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TECHNICAL MANUAL

for

SINGLE SIDEBAND RECEIVER CONVERTER, CV-2712/UR

DEPARTMENT OF THE NAVY

NAVAL ELECTRONIC SYSTEMS COMMAND

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LIST OF EFFECTIVE PAGES

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PATENT NOTICE

This equipment uses inventions of the Kahn Research Laboratories, Inc. which are either covered by U.S., Canadian and/or foreign patent(s) and/or patent application(s).

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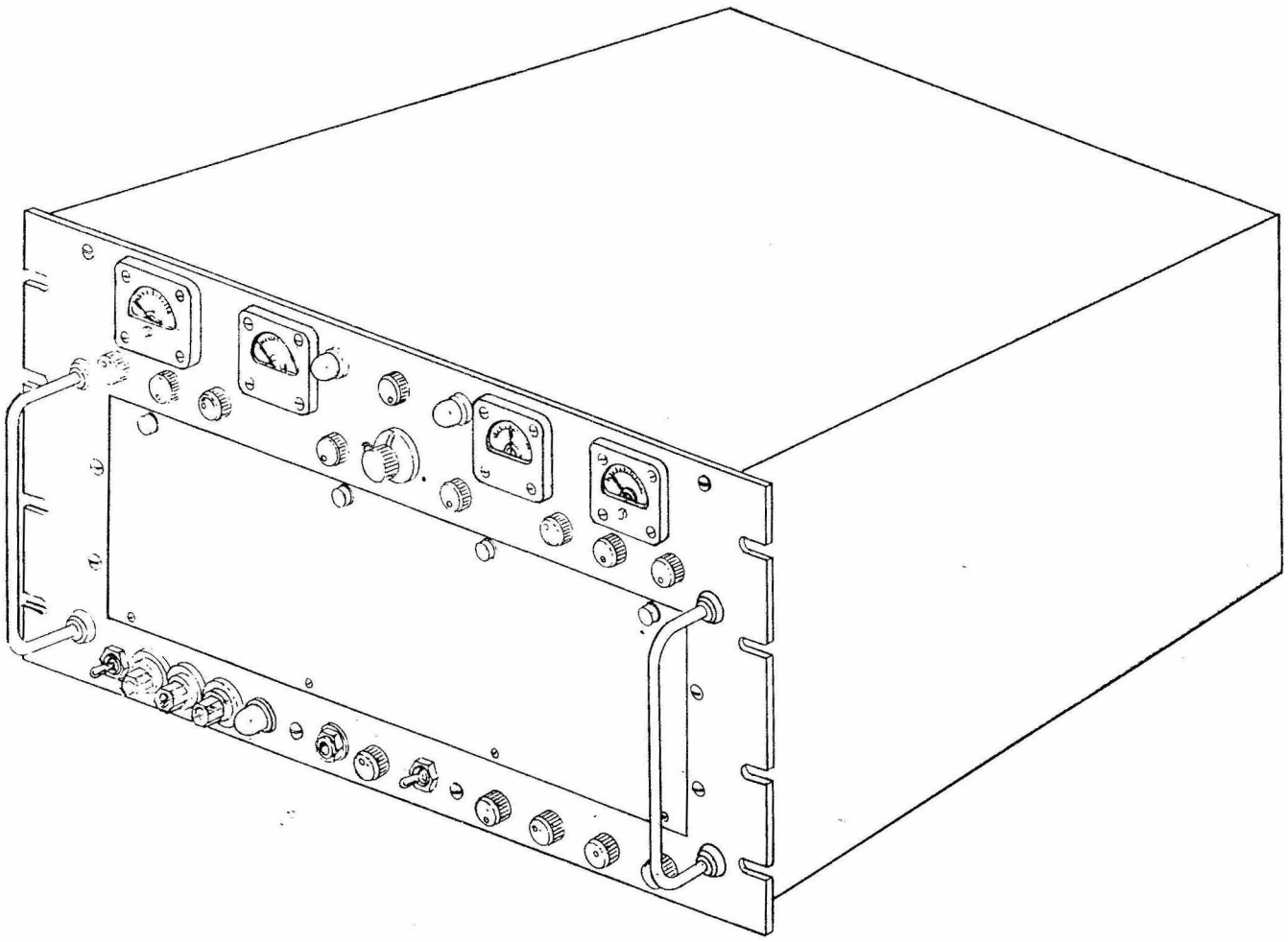


Figure 1-1. Single Sideband Receiver Converter, CV-2712/UR

SECTION 1

GENERAL INFORMATION

1-1. SCOPE.

This technical manual contains operation and service instructions together with an illustrated parts breakdown for the Single Receiver Converter, CV-2712/UR, (figure 1-1) manufactured by Kahn Research Laboratories, Inc., Freeport, New York.

1-2. GENERAL DESCRIPTION.

The Single Sideband Receiver Converter, CV-2712/UR, hereafter referred to as the converter, is an Independent Sideband (ISB) converter used with a general purpose communications receiver for receiving ISB suppressed carrier or reduced carrier signals. The converter accepts signals from the intermediate frequency amplifier of a radio receiver, demodulates the ISB signals and provides outputs in two independent audio frequency channels.

1-3. DESCRIPTION OF UNITS.

The converter consists of six basic units; power supply card, IF card, audio cards, AGC card, AFC cards and a meter card. The following paragraphs describe each of these units.

1-4. POWER SUPPLY CARD.

The power supply consists of an unregulated +24 volt oven supply, a regulated +24 volt supply and a regulated -24 volt supply.

a. OVEN SUPPLY. - This supply consists of a full wave rectifier and an RC filter, both of which are mounted entirely on the chassis.

b. REGULATED SUPPLY +24 VOLTS. - The +24 volt regulated supply consists of a bridge rectifier, a pre-regulator, a series regulator, a sampling circuit, an over-voltage protection circuit and a current limiter circuit.

c. REGULATED SUPPLY -24 VOLTS. - This supply is the same as the +24 volt regulated supply except that ground and output leads are reversed to obtain a -24 volt output.

1-5. IF CARD.

The IF card accepts IF from the communications receiver (not part of this equipment) and consists of a gain controlled amplifier, a mixer, a reactance tuned oscillator, a crystal oscillator an an emitter follower.

1-6. AUDIO CARD.

The converter uses two audio cards, Channel A and Channel B. In the SSB/CW (single sideband continuous wave) mode of the converter, the input to both cards consists of their respective sidebands and a 100 kHz reference. The audio signals are extracted from the sidebands by a balanced product demodulator. Each resulting audio signal is split into three paths: one of which goes to a ten-milliwatt amplifier; one to a one-watt amplifier; and one to a monitor circuit. In the AM (amplitude modulation) mode of the converter, the 100 kHz reference signal is disconnected, and the input to each card consists only of the respective audio signals. These audio signals are amplified and then split into three paths, the same as in the SSB/CW mode. The two audio cards function identically except for three differences described in the following paragraphs.

a. The channel B audio card is biased from the +24 volt regulated supply and the channel A audio card is biased from the -24 volt regulated supply. This reduces cross talk between channels through the power supplies.

b. The input stage of the one watt amplifier on the channel A card is comprised of two transistors (Darlington pair), while the input stage to the one watt amplifier on the channel B card is a single transistor. Both stages have been designed to give equal gain.

c. The channel B card has an audio monitor circuit which is not present on the channel A card. Input is from the LEVEL control, which is a balanced potentiometer. Input to either arm of the potentiometer is from the output of the balanced modulators on each audio card.

1-7. AGC CARD.

The AGC card peak detects the channel A, channel B and carrier signals to obtain dc voltage for use as an AGC signal. It also envelope detects both channel A and channel B signals for application to the respective audio cards in the AM mode.

1-8. AFC CARDS.

The converter uses two AFC Cards; AFC Card No. 1 and AFC Card No. 2. The following paragraphs describe each card.

a. AFC CARD NO. 1. - The AFC Card No. 1 compares the nominal 100 kHz IF frequency from the IF card with a 100 kHz reference signal and produces an output proportional to both the amount and direction of drift of the carrier frequency. The AFC Card No. 1 consists of a 100 kHz reference oscillator, a linear adder, three stages of limiting, a phase detector, and an amplifier.

b. AFC CARD NO. 2. - The AFC Card No. 2 differentiates the square wave output from the AFC Card No. 1, amplifies the resulting spikes and converts them into a dc voltage for application as an AFC signal to the voltage tuned local oscillator on the IF card. In addition, this card contains the carrier fade circuit and the carrier buffer amplifier.

1-9. METER CARD.

The METER card provides drive and switching for the DRIFT and FADE lamps and the DRIFT and CARRIER LEVEL meters. The circuits for the FADE lamps also control fade gate Z2 on AFC No. 2 Card and provide weak signal AGC voltage for application to the AGC plug-in module. In addition, the METER card contains a dc level shifter (Q1) which is common to both AGC circuits, providing strong signal and weak signal AGC paths. Further, the METER card contains part of the weak signal AGC control voltage circuits, namely transistors Q2 and Q14.

1-10. QUICK REFERENCE DATA.

Table 1-1 lists technical characteristics of the Single Sideband Receiver Converter, CV-2712/UR.

TABLE 1-1. TECHNICAL CHARACTERISTICS

ITEM	CHARACTERISTICS
Dimensions:	
Width	19 inches
Height	10-1/2 inches
Depth	16 inches
Weight	43 pounds
Input Power	115/230 volts ac ± 10%, 50/60 Hz ± 5% single phase, less than 50 watts.
Input Frequency	455 kHz ± 3 kHz
Input Signal Level	1 mV to 1,000 mV from a 50 ohm source.
Duty Cycle	Continuous, unattended.

TABLE 1-1. TECHNICAL CHARACTERISTICS (Continued)

ITEM	CHARACTERISTICS
Reception Modes	a. SSB or ISB with full carrier, reduced carrier, or totally supressed carrier.
	b. AM
	c. MCW or CW
Audio Output Level	a. High level: 0 to 1.0 watt, adjustable, into balanced 600 ohm line.
	b. Low level: 0 to 10 milliwatt, adjustable, into balanced 600 ohm line.
Audio Response	The response over the range of 100 Hz to 5 kHz is within ±1 db of the response at 1 kHz (referenced to an output of 1 mW into a 600 ohm resistance)
Audio Distortion	7%
AFC Correction Range	± 1 kHz
AFC Correction Accuracy	± 0.4 Hz
AFC Response Speed	10 Hz per second.
Unwanted Sideband Rejection	Undesired sidebands, removed more than 250 Hz from the carrier frequency are attenuated at least 60 db.
Ambient Temperature:	
Operating	0°C to +50°C
Storage	-62°C to +75°C
Ambient Relative Humidity	Up to 95%

1-11. EQUIPMENT SUPPLIED.

Equipment supplied as part of the Receiver Converter, CV-2712/UR is listed in table 1-2.

TABLE 1-2. EQUIPMENT SUPPLIED

QUANTITY	NOMENCLATURE
1	Single Sideband Receiver Converter, CV-2712/UR
1 set	RF connectors
1 set	Mounting hardware

1-12. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

Table 1-3 lists equipment required for use with the converter, but not supplied.

TABLE 1-3. EQUIPMENT REQUIRED BUT NOT SUPPLIED

QUANTITY	NOMENCLATURE
1	Communication Receiver
1	Speaker or Headphones

1-13. Table 1-4 lists the fuse, lamp and semiconductor complement used in the converter.

TABLE 1-4. FUSE, LAMP AND SEMICONDUCTOR COMPLEMENT

TYPE	QUANTITY
Fuse:	
1 Amp; (3 AG) Slow-Blow	3
Lamps:	
47	1
327	2
Semiconductors:	
1N705A-0	1
1N823	2
1N914	39
1N5059	12
1N5230B	1
1N5231	1
1N5252	1
2N1483	2
2N1711	1
2N3391	20
2N3713	2
2N3740	2
2N3766	2
2N3904	5
2N3906	10
2N4235	4
2N4238	4
2N4409	2
2N5086	1
2N5248	3
2N5306	20
2N5457	6
C106A2	2
MFE3006	6
MPS6507	8
MZ2361	15
MZ500-10	2
MZ500-20	2
MZ500-22	5

SECTION 2

INSTALLATION

2-1. UNPACKING AND HANDLING.

All equipment supplied with the Receiver Converter, CV-2712/UR is shipped in a single container. Remove packing material and lift the equipment out carefully. Inspect the converter thoroughly for possible damage in shipping. If a claim for damage is to be filed, the original shipping container and packing material should be preserved.

2-2. MOUNTING.

The Receiver Converter is designed for mounting in a standard 19-inch relay rack or cabinet and requires 10-1/2 inches of vertical panel space. Installation of the receiver converter is shown in figure 2-1. Four 10-32 screws are required for the mounting. Use of flat washers is recommended to preserve the finish.

2-3. SITE LOCATION.

A site should be selected which will keep the transmission lines from the converter to the receiver as short as possible. Attenuation of Type RG-8/U coaxial cable (normally used) is approximately 2.5 dB per 100 feet in the frequency range of a typical receiver. The converter should be located in an area where maximum air temperature immediately surrounding the converter will not exceed 50°C (122°F). If the converter is to be enclosed with other heat dissipating equipment in a single rack or cabinet, the temperature in the enclosure must be monitored to ensure normal operating temperatures of 0°C to +50°C. If necessary, forced ventilation should be installed to prevent excessive temperature.

2-4. EXTERNAL EQUIPMENT CONNECTIONS.

All connections are made on the rear panel of the converter. Table 2-1 lists the rear panel connectors, switches and controls and their functions. The location of the connectors, switches and controls is shown in figure 2-2.

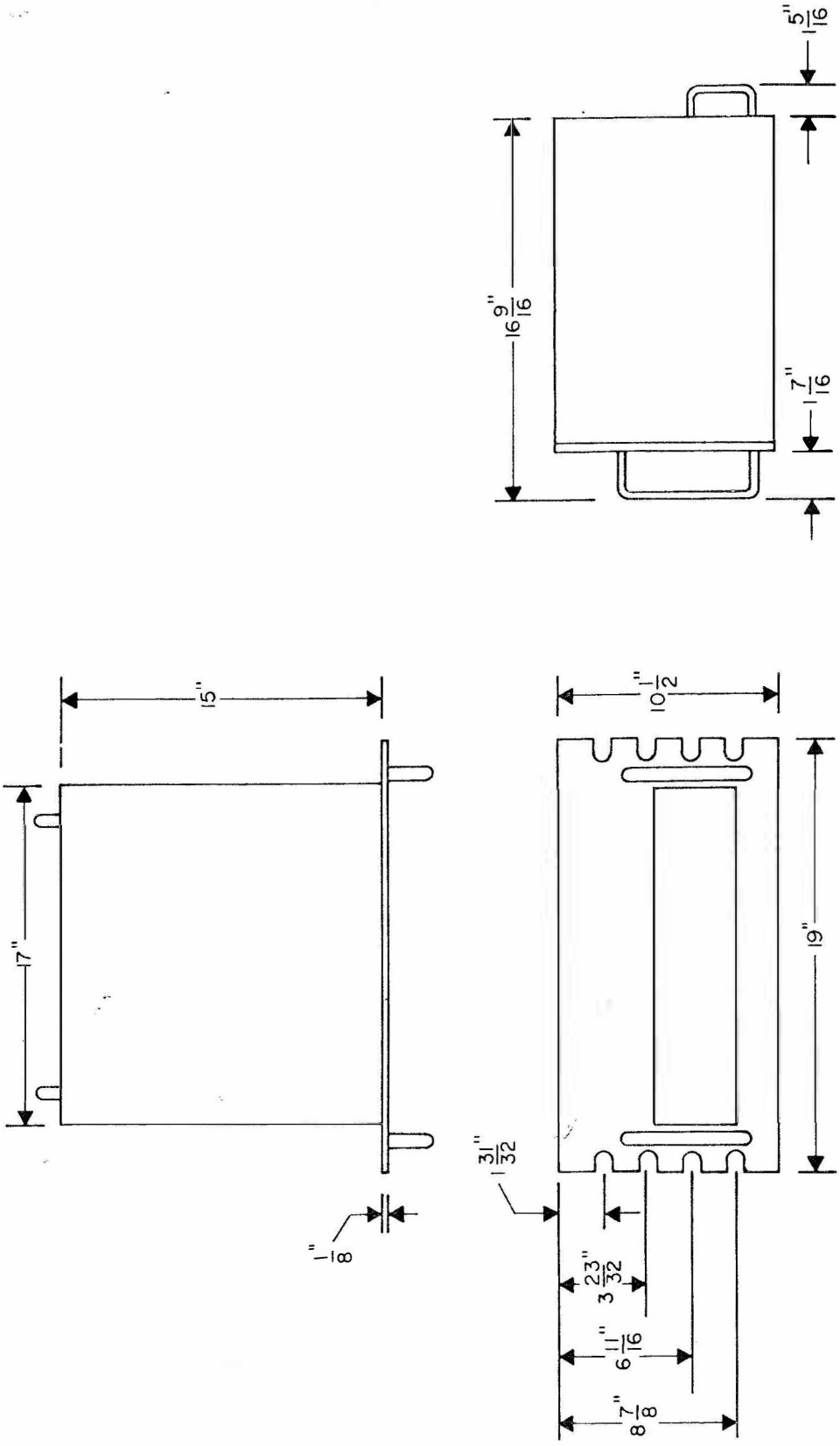


Figure 2-1. Installation Diagram

TABLE 2-1. REAR PANEL CONNECTORS, SWITCHES and CONTROLS

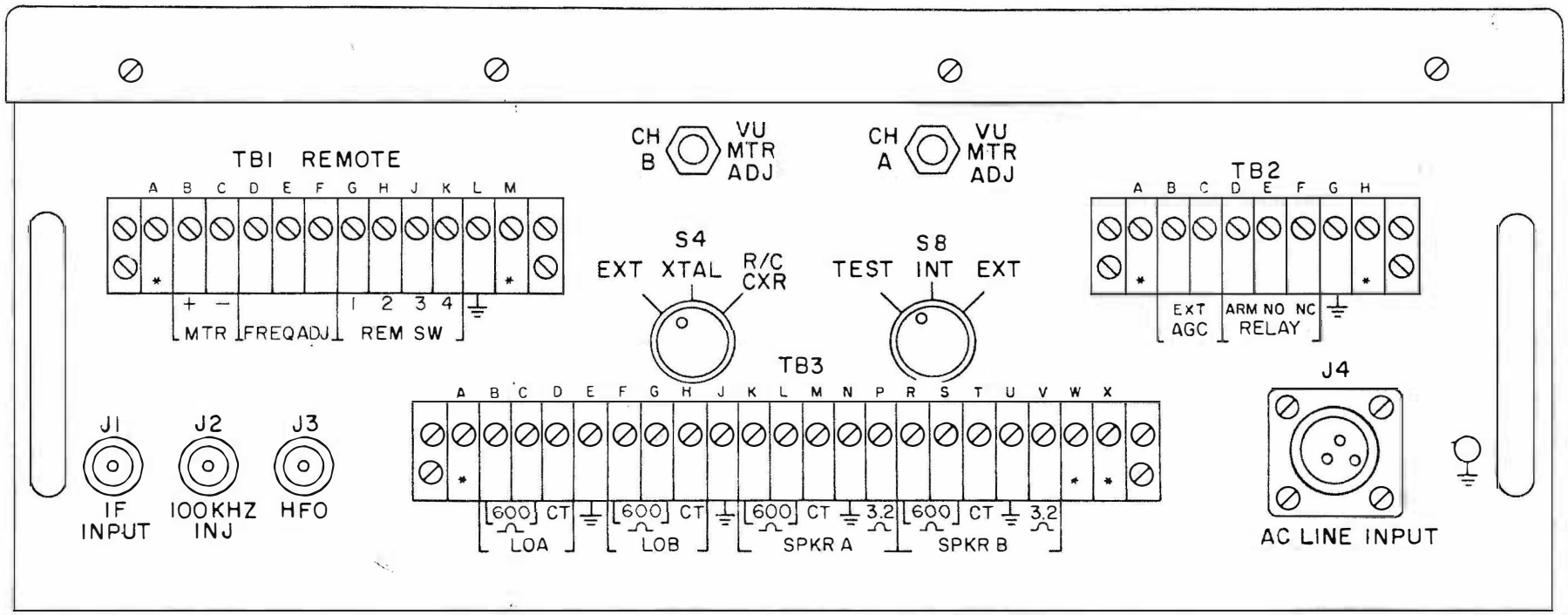
NAME	PANEL MARKING	TYPE AND FUNCTION
Power Connector	J4 AC LINE INPUT	Three-pin connector. Pin B is grounded. Pins A and C connected to 115V, 600 Hz line.
High Level Audio, Channel A	TB3 SPKR A	Four terminals on barrier strip TB3. Provides up to 1 watt into 600 ohms (floating) and a 3.2 ohm output. The 600 ohm output is center tapped.
High Level Audio, Channel B	TB3 SPKR B	Same as High Level Audio, Channel A.
Low Level Audio, Channel A	TB3 LOA	Three terminals on barrier strip TB3. Provides up to 10 mW into 600 ohms (floating). A center tap is provided.
Low Level Audio, Channel B	TB3 LOB	Same as Low Level Audio, Channel A.
IF Input	J1 IF INPUT	BNC connector. Input to receiver converter.
External AGC	TB2 EXT AGC	Two terminals on barrier strip TB2. Provides weak signal AGC from converter for use as desired.
Remote Control	TB1	Used with remote control unit (not supplied) as follows:
	MTR ±	Two terminals on barrier strip TB1 for connection of a remote carrier meter.

TABLE 2-1. REAR PANEL CONNECTORS, SWITCHES and CONTROLS (Continued)

NAME	PANEL MARKING	TYPE AND FUNCTION
	FREQ ADJ	Three terminals on barrier strip TB1 for connection of a remote potentiometer to manually control AGC in the TUNE mode.
	REM SW	Four terminals on barrier strip TB1 for connection of a remote AFC FUNC-TION switch.
IF Card Local Oscillator	J3 HFO	BNC connector. Provides for either injection of external local oscillator signal to IF card (S8 at EXT) or check of internal local oscillator on IF card (S8 at TEST).
100 kHz Injection	J2 100 kHz INJ	BNC connector. Provides for either injection of external 100 kHz to product demodulators or a check of the internal 100 kHz injection derived from R/C CXR or local crystal oscillator.
Product Demodulator Injection Selection Switch	S4	Selects source of 100 kHz injection to product demodulators on audio cards.
	EXT	100 kHz injection to product demodulators supplied from an external source at J2.
	XTAL	100 kHz injection to product demodulators from internal 100 kHz oscillator on AFC No. 1 card.
	R/C CXR	Injection to audio cards is own IF (100 kHz) from AFC No. 2 card.

TABLE 2-1. REAR PANEL CONNECTORS, SWITCHES and CONTROLS (Continued)

NAME	PANEL MARKING	TYPE AND FUNCTION
IF Local Oscillator Selection Switch	S8	Selects mode of local oscillator on IF card.
	TEST	Makes 555 kHz output of local oscillator on IF card available for test purposes at J3.
	INT	Permits local oscillator on IF card to be chosen by AFC FUNCTION switch on front panel.
	EXT	Disables both local oscillators on IF card. A 555 kHz signal is injected at J3.
Channel A VU Meter Calibration Control	CH A VU MTR ADJ	Channel A VU meter calibration control.
Channel B VU Meter Calibration Control	CH B VU MTR ADJ	Channel B VU meter calibration control.



*=SPARE TERMINAL

Figure 2-2. Rear Panel Connectors, Switches and Controls

SECTION 3

OPERATION

3-1. GENERAL.

This section contains operating instructions for the Single Sideband Receiver Converter, CV-2712/UR. The purpose and use of all operating controls including interpretation of indicating instrument readings are covered in this section. A view of the front panel is shown in figure 3-1.

3-2. OPERATING CONTROLS AND INDICATORS.

All controls and indicators necessary for operation of the converter, except switches S4 and S8, are located on the front panel. Switches S4 and S8 are located on the rear panel. The panel marking and function of each operating control and indicator is listed in table 3-1.

TABLE 3-1. FRONT PANEL CONTROLS AND INDICATORS

CONTROL OR INDICATOR	PANEL MARKING	FUNCTION
Power Switch	POWER	Applies power to the unit.
Power on Lamp	POWER	Lights to indicate power is applied to the unit.
Fuse with Indicator	AC LINE	One fuse with indicator for each side of ac line.
	SPARE	Spare fuseholder (no fuse).
RF Gain Control	RF GAIN	Varies the AGC voltage to first stage of IF card and to the AGC plug-in modules. Operational only with AGC SOURCE switch in MAN position. Maximum output (from the unit) is with the RF GAIN control in the extreme clockwise position.

TABLE 3-1. FRONT PANEL CONTROLS AND INDICATORS (Continued)

CONTROL OR INDICATOR	PANEL MARKING	FUNCTION
AGC Source Switch	AGC SOURCE	Provides for front panel control of source of AGC voltage.
	MAN	Permits AGC voltage to be controlled by RF GAIN control.
	CH A	AGC voltage derived from signal on Channel A (lower sideband).
	CH B	AGC voltage derived from signal on Channel B (upper sideband).
	CXR	AGC voltage derived from carrier.
	A or B	AGC voltage derived from either Channel A or Channel B signal, whichever is stronger.
AGC Time Constant Switch	TIME CONSTANT	Controls the rise and decay time of the AGC voltage.
	FAST	20 msec attack; 100 msec decay
	SLOW	40 msec attack; 2 msec decay
AFC Pip and Channel Monitor Switch	AFC PIP MON	Permits monitoring of the AFC pip rate or audio from either Channel A or Channel B.
	ON	Permits monitoring of AFC pip rate at PHONE jack.
	OFF	Permits monitoring of either Channel A or Channel B audio at PHONE jack.

TABLE 3-1. FRONT PANEL CONTROLS AND INDICATORS (Continued)

CONTROL OR INDICATOR	PANEL MARKING	FUNCTION
Channel A or B Monitor Control	LEVEL	With AFC PIP MON switch at OFF permits monitoring of either Channel A or Channel B audio at PHONE jack.
	A	Monitors Channel A audio.
	B	Monitors Channel B audio.
Channel A VU Meter	-	Indicates output level of Channel A low level output. Calibrated so that 0 VU corresponds to +10 dbm.
Channel B VU Meter	-	Indicates output level of Channel B low level output. Calibrated so that 0 VU corresponds to +10 dbm.
Channel A Low Level Output Control	LINE LEVEL	Controls level of Channel A low level output.
Channel B Low Level Control	LINE LEVEL	Controls level of Channel B low level output.
Channel A High Level Output Control	MONITOR SPKR	Controls level of Channel A high level output.
Channel B High Level Output Control	MONITOR SPKR	Controls level of Channel B high level output.
Carrier Strength Meter	CARRIER	Indicates relative strength of carrier.
Drift Meter	DRIFT	Indicates amount and direction carrier has deviated from center frequency.
Drift Lamp	DRIFT	Lights when carrier drifts more than about ±500 cycles from center frequency.

TABLE 3-1. FRONT PANEL CONTROLS AND INDICATORS (Continued)

CONTROL OR INDICATOR	PANEL MARKING	FUNCTION
Fade Lamp	FADE	Lights when level of carrier signal has decreased enough to cause a possible failure of the AFC loop.
Channel A IF Bandwidth Switch	IF BANDWIDTH	Selects the passband of the sideband filter for Channel A.
	3.3 KHz LSB	Sets passband of the sideband filter at 0.25-3.3 kHz above 100 kHz IF.
	7.5 KHz LSB	Sets passband of the sideband filter at 0.25-7.5 kHz above 100 kHz IF.
	3.3 KHz AM	Sets passband of the sideband filter at ±3.3 kHz around 100 kHz IF.
	WIDE	Removes all sideband filtering.
Channel B IF Bandwidth Switch	IF BANDWIDTH	Selects the passband of the sideband filter for Channel B.
	3.3 KHz USB	Sets passband of the sideband filter at 0.25-3.3 kHz below 100 kHz IF.
	7.5 KHz USB	Sets passband of the sideband filter at 0.25-7.5 kHz below 100 kHz IF.
	3.3 KHz AM	Sets passband of the sideband filter at ±3.3 kHz around 100 kHz IF.
	WIDE	Removes all sideband filtering.

TABLE 3-1. FRONT PANEL CONTROLS AND INDICATORS (Continued)

CONTROL OR INDICATOR	PANEL MARKING	FUNCTION
Carrier Gain Control	LEVEL	Controls carrier level. Carrier level is maximum when control is in extreme clockwise position.
Mode Switch	MODE	Selects mode of operation.
	AM	Unit is set to receive ordinary AM.
	SSB/CW	Unit is set to receive SSB or CW signals.
AFC Selector Switch	AFC FUNCTION	Selects mode of AFC.
	OFF	No AFC (Xtal Control).
	TUNE	No AFC. Reactance tuned oscillator on IF card can be pulled ±3 kHz by front panel TUNE control.
	ON	AFC is applied to reactance tuned oscillator on IF card.
	REMOTE	AFC mode is selected by remote operator.
AFC Tuning Control	TUNE	Operable only when AFC function switch is set at TUNE or ON. Enables local oscillator on IF card to be tuned ± 3 kHz.
AFC Threshold Control	THRESHOLD	Sets the level at which the FADE lamp lights.

