETWORK LINEARITY ADJUSTMENT

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

b. Use the signal generator to determine which side of the shaping network is the low side and which is the high side.

c. Disconnect the sweep generator output from the UG-914/U adapter.

d. Connect the signal generator output to the UG-914/U adapter and calibrate it for a 21.4 mc, CW output.

e. Place the G175K Receiver SWEEPWIDTH KC switch in the 25 position and rotate the SDU GAIN control fully clockwise.

f. Turn SDU MARKER to ON and adjust CENTER FREQ control to place marker in center of screen.

g. Turn MARKER to OFF.

h. Place SWEEPWIDTH KC switch in 4K position.

i. Tune signal generator to 19.4 mc and adjust output level to -90 dbm and SDU GAIN for full scale deflection of signal pip.

j. Tune signal generator to 23.4 mc while observing pip amplitude. If a noticeable decrease occurs in the amplitude, return the pip to the lowest point and note the signal generator frequency. Readjust inductor A1A1L3 slightly to again obtain full scale deflection. After any adjustment of A1A1L3 reconnect equipment as shown in Figure 5-2, place SWEEPWIDTH KC switch in 25 position and recheck response. Readjust A1A1L1, A1A1L4, and A1A1L6 as necessary for a response similar to Figure 5-4.

5-9. SWEEP LINEARITY CALIBRATION

5-10. Horizontal Width Adjustment

Prior to calibration of the SDU sweepwidth it is necessary to adjust the horizontal width of the CRT trace. Proceed as follows:

a. Place SDU SWEEPWIDTH KC switch in 100 position.

b. Turn MARKER switch ON and using the CENTER FREQ control position the marker so that the left-hand slope just reaches "around" the left-hand edge of the CRT screen.

c. Observe the marker pip and note if a small secondary pip appears in the left-hand slope. If so, adjust the HORIZ WIDTH potentiometer, A105A2R12, to extend the sweep width "around" the CRT and remove the smaller pip. This potentiometer is located on the right side of the printed circuit board (when viewed from the top of the chassis) that is mounted on the rear of the SDU chassis.

5-11. 4-mc Sweepwidth

a. Connect equipment as shown in Figure 5-5.

SWEEP LINEARITY CALIBRATION TEST SETUP

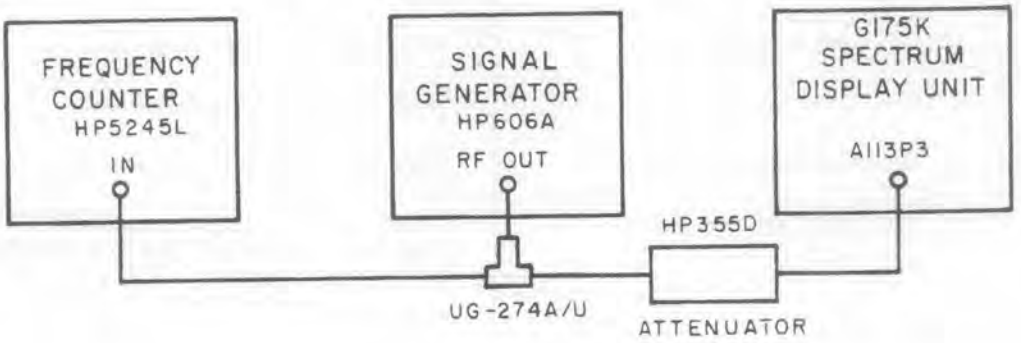


Figure 5-5

b. Turn SDU MARKER ON and rotate CENTER FREQUENCY control to mid-range (5 revolutions from one end).

c. Place SDU SWEEPWIDTH KC switch in 4K position.

d. Adjust the HORIZ POS potentiometer, A2R33, (if necessary) to position the marker over the center mark on the CRT screen. This potentiometer is located on the etched circuit board mounted on the rear of the SDU.

e. Rotate the signal generator output level control to -10 dbm.

f. Rotate the SDU GAIN control fully counterclockwise.

g. Using the frequency counter, calibrate the signal generator output frequency to 20.400 mc, CW mode.

h. Increase the SDU GAIN control for a signal pip approximately two-thirds of the height of the screen.

i. Observe the position of the signal pip on the screen. It should appear between the second and third vertical marks to the left of center (See Note). If not, adjust the sweep calibration control, A2R22, to properly position the signal pip. If adjustment of A2R22 does not properly position the pip, it will be necessary to select a value for resistor A2R46 that will accomplish this result.

NOTE

The position of the signals noted in steps i, n, and p are true only when relay A2K1 is in the deactivated state (Band C, D, or E tuner installed and selected for use). The signal positions given will be on the opposite side of the screen if A2K1 is activated. See Figure 5-6.

SWEEP REVERSAL RELAY CONDITION

RF TUNING HEADS INSTALLED	CONDITION OF RELAY A2K1
a. One Band A and one Band B	Activated; to deactivate, remove POWER plug from one tuner and select this tuner position with BAND SELECT switch.
b. One Band A and one Band C	Activated with Band A in use and deactivated with Band C in use; select tuner position that changes condition of relay.
c. One Band A and one Band D	Same as b. for respective tuner.
d. One Band A and one Band E	Same as b. for respective tuner.
e. One Band B and one Band C	Same as b. for respective tuner.
f. One Band B and one Band D	Same as b. for respective tuner.
g. One Band B and one Band E	Same as b. for respective tuner.
h. One Band C and one Band D	Deactivated; to activate remove POWER plug from one tuner, select this tuner position with BAND SELECT switch and ground pin J of removed POWER plug.
i. One Band C and one Band E	Same as h.
j. One Band D and one Band E	Same as h.
k. One Band A and one Band F	Same as a.
l. One Band A and one Band G	Same as a.

Figure 5-6

SWEEP REVERSAL RELAY CONDITION (Cont)

m. One Band B and one Band F	Same as a.
n. One Band B and one Band G	Same as a.
o. One Band C and one Band F	Deactivated with Band C in use; activated with Band F in use; select tuner position that changes condition of relay
p. One Band C and one Band G	Same as o. for respective tuner.
q. One Band D and one Band F	Same as o. for respective tuner.
r. One Band D and one Band G	Same as o. for respective tuner.
s. One Band E and one Band F	Same as o. for respective tuner.
t. One Band E and one Band G	Same as o. for respective tuner.

Figure 5-6

j. Remove resistor A2R46 and connect the resistance decade box across the mounting posts.

k. Select a value between 200K ohms and 1 megohm that results in proper positioning of the signal pip.

l. Remove the decade box and install a resistor having a value equal to that selected.

m. Using the counter, calibrate the signal generator output frequency to 19.400 mc. Increase the SDU GAIN to maintain the signal pip amplitude.

n. Observe the position of the signal pip. It should appear over the fifth vertical mark to the left of center. If not, follow the procedure used in steps k. through m. above for resistor A2R47. The nominal value for A2R47 is 150K. Usable values are from 100K ohms to 200K ohms.

p. Use the frequency counter and check for sweep linearity at 22.400 mc and 23.400 mc. The 22.400 mc signal pip should appear between the second and third vertical marks, and the 23.400 mc pip on the fifth vertical mark to the right of center, respectively.

5.12. 300-kc Sweepwidth

a. Connect equipment as shown in Figure 5-5.

b. Place SDU SWEEPWIDTH KC switch in 300 position; if necessary, reposition the marker using the CENTER FREQ control.

c. Using the frequency counter, calibrate the signal generator output frequency to 21.250 mc.

d. Observe the position of the signal pip. It should appear over the fifth vertical mark to the left of the screen. If not, it shall be necessary to select a value for resistor A1A2R59 that will properly position the signal pip.

NOTE

The position of the signals noted in steps d. and g. are true only when relay A2K1 is in the deactivated state (Band C, D, or E tuner installed and selected for use). The signal positions given will be on the [illegible] activated. See Figure 5-6.

e. Remove the factory installed resistor and use the decade resistance box to select the proper value. A nominal value for A2R59 is 82K ohms. Usable values range from 75K ohms to 91K ohms.

f. Remove the decade box and install a resistor of the selected value.

g. Use the frequency counter to calibrate the signal generator output frequency to 21.550 mc. The signal pip should appear directly under the fifth vertical mark to the right of center.

5-13. LINEARITY CHECK WITH SWEEP REVERSAL

In order to check sweep linearity with the sweep reversed, it is necessary to change the condition of relay A2K1 from the condition that existed during the calibration procedures listed in paragraphs 5-9 and 5-10. Since the relay is controlled by the installation of the RF tuners, it is first necessary to determine what condition A2K1 was in for the particular receiver under test. Figure 5-6 lists the RF tuning heads and the condition of A2K1 with these tuners installed. Determine from this list the mode of A2K1 with respect to the receiver under test. Perform the indicated operation(s) to reverse the mode of A2K1; then proceed as follows:

a. Connect equipment as shown in Figure 5-5.

b. Turn SDU MARKER ON and center on CRT screen using CENTER FREQ control.

c. Increase SDU GAIN for usable display.

d. Use the frequency counter and signal generator and recheck the sweep linearity using the 4-mc sweepwidth and the 300-kc sweepwidth. Signals should be within the ±5% tolerance. If not, reselect values for A2R46 and A2R47 until the linearity is within tolerance for both normal and reversed sweep conditions.

5-14. SDU GAIN ADJUSTMENT

a. Connect output of HP606A signal generator to SDU input A113P3; set output frequency to 21.4 mc, CW mode and a level of 10.0 μv.

b. Place SDU SWEEPWIDTH KC switch in 300 position and rotate SDU GAIN control fully clockwise. Note that a full-scale signal pip is displayed. If the signal is less than full-scale select a value for resistor A105A1R6 (nominal value 7.5K ohms) to obtain the proper signal amplitude. Usable values range from 4.7K ohms to 18K ohms.

5-15. PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic inspections performed at daily and 100 operation-hour intervals. The shop inspection is performed when SDU malfunction is suspected.

5-16. DAILY INSPECTION

At the start of each day of use, inspect the SDU for visible signs of damage, and remove any signs of dust or dirt build-up. All cables should be checked for cleanliness, signs of damage, and proper connection. Check all mountings for looseness. Ensure that adequate ventilation is provided.

5-17. 100-HOUR INSPECTION

Perform daily inspection. Disconnect all power supply cables. Remove dust covers and blow accumulated dust from interior using dry, low pressure compressed air.

5-18. SHOP INSPECTION

At any time degraded SDU performance is suspected, remove the entire receiver from its operating position and send it to the repair shop. Shop personnel should perform applicable portions of the daily and 100-hour inspections and the functional tests outlined in paragraph 5-19. If the spectrum display unit meets test specifications, return the receiver to service. If performance is degraded, replace only those semiconductors and/or components necessary to restore proper performance. Align the SDU (if necessary) and again perform the functional tests.

5-19. FUNCTIONAL TESTS

The following functional tests can be performed on the spectrum display unit when it is installed in its operating position on the receiver main chassis. At least one RF tuning head must be installed before the test can be performed.

5-20. TEST CONDITIONS

The functional tests should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power to G175K Receiver of 115 ±2.0 vac and 28.0 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

5-21. MARKER AND CENTER FREQUENCY

a. Apply power to the G175K Receiver and adjust the SDU FOCUS and INTENSITY controls for a usable trace.

b. Rotate CENTER FREQ control to midrange (Five revolutions from either end).

c. Turn MARKER switch ON and note that marker pip appears beneath center vertical mark on CRT screen.

d. Check marker position for all sweep widths; marker position may vary slightly but no more than four full revolutions of CENTER FREQ control should be necessary to properly reposition pip.

e. If necessary, adjust A1A1L9 to position the marker pip.

5-22. SWEEPWIDTH AND LINEARITY

a. Connect equipment as shown in Figure 5-5.

b. Place SDU MARKER switch to ON and SWEEPWIDTH KC switch in 25 position.

c. Adjust signal generator for CW mode; set output frequency to 21.4 mc and increase output level to operate counter.

d. Adjust SDU GAIN control for full-scale deflection and CENTER FREQ control to position marker at center of screen.

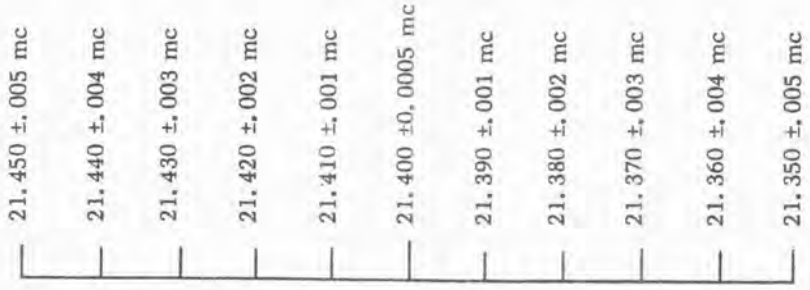
e. Tune signal generator to place signal behind left end graticule mark; record the signal generator frequency as displayed on the counter.

f. Tune the signal generator to place the signal behind the right end graticule mark. Record this frequency.

g. The difference between the two frequencies should be .025 ± .0025 mc.

h. Place the SWEEPWIDTH KC switch in the 50 position and repeat steps c. through g. The difference between the two frequencies should be .050 ± .005 mc.

i. Place the SWEEPWIDTH KC switch in the 100 position and record the frequencies at each graticule mark. The frequencies should be within the tolerances specified in the following diagram:

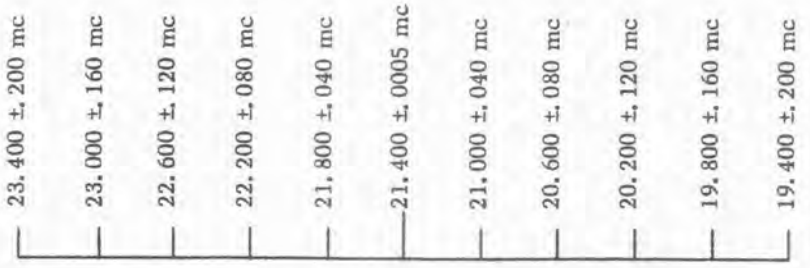


NOTE

Higher frequencies will appear to the right of 21.4 mc and lower frequencies to the left when Band C, D, E, F, or G tuners are being used.

j. Place the SWEEPWIDTH KC switch in the 300 position and repeat steps c. through g. The difference between the frequencies should be .300 ± .030 mc.

k. Place the SWEEPWIDTH KC switch in the 4K position and record the frequencies at each graticule mark. The frequencies should be within the tolerances specified in the following diagram:



5-23. SDU DISPLAY RESOLUTION

a. Connect equipment as shown in Figure 5-7.

b. Place SDU SWEEPWIDTH KC switch to 25 and MARKER OFF.

c. Tune signal generator to 1.0 mc and adjust controls for CW mode and output level to operate counter.

d. Adjust attenuator to maintain 16.0 vdc reading on the VTVM while adjusting signal generator frequency for peak output.

e. Decrease the attenuator 6 db and increase signal generator frequency to again obtain 16.0 vdc reading; record the signal generator frequency.

SDU DISPLAY RESOLUTION TEST SETUP

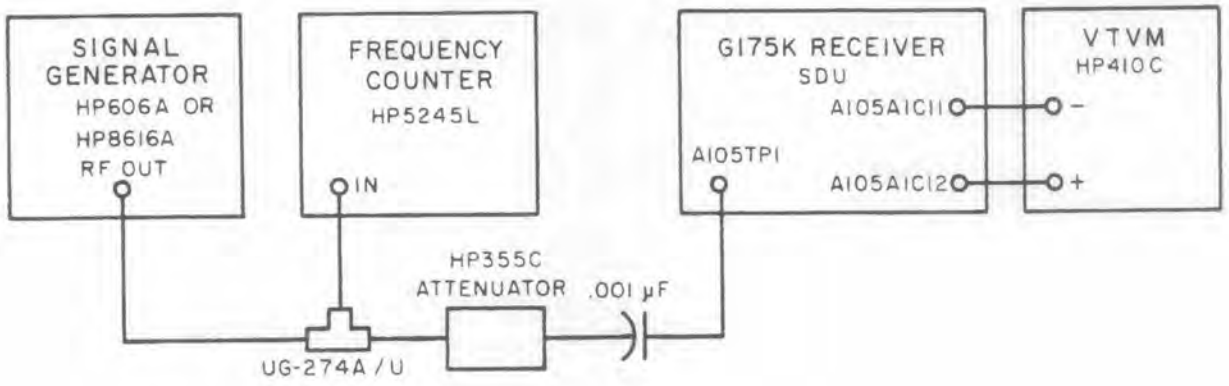


Figure 5-7

f. Decrease the signal generator frequency through the peak and below to again obtain 16.0 vdc; record the frequency.

g. The difference between the two frequencies should not be more than 2.5 kc.

h. Place the SWEEPWIDTH KC switch in the 4K position and repeat steps c. through g. The difference between the two frequencies should not be more than 20 kc.

5-24. SDU FREQUENCY RESPONSE

The following procedure for checking the SDU frequency response uses a Band A tuner. If any tuner other than Band A is used, reference should be made to Figure 5-8 for proper signal generator adjustments and tuner frequencies.

a. Connect the output of the HP606A signal generator to RF INPUT jack J101 or J105 (depending on position of Band A tuner); tune the signal generator to 32 mc.

b. Place G175K Receiver BAND SELECT switch in position necessary to activate Band A tuner; place MODE SELECT switch in AM MAN position, SDU SWEEPWIDTH KC switch in 4K position and rotate SDU GAIN and RF GAIN controls fully clockwise.

c. Set signal generator output level to -95 dbm, CW mode.

d. Tune Band A tuner to 32 mc and adjust SDU GAIN control for full-scale deflection of signal pip.

e. Tune signal generator ± 1.5 mc about 32 mc and note frequency where signal pip is greater in amplitude. Tune signal generator to this point and increase SDU GAIN control to again obtain full-scale deflection.

f. Tune signal generator ± 1.5 mc about 32 mc and note frequency where signal pip is minimum. Increase signal generator output level to again obtain full-scale deflection at this frequency. The signal generator output level should not be less than -89 dbm. This verifies an SDU amplitude variation of 6 db or less.

g. Repeat steps c. through f. at a frequency of 90 mc. The amplitude variation should be 6 db or less.

h. Use the information in Figure 5-8 for Band B, C, D, E, F, and G tuners. The amplitude variation should be 6 db or less in all cases.

SDU FREQUENCY RESPONSE TEST INFORMATION

RF TUNER	TEST FREQUENCY	FREQUENCY VARIATION
Band B	60 mc	±1.5 mc
	260 mc	± 2.0 mc
Band C	235 mc	± 2.0 mc
	500 mc	± 2.0 mc
Band D	490 mc	± 2.0 mc
	1000 mc	± 2.0 mc
Band E	12 mc	± 0.5 mc
	30 mc	± 0.5 mc
Band F	1.0 gc	± 2.0 mc
	1.9 gc	± 2.0 mc
Band G	2.1 gc	± 2.0 mc
	3.9 gc	± 2.0 mc

Figure 5-8

5-25. UNSCHEDULED MAINTENANCE

Most troubles experienced with the spectrum display unit will be caused by the failure of the CRT, transistors, or diodes. Proper operation of these components should be assured before any further troubleshooting is carried out.

Proper operation of the RF tuning head(s) installed on the main chassis should also be assured before troubleshooting is begun on the SDU. Ensure that the SDU power supply, PS1, and the receiver power supply are providing the proper output voltages. Figure 5-9 lists the transistor and CRT element voltages.

WARNING

Operating voltages for the cathode ray tube are dangerous and may be fatal if contacted. Exercise extreme care with working with any of the protective covers removed or when measuring these voltages at the CRT socket.

The easiest method of checking the IF amplifier subassemblies is to feed in a 21.4-mc signal at the input of the SDU (A113P3) and check for an output at each stage using a wideband oscilloscope. Select the narrowband and wideband sweepwidths as required to activate the respective circuits while signal tracing. Once the faulty stage is known voltage measurements will usually pin point the malfunctioning component. Refer to Figure 5-9 as necessary, and to the schematic diagrams FO-2 through FO-6. Troubleshooting of the sweep generator and horizontal amplifier board may be most easily accomplished by first obtaining a thorough knowledge of the circuit operation as described in paragraphs 4-1 through 4-22 of this part and then signal tracing with an oscilloscope while cross referencing with the schematic diagrams.

5-26. SUBASSEMBLY REMOVAL AND REPLACEMENT

To remove the entire spectrum display unit from the receiver main chassis reverse the installation procedures given in Section II of this part.

5-27. REMOVAL AND REPLACEMENT OF IF AMPLIFIER SUBASSEMBLIES

To replace a defective etched circuit board in the IF amplifier proceed as follows:

a. Remove the SDU from the main chassis of the receiver by reversing the procedures given in Section II of this part (Installation).

b. Remove the brass cover from the bottom of the SDU chassis.

c. Select the defective board (A1A1 or A1A2) as determined by troubleshooting procedures.

d. If subassembly A1A1 is defective, proceed with the following steps. If subassembly A1A2 is to be replaced begin with Step i.

e. To remove board A1A1 from the subchassis first remove the seven hold-down screws.

f. Lift the board from the subchassis; be careful not to damage the board or attaching wires.

CAUTION

Excess heat applied to the circuit may cause the pattern to lift from the board. Use only a low-heat iron to remove components or attaching wires. Use a heat sink when replacing transistors or diodes.

g. Once removed from the chassis, the attaching wires may be unsoldered from the circuit pattern side.

h. To replace the component boards reverse the applicable steps.

i. To remove board A1A2 first unsolder the bare wire connected to the forward most feedthrough capacitor mounted on the center partition.

j. Unsolder the end of the wire connected to pin three (3) of the CENTER FREQ potentiometer.

k. Unsolder the end of the wire at the feedthrough capacitor that connects to pin 2 of the CENTER FREQ control.

l. Remove the four hold-down screws from the corners of the board; remove the screw from the center of the board.

m. Unsolder the short bare wire from the feedthrough capacitor mounted on the far left side at the rear of the chassis.

n. Lift the component board from the chassis; be careful not to damage the board or attaching wires.

o. Once removed from the chassis, the attaching wires may be unsoldered from the circuit pattern side.

5-28. REMOVAL AND REPLACEMENT OF SWEEP GENERATOR AND HORIZONTAL AMPLIFIER BOARD

The sweep generator and horizontal amplifier board (A2) is mounted on the rear of the SDU chassis. To remove or replace this board proceed as follows:

a. Remove the multipin connector from the rear of the CRT. Exercise extreme care when removing this connector to avoid breaking the solder lugs.

b. Remove the four attaching screws from the corners of the board. The subassembly is now free of the chassis.

c. Remove the attaching wires from the circuit pattern side of the board.

d. Replace the board by reversing steps a. through c.

5-29. 21.4-MC MARKER OSCILLATOR AND 14-MC CRYSTAL OSCILLATOR REMOVAL AND REPLACEMENT

To replace either the marker oscillator or the 14-mc crystal oscillator, both of which are mounted on the top of the chassis, it is first necessary to remove either subassembly board A1A1 or A1A2. The attaching hardware for the defective oscillator is then exposed and can be removed. To replace a component on either of the oscillator boards it is only necessary to remove the two screws holding the small covers on the particular assembly and then remove the cover.

TROUBLESHOOTING CHART, SPECTRUM DISPLAY UNIT

SYMPTOM	PROBABLY CAUSE	REMEDY
Power applied, INTENSITY fully CW, no trace visable.	Defective sawtooth generator transistor; A105V1 faulty.	Replace A105A2Q1; measure A105V1 pin voltage and replace if necessary.
Input signal applied and present at receiver audio and video outputs, no pip on screen.	14-mc crystal oscillator defective.	Check A105A4Y1 and A105A4Q1; replace if necessary.
Input signal applied, no pip on screen.	Shaping network semiconductor defective.	Measure emitter voltages of A105A1A1Q1, Q2, Q3 and replace defective transistor
No signal pip visable in 25, 50, 100, or 300-kc sweepwidth; pip is present in 4K sweepwidth.	1.205 mc crystal defective.	Replace A105A1Y1.
Signals displayed low frequency to high frequency from left to right on normal sweep but opposite way on reversed sweep.	A105A2Q4, Q6, or Q7 defective.	Measure emitter voltages to determine faulty transistor and replace with good unit.
MARKER switch ON and CENTER FREQ at midrange, no marker pip.	21.4-mc crystal defective; marker oscillator circuit faulty.	Check A105A1A3Y1 and Q1 and replace as necessary.

Figure 5-9

TUBE AND TRANSISTOR ELEMENT VOLTAGES, SDU

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A1A1Q1	2N3478	1.2	1.9	9.1
A1A1Q2	2N3478	1.2	1.9	10.2
A1A1Q3	3N128	3.6(S)	2.4(G)	8.4(D)
A1A1Q4	2N3478	5.6	6.0	9.8
A1A2Q1	2N3478	2.1	2.9	9.9
A1A2Q2	2N3478	1.1	1.7	9.7
A1A2Q3	2N3478	1.7	2.3	9.4
A1A2Q4	2N3478	1.7	2.2	9.5
A1A2Q5	2N3933	0.7	1.4	18.5
A1A2Q6	2N706	4.5	3.8	8.5
A1A2Q7	2N3478	1.2	1.8	9.7
A1A2Q8	2N3478	1.3	2.0	9.6
A1A2Q9	2N3933	0.7	1.4	18.5
A1A3Q1	2N706	0.0	0.15	4.9
A1A4Q1	2N706	0.0	0.15	4.9
A2Q1	2N2646	6.2	0.0(B1)	15.6(B2)
A2Q2	2N3251	19.0	18.5	6.2
A2Q3	2N929	5.6	6.2	22.5
A2Q4	2N929	5.2	5.6	21.2
A2Q5	2N929	6.0	6.6	22.5
A2Q6	2N3251	21.5	21.2	0.54
A2Q7	2N2270	0.0	0.54	18.0
A2Q8	2N3440	5.4	6.0	106.0
A2Q9	2N2270	5.4	6.0	22.5
A2Q10	2N2270	5.8	6.4	22.5
A2Q11	2N929	5.6	6.0	21.9
A2Q12	2N3251	22.5	21.9	12.2
A2Q13	2N3440	5.8	6.2	88.0

Cathode Ray Tube A105V1

Pin Number	1	2	3	4	5	6	7	8
Voltage	102.0	92.0	-1600*	-1800**	-1100	82.0	73.0	-1600*

TEST CONDITIONS: All readings are positive dc with respect to chassis unless otherwise noted. Readings taken with HP410C VTVM; G175K Receiver used as power source, no signal input. Control settings: SWEEPWIDTH KC, SDU GAIN, INTENSITY, FOCUS fully clockwise; CENTER FREQ midrange; MARKER OFF.

NOTES: (B1) Base One; (B2) Base Two; (S) Source; (G) Gate; (D) Drain
* A105V1 pin 3 to 8 potential 6.3 vac (filament)
** Values range from -1500 to -1900 vdc

Figure 5-10

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

INTRODUCTION

PURPOSE AND FORMAT

This Illustrated Parts Breakdown lists and describes electrical and mechanical parts to assist in requisitioning, storing, and identifying spare parts. Four major parts comprise this section: (1) Introduction, (2) Group Assembly Parts Breakdown, (3) Numerical Index, and (4) Reference Designation Index.

SUMMARY OF CONTENTS

INTRODUCTION

Included in the Introduction are: (1) Purpose and Format, (2) Summary of Contents, (3) How to Use, (4) Abbreviations, and (5) List of Manufacturers' Codes and Addresses.

GROUP ASSEMBLY PARTS BREAKDOWN

The Group Assembly Parts Breakdown contains illustrations and parts lists of assemblies, and detailed parts. The illustrations and text are arranged according to function and/or next assembly. When it is necessary to show a subassembly in detail, and it is not possible to do so in the same illustration as its major assembly, it is referenced to another illustration in which the subassembly is exploded in as much detail as necessary and its component parts listed in the accompanying text.

The nomenclature of each part, the units per assembly, and the usable on code, if any, are listed to the right of the part number in the text. Next assembly sequence is determined by indenture position; that is, a part listed one column to the right of the position of the part above it is a component of that assembly or installation. Attaching parts are shown directly below in the same indenture column as the parts they attach.

When a manufacturer's part is listed, the manufacturer's code is given in the nomenclature along with any other information thought necessary or helpful. The manufacturer's name and address may be found from the code symbol by consulting the "List of Manufacturers' Codes and Addresses" in the Introduction. The codes are in accordance with Federal Supply Code for Manufacturers, cataloging handbook H4-1.

The column entitled "Usable on Code" is not utilized in this publication.

The number of parts given under the column entitled "Units per Assembly" constitute that number required to make up a single assembly.

Left- and right-hand parts are listed separately. Component parts of left- and right-hand assemblies are identified by determining next assembly order. When a left- or right-hand assembly has both left- and right-hand parts as components, the nomenclature will show the assembly to which each belongs.

NUMERICAL INDEX

Each part number appearing in the Group Assembly Parts Breakdown is listed in the Numerical Index. This index is compiled in accordance with the numerical part number filing system described below. Read part numbers from left to right, one digit at a time, to determine part number numerical arrangement. The order of precedence in

part number numerical arrangement is as follows:

(1) Space (blank column)

(2) Dash (-)

(3) Letters A thru Z

(4) Numerals 0 thru 9

All part numbers are listed with the figure and index number of each appearance.

REFERENCE DESIGNATION INDEX

The Reference Designation Index includes all components of electronic equipment having reference designators.

The Reference Designation Index is divided into three columns consisting of the following: (1) REFERENCE DESIGNATION - Reference designators listed in alphanumerical order; (2) FIG. AND INDEX NO. - Used to locate the corresponding part in the Group Assembly Parts Breakdown; (3) MFR PART NUMBER - The part number assigned by the manufacturer of the part.

HOW TO USE

KNOWN ➡	MFR PART NO.	REFERENCE DESIGNATION NO. (COMPONENT NUMBERS ON SCHEMATICS)
WANT TO KNOW ➡	SEQUENCE OF ASSEMBLY	MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED
SOLUTION ➡	IN NUMERICAL INDEX FIND MFR PART NUMBER. SEQUENCE OF ASSEMBLY MAY BE FOUND ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.	IN REFERENCE DESIGNATION INDEX FIND REFERENCE DESIGNATION NUMBER. FIND MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.

ABBREVIATIONS

AP	Attaching Part
ASSY.	Assembly
DC	Direct Current
FIG	Figure
GMV	Guaranteed Minimum Value
IF	Intermediate Frequency
k	Kilohm or Kilo (10^3)
MC	Megacycles (10^6)
meg	Megohms (10^6)
MFR	Manufacturer
NHA.	Next Higher Assembly
NO	Number
P.C.	Printed Circuit
pct	Percent
pf	Picofarad (10^{-12})
REF.	Reference
μf	Microfarad (10^{-6})
μh	Microhenry (10^{-6})
w	Watt
wvdc	Working Volts Direct Current

LIST OF MANUFACTURERS' CODES AND ADDRESSES

CODE	NAME AND ADDRESS
01121	Allen-Bradley Company 1201 South Second Street Milwaukee, Wisconsin 53204
01281	TRW Semiconductors, Inc. 14520 Aviation Boulevard Lawndale, California 90260
02114	Ferroxcube Corporation of America Mt. Marion Road Saugerties, New York 12477
02660	Amphenol Corporation 2801 S. 25th Avenue Broadview, Illinois 60153
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey 08530
04941	Walsco Electronics Corporation 4 South Wyman Rockford, Illinois 61101
06001	General Electric Company Capacitor Department P. O. Box 158 Irmo, South Carolina 29063
07047	The Ross Milton Company 511 Second Street Pike Southampton, Pennsylvania 18966
14632	Watkins-Johnson Company CEI Division 6006 Executive Boulevard Rockville, Maryland 20852
15605	Cutler-Hammer Incorporated Milwaukee, Wisconsin
16733	Phelps Dodge Electronic Products Corporation 60 Dodge Avenue North Haven, Connecticut 06473
26655	Oster Tool & Die Corporation 5234 W. 26th Street Cicero, Illinois 60650
37942	P. R. Mallory and Company, Inc. 3029 E. Washington Street Indianapolis, Indiana 46206
56289	Sprague Electric Company Marshall Street North Adams, Massachusetts 01247
70485	Atlantic India Rubber Works, Inc. 571 W. Polk Street Chicago, Illinois 60607
72259	Nytronics Incorporated 550 Springfield Avenue Berkeley Heights, New Jersey 07922
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
75042	IRC Division of TRW Incorporated 401 North Broad Street Philadelphia, Pennsylvania 19108
76055	Mallory Controls, Division of P. R. Mallory and Co., Inc. State Road 28W Frankfort, Indiana 46041
77342	American Machine & Foundry Company Potter and Brumfield Division 1200 East Broadway, P. Bo Box 522 Princeton, Indiana 47570
78189	Illinois Tool Works Inc. Shakeproof Division St. Charles Road Elgin, Illinois 60126
79963	Zierick Manufacturing Corporation 83 Rockdale Avenue New Rochelle, New York 10802

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	79198	SPECTRUM DISPLAY UNIT -14632-	1	
	MS35233-13	SCREW, MACHINE (AP)	5	
	MS35338-78	WASHER, LOCK (AP)	5	
-1	8103	. AMPLIFIER, IF -14632- (FOR BREAKDOWN SEE FIGURE 6-2)	1	
-2	8218	. SWEEP GENERATOR AND HORIZONTAL DEFLECTION AMPLIFIER -14632- (FOR BREAKDOWN SEE FIGURE 6-7)	1	
-3	13200	. SPRING COLLAR -14632-	2	
	AN565DC4-2	. SETSCREW (AP)	4	
-4	12770	. TUNING SHAFT -14632-	2	
	AN565DC4-2	. SETSCREW (AP)	4	
-5	3502-20-43	. WASHER, SPRING TENSION -78189-	2	
-6	12806	. COVER -14632-	1	
-7	MS35249-9	. SCREW, MACHINE (AP)	2	
-8	12688	. FOCUS AND INTENSITY CONTROL -14632- (FOR BREAKDOWN SEE FIGURE 6-8)	1	
-9	13182	. BRACKET, PC CARD -14632-	1	
	11A	. TERMINAL, LUG -79963-	2	
-10	MS35233-13	. SCREW, MACHINE (AP)	2	
-11	MS35338-78	. WASHER, LOCK (AP)	2	
-12	12667-2	. SPACER -14632-	3	
-13	MS35233-3	. SCREW, MACHINE (AP)	3	
-14	MS35338-77	. WASHER, LOCK (AP)	3	
-15	13180	. BRACKET, CONNECTOR -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-16	SM2SN	. CONNECTOR, RECEPTACLE, ELECTRICAL, MULTIPIN -81312-	1	
-17	SMRE7PG	. CONNECTOR, RECEPTACLE, ELECTRICAL, MULTIPIN -81312-	1	
-18	13181	. BRACKET, CONNECTOR -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	1	
	MS35338-78	. WASHER, LOCK (AP)	1	
-19	UG1466U	. CONNECTOR, PLUG, ELECTRICAL	1	
-20	7696A	. DC-DC CONVERTER -14632-	1	
-21	MS35233-26	. SCREW, MACHINE (AP)	2	
-22	MS35338-79	. WASHER, LOCK (AP)	2	
-23	MS15795-305	. WASHER, FLAT (AP)	2	
-24	8280K16	. SWITCH, TOGGLE, SPST -15605-	1	
-24A	1043M	. SCREW, PLASTIC -04941-	2	
-25	20519	. SHIELD, ELECTRON TUBE -14632-	1	
	MS35233-27	. SCREW, MACHINE (AP)	2	
	MS35338-79	. WASHER, LOCK (AP)	2	
-26	78S8L	. SOCKET, ELECTRON TUBE -02660-	1	
-26A	1128S1-1-8	. GROMMET -70485-	1	
-27	3XP1	. ELECTRON TUBE	1	
-28	20510	. BACK PLATE -14632-	1	
-28A	N632-3-8	. GROMMET -95987-	1	
	MS35233-27	. SCREW, MACHINE (AP)	2	
	MS35338-79	. WASHER, LOCK (AP)	2	
-29	13203	. MARKER STRIP -14632-	1	
-30	MS35249-9	. SCREW, MACHINE (AP)	2	
-31	12667-1	. SPACER -14632-	2	
	MS35233-3	. SCREW, MACHINE (AP)	2	
	MS35338-77	. WASHER, LOCK (AP)	2	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2	8103	AMPLIFIER, IF -14632- (FOR NHA SEE FIGURE 6-1)	REF	
	20684	. COVER -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	7	
-1	12634	. IF AMPLIFIER BOARD NO. 1 -14632- (FOR BREAKDOWN SEE FIGURE 6-3)	1	
-2	12660	. IF AMPLIFIER BOARD NO. 2 -14632- (FOR BREAKDOWN SEE FIGURE 6-4)	1	
-3	11280-3	. 21.4 MC MARKER OSCILLATOR -14632- (FOR BREAKDOWN SEE FIGURE 6-5)	1	
-4	11280-4	. 14 MC OSCILLATOR -14632- (FOR BREAKDOWN SEE FIGURE 6-6)	1	
-5	FA5C102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV 500 wvdc -01121-	10	
-6	C023B101F103M	. CAPACITOR, FIXED, CERAMIC, 0.01 μf, 20 pct, 100 wvdc -56289	1	
-7	FA5C3301	. CAPACITOR, FIXED, CERAMIC, 33 pf, 10 pct, 500 wvdc -01121-	3	
-8	SS5A102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV 500 wvdc -01121-	2	
-9	C023B101L503M	. CAPACITOR, FIXED, CERAMIC, 0.05 μf, 20 pct, 100 wvdc -56289-	2	
-10	SFU16	. TERMINAL, FEEDTHRU, INSULATED -04013-	1	
-11	56-590-65-4A	. FERRITE BEAD -02114-	1	
-12	SWD1000	. COIL, RADIO FREQUENCY, 1000 μh -72259-	2	
-13	12217-1	. RESISTOR, VARIABLE, 10k, 10 pct, 1/2w -14632-	1	
-14	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	1	
-15	5000-10KPORM10PCT	. RESISTOR, VARIABLE, 10k, 10 pct, 1/2w -75042-	1	
-16	RCR07G823JS	. RESISTOR, FIXED, COMPOSITION	1	
-17	RCR07G5R1JS	. RESISTOR, FIXED, COMPOSITION	1	
-18	RCR07G822JS	. RESISTOR, FIXED, COMPOSITION	1	
-19	8A36-01-2-5N	. SWITCH, ROTARY, 1 SECTION, 2 POLE, 5 POSITIONS -81073-	1	
-20	CR18U1205KC	. CRYSTAL UNIT, QUARTZ, 1205kc	1	
-21	8000AG3	. SOCKET, CRYSTAL -91506-	1	
	MS35233-2	. SCREW, MACHINE (AP)	1	
	MS35338-77	. WASHER, LOCK (AP)	1	
-22	12798	. SPACER PLATE -14632-	1	
	MS35233-14	. SCREW, MACHINE (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-23	91117	. GROMMET -83330-	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
3	12634	IF AMPLIFIER BOARD NO. 1 -14632- (FOR NHA SEE FIGURE 6-2)	REF	
	MS35233-14	SCREW, MACHINE (AP)	7	
	MS15795-304	WASHER, FLAT (AP)	7	
	MS35338-78	WASHER, LOCK (AP)	7	
-1	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -91418-	2	
-2	301-000COKO159B	. CAPACITOR, FIXED, CERAMIC, 1.5 pf, ±0.1 pf, 500 wvdc -72982-	2	
-3	CM04ED300J03	. CAPACITOR, FIXED, MICA	2	
-4	CM04FD910J03	. CAPACITOR, FIXED, MICA	2	
-5	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	4	
-6	CM04ED270J03	. CAPACITOR, FIXED, MICA	2	
-7	CM04CD150J03	. CAPACITOR, FIXED, MICA	1	
-8	CM04FD101J03	. CAPACITOR, FIXED, MICA	1	
-9	CM04CD100J03	. CAPACITOR, FIXED, MICA	1	
-10	CM04ED500J03	. CAPACITOR, FIXED, MICA	1	
-11	CM04ED240J03	. CAPACITOR, FIXED, MICA	1	
-12	CM04ED750J03	. CAPACITOR, FIXED, MICA	2	
-13	301-000COKO109B	. CAPACITOR, FIXED, CERAMIC, 1 pf, ±0.1 pf, 500 wvdc -72982-	2	
-14	DM15-821J	. CAPACITOR, FIXED, MICA, 820 pf, 5 pct, 500 wvdc -84171-	1	
-15	MTP106M030PIA	. CAPACITOR, FIXED, ELECTROLYTIC, 10 µf, 20 pct, 30 wvdc -37942-	1	
-16	CM04FD560J03	. CAPACITOR, FIXED, MICA	1	
-17	CM04ED390J03	. CAPACITOR, FIXED, MICA	1	
-18	CS13BF105K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-19	CM04FA331J03	. CAPACITOR, FIXED, MICA	1	
-20	CM04ED680J03	. CAPACITOR, FIXED, MICA	1	
-21	1N759A	. SEMICONDUCTOR DEVICE, DIODE, ZENER -80131-	1	
-22	V27E	. SEMICONDUCTOR DEVICE, DIODE, VARICAP -01281-	1	
-23	1N198A	. SEMICONDUCTOR DEVICE, DIODE, GERMANIUM -80131-	1	
-24	30705-1	. COIL, VARIABLE -14632-	4	
-25	1131-37	. COIL, RADIO FREQUENCY -14632-	2	
-26	30705-6	. COIL, VARIABLE -14632-	3	
-27	2N3478	. TRANSISTOR, NPN, SILICON -80131-	2	
-28	2N3933	. TRANSISTOR, NPN, SILICON -80131-	1	
-29	3N128	. TRANSISTOR, MOS FIELD-EFFECT -80131-	1	
	10028DAP	. INSULATOR, DISK -07047-	4	
-30	RCR05G104JS	. RESISTOR, FIXED, COMPOSITION	1	
-31	RCR07G223JS	. RESISTOR, FIXED, COMPOSITION	2	
-32	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	3	
-33	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	5	
-34	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	3	
-35	RCR07G222JS	. RESISTOR, FIXED, COMPOSITION	2	
-36	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	3	
-37	RCR07G202JS	. RESISTOR, FIXED, COMPOSITION	1	
-38	RCR07G334JS	. RESISTOR, FIXED, COMPOSITION	1	
-39	RCR07G473JS	. RESISTOR, FIXED, COMPOSITION	2	
-40	RCR07G242JS	. RESISTOR, FIXED, COMPOSITION	1	
-41	RCR07G220JS	. RESISTOR, FIXED, COMPOSITION	1	
-42	RCR07G303JS	. RESISTOR, FIXED, COMPOSITION	1	