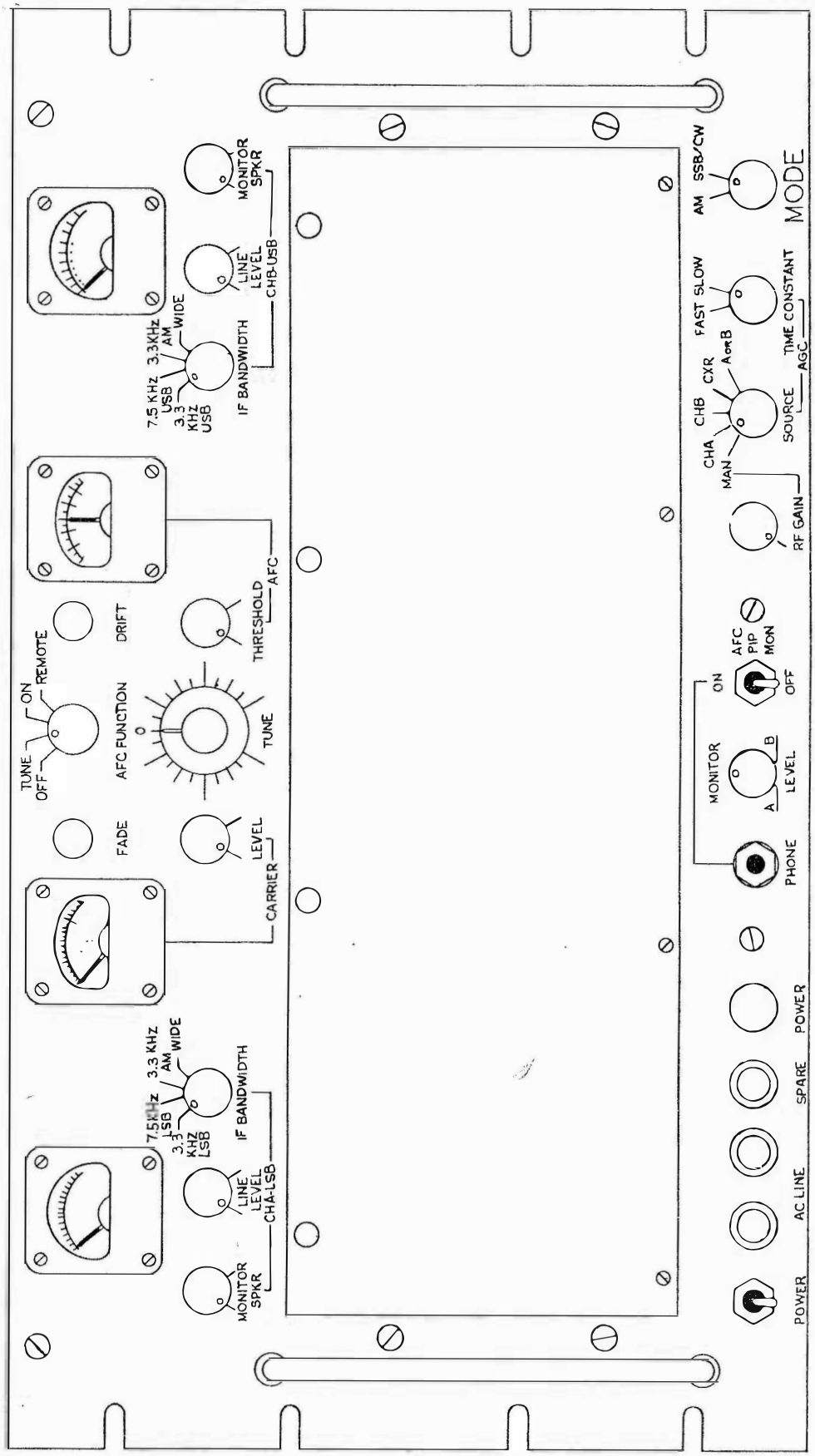


Figure 3-1. Front Panel Controls and Indicators

3-3. OPERATING INSTRUCTIONS.

Operating instructions consist of preliminary control settings, starting, operating and stopping procedures.

3-4. PRELIMINARY CONTROL SETTINGS.

Before attempting any mode of operation with the converter perform the initial control settings as follows:

CONTROL	POSITION
CHA - LSB IF BANDWIDTH	3.3 kHz LSB
CHB - USB IF BANDWIDTH	3.3 kHz USB
CHA - LSB LINE LEVEL	CCW (extreme position)
CHB - USB LINE LEVEL	CCW (extreme position)
CHA - LSB MONITOR SPKR	CCW (extreme position)
CHB - USB MONITOR SPKR	CCW (extreme position)
TUNE	0 (center position)
MONITOR	center position
RF GAIN	CCW (extreme position)
AGC SOURCE	A or B
AGC TIME CONSTANT	SLOW
CARRIER LEVEL	CCW (extreme position)
AFC THRESHOLD	CCW (extreme position)
AFC FUNCTION	OFF
MODE	SSB/CW
AFC PIP MON	ON
S4	XTAL
S8	INT

3-5. STARTING.

After a complete shutdown, or starting converter for the first time, perform the preliminary control settings in paragraph 3-4.

To start the converter, proceed as follows:

Note

Ensure that line cord is plugged into ac power line and AC LINE INPUT J4.

a. Set POWER switch to ON. The POWER lamp will light indicating power is being applied to the unit.

b. Allow converter to warm up for at least one hour to ensure stable operation.

3-6. EMERGENCY STARTING.

In the event of an emergency the converter can be turned on and operated without a warmup time as follows.

a. Set POWER switch to on.

b. Set S8 to INT.

c. Set AFC FUNCTION switch to TUNE.

d. Adjust TUNE control as necessary to maintain frequency control of the local oscillator.

3-7. TYPES OF OPERATION.

The converter can be operated local (on site) or remote (remote site).

a. ON SITE OPERATION. - On site operation is dependent partly on operators choice and partly on the received input.

b. REMOTE OPERATION. - Remote operation requires a special remote operating fixture, not normally supplied with the converter. The remote capabilities are as follows:

1. Tuning to and locking on to a carrier frequency, or if necessary, continually tuning the oscillator frequency (if in the SSB mode).

2. A remote carrier meter (identical to the carrier meter in the converter) provides monitoring of the carrier signal strength.

3. Remote monitoring of the AGC is available. The monitor will indicate whichever AGC has been selected by the AGC source switch.

4. Remote FADE relay is made available to detect possible failure of the AFC loop.

3-8. MODES OF OPERATION.

With the use of front panel MODE switch, the converter can provide demodulation in the SSB/CW mode (independent sideband, product demodulation) or in the AM mode (envelope detection). The capabilities available with each mode of operation is as follows:

a. AFC (AUTOMATIC FREQUENCY CONTROL). - This capability is available only if a carrier is present in the received input to the converter.

A carrier is considered present when it is not more than 20 DB below the received sideband.

b. INTERNAL CRYSTAL CONTROLLED LOCAL OSCILLATOR. - This capability is used when AFC is not desired and can be chosen with any received carrier.

c. EXTERNAL LOCAL OSCILLATOR. - This capability is used when AFC is not desired and is available with any received carrier. An external generator is required to supply a 555 kHz input signal to the converter (for use as local oscillator) at connector J3 on the rear panel. This external capability can also be used to slave one or more units by setting switch S8 to TEST. A 555 kHz output (of the local oscillator on IF card) is now available at J3 for either test purposes or application to additional units for use as a local oscillator injection.

d. AGC (AUTOMATIC GAIN CONTROL). - AGC capabilities are always available. The operator has the choice of deriving AGC from either the upper sideband or lower sideband whichever is available in the received input, from the stronger of the two sidebands (derived automatically by a strong signal gate in the AGC card) or from the carrier if it is present.

e. MANUAL GAIN CONTROL. - This capability is always available and can be used by setting the AGC source switch to MAN and adjusting the RF GAIN control.

f. PRODUCT DEMODULATOR INJECTION. - The converter provides the operator with the capability of choosing the 100 kHz reference signal to be injected into the product demodulators on the audio cards. Switch S4 provides a rear panel selection of R/C CXR injection (only when carrier is available), internal crystal oscillator or external oscillator injection. In the two internal selections (R/C CXR and XTAL) the 100 kHz injection signal can be monitored at the rear panel jack J2. The output at J2 can also be tapped off and applied to one or more units for injection to their own product demodulators.

In the external position the 100 kHz injection signals (R/C CXR and XTAL) are disconnected and an external oscillator signal can be applied to J2 for application to the product demodulators.

g. BANDWIDTH SELECTION. - The converter provides the capability to select the

passband of the sideband filters. The bandwidth of either sideband (upper or lower) can be independently chosen to be 3.3 kHz or 7.5 kHz. In the AM mode the bandwidth can be selected as ±3.3 kHz on either side of the 100 kHz carrier. For wideband AM operation all sideband filtering can be removed by selecting WIDE position on IF bandwidth switch.

h. AGC TIME CONSTANT. - The converter provides capability of controlling the rise and decay time of the AGC voltage. The operator can choose a time constant to give a fast attack, fast decay or a slow attack, slow decay.

3-9. OPERATING PROCEDURES

Perform the operating procedure applicable to the mode of operation selected.

a. SSB/CW (FULL CARRIER OR REDUCED CARRIER ONLY).

1. Perform the preliminary control settings (paragraph 3-4).

2. Perform the starting procedures (paragraph 3-5 a and b).

3. Set MODE switch to SSB/CW.

Note

If operation with AFC is desired perform steps 4 through 13. If operation with internal local oscillator is desired perform steps 14 and 15 then proceed to step 19. If external operation is desired perform steps 16 through 18 then proceed to step 19. If AFC is not chosen proceed to step 14.

4. Set AFC FUNCTION switch to TUNE.

5. Plug headphone into MONITOR PHONE jack.

6. Set AFC PIP MON to ON.

7. Rotate CARRIER LEVEL control fully clockwise.

8. Set AGC SOURCE switch to MAN.

9. Rotate RF GAIN control clockwise to 75% of its full rotation.

10. Rotate AFC THRESHOLD control clockwise to 50% of its full rotation.

11. Adjust TUNE control as necessary to minimize rep rate of signal heard in headphone and to peak CARRIER meter. If CARRIER meter deflects off scale high, reduce setting of RF GAIN control.

12. Adjust CARRIER LEVEL control and RF GAIN control so that CARRIER meter is reading between 40-45 and CARRIER LEVEL control is set clockwise to approximately 10% of its full rotation.

Note

Allow approximately 1 minute for CARRIER meter to settle before proceeding to next step.

13. Set AFC FUNCTION switch to ON. Verify that AFC is in control by checking that CARRIER meter maintains an indication of 40-45 and rep rate signal heard in headphone is minimized.

14. Set switch S8 (rear panel) to INT.

15. Set AFC FUNCTION switch to OFF.

16. Set switch S8 (rear panel) to EXT.

17. Set AFC FUNCTION switch to OFF.

18. Apply external oscillator signal of 555 kHz at BNC connector J3 (rear panel.) The amplitude of the signal shall be at least 750 mv rms and not more than 800 mv rms.

19. Rotate CARRIER LEVEL control clockwise to approximately 10% of its full rotation.

20. Set AGC SOURCE switch to MAN.

21. Rotate AFC THRESHOLD control clockwise to 50% of its full rotation.

22. Rotate RF GAIN control until CARRIER meter indicates between 40 and 45.

Note

Choice of 100 kHz demodulator injection can be made by selecting internal XTAL (step 23), R/C CXR (step 24) or EXT (step 25).

23. Set switch S4 (rear panel) to XTAL.

24. Set switch S4 (rear panel) to R/C CXR.

25. Set switch S4 (rear panel) to EXT and apply external oscillator signal of 100 kHz at 100 mv rms to the BNC connector J2.

Note

If AGC is desired it can be selected from the carrier (CXR) step 26, upper sideband (CHB) step 27, lower sideband (CHA) step 28 or from the stronger of the two sidebands (A or B) step 29. If AGC is not desired proceed to step 30.

26. Set AGC SOURCE switch to CXR.

27. Set AGC SOURCE switch to CHB.

28. Set AGC SOURCE switch to CHA.

29. Set AGC SOURCE switch to A or B.

Note

Narrow or wide bandwidth can be selected for either the upper or lower sideband filters. Perform step 30 for 3.3 kHz (narrow) or step 31 for 7.5 kHz (wide).

30. Set IF BANDWIDTH switch to 3.3 kHz.

31. Set IF BANDWIDTH switch to 7.5 kHz.

32. Rotate AFC THRESHOLD control fully clockwise. Back off slowly until FADE lamp lights, then rotate control clockwise again until lamp just goes out.

33. Adjust audio output level of either channel A or channel B whichever is desired, by rotating LINE LEVEL control and observing appropriate VU meter.

34. Set AGC TIME CONSTANT switch to FAST or SLOW position whichever rise and decay time is desired.

b. SSB/CW (SUPPRESSED CARRIER ONLY).

1. Perform the preliminary control settings (paragraph 3-4).

2. Perform the starting procedures (paragraph 3-5 a and b).

3. Set MODE switch to SSB/CW.

Note

If operation with internal local oscillator is desired perform steps 4 and 5. If external operation is desired perform steps 6 through 8. After choice of local oscillator is selected perform steps 9 and 10.

4. Set switch S8 (rear panel) to INT.

5. Set AFC FUNCTION switch to OFF.

6. Set switch S8 (rear panel) to EXT.

7. Set AFC FUNCTION switch to OFF.

8. Apply external oscillator signal of 555 kHz at BNC connector J3 (rear panel). The amplitude of the signal shall be at least 750 mv rms and not more than 800 mv rms.

9. Rotate RF GAIN control fully clockwise.

10. Set AGC SOURCE switch to MAN.

Note

A choice of 100 kHz demodulator injection can be made by selecting internal XTAL (step 11), or EXT (step 12).

11. Set switch S4 (rear panel) to XTAL.

12. Set switch S4 (rear panel) to EXT and apply external oscillator signal of 100 kHz at 100 v rms to the BNC connector J2.

Note

If AGC is desired, it can be selected from the upper sideband (CHB) step 13, lower sideband (CHA) step 14 or from the stronger of the two sidebands (A or B) step 15. After AGC is selected proceed to step 16. If AGC is not desired proceed to step 20.

13. Set AGC SOURCE switch to CHB.

14. Set AGC SOURCE switch to CHA.

15. Set AGC SOURCE switch to A or B.

Note

Narrow or wide bandwidth can be selected for either upper or lower sideband filters. Perform step 16 for 3.3 kHz (narrow) or step 17 for 7.5 kHz (wide).

16. Set IF BANDWIDTH switch to 3.3 kHz.

17. Set IF BANDWIDTH switch to 7.5 kHz.

18. Adjust audio output level of either channel A or channel B whichever is desired by rotating LINE LEVEL control and observing appropriate VU meter.

19. Set AGC TIME CONSTANT switch to FAST or SLOW position whichever rise and decay time is desired.

20. Perform step 16 (paragraph 3-9b) for narrow bandwidth or step 17 (paragraph 3-9b) if wide bandwidth is desired.

21. Perform step 20 (paragraph 3-9b).

22. Adjust audio output level of either channel A or channel B whichever is desired by rotating LINE LEVEL control (low level) or MONITOR SPKR control (high level) clockwise between approximately 30 to 50% of its full rotation.

23. Set AGC SOURCE switch to MAN.

24. Rotate RF GAIN control for desired level.

c. AM.

1. Perform the preliminary control settings (paragraph 3-4).

2. Perform the starting procedures (paragraph 3-5 a and b).

3. Set MODE switch to AM.

4. Perform steps 4 through 13 of paragraph 3-9a if operation with AFC is desired.

5. Perform steps 14 and 15 of paragraph 3-9a if operation with internal local oscillator is desired.

6. Perform steps 16 through 18 of paragraph 3-9a if operation with external oscillator is desired.

7. Perform steps 19 through 22 of paragraph 3-9a.

Note

Choice of 100 kHz demodulator injection can be made by selecting internal XTAL, R/C CXR or EXT.

8. Perform step 23, 24 or 25 of paragraph 3-9a depending on choice of demodulator injection desired.

Note

If AGC is desired it can be selected from the carrier (CXR), upper sideband (CHB), lower sideband (CHA) or from the stronger of the two sidebands (A or B). Proceed to step 10 (paragraph 3-9c) if AGC is not desired.

9. Perform step 26, 27, 28 or 29 of paragraph 3-9a depending on choice of AGC desired.

10. Set IF BANDWIDTH switch to 3.3 kHz AM.

11. Perform steps 32 through 34 of paragraph 3-9a.

3-10. STOPPING.

To shut down the converter, set the POWER switch to OFF. The POWER lamp will go out indicating power has been disconnected.

SECTION 4

TROUBLESHOOTING

This section provides information required for troubleshooting the Single Sideband Receiver Converter, CV-2712/UR. It includes functional description of the equipment, a functional description of each subsystem, and a circuit description of each subsystem. Trouble analysis, troubleshooting procedures, a troubleshooting chart, voltage charts, and waveform data will be included.

4-1. OVER-ALL FUNCTIONAL DESCRIPTION (See Figure 4-1).

The 455 kHz input signal is applied to the IF card where it is mixed with the 555 kHz local oscillator signal, producing a frequency difference of 100 kHz. The local oscillator signal may be either externally supplied, crystal controlled, or voltage controlled (for application of AFC). The choice of local oscillator is controlled by the front panel AFC FUNCTION switch for crystal or VCO modes and switch S4 (on the rear panel) for external mode. The 100 kHz IF signal from the IF card is split and goes to the upper sideband filter (channel A), the lower sideband filter (channel B), and the carrier bandpass filter. The desired bandpass can be selected by the front panel IF BANDWIDTH switches. After filtering, both sideband signals go to separate channels on the AGC plug-in module, which amplify the signals. The gain of these channels is controlled by a weak signal AGC voltage. In the SSB/CW mode, the amplified signals from the AGC plug-in module go to audio cards (A AUDIO and B AUDIO) where the signals are product detected. In the AM mode, the amplified signal from the AGC plug-in module is envelope detected on the AGC card and applied to the respective audio cards. The resultant audio signals are amplified and provide high and low level outputs at rear panel connectors.

The output of the carrier bandpass filter is amplified in the AGC plug-in module, and is applied to the carrier buffer amplifier on AFC No. 2 card. The carrier is then applied to AFC No. 1 card for AFC, to the AGC card for AGC, and to switch S4 for R/C CXR demodulation. In AFC No. 1 card the nominal 100 kHz from the carrier is linearly added to 100 kHz reference signal. The resultant output of the adder is limited to remove AM components and then phase detected. The sawtooth output of the phase detector is clipped to produce a square wave. This square wave is differentiated producing spikes for application to plus and minus peak detectors, that provide dc output used as AFC voltage.

The metering circuits provide front panel indications of the Channel A and the Channel B low-level output levels, the relative carrier strength and the amount of drift of the carrier frequency. A FADE lamp lights when the carrier signal falls below a pre-set level established by the AFC THRESHOLD control on the front panel. The DRIFT lamp lights when the carrier drifts more than 500 Hz from its center frequency.

4-2. SUBSYSTEM FUNCTIONAL DESCRIPTION.

a. IF CARD (See Figure 4-2). - The 455 kHz input signal is applied to a gain controlled amplifier whose gain is controlled by a strong signal AGC voltage. The amplified 455 kHz signal is applied to a mixer stage where it is mixed with the output of either a reactance tuned oscillator (RTO), a crystal controlled oscillator, or an externally supplied signal as selected by switches S7 and S8. The 100 kHz output of the mixer is then applied to an emitter follower which allows proper termination of the filters that follow the IF card. The RTO is controlled by the AFC signal output of AFC No. 2 card to maintain 100 kHz output of mixer Q2. Q6 is a buffer stage between either internal oscillator (whichever is running) and the mixer transistor. The oven heater maintains a fixed temperature for the internal oscillators.

b. CHANNEL A AUDIO CARD (See Figure 4-3). - The information signal is applied to a phase splitter whose outputs to the balanced product demodulator are 180° out of phase with each other. A 100 kHz reference signal is applied to a two stage amplifier-limiter and the output is applied to the product demodulator. Each audio output from the balanced product demodulator is applied to one input of a differential amplifier. The audio frequency output from the differential amplifier is filtered and applied to the next stage where it is amplified and sent to the LINE LEVEL, MONITOR SPKR, and MONITOR LEVEL controls. The output of these controls go through amplification stages to produce 1 watt and 10 milliwatt outputs.

c. CHANNEL B AUDIO CARD (See Figure 4-4). - The Channel B audio card functions identifically to the Channel A audio card, except for three differences noted in paragraphs 1-6. a, b, and c.

d. AFC CARD NO. 1 (See Figure 4-5). - The 100 kHz output of the carrier buffer amplifier is applied to amplifier-limiter Q3, Q4, whose output is linearly added to the output of 100 kHz crystal oscillator Q1, Q2, Y1. The resulting sum signal is amplified by Q5 and applied to limiter Q6, Q7, Q8. Limiter Q6, Q7, Q8 removes any AM components that may be present and, via amplifier Q9, supplies the signal to phase detector T1, D9, D10. The output of phase detector T1, D9, D10 is a sawtooth which is amplified and clipped by amplifier Q10, Q11 to supply a square wave to AFC Card No. 2.

e. AFC CARD NO. 2 (See Figure 4-6). - The output of AFC Card No. 1 is differentiated by C1, R1, and amplified by amplifier Q1, Q2. The output of the amplifier is applied to circuit Z1 which extracts a dc level from the pulse train. The output of the amplifier also provides a signal to the AFC pip monitor. The output of Z1 is applied to servo loop amplifier Q3, Q4, Q5, Q6 and then via fade gate Z2, to the IF card as the AFC signal.

f. POWER SUPPLY CARD (See Figure 4-7). - The power supply card consists of two supplies; a regulated +24 volt, and a regulated -24 volt supply. Bridge rectifiers for both supplies, as well as for the +24 volt unregulated oven supply, are mounted on the chassis.

1. The +24 volt regulated supply functions as follows:

The output of the bridge rectifier is applied to pre-regulator Q1, D1 whose output is applied to series regulator transistor QQ3. The series regulator is controlled via control Q2, by the output of reference amplifier Q4 whose output is a function of the regulated +24 volts. Overvoltage protection Q5, Q6 protects circuitry which use the +24 volts from damage due to an overvoltage condition.

2. The -24 volt regulated supply operates in the same way as the +24 volt regulated supply except that ground and output leads are reversed to obtain a -24 volt output.

g. METER CARD (See Figure 4-8). - The output from the AGC card is applied via AGC SOURCE Switch S1 as the AGC input to emitter follower Q1. The output of Q1 is supplied back to the AGC card to generate the strong signal AGC, and is applied to amplifier Q2, Q14, whose output is the weak signal AGC. Carrier AGC from the AGC Card is applied to emitter follower Q3. The output of Q3 is applied to the CARRIER LEVEL meter and to AFC threshold amplifier Q4. The output of Q4 is applied to solid state relay Q5, Q6, Q7 whose output lights the FADE alarm, via relay KK1, and controls the fade gate on AFC Card No. 2. AFC voltage from AFC Card No. 2 is applied to DC amplifier Q8, Q9, Q10, Q11. The output of the DC amplifier is applied to the DRIFT Meter and to solid state relay Q12, Q13. The solid state relay lights the DRIFT alarm via relay K1.

h. AGC Card (See Figure 4-9). - The AGC Card provides peak and envelope detection of the channel A and channel B signals derived from the lower sideband (LSB) and upper sideband (USB) filters, respectively. In addition, this card provides peak detection

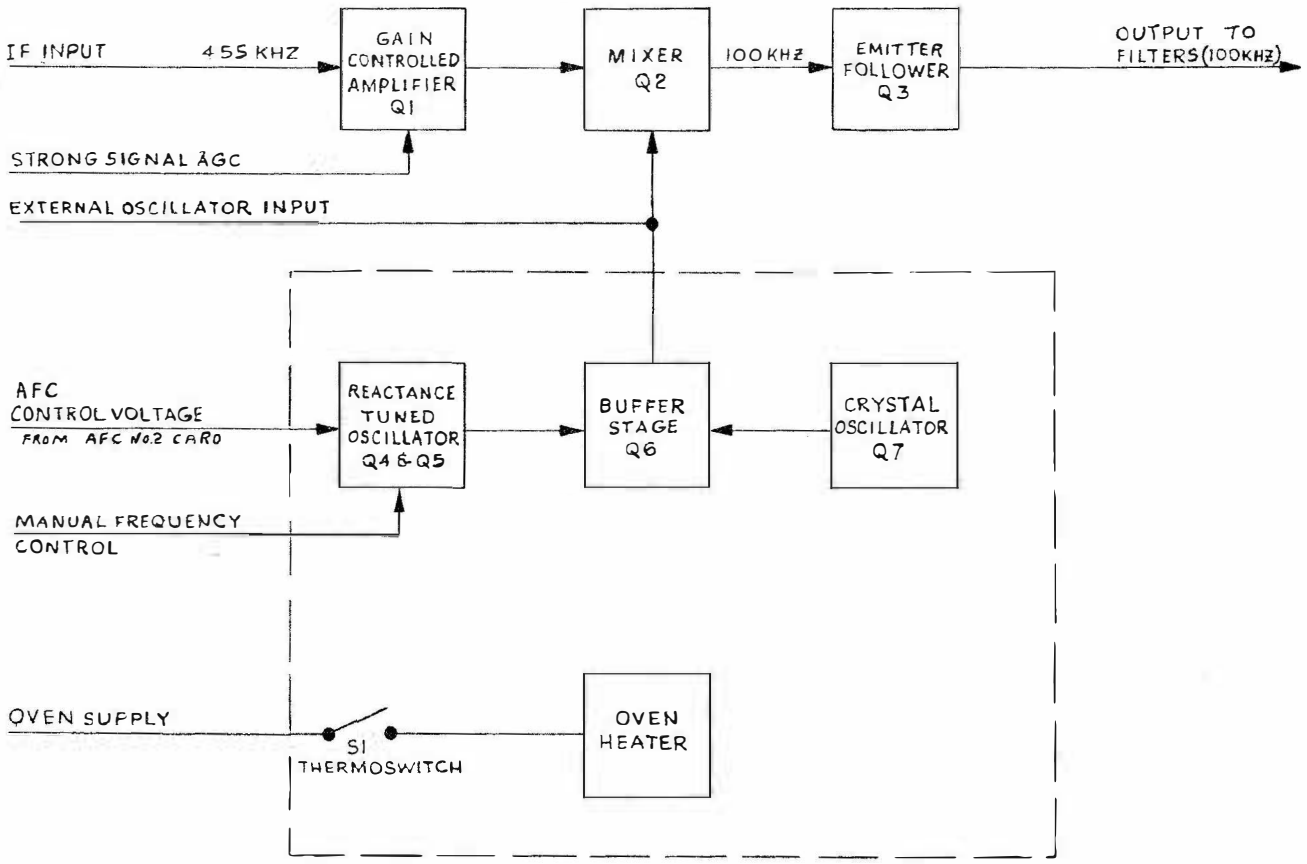


Figure 4-2. IF Card Block Diagram

of the carrier signal. Any of the three peak detector outputs, as well as a strong signal gate output, can be applied via AGC SOURCE Switch S1 to the meter card. Typically, the channel A signal is applied via amplifier Q4 to tuned amplifier Q5. The output of Q5 is applied to peak detector D5, R21, C10 and via amplifier Q6, to the envelope detector. The output of the peak detector is applied to AGC SOURCE switch. In the AM mode of operation only, the output of the envelope detector is applied, via MODE Switch S9, to the Channel A Audio Card and the output of the Channel B envelope detector is applied, via MODE Switch S9 to the Channel B Audio Card.

4-3. CIRCUIT DESCRIPTIONS.

This paragraph describes all circuits, as shown in the schematic diagrams provided with each circuit description. Refer to figure 5-10 for the overall schematic diagram illustrating the chassis mounted components and interconnections with the individual circuit cards.

a. IF CARD CIRCUIT DESCRIPTION (See Figure 4-10. - The IF input is applied to gate 1 of dual gate FET amplifier Q1. A strong signal AGC voltage applied to gate 2 of Q1 from pin 13 of the AGC card maintains the output of Q1 relatively constant over an input range of 100 to 1000 millivolts. Transistor Q2 is an FET mixer. The input is applied to gate 1 and the local oscillator signal is applied to gate 2. The 100 kHz output of mixer Q2 is the difference between the local oscillator frequency and the signal frequency. Choice of local oscillator is by switch S8 on the rear panel of the converter and by the AFC FUNCTION switch on the front panel. Switch S8 chooses either internal or external mode. In the EXT position an external oscillator is connected to jack J3 (HFO) on the rear panel and both the crystal and reactance tuned oscillators are disabled. With S8 set at INT, the AFC FUNCTION switch selects the desired mode (crystal or RTO) by applying B+ (+24 volt) to the desired oscillator. Transistors Q4 and Q5 comprise the reactance tuned oscillator, which is tuned for 555 kHz. With the AFC FUNCTION switch at ON, an AFC signal is applied to

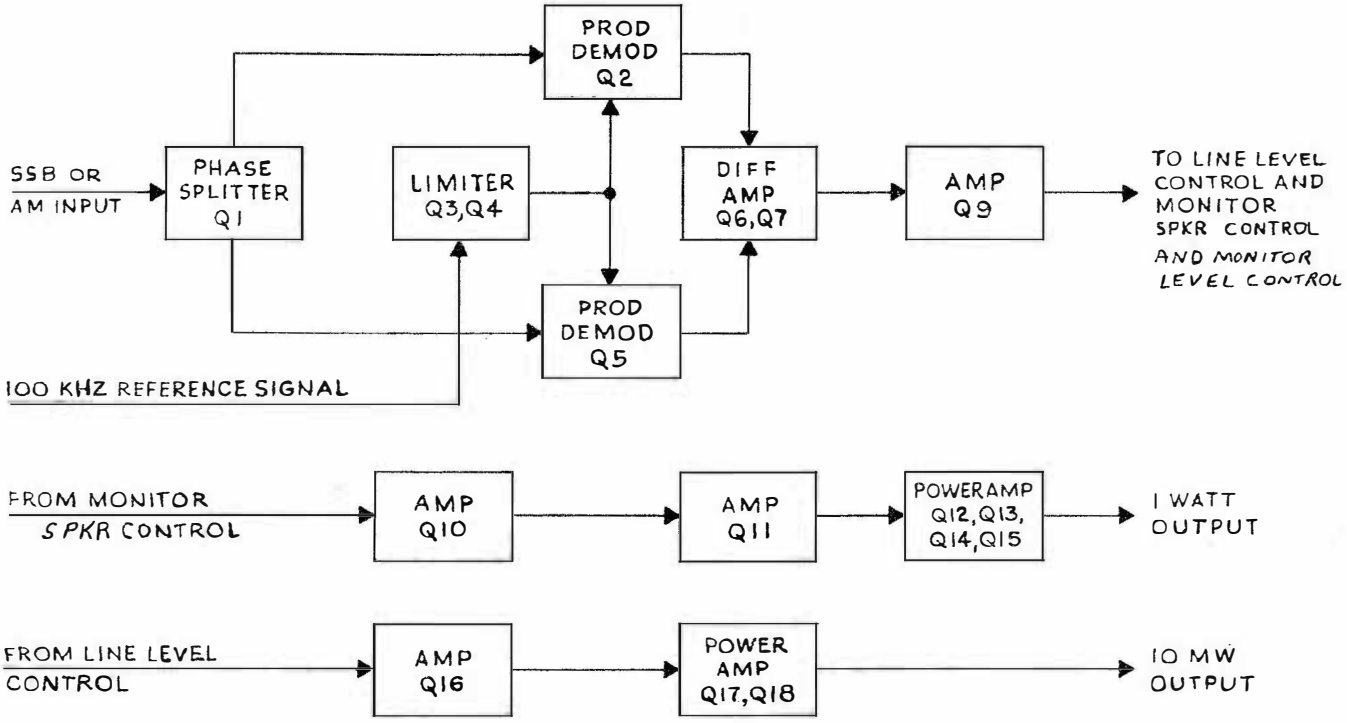


Figure 4-3. Channel A Audio Card Block Diagram

varicap D2 causing the oscillator frequency to change in the direction necessary to keep the output of mixer Q2 at 100 kHz. In the TUNE position of the AFC FUNCTION switch the AFC signal is grounded and an external voltage, controlled by the TUNE control is applied to varicap D4 to pull the oscillator frequency in such a manner as to keep the output from Q2 at 100 kHz. Transistor Q7 and crystal Y1 make up the crystal oscillator. Transistor Q6 is a common base buffer stage for both oscillators. It provides isolation between the oscillators and load. Emitter follower Q3 provides impedance matching for the filters.

b. CHANNEL A AUDIO CARD CIRCUIT DESCRIPTION (See Figure 4-11). - In the SSB/CW mode the information signal, which is the sideband either below (Channel A) or above (Channel B) 100 kHz is applied to transistor Q1. With outputs taken from both the source and drain, Q1 is acting as a 180 degree phase splitter. A 100 kHz reference signal is applied to a two stage amplifier-limiter comprised of transistors Q3 and Q4. Diodes D1 and D2 provide limiting to keep the output of transistor Q4 constant. The output of transistor Q4 goes to a balanced product demodulator comprised of transistors Q2 and Q5. The balanced product demodulator also receives the information signal. Note that the information signal applied to transistor Q2 is 180 degrees out of phase with the information signal applied to transistor Q5. The audio frequency output from each arm of the balanced product demodulator is applied to one end (respectively) of a differential amplifier comprised of transistors Q6 and Q7. Transistor Q8 is a constant current source for the differential amplifier. The audio frequency output of the differential amplifier is applied through a low-pass filter and amplifier Q9 to pin 5 where it is applied to both the LINE LEVEL (10 milliwatt) and MONITOR SPKR (1 watt) controls.