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
3-43	RCR07G224JS	. RESISTOR, FIXED, COMPOSITION	1	
-44	TJ358W	. JACK, TIP -99687-	1	
-45	12633	. PRINTED WIRING BOARD -14632-	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
4	12660	IF AMPLIFIER BOARD NO. 2 -14632- (FOR NHA SEE FIGURE 6-2)	REF	
	MS35233-14	SCREW, MACHINE (AP)	5	
	MS15795-304	WASHER, FLAT (AP)	5	
	MS35338-78	WASHER, LOCK (AP)	5	
-1	CM04ED750J03	. CAPACITOR, FIXED, MICA	2	
-2	C023B101F103M	. CAPACITOR, FIXED, CERAMIC, 0.01 µf, 20 pct, 100 wvdc -56289-	8	
-3	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	2	
-4	301-000COJO279C	. CAPACITOR, FIXED, CERAMIC, 2.7 pf, ±0.25 pf, 500 wvdc -72982-	1	
-5	DM15-821J	. CAPACITOR, FIXED, MICA, 820 pf, 5 pct, 500 wvdc -84171-	1	
-6	DM15-471G	. CAPACITOR, FIXED, MICA, 470 pf, 2 pct, 500 wvdc -84171-	3	
-7	301-000COHO439C	. CAPACITOR, FIXED, CERAMIC, 4.3 pf, ±0.25 pf, 500 wvdc -72982-	2	
-8	DM15-511G	. CAPACITOR, FIXED, MICA, 510 pf, 2 pct, 500 wvdc -84171-	3	
-9	61F10AA682	. CAPACITOR, FIXED, PLASTIC, 6800 pf, 10 pct, 100 wvdc -06001-	3	
-10	CS13BF105K	. CAPACITOR, FIXED ELECTROLYTIC	2	
-11	CM04FD101J03	. CAPACITOR, FIXED, MICA	6	
-12	CM06FD182F03	. CAPACITOR, FIXED, MICA	3	
-13	C023B101L503M	. CAPACITOR, FIXED, CERAMIC, 0.05 µf, 20 pct, 100 wvdc -56289-	5	
-14	CM04CD100J03	. CAPACITOR, FIXED, MICA	2	
-15	CM06FD202F03	. CAPACITOR, FIXED, MICA	2	
-16	663UW223-9-1W	. CAPACITOR, FIXED, PLASTIC, 0.022 µf, 10 pct, 100 wvdc -26655-	2	
-17	CM05FD271J03	. CAPACITOR, FIXED, MICA	2	
-18	8131-026-75U0-103M	. CAPACITOR, FIXED, CERAMIC, 0.01 µf, 20 pct, 200 wvdc -72982-	2	
-19	1N1401	. SEMICONDUCTOR DEVICE, DIODE, ZENER -80131-	1	
-20	1N198A	. SEMICONDUCTOR DEVICE, DIODE, GERMANIUM -80131-	4	
-21	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	
-22	30705-1	. COIL, VARIABLE, 1.76 µh, 10 pct -14632-	2	
-23	30705-3	. COIL, VARIABLE, 45.2 µh, 6 pct -14632-	6	
-24	30705-4	. COIL, VARIABLE, 308 µh, 4 pct -14632-	5	
-25	2N3478	. TRANSISTOR, NPN, SILICON -80131-	6	
-26	2N3933	. TRANSISTOR, NPN, SILICON -80131-	2	
	10042DAP	. INSULATOR, DISK - 07047-	8	
-27	2N706	. TRANSISTOR, NPN, SILICON -80131-	1	
	10036DAP	. INSULATOR, DISK -07047-	1	
-28	RCR07G273JS	. RESISTOR, FIXED, COMPOSITION	2	
-29	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	7	
-30	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	3	
-31	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	8	
-32	RCR07G473JS	. RESISTOR, FIXED, COMPOSITION	1	
-33	RCR07G272JS	. RESISTOR, FIXED, COMPOSITION	5	
-34	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	4	
-35	RCR07G333JS	. RESISTOR, FIXED, COMPOSITION	6	
-36	RCR07G153JS	. RESISTOR, FIXED, COMPOSITION	4	

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
4-37	RCR07G511JS	. RESISTOR, FIXED, COMPOSITION	2	
-38	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	2	
-39	RCR07G203JS	. RESISTOR, FIXED, COMPOSITION	1	
-40	RCR07G514JS	. RESISTOR, FIXED, COMPOSITION	1	
-41	RCR07G204JS	. RESISTOR, FIXED, COMPOSITION	2	
-42	RCR07G222JS	. RESISTOR, FIXED, COMPOSITION	1	
-43	RCR07G393JS	. RESISTOR, FIXED, COMPOSITION	2	
-44	RCR07G363JS	. RESISTOR, FIXED, COMPOSITION	2	
-45	150-50KPORM10PCT	. RESISTOR, VARIABLE, 50k, 10 pct, 3/4w -75042-	2	
-46	RCR07G332JS	. RESISTOR, FIXED, COMPOSITION	1	
-47	RCR07G224JS	. RESISTOR, FIXED, COMPOSITION	2	
-48	RCR07G244JS	. RESISTOR, FIXED, COMPOSITION	1	
-49	RL07S753G	. RESISTOR, FIXED, FILM	1	
-50	RL07S392G	. RESISTOR, FIXED, FILM	1	
-51	RL07S102G	. RESISTOR, FIXED, FILM	1	
-52	RL07S511G	. RESISTOR, FIXED, FILM	2	
-53	12661	. PRINTED WIRING BOARD -14632-	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5	11280-3	21.4 MC MARKER OSCILLATOR -14632- (FOR NHA SEE FIGURE 6-2)	REF	
	MS35233-3	SCREW, MACHINE (AP)	2	
	MS35338-77	WASHER, LOCK (AP)	2	
	1365	. CRYSTAL MARKER CAN -14632-	1	
	MS35233-1	. SCREW, MACHINE (AP)	2	
	MS35338-77	. WASHER, LOCK (AP)	2	
-1	FA5C102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -01121-	1	
-2	QC0-2PFPORM10PCT	. CAPACITOR, FIXED, CERAMIC, 0.2 pf, 10 pct, 500 wvdc -95121-	1	
-3	CM04ED430J03	. CAPACITOR, FIXED, MICA	1	
-4	CM04ED680J03	. CAPACITOR, FIXED, MICA	1	
-5	CK05CW471M	. CAPACITOR, FIXED, CERAMIC	1	
-6	SFU16	. TERMINAL, FEEDTHRU, INSULATED -04013-	1	
-7	C023B101F103M	. CAPACITOR, FIXED, CERAMIC, 0.01 μf, 20 pct, 100 wvdc -56289	1	
-8	2N706	. TRANSISTOR, NPN, SILICON -80131-	1	
	10045DAP	. INSULATOR, DISK -07047-	1	
-9	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	1	
-10	RCR07G474JS	. RESISTOR, FIXED, COMPOSITION	1	
-11	96402-1	. CRYSTAL UNIT, QUARTZ, 21.4MC -14632-	1	
-12	11260	. BRACKET -14632-	1	
-13	11279	. PRINTED WIRING BOARD -14632-	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
6	11280-4	14MC OSCILLATOR -14632- (FOR NHA SEE FIGURE 6-2)	REF	
	MS35233-2	SCREW, MACHINE (AP)	2	
	MS35338-77	WASHER, LOCK (AP)	2	
	1365	. CRYSTAL MARKER CAN -14632-	1	
	MS35233-1	. SCREW, MACHINE (AP)	2	
	MS35338-77	. WASHER, LOCK (AP)	2	
-1	FA5C102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -01121-	1	
-2	301-000COHO479C	. CAPACITOR, FIXED, CERAMIC, 4.7 pf, ±0.25 pf, 500 wvdc -72982-	1	
-3	CM04ED430J03	. CAPACITOR, FIXED, MICA	2	
-4	CM04FD201J03	. CAPACITOR, FIXED, MICA	1	
-5	SFU16	. TERMINAL, FEEDTHRU, INSULATED -04013-	1	
-6	2N706	. TRANSISTOR, NPN, SILICON -80131-	1	
	10045DAP	. INSULATOR, DISK -07047-	1	
-7	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	1	
-8	RCR07G474JS	. RESISTOR, FIXED, COMPOSITION	1	
-9	CR64U14MC	. CRYSTAL UNIT, QUARTZ, 14MC	1	
-10	11260	. BRACKET -14632-	1	
-11	11279	. PRINTED WIRING BOARD -14632-	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
7	8218	SWEEP GENERATOR AND HORIZONTAL DEFLECTION AMPLIFIER -14632- (FOR NHA SEE FIGURE 6-1)	REF	
	MS35233-14	SCREW, MACHINE (AP)	4	
	MS15795-304	WASHER, FLAT (AP)	4	
	MS35338-78	WASHER, LOCK (AP)	4	
-1	CS13BF105K	. CAPACITOR, FIXED, ELECTROLYTIC	1	
-2	CS13BF475K	. CAPACITOR, FIXED, ELECTROLYTIC	2	
-3	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	
-4	1N746A	. SEMICONDUCTOR DEVICE, DIODE, ZENER -80131-	2	
-5	1N749A	. SEMICONDUCTOR DEVICE, DIODE, ZENER -80131-	1	
-6	FC11D24VDC	. RELAY, ARMATURE, 24 vdc -77342-	1	
-7	2N2646	. TRANSISTOR, UNIJUNCTION -80131-	1	
-8	2N3251	. TRANSISTOR, PNP, SILICON -80131-	3	
-9	2N929	. TRANSISTOR, NPN, SILICON -80131-	4	
-10	2N2270	. TRANSISTOR, NPN, SILICON -80131-	3	
-11	2N3440	. TRANSISTOR, NPN, SILICON -80131-	2	
	10028DAP	. INSULATOR, DISK -07047-	6	
	10036DAP	. INSULATOR, DISK -07047-	7	
-12	RCR07G302JS	. RESISTOR, FIXED, COMPOSITION	1	
-13	RCR07G202JS	. RESISTOR, FIXED, COMPOSITION	1	
-14	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-15	RCR07G472JS	. RESISTOR, FIXED, COMPOSITION	1	
-16	RCR07G163JS	. RESISTOR, FIXED, COMPOSITION	1	
-17	RCR07G223JS	. RESISTOR, FIXED, COMPOSITION	4	
-18	RCR07G513JS	. RESISTOR, FIXED, COMPOSITION	1	
-19	RCR07G224JS	. RESISTOR, FIXED, COMPOSITION	1	
-20	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	3	
-21	RL07S202G	. RESISTOR, FIXED, FILM	2	
-22	RL07S103G	. RESISTOR, FIXED, FILM	1	
-23	3068P1-204	. RESISTOR, VARIABLE, 200k, 10 pct, 3/4w -80294-	2	
-24	RCR07G683JS	. RESISTOR, FIXED, COMPOSITION	1	
-25	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	3	
-26	RCR07G106JS	. RESISTOR, FIXED, COMPOSITION	1	
-27	RL07S822G	. RESISTOR, FIXED, FILM	1	
-28	RCR07G204JS	. RESISTOR, FIXED, COMPOSITION	2	
-29	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	1	
-30	RCR07G133JS	. RESISTOR, FIXED, COMPOSITION	2	
-31	RCR07G752JS	. RESISTOR, FIXED, COMPOSITION	1	
-32	RCR07G203JS	. RESISTOR, FIXED, COMPOSITION	1	
-33	RCR07G394JS	. RESISTOR, FIXED, COMPOSITION	1	
-34	RCR07G154JS	. RESISTOR, FIXED, COMPOSITION	2	
-35	RCR07G272JS	. RESISTOR, FIXED, COMPOSITION	1	
-36	RCR07G332JS	. RESISTOR, FIXED, COMPOSITION	1	
-37	RCR07G273JS	. RESISTOR, FIXED, COMPOSITION	1	
-38	3067P1-103	. RESISTOR, VARIABLE, 10k, 5 pct, 1w -80294-	1	
-39	RCR07G822JS	. RESISTOR, FIXED, COMPOSITION	1	
-40	RCR07G184JS	. RESISTOR, FIXED, COMPOSITION	2	
-41	RCR07G244JS	. RESISTOR, FIXED, COMPOSITION	2	
-42	RCR07G333JS	. RESISTOR, FIXED, COMPOSITION	1	
-43	RCR07G134JS	. RESISTOR, FIXED, COMPOSITION	1	
-44	RCR07G364JS	. RESISTOR, FIXED, COMPOSITION	1	
-45	3068P1-503	. RESISTOR, VARIABLE, 50k, 10 pct, 3/4w -80294-	1	
-46	12681	. PRINTED WIRING BOARD -14632-	1	

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
8	12688	FOCUS AND INTENSITY CONTROL -14632- (FOR NHA SEE FIGURE 6-1)	REF	
	MS35233-2	SCREW, MACHINE (AP)	3	
	MS35338-77	WASHER, LOCK (AP)	3	
-1	33C17A	. CAPACITOR, FIXED, CERAMIC, 0.05 µf, 20 pct, 500 wvdc -56289-	1	
-2	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	1	
-3	70-09172	. RESISTOR, VARIABLE, 500k, 10 pct, 1/4w -76055-	1	
-4	RCR20G335JS	. RESISTOR, FIXED, COMPOSITION	1	
-5	70-09173	. RESISTOR, VARIABLE, 2.5meg, 10 pct, 1/4w -76055-	1	
-6	RCR20G395JS	. RESISTOR, FIXED, COMPOSITION	1	
-7	RCR20G475JS	. RESISTOR, FIXED, COMPOSITION	1	
-8	12687	. PRINTED WIRING BOARD -14632-	1	

PART 3

TYPE 79193 IF FILTER/SWITCHING MODULE

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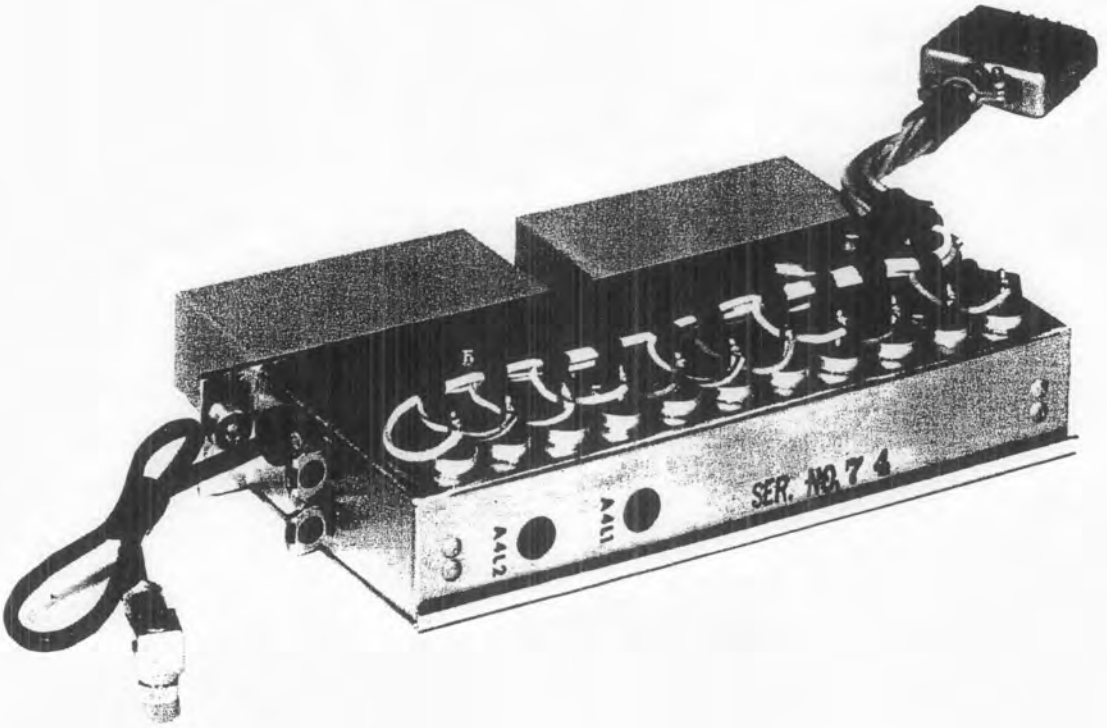
PART 3

LIST OF ILLUSTRATIONS
PART 3

TYPE 79193 IF FILTER/SWITCHING MODULE



SECTION I

GENERAL DESCRIPTION

1-1. GENERAL

The IF filter/switching module is provided as standard equipment in the G175K Receiver. The unit is designed to provide a basic 300-kc bandwidth and, in conjunction with switching in the receiver, two additional IF bandwidths determined by plug-in crystal filters. The two plug-in filters may have bandwidths of 10, 20, 40, or 75 kc. Only one circuit and its associated crystal filter are operated at a time. Remote indication of the bandwidth in use is provided through a rear-apron connector. All operating voltages for the IF filter/switching module are supplied by the receiver's power supply.

1-2. EQUIPMENT SUPPLIED

QUANTITY	ITEM	PART NUMBER
1	IF Filter/Switching Module	79193

1-3. ELECTRICAL SPECIFICATIONS

Signal Input . . . . . One, 50-ohm unbalanced RF input

IF Bandwidths

10 kc

IF Center Frequency . . . . . 21.4 ± .0005 mc

Bandwidth . . . . . 10 ± 1 kc

Bandpass Ripple . . . . . 2 db, maximum

6 db to 60 db Skirt Ratio . . . . . 3:1, maximum

20 kc

IF Center Frequency . . . . . 21.4 ± .001 mc

Bandwidth . . . . . 20 ± 2 kc

Bandpass Ripple . . . . . 2 db, maximum

6 db to 60 db Skirt Ratio . . . . . 3:1, maximum

40 kc

IF Center Frequency . . . . . 21.4 ± .002 mc

Bandwidth . . . . . 40 ± 4 kc

Bandpass Ripple . . . . . 2 db, maximum

6 db to 60 db Skirt Ratio . . . . . 3:1, maximum

75 kc

IF Center Frequency	21.4 ± .00375 mc
Bandwidth	75 ± 7 kc
Bandpass Ripple	2 db, maximum
6 db to 60 db Skirt Ratio	3:1, maximum

1-4. MECHANICAL SPECIFICATIONS

Weight	0.9 lbs., approximately
Over-all Dimensions	2.75 inches high, 1.25 inches wide, and 5.25 inches deep
Operating Temperature Limits	0° to 50° C
Altitude Limits	
Operating	15,000 feet
Non-operating	50,000 feet
Mounting	Screw-mounted to receiver main chassis

SECTION II

PREPARATION FOR USE AND RESHIPMENT

2-1. UNPACKING AND INSPECTION

No special unpacking or inspection procedures are required for the IF filter/switching module. Refer to Section II, Part 1 for general inspection procedures.

2-2. INSTALLATION

To install the IF filter/switching module into the main chassis of the receiver, proceed as follows:

a. Remove the receiver from its mounting position and remove top and bottom dust covers.

b. Install the IF filter/switching module from above the main chassis of the receiver. The attached cable must be placed so that it may later be plugged into its mating connector on top of the main chassis.

c. Hold the module in position while installing four 4-40 x 3/8-inch binder head screws from the bottom of the receiver.

d. Connect plug A108P1 on the main chassis of the receiver to jack J1 in the IF filter/switching module.

e. Connect plug P115 on the module to J115 on the receiver.

f. Connect plug A106P1 on the module to jack J1 on the 300-kc IF amplifier A106.

g. Check the marking on the BANDWIDTH knob of the receiver to insure that it agrees with the filters installed in the IF filter/switching module.

h. Energize the receiver and insure proper operation of the IF filter/switching module. Refer to Section III, Part 1.

2-3. PREPARATION FOR RESHIPMENT

No special preparation is necessary to prepare the IF filter/switching module for reshipment.

SECTION III
OPERATION

3-1. GENERAL

The IF filter/switching module (hereafter called filter module) operates in conjunction with the 300-kc IF amplifier, A106, to provide additional IF bandwidths of 10, 20, 40, or 75 kc. The filter module is placed in operation when the 10, 20, 40, 75, or 300 positions are selected by the IF BANDWIDTH KC switch. The reference designation prefix for this module is A108.

3-2. CONTROLS

The IF BANDWIDTH KC switch, S103, on the front panel of the G175K Receiver is the only control directly associated with the filter module. This switch has three wafers with three switch sections per wafer. Refer to the receiver main chassis schematic diagrams FO-2 and FO-3, Part 1. Switch section S103A-W applies automatic gain control voltage to the IF amplifiers for the selected bandwidth. Section S103B-W applies +12 vdc to the selected bandpass network, activating that particular circuit. S103B-X provides a remote indication of the bandwidth in use and applies it to pin 6 of rear-apron connector J103. Section S103B-Y also provides a remote bandwidth indication; in this case it is applied to pin 5 of J103.

3-3. OPERATING PROCEDURES

No special operating procedures are necessary for the IF filter/switching module. Refer to Section III, Part 1.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL

A functional block diagram for the IF filter/switching module has been incorporated in the overall G175K Receiver block diagram, FO-1, Part 1. A functional description of the IF filter/switching module is given in the following paragraphs using this diagram and the schematic diagram, FO-1, of this part. The IF filter/switching module carries the reference designation prefix A108. The incoming signal to the module is the 21.4-mc IF output from jack A113J5 on the IF coupler. This input signal is applied simultaneously to three parallel emitter followers: A1Q1, A1Q2, and A2Q1.

The output of A1Q1 is coupled through crystal bandpass filter FL1 to IF amplifier A3Q1. This filter may have a bandwidth of 10, 20, or 40 kc.

The output of A1Q2 is coupled through filter FL2 to IF amplifier A3Q2. Filter FL2 may have a bandwidth of 40 or 75 kc.

RC coupling is used between the output of A2Q1 and the input of IF amplifier A4Q1. The output circuit of IF amplifier A4Q1 is a double-tuned network having a 300-kc bandpass. This network also serves as the collector load for IF amplifiers A3Q1 and A3Q2. Activation of one of the three signal paths is by means of an operating bias which is applied to the base circuits of the emitter follower and IF amplifier for the selected bandwidth.

4-2. DETAILED THEORY

4-3. 10/20/40-KC BANDWIDTHS

The 21.4-mc signal from the IF coupler, A113, is fed to the base of emitter follower A1Q1 through dc-blocking capacitor A1C1. Resistor A1R10 terminates the input for all three emitter followers. Emitter follower A1Q1 is placed in operation by the application of a bias voltage, from the IF BANDWIDTH KC switch, to the base voltage divider consisting of A1R2 and A1R3. The emitter signal from A1Q1 is fed through impedance-matching resistor A1R7 and dc-blocking capacitor A1C4 to the input of filter FL1. This circuit is designed so that FL1 may have bandwidths of 10, 20, or 40 kc. The output from the filter is coupled through dc-blocking capacitor A3C1 to the base of IF amplifier A3Q1. Operating voltage for this stage is supplied by the AGC amplifier and is applied to the base of the stage through section S103A-W of the IF BANDWIDTH KC switch. Assuming the receiver is in the AGC mode, an incoming RF signal which is increasing in strength will result in a reduction of the base bias which in turn lowers the conduction through the stage and consequently the stage gain.

The dc return for the emitter of A3Q1 is through the AGC compensation network located in the emitter of A4Q1. This network is used to linearize the AGC characteristics of the stage in operation (see paragraph 4-4). The collector load for A3Q1 is the common, double-tuned network located on subassembly A4. This circuit also serves as the collector load for A3Q2 and A4Q1. Capacitive tapping of inductor A4L1 by A4C3 and A4C4 provides a signal voltage at the junction of A4C4 and A4L1 which is out of phase with the input signal. This voltage is fed back to the bases of the three IF amplifiers through capacitors A3C3, A3C4, and A4C1 to neutralize the stage in operation.

The output of the double-tuned circuit is fed through a capacitive impedance-matching network, made up of A4C6 and A4C7, to the input of the 300-kc IF amplifier A106.

4-4. AGC COMPENSATION

A compensation network has been included in the module to provide more linear operation of the three IF amplifiers during the application of the AGC voltage. This network is common to all three amplifier stages and is located on

switching board A4. Operation of the network is explained assuming IF amplifier A3Q1 to be in conduction. It should be noted however that the conditions described for A3Q1 apply equally to A4Q1 and A3Q2 when they are conducting. Under no-signal conditions, diode A4CR1 conducts and shorts A4R2. At this time only A4R3 which is bypassed by A4C2 is active in the emitter circuit. This is the maximum gain condition for the stage. As the input signal level rises, the conduction through A3Q1 is reduced by the AGC voltage. When the voltage drop across A4R2 is insufficient to maintain a forward bias on A4CR1, this resistor is added to the emitter circuit, further reducing stage gain. Note that A4R2 is not bypassed by A4C2, so that when A4CR1 is cut off ac degeneration is obtained across A4R2 which improves the signal-handling ability of the stage. Additional ac degeneration is provided by A4R1 when amplifier A4Q1 is conducting.

4-5. EXTERNAL BANDWIDTH INDICATION

Pins 2 and 3 of filter FL1 are either grounded or open circuited depending on the particular filter being used (see Note 3 on FO-1). These grounds and opens are connected through feedthru capacitors C4 and C5 to IF BANDWIDTH KC switch sections S103B-X and S103B-Y in the receiver. The wipers of these switch sections connect either these paths or similar paths from other contacts on the switch wafers to jack J103 on the rear apron of the receiver. These paths along with similar ones on switch section S103C-Y may be used for external indication of the bandwidth in use.

4-6. 75 KC/40 KC BANDWIDTHS

Circuitry for the 75 kc or 40 kc bandwidth is similar to that described in paragraph 4-2 above. Transistor A1Q2 serves as the input emitter follower, FL2 as the crystal filter and A3Q2 as the IF amplifier.

4-7. 300-KC BANDWIDTH

The input circuitry of the 300-kc bandwidth emitter follower, A2Q1, is similar to that described above. The output circuit of this stage includes blocking diode A2CR1. The positive voltage used to bias IF amplifier A1Q1 into operation will also forward bias A2CR1 through R2. Resistor R1 performs the same function when IF amplifier A1Q2 is operative. Conduction through A2CR1 shorts the output of A2Q1 to provide additional isolation of the 300-kc stage when either of the narrowband stages are in use. The output of A2Q1 is coupled to IF amplifier A4Q1 through A2C4, A2E4, and A4E1. Note that no intermediate bandpass filter is used between the two stages as was the case in the narrowband circuits. The input circuit of A4Q1 is similar to that of the narrowband stages A3Q1 and A3Q2. The base biasing resistors are located in module A2. Resistors A2R5 and A2R6 divide the AGC input to A4Q1 so that it receives less operating bias than the narrowband IF amplifiers, A3Q1 and A3Q2. This reduces the gain of A4Q1 to compensate for crystal filter losses in the narrowband circuits so that the output is essentially equal for all three signal paths. Resistor A4R1 in the emitter circuit serves the same function.

SECTION V
MAINTENANCE

5-1. GENERAL

The IF filter/switching module normally requires no care beyond being kept clean. General maintenance procedures and inspections should be performed on the module at the same time they are performed on the entire G175K Receiver. Refer to Section V, Part 1, for pertinent maintenance procedures. The maintenance technician should be thoroughly familiar with Section IV of this part before beginning the alignment and before attempting any troubleshooting.

5-2. ALIGNMENT

Alignment of the 300-kc bandpass output network must be performed in conjunction with the alignment of the entire 300-kc IF amplifier, A106. Refer to Section V, Part 4 for pertinent alignment instructions.

5-3. PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic inspections performed at daily and 100 operational-hour intervals. The shop inspection should be performed when a IF filter/switching module malfunction is suspected.

5-4. DAILY INSPECTION

At the start of each day of use, inspect the module for visible signs of damage and remove any signs of dust or dirt build-up. Check all cables and plugs for tightness. Ensure that the crystal filters are properly seated and securely fastened to the chassis.

5-5. 100-HOUR INSPECTION

Perform the daily inspection, and remove any dust or dirt using dry, low pressure compressed air.

5-6. SHOP INSPECTION

Any time degraded IF filter/switching module performance is suspected, remove the entire receiver from the aircraft and send it to the repair shop. Maintenance personnel should perform applicable portions of the daily and 100-hour inspections and functional tests outlined in paragraph 5-7, Part 3, and paragraph 5-10, Part 4. If the module meets the test specifications return it to service. If not, replace only those components necessary to restore to performance. Align the module as described in paragraph 5-4, Part 4 and again perform the functional tests.

5-7. FUNCTIONAL TEST

The following functional test provides a means of checking the IF filter/switching module for proper operation. The test equipment necessary for performing the functional test is listed in Figure 5-1.

5-8. TEST CONDITIONS

The functional tests should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power to G175K Receiver of 115 ± 2.0 vac and 28.0 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

TEST EQUIPMENT REQUIRED

PREFERRED TYPE	SUITABLE ALTERNATE
Hewlett Packard 606A Signal Generator	AN/URM-25D
Tektronix 545B Oscilloscope	MIL-O-9960
Tektronix 1A2 Plug-In Unit	MIL-O-9960

Figure 5-1

5-9. SIGNAL PATH CHECK

a. Connect the output of the signal generator to input jack A108J1 on the IF filter/switching module.

b. Connect the oscilloscope vertical input to output plug A106P1 on the IF filter/switching module.

c. Select bandwidth of crystal filter installed in FL1 position with G175K Receiver IF BANDWIDTH KC switch.

d. Set output frequency of signal generator to 21.4 mc, CW mode.

e. Observe oscilloscope for an output from the selected path.

f. Select with the IF BANDWIDTH KC switch, the remaining crystal filter bandwidth and check oscilloscope for output signal.

g. Place IF BANDWIDTH KC in 300 position and observe oscilloscope for output signal.

5-10. UNSCHEDULED MAINTENANCE

Mose troubles experienced with the IF filter/switching module will be caused by the failure of the transistors or crystal filters. If any of these are suspected, they should be replaced with parts known to be good before any further troubleshooting is carried out. Aids in the form of a troubleshooting chart, Figure 5-2 are included to help the technician locate the faulty component.

5-11. SUBASSEMBLY REMOVAL AND REPLACEMENT

The procedures for the removal of the IF filter/switching module from the main chassis of the receiver, and for the replacement of the crystal filters are given in the following steps.

a. To remove the entire assembly from the receiver first disconnect plug A108P1 from jack A108J1.

b. Disconnect jack J115 from plug P115.

c. Disconnect plug A106P1 from jack A106J1.

d. Remove the two mounting screws and lift the assembly from the receiver.

e. Replace the IF filter/switching module by reversing the above steps.

f. To replace a crystal filter on the module, first remove the mounting screws, and then unplug the crystal filter; replace the common mounting screw if a second module is not installed.

g. Replace the defective or removed crystal filter by reversing the above steps.

h. Note that crystal filters having bandwidths of 10, 20 or 40 kc may be installed in the "FL1" position and crystal filters having bandwidths of 40 or 75 kc may be installed in the "FL2" position. If a crystal filter is installed that was not previously used it will be necessary to change the IF BANDWIDTH KC switch control knob. Select a knob with the proper dial skirt designation and install on the IF BANDWIDTH KC switch shaft.

TROUBLESHOOTING CHART, IF FILTER/SWITCHING MODULE

SYMPTOM	PROBABLE CAUSE	REMEDY
IF input signal applied, IF BANDWIDTH KC switch in position that activates FL1 path; no output at A106P1.	A108A1Q1 or A108A3Q1 defective.	Measure A108A1Q1 and A108A3Q1 emitter voltage; replace defective component.
IF input signal applied, IF BANDWIDTH KC switch in position that activates FL2 path; no output form A106P1.	A108A1Q2 or A108A3Q2 defective.	Measure A108A1Q2 and A108A3Q2 emitter voltage; replace defective transistor.
IF input signal applied, no output at A106P1 for any bandwidth except 4-mc.	A108A4C5 or C6 open.	Check and replace if necessary.
IF input signal applied; no output from 300-kc bandwidth path.	A108A2Q1 or A108A4Q1 defective.	Measure emitter voltage and replace faulty transistor.

Figure 5-2

TRANSISTOR ELEMENT VOLTAGES, IF FILTER/SWITCHING MODULE

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A1Q1	2N3478	2.1	2.9	10.4
A1Q2	2N3478	2.1	2.9	10.4
A2Q1	2N3478	2.2	2.8	10.4
A3Q1	2N3478	2.1	2.9	10.4
A3Q2	2N3478	1.4	2.1	10.4
A4Q1	2N3478	0.9	1.6	10.4

TEST CONDITIONS: No signal input to receiver; RF GAIN control fully clockwise; MODE SELECT switch to AM MAN. All voltages are positive dc with respect to ground. Voltages taken with HP410C VTVM.

Figure 5-3

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

INTRODUCTION

PURPOSE AND FORMAT

This Illustrated Parts Breakdown lists and describes electrical and mechanical parts to assist in requisitioning, storing, and identifying spare parts. Four major parts comprise this section: (1) Introduction, (2) Group Assembly Parts Breakdown, (3) Numerical Index, and (4) Reference Designation Index.

SUMMARY OF CONTENTS

INTRODUCTION

Included in the Introduction are: (1) Purpose and Format, (2) Summary of Contents, (3) How to Use, (4) Abbreviations, and (5) List of Manufacturers' Codes and Addresses.

GROUP ASSEMBLY PARTS BREAKDOWN

The Group Assembly Parts Breakdown contains illustrations and parts lists of assemblies, and detailed parts. The illustrations and text are arranged according to function and/or next assembly. When it is necessary to show a subassembly in detail, and it is not possible to do so in the same illustration as its major assembly, it is referenced to another illustration in which the subassembly is exploded in as much detail as necessary and its component parts listed in the accompanying text.

The nomenclature of each part, the units per assembly, and the usable on code, if any, are listed to the right of the part number in the text. Next assembly sequence is determined by indenture position; that is, a part listed one column to the right of the position of the part above it is a component of that assembly or installation. Attaching parts are shown directly below in the same indenture column as the parts they attach.

When a manufacturer's part is listed, the manufacturer's code is given in the nomenclature along with any other information thought necessary or helpful. The manufacturer's name and address may be found from the code symbol by consulting the "List of Manufacturers' Codes and Addresses" in the Introduction. The codes are in accordance with Federal Supply Code for Manufacturers, cataloging handbook H4-1.

The column entitled "Usable on Code" is not utilized in this publication.

The number of parts given under the column entitled "Units per Assembly" constitute that number required to make up a single assembly.

Left- and right-hand parts are listed separately. Component parts of left- and right-hand assemblies are identified by determining next assembly order. When a left- or right-hand assembly has both left- and right-hand parts as components, the nomenclature will show the assembly to which each belongs.

NUMERICAL INDEX

Each part number appearing in the Group Assembly Parts Breakdown is listed in the Numerical Index. This index is compiled in accordance with the numerical part number filing system described below. Read part numbers from left to right, one digit at a time, to determine part number numerical arrangement. The order of precedence in

part number numerical arrangement is as follows:

(1) Space (blank column)

(2) Dash (-)

(3) Letters A thru Z

(4) Numerals 0 thru 9

All part numbers are listed with the figure and index number of each appearance.

REFERENCE DESIGNATION INDEX

The Reference Designation Index includes all components of electronic equipment having reference designators.

The Reference Designation Index is divided into three columns consisting of the following: (1) REFERENCE DESIGNATION - Reference designators listed in alphanumerical order; (2) FIG. AND INDEX NO. - Used to locate the corresponding part in the Group Assembly Parts Breakdown; (3) MFR PART NUMBER - The part number assigned by the manufacturer of the part.

HOW TO USE

KNOWN ➡	MFR PART NO.	REFERENCE DESIGNATION NO. (COMPONENT NUMBERS ON SCHEMATICS)
WANT TO KNOW ➡	SEQUENCE OF ASSEMBLY	MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED
SOLUTION ➡	IN NUMERICAL INDEX FIND MFR PART NUMBER. SEQUENCE OF ASSEMBLY MAY BE FOUND ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.	IN REFERENCE DESIGNATION INDEX FIND REFERENCE DESIGNATION NUMBER. FIND MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.

ABBREVIATIONS

AP.	Attaching Part
ASSY	Assembly
FIG	Figure
GMV.	Guaranteed Minimum Value
IF	Intermediate Frequency
kc	Kilocycles (10^3)
MFR.	Manufacturer
NHA.	Next Higher Assembly
NO.	Number
pct.	Percent
pf	Picofarad (10^{-12})
REF.	Reference
μh	Microhenry (10^{-6})
wvdc.	Working Volts Direct Current

LIST OF MANUFACTURERS' CODES AND ADDRESSES

CODE	NAME AND ADDRESS
01121	Allen-Bradley Company 1201 South Second Street Milwaukee, Wisconsin 53204
02114	Ferroxcube Corporation of America Mt. Marion Road Saugerties, New York 12477
07047	The Ross Milton Company 511 Second Street Pike Southampton, Pennsylvania 18966
14632	Watkins-Johnson Company CEI Division 6006 Executive Boulevard Rockville, Maryland 20852
16733	Phelps Dodge Electronic Products Corporation 60 Dodge Avenue North Haven, Connecticut 06473
56289	Sprague Electric Company Marshall Street North Adams, Massachusetts 01247
72653	GC Electronics Company Division of Hydrometals, Inc. 400 South Wyman Rockford, Illinois 61101
74306	Piezo Crystal Company 100 K Street Carlisle, Pennsylvania 17013
74868	Amphenol Corporation Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
80131	Electronic Industries Association 2001 Eye Street, N. W. Washington, D. C. 20006
81312	Winchester Electronics Division of Litton Industries, Inc. Main Street and Hillside Avenue Oakville, Connecticut 06779
83330	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
84171	Arco Electronics, Inc. Community Drive Great Neck, New York 11022
91418	Radio Materials Company 4242 West Bryn Mawr Chicago, Illinois 60646
95121	Quality Components, Inc. P. O. Box 113 St. Mary's, Pennsylvania 15857
98291	Sealectro Corporation 225 Hoyt Mamaroneck, New York 10544

TYPE 79193 IF FILTER SWITCHING MODULE

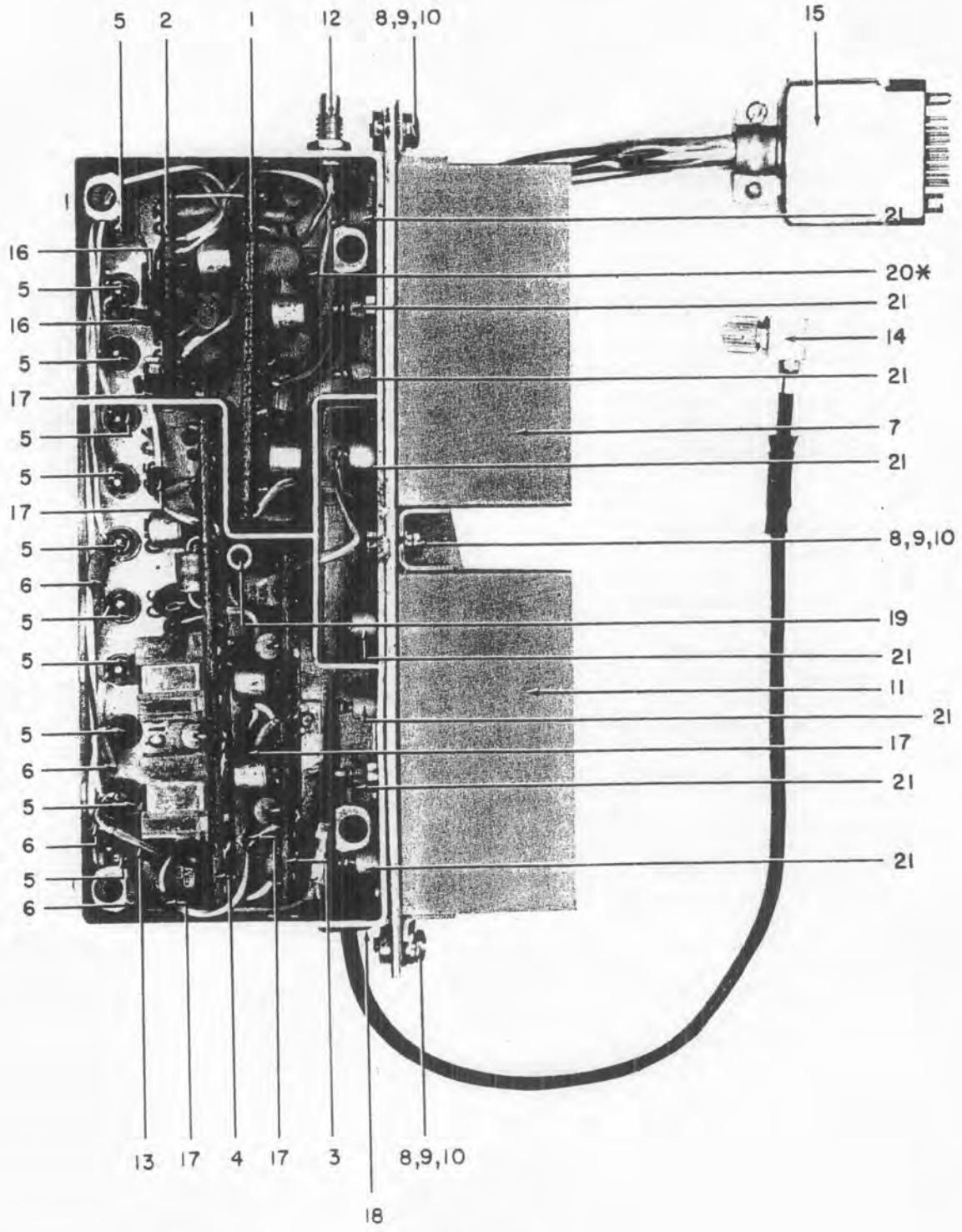


Figure 6-1

* DENOTES HIDDEN PART

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	79193	IF FILTER SWITCHING MODULE -14632-	1	
	MS35233-12	SCREW, MACHINE (AP)	4	
	12685	. COVER -14632-	1	
	MS35233-14	. SCREW, MACHINE (AP)	4	
-1	12921	. IF SWITCHING BOARD NO. 1 -14632- (FOR BREAKDOWN SEE FIGURE 6-2)	1	
-2	12923	. IF SWITCHING BOARD NO. 2 -14632- (FOR BREAKDOWN SEE FIGURE 6-3)	1	
-3	12925	. IF SWITCHING BOARD NO. 3 -14632- (FOR BREAKDOWN SEE FIGURE 6-4)	1	
-4	12927	. IF SWITCHING BOARD NO. 4 -14632- (FOR BREAKDOWN SEE FIGURE 6-5)	1	
-5	FA5C102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -01121-	11	
-6	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	4	
-7	*6043661	. FILTER, BANDPASS, 10 kc -74306-	1	
-8	MS35233-13	. SCREW, MACHINE (AP)	2	
-9	MS15795-304	. WASHER, FLAT (AP)	2	
-10	MS35338-78	. WASHER, LOCK (AP)	2	
-11	*6043663	. FILTER, BANDPASS, 40 kc -74306-	1	
	MS35233-13	. SCREW, MACHINE (AP)	2	
	MS15795-304	. WASHER, FLAT (AP)	2	
	MS35338-78	. WASHER, LOCK (AP)	2	
-12	27-9	. CONNECTOR, RECEPTACLE, ELECTRICAL -74868-	1	
-13	1131-37	. COIL, RADIO FREQUENCY -14632-	1	
-14	UG1466U	. CONNECTOR, PLUG, ELECTRICAL	1	
-15	SMRE14PGH	. CONNECTOR, PLUG, ELECTRICAL, MULTIPIN -81312-	1	
-16	RCR07G622JS	. RESISTOR, FIXED, COMPOSITION	2	
-17	56-590-65-4A	. FERRITE BEAD -02114-	5	
-18	H030F1041-2	. GROMMET -72653-	1	
-19	20740-52	. SPACER -14632-	1	
	MS35233-3	. SCREW, MACHINE (AP)	1	
	MS35338-77	. WASHER, LOCK (AP)	1	
-20	833	. CABLE CLIP -83330-	1	
	MS35233-26	. SCREW, MACHINE (AP)	1	
	MS35338-79	. WASHER, LOCK (AP)	1	
-21	SKT14	. JACK, TIP -98291-	8	

*Bandwidth of filters to be optional, the following are available:
FL1 - 6043661 (10 kc) -74306-
FL1 - 6043662 (20 kc) -74306-
FL1 - 6043663 (40 kc) -74306-
FL2 - 6043663 (40 kc) -74306-
FL2 - 6043664 (75 kc) -74306-

PART 12921 IF SWITCHING BOARD NO. 1

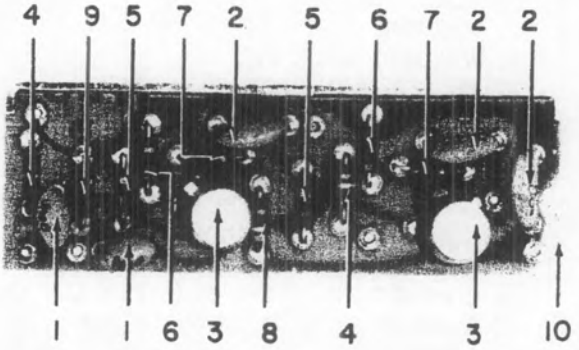


Figure 6-2

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2	12921	IF SWITCHING BOARD NO. 1 -14632- (FOR NHA SEE FIGURE 6-1)	REF	
-1	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -91418-	2	
-2	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	3	
-3	2N3478	. TRANSISTOR, NPN, SILICON -80131-	2	
	10042DAP	. INSULATOR, DISK -07047-	2	
-4	RCR05G123JS	. RESISTOR, FIXED, COMPOSITION	2	
-5	RCR05G512JS	. RESISTOR, FIXED, COMPOSITION	2	
-6	RCR05G102JS	. RESISTOR, FIXED, COMPOSITION	2	
-7	RCR05G201JS	. RESISTOR, FIXED, COMPOSITION	2	
-8	RCR05G390JS	. RESISTOR, FIXED, COMPOSITION	1	
-9	RCR05G750JS	. RESISTOR, FIXED, COMPOSITION	1	
-10	12920	. PRINTED WIRING BOARD -14632-	1	

PART 12923 IF SWITCHING BOARD NO. 2

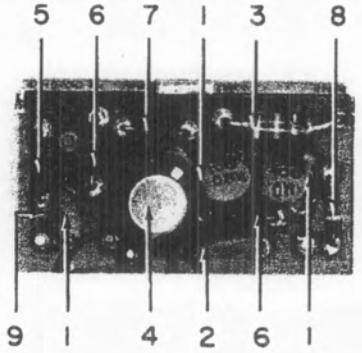


Figure 6-3

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
3	12923	IF SWITCHING BOARD NO. 2 (FOR NHA SEE FIGURE 6-1)	REF	
-1	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -91418-	3	
-2	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct 100 wvdc -56289-	1	
-3	1N914A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	
-4	2N3478	. TRANSISTOR, NPN, SILICON -80131-	1	
	10042DAP	. INSULATOR, DISK -07047-	1	
-5	RCR05G123JS	. RESISTOR, FIXED, COMPOSITION	1	
-6	RCR05G512JS	. RESISTOR, FIXED, COMPOSITION	2	
-7	RCR05G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-8	RCR05G243JS	. RESISTOR, FIXED, COMPOSITION	1	
-9	12922	. PRINTED WIRING BOARD -14632-	1	

PART 12925 IF SWITCHING BOARD NO. 3

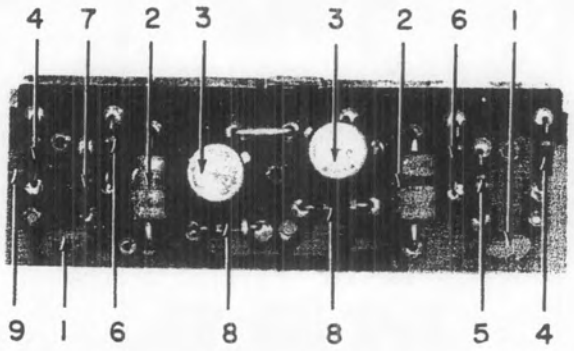


Figure 6-4

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
4	12925	IF SWITCHING BOARD NO. 3 (FOR NHA SEE FIGURE 6-1)	REF	
-1	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV 500 wvdc -91418-	2	
-2	QC0-33PFPORM10PCT.	CAPACITOR, FIXED, CERAMIC, 0.33 pf, 10 pct, 500 wvdc -95121-	2	
-3	2N3478	. TRANSISTOR, NPN, SILICON -80131-	2	
	10042DAP	. INSULATOR, DISK -07047-	2	
-4	RCR05G201JS	. RESISTOR, FIXED, COMPOSITION	2	
-5	RCR05G103JS	. RESISTOR, FIXED, COMPOSITION	1	
-6	RCR05G512JS	. RESISTOR, FIXED, COMPOSITION	2	
-7	RCR05G163JS	. RESISTOR, FIXED, COMPOSITION	1	
-8	RCR05G470JS	. RESISTOR, FIXED, COMPOSITION	2	
-9	12924	. PRINTED WIRING BOARD -14632-	1	

PART 12927 IF SWITCHING BOARD NO. 4

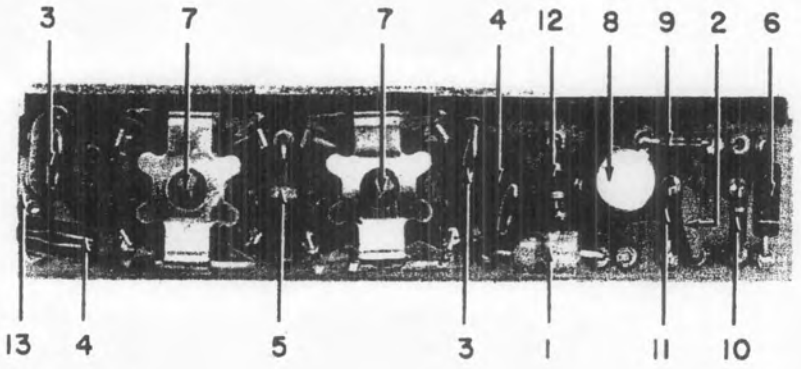


Figure 6-5

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
5	12927	IF SWITCHING BOARD NO. 4 (FOR NHA SEE FIGURE 6-1)	REF	
-1	QC0-33PFPORM10PCT.	CAPACITOR, FIXED, CERAMIC, 0.33 pf, 10 pct, 500 wvdc -95121-	1	
-2	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	1	
-3	CM04FD101J03	. CAPACITOR, FIXED, MICA	2	
-4	CM04ED360J03	. CAPACITOR, FIXED, MICA	2	
-5	QC1-5PFPORM10PCT	. CAPACITOR, FIXED, CERAMIC, 1.5 pf, 10 pct, 500 wvdc -95121-	1	
-6	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	1	
-7	30705-5	. COIL, RADIO FREQUENCY, 1.44 μh, 10 pct -14632-	2	
-8	2N3478	. TRANSISTOR, NPN, SILICON -80131-	1	
	10042DAP	. INSULATOR, DISK -07047-	1	
-9	RCR05G101JS	. RESISTOR, FIXED, COMPOSITION	1	
-10	RCR05G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-11	RCR05G681JS	. RESISTOR, FIXED, COMPOSITION	1	
-12	RCR05G470JS	. RESISTOR, FIXED, COMPOSITION	1	
-13	12926	. PRINTED WIRING BOARD -14632-	1	

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	UNITS PER ASSEMBLY
CM04ED360J03	5-4	2
CM04FD101J03	5-3	2
C023B101E502M	1-6	4
	2-2	3
	3-2	1
	5-2	1
FA5C102W	1-5	11
H030F1041-2	1-18	1
MS15795-304	1-9	2
MS35233-12	1-	4
MS35233-13	1-8	2
MS35233-14	1-	4
MS35233-26	1-	1
MS35233-3	1-	1
MS35338-77	1-	1
MS35338-78	1-10	2
MS35338-79	1-	1
QC0-33PFPORM10PCT	4-2	2
	5-1	1
QC1-5PFPORM10PCT	5-5	1
RCR05G101JS	5-9	1
RCR05G102JS	2-6	2
	3-7	1
	5-10	1
RCR05G103JS	4-5	1
RCR05G123JS	2-4	2
	3-5	1
RCR05G163JS	4-7	1
RCR05G201JS	2-7	2
	4-4	2
RCR05G243JS	3-8	1
RCR05G390JS	2-8	1
RCR05G470JS	4-8	2
	5-12	1
RCR05G512JS	2-5	2
	3-6	2
	4-6	2
RCR05G681JS	5-11	1
RCR05G750JS	2-9	1
RCR07G622JS	1-16	2
SKT14	1-21	8
SMRE14PGH	1-15	1
SM001GMV	2-1	2
	3-1	3
	4-1	2
UG1466U	1-14	1
1N462A	5-6	1
1N914A	3-3	1
10042DAP	2-	2
	3-	1
	4-	2
	5-	1
1131-37	1-13	1
12685	1-	1
12920	2-10	1
12921	1-1	1
	2-	REF
12922	3-9	1
12923	1-2	1
	3-	REF
12924	4-9	1
12925	1-3	1
	4-	REF
12926	5-13	1
12927	1-4	1
	5-	REF
2N3478	2-3	2
	3-4	1
	4-3	2
	5-8	1
20740-52	1-19	1
27-9	1-12	1
30705-5	5-7	2
56-590-65-4A	1-17	5
6043661	1-7	1
6043663	1-11	1
79193	1-	1
833	1-	1

PART 4

TYPE 72127 300-KC BANDWIDTH IF AMPLIFIER

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PART 4

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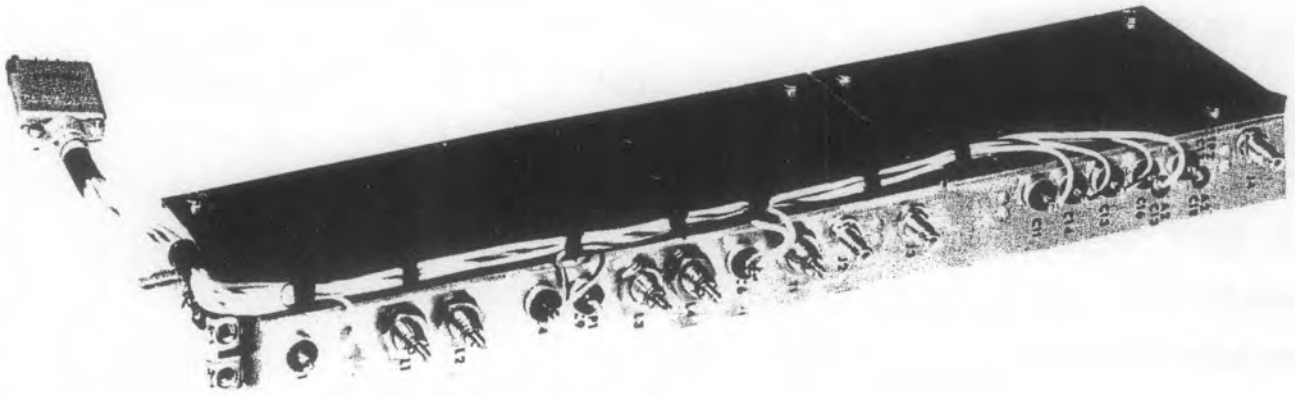
PART 4

LIST OF ILLUSTRATIONS

PART 4

TYPE 72127 300-KC BANDWIDTH IF AMPLIFIER



SECTION I

GENERAL DESCRIPTION

1-1. GENERAL

The type 72127 300-kc bandwidth IF amplifier is provided as standard equipment in the G175K Receiver. This subassembly provides amplification and detection of AM, FM, and CW signals from a 21.4-mc IF input. A beat frequency oscillator (BFO) is included in this IF strip and is activated when the CW mode is selected. A section of the receiver's IF BANDWIDTH KC switch is used to change the operating parameters of the FM discriminator thereby permitting more efficient detection of varied-bandwidth input signals. Outputs from the IF strip include a 21.4-mc predetection IF output, an AM output and an FM output. Operating voltages for the IF strip are supplied by the receiver power supply.

1-2. EQUIPMENT SUPPLIED

QUANTITY	ITEM	PART NUMBER
1	300-kc IF Amplifier	72127

1-3. ELECTRICAL SPECIFICATIONS

Signal Input	One, 50-ohm unbalanced RF input
Input Center Frequency	21.4 mc
AGC Input	One, negative going with increasing input signal
WB-NB Input	Discriminator bandwidth control voltage
Bandwidth	300 kc ± 30 kc at 3-db points
Bandpass Ripple	2 db, maximum
Shape Factor	4:1, maximum
Bandpass Center Frequency Stability	± 15 kc, maximum
Discriminator, Zero Crossing	21.4 mc ± 15 kc
Outputs	Three: FM video, AM, and Predetection
BFO Frequency	21.4 mc ± 15 kc, minimum

1-4. MECHANICAL SPECIFICATIONS

Weight	1.2 lbs., approximately
Over-all Dimensions	2.75 inches high, 1.25 inches wide, and 10 inches deep

Operating Temperature	
Limits	0° to 50°C
Altitude Limits	
Operating	15,000 feet
Non-operating	50,000 feet
Mounting	Screw mounted to receiver main chassis

SECTION II

PREPARATION FOR USE AND RESHIPMENT

2-1. UNPACKING AND INSPECTION

No special unpacking or inspection procedures are required for the 300-kc bandwidth IF amplifier assembly. Refer to Section II, Part 1 for general inspection procedures.

2-2. INSTALLATION

To install the 300-kc bandwidth IF amplifier assembly into the main chassis of the receiver, proceed as follows:

a. Remove the receiver from its mounting position and remove the top and bottom dust covers.

b. Install the IF amplifier from the top of the receiver. The attached multiconductor cable must be positioned so that it may later be connected to its mating jack on top of the main chassis.

c. Hold the IF amplifier in position while installing four 6-32 x 3/8-inch binder head screws, from the bottom of the receiver.

d. Interconnect the following plugs and jacks: A106P1 to J1, A106P2 to J2, A106P3 to J3, A106P4 to J4.

e. Connect plug P116 on the attached multi-conductor cable to jack J116 on the main chassis.

f. Energize the receiver and insure proper operation of the IF amplifier assembly. Refer to Section III, Part 1.

2-3. PREPARATION FOR RESHIPMENT

No special preparation is necessary to prepare the IF amplifier assembly for reshipment.

SECTION III

OPERATION

3-1. GENERAL

The type 72127 IF amplifier provides amplification and detection of AM, FM, and CW input signals. The unit operates at a center frequency of 21.4-mc and has a bandwidth of 300-kc. The reference designation prefix for the unit is A106. Three stages of IF amplification are used followed by an AM detector, FM limiter, and FM discriminator. Two Q-multipliers operate in conjunction with the first two IF amplifier stages to improve the IF response shape. Signal outputs from the IF strip include an AM video output, an FM video output and a predetection IF output. Input signals to the IF strip may have bandwidths of 10, 20, 40, or 75 kc as determined by the crystal filters in the IF filter/switching module, or of 300 kc when passed directly through the switching module. Efficient detection of FM signals with these varied bandwidths by a single discriminator is possible through switching to adjust the discriminator's operating conditions. One section of the receiver IF BANDWIDTH KC switch provides this function. A crystal-controlled beat frequency oscillator (BFO) is included in this assembly and is activated when the CW mode of operation is selected. The BFO operates only with the narrow bandwidths.

3-2. CONTROLS

The functions of the controls directly associated with the 300-kc IF amplifier are described in this paragraph. Refer to FO-2 and FO-3, Part 1 as necessary. Section S104A-F of the MODE SELECT switch applies operating bias to the beat frequency oscillator when the CW mode is selected. The AM video signal is coupled to subsequent stages in the receiver by section S103C-W. The FM video signal is fed through section S103C-X to various other stages in the receiver.

3-3. OPERATING PROCEDURES

No special operating procedures are required for the 300-kc bandwidth IF amplifier. Refer to Section III, Part 1 for general operating procedures for the G175K Receiver.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL

A functional block diagram of the 300-kc bandwidth IF amplifier is incorporated in the overall block diagram for the G175K Receiver, FO-1, Part 1. A functional description of the IF strip is given in the following paragraphs using this diagram and the schematic diagram, FO-1 of this part.

The 300-kc IF amplifier is a plug-in unit provided as standard equipment in the G175K Receiver. Input to the 21.4-mc IF amplifier is from the IF filter/switching module, A108. The 300-kc bandwidth of the unit will accommodate signals from A108 which may have bandwidths between 10 kc and 300 kc. Efficient detection of FM signals with such varied bandwidths with one discriminator is possible through switching to adjust the discriminator's operating conditions. The four-position IF BANDWIDTH KC switch in the receiver provides this function. The unit consists of two printed circuit boards, A1 and A2, mounted in a brass chassis. All operating voltages, signal inputs and outputs are coupled through cables and connectors which permit rapid replacement of the unit.

The 21.4-mc IF signal from the IF filter/switching module, A108, in the receiver is applied to the first IF amplifier stage A1Q1. Q-multiplier stage, A1Q2, operates in conjunction with the first IF amplifier to produce the desired selectivity. The 21.4-mc output from A1Q1 is coupled to the second IF amplifier stage A1Q3. Another Q-multiplier, A1Q4, operates with stage A1Q3. The first two IF amplifier stages, with the associated Q-multipliers, set the bandwidth of the unit at 300 kc. The 21.4-mc IF signal out of the second IF amplifier receives additional amplification in wideband stage A1Q5, and is then applied to the AM detector, A1CR4, the 21.4-mc IF output jack, J3, and to the FM limiters located in A106A2. The demodulated output from A1CR4 is fed through cascaded emitter followers A1Q6 and A1Q7 to the AM output jack, J2.

The BFO is activated when the receiver MODE SELECT switch is placed in the CW position. The 21.4-mc output of the BFO stage, A2Q2, is applied to the AM detector, A1CR4. The pitch of the CW beat note signal produced can be varied by adjusting the BFO control on the front panel of the receiver.

Two symmetrical limiter stages (A2Q1, A2Q3, and A2Q4, A2Q5) remove amplitude variations from the signal. The second limiter stage is coupled to the discriminator circuit for FM detection. The FM detector is a modified Foster-Seeley discriminator containing diodes A2CR3 and A2CR4.

The FM video output from the discriminator is coupled to parallel emitter followers A2Q6 and A2Q7 which feed A2Q8 and A2Q9, respectively. The latter two transistors are connected in a complementary symmetry configuration. Signals from this stage are coupled through an RF filter to the FM output jack.

4-2. DETAILED THEORY

4-3. FIRST IF AMPLIFIER

Transistor A1Q1 is the first stage in the 300-kc bandwidth IF amplifier. Input to the base of A1Q1 is through input jack, J1, feedthru terminal A1E1 and dc-blocking capacitor A1C1. Gain control of the IF strip is obtained by applying a voltage to the base of A1Q1 from the AGC module, A111. This input is through C1 and A1E2. The collector load for this stage is a double-tuned circuit consisting of A1L1 and A1L2 and their associated capacitors. Since the junction of A1C6 and A1C7 is grounded, the voltage at the junction of A1L1 and A1C7 is out of phase with the input signal. This voltage is coupled to the base of A1Q1 through A1C4 to neutralize the stage. The selectivity of this stage is increased and spurious responses are reduced through the use of Q-multiplier stage A1Q2.

4-4. AGC COMPENSATION

A diode compensation network is included in the emitter circuit of IF amplifier A1Q1 to linearize the automatic gain control characteristics of the IF strip. The AGC amplifier produces a negative-going voltage which is proportional to the average level of the incoming RF signal to the receiver. This voltage is applied to the base of A1Q1. Diodes A1CR2 and A1CR3 in the emitter circuit of A1Q1 conduct and short resistors A1R7 and A1R5, respectively, under no-signal conditions. At this time only A1R6, which is bypassed by A1C5, is active in the emitter circuit. This is the maximum gain condition for the stage. As the input signal level rises, the conduction of A1Q1 is reduced by the AGC voltage. When the voltage drop across A1R7 becomes too small to maintain a forward bias on A1CR2 this resistor is added to the emitter circuit, further reducing the stage gain. As the AGC continues to increase with increasing signal level, the voltage drop across A1R5 will decrease thereby reverse biasing A1CR3. At this AGC input level, A1R5 is added to the emitter circuit of A1Q1. Note that A1R5 is not bypassed by A1C5, so that when A1CR3 is cut off, ac degeneration is obtained across A1R5 which improves the signal-handling ability of the stage. A further expansion of the gain-control characteristics is provided by A1CR1. As the IF AGC voltage applied to A1Q1 approaches its most negative point on extremely high level input signals, the decreased conduction through A1CR1 causes an increase in the dynamic impedance of the diode. As a result, the AGC voltage must go even more negative to achieve an equal amount of gain reduction, than when A1CR1 was conducting heavily.

4-5. Q-MULTIPLIER

Transistor A1Q2 operates as a Q-multiplier to increase the selectivity of the double-tuned collector load of A1Q1. Since the selectivity of a tuned circuit is a function of the losses in the circuit, the selectivity may be increased by reducing or overcoming part of these losses. Stage A1Q2 reinserts energy into its associated tuned circuit by developing an in-phase voltage across capacitor A1C9. This energy adds to the energy in the tuned circuit, thereby effectively reducing the circuit losses. This results in an increase in selectivity. Oscillation in stage A1Q2, to obtain the boost in circuit Q, is maintained through the positive feedback path consisting of resistor A1R10 and capacitor A1C10. Transistor A1Q4 performs the same function for the second IF stage A1Q3.

4-6. SECOND AND THIRD IF AMPLIFIERS

Operation and neutralization of the second IF amplifier consisting of A1Q3 and Q-multiplier A1Q4 is identical to that of the first except that AGC voltage is not applied to this stage. This eliminates the need for an AGC compensation network in the emitter circuit. Output from the A1Q3-A1Q4 combination is coupled to IF amplifier A1Q5 through A1C22. The collector load for A1Q5 is the primary winding of wideband coupling transformer T1. Neutralization of this stage is accomplished by feeding an out-of-phase signal from the secondary of A1T1 to the base of A1Q5 through capacitor A1C26. The output of A1Q5 is coupled to the AM detector, A1CR4, to the Limiter/Discriminator/BFO board, A2, and to the IF output jack, J3.

4-7. AM DETECTOR

The 21.4-mc signal from the third IF stage, A1Q5, is coupled through transformer A1T1 to the AM detector, A1CR4, and through capacitor A2C32 to the input of the Limiter/Discriminator/BFO board, A2. Capacitor A1C30 eliminates RF signal components from the output of the detector. The audio-video from the detector is fed through cascaded emitter followers A1Q6 and A1Q7 to an RF filter consisting of A1L3, A1C31, L5 and C7. This filter eliminates any remaining RF from the AM output present at jack J2.

4-8. BFO (Beat Frequency Oscillator)

The BFO is a portion of module A2. In the CW mode of operation, a 21.4-mc signal from the BFO is injected into the AM detector through capacitors A2C2 and A1C32. This signal beats with the IF frequency to produce an audible note. The BFO is placed in operation by the application of +12 vdc through section S104A-F of the MODE SELECT switch on the main chassis of the receiver. The +12 vdc forward biases diode A2CR2 which applies the dc voltage to the collector of transistor A2Q2. The BFO is a self-regulating Colpitts oscillator. The output signal is derived

from the feedback divider circuit consisting of A2C4, A2C5, and A4R5. With the BFO on, diode A2CR1 is reverse biased and has little effect upon the circuit. When the MODE SELECT switch is moved to any position other than the CW position, -12 vdc is applied to A2CR2 and to A2CR1 through A2R1. Now A2CR1 is forward biased and A2CR2 is reverse biased. When A2CR1 is conducting a short circuit is effectively placed across crystal A2Y1. If this action were not taken, the crystal would be coupled to the IF strip through capacitors A2C4 and A2C2. This could cause undesirable effects on the IF response.

4-9. FM LIMITERS

The 21.4-mc signal from the IF amplifier stages in A1 is fed to a symmetrical limiter stage consisting of A2Q1 and A2Q3. The incoming signal swings about a dc level of approximately +3 volts established by base-bias resistors A2R2 and A2R3. Transistors A2Q1 and A2Q3 share a common emitter resistor, A2R6. Under no-signal conditions the combined emitter currents of the two transistors develop a voltage across A2R6 which approaches +3 volts. When a signal is applied to the base of A1Q1, the positive-going half cycle causes increased conduction through A2Q1 which increases the voltage drop across A2R6. If the input signal has sufficient amplitude the voltage drop across A2R6 will reverse bias the base-emitter junction of A2Q3, cutting the transistor off. On the negative-going half cycle, the decreased drop across A2R6 will cause A2Q3 to conduct to saturation. Thus the transistor operates between cut off and saturated conditions, limiting both the positive and negative cycles of the input signal. The first limiter output is coupled to the second limiter through capacitor A2C8. The operation of the second limiter is similiar to that of the first except that transistors A2Q4 and A2Q5 are ac coupled by capacitor A2C10. This permits independent dc operation of each transistor and the use of different transistor types. Note that different emitter resistors are used and that the resistors are connected to the -12-volt supply. The base of A2Q5 is connected to the -12-volt supply through a resistive voltage divider consisting of A2R18, A2R17, A2R16, and R3. This biasing arrangement permits a greater voltage swing at the collector-base junction and provides a more linear output.

4-10. FM DISCRIMINATOR AND OUTPUT

The FM discriminator is a modified Foster-Seeley circuit. The 21.4-mc output of the second limiter is coupled through torroidal transformers A2T1 and A2T2. Capacitor A2C15 couples an RF reference voltage from the collector of A2Q5 to the centertap of the secondary of A2T2. Capacitive center-tapping of the secondary through A2C16 and A2C17 makes it possible to obtain a high degree of discriminator balance unaffected by coil characteristics. The FM video output from the discriminator is resistance coupled to parallel emitter followers A2Q6 and A2Q7. The outputs from A2Q6 and A2Q7 are dc coupled to emitter followers A2Q8 and A2Q9 which are connected in a complementary symmetry configuration. The output from A2Q8 and A2Q9 is taken at the junction of emitter load resistors A2R28 and A2R29 and fed through A2R30 and an RF filter network to the FM video output jack, J4. This filter network, consisting of A2L2, A2C24, L7 and C18 eliminates any 21.4-mc components from the output. Test point TP2 is connected to this output through R4 and feedthru capacitor C17 for use in aligning the discriminator.

4-11. NARROWBAND-WIDEBAND SWITCHING

A discriminator response curve slope which can be made less steep when the incoming signal bandwidth is increased is desirable so that the discriminator output voltage will remain nearly constant for all bandwidths. This is accomplished by adjusting the signal level applied to the discriminator for each setting of the IF BANDWIDTH KC switch located on the main chassis of the receiver. Wafer S103A-Y of this switch changes the voltage level at C13. One of three progressively less negative voltages is applied to C13 as S103 is rotated toward the 4-mc bandwidth position. A less negative voltage at C13 results in reduced conduction through A2Q5 and, therefore reduced signal voltage into the discriminator. Since the slope of the discriminator curve is proportional to the voltage applied, the slope becomes less steep as the bandwidth control is rotated toward the 4-mc position.

SECTION V

MAINTENANCE

5-1. GENERAL

The 300-kc bandwidth IF amplifier presents no special maintenance problems and normally requires no care beyond being kept clean. Periodic inspections of the assembly should be performed concurrent with over-all G175K operations and cleaning. Section V, Part 1 of this manual lists general maintenance procedures for the entire receiver. The maintenance technician should be familiar with Section IV of this part before an alignment is attempted.