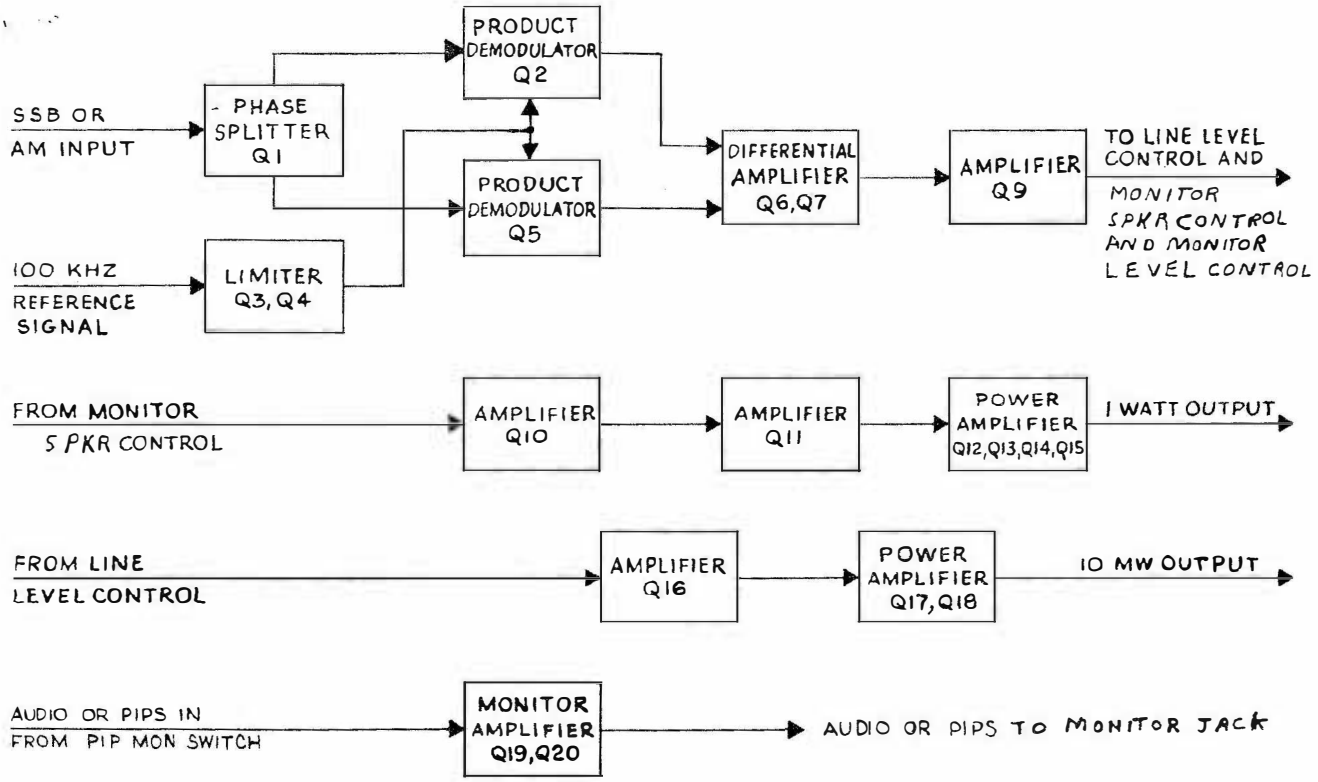


Figure 4-4. Channel B Audio Card Block Diagram

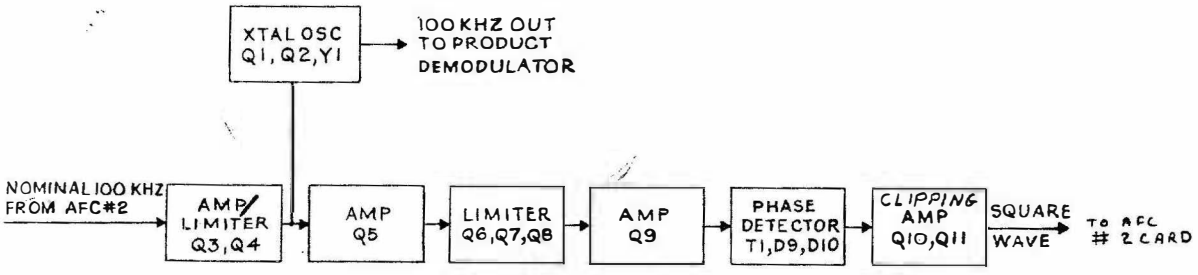


Figure 4-5. AFC Card No. 1 Block Diagram

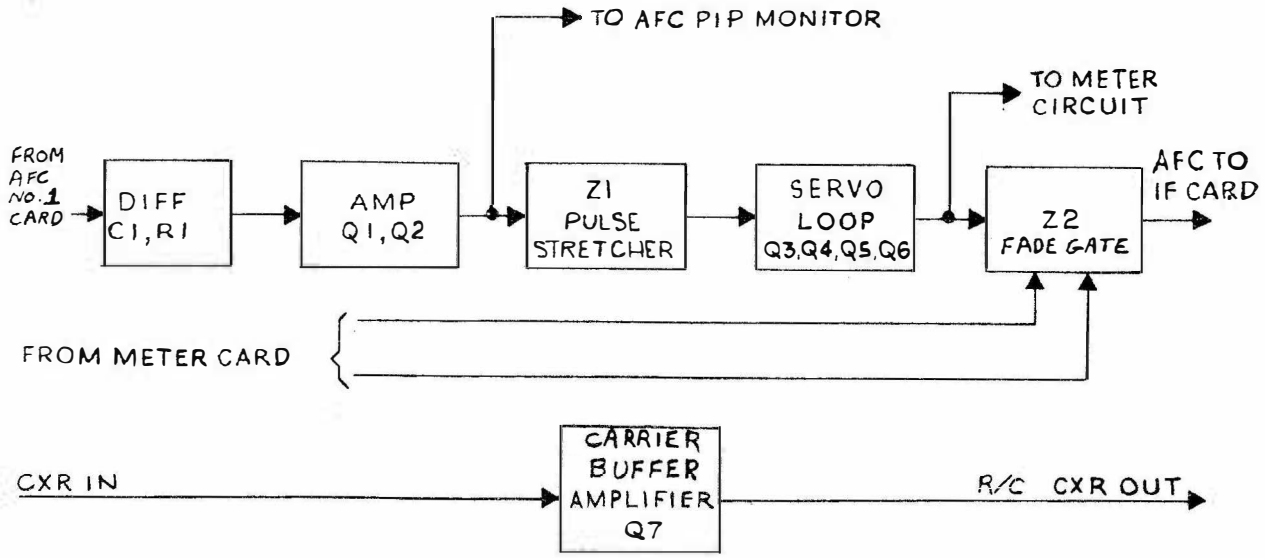


Figure 4-6. AFC Card No. 2 Block Diagram

The 1 watt amplifier is composed of transistors Q19, Q10, Q11, Q12, Q13, Q14 and Q15. Transistors Q19 and Q10 comprise a Darlington pair amplifier and transistor Q11 is an ordinary amplifier. Transistors Q12 and Q14 comprise one stage of a complementary symmetry, push-pull amplifier, and transistors Q13 and Q15 comprise the second stage. The input to the Darlington pair Q19, Q10 is from the Channel A MONITOR SPKR control. As this signal goes positive, the Darlington pair conducts less heavily. The reduced current drawn through resistors R46 and R57 lowers the voltage at the base of transistor Q11, causing it to conduct less heavily. The reduced current drawn through resistors R49 and R50 and diodes D4 and D5 raises the voltage at the base of transistor Q12 and the base of transistor Q14. The increased voltage at the base of transistor Q14 shuts off the transistor. This, in turn, shuts off transistor Q15, resulting in no output at its collector. The increased voltage at the base of transistor Q12 causes the transistor to conduct more heavily. The increased current through resistor R58 lowers the voltage at the base of transistor Q13. This results in a voltage rise at the collector of Q13. Tracing the signal from input to output, it is seen that amplification for a positive going input is through transistors Q19, Q10, Q11, Q12, and Q13, and results in a positive going output. Similarly, for a negative going input, transistors Q12 and Q13 are off, and amplification is through transistors Q19, Q10, Q11, Q14, and Q15, and results in a negative going output. Resistor R56 provides de-generative feedback to the base of Q11. Increasing the value of this resistor decreases the amount of de-generative feedback and increases the gain of the amplifier at the expense of increased distortion.

The low level (10 milliwatt) audio amplifier is comprised of transistors Q16, Q17, and Q18. Transistor Q16 is a common emitter amplifier. Transistors Q17 and Q18 comprise a class A, complementary symmetry, push-pull amplifier. The input to transistor Q16 is from the LINE LEVEL

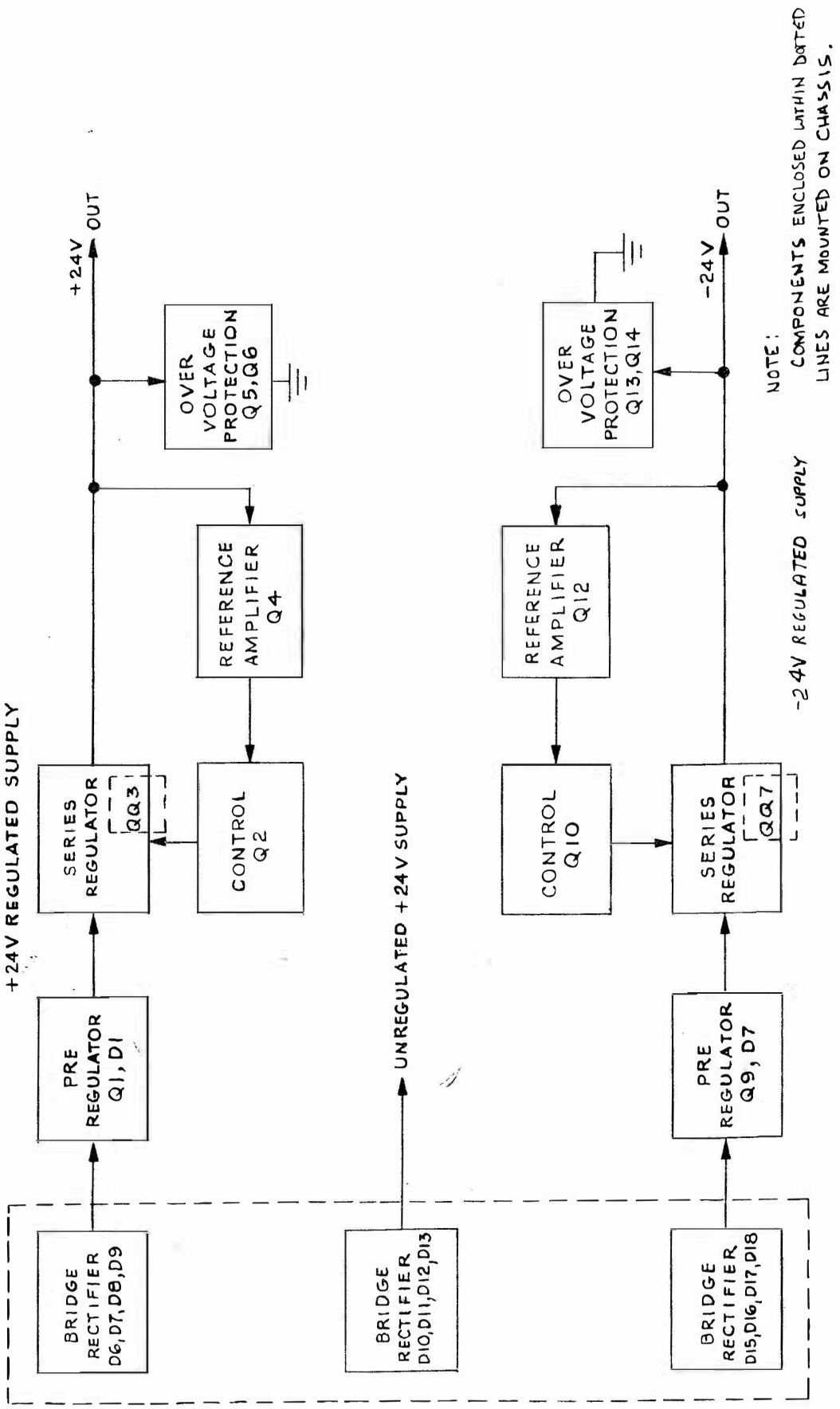


Figure 4-7. Power Supply Card Block Diagram

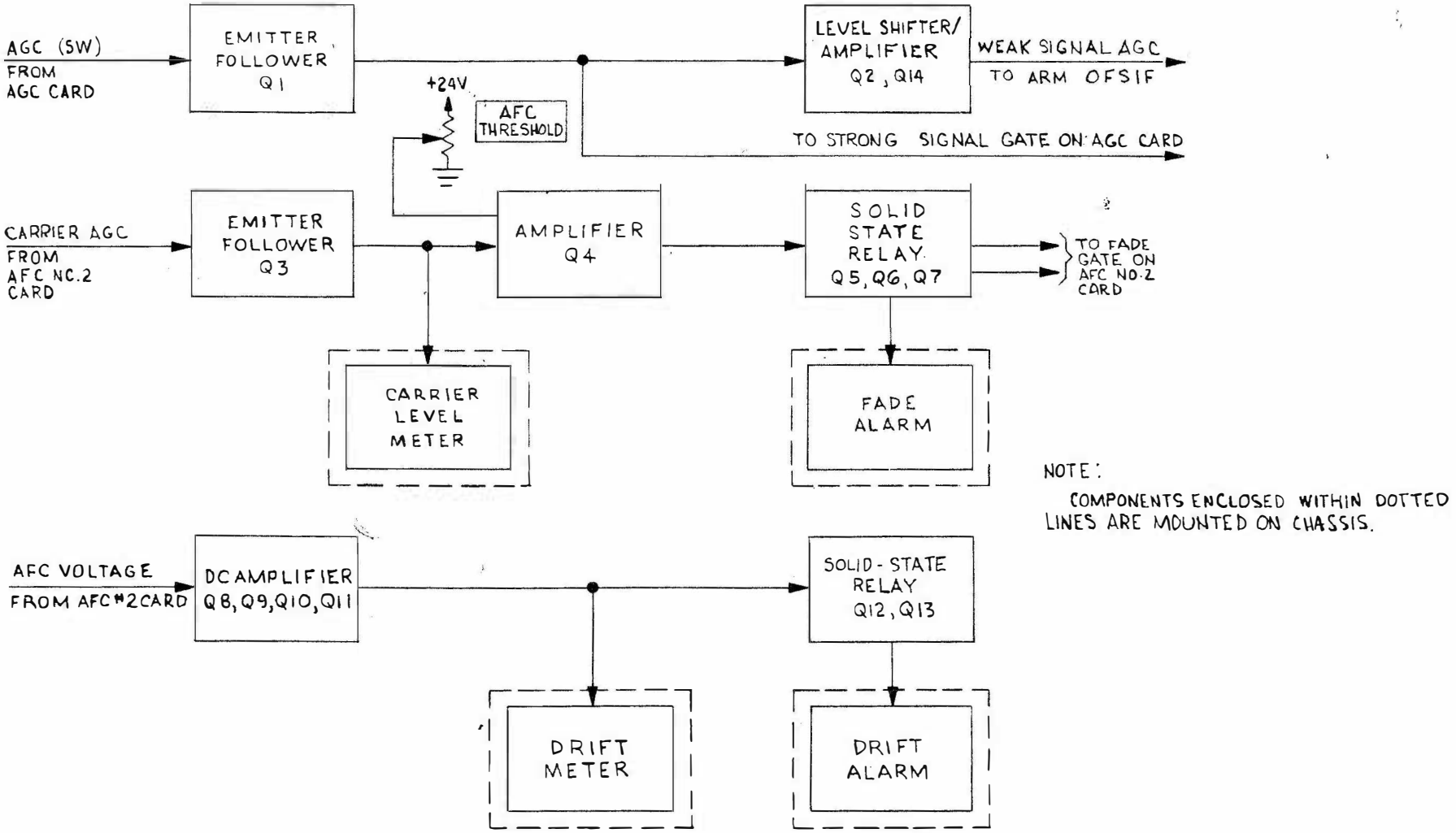


Figure 4-8. Meter Card Block Diagram

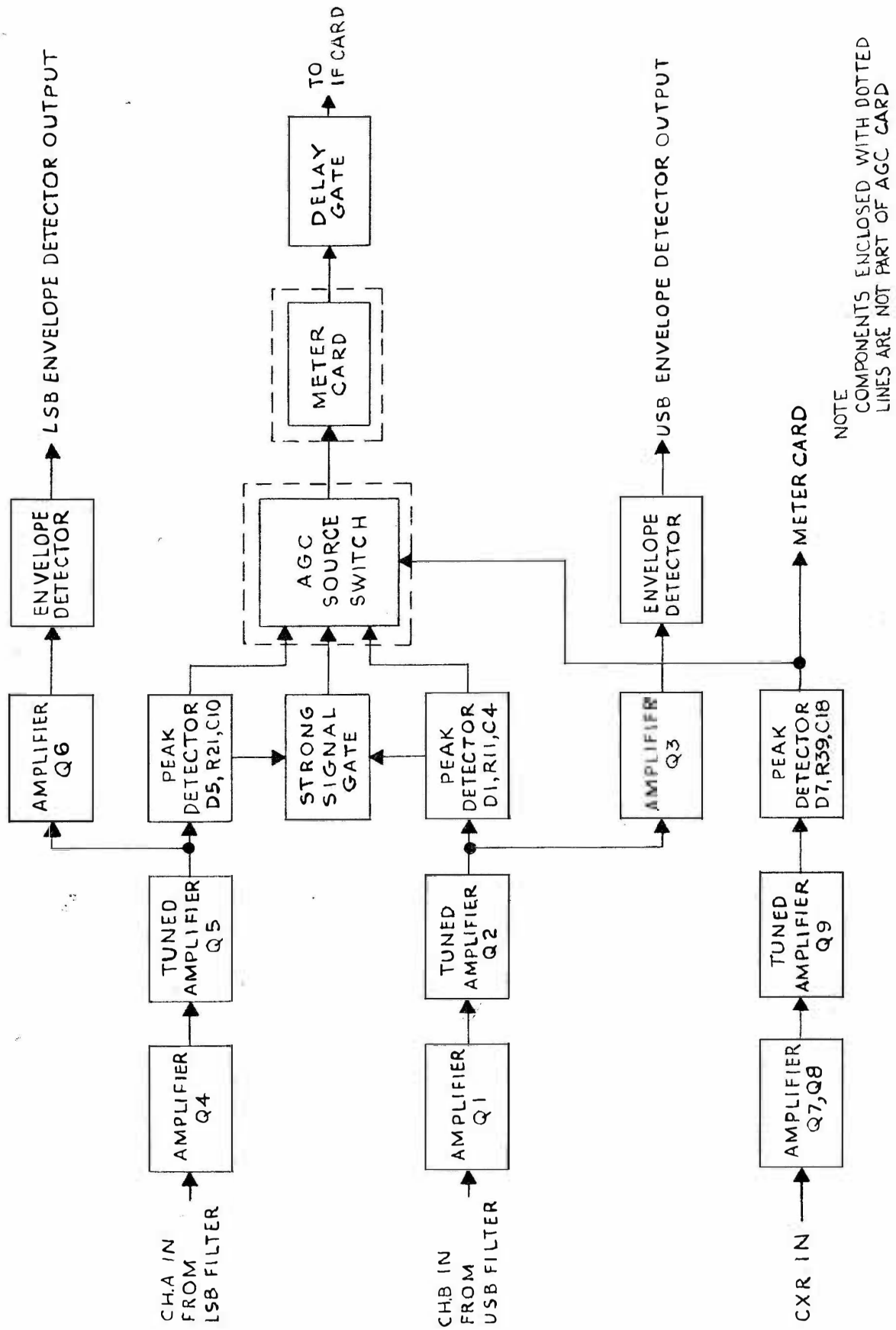


Figure 4-9. AGC Card Block Diagram

control. For a positive going input, transistor Q16 conducts more heavily. The increased current through resistors R68 and R69 lowers the voltage at the base of transistors Q17 and Q18. Note that transistors Q17 and Q18 are a complementary pair. Lowering the voltage at the base of transistor Q17 increases its conduction, thus raising its collector voltage. Lowering the voltage on the base of transistor Q18 decreases its conduction, thus raising its collector voltage. Therefore, the net result is a positive going output for a positive going input. Similarly, for a negative going input, the output is negative going. Resistor R72 provides de-generative feedback to the emitter of Q16. Increasing the value of this resistor decreases the amount of de-generative feedback and increases the gain of the amplifier at the expense of increased distortion.

In the AM mode, the 100 kHz reference signal is removed from pin 2 and pin 2 is grounded. The audio signal, from the respective envelope detectors on the AGC card, is applied to FET amplifier Q1. This amplifier continues to function as a 180 degree phase splitter. Transistors Q2 and Q5 function as ordinary FET amplifiers (the second gate has been disabled by removing the 100 kHz reference signal). Note that since the inputs to transistors Q2 and Q5 are 180 degrees out of phase, the output of the amplifiers are 180 degrees out of phase. The outputs of transistors Q2 and Q5 are applied to one end (respectively) of differential amplifier Q6, Q7. Note that since the inputs at transistors Q6 and Q7 are of opposite polarity, the gain of the differential amplifier is twice what it would have been if one end had been referenced. The output of the differential amplifier goes through a low pass filter to amplifier Q9 and then to pin 5.

c. CHANNEL B AUDIO CARD CIRCUIT DESCRIPTION (See Figure 4-12). - The Channel B audio card functions identically to the Channel A audio card, differing only in three particulars referenced in paragraphs 1-6a, b and c.

d. AFC CARD NO. 1 CIRCUIT DESCRIPTION (See Figure 4-13). - The signal applied to pin 3 is a result of taking the difference between a 555 kHz reference frequency and the nominal 455 kHz input to the receiver adapter. Thus, if the input frequency drifts, the nominal 100 kHz input to the AFC Card No. 1 drifts in the same direction. This nominal 100 kHz signal is amplified by transistor Q3 and limited by transistor Q4. Transistors Q1, Q2 and crystal Y1 comprise a 100 kHz crystal oscillator, which provides a 100 kHz reference signal.

The nominal 100 kHz IF signal and the 100 kHz reference signal are linearly added and applied to the base of transistor Q5. This signal has both amplitude modulation and phase modulation components. Transistors Q6 through Q8 provide three stages of amplitude limiting to remove the amplitude modulation components of the signal. The resulting signal at the collector of transistor Q9 contains only phase modulation components. This phase modulated signal is then applied to a phase detector made up of transformer T1 and diodes D9 and D10. The phase detected output is a sawtooth wave. The polarity of the sawtooth is proportional to the direction of carrier drift (positive slope if the carrier drifts above 455 kHz, negative slope if the carrier drifts below 455 kHz) and the repetition rate of the sawtooth is proportional to the amount of drift (higher repetition rate for greater drift away from 455 kHz). This sawtooth wave is amplified by transistors Q10 and Q11 which form a clipping amplifier, resulting in a square wave output at pin 15.

e. AFC CARD NO. 2 CIRCUIT DESCRIPTION (See Figure 4-14). - The square wave output from the AFC Card No. 1 is differentiated by RC differentiator C1, R1. The resulting spikes are amplified by Darlington emitter follower Q1, Q2. The amplified spikes are processed by Z1, which extracts a dc level from the pulse train. This dc level is then applied to a zero offset servo loop comprised of transistors Q3, Q4, Q5, and Q6. A signal with positive average voltage at the base of transistor Q3 causes it to conduct heavily. The increased conduction of transistor Q3 has two effects. First, it tends to turn transistor Q4 on, raising its collector voltage. Second, the increased emitter current drawn by transistor Q3 decreases the emitter current of transistor Q6, reducing its conduction. Reducing the conduction of transistor Q6 raises its collector voltage and turns transistor Q5 on, increasing its conduction. Increasing the conduction of transistor Q5 increases the conduction of transistor Q4, since transistors Q4 and Q5 are a complementary pair. The increased conduction of transistor Q4 raises its collector voltage. Following this chain of cause and effect from transistor Q3 through transistors Q6 and Q5 to transistor Q4, it is seen that this augments the effect of the

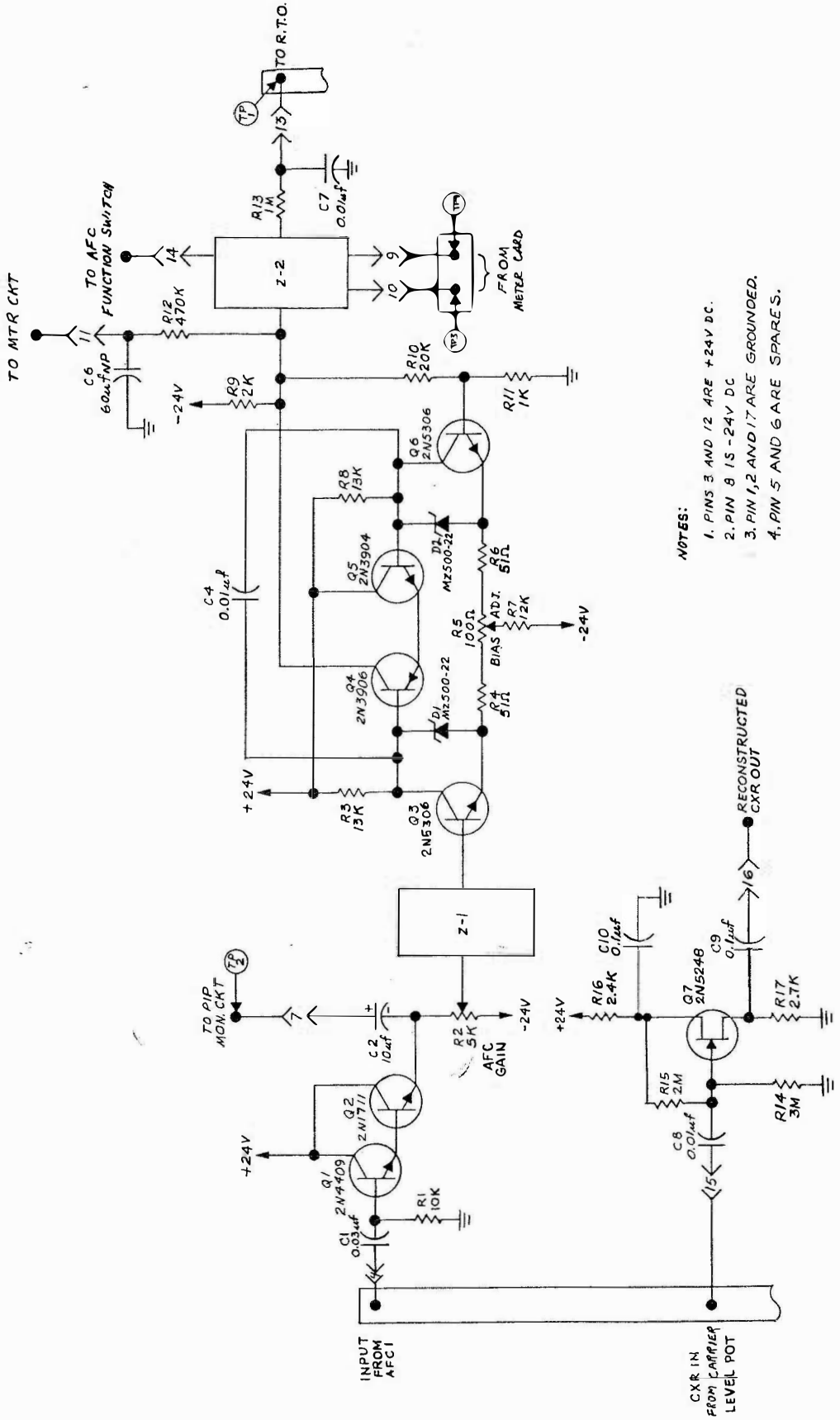


Figure 4-14. AFC Card No. 2 Schematic Diagram

collector voltage of transistor Q3 on the output of transistor Q4. Part of the output of transistor Q4 is fed back to the base of transistor Q6 for purposes of loop stability. In the case of a positive input to the base of transistor Q3, discussed above, the output of transistor Q4 is also positive. Feeding this back to the base of transistor Q6 increases its conduction, thus lowering the collector voltage. This in turn decreases the conduction of both transistors Q5 and Q4, tending to lower the collector voltage of transistor Q4. This decreases the overall loop gain, but increases the stability. The loop has an overall gain (from the base of transistor Q3 to the collector of transistor Q4) of about 20. The output from transistor Q4 is the AFC voltage and is applied to the fade circuit, Z2. This circuit is controlled by solid state relay Q3, Q6 on the METER card. During a carrier fade Z2 acts like a short to ground, and no AFC signal is applied to the voltage controlled local oscillator on the IF card. During normal operation (normal strength carrier) Z2 acts essentially as a short between Q4 and pin 13 and the AFC control voltage is available at pin 13. FET source follower Q7 is the carrier buffer amplifier.

f. POWER SUPPLY CARD CIRCUIT DESCRIPTION (See Figure 4-15).