5-2. ALIGNMENT

Alignment procedures for the 300-kc bandwidth IF amplifier and for the 300-kc bandpass network located in the IF filter/switching module, A108, are presented in the following steps. Use of an external marker is recommended during the performance of these procedures. Paragraph 5-3, Section V, Part 1 describes the methods of obtaining this marker. The test equipment necessary to perform the alignment is listed in Figure 5-1.

TEST EQUIPMENT REQUIRED

PREFERRED TYPE	SUITABLE ALTERNATE
Telonic SM2000 Sweep Generator	Jerrold 900B
Telonic LH-2 Plug-In Head	None
Hewlett Packard 410C VTVM	MIL-M-9996
Hewlett Packard 606A Signal Generator	AN/URM-25D
Hewlett Packard 355C Attenuator	Telonic TAB-50
Hewlett Packard 5245L Frequency Counter	MIL-C-9988
Tektronix 545B Oscilloscope	MIL-O-9960
Tektronix 1A2 Plug-In Unit	MIL-O-9960

Figure 5-1

5-3. GENERAL

The alignment procedures should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power to G175K Receiver of 115 ± 2.0 vac and 28.0 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

5-4. AM ALIGNMENT

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

b. Place G175K IF BANDWIDTH KC switch in 300 position.

c. Place MODE SELECT switch in AM MAN and rotate RF GAIN control maximum clockwise.

d. Set output frequency of sweep generator and signal generator to 21.4 mc.

300-KC BW IF AM ALIGNMENT TEST SETUP

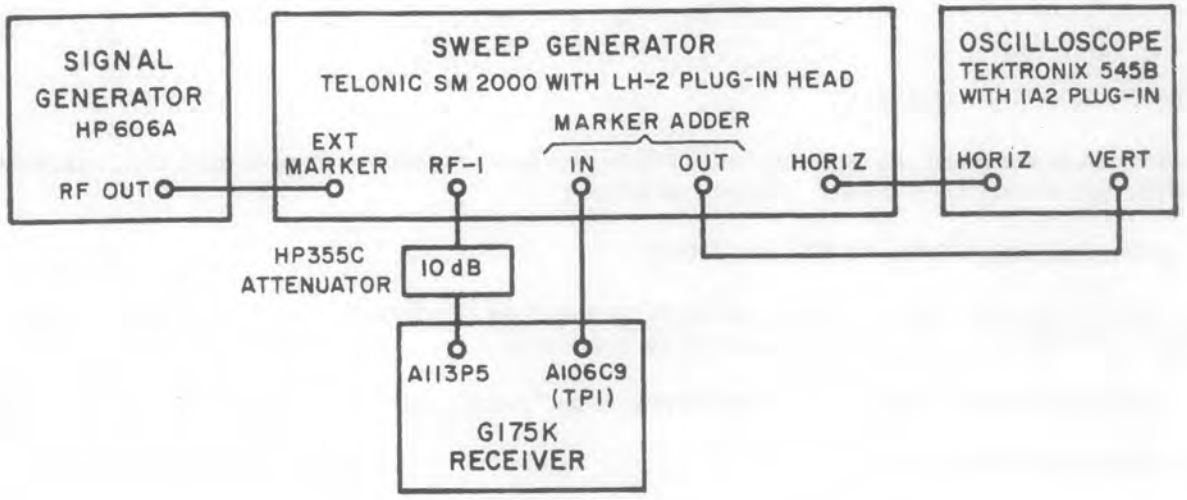


Figure 5-2

e. Adjust sweep generator and oscilloscope controls to display a response curve.

f. Adjust A108A4L1 and A108A4L2 on the IF filter/switching module for maximum gain at 21.4 mc.

g. Adjust transformer A1T1 and inductor A1L3 on the IF amplifier to position the 21.4 mc marker on the highest portion of the response as effected by the respective components.

h. Adjust A1L4, A1L2, A1L1 for maximum amplitude at 21.4 mc.

i. Readjust A1T1 and A1L3 as necessary for a maximum amplitude, symmetrical response centered about the 21.4-mc marker. Use the signal generator to check for 3-db response at 21.250 mc and 21.550 mc. A typical AM response is shown in Figure 5-3.

300-KC BW IF TYPICAL AM RESPONSE

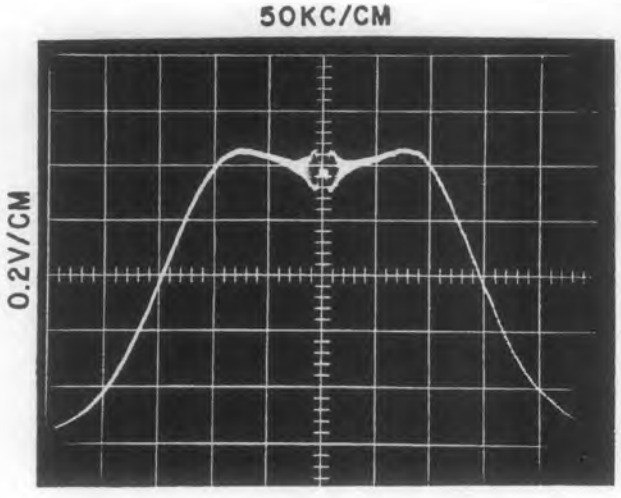


Figure 5-3

FM DISCRIMINATOR TYPICAL RESPONSE

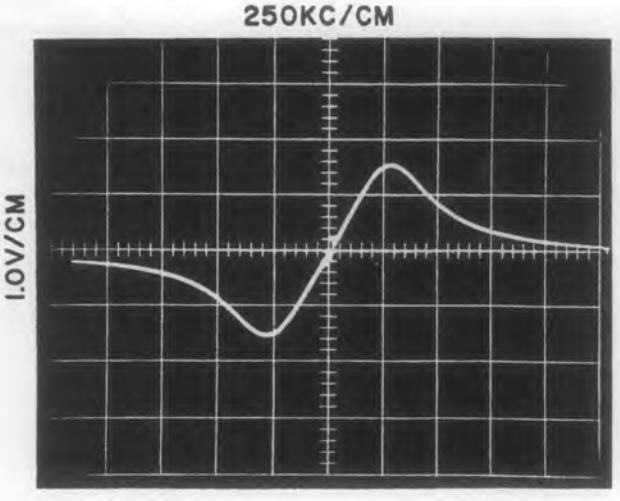


Figure 5-4

5-5. DISCRIMINATOR ALIGNMENT

Before a complete alignment can be performed it will be necessary to partially remove the 300-kc bandwidth IF amplifier from the receiver main chassis. Proceed as follows:

a. Remove plugs A106P1, A106P2, and A106P4.

b. Remove the four mounting screws and from the top of the receiver remove the IF strip from its mounting position. Note that plug P116 remains attached to its receptacle.

c. Rotate the IF strip 180° to expose the "wrap around" brass covers on the component side of the chassis.

d. Remove the larger brass cover.

e. Connect equipment as shown in Figure 5-5.

300-KC BW IF DISCRIMINATOR ALIGNMENT TEST SETUP

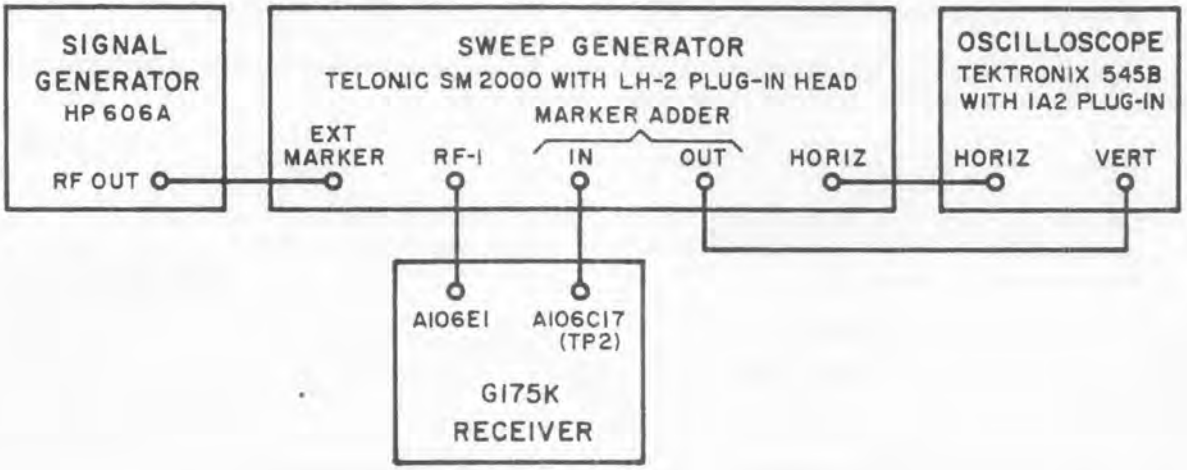


Figure 5-5

f. Set output frequency of signal generator and sweep generator to 21.4 mc.

g. Adjust sweep generator and oscilloscope controls to display an "S" response curve.

h. Adjust A2C13 for amplitude symmetry and A2C18 for zero crossing of the "S" curve about the 21.4-mc marker. Use the signal generator to check for linearity between 21.250 and 21.550 mc. A typical response is shown in Figure 5-4.

5-6. PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic inspections performed at daily and 100 operational-hour intervals. The shop inspection is performed when a malfunction in the 300-kc IF strip is suspected.

5-7. DAILY INSPECTION

At the start of each day of use, inspect the 300-kc IF connecting cables for good mechanical connections. Inspect the connecting wires for good solder joints. Remove any accumulated dust or dirt. Check all mounting screws for looseness.

5-8. 100-HOUR INSPECTION

Perform the daily inspection. Remove accumulated dust or dirt with low pressure, dry compressed air.

5-9. SHOP INSPECTION

When degraded performance of the 300-kc IF strip is suspected, remove the entire receiver from its operating position and send it to the repair shop. Maintenance personnel should perform applicable portions of the daily and 100-hour inspections and the functional tests outlined in paragraph 5-10. If the IF strip meets test specifications return it to service. If not, replace only those components necessary to restore performance. Align the IF strip and again perform the functional tests.

5-10. FUNCTIONAL TESTS

The following functional tests provide a means of checking the performance of the 300-kc IF amplifier as well as the IF filter/switching module. The tests equipment necessary to perform the functional tests is listed in Figure 5-1.

5-11. TEST CONDITIONS

The functional tests should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power to G175J Receiver of 115 ± 2.0 vac and 28.0 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

5-12. IF BANDWIDTH CHECK

The following functional tests provide a means of checking the bandwidth of the four available crystal filters and the 300-kc IF amplifier, as well as the response skirt ratio for all five bandwidths.

5-13. 10-KC Bandwidth

a. Connect equipment as shown in Figure 5-6.

IF BANDWIDTH CHECK TEST SETUP

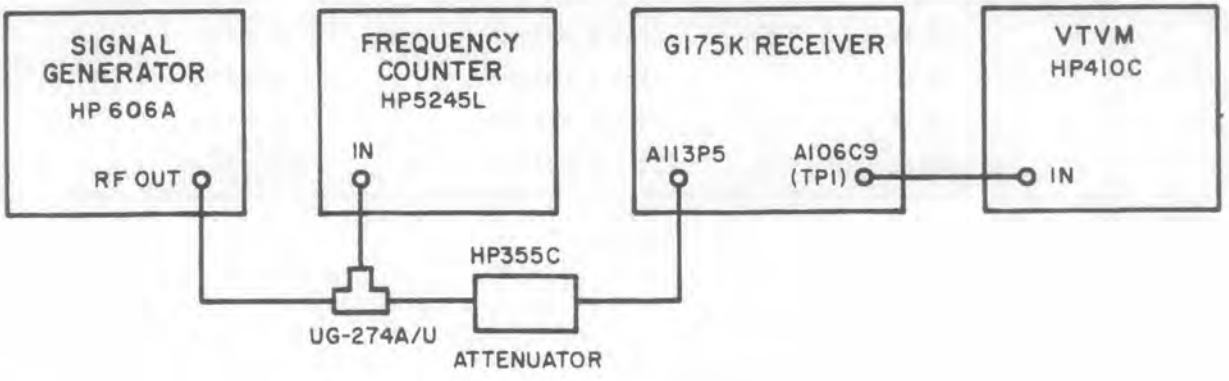


Figure 5-6

b. Place receiver IF BANDWIDTH KC switch in 10 position and MODE SELECT switch in AM MAN position; rotate RF GAIN control fully clockwise.

c. Set output frequency of signal generator to 21.4 mc, CW mode.

d. Adjust VTVM to read positive dc volts.

e. Adjust the signal generator frequency for a maximum detector output as indicated by the VTVM.

f. Adjust signal generator output to a level that is sufficient to operate the frequency counter.

g. Add attenuation with the HP355C attenuator until a 2.0 vdc reading is obtained on the VTVM.

h. Decrease the attenuation by 3 db.

i. Increase signal generator output frequency until VTVM again reads 2.0 vdc; record the generator frequency.

j. Decrease the signal generator output frequency to 21.4 mc and then below until the VTVM again reads 2.0 vdc. The difference between the frequency readings should be 10 kc ± 1 kc.

k. Divide the bandwidth obtained in step j. by two and add this quotient to the low frequency reading obtained in step j. The result should be a center frequency of 21.4 mc ± 0.5 kc.

l. Repeat the procedures outlined in steps h. through k. and measure the 6 db and 60 db bandwidth. The 6 db to 60 db skirt ratio should not exceed 3:1.

5-14. 20/40/75/300 KC Bandwidths

Repeat the test outlined in paragraph 5-13 for the 20, 40, 75, and 300-kc bandwidths. Place the IF BANDWIDTH KC switch in the position of the bandwidth under test. The bandwidths and center frequency tolerance for the remaining bandwidths are given in Figure 5-7.

IF BANDWIDTH CHECK SETUP INFORMATION

IF BANDWIDTH	CENTER FREQUENCY TOLERANCE	BANDWIDTH TOLERANCE
20 kc	21.4 ± .001 mc	20 ± 2 kc
40 kc	21.4 ± .002 mc	40 ± 4 kc
75 kc	21.4 ± .00375 mc	75 ± 7 kc
300 kc	21.4 ± .015 mc	300 ± 30 kc

Figure 5-7

5-15. DISCRIMINATOR CROSSOVER

a. Connect equipment as shown in Figure 5-8.

b. Place receiver IF BANDWIDTH KC switch in 300 position and MODE SELECT switch in FM position.

c. Set output frequency of signal generator to 21.4 mc.

d. Increase signal generator output to [illegible] to operate the frequency counter.

DISCRIMINATOR CROSSOVER TEST SETUP

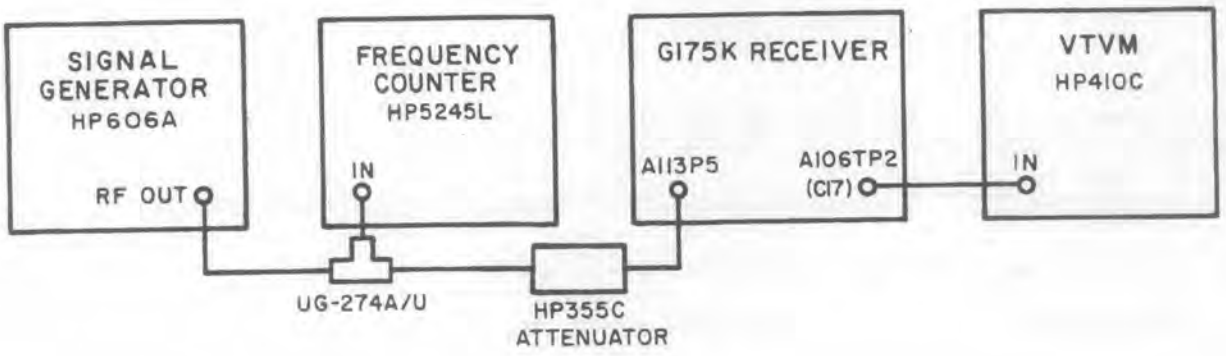


Figure 5-8

e. Adjust the VTVM controls to read positive dc volts, and place needle on zero center mark; use 1-volt range.

f. Adjust signal generator output frequency for a zero volt reading on the VTVM; the counter should read 21.4 mc ± 15 kc.

5-16. UNSCHEDULED MAINTENANCE

Most troubles experienced with the 300-kc IF amplifier will be caused by the failure of the semiconductors. If any are suspected, they should be replaced before any further troubleshooting is carried out. A troubleshooting chart, Figure 5-9, supplemented by a list of transistor element voltages, Figure 5-10, are included to aid the technician in locating the faulty component.

Proper operation of the RF tuning head(s) installed in the receiver and the IF filter/switching module (A108) should be assured before troubleshooting is begun on the 300-kc IF amplifier. In addition, proper operation of the stages at the output of the IF amplifier should be confirmed.

Troubleshooting of the IF amplifier is most easily accomplished by feeding in a 21.4-mc CW signal at the input and checking for an output at each stage using a wideband oscilloscope. Once the defective stage is located, voltage measurements will usually pin point the malfunctioning component.

5-17. SUBASSEMBLY REMOVAL AND REPLACEMENT

The 300-kc bandwidth amplifier chassis employs four brass covers, two on each side, that can be easily removed to provide access to both sides of the etched circuit boards. The replacement of a faulty component on one of the etched circuit boards should first be attempted with the boards mounted in the chassis. An entire board should not be removed from the chassis unless considered absolutely necessary. The IF amplifier must be removed from its mounting position on the main chassis of the receiver prior to the removal of the etched circuit boards.

5-18. REMOVAL OF CIRCUIT BOARD A106A1

CAUTION

Excess heat applied to the circuit may cause the pattern to lift from the board. Use only a low-heat iron when replacing components. Use a heat sink when replacing transistors or diodes.

a. To detach board A1, unsolder all solid wires that are connected between the board and components mounted on the chassis. Unsolder these wires from the end connected to the component on the chassis.

b. Unsolder resistor R5 from feedthrough capacitor C6; unsolder inductor L5 from jack J2.

c. Remove the ten mounting screws and their attached washers.

d. Unsolder the two inner wires attached to feedthrough capacitors C4 and C9 (TP1).

e. Gently lift the board from the chassis; components may now be replaced as necessary.

f. Install a new board by reversing steps a. through e. Note that it will be necessary to install some connecting wires, resistor R5 and inductor L5 on the new board.

5-19. REMOVAL OF CIRCUIT BOARD A106A2

a. To remove board A2, first unsolder resistors R1, R2, and R3 from feedthrough capacitors C11, C13, and C14 respectively.

b. Unsolder inductors L6 and L7 from feedthrough capacitor C16 and jack J4 respectively.

c. Remove the four mounting screws and their attached washers.

d. The board may now be lifted from the chassis.

e. Install a new board by reversing steps a. through d. Note that it will be necessary to install some connecting wires, resistors R1, R2, and R3, and inductors L6 and L7 on the new board.

TROUBLESHOOTING CHART, 300-KC BW IF

SYMPTOM	PROBABLE CAUSE	REMEDY
AM input signal applied, no AM output at J2.	a. Defective transistor in AM section. b. AM detector defective.	a. Measure voltages on A1Q1 thru A1Q7; replace defective transistor. b. Check A1CR4 and replace if necessary.
FM input signal applied, no FM output at J4.	a. Defective limiter. b. Capacitor A2C10 open. c. Discriminator diode defective. d. Torroid transformers A2T1 and A2T2 shorted together or connecting leads broken.	a. Measure voltages on A2Q1, A2Q3, A2Q4 and A2Q5; replace defective transistor. b. Replace c. Replace defective diode; A2CR3 or A2CR4. d. Adjust turns on transformers; resolder broken connection; realign discriminator
MODE SELECT switch in CW position, no audio beat note.	a. BFO crystal A2Y1 defective.	a. Replace A2Y1.

Figure 5-9

TROUBLESHOOTING CHART, 300-KC BW IF (Cont)

SYMPTOM	PROBABLE CAUSE	REMEDY
	b. BFO A2Q2 defective.	b. Measure voltage on A2Q2 with MODE SELECT switch in CW position; replace A2Q2 if necessary.

Figure 5-9

TRANSISTOR ELEMENT VOLTAGES, 300-KC BW IF

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A1Q1	2N3478	7.2	7.8	10.1
A1Q2	2N706	7.3	7.8	10.1
A1Q3	2N3478	7.2	7.8	10.1
A1Q4	2N706	7.6	8.0	10.1
A1Q5	2N3478	7.1	7.8	10.1
A1Q6	2N3251	7.3	6.8	-11.0
A1Q7	2N929	6.7	7.4	10.1
A2Q1	2N706	2.4	3.0	10.1
A2Q2	2N706	6.2	6.25	9.8*
A2Q3	2N706	2.4	3.0	10.1
A2Q4	2N706	-0.85	-0.25	10.1
A2Q5	2N3478	-3.8	-3.25	10.1
A2Q6	2N929	-0.02	0.48	10.1
A2Q7	2N3251	1.5	0.58	-10.7
A2Q8	2N929	0.74	1.5	10.1
A2Q9	2N3251	0.74	-0.02	-10.7

TEST CONDITIONS: No signal input to receiver; RF GAIN control fully clockwise; MODE SELECT switch set to AM MAN. All voltages are positive dc with respect to ground. Voltages taken with HP410C VTVM.

* MODE SELECT switch to CW position

Figure 5-10

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

INTRODUCTION

PURPOSE AND FORMAT

This Illustrated Parts Breakdown lists and describes electrical and mechanical parts to assist in requisitioning, storing, and identifying spare parts. Four major parts comprise this section: (1) Introduction, (2) Group Assembly Parts Breakdown, (3) Numerical Index, and (4) Reference Designation Index.

SUMMARY OF CONTENTS

INTRODUCTION

Included in the Introduction are: (1) Purpose and Format, (2) Summary of Contents, (3) How to Use, (4) Abbreviations, and (5) List of Manufacturers' Codes and Addresses.

GROUP ASSEMBLY PARTS BREAKDOWN

The Group Assembly Parts Breakdown contains illustrations and parts lists of assemblies, and detailed parts. The illustrations and text are arranged according to function and/or next assembly. When it is necessary to show a subassembly in detail, and it is not possible to do so in the same illustration as its major assembly, it is referenced to another illustration in which the subassembly is exploded in as much detail as necessary and its component parts listed in the accompanying text.

The nomenclature of each part, the units per assembly, and the usable on code, if any, are listed to the right of the part number in the text. Next assembly sequence is determined by indenture position; that is, a part listed one column to the right of the position of the part above it is a component of that assembly or installation. Attaching parts are shown directly below in the same indenture column as the parts they attach.

When a manufacturer's part is listed, the manufacturer's code is given in the nomenclature along with any other information thought necessary or helpful. The manufacturer's name and address may be found from the code symbol by consulting the "List of Manufacturers' Codes and Addresses" in the Introduction. The codes are in accordance with Federal Supply Code for Manufacturers, cataloging handbook H4-1.

The column entitled "Usable on Code" is not utilized in this publication.

The number of parts given under the column entitled "Units per Assembly" constitute that number required to make up a single assembly.

Left- and right-hand parts are listed separately. Component parts of left- and right-hand assemblies are identified by determining next assembly order. When a left- or right-hand assembly has both left- and right-hand parts as components, the nomenclature will show the assembly to which each belongs.

NUMERICAL INDEX

Each part number appearing in the Group Assembly Parts Breakdown is listed in the Numerical Index. This index is compiled in accordance with the numerical part number filing system described below. Read part numbers from left to right, one digit at a time, to determine part number numerical arrangement. The order of precedence

in part number numerical arrangement is as follows:

(1) Space (blank column)

(2) Dash (-)

(3) Letters A thru Z

(4) Numerals 0 thru 9

All part numbers are listed with the figure and index number of each appearance.

REFERENCE DESIGNATION INDEX

The Reference Designation Index includes all components of electronic equipment having reference designators.

The Reference Designation Index is divided into three columns consisting of the following: (1) REFERENCE DESIGNATION - Reference designators listed in alphanumerical order; (2) FIG. AND INDEX NO. - Used to locate the corresponding part in the Group Assembly Parts Breakdown; (3) MFR PART NUMBER - The part number assigned by the manufacturer of the part.

HOW TO USE

KNOWN ➡	MFR PART NO.	REFERENCE DESIGNATION NO. (COMPONENT NUMBERS ON SCHEMATICS)
WANT TO KNOW ➡	SEQUENCE OF ASSEMBLY	MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED
SOLUTION ➡	IN NUMERICAL INDEX FIND MFR PART NUMBER. SEQUENCE OF ASSEMBLY MAY BE FOUND ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.	IN REFERENCE DESIGNATION INDEX FIND REFERENCE DESIGNATION NUMBER. FIND MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.

ABBREVIATIONS

AP	Attaching Part
ASSY	Assembly
BFO	Beat Frequency Oscillator
FIG	Figure
GMV	Guaranteed Minimum Value
IF	Intermediate Frequency
kc	Kilocycle (10^3)
MC	Megacycles (10^6)
MFR	Manufacturer
NHA	Next Higher Assembly
NO	Number
pf	Picofarad (10^{-12})
pct	Percent
REF	Reference
μf	Microfarad (10^{-6})
μh	Microhenry (10^{-6})
wvdc	Working Volts Direct Current

LIST OF MANUFACTURERS' CODES AND ADDRESSES

CODE	NAME AND ADDRESS
01121	Allen-Bradley Company 1201 South Second Street Milwaukee, Wisconsin 53204
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey 08530
07047	The Ross Milton Company 511 Second Street Pike Southampton, Pennsylvania 18966
14632	Watkins-Johnson Company CEI Division 6006 Executive Boulevard Rockville, Maryland 20852
28480	Hewlett-Packard Company 1501 Page Mill Road Palo Alto, California 04304
56289	Sprague Electric Company Marshall Street North Adams, Massachusetts 01247
72259	Nytronics Incorporated 550 Springfield Avenue Berkeley Heights, New Jersey 07922
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
74868	Amphenol Corporation Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
80131	Electronic Industries Association 2001 Eye Street, N. W. Washington, D. C. 20006
81312	Winchester Electronics Division Litton Industries, Incorporated Main Street & Hillside Avenue Oakville, Connecticut 06779
83330	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
84171	Arco Electronics, Inc. Community Drive Great Neck, New York 11022
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, Illinois 60646
95121	Quality Components, Inc. P. O. Box 113 St. Mary's, Pennsylvania 15857

TYPE 72127 300-KC BANDWIDTH IF AMPLIFIER

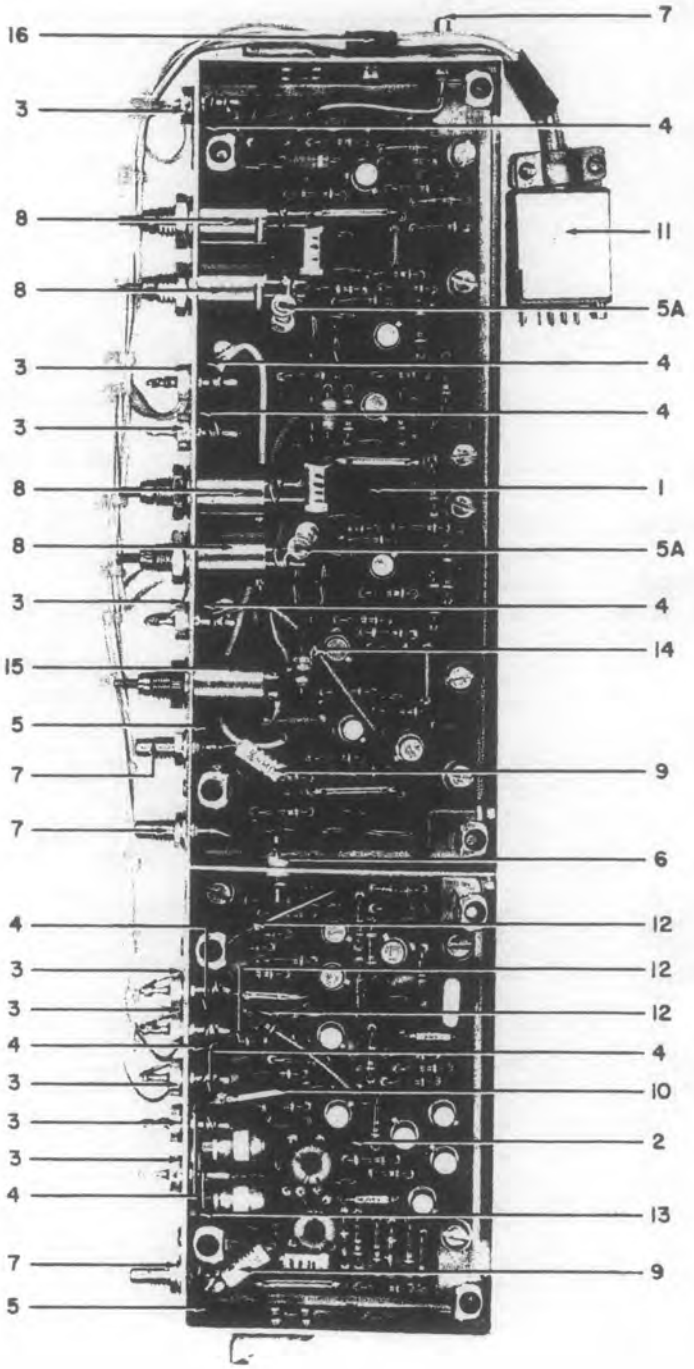


Figure 6-1

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	72127	300 kc IF AMPLIFIER -14632-	1	
	MS35233-12	SCREW, MACHINE (AP)	4	
	13139	. COVER, TOP, SMALL -14632	1	
	MS35233-13	. SCREW, MACHINE (AP)	4	
	12677	. COVER, TOP, LARGE -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	4	
	20993	. COVER, BOTTOM, SMALL -14632-	1	
	MS35233-11	. SCREW, MACHINE (AP)	4	
	20994	. COVER, BOTTOM, LARGE -14632-	1	
	MS35233-11	. SCREW, MACHINE (AP)	4	
-1	12431	. AMPLIFIER, IF -14632- (FOR BREAKDOWN SEE FIGURE 6-2)	1	
-2	12740	. LIMITER/DISCRIMINATOR/BFO -14632- (FOR BREAKDOWN SEE FIGURE 6-3)	1	
-3	FA5C102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -01121	9	
-4	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	8	
-5	CM04ED300J03	. CAPACITOR, FIXED, MICA	2	
-5A	301-000P3KO479C	. CAPACITOR, FIXED, CERAMIC, 4.7 pf, ±0.25 pf, 500 wvdc -72982-	2	
-6	SFU16	. TERMINAL, FEEDTHRU, INSULATED -04013-	1	
-7	27-9	. CONNECTOR, RECEPTACLE, ELECTRICAL SUBMINIATURE -74868-	4	
-8	1472-3	. COIL, RADIO FREQUENCY -14632-	4	
-9	WEE82	. COIL, RADIO FREQUENCY, 82 µh -72259-	2	
-10	1131-37	. COIL, RADIO FREQUENCY -14632-	1	
-11	SLE7PNSS	. CONNECTOR, PLUG, ELECTRICAL, MULTIPIN -81312-	1	
-12	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	3	
-13	RCR07G203JS	. RESISTOR, FIXED, COMPOSITION	1	
-14	RCR07G220JS	. RESISTOR, FIXED, COMPOSITION	1	
-15	20349-8	. TRANSFORMER -14632-	1	
-16	833	. CABLE CLIP -83330-	1	
	MS35233-26	. SCREW, MACHINE (AP)	1	
	MS35338-79	. WASHER, LOCK (AP)	1	

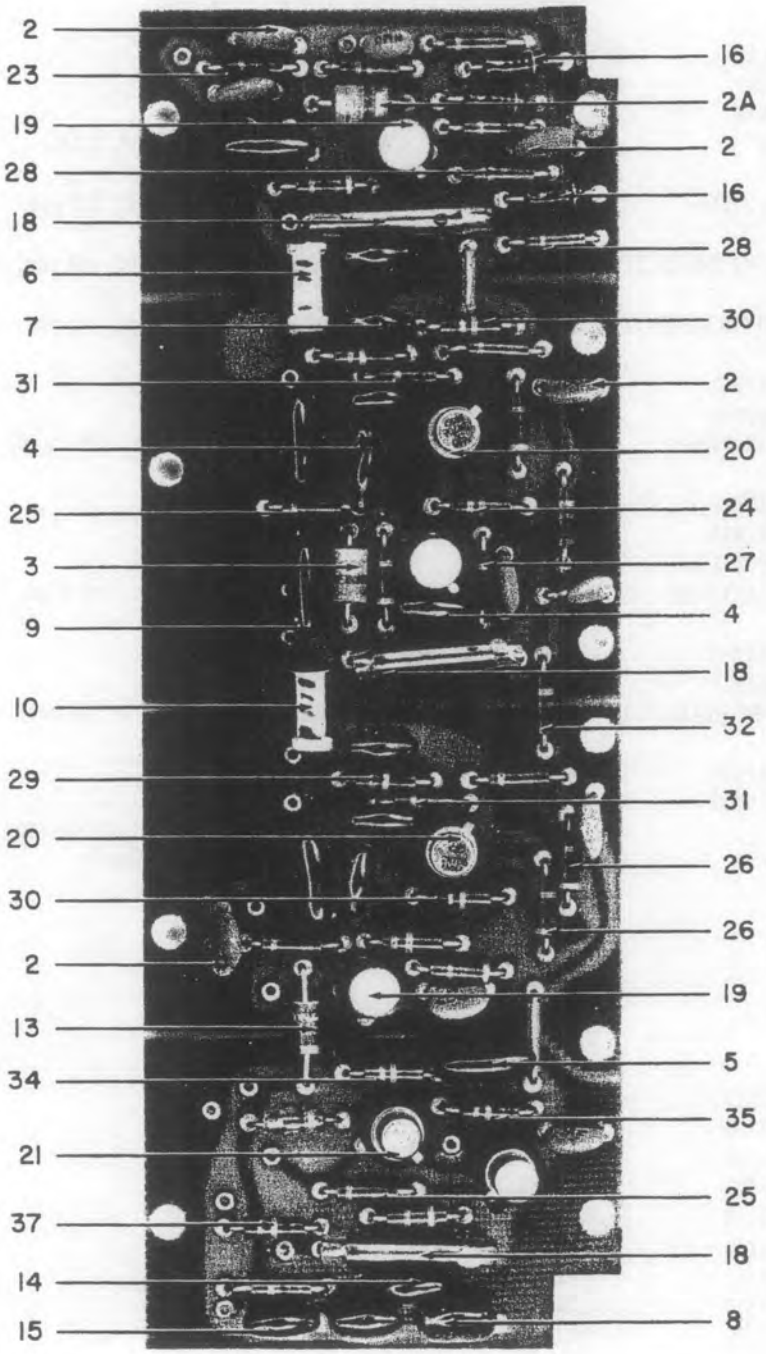


Figure 6-2 (Sheet 1)

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2	12431	AMPLIFIER, IF -14632- (FOR NHA SEE FIGURE 6-1)	REF	
	MS35233-13	SCREW, MACHINE (AP)	10	
	MS35338-78	WASHER, LOCK (AP)	10	
	MS15795-304	WASHER, FLAT (AP)	10	
-1	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV 500 wvdc -91418-	1	
-2	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	10	
-2A	QCO-18PFPORM10PCT.	CAPACITOR, FIXED, CERAMIC, 0.18 pf, 10 pct, 500 wvdc -95121-	1	
-3	QCO-33PFPORM10PCT.	CAPACITOR, FIXED, CERAMIC, 0.33 pf, 10 pct, 500 wvdc -95121-	1	
-4	CM04FD101J03	. CAPACITOR, FIXED, MICA	6	
-5	CM04ED330J03	. CAPACITOR, FIXED, MICA	1	
-6	301-000COKO159C	. CAPACITOR, FIXED, CERAMIC, 1.5 pf, ±0.25 pf, 500 wvdc -72982-	1	
-7	CM04ED470J03	. CAPACITOR, FIXED, MICA	2	
-8	CM05ED201J03	. CAPACITOR, FIXED, MICA	2	
-9	CM05ED330J03	. CAPACITOR, FIXED, MICA	2	
-10	301-000COKO508B	. CAPACITOR, FIXED, CERAMIC, 0.5 pf, ±0.1 pf, 500 wvdc -72982-	1	
-11	CM05FD101J03	. CAPACITOR, FIXED, MICA	1	
-12	CM05FD301J03	. CAPACITOR, FIXED, MICA	1	
-13	QCO-43PFPORM10PCT.	CAPACITOR, FIXED, CERAMIC, 0.43 pf, 10 pct, 500 wvdc -95121-	1	
-14	CM04FD131J03	. CAPACITOR, FIXED, MICA	1	
-15	CM04ED270J03	. CAPACITOR, FIXED, MICA	1	
-16	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	3	
-17	5082-2900	. SEMICONDUCTOR DEVICE, DIODE -28480-	1	
-18	1131-37	. COIL, RADIO FREQUENCY -14632-	3	
-19	2N3478	. TRANSISTOR, NPN, SILICON -80131-	3	
	10042DAP	. INSULATOR, DISK -07047-	3	
-20	2N706	. TRANSISTOR, NPN, SILICON -80131-	2	
	10036DAP	. INSULATOR, DISK -07047-	4	
-21	2N3251	. TRANSISTOR, PNP, SILICON -80131-	1	
-22	2N929	. TRANSISTOR, NPN, SILICON -80131-	1	
-23	RCR07G201JS	. RESISTOR, FIXED, COMPOSITION	1	
-24	RCR07G123JS	. RESISTOR, FIXED, COMPOSITION	3	
-25	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	6	
-26	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	5	
-27	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	2	
-28	RCR07G681JS	. RESISTOR, FIXED, COMPOSITION	2	
-29	RCR07G104JS	. RESISTOR, FIXED, COMPOSITION	2	
-30	RCR07G623JS	. RESISTOR, FIXED, COMPOSITION	2	
-31	RCR07G152JS	. RESISTOR, FIXED, COMPOSITION	2	
-32	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	3	
-33	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	1	
-34	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	1	
-35	RCR07G513JS	. RESISTOR, FIXED, COMPOSITION	1	
-36	RCR07G131JS	. RESISTOR, FIXED, COMPOSITION	1	
-37	RCR07G203JS	. RESISTOR, FIXED, COMPOSITION	1	
-38	12430	. PRINTED WIRING BOARD -14632-	1	

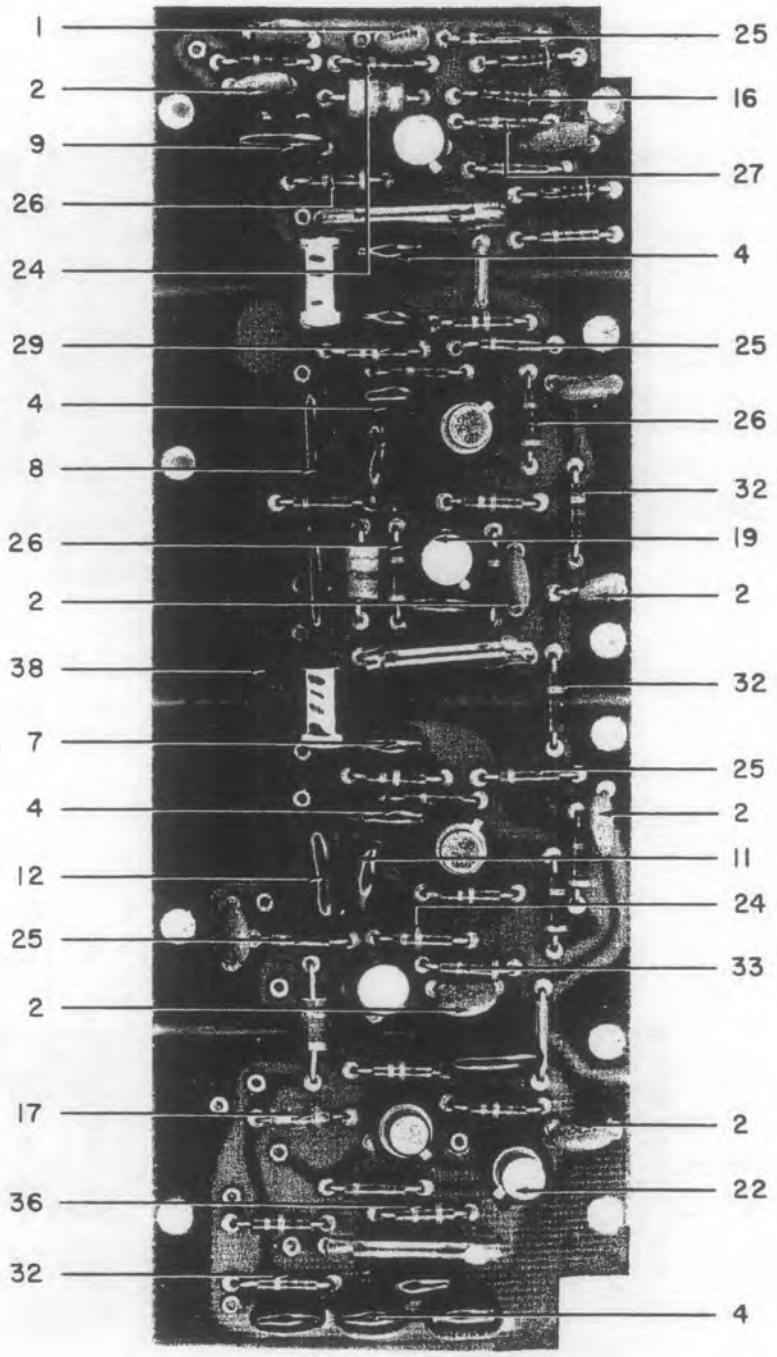
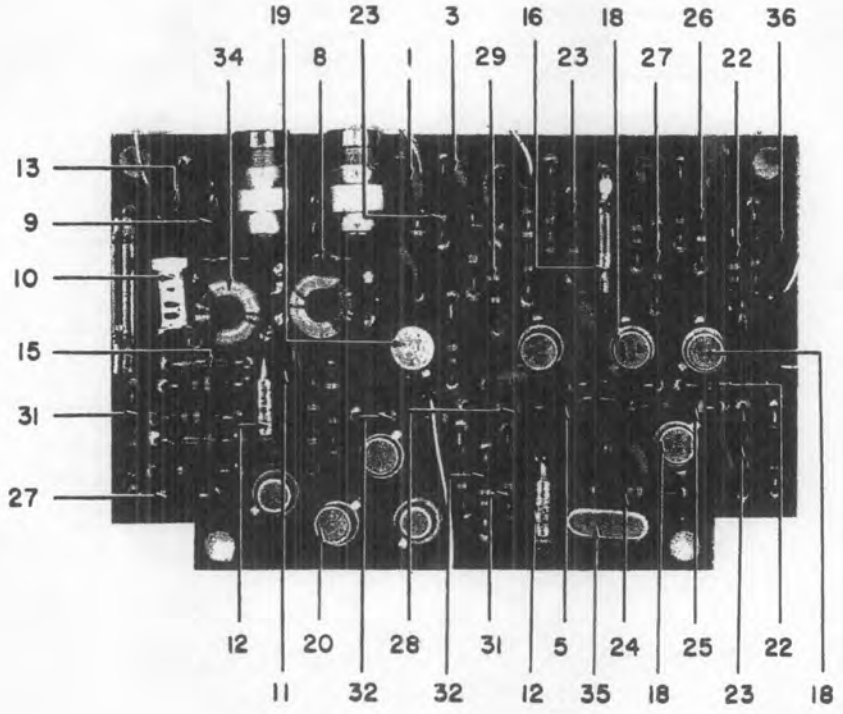


Figure 6-2 (Sheet 2)

PART 12740 LIMITER/DISCRIMINATOR/BFO



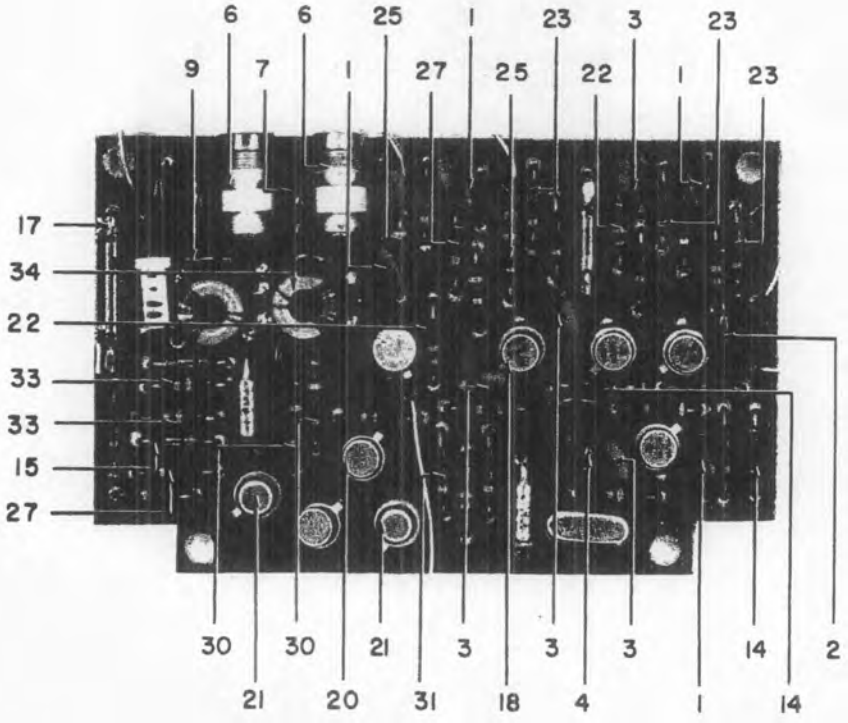


Figure 6-5

FIGURE AND INDEX NO.	PART NUMBER	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
3	12740	LIMITER/DISCRIMINATOR/BFO -14632- (FOR NHA SEE FIGURE 6-1)	REF	
	MS35233-13	SCREW, MACHINE (AP)	4	
	MS35338-78	WASHER, LOCK (AP)	4	
	MS15795-304	WASHER, FLAT (AP)	4	
-1	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	5	
-2	CM04CD100J03	. CAPACITOR, FIXED, MICA	1	
-3	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -91418-	5	
-4	CM04ED680J03	. CAPACITOR, FIXED, MICA	1	
-5	CM04ED430J03	. CAPACITOR, FIXED, MICA	1	
-6	2951	. CAPACITOR, VARIABLE, AIR, 1-10 pf, -91293-	2	
-7	CM04ED270J03	. CAPACITOR, FIXED, MICA	1	
-8	CM04ED200J03	. CAPACITOR, FIXED, MICA	1	
-9	CM04ED430J03	. CAPACITOR, FIXED, MICA	2	
-10	301-000T2J0100D	. CAPACITOR, FIXED, CERAMIC, 10 pf, ±0.5 pf, 500 wvdc -72982-	1	
-11	CM04ED300J03	. CAPACITOR, FIXED, MICA	1	
-12	CS13BF105K	. CAPACITOR, FIXED, ELECTROLYTIC	2	
-13	CM04FD131J03	. CAPACITOR, FIXED, MICA	1	
-14	1N462A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	
-15	1N198A	. SEMICONDUCTOR DEVICE, DIODE, GERMANIUM -80131-	2	
-16	1131-41	. COIL, RADIO FREQUENCY -14632-	1	
-17	1131-37	. COIL, RADIO FREQUENCY -14632-	1	
-18	2N706	. TRANSISTOR, NPN, SILICON -80131-	4	
	10036DAP	. INSULATOR, DISK -07047-	8	
-19	2N3478	. TRANSISTOR, NPN, SILICON -80131-	1	
	10042DAP	. INSULATOR, DISK -07047-	1	
-20	2N929	. TRANSISTOR, NPN, SILICON -80131-	2	
-21	2N3251	. TRANSISTOR, PNP, SILICON -80131	2	
-22	RCR07G123JS	. RESISTOR, FIXED, COMPOSITION	4	
-23	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	6	
-24	RCR07G124JS	. RESISTOR, FIXED, COMPOSITION	1	
-25	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	3	
-26	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-27	RCR07G220JS	. RESISTOR, FIXED, COMPOSITION	4	
-28	RCR07G242JS	. RESISTOR, FIXED, COMPOSITION	1	
-29	RCR07G152JS	. RESISTOR, FIXED, COMPOSITION	1	
-30	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	2	
-31	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	3	
-32	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	2	
-33	RCR07G753JS	. RESISTOR, FIXED, COMPOSITION	2	
-34	20937-1	. TRANSFORMER, TOROIDAL -14632-	2	
-35	96402-1	. CRYSTAL UNIT, QUARTZ, 21.4 MC -14632-	1	
-36	12739	. PRINTED WIRING BOARD -14632-	1	

NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	UNITS PER ASSEMBLY
CM04CD100J03	3-2	1
CM04ED200J03	3-8	1
CM04ED270J03	2-15	1
	3-7	1
CM04ED300J03	1-5	2
	3-11	1
CM04ED330J03	2-5	1
CM04ED430J03	3-5	1
	3-9	2
CM04ED470J03	2-7	2
CM04ED680J03	3-4	1
CM04FD101J03	2-4	6
CM04FD131J03	2-14	1
	3-13	1
CM05ED330J03	2-9	2
CM05FD101J03	2-11	1
CM05FD201J03	2-8	2
CM05FD301J03	2-12	1
CS13BF105K	3-12	2
C023B101E502M	1-4	8
	2-2	10
	3-1	5
FA5C102W	1-3	9
MS15795-304	2-	10
MS35233-11	1-	4
MS35233-12	1-	4
MS35233-13	1-	4
MS35233-26	1-	1
MS35338-78	2-	10
MS35338-79	1-	1
QCO-18PFPORM10PCT	2-2A	1
QCO-33PFPORM10PCT	2-3	1
QCO-43PFPORM10PCT	2-13	1
RCR07G101JS	1-12	3
RCR07G102JS	2-27	2
RCR07G103JS	2-34	1
RCR07G104JS	2-29	2
RCR07G123JS	2-24	3
RCR07G124JS	3-24	1
RFR07G131JS	2-36	1
RCR07G152JS	2-31	2
RCR07G201JS	2-23	1
RCR07G203JS	1-13	1
RCR07G220JS	1-14	1
RCR07G242JS	3-28	1
RCR07G470JS	2-26	5
RCR07G471JS	2-33	1
RCR07G512JS	2-25	6
RCR07G513JS	2-35	1
RCR07G623JS	2-30	2
RCR07G681JS	2-28	2
RCR07G753JS	3-33	2
SFU16	1-6	1
SLE7PNSS	1-11	1
SM001GMV	2-1	1
	3-3	5
WEE82	1-9	2
1N198A	3-15	2
1N462A	2-16	3
	3-14	2
10036DAP	2-	4
	3-	8
10042DAP	2-	3
	3-	1
1131-37	1-10	1
	2-18	3
	3-17	1
1131-41	3-16	1
12430	2-38	1
12431	1-1	1
	2-	REF
12677	1-	1
12739	3-36	1
12740	1-2	1
	3-	REF
13139	1-	1
1472-3	1-8	4
2N3251	2-21	1
	3-21	2
2N3478	2-19	3
	3-19	1
2N706	2-20	2
	3-18	4
2N929	2-22	1
	3-20	2
20349-8	1-15	1
20937-1	3-34	2
20993	1-	1
20994	1-	1
27-9	1-7	4
2951	3-6	2
301-000COKO159C	2-6	1
301-000COKO508B	2-10	1
301-000P3KO479C	1-5A	2
301-000T2J0100D	3-10	1
5082-2900	2-17	1
72127	1-	1
833	1-16	1
96402-1	3-35	1

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
A106	1-	72127
A106A1	1-1	12431
A106A1CR1	2-16	1N462A
A106A1CR2	2-16	1N462A
A106A1CR3	2-16	1N462A
A106A1CR4	2-17	5082-2900
A106A1C1	2-1	SM001GMV
A106A1C10	2-4	CM04FD101J03
A106A1C11	2-4	CM04FD101J03
A106A1C12	2-8	CM05FD201J03
A106A1C13	2-2	C023B101E502M
A106A1C14	2-2	C023B101E502M
A106A1C15	2-2	C023B101E502M
A106A1C16	2-3	QCO-33PFPORM10PCT
A106A1C17	2-4	CM04FD101J03
A106A1C18	2-9	CM05ED330J03
A106A1C19	2-10	301-000COKO508B
A106A1C2	2-2	C023B101E502M
A106A1C20	2-7	CM04ED470J03
A106A1C21	2-4	CM04FD101J03
A106A1C22	2-11	CM05FD101J03
A106A1C23	2-12	CM05FD301J03
A106A1C24	NOT USED	
A106A1C25	2-2	C023B101E502M
A106A1C26	2-13	QCO-43PFPORM10PCT
A106A1C27	2-2	C023B101E502M
A106A1C28	2-2	C023B101E502M
A106A1C29	2-2	C023B101E502M
A106A1C3	2-2	C023B101E502M
A106A1C30	2-5	CM04ED330J03
A106A1C31	2-14	CM04FD131J03
A106A1C32	2-15	CM04ED270J03
A106A1C33	2-4	CM04FD101J03
A106A1C34	2-8	CM05FD201J03
A106A1C4	2-2A	QCO-18PFPORM10PCT
A106A1C5	2-2	C023B101E502M
A106A1C6	2-4	CM04FD101J03
A106A1C7	2-9	CM05ED330J03
A106A1C8	2-6	301-000COKO159C
A106A1C9	2-7	CM04ED470J03
A106A1L1	2-18	1131-37
A106A1L2	2-18	1131-37
A106A1L3	2-18	1131-37
A106A1Q1	2-19	2N3478
A106A1Q2	2-20	2N706
A106A1Q3	2-19	2N3478
A106A1Q4	2-20	2N706
A106A1Q5	2-19	2N3478
A106A1Q6	2-21	2N3251
A106A1Q7	2-22	2N929
A106A1R1	2-23	RCR07G201JS
A106A1R10	2-31	RCR07G152JS
A106A1R11	2-26	RCR07G470JS
A106A1R12	2-25	RCR07G512JS
A106A1R13	2-24	RCR07G123JS
A106A1R14	2-25	RCR07G512JS
A106A1R15	2-32	RCR07G101JS
A106A1R16	2-26	RCR07G470JS
A106A1R17	2-27	RCR07G102JS
A106A1R18	2-29	RCR07G104JS
A106A1R19	2-30	RCR07G623JS
A106A1R2	2-24	RCR07G123JS
A106A1R20	2-31	RCR07G152JS
A106A1R21	2-32	RCR07G101JS
A106A1R22	2-26	RCR07G470JS
A106A1R23	2-25	RCR07G512JS
A106A1R24	2-24	RCR07G123JS
A106A1R25	2-25	RCR07G512JS
A106A1R26	2-26	RCR07G470JS
A106A1R27	2-33	RCR07G471JS
A106A1R28	2-34	RCR07G103JS
A106A1R29	2-35	RCR07G513JS
A106A1R3	2-25	RCR07G512JS
A106A1R30	2-25	RCR07G512JS
A106A1R31	2-36	RCR07G131JS
A106A1R32	2-37	RCR07G203JS
A106A1R33	2-32	RCR07G101JS
A106A1R4	2-26	RCR07G470JS
A106A1R5	2-27	RCR07G102JS
A106A1R6	2-28	RCR07G681JS
A106A1R7	2-28	RCR07G681JS
A106A1R8	2-29	RCR07G104JS
A106A1R9	2-30	RCR07G623JS
A106A2	1-2	12740
A106A2CR1	3-14	1N462A
A106A2CR2	3-14	1N462A
A106A2CR3	3-15	1N198A
A106A2CR4	3-15	1N198A
A106A2C1	3-1	C023B101E502M
A106A2C10	3-3	SM001GMV
A106A2C11	3-1	C023B101E502M
A106A2C12	3-3	SM001GMV
A106A2C13	3-6	2951
A106A2C14	3-7	CM04ED270J03
A106A2C15	3-8	CM04ED200J03
A106A2C16	3-9	CM04ED430J03
A106A2C17	3-9	CM04ED430J03
A106A2C18	3-6	2951
A106A2C19	3-10	301-000T2J0100D
A106A2C2	3-2	CM04CD100J03
A106A2C20	3-11	CM04ED300J03
A106A2C21	3-1	C023B101E502M
A106A2C22	3-12	CS13BF105K
A106A2C23	3-12	CS13BF105K

REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
A106A2C24	3-13	CM04FD131J03
A106A2C3	3-3	SM001GMV
A106A2C4	3-4	CM04ED680J03
A106A2C5	3-5	CM04ED430J03
A106A2C6	3-3	SM001GMV
A106A2C7	3-1	C023B101E502M
A106A2C8	3-3	SM001GMV
A106A2C9	3-1	C023B101E502M
A106A2L1	3-16	1131-41
A106A2L2	3-17	1131-37
A106A2Q1	3-18	2N706
A106A2Q2	3-18	2N706
A106A2Q3	3-18	2N706
A106A2Q4	3-18	2N706
A106A2Q5	3-19	2N3478
A106A2Q6	3-20	2N929
A106A2Q7	3-21	2N3251
A106A2Q8	3-20	2N929
A106A2Q9	3-21	2N3251
A106A2R1	3-22	RCR07G123JS
A106A2R10	3-27	RCR07G220JS
A106A2R11	3-23	RCR07G512JS
A106A2R12	3-23	RCR07G512JS
A106A2R13	3-25	RCR07G470JS
A106A2R14	3-28	RCR07G242JS
A106A2R15	3-29	RCR07G152JS
A106A2R16	3-22	RCR07G123JS
A106A2R17	3-27	RCR07G220JS
A106A2R18	3-23	RCR07G512JS
A106A2R19	3-25	RCR07G470JS
A106A2R2	3-22	RCR07G123JS
A106A2R20	3-30	RCR07G471JS
A106A2R21	3-30	RCR07G471JS
A106A2R22	3-31	RCR07G101JS
A106A2R23	3-32	RCR07G103JS
A106A2R24	3-32	RCR07G103JS
A106A2R25	3-31	RCR07G101JS
A106A2R26	3-33	RCR07G753JS
A106A2R27	3-33	RCR07G753JS
A106A2R28	3-27	RCR07G220JS
A106A2R29	3-27	RCR07G220JS
A106A2R3	3-23	RCR07G512JS
A106A2R30	3-31	RCR07G101JS
A106A2R4	3-24	RCR07G124JS
A106A2R5	3-26	RCR07G470JS
A106A2R6	3-26	RCR07G102JS
A106A2R7	3-23	RCR07G512JS
A106A2R8	3-23	RCR07G512JS
A106A2R9	3-22	RCR07G123JS
A106A2T1	3-34	20937-1
A106A2T2	3-34	20937-1
A106A2Y1	3-35	95402-1
A106C1	1-3	FA5C102W
A106C10	1-4	C023B101E502M
A106C11	1-3	FA5C102W
A106C12	1-4	C023B101E502M
A106C13	1-3	FA5C102W
A106C14	1-3	FA5C102W
A106C15	1-4	C023B101E502M
A106C16	1-3	FA5C102W
A106C17	1-3	FA5C102W
A106C18	1-5	CM04ED300J03
A106C19	1-4	C023B101E502M
A106C2	1-4	C023B101E502M
A106C20	1-5A	301-000P3KO479C
A106C21	1-5A	301-000P3KO479C
A106C3	1-4	C023B101E502M
A106C4	1-3	FA5C102W
A106C5	1-4	C023B101E502M
A106C6	1-3	FA5C102W
A106C7	1-5	CM04ED300J03
A106C8	1-4	C023B101E502M
A106C9	1-3	FA5C102W
A106E1	1-6	SFU16
A106J1	1-7	27-9
A106J2	1-7	27-9
A106J3	1-7	27-9
A106J4	1-7	27-9
A106L1	1-8	1472-3
A106L2	1-8	1472-3
A106L3	1-8	1472-3
A106L4	1-8	1472-3
A106L5	1-9	WEE82
A106L6	1-10	1131-37
A106L7	1-9	WEE82
A106R1	1-12	RCR07G101JS
A106R2	1-12	RCR07G101JS
A106R3	1-12	RCR07G101JS
A106R4	1-13	RCR07G203JS
A106R5	1-14	RCR07G220JS
A106T1	1-15	20349-8
P116	1-11	SLE7PNSS

PART 5

G175K20000-2 4-MC BANDWIDTH IF AMPLIFIER

TABLE OF CONTENTS

PART 5

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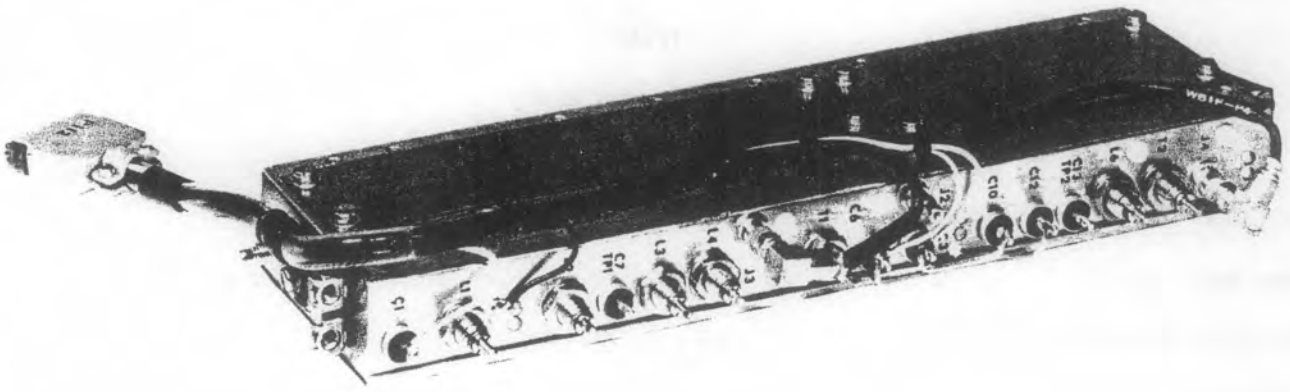
PART 5

LIST OF ILLUSTRATIONS

PART 5

G175K20000-2 4-MC BANDWIDTH IF AMPLIFIER



SECTION I

GENERAL DESCRIPTION

1-1. GENERAL

The 4-mc bandwidth IF amplifier is an optional accessory designed for use with the G175K Receiver. As optional equipment, the IF amplifier carries the part number G175K20000-2 rather than a reference designation prefix. The unit provides amplification and detection of AM and FM signals from a 21.4-mc IF input; the overall bandwidth is 4 mc. Signal outputs include a 21.4 mc predetection output, an AM output and an FM output. Solid-state components are used to provide high reliability and low power consumption. Pertinent specifications are presented in paragraph 1-3.

1-2. EQUIPMENT SUPPLIED

QUANTITY	ITEM	PART NUMBER
1	4-mc Bandwidth IF Amplifier Assembly	G175K20000-2

1-3. ELECTRICAL SPECIFICATIONS

Signal Input	One, 50-ohm unbalanced RF input
Input Center Frequency	21.4 mc
AGC Input	One, negative going with increasing signal
Bandwidth	4 mc ± 400 kc at 3-db points
Bandpass Ripple	2 db, maximum
Shape Factor	4:1, maximum
Bandpass Center Frequency Stability	± 200 kc, maximum
Discriminator Zero Crossing	21.4 mc ± 200 kc
Outputs	Three: FM Video, AM Video, Predetection IF

1-4. MECHANICAL SPECIFICATIONS

Weight	1.1 lbs., approximately
Over-all Dimensions	2.75 inches high, 1.25 inches wide, and 9.00 inches deep
Operating Temperature Limits	0° to 50° C
Altitude Limits:	
Operating	15,000 feet
Non-operating	50,000 feet
Mounting	Screw mounted to receiver main chassis

SECTION II

PREPARATION FOR USE AND RESHIPMENT

2-1. UNPACKING AND INSPECTION

No special unpacking or inspection procedures are required for the 4-mc bandwidth IF amplifier assembly. Refer to Section II, Part 1 for general inspection procedures.

2-2. INSTALLATION

To install the 4-mc bandwidth IF amplifier into the main chassis of the receiver, proceed as follows:

a. Remove the receiver from its mounting position and remove the top and bottom dust covers.

b. Install the IF amplifier from above the main chassis of the receiver. The attached cable must be placed so that it may later be connected to its mating jack on top of the main chassis.

c. Hold the IF amplifier in position while installing four 6-32 x 3/8-inch binder head screws from the bottom of the receiver.

d. Connect plug P113 on the IF amplifier to jack J113 on the receiver main chassis.

e. Check the IF BANDWIDTH KC knob of the receiver to insure that it includes a 4K position.

f. Energize the receiver and insure proper operation of the IF amplifier assembly. Refer to Section III, Part 1.

2-3. PREPARATION FOR RESHIPMENT

No special preparation is necessary to prepare the IF amplifier assembly for reshipment.

SECTION III

OPERATION

3-1. GENERAL

The type G175K20000-2 IF amplifier provides amplification and detection of AM and FM input signals. The unit operates at a center frequency of 21.4 mc and has a bandwidth of 4 mc. This unit does not have a reference designation prefix. Four stages of IF amplification are followed by an AM detector, FM limiter, and FM discriminator. Signal outputs from the IF strip are: an AM video output, an FM video output and a predetection IF output. Input signals to the IF amplifier are provided by the RF tuning head(s) installed in the receiver. AM and FM output signals from the unit are fed to subsequent stages in the receiver through sections of the MODE SELECT switch.

3-2. CONTROLS

The only control directly associated with the operation of the 4-mc bandwidth IF amplifier is the IF BANDWIDTH KC switch. Section S103A-W applies AGC voltage to the IF amplifier stages when the 4K position is selected, activating the circuits. Section S103C-W feeds the AM video signal to various other stages in the receiver. Section S103C-X couples the FM video signal to subsequent receiver output stages.

3-3. OPERATING PROCEDURES

No special operating procedures are required for the 4-mc bandwidth IF amplifier. Refer to Section III, Part 1 for general operating procedures for the G175K Receiver.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL

A circuit description of the type G175K20000-2 4-mc bandwidth (wideband) IF amplifier is given in the following paragraphs using the functional block diagram, FO-1, and the over-all schematic diagram, FO-2. Note that the unit numbering system is used for the electrical components, which means that parts on subassemblies carry a prefix before the usual class letter and number of the item (such as A1C1 and A2Q1). These prefixes are omitted on illustrations and in the text except in those cases where confusion might result from their omission.

The type G175K20000-2 wideband IF amplifier provides a bandwidth of 4 mc. It is a plug-in unit available as an option with the G175K Receiver. The unit consists of two printed circuit boards, A1 and A2, mounted in a brass chassis. All operating voltages, signal inputs and outputs are coupled through cables and connectors which permit rapid removal and replacement of the unit. The 21.4-mc IF signal from the IF coupler, A113, in the receiver is applied to four cascaded IF amplifier stages, A1Q1 through A1Q4. The 4-mc bandwidth is achieved by stagger tuning of the interstage coupling networks between these four amplifiers. An AGC voltage from the receiver is applied to A1Q1 and A1Q2 to regulate the over-all gain of the IF strip.

The output of the fourth IF amplifier is applied to the AM detector, A1CR3, and to the FM limiters located on board A2. Demodulated signals from A1CR3 pass through cascaded emitter followers A1Q5 and A1Q6 to the AM OUTPUT jack.

Two symmetrical limiter stages (A2Q1, A2Q2 and A2Q3, A2Q4) remove amplitude variations from the 21.4-mc signal. The second limiter stage is coupled to the discriminator for FM detection. The FM detector is a modified Foster-Seeley discriminator containing diodes A2CR1 and A2CR2.

The FM video output from the discriminator is coupled to parallel emitter followers A2Q5 and A2Q6 which feed A2Q7 and A2Q8, respectively. The latter two transistors are connected in a complementary symmetry configuration. Signals from this stage are coupled through an RF filter to the FM OUTPUT jack.

4-2. DETAILED THEORY

4-3. FIRST AND SECOND IF AMPLIFIERS

Transistors A1Q1 and A1Q2 are the first and second IF amplifiers, respectively. The gain of these stages is controlled by the AGC amplifier or by the RF GAIN control R113 depending on the gain control mode selected. The collector load for A1Q1 is the single-tuned circuit consisting of A1L1, A1C5, A1C6 and A1C7. This circuit is tuned to the high side of the IF passband. The tuned circuit in the second stage is tuned to the low side.

The signal voltage at the junction of A1C6 and L1 is out of phase with the input signal. A portion of this voltage is coupled back to the base of A1Q1 through A1C3 to neutralize the stage. This same method is used to neutralize A1Q2. Capacitors A1C6 and A1C7 form an impedance-matching voltage divider used to couple the output of A1Q1 to the input of the next stage. A similar coupling network is used in the collector circuit of A1Q2.

4-4. AGC COMPENSATION

A diode compensation network is included in the emitter circuits of A1Q1 and A1Q2 to linearize the AGC characteristics of the IF strip. The AGC amplifier, A111, produces a negative-going voltage which is proportional to the average level of incoming RF signals. This voltage is applied to the base circuits of A1Q1 and A1Q2. For example, diode A1CR1 conducts and shorts resistor A1R5 under no-signal conditions. At this time only A1R6, which is bypassed to ground by A1C4, is active in the emitter circuit. This is the maximum gain condition of the IF strip.

As the input signal level rises, the conduction of A1Q1 is reduced by the AGC voltage. When the voltage drop across A1R5 becomes too small to maintain a forward bias on A1CR1 this resistor is added to the emitter circuit, further reducing the stage gain. Note that A1R5 is not bypassed by A1C4, so that when A1CR1 is cut off ac degeneration is obtained across the resistor, which improves the signal-handling ability of the stage.

4-5. THIRD AND FOURTH IF AMPLIFIERS

Transistors A1Q3 and A1Q4 are the third and fourth IF amplifiers, respectively. The bandwidth of the third IF is determined by the interstage coupling between A1Q3 and A1Q4, a double-tuned, over-coupled network centered at 21.4 mc. The tuned circuit in the collector of A1Q3 consisting of A1C16, A1C17 and A1L3 has the junction of A1C16 and A1C17 grounded to provide a signal voltage at the junction of A1C16 and A1L3 which is out of phase with the input signal. This voltage is coupled back to the base of A1Q3 through A1C14 to neutralize the stage. The input ot A1Q4 is through capacitive voltage divider A1C19 and A1C20. The collector circuit of A1Q4 is tuned by step-up transformer A1T1 to the 21.4-mc IF center frequency. This transformer raises the detector output level to provide a more linear AM output.

4-6. AM DETECTOR AND OUTPUT NETWORKS

The signal from the fourth IF amplifier, A1Q4, is coupled through transformer A1T1 to the AM detector, A1CR3, and through capacitor A1C23 to the input of the FM limiter and discriminator board, A2. A 21.4-mc predetection output is taken from the junction of voltage divider A1C24 and A1C25 and fed to jack J2. The audio-video output from the AM detector A1CR3 is fed through cascaded emitter followers A1Q5 and A1Q6 and a filter consisting of A1L1, A1C28, L5 and C8. This filter eliminates any remaining 21.4-mc signal component from the output of A1Q6. Test point TP1 is connected to this output through R2 and feedthrough capacitor C7 for use in alignment.

4-7. FM LIMITERS

The 21.4-mc signal from the IF amplifiers is fed to a symmetrical limiter stage formed by A2Q1 and A2Q2 from a capacitive voltage divider consisting of A1C23, A1C24, and A1C25. The incoming signal to A2Q1 swings about a positive dc level of approximately three volts established by base-bias resistors A2R1 and A2R2. Similar networks are in the base circuit of A2Q2, A2Q3, and A2Q4. Transistors A2Q1 and A2Q2 share a common emitter resistor, A2R3. Under no-signal conditions the combined emitter currents of the two transistors develop a nominal voltage across A2R3. When a signal is applied to the base of A2Q1, the positive-going half cycle causes increased conduction through A2Q1 which increases the voltage drop across A2R3. If the input signal has sufficient amplitude the voltage drop across A2R3 will reverse bias the base-emitter junction of A2Q2, cutting the transistor off. On the negative-going halfcycle, the decreased drop across A2R3 will cause A2Q2 to conduct to saturation. Thus the transistor operates between cut off and saturated conditions, limiting both the positive and negative cycles of the input signal. The base of A2Q2 is held near RF ground potential by capacitor A2C2. The first limiter output is coupled to the second limiter through capacitor A2C3. The operation of the second limiter is identical to that of the first except that ac coupling through A2C4 and separate emitter resistors are used. These components provide independent dc operating conditions for each transistor to assure a smooth symmetrical output from A2Q4.

4-8. FM DISCRIMINATOR AND OUTPUT

The FM discriminator is a modified Foster-Seeley circuit. Capacitor A2C6 couples the 21.4-mc signal from the second limiter stage to a tuned circuit consisting of capacitor A2C7, variable inductor A1L6, and the primary of the discriminator transformer A1T2. An inductive voltage divider is formed by A1L6 and the primary of T2, with only a very small percentage of the limiter output appearing across the transformer primary. Capacitor A2C8 couples the RF reference voltage to the secondary of A1T2. Capacitive center-taping of the secondary through A2C9 and A2C10 makes it possible to obtain a high degree of discriminator balance unaffected by coil characteristics or the position of the tuning slug. Discriminator diodes A2CR1 and A2CR2 demodulate the FM signal. The resultant video output is applied through resistors A2R20 and A2R21 to parallel emitter followers A2Q5 and A2Q6. The outputs from A2Q5 and A2Q6 are dc coupled to emitter followers A2Q7 and A2Q8 which are connected in a complementary symmetry configuration. The output from the latter stage is taken at the junction of emitter load resistors

A2R26 and A2R27 and fed through A2R28 and a filter network to the FM video output jack, J4. The filter network, consisting of A2L3, A2C13, L8 and C14, eliminates any 21.4-mc components from the output. Test point TP2 is connected to this output through R4 and feedthru capacitor C13 for use in aligning the discriminator.

SECTION V

MAINTENANCE

5-1. GENERAL

The 4-mc bandwidth IF amplifier presents no special maintenance problems and normally requires no care beyond being kept clean. Periodic inspections of the assembly should be performed concurrent with inspections of the G175K Receiver. Section V, Part 1 of this manual lists general maintenance procedures for the over-all receiver. The maintenance technician should be familiar with Section IV of this part in which the circuits are described before beginning an alignment.

5-2. ALIGNMENT

Alignment procedures for the 4-mc bandwidth IF amplifier are given in the following paragraphs. Refer to the schematic diagram, FO-2, as necessary. Use of a post detection marker is recommended during the performance of these procedures. Paragraph 5-3, Section V, Part 1 lists methods of obtaining this marker. Test equipment necessary to perform the complete alignment is listed in Figure 5-1. An accurately aligned RF tuner is necessary in order to align this subassembly. Refer to Parts 8 through 14 for alignment procedures of the RF tuner installed in the receiver.

TEST EQUIPMENT REQUIRED

PREFERRED TYPE	SUITABLE ALTERNATE
Telonic SM2000 Sweep Generator	Jerrold 900B
Telonic LH-2 Plug-In Head	None
Hewlett Packard 606A Signal Generator	AN/URM-25D
Hewlett Packard 410C VTVM	MIL-M-9996
Hewlett Packard 335C Attenuator	Telonic TAB-50
Tektronix 545B Oscilloscope	MIL-O-9960
Tektronix 1A2 Plug-In Unit	MIL-O-9960
Hewlett Packard 5245L Frequency Counter	MIL-C-9988

Figure 5-1

5-3. GENERAL

The alignment procedures should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power to G175K Receiver of 115 ± 2.0vac and 28.0 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

5-4. IF ALIGNMENT

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

b. Set G175K Receiver IF BANDWIDTH KC switch to 4K.

c. Place MODE SELECT switch in AM MAN position and rotate RF GAIN control fully clockwise.