1. REGULATED SUPPLY +24 VOLTS. - The +24 volt regulated supply consists of a bridge rectifier, a pre-regulator, a series regulator, a sampling circuit, an over-voltage protection circuit and a current limiter circuit. Diode D1, resistor R2 and transistor Q1 comprise the pre-regulator. The output from transistor Q1 drives the Darlington pair series regulator Q2, QQ3. Voltage divider R8, R9, R10 samples the output voltage and applies the sample to the base of transistor Q4. Zener diode D4 provides the reference voltage for dc amplifier Q4. If, for example, the output voltage rises, transistor Q4 conducts more heavily, reducing the drive to transistor Q2 and consequently to transistor QQ3. This increases the collector-emitter resistance of transistor QQ3, thus reducing the output voltage. Over-voltage protection is provided by transistors Q5, Q6 and thermistor R18. If the output voltage rises about 16 to 17 percent above the nominal 24 volt output, transistor Q6 turns on, turning on transistor Q5. The resulting current through resistor R12 produces a voltage which fires SCR D5, thus shorting the output terminals and causing the supply to current limit to a predetermined value of between 800 and 850 milliamperes. Current limiting is provided by resistor R5 and diode D2. Diode D2 is normally open. If the supply is accidentally shorted, the increased current drawn through resistor R5 turns diode D5 on, limiting the voltage drop across R5 to about 0.7 volt. With the voltage drop across resistor R5 limited to about 0.7 volt, the current through it is limited. This limits the current through series regulator QQ3, which limits the current that can be drawn from the supply.

Resetting of the power supply after it shuts down due to overvoltage is accomplished by cycling the POWER switch on the front panel. Resetting after a current overload is automatic, after the cause of the overload is removed.

2. REGULATED SUPPLY -24 VOLTS. - This supply operates in the same way as the +24 volt regulated supply except that ground and output leads are reversed to obtain a -24 volt output.

g. METER CARD CIRCUIT DESCRIPTION (See Figure 4-16). - Transistor Q1 is functionally part of the AGC circuits, and provides impedance matching for transistor Q10 on the AGC card. It also provides impedance matching for transistor Q14 on the METER card. The AGC input to transistor Q1 is a slowly varying dc voltage of between approximately -6.5 and -9.4 volts. As this signal goes more negative, transistor Q1 conducts more heavily. This lowers the voltage on the emitter of transistor Q14. Zener diode D1 maintains the base of transistor Q14 at a constant negative voltage, so that lowering its emitter voltage causes transistor Q14 to conduct more heavily. The resulting conduction through resistor R41 lowers the voltage at the base of transistor Q2, causing it to conduct less heavily, thus making the voltage at the emitter of Q2 more negative. Zener diode D10 shifts the level between the emitter of transistor Q2 and the cathode of diode D2 -24 volts so that the output voltage will swing over the desired range. For an input voltage range of approximately -6.5 to -9.4 volts the output at pin 14 varies between 0 and -8 volts. This voltage at pin 14 is the weak signal AGC voltage applied to the AGC plug-in module and is also made available at pins B and C of TB2.

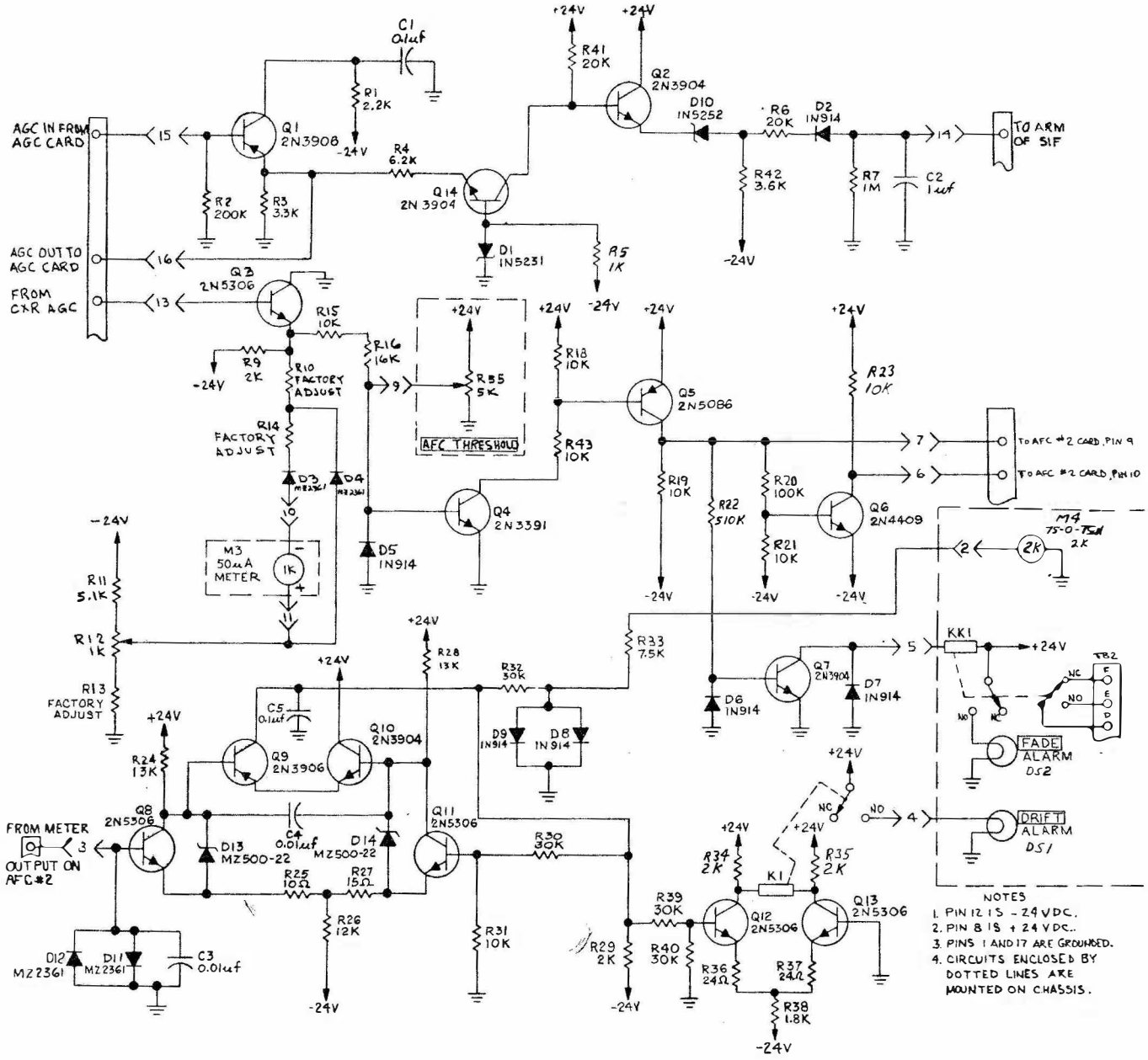


Figure 4-16. Meter Card Schematic Diagram

1. The CARRIER level meter and the FADE lamp are controlled by transistors Q3, Q4, Q5, Q6 and Q7. The signal at the base of transistor Q3 comes from the carrier AGC circuit and is a slowly varying dc level, ranging from -6.5 volts (weak carrier) to -9.4 volts (strong carrier). Voltage divider R11, R12, R13 produces a negative voltage at pin 11, which goes to the positive terminal of the CARRIER level meter. With -6.5 volts on its base, transistor Q3 conducts heavily. The current through resistors R10, R14 and diode D3 produces a voltage at pin 10 which is only slightly less negative than the voltage at pin 11, and the meter reading is small, indicating a weak carrier. As the carrier signal at the base of transistor Q3 becomes more negative, Q3 conducts less heavily and resistors R10, R14 and diode D3 draw less current, making the voltage at pin 10 more negative. The resulting voltage across the meter is more positive, and the meter indication increases.

Setting AFC THRESHOLD potentiometer R55 places a positive bias on the base of transistor Q4. For a strong carrier condition, the negative voltage supplied by the emitter of transistor Q3 overcomes this bias and turns Q4 off. When transistor Q4 turns off its collector goes up, holding transistor Q5 off. The -24 volt level on the collector of Q5 is applied, via pin 7, to AFC No. 2 card and, via resistor R20, to turn off transistor Q6. With Q6 off, +24 volts is applied, via pin 6, to AFC No. 2 card. In addition, the low level at the collector of transistor Q5, biases transistor Q7 off and relay KK1 remains de-energized. With KK1 de-energized the FADE ALARM will be off.

When the carrier level goes down, the voltage on the emitter of transistor Q3 gets less negative and transistor Q4 turns on. This turns on transistor Q5, Q6, and Q7. Transistor Q5 supplies +24 volts at pin 7, and Q6 supplies -24 volts at pin 6, for application to AFC No. 2 card. When transistor Q7 turns on it provides a return path for relay KK1, causing it to energize and light the FADE ALARM.

2. The DRIFT lamp and DRIFT meter are controlled by transistors Q8, Q9, Q10, Q11, Q12 and Q13. Transistors Q8, Q9, Q10 and Q11 comprise a zero offset servo loop with a gain of approximately 3. The input at the base of transistor Q8 is derived from the AFC circuits and is a slowly varying dc level of between approximately -1 volt (carrier drift of -1 kHz) and approximately +1 volt (carrier drift of +1 kHz). If, for example, the input to the base of transistor Q8 goes negative, Q8 conducts less heavily. This has two effects: First, the decreased current through resistor R24 raises the collector voltage of transistor Q8. Second, the decreased emitter current drawn by transistor Q8 increases the emitter current drawn by transistor Q11, increasing its conduction. Increasing conduction of transistor Q11 lowers its collector voltage. This lowered voltage is applied directly to the base of transistor Q10, causing it to conduct less heavily. This decreased emitter current of transistor Q10 also causes transistor Q9 to conduct less heavily, since transistors Q9 and Q10 form a complementary pair. As previously noted, decreasing the voltage on the base of transistor Q8 raises its collector voltage. This increased voltage is applied directly to the base of transistor Q9, causing it to conduct less heavily, thus acting in conjunction with the signal on the emitter, as already described. The reduced conduction of transistor Q9 lowers its collector voltage. It is seen that output of the servo loop is in the same direction as the input. Note that a portion of the output of the servo loop is fed back to the base of transistor Q11. For a negative input, the feedback signal applied to the base of transistor Q11 will be negative, causing Q11 to conduct less heavily and raising its collector voltage. This increased voltage, applied to the base of transistor Q10, causes it to conduct more heavily, also causing transistor Q9 to conduct more heavily and raising its collector voltage. This is done for stability. The output from the collector of transistor Q9 is applied to pin 2 where it drives the DRIFT meter and to the base of transistor Q12. Transistors Q12 and Q13 form a differential amplifier pair, with the base of transistor Q13 referenced to ground. A negative signal at the base of transistor Q12 causes it to conduct less heavily. This has two effects: First, it raises the collector voltage of transistor Q12 to +24 volts. Second, it increases the emitter current drawn by transistor Q13. The increased conduction of transistor Q13 lowers its collector voltage toward -24 volts. The voltage thus impressed across relay coil K1 energizes the relay and lights the DRIFT lamp. Similarly, a positive signal at the base of transistor Q12 lowers the collector voltage of Q12 towards -24 volts and raises the collector voltage of transistor Q13 to +24

volts. The resulting voltage across the relay coil energizes the DRIFT lamp.

h. AGC CARD CIRCUIT DESCRIPTION (See Figure 4-17). - The Channel A (B) (information in parentheses refers to Channel B.) AGC circuit consists of transistors Q4 (Q1), Q5 (Q2). Transistor Q4 (Q1) amplifies the input and applies it to collector-tuned amplifier Q5 (Q2). Resistor R16 (R2) applies negative feedback to Q4 (Q1) for stability. The collector is tuned just below (above) the 100 kHz IF frequency. The output of the tank is applied to a negative peak detector made up of diode D5 (D1), resistor R21 (R11) and capacitor C10 (C4). The detected output is applied to one arm of a strong signal gate and is also applied through diode D6 (D2) to pin 6 (pin 4) which goes to the AGC SOURCE switch. The strong signal gate consists of diodes D3 and D4. Whichever of the two diodes has the more negative signal at its cathode conducts, and the other diode is open. Thus, the most negative (strongest) signal of the Channel A and Channel B AGC voltages is available at pin 5.

The carrier, from FET amplifier Q7 on the AFC Card No. 2 is applied to a 3 stage amplifier consisting of transistors Q7, Q8, and Q9. The collector of transistor Q9 is tuned to 100 kHz by capacitor C17 and coil L3. Resistor R35 provides negative feedback between transistors Q9 and Q8 for stability. The output of the tank is applied to a negative peak detector made up of diode D7, resistor R39, and capacitor C18. The output of the peak detector is applied through diode D8 to pin 16, which goes to the AGC SOURCE switch and to the METER card to drive the carrier fade circuits.

The switched signal from the AGC SOURCE switch is applied to emitter follower Q1 on the METER card and returned to common base amplifier Q10 on the AGC card. Transistor Q10 is a delay gate for the strong signal AGC voltage used to control gain controlled amplifier Q1 on the IF card. Diode D11 maintains a constant voltage on the base of transistor Q10. For weak input signals to the receiver converter (1 to 100 millivolts), the voltage applied to the emitter of transistor Q10 will not be sufficiently negative to turn transistor Q10 on. Thus, no path exists to pin 13 and no AGC voltage is applied to gain controlled amplifier Q1 an the IF card and it runs at full gain. As the input to the receiver converter becomes stronger (100 to 1000 millivolts), the voltage applied to the emitter of transistor Q10 becomes negative enough to turn transistor Q10 on, and the AGC voltage is then available at pin 13 for application to the IF card. In the Channel A (B) signal path, the signal at the emitter of the tuned-collector amplifier Q5 (Q2) is applied through amplifier Q6 (Q3) to an envelope detector consisting of diode D14 (D13), resistors R27 and R28 (R13 and R14) and capacitor C12 (C7). The detected output is available at pin 2 (pin 8).

4-4. TROUBLE ANALYSIS. -

a. TEST DATA. - A list of required test equipment is given in table 5-1.

4-5. APPROACH.

When adequate historical data is not available, troubleshooting procedures should be based on the following six steps:

a. SYMPTOM RECOGNITION. - This is the first step in the troubleshooting procedure and is based on a complete knowledge and understanding of equipment operating characteristics. All equipment troubles are not the direct result of component failure. Therefore, a trouble in an equipment is not always easy to recognize since all conditions of less than peak performance are not always apparent. This type of equipment trouble is usually discovered while accomplishing preventive maintenance procedures, such as the POMSEE checks. It is important that the not so apparent troubles, as well as the apparent troubles, be recognized.

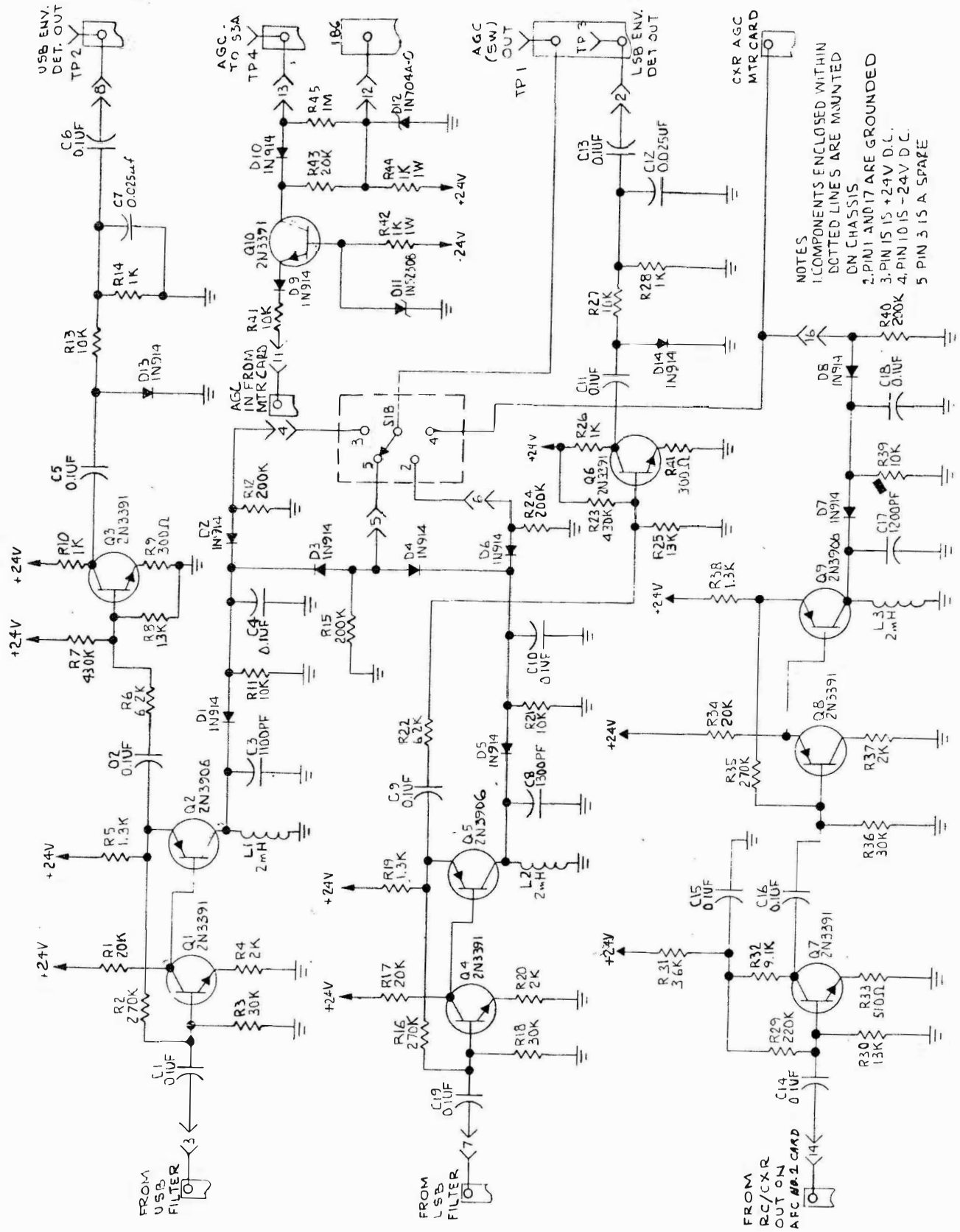


Figure 4-17. AGC Card Schematic Diagram

b. SYMPTOM ELABORATION. - After an equipment trouble has been recognized, all the available aids designed into the equipment should be used to further elaborate on the original trouble symptom. Use of front panel controls and other built-in indicating or testing aids should provide better identification of the original trouble symptom. Also checking or manipulating the operating controls may eliminate the trouble.

c. LISTING PROBABLE FAULTY FUNCTION. - The next step in logical troubleshooting is to formulate a number of logical choices as to the cause and likely location (functional section) of the trouble. The logical choices are mental decisions which are based on knowledge of the equipment operation, a full identification of the trouble symptom, and information contained in this manual. The over-all function description and its associated block diagram should be referred to when selecting possible faulty functional sections.

d. LOCALIZING THE FAULTY FUNCTION. - For the greatest efficiency in localizing trouble, the functional sections which have been selected by the logical choice method should be tested in an order that will require the least time. This requires a mental selection to determine which section to test first. The selection should be based on the validity of the logical choice and the difficulties in making the necessary tests. If the tests do not prove that functional section to be at fault, the next selection should be tested, and so on until the faulty functional section is located. As aids in this process, the manual contains a functional description and a servicing block diagram (see figure 4-18). Waveforms are included to aid in isolating the faulty section.

e. LOCALIZING TROUBLE TO THE CIRCUIT. - After the faulty functional section has been isolated, it is often necessary to make additional logical choices to determine which circuit or group of circuits (within the functional section) is at fault. Functional descriptions, schematics, and pertinent test data for individual circuits or groups of circuits comprising the functional section provide the signal flow and test location information needed to bracket then isolate the faulty circuit.

f. FAILURE ANALYSIS. - After the trouble (faulty component, misalignment, etc.) has been located (but prior to performing corrective action), the procedures followed up to this point should be reviewed to determine exactly why the fault affected the equipment in the manner it did. This review is usually necessary to make certain that the fault discovered is actually the cause of the malfunction, and not the result of the malfunction.

4-6. PRELIMINARY INSTRUCTIONS.

WARNING

Line voltages are present in this equipment. All testing should be done with proper regard for the danger involved. Whenever possible, test equipment should be connected with power turned off. All repairs should be done with power disconnected.

Before attempting to localize a fault, perform the following steps.

a. Ensure that line plug is connected to proper power source.

b. Ensure that POWER switch is ON.

c. Ensure that fuses are installed.

d. Observe that input signal is connected.

e. Check rear panel connections.

f. Check all control settings.

g. Check printed circuit cards for correct location and good contact at connecting pins.

4-7. TROUBLESHOOTING PROCEDURES.

If procedures in paragraph 4-6 have not corrected the fault, consult table 4-1 which provides symptoms, probable causes and associated remedies, and refer to figure 4-18.

TABLE 4-1. TROUBLESHOOTING CHART

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
1	POWER indicator lamp does not light when POWER switch is turned on.	a. Line cord is not connected.	a. Connect line cord to power source and check connection at AC LINE INPUT connector J4.
		b. AC LINE fuses blown.	b. Check AC LINE fuses and replace as necessary.
		c. Defective POWER indicator lamp.	c. Check POWER lamp and replace as necessary.
		d. Defective POWER switch.	d. Check POWER switch and replace as necessary.
		e. Shorted 0.1 uf capacitors (C43, C44) across power jack J4.	e. Replace as necessary.
2	POWER indicator lamp lights but power supply voltages (+24V, -24V regulated and +24V unregulated) are not available.	Defective primary winding of power transformer.	Check power transformer for open primary winding and replace as necessary. (Refer to figure 4-15.)
3	POWER indicator lamp lights but +24V regulated voltage is not available. Regulated -24V and unregulated +24V are available.	a. Defective secondary winding of power transformer for +24V regulated supply.	a. Check power transformer for open or shorted secondary winding of +24V regulated supply. (Refer to figure 4-15.)
		b. Defective bridge rectifier of +24V regulated supply.	b. Check diodes D6, D7, D8 and D9. Replace as necessary. (Refer to figure 4-15.)
		c. Defective series regulator.	c. Check transistor QQ3 (Refer to table 4-2) and replace as necessary.
		d. Potentiometer R9 set incorrectly.	d. Check potentiometer and readjust as required. Nominal setting is at +6.8 volts.

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
3 (Cont.)		e. Defective component(s) on +24V regulated supply.	e. Measure dc voltages to isolate faulty component(s). (Replace as necessary.) NOTE Perform adjustment procedures in paragraph 5-5 and 5-6 after replacement of component(s).
4	POWER indicator lamp lights but -24V regulated voltage is not available. Regulated +24V and unregulated +24V are available.	a. Defective secondary winding of power transformer for -24V regulated supply.	a. Check power transformer for open or shorted secondary winding of -24V regulated supply. (Refer to figure 4-15.)
		b. Defective bridge rectifier of -24V regulated supply.	b. Check diodes D14, D15, D16 and D17. Replace as necessary.
		c. Defective series regulator.	c. Check transistor QQ7. (Refer to table 4-2) and replace as necessary.
		d. Potentiometer R30 set incorrectly.	d. Check potentiometer and readjust as required. Nominal setting -17.2 volts.
		e. Defective component(s) on -24V regulated supply.	e. Measure dc voltages to isolate faulty component(s). Replace as necessary. NOTE Perform adjustment procedures in paragraphs 5-5 and 5-6 after replacement of component(s).

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
5	POWER indicator lamp lights but +24V unregulated voltage is not available. Regulated +24V and -24V are available.	a. Defective secondary winding of power transformer for +24V unregulated supply.	a. Check power transformer for open or shorted secondary winding of +24V unregulated supply. (Refer to figure 4-15.)
		b. Defective bridge rectifier of +24V unregulated supply.	b. Check diodes D10, D11, D12 and D13. Replace as necessary.
		c. Defective components on +24V unregulated supply.	c. Check RR2 and C6 and replace as necessary.
6	Strong signal AGC to IF card not available.	a. Defective strong signal AGC gate.	a. Check output at TP6, (Refer to figure 4-18) if output is not correct check strong signal AGC gate Q10 and replace as necessary.
		b. Defective transistor (Q1) on meter card.	b. Check transistor (Q1) and replace as necessary. Refer to figure 4-16.
7	No weak signal AGC to AGC Plug-in module.	a. Defective amplifier (Q2) of meter card.	a. Measure dc voltages of amplifier to locate faulty component(s). (Refer to figure 4-16.)
		b. Same as step 6b.	b. Same as step 6b.
8	AGC derived from carrier not available. AGC source switch in CXR position.	a. Defective tuned amplifier (Q7, Q8, Q9) or peak detector (D7, R39 and C18) of AGC card.	a. Measure dc voltages of tuned amplifier and peak detector to isolate faulty components(s). Replace as necessary. (Refer to figure 4-17.)
		b. Defective carrier buffer amplifier on AFC #2 card.	b. Measure dc voltages of carrier buffer amplifier Q7 on AFC #2 card to isolate faulty component. Replace as necessary. (Refer to figure 4-14.)

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
8 (Cont.)		c. Defective CARRIER LEVEL potentiometer.	c. Check CARRIER LEVEL potentiometer and replace as necessary. (Refer to figure 5-10.)
		d. Defective AGC plug-in.	d. Check input (socket 1, pin 4) and output (socket 1, pin 7) of AGC plug-in. If defective replace.
		e. Defective carrier band pass filter.	e. Check carrier band pass filter and replace as necessary.
		f. Defective AGC SOURCE switch.	f. Check AGC SOURCE switch and replace as necessary.
9	AGC derived from channel A (lower sideband) not available. AGC SOURCE switch in CHA position.	a. Defective tuned amplifier (Q4, Q5) or peak detector (D5, R21 and C10) of AGC card.	a. Measure dc voltages of tuned amplifier and peak detector to isolate faulty component(s). Replace as necessary. (Refer to figure 4-17.)
		b. Defective AGC plug-in.	b. Check input (socket 2, pin 7) and output (socket 2, pin 1) of AGC plug in. If defective replace.
		c. Defective LSB filters.	c. Check LSB filter and replace as necessary. (Refer to figure 5-10.)
		d. Same as step 8f.	d. Same as step 8f.
10	AGC derived from channel B (upper sideband) not available. AGC SOURCE switch CHB position.	a. Defective tuned amplifier (Q1, Q2) or peak detector (D1, R11 and C4) of AGC card.	a. Same as step 9a.

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
10 (Cont.)		b. Same as step 9b.	b. Check input (socket 1, pin 6) and output (socket 1, pin 3) of AGC plug-in. If defective replace.
		c. Defective USB filters.	c. Check USB filters and replace as necessary. (Refer to figure 5-10.)
		d. Same as step 8f.	d. Same as step 8f.
11	AGC derived from the stronger signal of channel A or channel B is not available. AGC SOURCE switch in A or B position.	a. Defective strong signal gate (D3 and D4) of AGC card.	a. Check diodes D3 and D4 and replace as necessary.
		b. Same as steps 9 and 10.	b. Same as steps 9 and 10.
12	AGC voltage to IF card and to AGC plug-in cannot be varied with RF GAIN control. AGC SOURCE switch in MAN position.	a. Defective RF GAIN control.	a. Check RF GAIN control and replace faulty component(s) as necessary. (Refer to figure 5-10.)
		b. Same as step 6.	b. Same as step 6.
		c. Same as step 7.	c. Same as step 7.
13	No input to either audio card. MODE switch in either SSB/CW or AM position.	a. Defective MODE switch.	a. Check MODE switch and replace as necessary.
		b. Defective IF card.	b. Check output at TP2, if output is not available check oscillator outputs. Replace defective oscillator as required. NOTE Perform adjustment(s) in paragraphs 5-8, 5-9, or 5-10 (if applicable oscillator is replaced). Measure dc voltages of gain controlled amplifier and mixer to isolate faulty component(s).

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTON	PROBABLE CAUSE	REMEDY
14	No input to channel A audio card. MODE switch in SSB/CW position.	a. Defective AGC plug-in.	a. Measure input (socket 2, pin 1) and output (socket 2, pin 7) of AGC plug-in, and replace as necessary.
		b. Defective IF BANDWIDTH switch.	b. Rotate channel A IF BANDWIDTH switch between 3.3K Hz LSB and 7.5K Hz LSB. If input to audio card A is still not present proceed to step 14c.
		c. Defective LSB filters.	c. Same as step 9c.
15	No input to channel B audio card. MODE switch in SSB/CW position.	a. Defective AGC plug-in.	a. Measure input (socket 1, pin 3) and output (socket 1, pin 6) of AGC plug-in and replace as necessary.
		b. Same as step 14b.	b. Rotate channel B IF BANDWIDTH switch between 3.3K Hz USB and 7.5K Hz USB, if input to audio card B is still not present proceed to step 15c.
		c. Defective USB filters.	c. Same as step 10c.
16	No input to channel A audio card. MODE switch in AM position.	a. Defective AGC card.	a. Check output at TP4. (Reference figure 4-18.) If output is not available measure dc voltages of envelope detector, (D14, R27, R28 and C12) amplifier, (Q6) and tuned amplifier (Q4 and Q5), to isolate faulty component(s).
		b. Defective AGC plug-in.	b. Same as step 14a.
		c. Defective LSB filters.	c. Same as step 9c.