4-MC BW IF ALIGNMENT, TEST SETUP

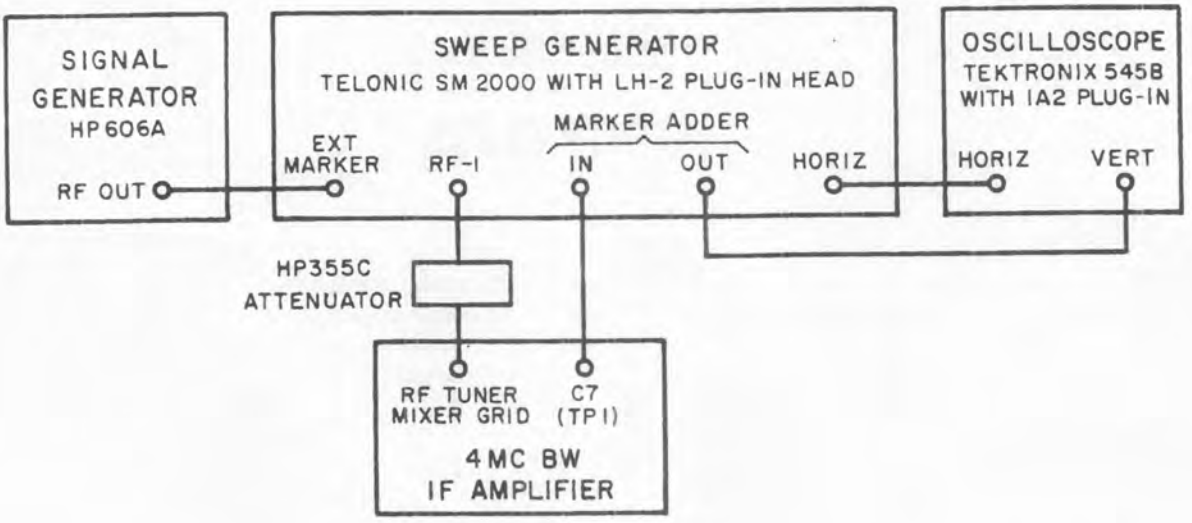


Figure 5-2

d. Detune inductors A1L1 and A1L2 by rotating the first fully counterclockwise and the latter fully clockwise.

e. Set output frequency of sweep generator and signal generator to 21.4 mc.

f. Adjust sweep generator and oscilloscope controls to display a response curve.

g. Adjust A1L3, A1L4, and A1T1 for a slightly peaked response centered at 21.4 mc.

h. Readjust A1L1 and A1L2 for a maximum amplitude, symmetrical response centered about the 21.4-mc marker. Use the signal generator to check for 3-db response at 23.4 mc and 19.4 mc. Note that A1L1 affects the high side, A1L2 the low side and A1L3 the middle of the response. A typical response is shown in Figure 5-3.

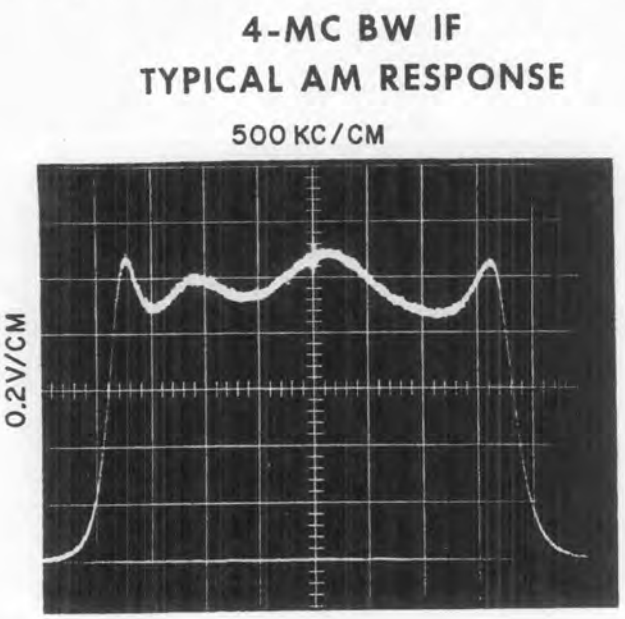


Figure 5-3

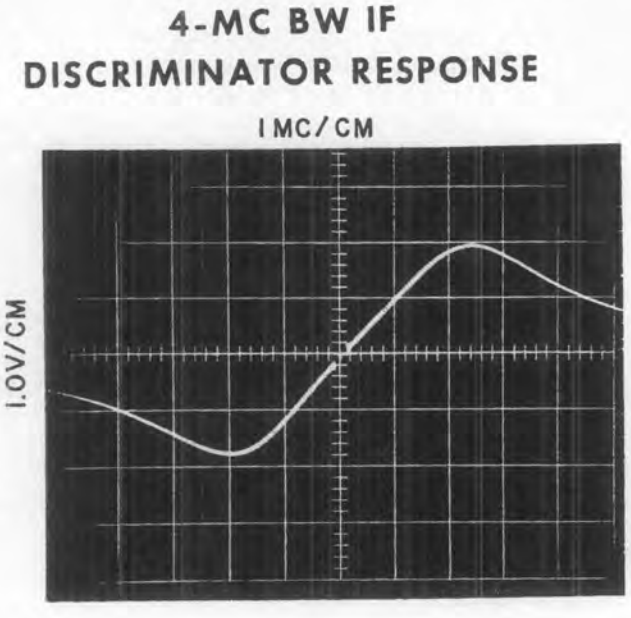


Figure 5-4

5-5. DISCRIMINATOR ALIGNMENT

Before the discriminator can be aligned it will be necessary to partially remove the 4-mc bandwidth IF amplifier from the receiver main chassis. Proceed as follows:

a. Remove the four mounting screws.

b. Remove plug P113 from jack J113 and remove the IF strip from the receiver.

c. With the "wrap-around" brass covers up, reconnect P113 to J113.

d. Remove the larger brass cover.

e. Connect equipment as shown in Figure 5-5.

DISCRIMINATOR ALIGNMENT TEST SETUP

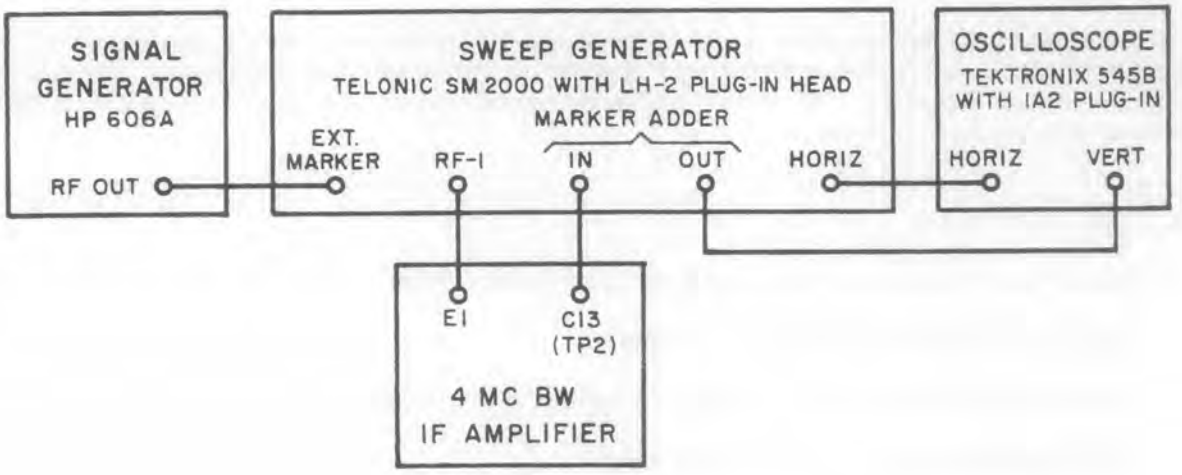


Figure 5-5

f. Set output frequency of sweep generator and signal generator to 21.4 mc.

g. Rotate G175K RF GAIN control fully counterclockwise.

h. Adjust sweep generator and oscilloscope controls to display "S" response curve.

i. Adjust A2L6 for amplitude symmetry and A2T2 for zero crossing of the "S" curve. Use the signal generator to check for maximum linearity between 19.4 mc and 23.4 mc. A typical response is shown in Figure 5-4.

j. Replace the brass cover and mount the IF strip in its operating position on the main chassis.

5-6. PREVENTIVE MAINTENANCE

Preventive maintenance consists of periodic inspections performed at daily and 100 operational-hour intervals. The shop inspection is performed when a malfunction in the 4-mc IF amplifier is suspected.

5-7. DAILY INSPECTION

At the beginning of each day of use remove the receiver dust covers and inspect the 4-mc IF amplifier for any signs of dust or dirt build-up. Check the connecting wires for good solder joints and the cables and plugs for tightness. Ensure that the mounting screws are tight.

5-8. 100-HOUR INSPECTION

Perform the daily inspection. Remove any accumulated dust or dirt with dry, low-pressure compressed air.

5-9. SHOP INSPECTION

When degraded performance of the 4-mc IF amplifier is suspected, remove the entire receiver from it operating position and send it to the repair shop. Maintenance personnel should perform applicable portions of the daily and 100-hour inspections and the functional tests outlined in paragraph 5-10. If the IF amplifier meets test specifications return it to service. If not, replace only those components necessary to restore performance. Align the IF amplifier and again perform the functional tests.

5-10. FUNCTIONAL TESTS

The following functional tests provide a means of checking the bandwidth and response skirt ratio of the G175J30000-2 IF amplifier. These tests should be performed if degraded amplifier operation is suspected. The test equipment required is listed in Figure 5-1. The tests should be performed with the IF amplifier mounted in its operating position on the receiver main chassis.

5-11. TEST CONDITIONS

The functional tests should be performed under the following conditions:

a. Prevailing laboratory atmospheric conditions.

b. Input power to G175K Receiver of 115 ± 2.0 vac and 28.0 ± 1.0 vdc.

c. Equipment warm-up of at least thirty minutes.

5-12. IF BANDWIDTH

a. Connect equipment as shown in Figure 5-6.

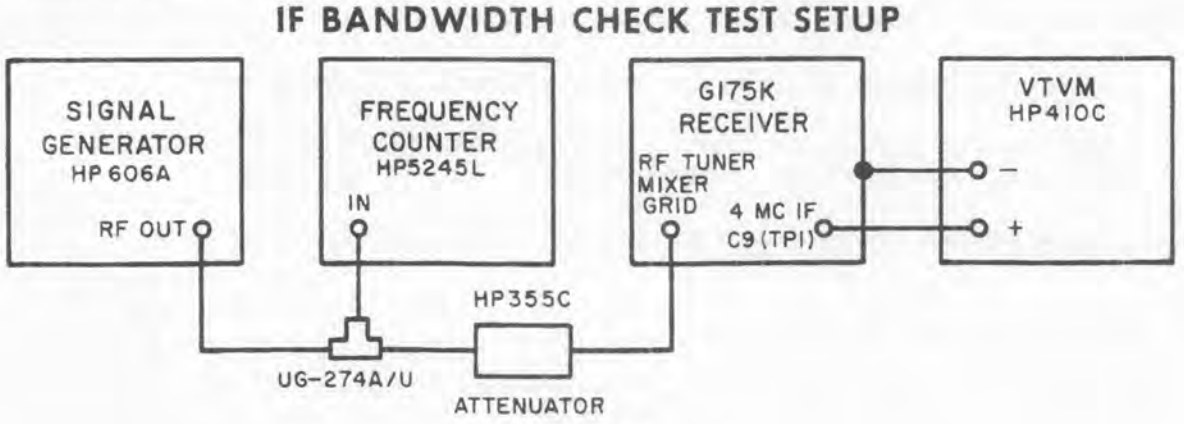


Figure 5-6

b. Determine from RF tuning head installed what frequency is present at output of first mixer (either 21.4 mc or 60 mc).

c. Connect signal generator output through HP355C attenuator to first mixer grid; tune generator to frequency determined in step b; use CW mode.

d. Place receiver IF BANDWIDTH KC switch in 4K position and MODE SELECT switch in AM MAN; rotate RF GAIN fully clockwise.

e. Adjust signal generator output level to operate counter; adjust frequency for maximum detector output.

f. Set HP355C attenuator for VTVM reading of 2.0 vdc.

g. Decrease attenuation by 3 db and increase the signal generator frequency until VTVM again reads 2 vdc; record this frequency.

h. Decrease signal generator frequency below 21.4 mc (or 60 mc) until a 2 vdc reading is again obtained on VTVM; record this frequency.

i. The difference between the readings obtained in steps g. and h. should be 4 mc ± 400 kc.

j. Divide the bandwidth by two and add this quotient to the low frequency reading. The result should be 21.4 mc ± 200 kc (or 60 mc ± 200 kc).

k. Repeat the entire test for 6 db and 60 db bandwidths; the 6 db to 60 db skirt ratio should not exceed 4:1.

5-13. DISCRIMINATOR CROSSOVER

a. Connect equipment as shown in Figure 5-7.

DISCRIMINATOR CROSSOVER TEST SETUP

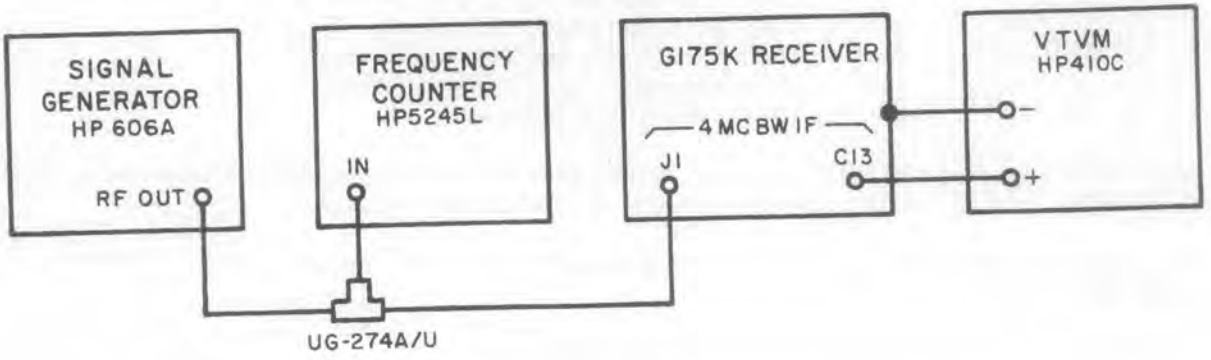


Figure 5-7

b. Place receiver IF BANDWIDTH KC switch in 4K position and MODE SELECT switch in FM.

c. Set signal generator output frequency to 21.4 mc, CW mode.

d. Adjust the signal generator output frequency for zero voltage as indicated by the VTVM.

e. The frequency displayed on the counter should be 21.4 mc ± 200 kc.

5-14. UNSCHEDULED MAINTENANCE

Most troubles experienced with the 4-mc IF amplifier will be caused by the failure of the transistors or diodes. If one of these components is suspected it should be replaced with a part known to be good before any further troubleshooting is carried out. Aids in the form of a troubleshooting chart, Figure 5-8 and a list of transistor element voltages, Figure 5-9, are included to help the maintenance technician locate the faulty part.

Proper operation of the RF tuning head(s) installed in the receiver should be assured before troubleshooting is begun on the 4-mc IF amplifier. In addition, proper operation of the stages at the output of the IF amplifier should be confirmed.

Troubleshooting of the IF amplifier is most easily accomplished by feeding in a 21.4-mc CW signal at the input and checking for an output at each stage using a wideband oscilloscope. Once the defective stage is located, voltage measurements will usually pin point the malfunctioning component.

5-15. SUBASSEMBLY REMOVAL AND REPLACEMENT

The G175J20000-1 4-mc bandwidth IF amplifier chassis employs four brass covers, two on each side that can be easily removed to provide access to both sides of the etched circuit boards. The replacement of a faulty component on one of the etched circuit boards should first be attempted with the boards mounted in the chassis. An entire board should not be detached from the chassis unless considered absolutely necessary. The IF amplifier must be removed from its mounting position on the receiver main chassis prior to the removal of an etched circuit board.

NOTE

Insure that the screws used to replace the two brass covers on the printed circuit side of the brass chassis do not penetrate beyond the threaded bushings as a short circuit may result.

5-16. REMOVAL AND REPLACEMENT OF CIRCUIT BOARD A1.

CAUTION

Excess heat applied to the printed circuit may cause the pattern to lift from the board. Use a low heat iron when replacing components. Use a heat sink when replacing transistors or diodes.

a. To detach board A1, first unsolder all solid wires that are connected between the board and components mounted on the chassis. Unsolder these wires from the chassis component end.

b. Unsolder resistor R1 (1K ohm) from feedthrough capacitor C1; unsolder resistor R3 (22 ohms) from feedthrough capacitor C3.

c. Remove the nine mounting screws and their attached washers.

d. The board is now free and may be lifted from the chassis.

e. Install a new board by reversing steps a. through d. Note that it will be necessary to add some connecting wires and resistors R1 and R3 to the new board.

5-17. REMOVAL AND REPLACEMENT OF CIRCUIT BOARD A2

a. To remove board A2, first unsolder inductor L7 from feedthrough capacitor C10.

b. Unsolder bare wires connected from the board to chassis mounted components.

c. Remove the four mounting screws and their attached washers.

d. The board is now free and may be lifted from the chassis.

e. To install a new board reverse steps a. through d. above. Note that it will be necessary to install some connecting wires and inductor L7 on the new board.

TROUBLESHOOTING CHART, 4-MC BW IF

SYMPTOM	PROBABLE CAUSE	REMEDY
AM input signal applied; no output at J3.	a. Transistor(s) A1Q1 thru A1Q6 defective.	a. Measure voltages on A1Q1 thru A1Q6; replace defective transistor.
	b. AM detector diode faulty.	b. Replace A1CR3.
	c. Coupling capacitor open.	c. Check A1C1, A1C6, A1C12, A1C18, A1C19 and replace faulty component.
FM input signal applied to A2E1; no output at J4.	a. Faulty limiter stage.	a. Measure voltages on A2Q1 thru A2Q4; replace defective transistor.
	b. Coupling capacitor open.	b. Check A2C4 and replace if necessary.
	c. Discriminator diode defective.	c. Replace A2CR1 and/or A2CR2.
	d. Output stage defective.	d. Measure voltages on A2Q5 thru A2Q8 and replace defective transistor.

Figure 5-8

TRANSISTOR ELEMENT VOLTAGES, 4-MC BW IF

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A1Q1	2N3478	1.5	2.1	8.7
A1Q2	2N3478	1.5	2.1	8.7
A1Q3	2N3478	2.2	2.9	8.8
A1Q4	2N2708	1.9	2.6	9.5
A1Q5	2N3251	1.0	0.5	-11.0
A1Q6	2N929	0.2	1.0	10.0

Figure 5-9

TRANSISTOR ELEMENT VOLTAGES, 4-MC BW IF (Cont)

Ref. Desig.	Type	Element		
		Emitter	Base	Collector
A2Q1	2N706	2.3	2.9	10.1
A2Q2	2N706	4.0	2.3	10.1
A2Q3	2N706	2.5	3.0	10.4
A2Q4	2N3478	2.5	3.0	10.3
A2Q5	2N929	-1.4	-0.8	10.3
A2Q6	2N3251	-0.2	-0.8	-11.8
A2Q7	2N929	-0.6	0.0	10.4
A2Q8	2N3251	-11.3	-1.4	-0.8

TEST CONDITIONS: No signal input to receiver; RF GAIN control fully clockwise; MODE SELECT switch to AM MAN. All voltages are positive dc with respect to ground unless otherwise noted. Voltages taken with HP410C VTVM.

Figure 5-9

SECTION VI

ILLUSTRATED PARTS BREAKDOWN

INTRODUCTION

PURPOSE AND FORMAT

This Illustrated Parts Breakdown lists and describes electrical and mechanical parts to assist in requisitioning, storing, and identifying spare parts. Four major parts comprise this section: (1) Introduction, (2) Group Assembly Parts Breakdown, (3) Numerical Index, and (4) Reference Designation Index.

SUMMARY OF CONTENTS

INTRODUCTION

Included in the Introduction are: (1) Purpose and Format, (2) Summary of Contents, (3) How to Use, (4) Abbreviations, and (5) List of Manufacturers' Codes and Addresses.

GROUP ASSEMBLY PARTS BREAKDOWN

The Group Assembly Parts Breakdown contains illustrations and parts lists of assemblies, and detailed parts. The illustrations and text are arranged according to function and/or next assembly. When it is necessary to show a subassembly in detail, and it is not possible to do so in the same illustration as its major assembly, it is referenced to another illustration in which the subassembly is exploded in as much detail as necessary and its component parts listed in the accompanying text.

The nomenclature of each part, the units per assembly, and the usable on code, if any, are listed to the right of the part number in the text. Next assembly sequence is determined by indenture position; that is, a part listed one column to the right of the position of the part above it is a component of that assembly or installation. Attaching parts are shown directly below in the same indenture column as the parts they attach.

When a manufacturer's part is listed, the manufacturer's code is given in the nomenclature along with any other information thought necessary or helpful. The manufacturer's name and address may be found from the code symbol by consulting the "List of Manufacturers' Codes and Addresses" in the Introduction. The codes are in accordance with Federal Supply Code for Manufacturers, cataloging handbook H4-1.

The column entitled "Usable on Code" is not utilized in this publication.

The number of parts given under the column entitled "Units per Assembly" constitute that number required to make up a single assembly.

Left- and right-hand parts are listed separately. Component parts of left- and right-hand assemblies are identified by determining next assembly order. When a left- or right-hand assembly has both left- and right-hand parts as components, the nomenclature will show the assembly to which each belongs.

NUMERICAL INDEX

Each part number appearing in the Group Assembly Parts Breakdown is listed in the Numerical Index. This index is compiled in accordance with the numerical part number filing system described below. Read part numbers from left to right, one digit at a time, to determine part number numerical arrangement. The order of precedence in

part number numerical arrangement is as follows:

(1) Space (blank column)

(2) Dash (-)

(3) Letters A thru Z

(4) Numerals 0 thru 9

All part numbers are listed with the figure and index number of each appearance.

REFERENCE DESIGNATION INDEX

The Reference Designation Index includes all components of electronic equipment having reference designators.

The Reference Designation Index is divided into three columns consisting of the following: (1) REFERENCE DESIGNATION - Reference designators listed in alphanumerical order; (2) FIG. AND INDEX NO. - Used to locate the corresponding part in the Group Assembly Parts Breakdown; (3) MFR PART NUMBER - The part number assigned by the manufacturer of the part.

HOW TO USE

KNOWN ➡	MFR PART NO.	REFERENCE DESIGNATION NO. (COMPONENT NUMBERS ON SCHEMATICS)
WANT TO KNOW ➡	SEQUENCE OF ASSEMBLY	MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED
SOLUTION ➡	IN NUMERICAL INDEX FIND MFR PART NUMBER. SEQUENCE OF ASSEMBLY MAY BE FOUND ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.	IN REFERENCE DESIGNATION INDEX FIND REFERENCE DESIGNATION NUMBER. FIND MFR PART NO., DESCRIPTION, AND WHERE PART IS PHYSICALLY INSTALLED ON INDICATED FIGURE AND INDEX NO. IN GROUP ASSEMBLY PARTS BREAKDOWN.

ABBREVIATIONS

AP. . . . . Attaching Part
ASSY . . . . Assembly
FIG . . . . . Figure
GMV. . . . . Guaranteed Minimum Value
IF . . . . . Intermediate Frequency
MC . . . . . Megacycles (10^6)
MFR. . . . . Manufacturer
NHA. . . . . Next Higher Assembly
NO. . . . . Number
pct. . . . . Percent
pf . . . . . Picofarad (10^{-12})
REF . . . . . Reference
μf . . . . . Microfarad (10^{-6})
μh . . . . . Microhenry (10^{-6})
wvdc . . . . . Working Volts Direct Current

LIST OF MANUFACTURERS' CODES AND ADDRESSES

CODE	NAME AND ADDRESS
01121	Allen-Bradley Company 1201 South Second Street Milwaukee, Wisconsin 53204
04013	Taurus Corporation 1 Academy Hill Lambertville, New Jersey 08530
07047	The Ross Milton Company 511 Second Street Pike Southampton, Pennsylvania 18966
14632	Watkins-Johnson Co., CEI Division 6006 Executive Boulevard Rockville, Maryland 20852
16733	Phelps Dodge Electronic Products Corporation 60 Dodge Avenue North Haven, Connecticut 06473
56289	Sprague Electric Company Marshall Street North Adams, Massachusetts 01247
72259	Nytronics Incorporated 550 Springfield Avenue Berkeley Heights, New Jersey 07922
72982	Erie Technological Products, Inc. 644 West 12th Street Erie, Pennsylvania 16512
74868	Amphenol Corporation Amphenol RF Division 33 East Franklin Street Danbury, Connecticut 06810
80131	Electronic Industries Association 2001 Eye Street, N. W. Washington, D. C. 20006
81312	Winchester Electronics Division Litton Industries, Incorporated Main Street & Hillside Avenue Oakville, Connecticut 06779
83330	Herman H. Smith, Inc. 812 Snediker Avenue Brooklyn, New York 11207
84171	Arco Electronics, Inc. Community Drive Great Neck, New York 11022
91418	Radio Materials Company 4242 West Bryn Mawr Avenue Chicago, Illinois 60646

TYPE G175K20000-2 4-MC BANDWIDTH IF AMPLIFIER

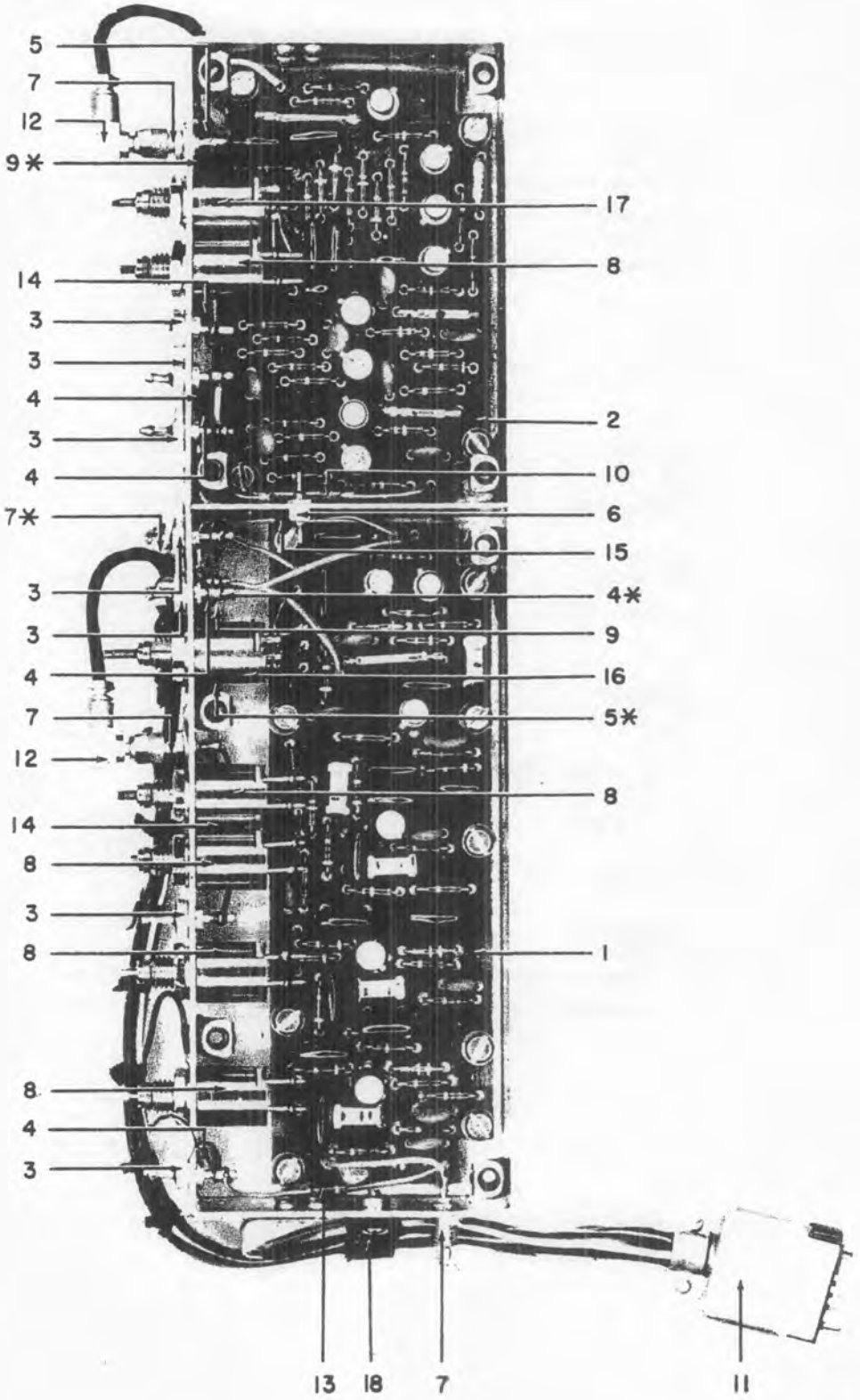


Figure 6-1

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
1	G175K20000-2	4-MC BANDWIDTH IF AMPLIFIER	1	
	MS23233-13	SCREW, MACHINE (AP)	4	
	MS35338-78	WASHER, LOCK (AP)	4	
	20995	. COVER, BOTTOM, SMALL -14632-	1	
	MS35233-12	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	20996	. COVER, BOTTOM, LARGE -14632-	1	
	MS35233-12	. SCREW, MACHINE (AP)	4	
	MS35338-78	. WASHER, LOCK (AP)	4	
	12935	. COVER, TOP, SMALL -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	4	
	12936	. COVER, TOP, LARGE -14632-	1	
	MS35233-13	. SCREW, MACHINE (AP)	4	
-1	12917	. 4MC IF AMPLIFIER -14632- (FOR BREAKDOWN SEE FIGURE 6-2)	1	
-2	12918	. 4MC LIMITER AND DISCRIMINATOR -14632- (FOR BREAKDOWN SEE FIGURE 6-3)	1	
-3	FA5C102W	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -01121-	7	
-4	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc -56289-	5	
-5	CM04ED300J03	. CAPACITOR, FIXED, MICA	2	
-6	SFU16	. TERMINAL, FEEDTHRU, INSULATED -04013-	1	
-7	27-9	. CONNECTOR, RECEPTACLE, ELECTRICAL, SUBMINIATURE -74868-	4	
-8	1472-3	. COIL, RADIO FREQUENCY -14632-	5	
-9	WEE82	. COIL, RADIO FREQUENCY, 82 μh -72259-	2	
-10	1131-37	. COIL, RADIO FREQUENCY -14632-	1	
-11	SMRE14PGH	. CONNECTOR, PLUG, ELECTRICAL, MULTIPIN -81312-	1	
-12	1026-88	. CONNECTOR, PLUG, ELECTRICAL, SUBMINIATURE -16733-	1	
	30020-540	. CABLE ASSEMBLY, RF -14632-	1	
	1026-188	. . CONNECTOR, PLUG, ELECTRICAL, SUBMINIATURE -16733-	2	
-13	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	1	
-14	RCR07G103JS	. RESISTOR, FIXED, COMPOSITION	2	
-15	RCR07G220JS	. RESISTOR, FIXED, COMPOSITION	1	
-16	20349-10	. TRANSFORMER -14632-		
-17	20349-9	. TRANSFORMER -14632-	1	
-18	833	. CABLE CLIP -83330-	1	
	MS35233-26	. SCREW, MACHINE (AP)	1	
	MS35338-79	. WASHER, LOCK (AP)	1	
	SS0-1	. TERMINAL, STANDOFF -04013-	4	

PART 12917 4 MC IF AMPLIFIER BOARD

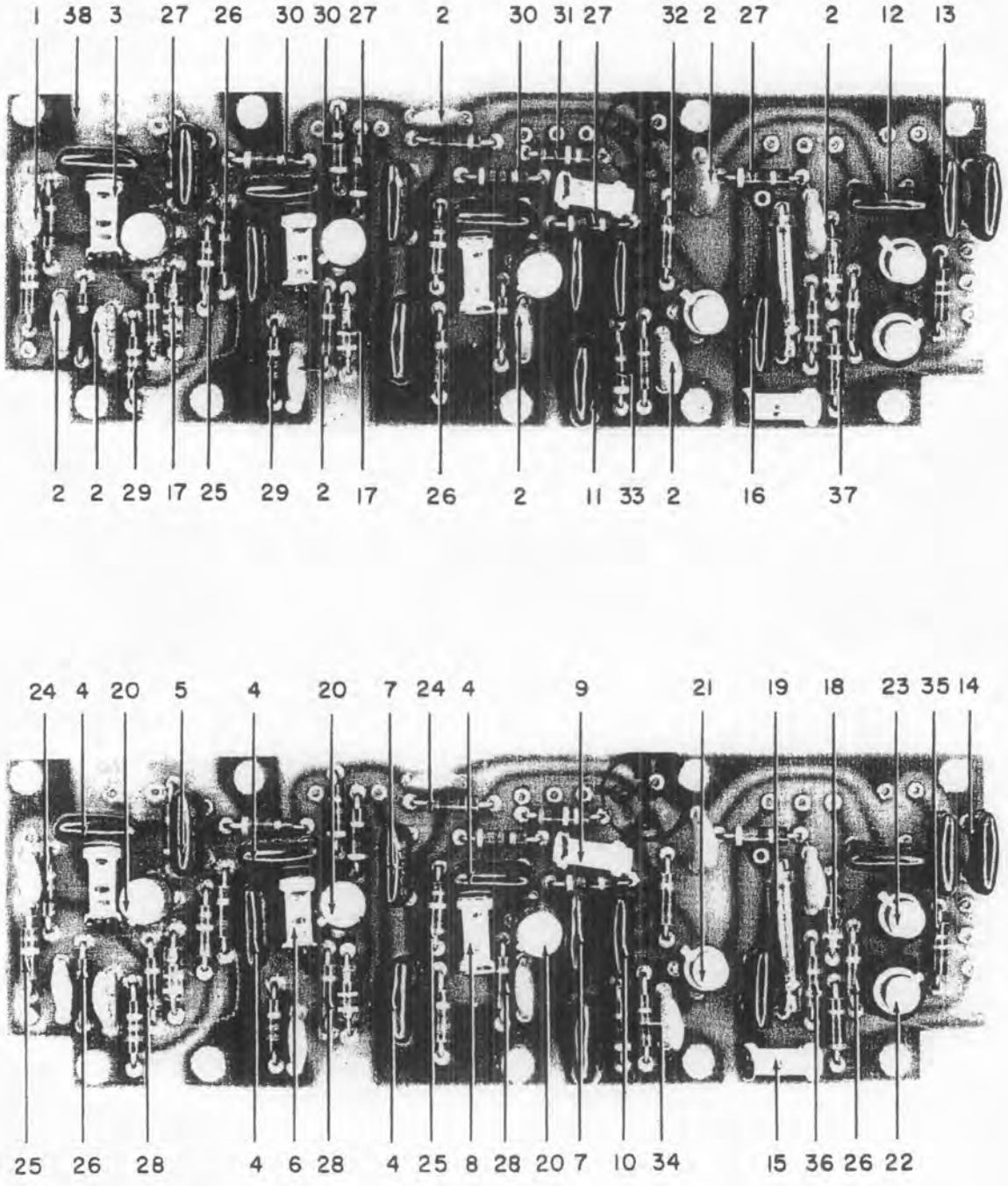
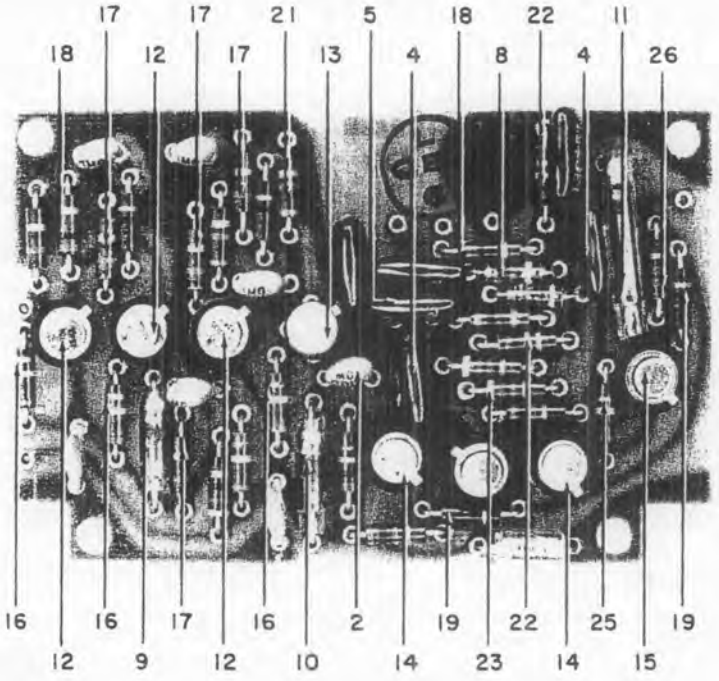


Figure 6-2

FIGURE AND INDEX NO.	PART NUMBER	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
2	12917	4MC IF AMPLIFIER BOARD -14632- (FOR NHA SEE FIGURE 6-1)	REF	
	MS35233-13	SCREW, MACHINE (AP)	9	
	MS35338-78	WASHER, LOCK (AP)	9	
	MS15795-304	WASHER, FLAT (AP)	9	
-1	SM001GMV	. CAPACITOR, FIXED, CERAMIC, 1000 pf, GMV, 500 wvdc -91418-	1	
-2	C023B101E502M	. CAPACITOR, FIXED, CERAMIC, 5000 pf, 20 pct, 100 wvdc - 56289-	8	
-3	301-000COHO759D	. CAPACITOR, FIXED, CERAMIC, 7.5 pf, ±0.5 pf, 500 wvdc -72982-	1	
-4	CM05FD221J03	. CAPACITOR, FIXED, MICA	5	
-5	CM05ED270J03	. CAPACITOR, FIXED, MICA	1	
-6	301-000COHO689D	. CAPACITOR, FIXED, CERAMIC, 6.8 pf, ±0.5 pf, 500 wvdc -72982-	1	
-7	CM05ED220J03	. CAPACITOR, FIXED, MICA	2	
-8	301-000COHO629D	. CAPACITOR, FIXED, CERAMIC, 6.2 pf, ±0.5 pf, 500 wvdc -72982-	1	
-9	301-000COKO189C	. CAPACITOR, FIXED, CERAMIC, 1.8 pf, ±0.25 pf, 500 wvdc -72982-	1	
-10	CM05CD150J03	. CAPACITOR, FIXED, MICA	1	
-11	CM05FD201J03	. CAPACITOR, FIXED, MICA	1	
-12	CM05CD120J03	. CAPACITOR, FIXED, MICA	1	
-13	CM05ED820J03	. CAPACITOR, FIXED, MICA	1	
-14	CM05FD161J03	. CAPACITOR, FIXED, MICA	1	
-15	301-000COHO479C	. CAPACITOR, FIXED, CERAMIC, 4.7 pf, ±0.25 pf, 500 wvdc -72982-	1	
-16	CM05ED131J03	. CAPACITOR, FIXED, MICA	1	
-17	1N914A	. SEMICONDUCTOR DEVICE, DIODE, SILICON -80131-	2	
-18	1N198A	. SEMICONDUCTOR DEVICE, DIODE, GERMANIUM -80131-	1	
-19	1131-37	. COIL, RADIO FREQUENCY -14632-	1	
-20	2N3478	. TRANSISTOR, NPN, SILICON -80131-	3	
-21	2N2708	. TRANSISTOR, NPN, SILICON -80131-	1	
	10042DAP	. INSULATOR, DISK -07047-	4	
-22	2N3251	. TRANSISTOR, PNP, SILICON -80131-	1	
	10036DAP	. INSULATOR, DISK -07047-	2	
-23	2N929	. TRANSISTOR, NPN, SILICON -80131-	1	
-24	RCR07G101JS	. RESISTOR, FIXED, COMPOSITION	2	
-25	RCR07G123JS	. RESISTOR, FIXED, COMPOSITION	3	
-26	RCR07G512JS	. RESISTOR, FIXED, COMPOSITION	4	
-27	RCR07G470JS	. RESISTOR, FIXED, COMPOSITION	4	
-28	RCR07G102JS	. RESISTOR, FIXED, COMPOSITION	3	
-29	RCR07G511JS	. RESISTOR, FIXED, COMPOSITION	2	
-30	RCR07G471JS	. RESISTOR, FIXED, COMPOSITION	3	
-31	RCR07G163JS	. RESISTOR, FIXED, COMPOSITION	1	
-32	RCR07G752JS	. RESISTOR, FIXED, COMPOSITION	1	
-33	RCR07G302JS	. RESISTOR, FIXED, COMPOSITION	1	
-34	RCR07G201JS	. RESISTOR, FIXED, COMPOSITION	1	
-35	RCR07G513JS	. RESISTOR, FIXED, COMPOSITION	1	
-36	RCR07G131JS	. RESISTOR, FIXED, COMPOSITION	1	
-37	RCR07G822JS	. RESISTOR, FIXED, COMPOSITION	1	
-38	12964	. PRINTED WIRING BOARD -14632-	1	

PART 12918 4-MC LIMITER AND DISCRIMINATOR BOARD



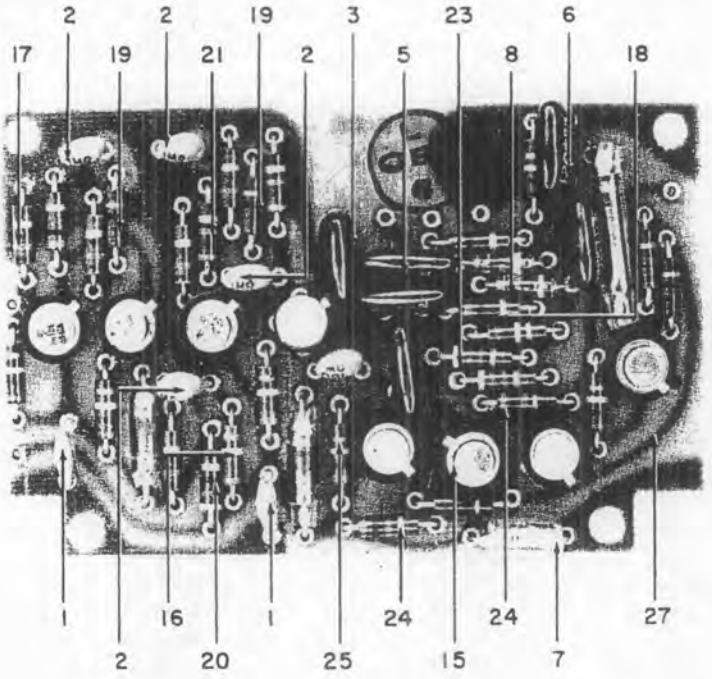


Figure 6-3

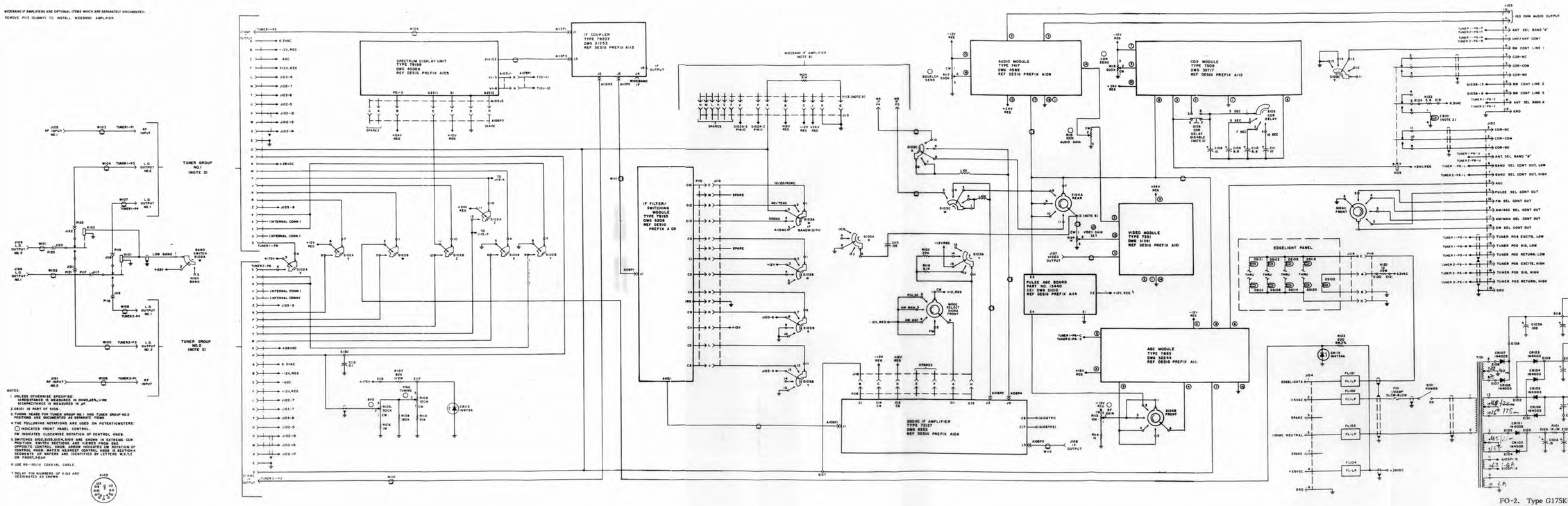
NUMERICAL INDEX

PART NUMBER	FIGURE & INDEX NO.	UNITS PER ASSEMBLY
CM04CD100J03	3-4	2
CM04ED300J03	1-5	2
CM04ED330J03	3-5	2
CM05CD120J03	2-12	1
CM05CD150J03	2-10	1
CM05ED131J03	2-16	1
CM05ED220J03	2-7	2
CM05ED270J03	2-5	1
CM05ED820J03	2-13	1
CM05FD131J03	3-6	1
CM05FD161J03	2-14	1
CM05FD201J03	2-11	1
CM05FD221J03	2-4	5
CS13BF105K	3-7	1
C023B101E502M	1-4	5
	2-2	8
	3-1	2
DM10-120J	3-3	1
FA5C102W	1-3	7
G175K20000-2	1-	1
MS15795-304	2-	9
MS35233-12	1-	4
MS35233-13	1-	4
MS35233-26	1-	1
MS35233-3	1-	10
MS35338-77	1-	10
MS35338-78	1-	4
MS35338-79	1-	1
RCR07G101JS	2-24	2
RCR07G102JS	1-13	1
RCR07G103JS	1-14	2
RCR07G111JS	3-26	1
RCR07G123JS	2-25	3
RCR07G131JS	2-36	1
RCR07G163JS	2-31	1
RCR07G201JS	2-34	1
RCR07G220JS	1-15	1
RCR07G223JS	3-22	2
RCR07G302JS	2-33	1
RCR07G470JS	2-27	4
RCR07G471JS	2-30	3
RCR07G511JS	2-29	2
RCR07G512JS	2-26	4
RCR07G513JS	2-35	1
RCR07G752JS	2-32	1
RCR07G821JS	3-21	2
RCR07G822JS	2-37	1
SFU16	1-6	1
SMRE14PGH	1-11	1
SM001GMV	2-1	1
	3-2	5
SS0-1	1-	4
WEE82	1-9	2
1N198A	2-18	1
	3-8	2
1N914A	2-17	2
10036DAP	2-	2
	3-	7
10042DAP	2-	4
	3-	1
1026-188	1-12	1
	1-	2
1131-120	3-10	1
1131-37	1-10	1
	2-19	1
	3-11	1
1131-41	3-9	1
12917	1-1	1
	2-	REF
12918	1-2	1
	3-	REF
12935	1-	1
12936	1-	1
12964	2-38	1
12987	3-27	1
1472-3	1-8	5
2N2708	2-21	1
2N3251	2-22	1
	3-15	2
2N3478	2-20	3
	3-13	1
2N706	3-12	3
2N929	2-23	1
	3-14	2
20349-10	1-16	1
20349-9	1-17	1
20995	1-	1
20996	1-	1
27-9	1-7	4
30020-540	1-	1
301-000C0H0479C	2-15	1
301-000C0H0629D	2-8	1
301-000C0H0689D	2-6	1
301-000C0H0759D	2-3	1
301-000C0K0189C	2-9	1
833	1-18	1

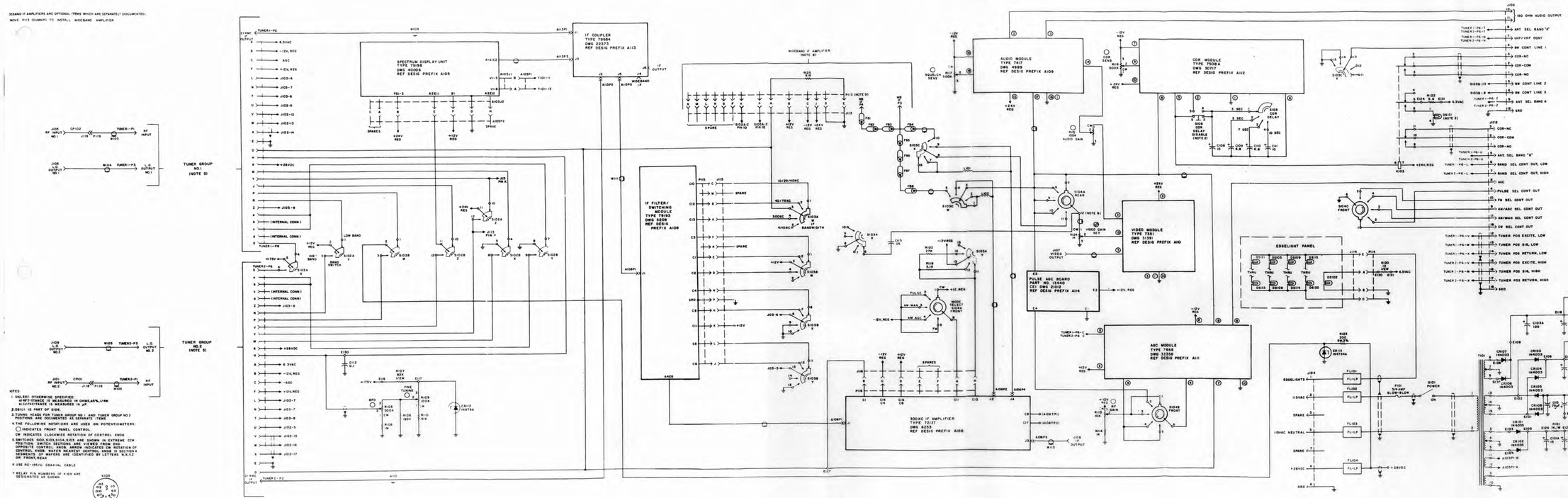
REFERENCE DESIGNATION INDEX

REFERENCE DESIGNATION	FIG. AND INDEX NO.	MFR PART NUMBER
A2R17	3-18	RCR07G102JS
A2R18	3-22	RCR07G223JS
A2R19	3-22	RCR07G223JS
A2R2	3-17	RCR07G512JS
A2R20	3-23	RCR07G471JS
A2R21	3-23	RCR07G471JS
A2R22	3-24	RCR07G101JS
A2R23	3-25	RCR07G103JS
A2R24	3-25	RCR07G103JS
A2R25	3-24	RCR07G101JS
A2R26	3-19	RCR07G220JS
A2R27	3-19	RCR07G220JS
A2R28	3-26	RCR07G111JS
A2R3	3-18	RCR07G102JS
A2R4	3-17	RCR07G512JS
A2R5	3-17	RCR07G512JS
A2R6	3-16	RCR07G123JS
A2R7	3-19	RCR07G220JS
A2R8	3-20	RCR07G470JS
A2R9	3-16	RCR07G123JS
C1	1-3	FA5C102W
C10	1-3	FA5C102W
C11	1-4	C023B101E502M
C12	1-3	FA5C102W
C13	1-3	FA5C102W
C14	1-5	CM04ED300J03
C15	1-4	C023B101E502M
C2	1-4	C023B101E502M
C3	1-3	FA5C102W
C4	1-4	C023B101E502M
C5	1-4	C023B101E502M
C6	1-3	FA5C102W
C7	1-3	FA5C102W
C8	1-5	CM04ED300J03
C9	NOT USED	
E1	1-6	SFU16
J1	1-7	27-9
J2	1-7	27-9
J3	1-7	27-9
J4	1-7	27-9
L1	1-8	1472-3
L2	1-8	1472-3
L3	1-8	1472-3
L4	1-8	1472-3
L5	1-9	WEE82
L6	1-8	1472-3
L7	1-10	1131-37
L8	1-9	WEE82
P113	1-11	SMRE14PGH
R1	1-13	RCR07G102JS
R2	1-14	RCR07G103JS
R3	1-15	RCR07G220JS
R4	1-14	RCR07G103JS
T1	1-16	20349-10
T2	1-17	20349-9
W. B. IF-P1	1-	1026-188
W. B. IF-P4	1-12	1026-188
W1	1-	30020-540

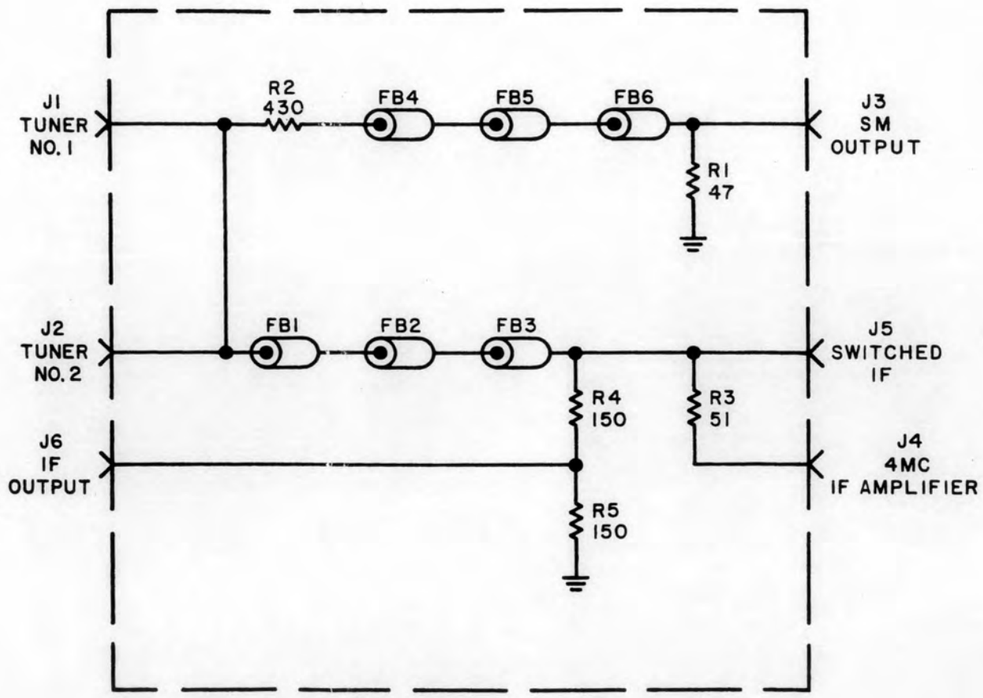
FO-1. Type G175K00000-1 Receiver, Functional Block Diagram



FO-2. Type G175K00000-1 Receiver, Main Chassis Schematic Diagram



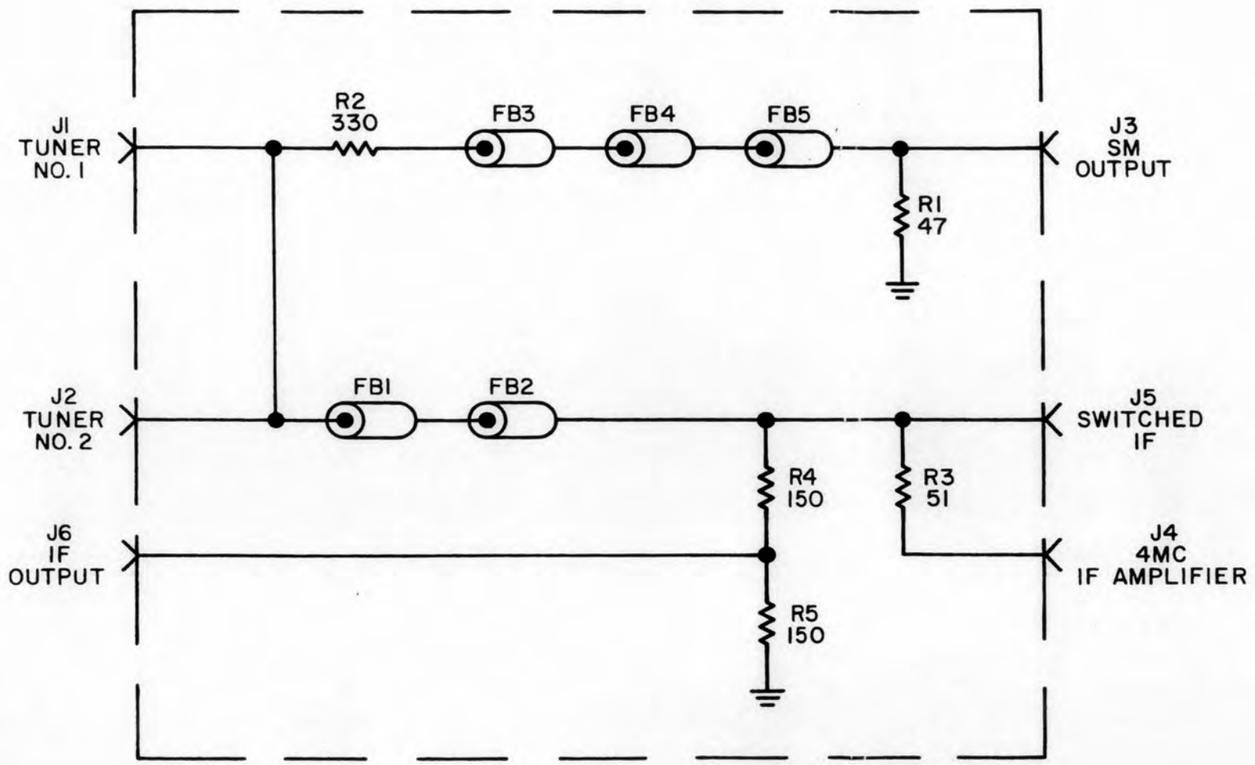
FO-3. Type G175K00000-2 Receiver, Main Chassis Schematic Diagram



NOTES:

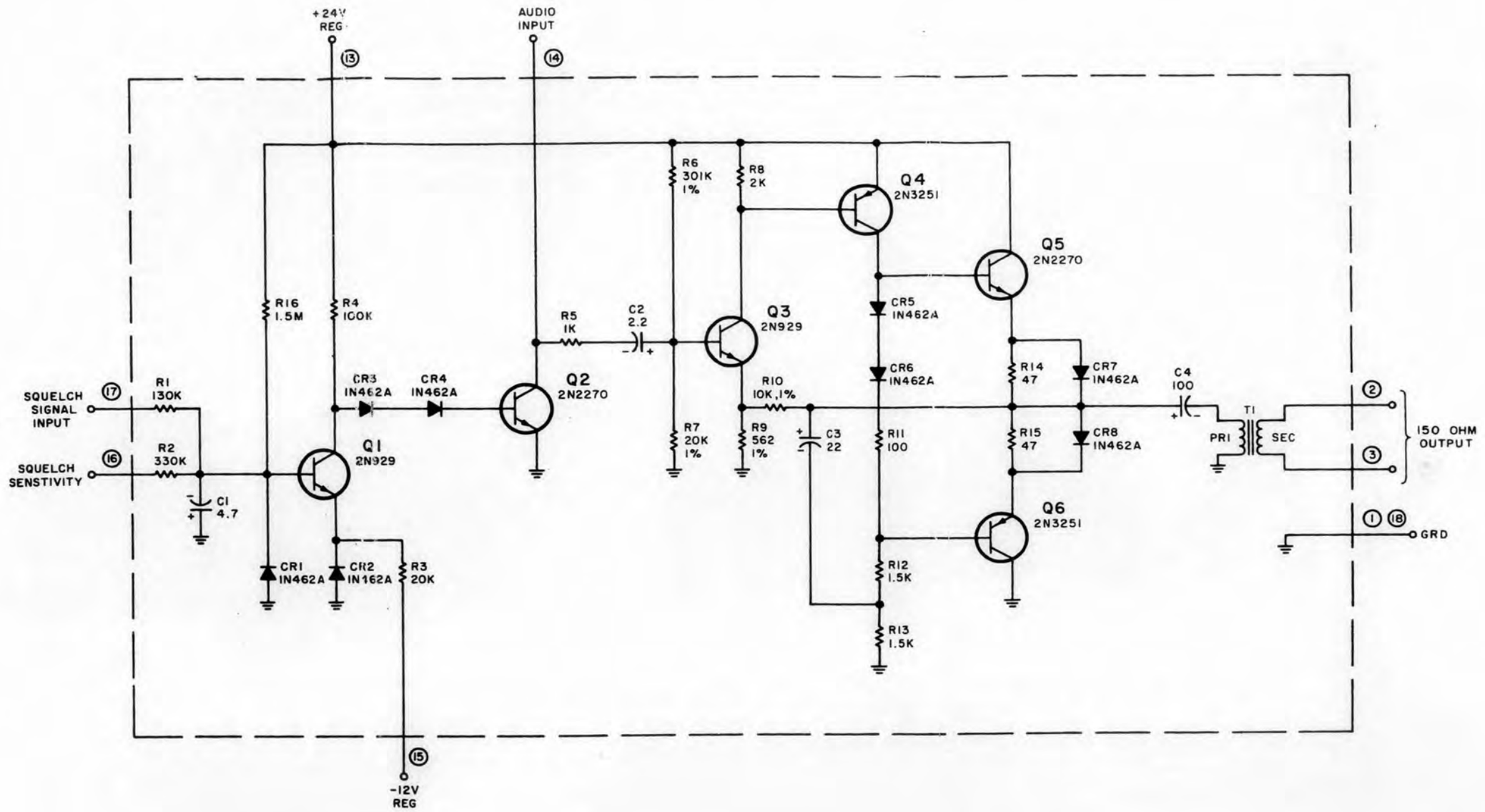
1. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A113.

FO-4. Type 79207 IF Coupler, Schematic Diagram



NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W

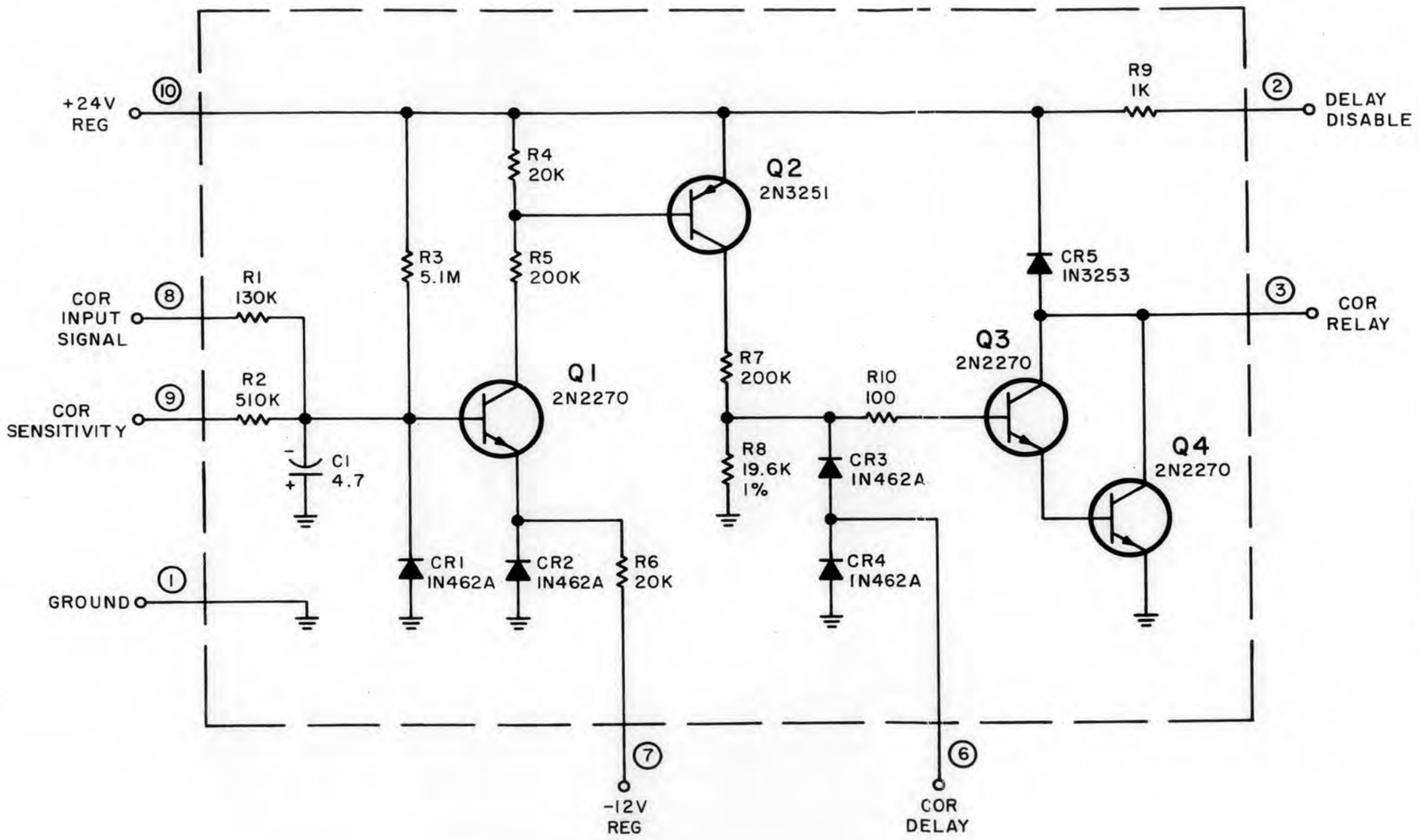
FO-5. Type 79684 IF Coupler, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ± 5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A109.

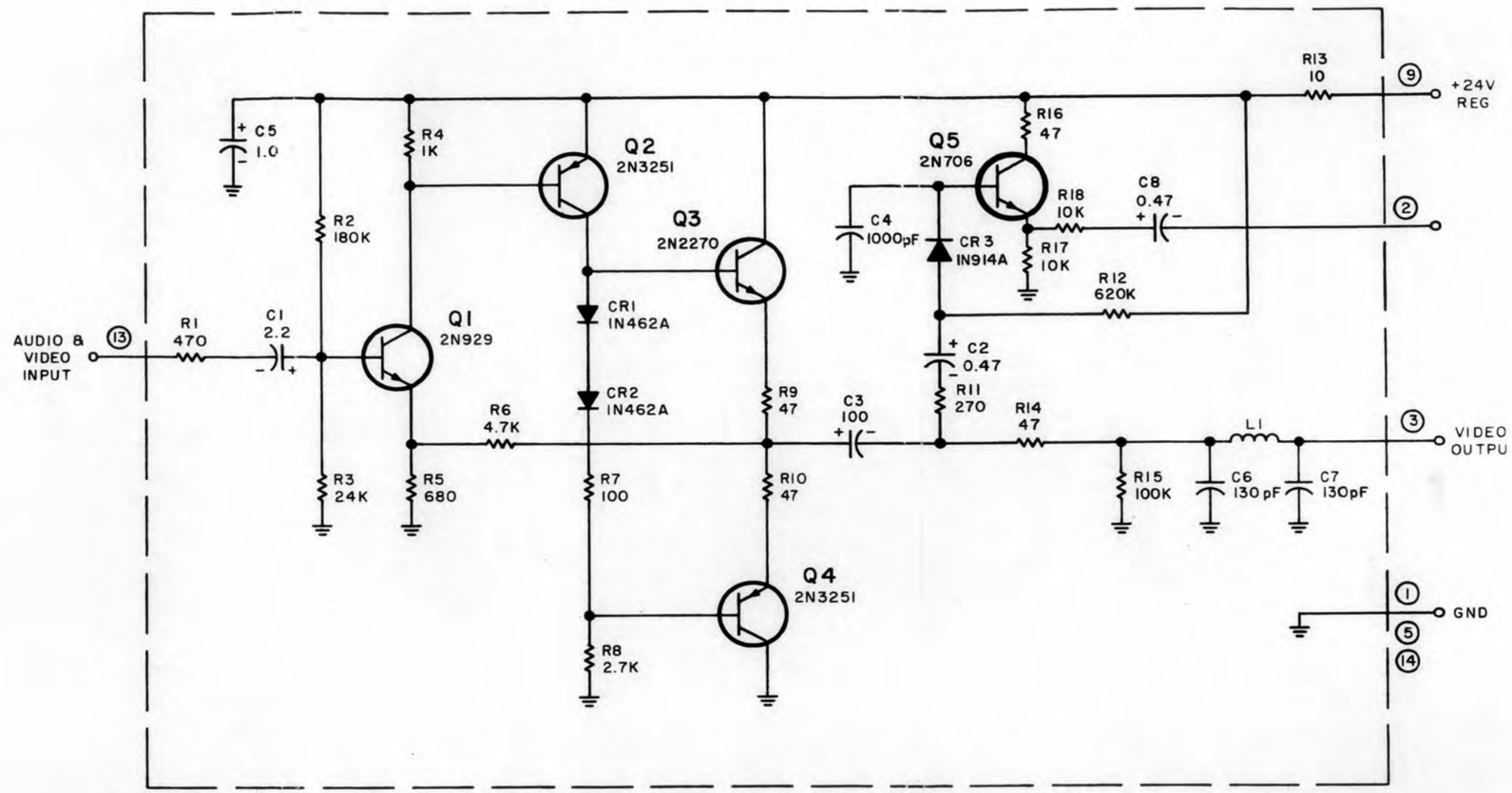
FO-6. Type 7417 Audio Amplifier, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN µf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A112.

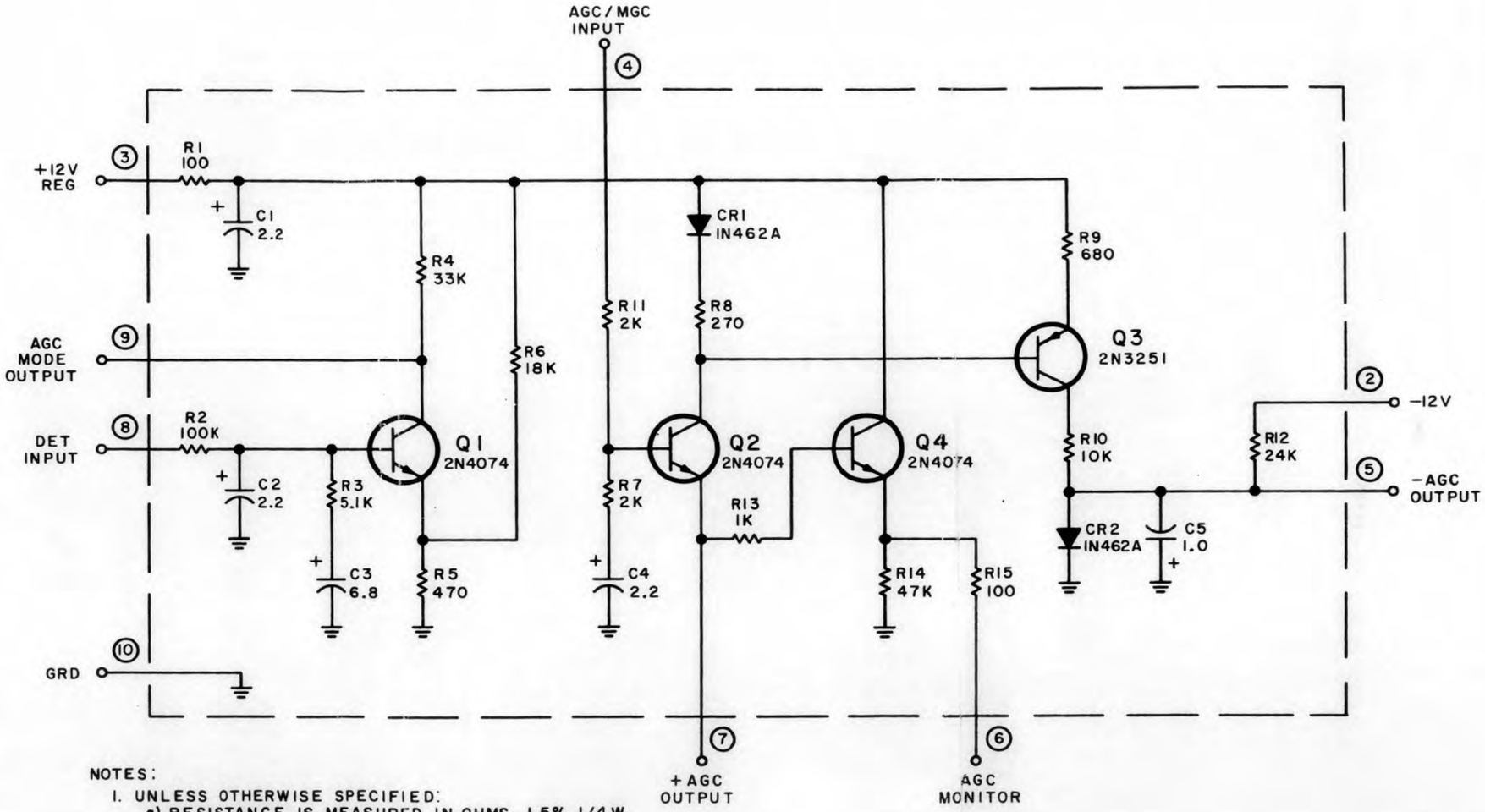
FO-7. Type 7508A COR Amplifier, Schematic Diagram



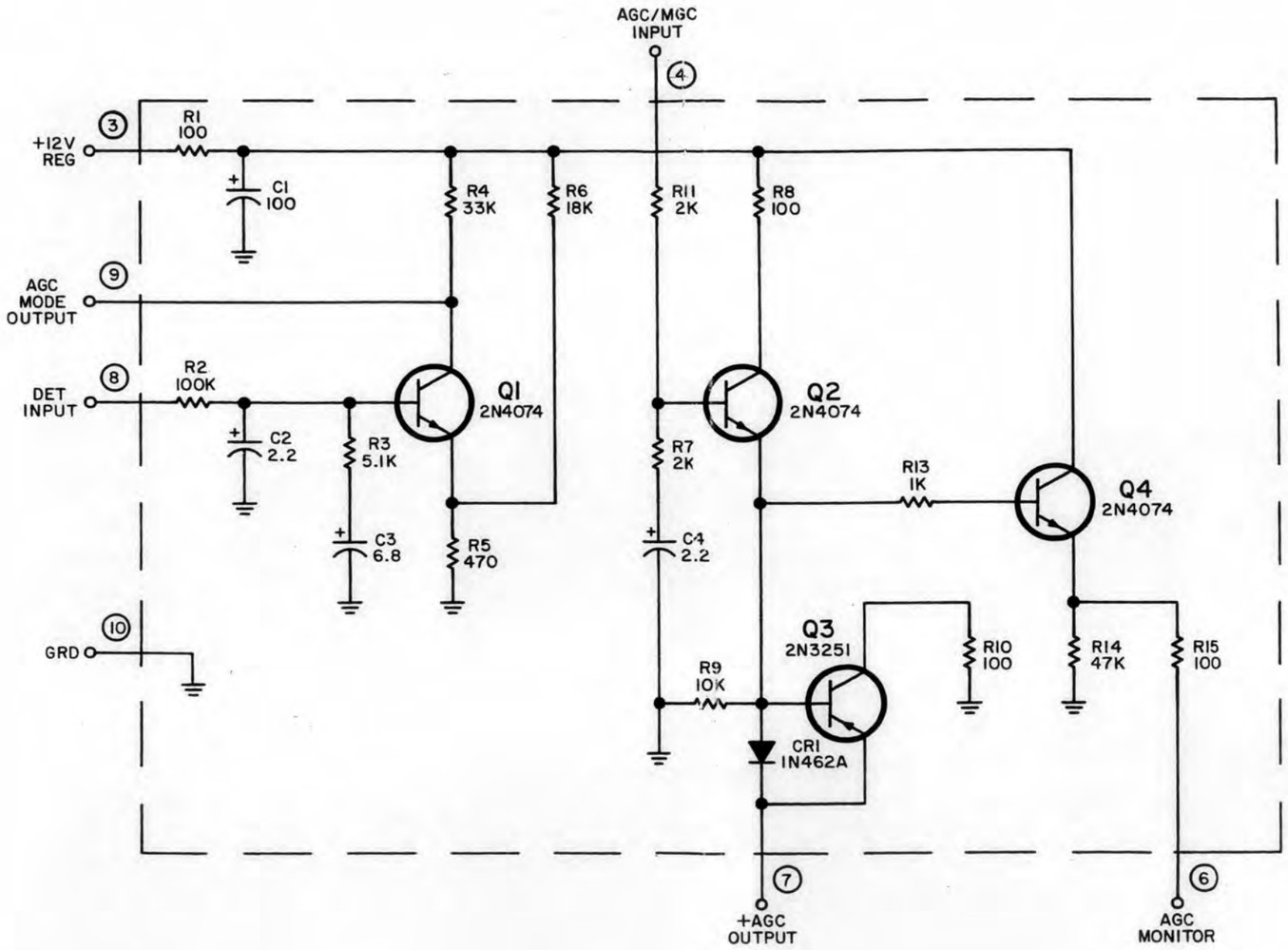
NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μf.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A110.