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
17	No input to channel B audio card. MODE switch in AM position.	a. Defective AGC card.	a. Check output at TP3. (Refer to figure 4-18.) If output is not available measure dc voltages of envelope detector, (D13, R13, R14 and C7) amplifier (Q3) and tuned amplifier (Q1 and Q2) to isolate faulty component(s).
		b. Defective AGC plug-in.	b. Same as step 15a.
		c. Defective USB filters.	c. Same as step 10c.
18	No high or low level audio output from either channel A or B.	Same as step 13.	Same as step 13.
19	No high or low level audio output from channel A audio card. Input at TP17 (fig 4-18) is available, 100 KHz injection at pin 2 is available.	Defective demodulator Q1-Q9 on audio card.	Check for 100 mv rms (±30 mv) of audio at TP18. If audio is not available check Q1-Q9 on audio card.
20	Same as step 19 except signal at TP-18 is available.	Defective MONITOR SPKR and LINE LEVEL controls or defective audio amplifiers.	Check and replace as required.
21	No high or low level audio output from channel B audio card. Input at TP-13 is available, 100 KHz injection at pin 2 is available.	Defective demodulator Q1-Q9 on audio card.	Check for 100 mv rms (±30 mv) of audio at TP-14. If audio is not available check Q1-Q9 on audio card.
22	Same as step 21, except audio is available at TP-14.	Defective MONITOR SPKR and LINE LEVEL control or defective audio amplifiers.	Repair and replace as required.

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
23	No high level output at TP19 of channel A audio output (figure 4-18). Low level output at TP20 is available.	a. CHA-LSB MONITOR SPKR control set too low or is defective.	a. Rotate MONITOR SPKR control fully clockwise. If output is still not available check MONITOR SPKR potentiometer R14 and replace as necessary.
		b. Defective transformer T3A.	b. Check transformer T3A and replace as necessary.
		c. Defective 1 watt amplifier.	c. Measure dc voltages of 1 watt amplifier (Q19, Q10, Q11, Q12, Q13, Q14 and Q15) to isolate faulty component(s). Refer to figure 4-11.)
24	No low level output at TP20 of channel A audio output (figure 4-18). High level output at TP19 is available.	a. CHA-LSB LINE control set too low or is defective.	a. Rotate LINE LEVEL control fully clockwise. If output is still not available check LINE LEVEL potentiometer R13 and replace as necessary.
		b. Defective transformer T2A.	b. Check transformer T2A and replace as necessary.
		c. Defective 10 milliwatt amplifier.	c. Measure dc voltages of 10 milliwatt amplifier (Q16, Q17 and Q18) to isolate faulty component(s). (Refer to figure 4-11.)
25	No high level output at TP15 of channel B audio output (figure 4-18). Low level output at TP16 is available.	a. CHB-USB MONITOR SPKR control set too low or defective.	a. Rotate MONITOR SPKR control fully clockwise. If output is still not available check MONITOR SPKR potentiometer R11 and replace as necessary.

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
25 (Cont.)		b. Defective transformer T3B.	b. Check transformer T3B and replace as necessary.
		c. Defective 1 watt amplifier.	c. Measure dc voltages of 1 watt amplifier (Q10, Q11, Q12, Q13, Q14 and Q15) to isolate faulty component(s). (Refer to figure 4-12.)
26	No low level output at TP16 of channel B audio output (figure 4-18). High level output at TP15 is available.	a. CHB-USB LINE LEVEL control set too low or is defective.	a. Rotate LINE LEVEL control fully clockwise. If output is still not available check line level potentiometer R10 and replace as necessary.
		b. Defective transformer T2B.	b. Check transformer T2B and replace as necessary.
		c. Defective 10 milliwatt amplifier.	c. Measure dc voltages of 10 milliwatt amplifier (Q16, Q17 and Q18) to isolate faulty components(s). Refer to figure 4-12.)
27	No PHONE output of channel A audio, channel B audio or AFC PIP rate. Outputs measured at TP18, TP14 and TP9 are available. (Refer to figure 4-18.)	a. Defective phone jack J5.	a. Check phone jack J5 and replace as necessary.
		b. Defective monitor amplifier of channel B audio card.	b. Measure dc voltages of monitor amplifier (Q19 and Q20) to isolate faulty component(s). (Refer to figure 4-12.)
28	No PHONE output of channel A or B audio. AFC PIP MON switch is OFF. AFC PIP rate is available at PHONE output when AFC PIP MON switch is ON.	a. Same as step 27a.	a. Same as step 27a.
		b. Defective monitor level potentiometer R54.	b. Check monitor level potentiometer R54 and replace as necessary.

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
29	No PHONE output of AFC PIP rate. Audio output of channel A & B is available. Output at TP9 is also available. (Reference figure 4-18.)	a. Defective AFC PIP MON switch.	a. Check AFC PIP MON switch and replace as necessary.
30	No AFC available during normal operation (normal strength carrier).	a. Defective AFC No. 2 card.	a. Perform operating procedures of para 3-8 step 4 through 13. If AFC is still not available proceed as follows: (1) Check output at TP11 (figure 4-18). (2) Check input to Z1 at TP9 (figure 4-18). If output at TP9 is normal, measure dc voltages of Z1, Q3 through Q6 and Z2. Replace faulty component(s) as necessary. (Refer to figure 4-14.) (3) If output at TP9 is not normal check output at TP8 (figure 4-18). (4) If output at TP8 is normal, measure dc voltages of Q1 and Q2, and also check AFC GAIN potentiometer R2. (Refer to figure 4-14.)
		b. Defective AFC No. 1 card.	b. Measure dc voltages of AFC No. 1 card to isolate faulty component(s). Replace as necessary. (Refer to figure 4-13.)

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
30 (Cont.)		c. Defective carrier buffer amplifier (AFC No. 2 card).	c. Measure dc voltages of Q7 (AFC No. 2 card figure 4-14). NOTE Perform adjustments in paragraph 5-12 after replacement of any component(s).
31	No indication on channel A VU meter. Output measured at TP20 (figure 4-18) is normal.	a. Channel A VU meter adjust not set properly. b. Defective components. c. Defective meter.	a. Adjust channel A VU meter adjustment on rear panel. b. Measure dc voltages of R58, R59, D4 and D5. (Refer to figure 5-10) to isolate faulty component(s). c. Check channel A VU meter and replace as necessary. NOTE Perform adjustment procedures given in para 5-7 if component(s) are replaced.
32	No indication on channel B VU meter. Output measured at TP16 (figure 4-18) is normal.	a. Channel B VU meter adjust not set properly. b. Defective components.	a. Adjust channel B VU meter adjustment on rear panel. b. Measure dc voltages of R56, R57, D2 and D3. (Refer to figure 5-10) to isolate faulty component(s).

TABLE 4-1. TROUBLESHOOTING CHART (Continued)

STEP	SYMPTOM	PROBABLE CAUSE	REMEDY
32 (Cont.)		c. Defective meter.	c. Check channel B VU meter and replace as necessary. NOTE Perform adjustment procedures given in para 5-7 if component(s) are replaced.
33	CARRIER LEVEL meter indicates low but FADE alarm lamp does not light.	a. AFC THRESHOLD control is set incorrectly. b. Defective bulb. c. Relay KK1 defective. d. Solid state relay or amplifier on meter card defective.	a. Adjust AFC THRESHOLD control to level at which FADE lamp lights. b. Replace bulb. c. Check relay and replace as necessary. d. Measure dc voltages to isolate faulty component(s). (Refer to fig. 4-16.) Perform adjustment in paragraph 5-11 after replacement of component(s).
34	DRIFT meter indicates a drift condition of more than 500 Hz but DRIFT alarm lamp does not light.	a. Defective bulb. b. Relay K1 on meter card defective. c. DC amplifier or differential amplifier on meter card defective.	a. Replace bulb. b. Check relay and replace as necessary. c. Measure dc voltages to isolate faulty component(s). (Refer to figure 4-16.)

4-8. VOLTAGE AND WAVEFORM DATA.

If the previous procedures still fail to isolate a fault, voltages and waveforms on the printed circuit cards should be checked. Tables 4-2 through 4-13 provide voltages and waveforms at transistor connections and test points. There are no dc voltages to be measured on the chassis.

a. Unless otherwise specified, all voltages are measured with respect to ground, and the tolerance on all measurements is ±10%. The unit of measurement is volts.

Note

After the equipment has been turned on, it must be allowed to warm up for one hour before any measurements are taken.

b. Unless otherwise specified, the following conditions of measurement are applicable to tables 4-2 thru 4-13.

1. All dc voltages are measured with power applied to the unit and with no input signal applied.

2. The settings of front panel switches and controls are immaterial.

3. The test point designations in the tables correspond to the test points called out on the schematic diagrams.

4. All waveforms are measured between the test point and ground.

5. All values shown are nominal.

TABLE 4-2. POWER SUPPLY CARD DC VOLTAGES

TRANSISTOR	E	B	C
Q1	+35.6	+34.4	+27.4
Q2	+24.6	+25.2	+38
Q3**	-	-	-
QQ3****	+24	+24.6	+38
Q4	+6.2	+4.8 to +9.6*	+25.2
Q5	+24	+24	0
Q6	0	0	+24
Q7**	-	-	-
QQ7****	0	+.6	+17
Q8**	-	-	-

TABLE 4-2. POWER SUPPLY CARD DC VOLTAGES (Continued)

TRANSISTOR	E	B	C
Q9	+13.6	+13.2	+3.6
Q10	+0.68	+1.16	+17
Q11**	-	-	-
Q12	-17.8	-19.2 to -14.4***	+1.16
Q13	0	0	-24
Q14	-24	-24	0

* Depends on setting of R9, nominal setting at +6.8 volts.
** Not on board - deleted.
*** Depends on setting of R30, nominal setting at -17.2 volts.
**** Mounted on top deck.

TABLE 4-3. IF CARD DC VOLTAGES

TRANSISTOR	GATE 1 (E)	GATE 2 (B)	DRAIN	SOURCE (C)
Q1*	+1.55	+3.4	+14	+1.6
Q2	+0.5	+1.9	+16.5	+0.7
Q3	+10	+10.8	-	+21.3
Q4**	+6.8	-	+15	+7.8
Q5**	+7.2	+7.8	-	+11.9
Q6	+6.1	+6.7	-	+11.8
Q7***	+4.2	+4.8	-	+11.3

* With no input signal applied. +3.8 volts on G2 is the nominal AGC voltage for zero signal. Note: AGC SOURCE switch in any position except MAN.
** Values when RTO is running.
*** Values when crystal oscillator is running.

TABLE 4-4. CHANNEL A AUDIO CARD DC VOLTAGES

TRANSISTOR	GATE 1 (E)	GATE 2	SOURCE (B)	DRAIN (C)
Q1	-19.4	-	-19	-5
Q2	-23.8	-22.2	-23	-9.4
Q3*	-23.6	-	-23	-18.5
Q4*	-19.2	-	-18.5	-9.5
Q5	-24	-22.8	-23.5	0
Q6	-14.2	-	-13.7	0
Q7	-14.6	-	-14.1	-4
Q8	-23.5	-	-23	-16.8
Q9	-23.7	-	-23.1	-12.6
Q10	-0.22	-	-0.8	-11.3
Q11	-24	-	-23	-11.9
Q12	-11	-	-10.5	-0.6
Q13	0	-	-0.6	-11.2
Q14	-11.4	-	-11.9	-23.4
Q15	-24	-	-23.4	-11.2
Q16	-18	-	-17	-10.7
Q17	-0.55	-	-1.05	-12.3
Q18	-23.5	-	-23.0	-12.3
Q19, Q20**				
Q21	-0.8	-	-1.4	-11.3

* These measurements must be made with the MODE switch set at AM.
** There are no transistors numbered Q19 or Q20 on this board.

TABLE 4-5. CHANNEL B AUDIO CARD DC VOLTAGES

TRANSISTOR	GATE 1 (E)	GATE 2	SOURCE (B)	DRAIN (C)
Q1	+4.6	-	+5	+19
Q2	+0.2	+1.3	+0.7	+18
Q3*	+0.5	-	+1.2	+2.6
Q4*	+2	-	+2.6	+13.6
Q5	+0.1	+1	+0.2	+19
Q6	+9.6	-	+10.2	+24
Q7	+9.8	-	+10.4	+20
Q8	+1	-	+1.6	+7.9
Q9	+0.3	-	+0.9	+5.7
Q10	+1	-	+1.3	+8
Q11	+0.1	-	+1.15	+12.6
Q12	+13.6	-	+13.8	+23
Q13	+23.5	-	+23	+13.2
Q14	+13	-	+12.6	+0.6
Q15	0	-	+0.6	+13.2
Q16	+6.2	-	+7.2	+12.6
Q17	+23.6	-	+23	+11.7
Q18	+0.5	-	+1	+11.7
Q19	+0.2	-	+1.25	+4.7
Q20	+3.65	-	+4.7	+11.7

* These measurements must be made with the MODE switch set at AM.

TABLE 4-6. AGC CARD DC VOLTAGES

TRANSISTOR	E	B	C
Q1	+0.93	+1.53	+14.7
Q2	+15.3	+14.7	0
Q3	+0.04	+0.65	+23.7
Q4	+0.93	+1.53	+14.7
Q5	+15.3	+14.7	0
Q6	+0.04	+0.65	+23.7
Q7	+0.2	+0.8	+10.8
Q8	+0.93	+1.53	+14.7
Q9	+15.3	+14.7	0
Q10*	0	-4.7	+3.7

* Readings are for zero input signal, AGC SOURCE switch in any position except MAN.

TABLE 4-7. AFC CARD NO. 1 DC VOLTAGES

TRANSISTOR	E	B	C
Q1	+0.32	+0.44	+11
Q2	+10.4	+10.6	+19.2
Q3	+0.2	+1.3	+6.7
Q4	+1	+1.7	+14.1
Q5	+1	+2	+9.5
Q6	+1	+1.7	+14.1
Q7	+1	+1.7	+14.1
Q8	+1	+1.7	+14.1
Q9	+0.6	+1.18	+10.6
Q10	+0.9	+1.8	+9.4
Q11	+1	+2.1	+12.8

TABLE 4-8. AFC CARD NO. 2 DC VOLTAGES

Note

These measurements must be taken with the AFC FUNCTION switch set at OFF.

TRANSISTOR	E(G)	B(D)	C(S)
Q1*	-0.54	0	+24
Q2*	-1.15	-0.54	+24
Q3*	-1.1	0	+10.2
Q4*	+10.8	+10.2	+0
Q5*	+10.8	+11.5	+24
Q6*	-1	0	+11.8
Q7	+8	+14.2	+10

* To check transistors Q1 thru Q6 voltages, first adjust R2 for -24 volts on arm, then adjust R5 for 0 volts on collector of Q4. After measurement, rotate R2 extreme CCW.

TABLE 4-9. METER CARD DC VOLTAGE

Note

These measurements must be made with the AFC THRESHOLD control fully clockwise and the AGC SOURCE switch in any position except MAN.

TRANSISTOR	E	B	C
Q1	0	0	-24
Q2	+22	+23	+22.5
Q3	-1.75	-0.5	0
Q4	0	0.7	0
Q5	+24	+23.3	+23.7
Q6	-24	-23.3	-23.7
Q7	0	+0.7	+0.16
Q8	-1.1	0	+13.9
Q9	+11.2	+10.6	0
Q10	+11.2	+11.8	+24
Q11	0	0	+11.8
Q12	-1.05	0	+10.2
Q13	-1.07	0	+11.2
Q14	0	-4.8	+23

TABLE 4-10. IF CARD WAVEFORMS

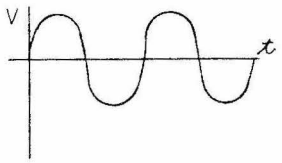
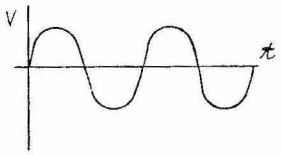
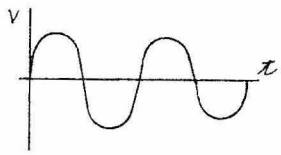
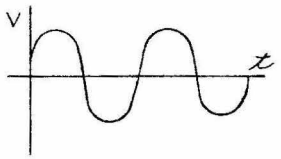
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-1	None	S8 at INT, AFC FUNCTION switch at OFF. All other controls: any setting.	 750 mV rms f = 555 kHz
TP-1	None	S8 at INT, AFC FUNCTION switch at TUNE. TUNE control centered. All other controls: any setting.	 750 mV rms f = 555 kHz
TP-2	10 mV rms, 455 kHz.	S8 at INT, AFC FUNCTION switch at OFF. AGC SOURCE switch at A or B. CARRIER LEVEL control at half way point. All other controls: any setting.	 10 mV rms f = 100 kHz
TP-2	Between 100 mV and 1 volt, 455 kHz.	S8 at INT, AFC FUNCTION switch at OFF. AGC SOURCE switch at A or B. CARRIER LEVEL control at half way point. All other controls: any setting.	 1000 mV rms f = 100 kHz

TABLE 4-11. AUDIO CARD WAVEFORMS

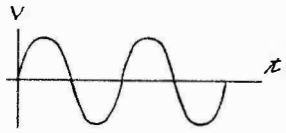
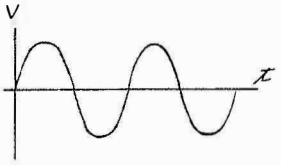
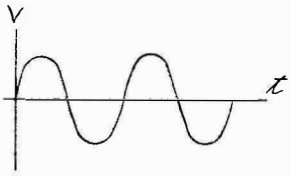
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-1	454 kHz (CH. A) or 456 kHz (CH. B), 100 mV.	S8 at INT. S4 at XTAL, MODE switch at SSB/CW CARRIER LEVEL control at 50%, AFC FUNCTION switch at OFF. AGC SOURCE switch at A or B. All other controls: any setting.	 300 mV rms f = 1000 Hz
TP-2	Same as above.	Same as above. In addition, terminate either CH. A SPKR OUTPUT (454 kHz input) or CH. B SPKR OUTPUT (456 kHz input) with a 600 ohm, 1 watt resistor. Rotate the CH. A (454 kHz input) or CH. B (456 kHz input) MONITOR SPKR control fully CW.	 at least 24.5 volts rms f = 1000 Hz
TP-3	Same as above.	Same as above, except terminate both low level (LOA and LOB) outputs and rotate both LINE LEVEL controls fully CW.	 at least 2.45 volts rms f = 1000 Hz

TABLE 4-11. AUDIO CARD WAVEFORMS (Continued)

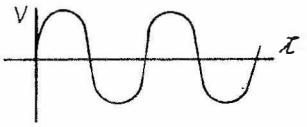
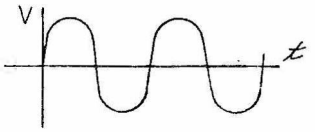
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-4	Same as above.	Same as for TP-1.	 300 mV rms f = 101 kHz (CH. A) f = 99 kHz (CH. B)
TP-5	Same as above.	Same as for TP-1.	 0.05 volts rms f = 100 kHz

TABLE 4-12. AGC CARD WAVEFORMS

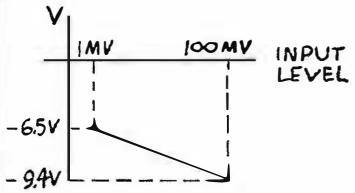
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-1	455 kHz, vary between 1 mV and 1000 mV rms.	S8 at INT. S4 at XTAL, CARRIER LEVEL control at 50%, AFC FUNCTION switch at OFF, AGC SOURCE switch at CXR. All other controls: any setting.	 Adjust CARRIER LEVEL control for best fit.
TP-1	454 kHz, vary between 1 mV and 1000 mV rms.	Same as above, except set AGC SOURCE switch at CH A.	Same as above. (Do not adjust CARRIER LEVEL control.)
TP-1	Same as above.	Same as above, except set AGC SOURCE switch at A or B.	Same as above.

TABLE 4-12. AGC CARD WAVEFORMS (Continued)

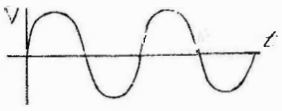
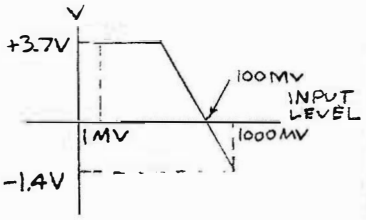
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-1	456 kHz, vary between 1 mV and 1000 mV rms.	Same as above.	Same as above.
TP-1	Same as above.	Same as above, except set AGC SOURCE switch at CH B.	Same as above.
TP-2	455 kHz carrier, 100 mV rms modulated 30% with 400 Hz tone.	Same as above, except AGC SOURCE switch at A or B, CH. A BANDWIDTH switch at WIDE, MODE switch at AM.	 100 mV rms f = 400 Hz
TP-3	Same as above.	Same as above, except set CH. B BANDWIDTH switch at WIDE.	Same as above.
TP-4	454 kHz vary between 1 mV and 1000 mV.	S8 at INT. S4 at XTAL, CARRIER LEVEL control at 50%, AFC FUNCTION switch at OFF, AGC SOURCE switch at CH A. All other controls: any setting.	

TABLE 4-13. AFC CARD NO. 1 WAVEFORMS

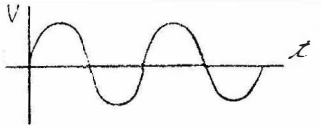
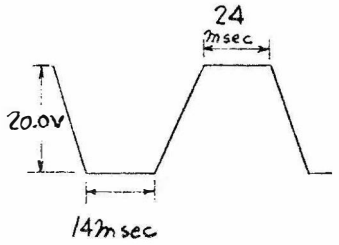
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-1	None	All controls - any setting.	 0.05 volt rms f = 100 kHz
TP-2	454,960Hz, 100 mV rms.	S8 at INT. AFC FUNCTION switch at ON, CARRIER LEVEL control at 50%, AGC SOURCE switch at A or B.	

TABLE 4-14. AFC CARD NO. 2 WAVEFORMS

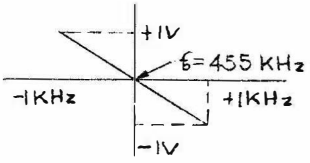
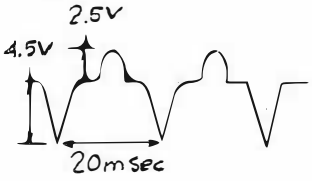
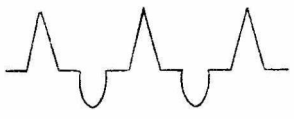
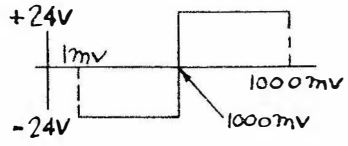
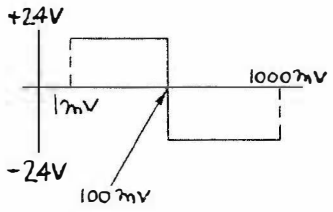
TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
TP-1	Initially 455 kHz, 100 mV rms. After AFC lock-on, sweep from 454 kHz to 456 kHz.	S8 at INT, AFC FUNCTION switch at ON, AGC SOURCE switch at A or B. All other controls: any setting.	 Note: TP-1 is a high impedance point (50 Meg-ohms)
TP-2	Same as above.	Same as above.	 OR 

TABLE 4-14. AFC CARD NO. 2 WAVEFORMS (Continued)

TEST TEST POINT	INPUT	CONTROL SETTINGS	WAVEFORMS
	Nominal dimensions for input of 455,050 Hz		
TP-3	455 kHz vary between 1 mV and 1000 mV.	Same as above except AGC SOURCE switch at CXR.	
TP-4	Same as above.	Same as above.	

SECTION 5

MAINTENANCE

5-1. FAILURE, PERFORMANCE AND OPERATIONAL REPORTS.

Note

The Bureau of Ships no longer requires the submission of failure reports for all equipments. Failure Reports and Performance and Operational Reports are to be accomplished for designated equipments (refer to Electronics Installation and Maintenance Book, NAVSHIPS 0967-000-0120) only to the extent required by existing directives. All failures shall be reported for those equipments requiring the use of Failure Reports.

5-2. PREVENTIVE MAINTENANCE.

Preventive maintenance procedures are not required for Single Sideband Receiver Converter, CV-2712/UR.

5-3. REPAIR.

WARNING

Line voltages are present in this equipment. All testing and calibration should be performed with proper regard for the dangers involved. Whenever possible, test equipment should be connected while power is off. All repairs should be performed with power disconnected.

The following paragraph provides instructions for the removal and replacement of parts in the converter.

a. Removal of the front panel access door held in place by four captive screws with knurled knobs and the top and bottom covers, held in place with machine screws, provides access to the plug-in printed circuit cards and chassis-mounted parts. The cards can be unplugged and removed by pulling.

b. Components mounted on the printed circuit cards or the chassis terminal boards can be removed and replaced using authorized desoldering and soldering procedures. For location of parts, see figures 5-1 through 5-8.

5-4. CALIBRATION AND ALIGNMENT.

a. Calibration and alignment procedures are given in paragraphs 5-5 through 5-12. In the introductory information for each procedure, instructions are given as to when the procedures are to be performed. For example, when certain components are removed and replaced, it is necessary to recalibrate or make certain adjustments.

b. Table 5-1 lists the test equipment and tools required during calibration and alignment.

TABLE 5-1. TEST EQUIPMENT AND TOOLS REQUIRED

QUANTITY	DESCRIPTION	MODEL OR TYPE
1	Ammeter	Hewlett-Packard Model HP428B
1	Counter	General Radio Model GR1192
1	Oscilloscope	Tektronix Model 547 with 1A1 plug-in module.
1	Probe	Tektronix P6006
1	Signal Generator	Hewlett-Packard Model HP606B
1	Tuning Tool, Non-Metallic	
1	Vacuum Tube Voltmeter	Hewlett-Packard Model HP400E
1	Voltmeter, D.C.	Hewlett-Packard Model HP3460B

5-5. POWER SUPPLY ADJUSTMENT (Figures 5-1 and 4-15.) Adjustment of the ±24-volt regulated output voltage is required whenever any component on the power supply card is replaced or whenever any chassis-mounted component of the power supply circuits is replaced. To perform this adjustment, a dc voltmeter is required. To adjust ±24 volts regulated power supply proceed as follows:

a. Extend power supply card.

b. Set potentiometer R9 at mid-range.

c. Turn on power.

d. Connect dc voltmeter between positive output at pin 8, and ground.

e. Adjust potentiometer R9 for reading of +24 ± 0.1 volts.

For adjustment of negative supply, proceed as follows:

a. Set potentiometer R30 at mid-range.

b. Turn on power.

c. Connect dc voltmeter between negative output at pin 15, and ground.

d. Adjust potentiometer R30 for reading of -24 ± 0.1 volts.

5-6. POWER SUPPLY SHORT CIRCUIT CURRENT ADJUSTMENT. This adjustment is made on both supplies only after the power supply card is set for +24 volts and -24 volts. The short circuit current adjusmtent is made after replacement of any of the following components:

+24-Volt Supply

Diodes D1, D2, D3

Resistors R3, R5

Transistors Q1, Q2, QQ3

-24-Volt Supply

Diodes D7, D8, D9

Resistors R22, R24

Transistors Q9, Q10, QQ7

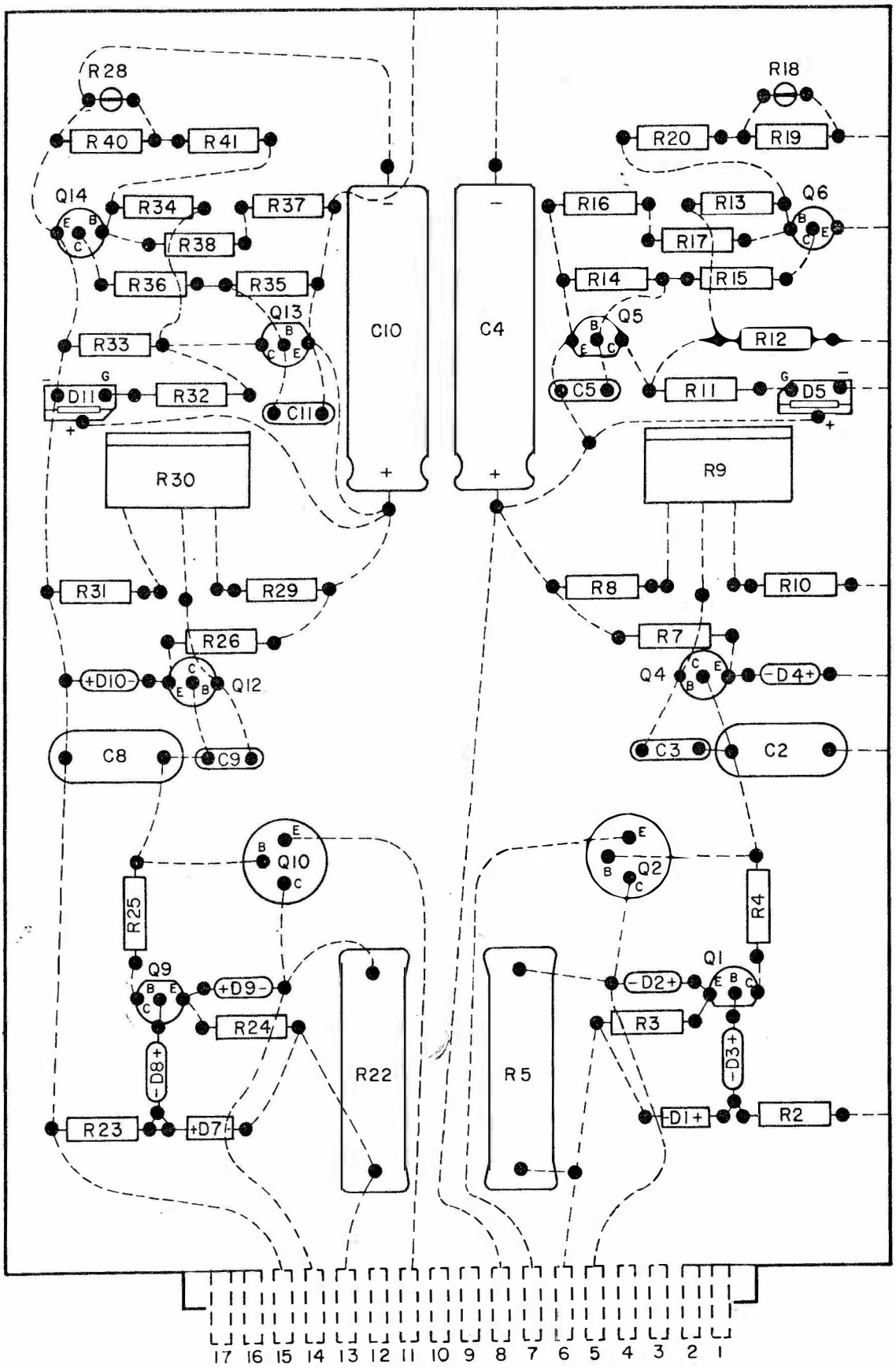


Figure 5-1. Power Supply Card Component Location

Proceed as follows for the positive supply:

CAUTION

Watch polarity when connecting ammeter.

a. Short card pin 8 to ground through ammeter set on 1 ampere scale or higher.

b. Observe reading of ammeter. Current shall be between 800 and 850 milliamperes.

c. If value found in step b. is too low, decrease value of resistor in parallel with resistor R5.

d. If value found in step b. is too high, increase value of resistor in parallel with resistor R5.

For the negative supply, proceed as follows:

CAUTION

Watch polarity when connecting ammeter.

a. Short card pin 15 to ground through ammeter set on 1 ampere scale or higher.

b. Observe reading of ammeter. Current shall be between 800 and 850 milliamperes.

c. If value found in step b. is too low, decrease value of resistor in parallel with resistor R22.

d. If value found in step b. is too high, increase value of resistor in parallel with resistor R22.

5-7. CHANNEL A AND CHANNEL B VU METER ADJUSTMENT (Figures 5-2, 5-3, 4-11, 4-12, 3-1, and 2-2). Adjustment of the VU meters is required whenever resistors R58 or R59 (Chan. A) or R56, R57 (Chan. B) are replaced or whenever meter M2 (Chan. A) or M1 (Chan. B) is replaced. Test equipment required for the VU meter adjustment are a signal generator and a vacuum tube voltmeter. Before performing the adjustment, set the controls as follows:

CONTROL	POSITION
CHA-LSB MONITOR SPKR	Fully counterclockwise
CHA-LSB LINE LEVEL	Fully counterclockwise
CHA-LSB IF BANDWIDTH	3.3 KHz LSB
CARRIER LEVEL	Approximately 25% up
TUNE	Center (0)
AFC FUNCTION	OFF
AFC THRESHOLD	Approximately 50% up
CHB-USB MONITOR SPKR	Fully counterclockwise
CHB-USB LINE LEVEL	Fully counterclockwise
MONITOR	Center
AFC PIP MON	OFF
RF GAIN	Counterclockwise
AGC SOURCE	A or B
AGC TIME CONSTANT	SLOW
MODE	SSB/CW
S4 (Rear Panel)	XTAL
S8 (Rear Panel)	INT

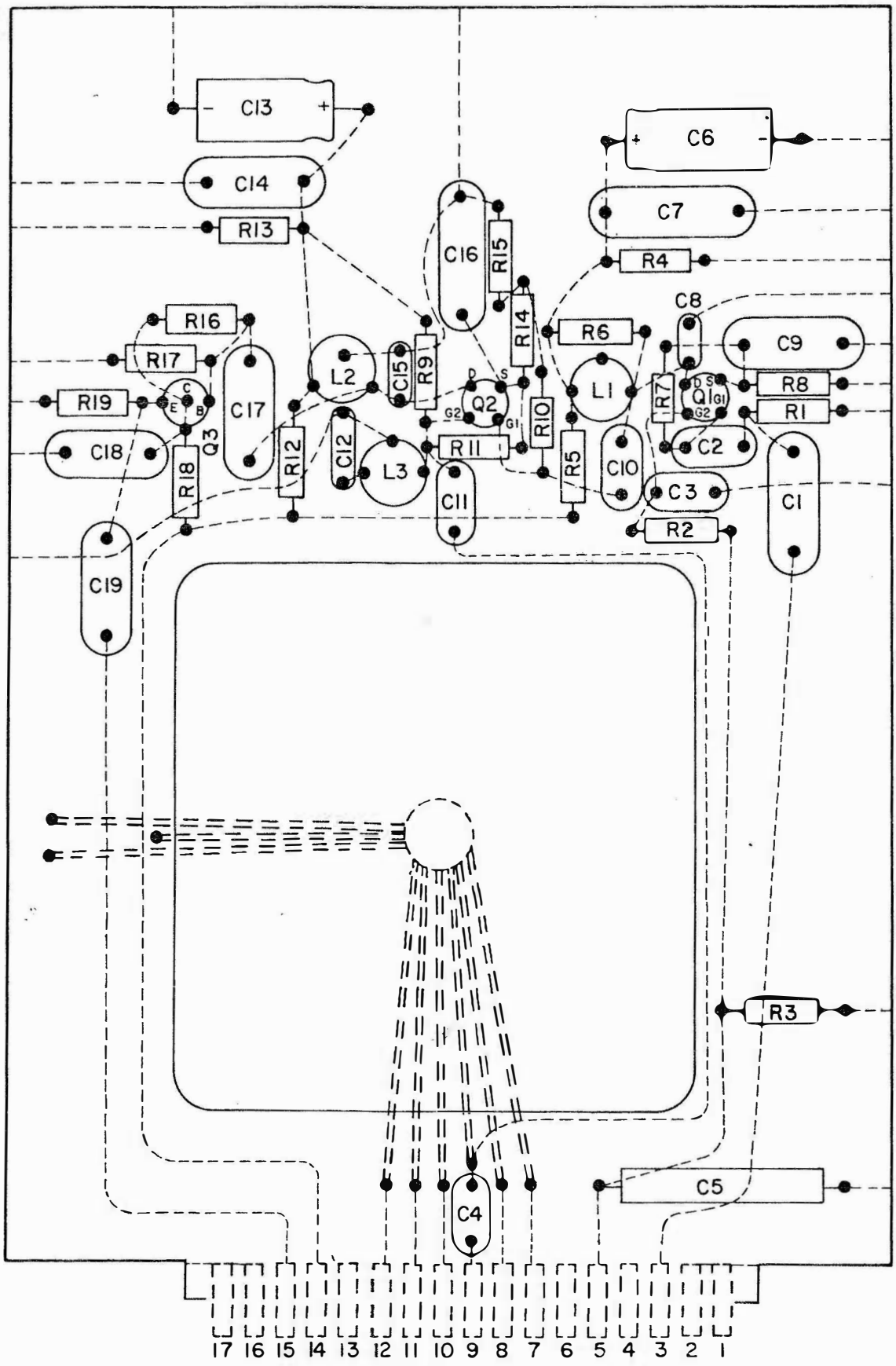


Figure 5-2. Channel A Audio Card Component Location

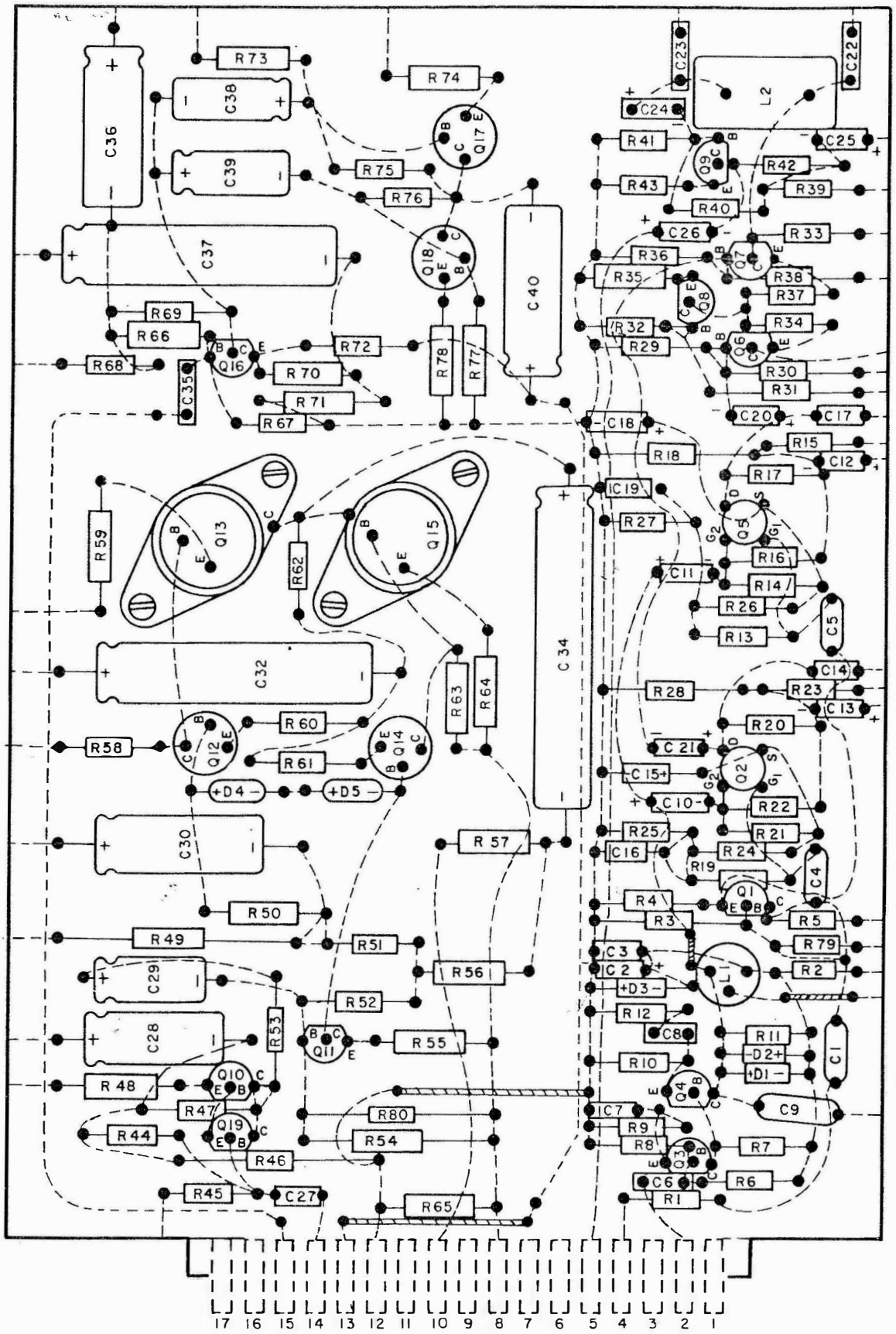


Figure 5-3. Channel B Audio Card Component Location

After establishing the initial control settings, proceed as follows:

a. Turn power on. Allow one hour warm-up.

b. Terminate all four audio outputs in 600 ohms.

c. Using signal generator, apply 454 ± 0.2 kHz at 100 millivolts to IF INPUT connector J1 located on rear panel.

d. Using VTVM, monitor LOA output on rear panel terminal strip.

e. Adjust CHA-LSB LINE LEVEL control to obtain reading of +10 db on VTVM.

f. Adjust CHA VU MTR ADJ (on rear panel) to obtain reading of 0 VU on LINE LEVEL meter (channel A).

g. Change signal generator frequency to 456 ± 0.2 kHz.

h. Repeat steps c. through g, except monitor LOB output in step d. and adjust CH B VU MTR ADJ in step g.

5-8. 100 KHZ CRYSTAL OSCILLATOR ADJUSTMENT (Figures 5-4, 4-13, 2-2). This adjustment is performed when the AFC circuit requires alignment or after replacement of crystal Y1, capacitors C1, C2, C3, C4, or transistor Q1 on AFC Card No. 1. To perform this adjustment, a frequency counter and a non-metallic tuning tool are required. The control settings are optional, except S4 on the rear panel must be set at XTAL. Proceed as follows:

a. Turn on power. Allow one hour warm-up.

b. Connect counter to 100 KHZ INJ connector J2 on rear panel.

c. Extend AFC No. 1 card.

d. Using non-metallic tuning tool, adjust capacitor C1 on AFC No. 1 card until 100.000 kHz ± 1 Hz reading is obtained on counter.

5-9. HFO CYRSTAL OSCILLATOR ADJUSTMENT (Figures 5-5, 4-10, 3-1, 2-2). This adjustment is performed whenever any of the following components on the IF card has been replaced: crystal Y1, capacitors C31, C33, C34 and transistor Q7. To perform this adjustment, a counter and a non-metallic tuning tool are required. Proceed as follows:

a. On rear panel, set S8 to TEST.

b. On front panel, set AFC FUNCTION switch to OFF.

c. Turn on power. Allow at least one hour for warm-up.

d. Connect counter to HFO connector J3 on rear panel.

e. Extend IF card.

f. Using non-metallic tuning tool, adjust capacitor C34 until reading of 555.000 kHz ± 1 Hz is obtained on counter.

5-10. REACTANCE TUNED OSCILLATOR (RTO) ADJUSTMENT (Figures 5-5, 4-10, 3-1, 2-2). This adjustment is performed whenever one of the following components on the IF card are replaced: capacitors C21, C22, C23, C30; diodes D2, D4; inductor L4; transistor Q4. To perform this adjustment, a counter and a non-metallic tuning tool are required. Proceed as follows:

a. On rear panel, set S8 to TEST.

b. On front panel, set AFC FUNCTION switch to ON.

c. On front panel, set TUNE control to 0.

d. Extend IF card.

e. Turn on power. Allow at least one hour for warm-up.

f. Connect counter to HFO connector J3.

g. Adjust capacitor C21 until reading of 555.000 kHz ± 1 Hz is obtained on counter.

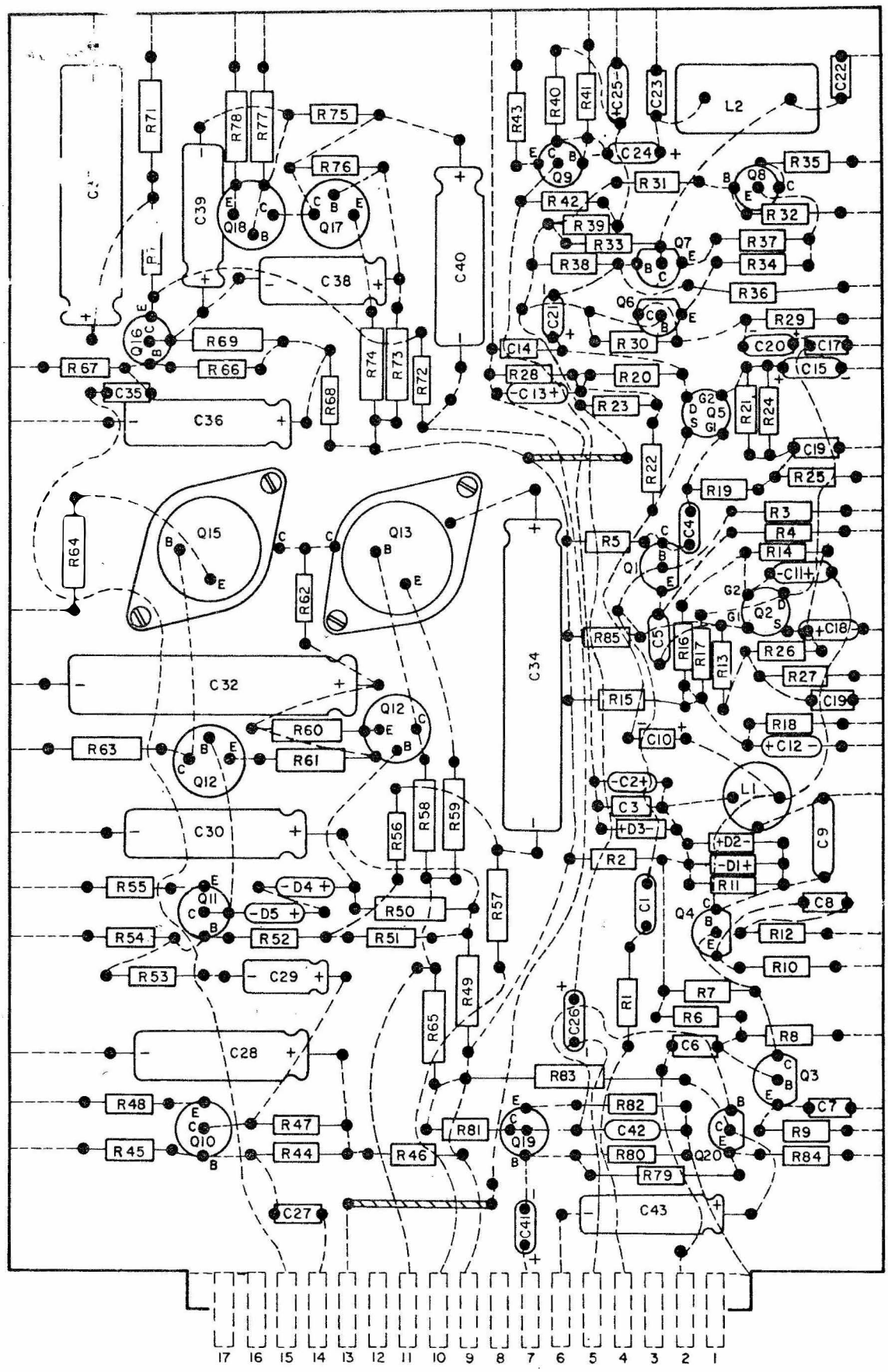


Figure 5-4. AFC Card No. 1 Component Location

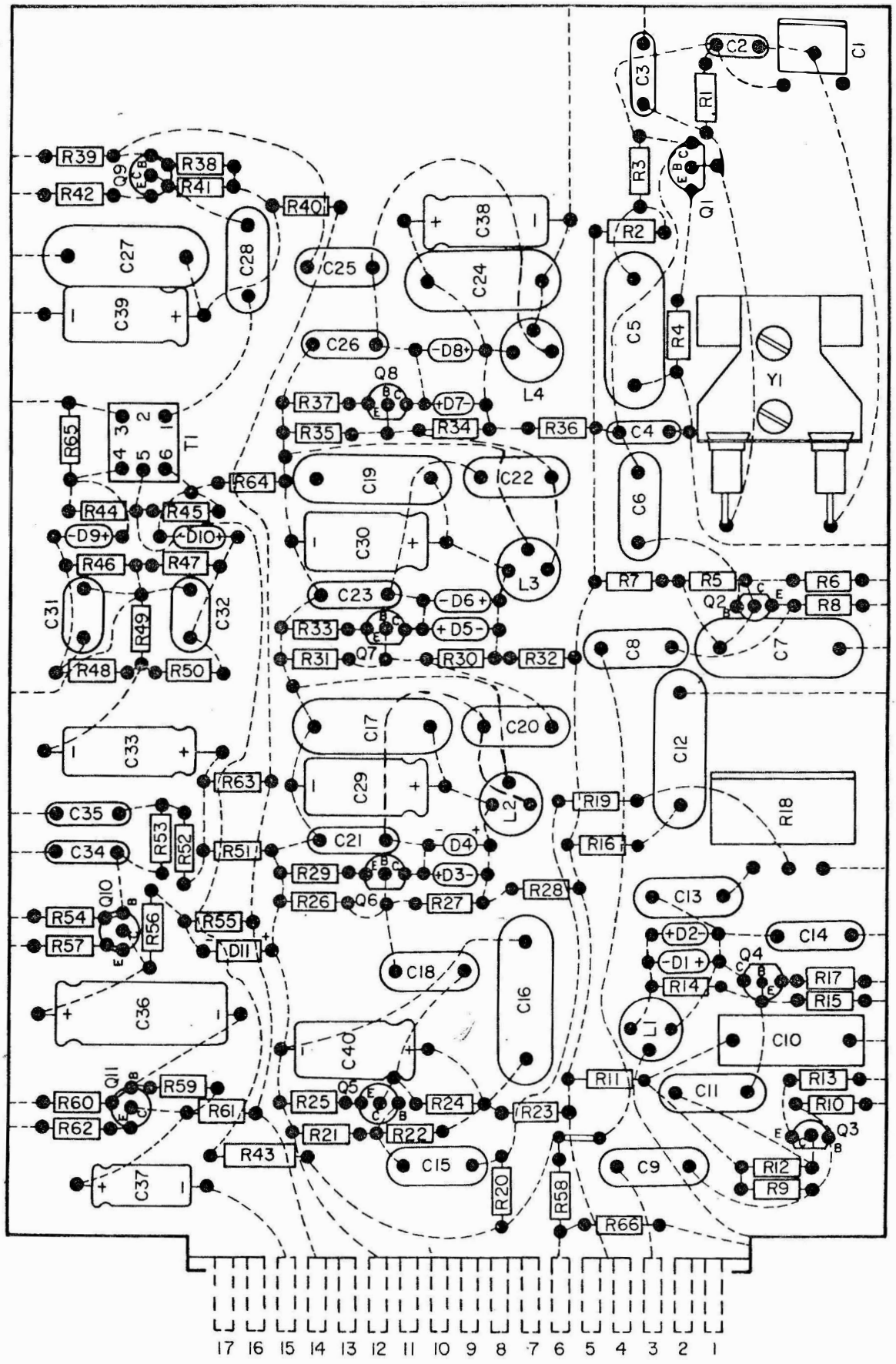


Figure 5-5. IF Card Component Location

5-11. CARRIER METER ADJUSTMENT (Figures 5-6, 5-7, 5-5, 4-17, 4-16, 4-10, 3-1, 2-2). The carrier meter adjustment is performed whenever any of the following takes place: replacement of any component on the IF card that is not in the oscillator circuit; replacement of the AGC plug-in module; replacement of diodes D3 or D4 on Meter card; replacement of resistors R9, R10, R11, R12, R13 or R14 on Meter card; or replacement of transistor Q3 on Meter card. The equipment required for performance of this adjustment are a signal generator and a dc voltmeter. Proceed as follows:

a. Turn on power.

b. Apply signal generator input to IF input connector J1.

c. Set controls as follows:

CONTROL	POSITION
CHA-LSB MONITOR SPKR	Counterclockwise
CHA-LSB LINE LEVEL	Counterclockwise
CHA-LSB IF BANDWIDTH	3.3 KHz LSB
CARRIER LEVEL	Counterclockwise
TUNE	0
AFC FUNCTION	OFF
AFC THRESHOLD	50%
CHB-USB IF BANDWIDTH	3.3 KHz USB
CHB-USB MONITOR SPKR	Counterclockwise
CHB-USB LINE LEVEL	Counterclockwise
MONITOR	Center
AFC PIP MON	OFF
RF GAIN	Counterclockwise
AGC SOURCE	A or B
AGC TIME CONSTANT	SLOW
MODE	SSB/CW
S4 (Rear Panel)	XTAL
S8 (Rear Panel)	INT

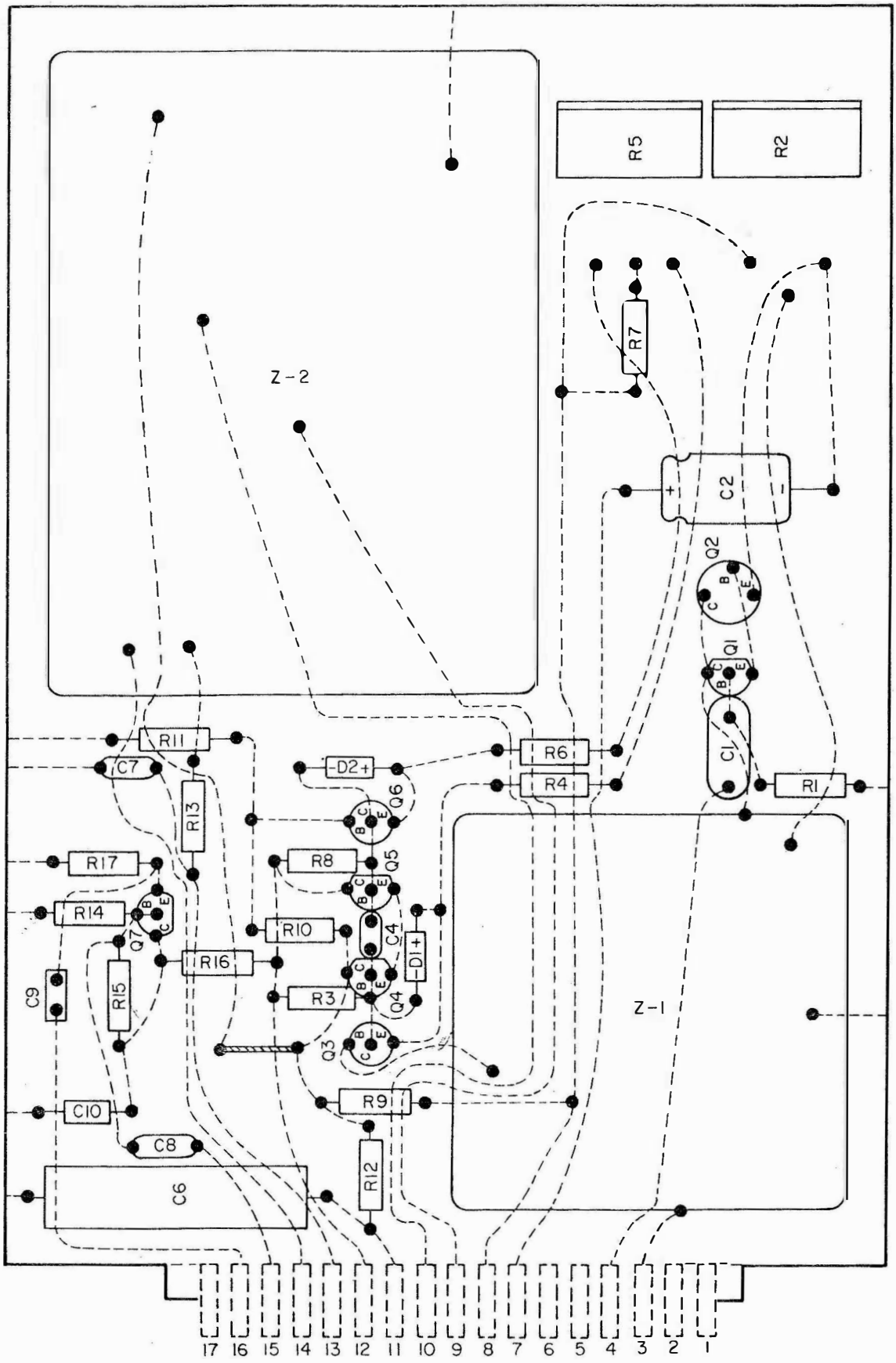


Figure 5-6. Meter Card Component Location

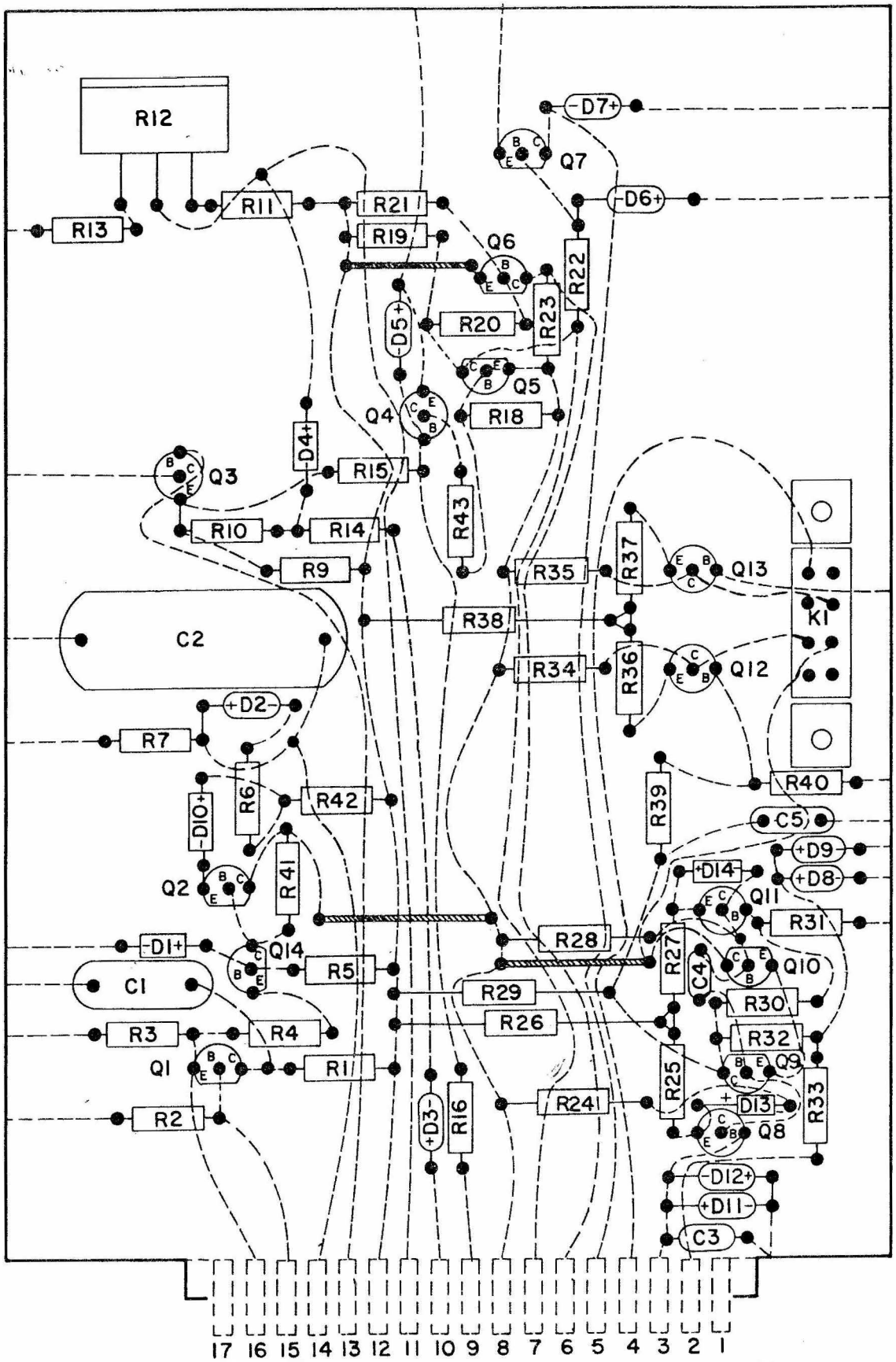


Figure 5-7. AGC Card Component Location

d. Adjust input for 456 kHz at 1 millivolt.

e. Measure dc voltage at pin 15 of Meter card. Note value.

f. Set AGC SOURCE switch to MAN.

g. Monitor dc voltage at pin 15 on Meter card.

h. Adjust RF GAIN control for same voltage as listed in step e.

i. Move signal generator to 455 kHz at 1 millivolt.

j. Measure dc voltage at pin 16 of AGC card.

k. Adjust CARRIER LEVEL control for same voltage as listed in step e.