FO-8. Type 7351 Video Amplifier, Schematic Diagram

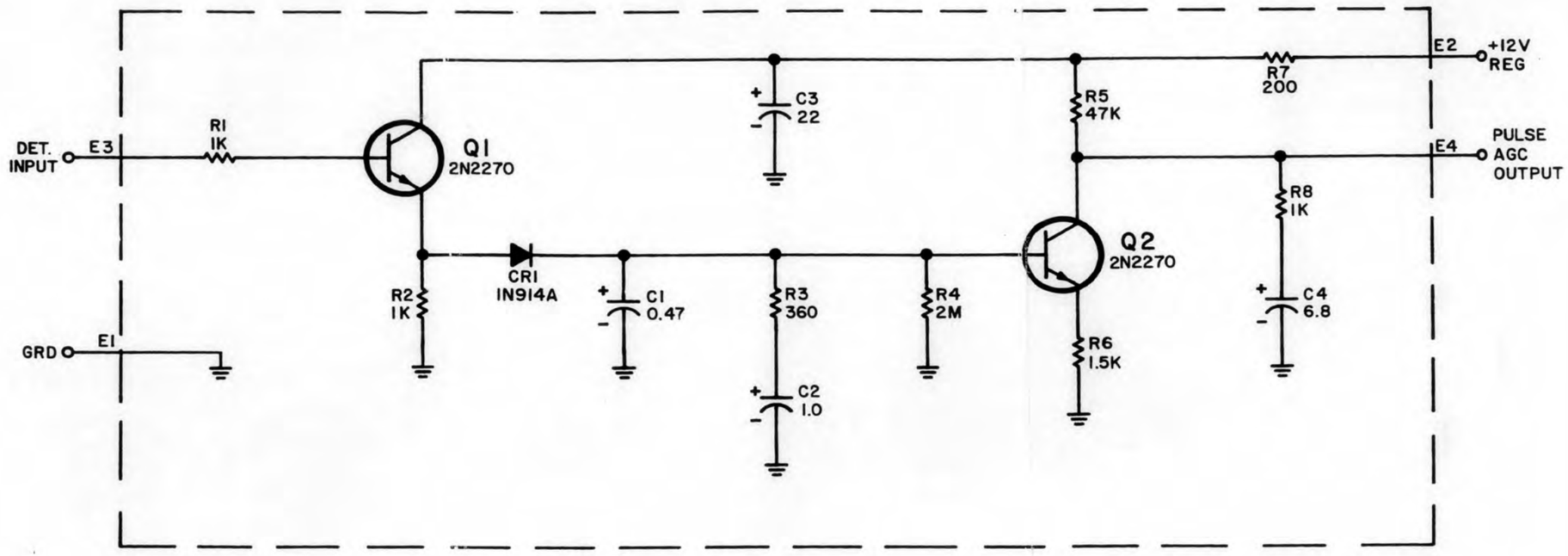


FO-9. Type 7865 AGC Amplifier, Schematic Diagram



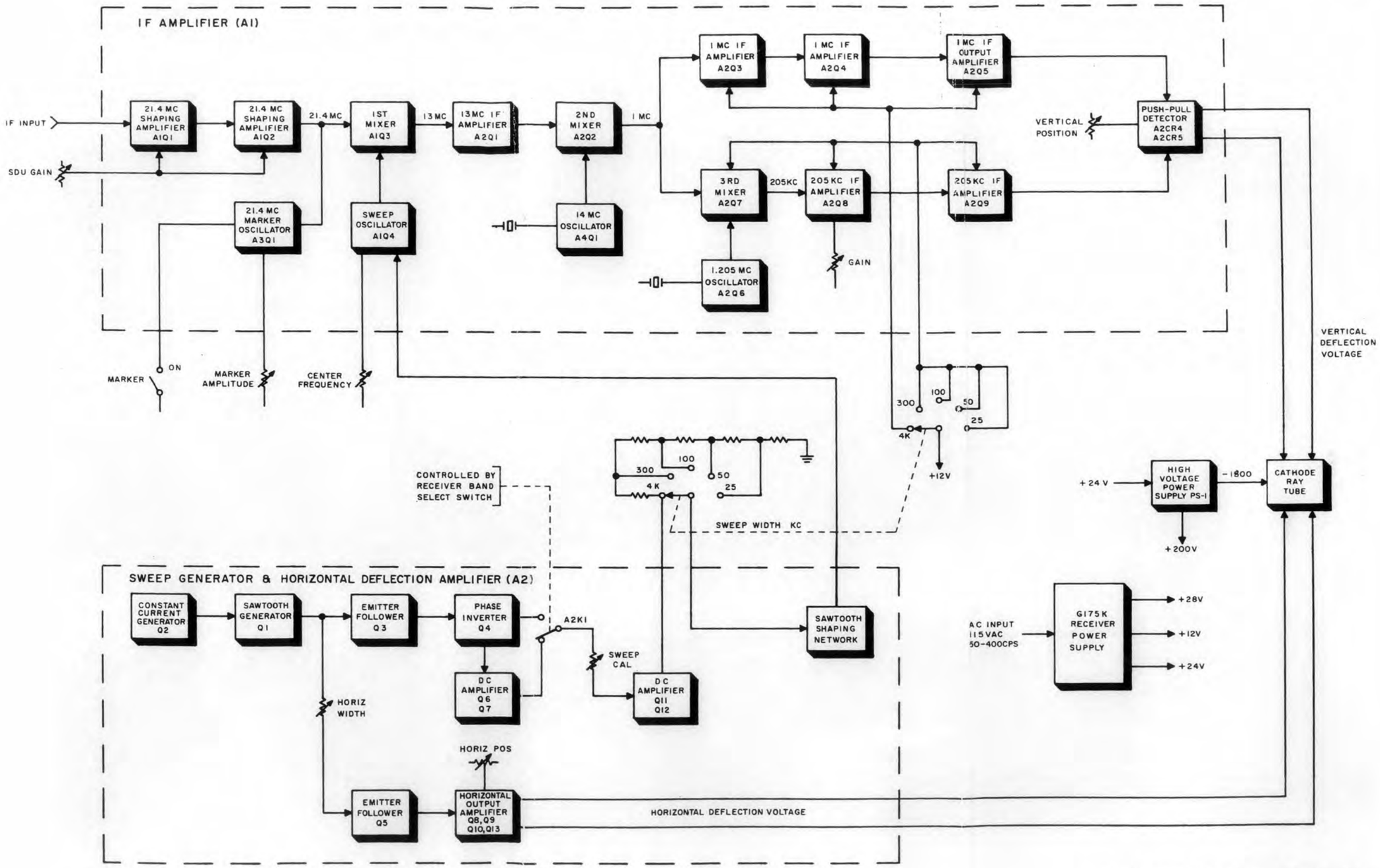
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μF.
2. ENCIRCLED NUMBERS ARE MODULE PIN NUMBERS.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A111.

FO-10. Type 7868 AGC Amplifier, Schematic Diagram

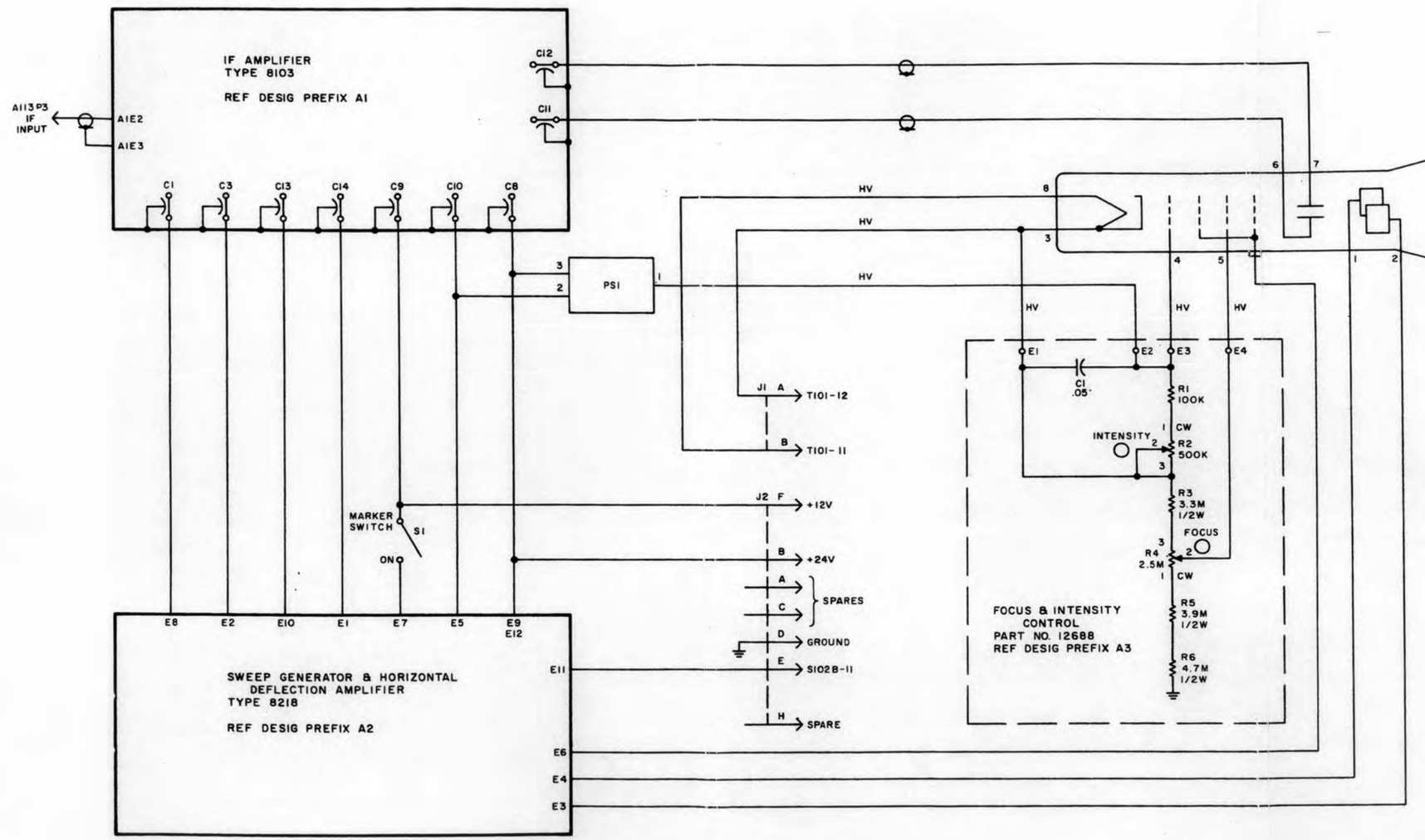


NOTES:
1. RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4 W.
2. CAPACITANCE IS MEASURED IN μF.
3. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A114.

FO-11. Part 13440 Pulse AGC Amplifier, Schematic Diagram



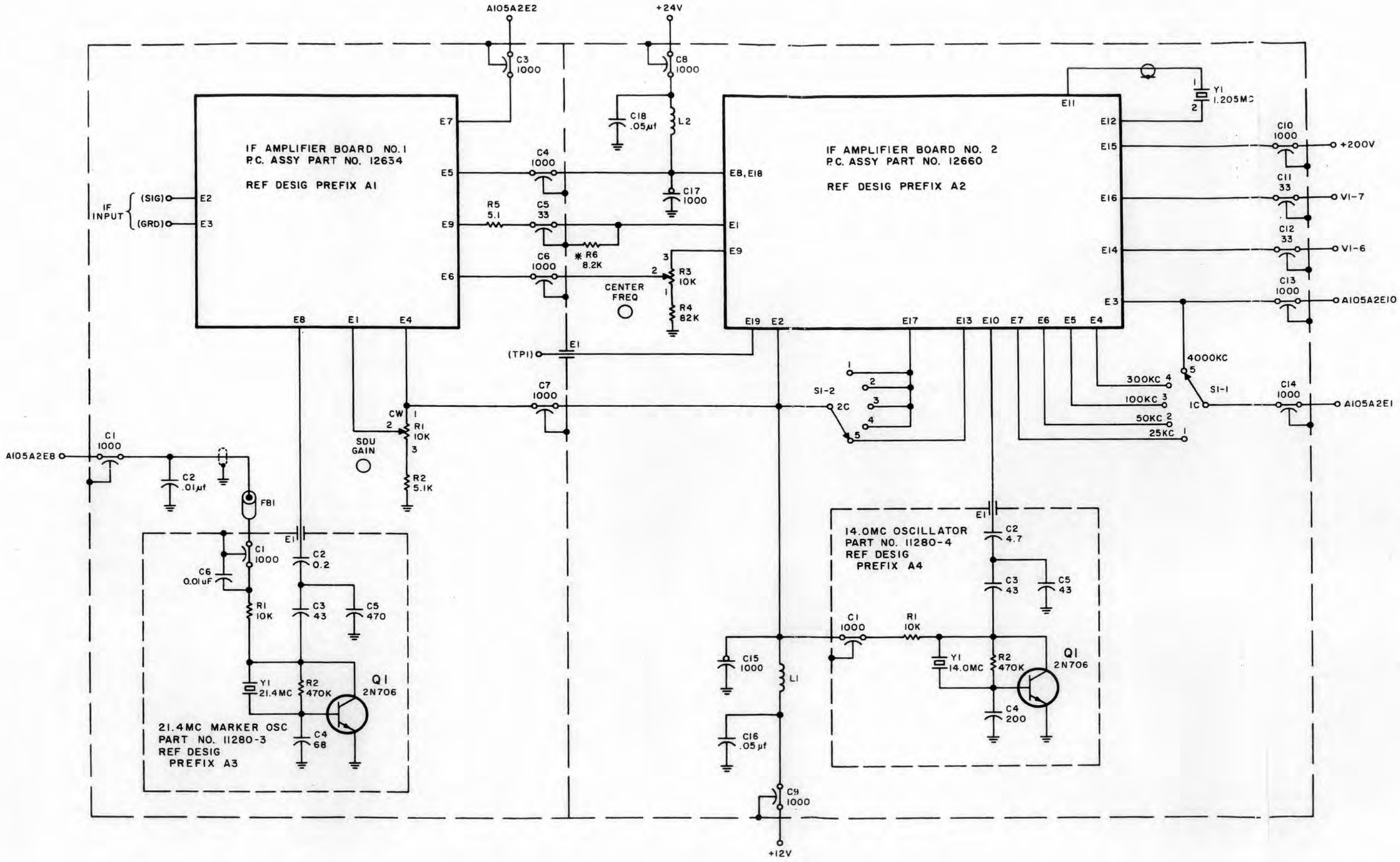
FO-1. Type 79198 Spectrum Display Unit, Functional Block Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS MEASURED IN μf.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN PREFIX THE PART DESIGNATION WITH A1OS
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS R2 & R4:
   CW INDICATES CLOCKWISE ROTATION
   ○ INDICATES FRONT PANEL CONTROL

FO-2. Type 79198 Spectrum Display Unit, Main Chassis Schematic Diagram

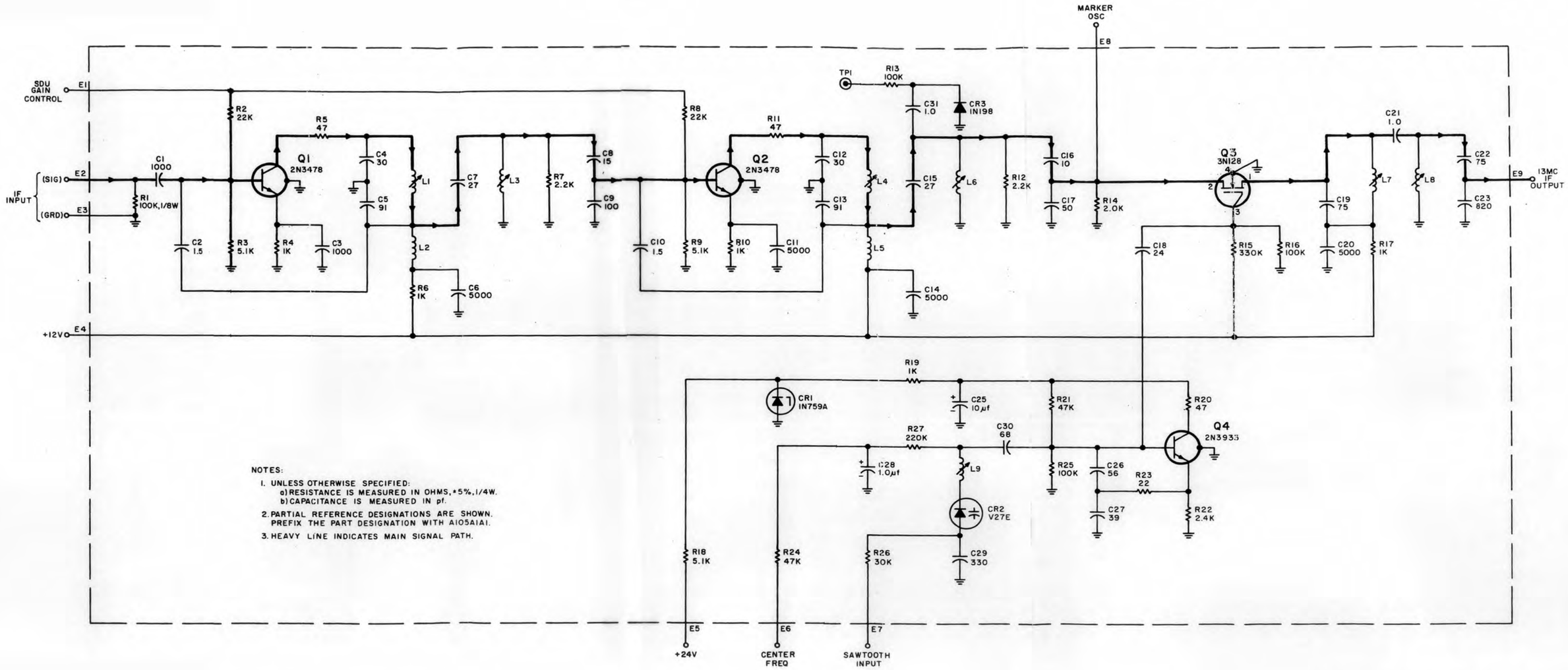


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W
   b) CAPACITANCE IS MEASURED IN pf.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN PREFIX THE PART DESIGNATIONS WITH A105A1
3. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS R1 & R3:
   CW INDICATES CLOCKWISE ROTATION
   ○ INDICATES FRONT PANEL CONTROL

* 4. NOMINAL VALUE. FINAL VALUE TO BE FACTORY SELECTED

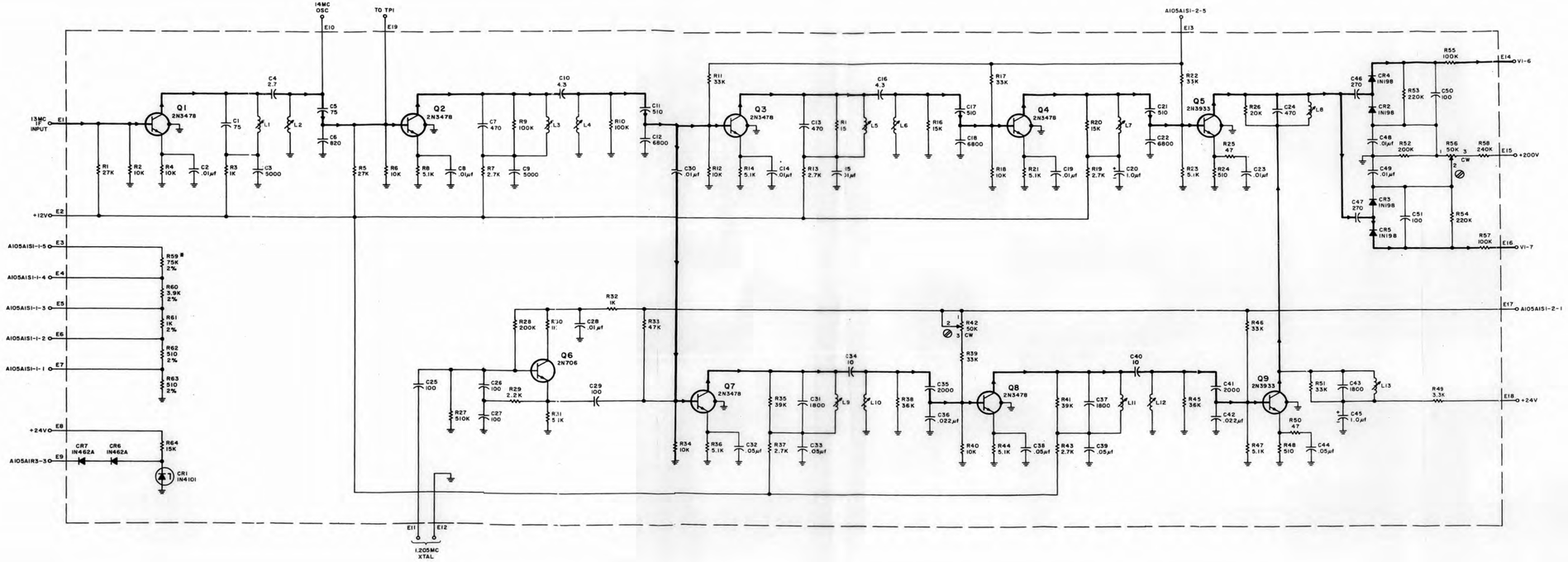
FO-3. Type 8103 IF Amplifier, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN pf.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A105A1A1.
3. HEAVY LINE INDICATES MAIN SIGNAL PATH.

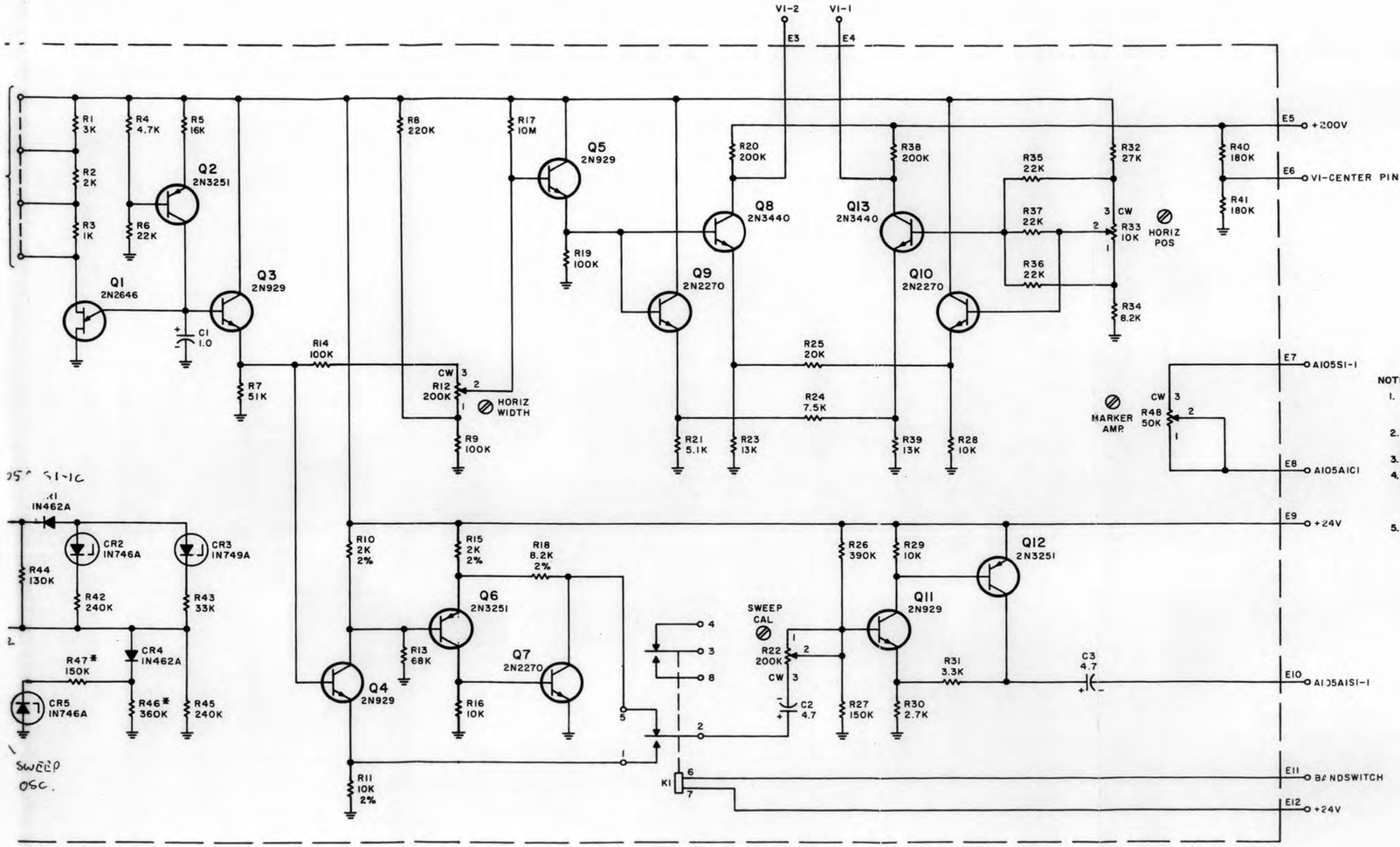
FO-4. Part 12634 IF Assembly, Schematic Diagram



NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, +5%, 1/4W
   b) CAPACITANCE IS MEASURED IN pf.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A105A1Z
3. HEAVY LINE INDICATES MAIN SIGNAL PATH
4. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS R42 & R56:
   CW INDICATES CLOCKWISE ROTATION
   ⊘ INDICATES SCREWDRIVER ADJUSTMENT
5. * INDICATES NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

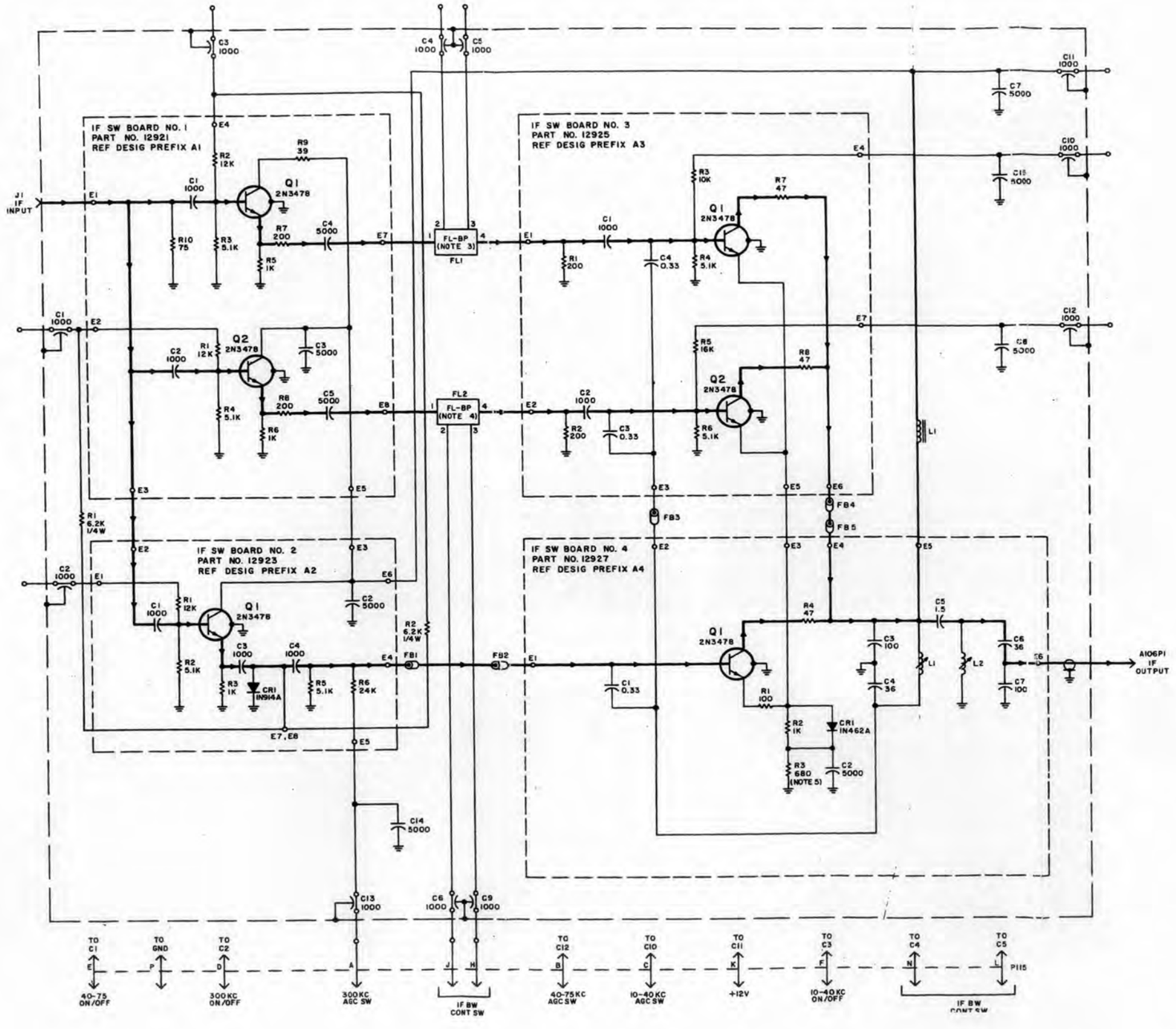
FO-5. Part 12660 IF Assembly, Schematic Diagram



NOTES:

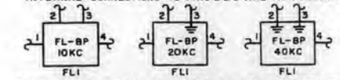
1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/4W.
   b) CAPACITANCE IS MEASURED IN μf.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A105A2.
3. * INDICATES NOMINAL VALUE; FINAL VALUE FACTORY SELECTED.
4. THE FOLLOWING NOTATIONS ARE USED ON POTENTIOMETERS:
   CW INDICATES CLOCKWISE ROTATION.
   ⊘ INDICATES SCREWDRIVER ADJUSTMENT.
5. CONNECTIONS MAY BE MADE ACROSS R1/R2/R3 AT FACTORY TO ADJUST DC LEVEL.

FO-6. Type 8218 Sweep Generator and Horizontal Amplifier, Schematic Diagram

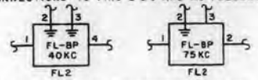


NOTES:

1. UNLESS OTHERWISE SPECIFIED:
   a) RESISTANCE IS MEASURED IN OHMS, ±5%, 1/8W.
   b) CAPACITANCE IS MEASURED IN pf.
2. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX THE PART DESIGNATION WITH A106.
3. FL1 CAN BE A 10KC, 20KC, OR 40KC BW XTAL FILTER. INTERNAL CONNECTIONS TO PINS 2 & 3 ARE AS FOLLOWS:

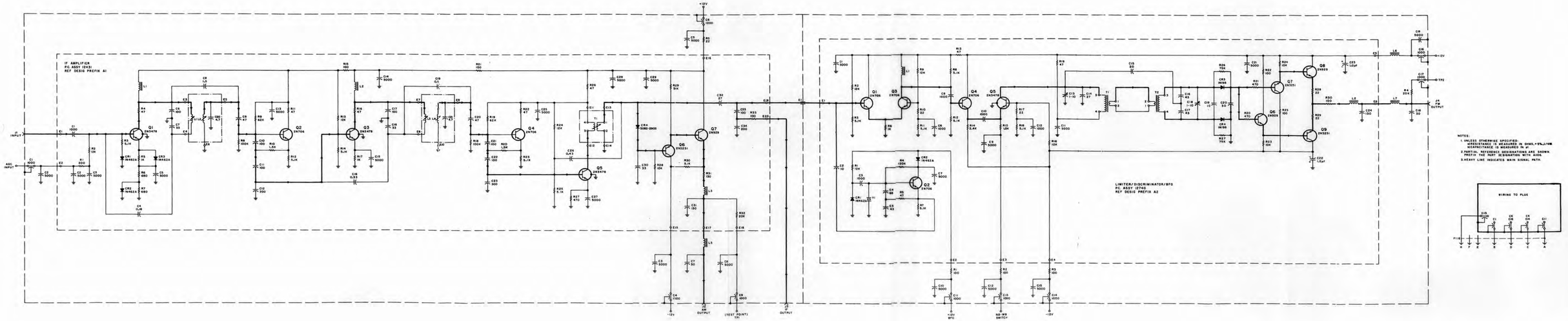


4. FL2 CAN BE A 40KC OR A 75KC BW XTAL FILTER. INTERNAL CONNECTIONS TO PINS 2 & 3 ARE AS FOLLOWS:

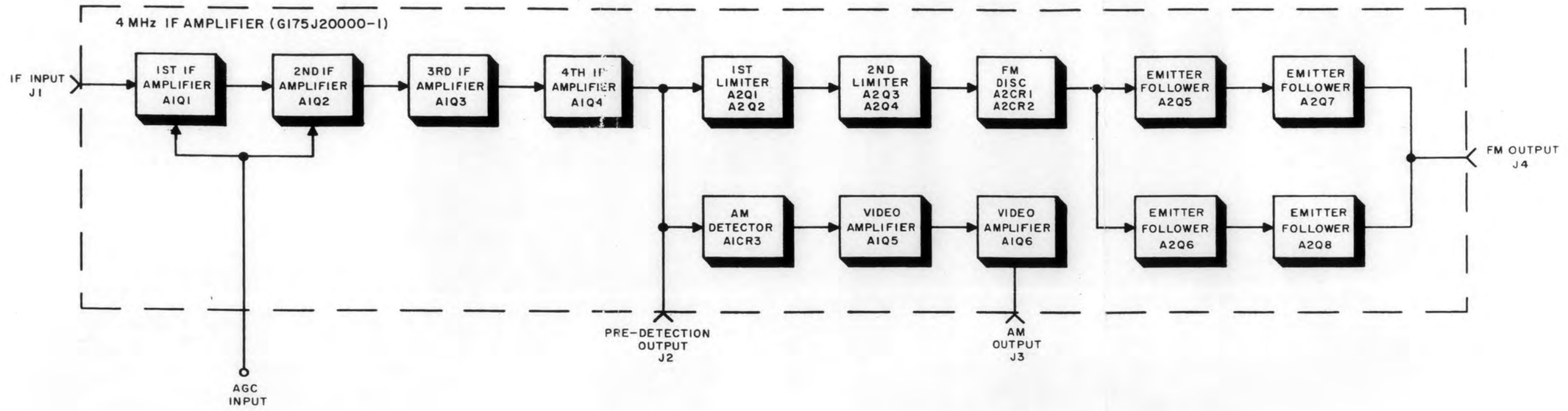


5. NOMINAL VALUE, FINAL VALUE FACTORY SELECTED.

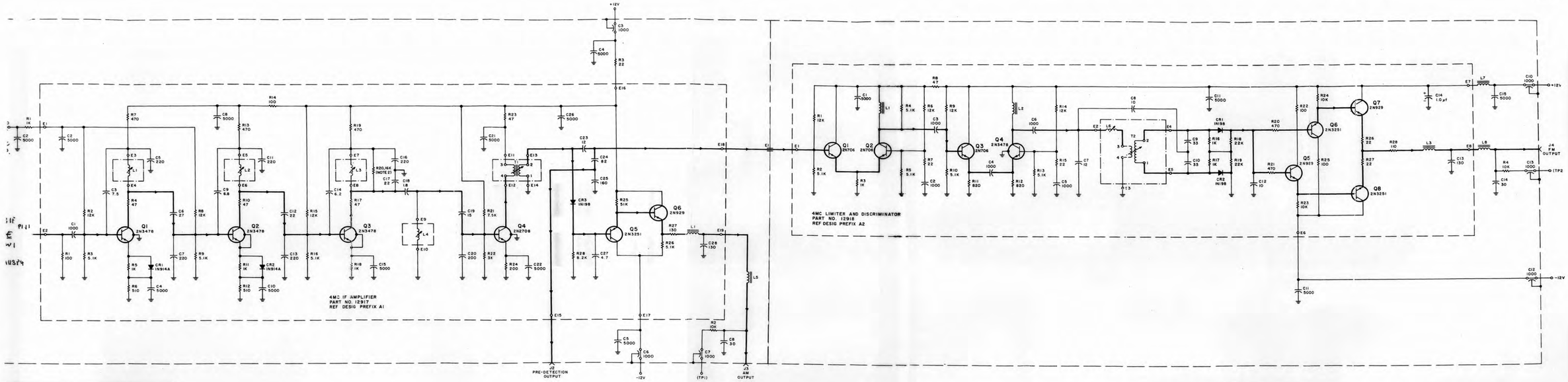
FO-1. Type 79193 IF Filter/Switching Module, Schematic Diagram



FO-1. Type 72127 300-kc Bandwidth IF Amplifier, Schematic Diagram



FO-1. G175K20000-2 4-mc Bandwidth IF Amplifier, Functional Block Diagram



FO-2. Type G175K20000-2 4-mc Bandwidth IF Amplifier, Schematic Diagram