1. Adjust potentiometer on Meter card for reading of 40 on CARRIER LEVEL meter.

5-12. AFC LOOP ALIGNMENT (Figures 5-8, 5-4, 4-14, 4-13, 3-1, 2-2). The AFC loop is aligned whenever the AFC No. 1 Card or anything on it is replaced, whenever the 100 kHz oscillator on AFC No. 1 Card is adjusted, or whenever the AFC No. 2 Card or anything on it is replaced, except transistor Q7 and its associate circuit. To perform this alignment, a signal generator, oscilloscope, and dc voltmeter are required. Proceed as follows:

a. Turn on power. Allow warm-up of one hour.

b. Set controls as follows:

CONTROL	POSITION
CHA-LSB MONITOR SPKR	Counterclockwise
CHA-LSB LINE LEVEL	Counterclockwise
CHA-LSB IF BANDWIDTH	3.3 KHz LSB
CHB-USB MONITOR SPKR	Counterclockwise
CHB-USB LINE LEVEL	Counterclockwise
CHB-USB IF BANDWIDTH	3.3 KHz USB
AFC FUNCTION	OFF
AFC THRESHOLD	Counterclockwise
CARRIER LEVEL	20%
AFC PIP MON	ON
MONITOR LEVEL	Center
TUNE	Center
AGC SOURCE	MAN
RF GAIN	70%
AGC TIME CONSTANT	SLOW
MODE	SSB/CW
S4 (Rear Panel)	XTAL
S8 (Rear Panel)	TEST

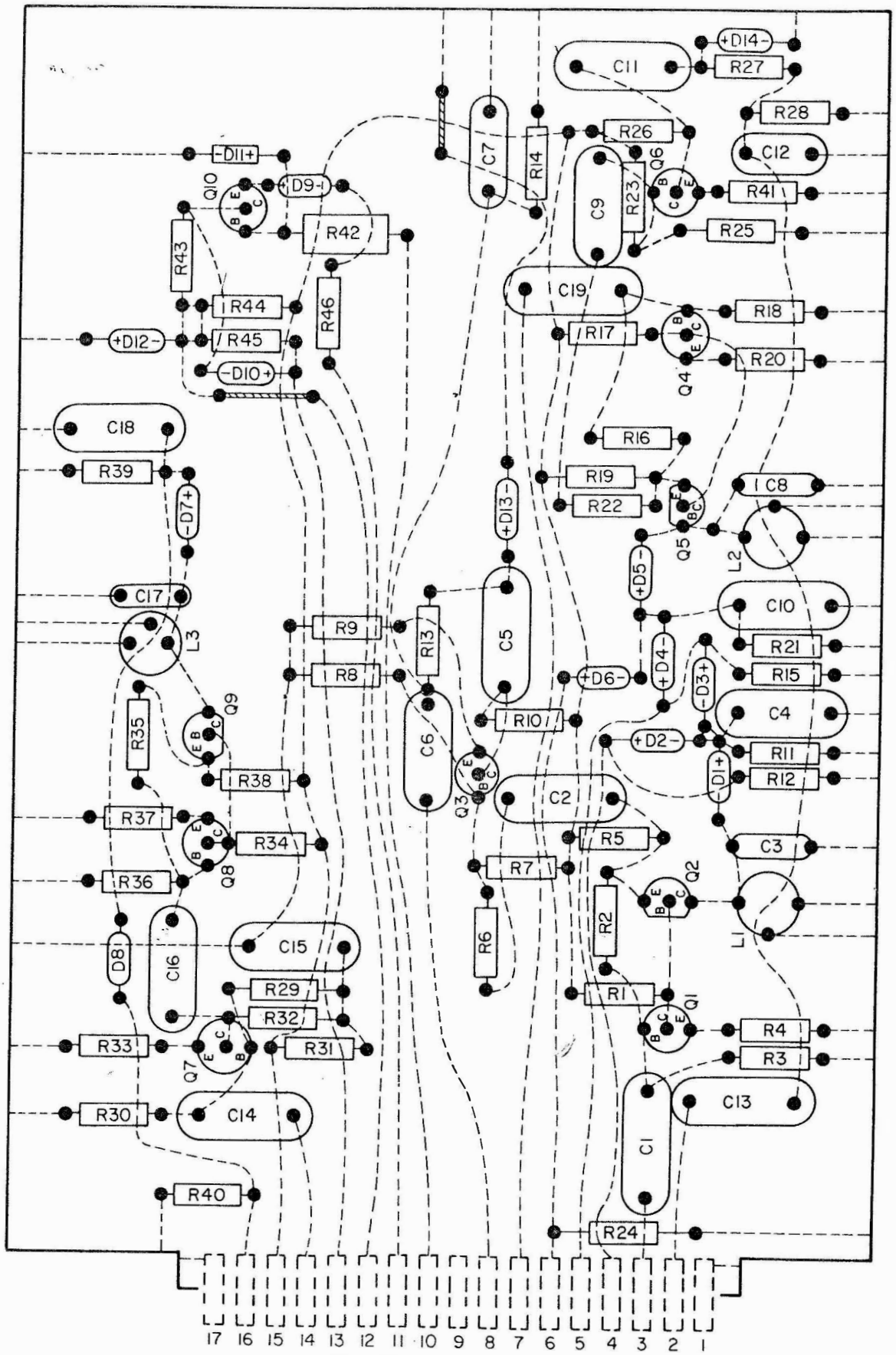


Figure 5-8. AFC Card No. 2 Component Location

c. Extend AFC No. 1 and AFC No. 2 cards.

d. Using signal generator, apply 454, 950 or 455,050 Hz at 100 millivolts to IF INPUT connector J1 on rear panel.

e. Using oscilloscope, observe waveform on arm of potentiometer R2 on AFC No. 2 Card.

f. Adjust potentiometer R18 on AFC No. 1 Card for maximum sharpness and amplitude of waveform.

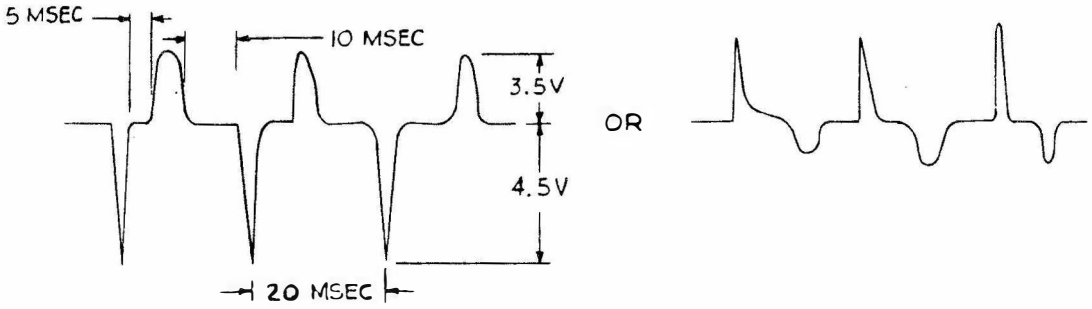
g. Adjust potentiometer R2 on AFC No. 2 Card for reading of -24 volts at arm.

h. Adjust potentiometer R5 on AFC No. 2 Card for 0 volt at collector of transistor Q4 on AFC No. 2 Card.

i. Fully rotate (as far as possible to stop) potentiometer R2, on AFC No. 2 Card, away from position of step h.

Note

The pips (on the arm of potentiometer R2 on AFC No. 2 Card) should look like



depending on which frequency is higher, the input or the 100 kHz injection.

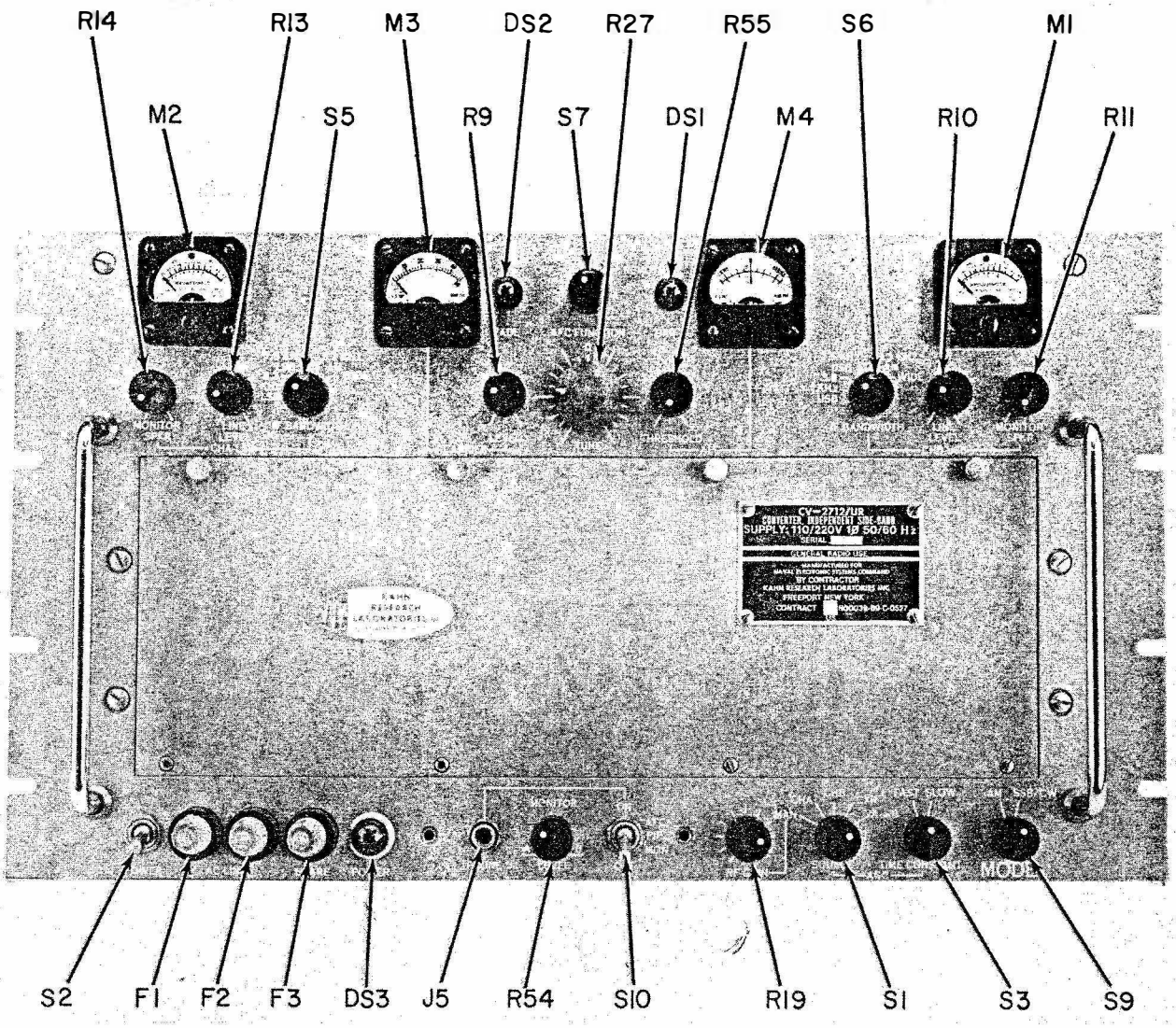


Figure 5-9. Chassis Mounted Component Location (Sheet 1 of 5)

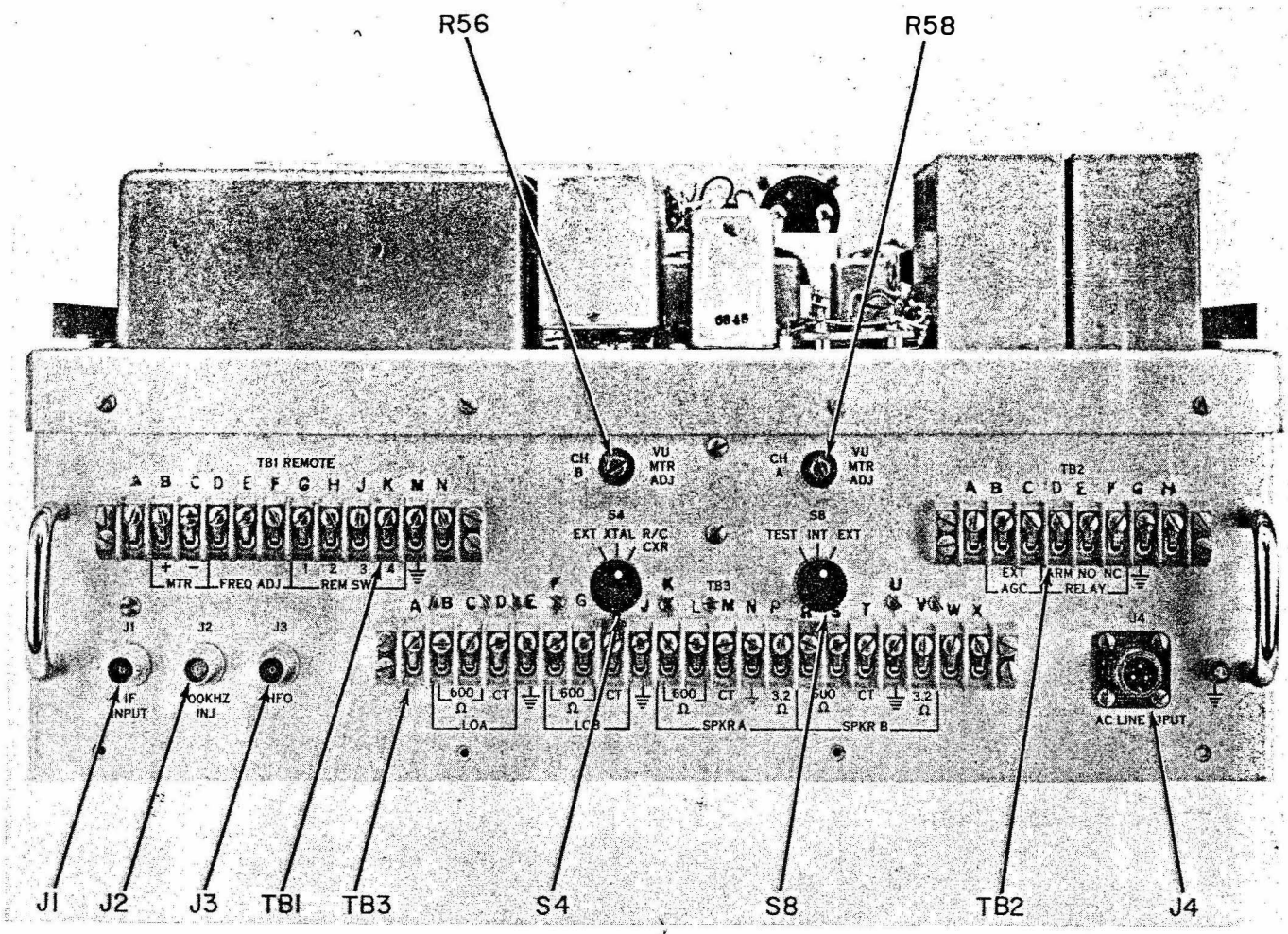


Figure 5-9. Chassis Mounted Component Location (Sheet 2 of 5)

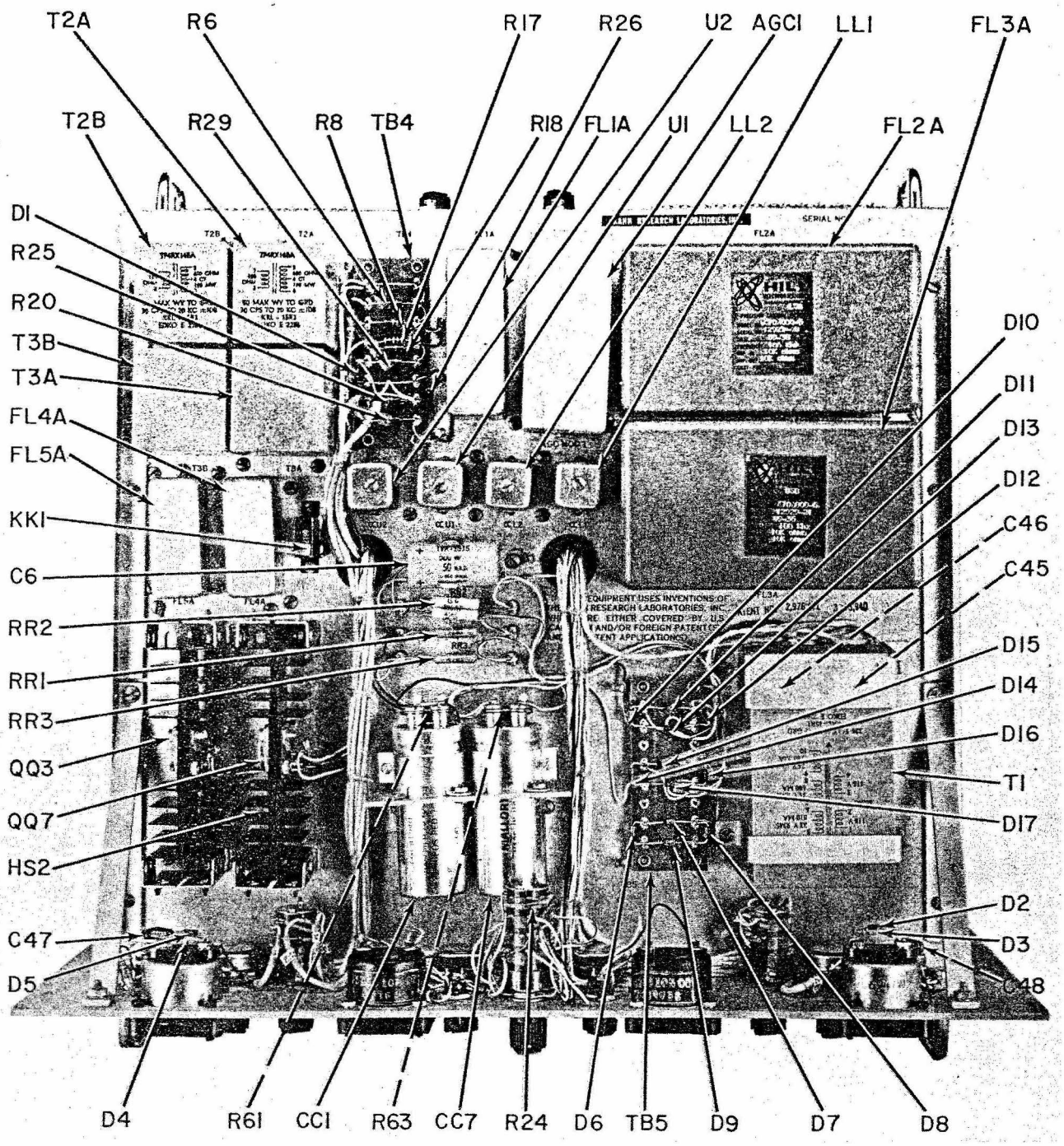


Figure 5-9. Chassis Mounted Component Location (Sheet 3 of 5)

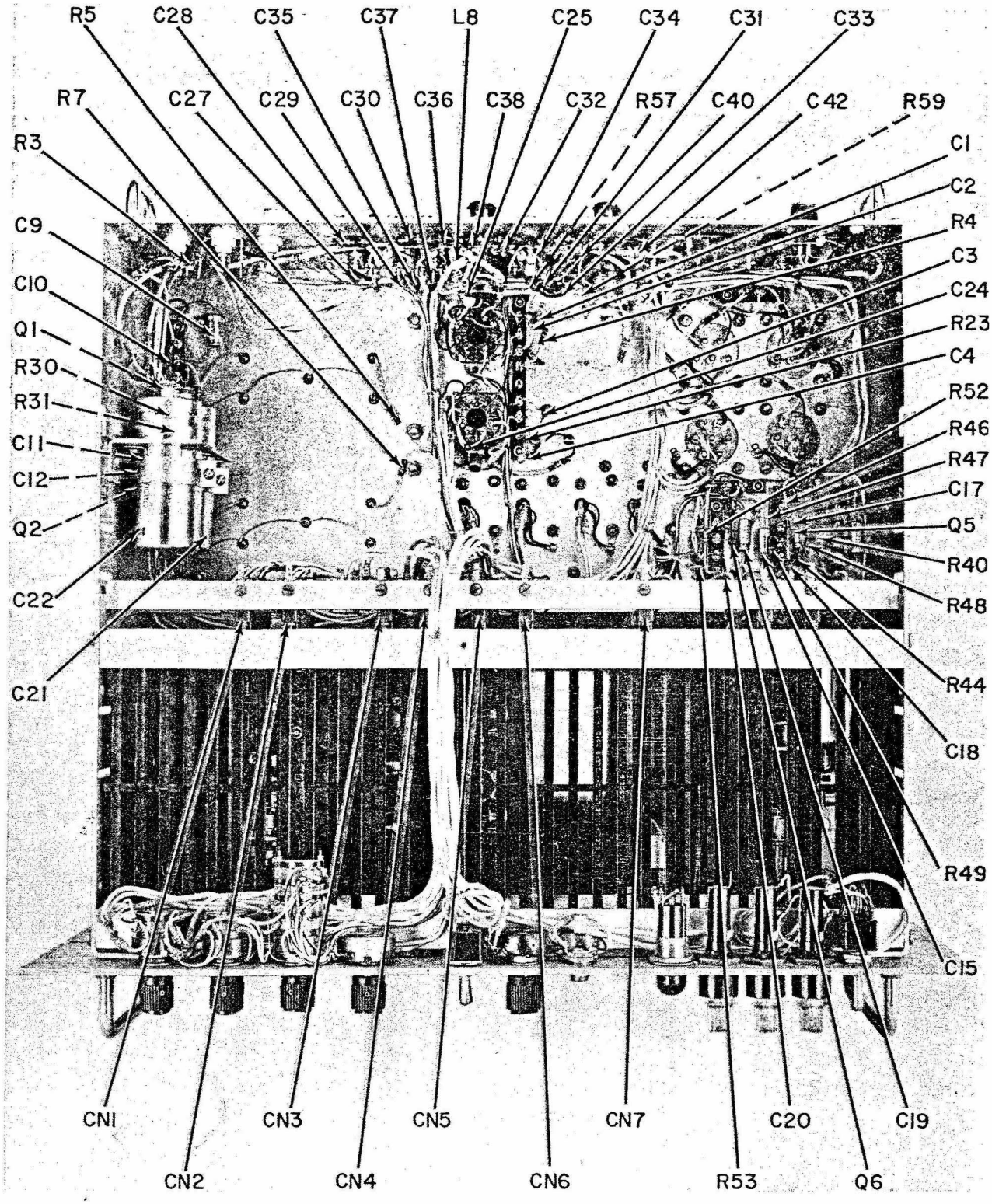


Figure 5-9. Chassis Mounted Component Location (Sheet 4 of 5)

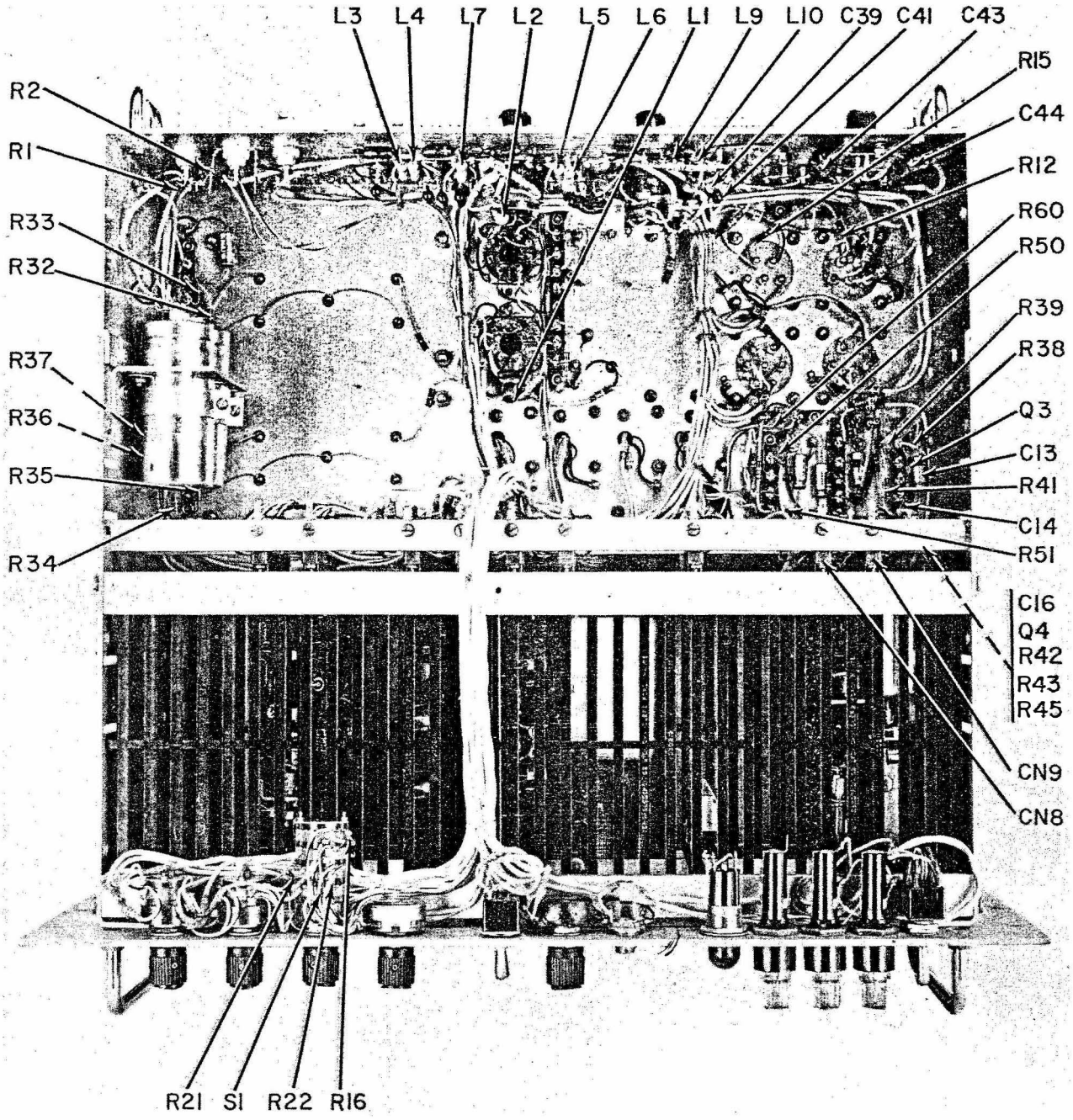


Figure 5-9. Chassis Mounted Component Location (Sheet 5 of 5)

SECTION 6

PARTS LIST

6-1. INTRODUCTION.

This section lists all assemblies and their maintenance parts contained in Single Sideband Receiver Converter, CV-2712/UR. The maintenance parts are listed under the associated major assemblies which are presented in table 6-1.

The maintenance parts are listed in alphabetical sequence according to reference designation. The following paragraphs describe the contents of each column of the maintenance parts list (table 6-2).

a. REFERENCE DESIGNATION. - The reference designation column lists the electrical parts alphabetically by circuit reference designations. The parts are identified on the associated illustration by the corresponding reference designation.

b. NAME AND DESCRIPTION. - The name and description column states the noun name and brief description of that particular item.

In certain cases where a particular manufacturer's part number is preferred, that number will appear in this column. In addition, the true manufacturer's part number is in the description column. Note that unless otherwise specified, all resistors are carbon composition. Unless otherwise specified all fixed resistors are ±5% tolerance.

c. MFR CODE. - The mfr code column contains the five-digit code assigned to the manufacturer of that particular item. This code is assigned in accordance with military handbook H4-1 and its latest supplement.

d. FIGURE NO. - The figure no. column indicates the illustration which pictorially locates the part.

6-2. LIST OF MANUFACTURERS. Table 6-3 lists the manufacturers of parts used in the equipment. The list is prepared in numerical order by the five-digit manufacturers code.

TABLE 6-1. LIST OF UNITS (MAJOR ASSEMBLIES)

NAME AND DESCRIPTION	QTY PER EQUIP.
CHASSIS	1
POWER SUPPLY CARD	1
IF CARD	1
CHANNEL A AUDIO CARD	1
CHANNEL B AUDIO CARD	1
AGC CARD	1
AFC NO. 1 CARD	1
AFC NO. 2 CARD	1
METER CARD	1
EXTENDER CARD	1

TABLE 6-2. MAINTENANCE PARTS LIST

CHASSIS ASSEMBLY

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
AGC1	CONT, AUTO GN, part no. KRLRISCAGC1	17591	5-9
CC1	CAPACITOR, 1000 UF, 75 V, ELECTROLYTIC, part no. CG13U75B1	37942	5-9
CC7	CAPACITOR, 1000 UF, 75 V, ELECTROLYTIC, part no. CG13U75B1	37942	5-9
CN1	CONNECTOR, part no. 5018A20	71785	5-9
CN2	CONNECTOR, part no. 5018A20	71785	5-9
CN3	CONNECTOR, part no. 5018A20	71785	5-9
CN4	CONNECTOR, part no. 5018A20	71785	5-9
CN5	CONNECTOR, part no. 5018A20	71785	5-9
CN6	CONNECTOR, part no. 5018A20	71785	5-9
CN7	CONNECTOR, part no. 5018A20	71785	5-9
CN8	CONNECTOR, part no. 5018A20	71785	5-9
CN9	CONNECTOR, part no. 5018A20	71785	5-9
C1	CAPACITOR, 10 UF, 20 V, TANTALUM, part no. 196D106X0020FB	56289	5-9
C2	CAPACITOR, 1 UF, 35 V, TANTALUM, part no. 196D105X0035EB	56289	5-9
C3	CAPACITOR, 10 UF, 20 V, TANTALUM, part no. 196D106X0020FB	56289	5-9
C4	CAPACITOR, 1 UF, 35 V, TANTALUM, part no. 196D106X0020FB	56289	5-9
C6	CAPACITOR, 500 UF, 50 V, ELECTROLYTIC part no. TVA1315	56289	5-9
C9	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC part no. TE1304	56289	5-9
C10	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC. part no. 805-000X5V) - 103Z	72982	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C11	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	56289	5-9
C12	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5VO-103Z	72982	5-9
C13	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	56289	5-9
C14	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5VO-103Z	72982	5-9
C15	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	56289	5-9
C16	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-9
C17	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	56289	5-9
C18	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-9
C19	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	56289	5-9
C20	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-9
C21	CAPACITOR, 1000 UV, 75 V, ELECTROLYTIC, part no. CG13U75B1	37942	5-9
C22	CAPACITOR, 1000 UF, 75 V, ELECTROLYTIC, part no. CG13U75B1	37942	5-9
C24	CAPACITOR, 2500 PF, MICA, part no. DM19-252J	84171	5-9
C25	CAPACITOR, 2500 PF, MICA, part no. DM19-252J	84171	5-9
C27	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C28	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C29	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MRF CODE	FIG. NO.
C30	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C31	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C32	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C33	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C34	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C35	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C36	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C37	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C38	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C39	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C40	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C41	CAPACITOR, 0.015 UF, MYLAR, part no. 1DP1-153	84171	5-9
C42	CAPACITOR, MYLAR, part no. 1DP4-153	84171	5-9
C43	CAPACITOR, MYLAR, part no. 4DP4-104	84171	5-9
C44	CAPACITOR, MYLAR, part no. 4DP4-104	84171	5-9
C45	CAPACITOR, CERAMIC, part no. DD5022	84171	5-9
C46	CAPACITOR, CERAMIC, part no. DD5022	84171	5-9
C47	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C48	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-9
DS1	LAMP, part no. 327	71744	5-9
DS2	LAMP, part no. 327	71744	5-9
DS3	LAMP, part no. NE51H	71744	5-9
D1	SEMICONDUCTOR DEVICE, DIODE, part no. MZ500-17	04713	5-9
D2	SEMICONDUCTOR DEVICE, DIODE, part no. MZ2361	04713	5-9
D3	SEMICONDUCTOR DEVICE, DIODE, part no. MZ2361	04713	5-9
D4	SEMICONDUCTOR DEVICE, DIODE, part no. MZ2361	04713	5-9
D5	SEMICONDUCTOR DEVICE, DIODE, part no. MZ2361	04713	5-9
D6	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D7	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D8	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D9	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D10	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D11	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D12	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D13	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
D14	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D15	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D16	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
D17	SEMICONDUCTOR DEVICE, DIODE, part no. 1N5059	03508	5-9
FL1A	FILTER, 100 KHZ BANDPASS, part no. 6948	21689	5-9
FL2A	FILTER, UPPER SIDEBAND, part no. 470A000-6	04397	5-9
FL3A	FILTER, LOWER SIDEBAND, part no. 470A000-5	04397	5-9
FL4A	FILTER, part no. KRL1SBF1	17591	5-9
FL5A	FILTER, part no. KRLISBF2	17591	5-9
F1	FUSE, part no. MDL1	71400	5-9
F2	FUSE, part no. MDL1	71400	5-9
F3	FUSE, part no. MDL1	71400	5-9
HS1	HEAT SINK, part no. NC401A	05820	5-9
HS2	HEAT SINK, part no. NC401A	05820	5-9
J1	JACK, BNC, part no. UG657U	02660	5-9
J2	JACK, BNC, part no. UG657U	02660	5-9
J3	JACK, BNC, part no. UG657U	02660	5-9
J4	CONNECTOR, ELECTRICAL, part no. MS3102A10SL3P	96906	5-9
J5	JACK PHONE, part no. L11	32389	5-9
KK1	RELAY, part no. WJS6D	70309	5-9
LL1	ATTENUATOR, EQUALIZER, part no. KRLL1	17591	5-9
LL2	ATTENUATOR, EQUALIZER, part no. KRLL2	17591	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
L1	INDUCTOR, R.F., part no. MIC1	95105	5-9
L2	INDUCTOR, R.F., part no. MIC1	95105	5-9
L3	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L4	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L5	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L6	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L7	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L8	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L9	INDUCTOR, R.F., part no. 2500-46	99800	5-9
L10	INDUCTOR, R.F., part no. 2500-46	99800	5-9
M1	METER, part no. 163W	81030	5-9
M2	METER, part no. 163W	81030	5-9
M3	METER, part no. 50-51	89280	5-9
M4	METER, part no. 50-52	89280	5-9
QQ3	TRANSISTOR, part no. 2N3713	04713	5-9
QQ7	TRANSISTOR, part no. 2N3713	04713	5-9
Q1	TRANSISTOR, part no. MPF103	04713	5-9
Q2	TRANSISTOR, part no. MPF103	04713	5-9
Q3	TRANSISTOR, part no. MPF103	04713	5-9
Q4	TRANSISTOR, part no. MPF103	04713	5-9
Q5	TRANSISTOR, part no. MPF103	04713	5-9
Q6	TRANSISTOR, part no. MPF103	04713	5-9
RR1	RESISTOR, 1 OHM, 5 W, WIRE WOUND, part no. 5XM1	63743	5-9
RR2	RESISTOR, 7.5 OHM, 5 W, WIRE WOUND, part no. HHJ7.5	63743	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
RR3	RESISTOR, 1 OHM, 5W, WIRE WOUND, part no. 5XM1	63743	5-9
R1	RESISTOR, 240 OHMS, 1/2 W, part no. EB2415	01121	5-9
R2	RESISTOR, 62 OHMS, 1/2 W, part no. EB6205	01121	5-9
R3	RESISTOR, 62 OHMS, 1/2 W, part no. EB6205	01121	5-9
R4	RESISTOR, 10 K OHMS 1/2 W, part no. EB1035	01121	5-9
R5	RESISTOR, 10 K OHMS 1/2 W, part no. EB1035	01121	5-9
R6	RESISTOR, 10 K OHMS 1/2 W, part no. EB1035	01121	5-9
R7	RESISTOR, 10 K OHMS 1/2 W, part no. EB1035	01121	5-9
R8	RESISTOR, 10 K OHMS 1/2 W, part no. EB1035	01121	5-9
R9	RESISTOR, 10 K OHMS 1/2 W, VARIABLE, part no. JU1031	01121	5-9
R10	RESISTOR, 10 K OHMS 1/2 W, VARIABLE, part no. JU1031	01121	5-9
R11	RESISTOR, 10 K OHMS 1/2 W, VARIABLE, part no. JU1031	01121	5-9
R12	RESISTOR, 51 OHMS, 1/2 W, part no. EB5105	01121	5-9
R13	RESISTOR, 10 K OHMS, 2 W, VARIABLE, part no. JU1031	01121	5-9
R14	RESISTOR, 10 K OHMS, 2 W, VARIABLE, part no. JU1031	01121	5-9
R15	RESISTOR, 51 OHMS, 1/2 W, part no. EB5105	01121	5-9
R16	RESISTOR, 1 MEGOHM, 1/4 W, part no. CB1055	01121	5-9
R17	RESISTOR, 1.2 MEGOHM, 1/2 W, part no. EB1255	01121	5-9
R18	RESISTOR, 36 K OHMS, 1/2 W, part no. EB3635	01121	5-9
R19	RESISTOR, 10 K OHMS, 2 W, VARIABLE, part no. JU1031	01121	5-9
R20	RESISTOR, 15 K OHMS, 1/2 W, part no. EB1535	01121	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R21	RESISTOR, 1 MEGOHM, 1/4 W, part no. CB1055	01121	5-9
R22	RESISTOR, 100 K OHMS, 1/4 W, part no. CB1045	01121	5-9
R23	RESISTOR, 100 K OHMS, 1/2 W, part no. EB1045	01121	5-9
R24	RESISTOR, 100 OHMS, 1/4 W, part no. CB1015	01121	5-9
R25	RESISTOR, 18 K OHMS, 1/2 W, part no. EB1835	01121	5-9
R26	RESISTOR, 22 K OHMS, 1/2 W, part no. EB2235	01121	5-9
R27	RESISTOR, 100 K OHMS, 2 W, VARIABLE part no. JU1041	01121	5-9
R28	RESISTOR, 4.3 K OHMS, 1/2 W, part no. EB4325	01121	5-9
R29	RESISTOR, 1 K OHMS, 1/2 W, part no. EB1025	01121	5-9
R30	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R31	RESISTOR, 5.1 K OHMS, 1/2 W, part no. EB5125	01121	5-9
R32	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R33	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R34	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R35	RESISTOR, 5.1 K OHMS, 1/2 W, part no. EB5125	01121	5-9
R36	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R37	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R38	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R39	RESISTOR, 5.1 K OHMS, 1/2 W, part no. EB5125	01121	5-9
R40	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R41	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R42	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R43	RESISTOR, 5.1 K OHMS, 1/2 W, part no. EB5125	01121	5-9
R44	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R45	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R46	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R47	RESISTOR, 5.1 K OHMS, 1/2 W, part no. EB5125	01121	5-9
R48	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R49	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R50	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R51	RESISTOR, 5.1 K OHMS, 1/2 W, part no. EB5125	01121	5-9
R52	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R53	RESISTOR, 10 K OHMS, 1/2 W, part no. EB1035	01121	5-9
R54	RESISTOR, part no. KRLRISCETP1	17591	5-9
R55	RESISTOR, 5 K OHMS, 2 W, VARIABLE, part no. JU5021	01121	5-9
R56	RESISTOR, 1 K OHMS, 2 W, VARIABLE, part no. JU1021	01121	5-9
R57	RESISTOR, 3.6 K OHMS, 1/2 W, part no. EB3625	01121	5-9
R58	RESISTOR, 1 K OHMS, 2 W, VARIABLE, part no. JU1021	01121	5-9
R59	RESISTOR, 3.6 K OHMS, 1/2 W, part no. EB3625	01121	5-9
R60	RESISTOR, 1 K OHMS, 1/2 W, part no. EB1025	01121	5-9
R61	RESISTOR, 2 K OHMS, 2 W, part no. HB2025	01121	5-9
R63	RESISTOR, 2 K OHMS, 2 W, part no. HB2025	01121	5-9
S1	SWITCH, ROTARY, part no. 1030F2-04-5NK	31336	5-9
S2	SWITCH, TOGGLE, part no. ST22K	31336	5-9
S3	SWITCH, ROTARY, part no. 1030F4-01-2	31336	5-9
S4	SWITCH, ROTARY, part no. 1030F1-01-3NK	31336	5-9
S5	SWITCH, ROTARY, part no. 1030F2-02-4NK	31336	5-9
S6	SWITCH, ROTARY, part no. 1030F2-02-4NK	31336	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHASSIS ASSEMBLY (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
S7	SWITCH, ROTARY, part no. 1030F2-04-4NK	31336	5-9
S8	SWITCH, ROTARY, part no. 1030F1-02-3NK	31336	5-9
S9	SWITCH, ROTARY, part no. 1030F3-01-2NK	31336	5-9
S10	SWITCH, TOGGLE, part no. ST13D	31356	5-9
T1	TRANSFORMER, POWER, part no. E2285	05955	5-9
T2A	TRANSFORMER, AUDIO OUTPUT, part no. E2287	05955	5-9
T2B	TRANSFORMER, AUDIO OUTPUT, part no. E2287	05955	5-9
T3A	TRANSFORMER, AUDIO OUTPUT, part no. E2287	05955	5-9
T3B	TRANSFORMER, AUDIO OUTPUT, part no. E2287	05955	5-9
U1	ATTENUATOR, EQUALIZER, part no. KRLU1	17591	5-9
U2	ATTENUATOR, EQUALIZER, part no. KRLU2	17591	5-9
XDS1	LAMP HOLDER, part no. 162-8430-0932-502	72619	5-9
XDS2	LAMP HOLDER, part no. 162-8430-0934-502	72619	5-9
XDS3	LAMP HOLDER, part no. 95-9163-09-112	72619	5-9
XF1	FUSE HOLDER, part no. HKL	91400	5-9
XF2	FUSE HOLDER, part no. HKL	91400	5-9
XF3	FUSE HOLDER, part no. HKL	91400	5-9
TB1	TERMINAL BLOCK, part no. 40TB-12	75382	5-9
TB2	TERMINAL BLOCK, part no. 40TB-8	75382	5-9
TB3	TERMINAL BLOCK, part no. 40TB-21	75382	5-9
TB4	TERMINAL BLOCK, part no. 7333	91833	5-9
TB5	TERMINAL BLOCK, part no. 7333	91833	5-9

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

POWER SUPPLY CARD

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C2	CAPACITOR, 0.1 UF 75 V, CERAMIC DISC, part no. DDA104	12697	5-1
C3	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	71590	5-1
C4	CAPACITOR, 100 UF, 50 V, ELECTROLYTIC, part no. TE1309	56289	5-1
C5	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	71590	5-1
C8	CAPACITOR, 0.1 UF, 75 V, CERAMIC DISC, part no. DDA104	71590	5-1
C9	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	71590	5-1
C10	CAPACITOR, 100 UF, 50 V, ELECTROLYTIC, part no. TE1309	56289	5-1
C11	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	71590	5-1
D1	DIODE, part no. MZ500-10	04713	5-1
D2	DIODE, part no. 1N914	01295	5-1
D3	DIODE, part no. 1N914	01295	5-1
D4	DIODE, part no. 1N823	04713	5-1
D5	DIODE, part no. C106A2	03508	5-1
D7	DIODE, part no. MZ500-10	04713	5-1
D8	DIODE, part no. 1N914	01295	5-1
D9	DIODE, part no. 1N914	01295	5-1
D10	DIODE, part no. 1N823	04713	5-1
D11	DIODE, part no. C106A2	03508	5-1
HS1	HEAT SINK, part no. 2131	05820	5-1
HS2	HEAT SINK, part no. 2131	05820	5-1
PC1	P.C. BOARD, part no. 7557	77954	5-1

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

POWER SUPPLY CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
Q1	TRANSISTOR, part no. 2N3906	04713	5-1
Q2	TRANSISTOR, part no. 2N1483	12672	5-1
Q4	TRANSISTOR, part no. 2N5306	03508	5-1
Q5	TRANSISTOR, part no. 2N3906	04713	5-1
Q6	TRANSISTOR, part no. 2N3391	03508	5-1
Q9	TRANSISTOR, part no. 2N3906	04713	5-1
Q10	TRANSISTOR, part no. 2N1483	12672	5-1
Q12	TRANSISTOR, part no. 2N5306	03508	5-1
Q13	TRANSISTOR, part no. 2N3906	04713	5-1
Q14	TRANSISTOR, part no. 2N3391	03508	5-1
R2	RESISTOR, 2 K, 1/2 W, part no. HB2025	01121	5-1
R3	RESISTOR, 2 K, 1/2 W, part no. HB2025	01121	5-1
R4	RESISTOR, 1 K, 1/2 W, part no. HB2025	01121	5-1
R5	RESISTOR, 7.5 OHMS, 8 W, part no. HHJ7.5	01121	5-1
R7	RESISTOR, 3.3 K, 1/2 W, part no. EB3325	01121	5-1
R8	RESISTOR, 3 K, 1/2 W, part no. EB3025	01121	5-1
R9	RESISTOR, 1 K, 1/2 W, VARIABLE, part no. RV6LAYSA102A	12697	5-1
R10	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-1
R11	RESISTOR, 22 OHM, 1/2 W, part no. EB2205	01121	5-1
R12	RESISTOR, 1.2 K, 1/2 W, part no. EB1225	01121	5-1
R13	RESISTOR, 15 K, 1/2 W, part no. EB1535	01121	5-1
R14	RESISTOR, 1.2 K, 1/2 W, part no. EB1225	01121	5-1
R15	RESISTOR, 1.2 K, 1/2 W, part no. EB1225	01121	5-1
R16	RESISTOR, 4.7 K, 1/2 W, part no. EB4725	01121	5-1

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

POWER SUPPLY CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R17	RESISTOR, 3.6 K, 1/2 W, part no. EB3625	01121	5-1
R18	RESISTOR, 455 OHM, NTC THERMISTOR, part no. 25E2	97794	5-1
R19	RESISTOR, 200 OHM, 1/2 W, part no. EB2015	01121	5-1
R20	RESISTOR, 39 OHM, 1/2 W, part no. EB3905	01121	5-1
R22	RESISTOR, 7.5 OHM, 8 W, part no. HHJ7.5	01121	5-1
R23	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-1
R24	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-1
R25	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-1
R26	RESISTOR, 3.3 K, 1/2 W, part no. EB3325	01121	5-1
R28	RESISTOR, 425 OHM, NTC THERMISTOR, part no. 25E2	97794	5-1
R29	RESISTOR, 3 K, 1/2 W, part no. EB3025	01121	5-1
R30	RESISTOR, 1 K, 1/2 W, VARIABLE, part no. RV6LAYSA102A	12697	5-1
R31	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-1
R32	RESISTOR, 22 OHM, 1/2 W, part no. EB2205	01121	5-1
R33	RESISTOR, 1.2 K, 1/2 W, part no. EB1225	01121	5-1
R34	RESISTOR, 15 K, 1/2 W, part no. EB1525	01121	5-1
R35	RESISTOR, 1.2 K, 1/2 W, part no. EB1225	01121	5-1
R36	RESISTOR, 1.2 K, 1/2 W, part no. EB1225	01121	5-1
R37	RESISTOR, 4.7 K, 1/2 W, part no. EB4725	01121	5-1
R38	RESISTOR, 3.6 K, 1/2 W, part no. EB2015	01121	5-1
R40	RESISTOR, 200 OHM, 1/2 W, part no. EB2015	01121	5-1
R41	RESISTOR, 39 OHM, 1/2 W, part no. EB3905	01121	5-1

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C1	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	71590	5-2
C2	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-2
C3	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2
C4	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	72982	5-2
C5	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	72982	5-2
C6	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2
C7	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2
C8	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2
C9	CAPACITOR, 2500 PF, 500 V, MICA, part no. DM19-252J	84171	5-2
C10	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-2
C11	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	
C12	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-2
C13	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-2
C14	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-2
C15	CAPACITOR, 47 UF, 15 V, TANTALUM, part no. 196D476X0015FB	56289	5-2
C16	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-105M	72982	5-2
C17	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-2

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C18	CAPACITOR, 47 UF, 15 V, TANTALUM, part no. 196D476X0015FB	56289	5-2
C19	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2
C20	CAPACITOR, 1 UF, 50 V, ELECTROLYTIC, part no. 196D105X0035EB	56289	5-2
C21	CAPACITOR, 1 UF, 50 V, ELECTROLYTIC, part no. 196D105X0035EB	56289	5-2
C22	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-2
C23	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-2
C24	CAPACITOR, 6.8 UF, 35 V, TANTALUM, part no. 196D685X0035FB	56289	5-2
C25	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-2
C26	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-2
C27	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2
C28	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	95105	5-2
C29	CAPACITOR, 0.2 UF, 50 V, MYLAR, part no. 1DP3-204	56289	5-2
C30	CAPACITOR, 20 UF, 50 V, ELECTROLYTIC, part no. TE1305	95105	5-2
C32	CAPACITOR, 100 UF, 25 V, ELECTROLYTIC, part no. TE1309	56289	5-2
C34	CAPACITOR, 100 UF, 25 V, ELECTROLYTIC, part no. TE1309	56289	5-2
C35	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-2

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C36	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	56289	5-2
C37	CAPACITOR, 200 UF, 25 V, ELECTROLYTIC, part no. TE1213	56289	5-2
C38	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-2
C39	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-2
C40	CAPACITOR, 50 UF, 25 V, ELECTROLYTIC, part no. TE1307	56289	5-2
D1	DIODE, part no. MZ2361	04713	5-2
D2	DIODE, part no. MZ2361	04713	5-2
D3	DIODE, part no. MZ500-20	04713	5-2
D4	DIODE, part no. 1N914	01295	5-2
D5	DIODE, part no. 1N914	01295	5-2
HS1	HEAT SINK, part no. 2131	05820	5-2
HS2	HEAT SINK, part no. 2131	05820	5-2
L1	INDICATOR, FIXED, 1 MH, part no. MIC-1	95105	5-2
L2	INDICATOR, FIXED, 20 MH, part no. MIC-18	95105	5-2
PC1	P.C. BOARD, part no. 7558A	77954	5-2
Q1	TRANSISTOR, part no. TIS-34	01295	5-2
Q2	TRANSISTOR, part no. MFE-3006	04713	5-2
Q3	TRANSISTOR, part no. MPS-6507	04713	5-2
Q4	TRANSISTOR, part no. MPS-6507	04713	5-2
Q5	TRANSISTOR, part no. MFE-3006	04713	5-2
Q6	TRANSISTOR, part no. 2N3391	03508	5-2
Q7	TRANSISTOR, part no. 2N3391	03508	5-2

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
Q8	TRANSISTOR, part no. 2N3391	03508	5-2
Q9	TRANSISTOR, part no. 2N3391	03508	5-2
Q10	TRANSISTOR, part no. 2N3906	04713	5-2
Q11	TRANSISTOR, part no. 2N5306	04713	5-2
Q12	TRANSISTOR, part no. 2N4238	06840	5-2
Q13	TRANSISTOR, part no. 2N3740	04713	5-2
Q14	TRANSISTOR, part no. 2N4235	04713	5-2
Q15	TRANSISTOR, part no. 2N3766	04713	5-2
Q16	TRANSISTOR, part no. 2N5306	04713	5-2
Q17	TRANSISTOR, part no. 2N4235	04713	5-2
Q18	TRANSISTOR, part no. 2N4238	06840	5-2
Q19	TRANSISTOR, part no. 2N3906	04713	5-2
R1	RESISTOR, 200 K, 1/4 W, part no. CB2045	01121	5-2
R2	RESISTOR, 2.4 K, 1/4 W, part no. CB2025	01121	5-2
R3	RESISTOR, 120 K, 1/4 W, part no. CB1245	01121	5-2
R4	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-2
R5	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-2
R6	RESISTOR, 150 K, 1/4 W, part no. CB1545	01121	5-2
R7	RESISTOR, 11 K, 1/4 W, part no. CB1135	01121	5-2
R8	RESISTOR, 13 K, 1/4 W, part no. CB1335	01121	5-2
R9	RESISTOR, 510 OHM, 1/4 W, part no. CB5115	01121	5-2
R10	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-2
R11	RESISTOR, 6.2 K, 1/4 W, part no. CB6225	01121	5-2
R12	RESISTOR, 200 OHM, 1/4 W, part no. CB2015	01121	5-2
R13	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-2

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R14	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-2
R15	RESISTOR, 1.2 K, 1/4 W, part no. CB1225	01121	5-2
R16	RESISTOR, 1.5 MEG, 1/4 W, part no. CB1515	01121	5-2
R17	RESISTOR, 820 OHM, 1/4 W, part no. CB8215	01121	5-2
R18	RESISTOR, 6.8 K, 1/4 W, part no. CB6825	01121	5-2
R19	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-2
R20	RESISTOR, 820 OHM, 1/4 W, part no. CB8215	01121	5-2
R21	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-2
R22	RESISTOR, 1.5 MEG, 1/4 W, part no. CB1555	01121	5-2
R23	RESISTOR, 1.2 K, 1/4 W, part no. CB1225	01121	5-2
R24	RESISTOR, 110 OHM, 1/4 W, part no. CB1115	01121	5-2
R25	220 OHM, 1/4 W, part no. CB2215	01121	5-2
R26	RESISTOR, 110 OHM, 1/4 W, part no. CB1115	01121	5-2
R27	RESISTOR, 220 OHM, 1/4 W, part no. CB2215	01121	5-2
R28	RESISTOR, 6.8 K, 1/4 W, part no. CB6825	01121	5-2
R29	RESISTOR, 1.8 K, 1/4 W, part no. CB1825	01121	5-2
R30	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-2
R31	RESISTOR, 27 K, 1/4 W, part no. CB2735	01121	5-2
R32	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-2
R33	RESISTOR, 820 OHM, 1/4 W, part no. CB8215	01121	5-2
R34	RESISTOR, 390 OHM, 1/4 W, part no. CB3915	01121	5-2
R35	RESISTOR, 100 OHM, 1/4 W, part no. CB1015	01121	5-2
R36	RESISTOR, 1.8 K, 1/4 W, part no. CB1825	01121	5-2
R37	RESISTOR, 390 OHM, 1/4 W, part no. CB3915	01121	5-2
R38	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-2

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R39	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-2
R40	RESISTOR, 11 K, 1/4 W, part no. CB1135	01121	5-2
R41	RESISTOR, 1 K, 1/4 W, part no. CB9115	01121	5-2
R42	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-2
R43	RESISTOR, 62 OHM, 1/4 W, part no. CB6205	01121	5-2
R44	RESISTOR, 910 OHM, 1/4 W, part no. CB1655	01121	5-2
R45	RESISTOR, 120 K, 1/4 W, part no. CB1245	01121	5-2
R46	RESISTOR, 3.9 K, 1/4 W, part no. CB3925	01121	5-2
R47	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-2
R48	RESISTOR, 240 OHM, 1/4 W, part no. EB2415	01121	5-2
R49	RESISTOR, 910 OHM, 1/2 W, part no. EB9115	01121	5-2
R50	RESISTOR, 1.1 K, 1/2 W, part no. EB1125	01121	5-2
R51	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-2
R52	RESISTOR, 4.3 K, 1/4 W, part no. CB4325	01121	5-2
R53	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-2
R54	RESISTOR, FACTORY ADJUST, part no. EB9115	01121	5-2
R55	RESISTOR, 20 OHM, 1/4 W, part no. EB2005	01121	5-2
R56	RESISTOR, FACTORY ADJUST, part no. CB6235	01121	5-2
R57	RESISTOR, 3.3 OHM, 1/4 W, part no. EB33G5	01121	5-2
R58	RESISTOR, 240 OHM, 1/2 W, part no. CB2415	01121	5-2
R59	RESISTOR, 5.1 OHM, 1/2 W, part no. EB51G5	01121	5-2
R60	RESISTOR, 51 OHM, 1/2 W, part no. CB5105	01121	5-2
R61	RESISTOR, 51 OHM, 1/2 W, part no. CB5105	01121	5-2
R62	RESISTOR, 1 K, 1/2 W, part no. CB1025	01121	5-2
R63	RESISTOR, 240 OHM, 1/4 W, part no. EB2415	01121	5-2

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL A AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR .CODE	FIG. NO.
R64	RESISTOR, 5.1 OHM, 1/2 W, part no. EB51G5	01121	5-2
R65	RESISTOR, 1 OHM, 1/2 W, part no. EB10G5	01121	5-2
R66	RESISTOR, 430 K, 1/4 W, part no. CB4345	01121	5-2
R67	RESISTOR, 200 K, 1/4 W, part no. CB2045	01121	5-2
R68	RESISTOR, 120 OHM, 1/4 W, part no. CB1215	01121	5-2
R69	RESISTOR, 620 OHM, 1/2 W, part no. CB6215	01121	5-2
R70	RESISTOR, 15 OHM, 1/4 W, part no. EB1505	01121	5-2
R71	RESISTOR, 430 OHM, 1/2 W, part no. EB4315	01121	5-2
R72	RESISTOR, 5.1 K, 1/4 W, part no. CB5125	01121	5-2
R73	RESISTOR, 620 OHM, 1/2 W, part no. EB6215	01121	5-2
R74	RESISTOR, 15 OHM, 1/4 W, part no. EB1505	01121	5-2
R75	RESISTOR, 6.2 K, 1/4 W, part no. CB6225	01121	5-2
R76	RESISTOR, 6.2 K, 1/4 W, part no. CB6225	01121	5-2
R77	RESISTOR, 620 OHM, 1/2 W, part no. EB6212	01121	5-2
R78	RESISTOR, 15 OHM, 1/4 W, part no. EB1505	01121	5-2
R80	RESISTOR, part no. CB5145	01121	5-2
	CHANNEL B AUDIO CARD		
C1	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	72982	5-3
C2	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C3	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C4	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	72982	5-3
C5	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. CK103	72982	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C6	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C7	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C8	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C9	CAPACITOR, 2500 PF, 500 V, MICA, part no. DM19-252J	84171	
C10	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C11	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C12	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C13	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C14	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-3
C15	CAPACITOR, 47 UF, 15 V, TANTALUM, part no. 196D475X0015EB	56289	5-3
C16	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C17	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-3
C18	CAPACITOR, 47 UF, 15 V, TANTALUM, part no. 196D476X0015FB	56289	5-3
C19	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C20	CAPACITOR, 1 UF, 50 V, ELECTROLYTIC, part no. 196D105X0035EB	56289	5-3
C21	CAPACITOR, 1 UF, 50 V, ELECTROLYTIC, part no. 195D105X0035EB	56289	5-3
C22	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C23	CAPACITOR, 0.015 UF, 100 V, CERAMIC MONOLITHIC, part no. 8121-100-651-153M	84171	5-3
C24	CAPACITOR, 6.8 UF, 35 V, TANTALUM, part no. 196D685X0035FB	56289	5-3
C25	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C26	CAPACITOR, 22 UF, 20 V, TANTALUM, part no. 196D226X0020FB	56289	5-3
C27	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C28	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	95105	5-3
C29	CAPACITOR, 0.2 UF, 50 V, MYLAR, part no. 1DP3-204	56289	5-3
C30	CAPACITOR, 20 UF, 50 V, ELECTROLYTIC, part no. TE1305	95105	5-3
C32	CAPACITOR, 100 UF, 25 V, ELECTROLYTIC, part no. TE1309	56289	5-3
C34	CAPACITOR, 100 UF, 25 V, ELECTROLYTIC, part no. TE1309	56289	5-3
C35	CAPACITOR, 0.1 UF, 100 V, CERAMIC MONOLITHIC, part no. 8131-100-651-104M	72982	5-3
C36	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, part no. TE1304	95105	5-3
C37	CAPACITOR, 200 UF, 25 V, ELECTROLYTIC, part no. TE1137	56289	5-3
C38	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-3
C39	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-3
C40	CAPACITOR, 50 UF, 25 V, ELECTROLYTIC, part no. TE1307	95105	5-3
C41	CAPACITOR, 1 UF, 35 V, TANTALUM, part no. 196D105X0035EB	56289	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C42	CAPACITOR, 0.001 UF, 1 KV, CERAMIC DISC, part no. DDA102	71590	5-3
C43	CAPACITOR, 25 UF, 20 V, CERAMIC MONOLITHIC, part no. TE1207	72982	5-3
D1	DIODE, part no. MZ2361	04713	5-3
D2	DIODE, part no. MZ2361	04713	5-3
D3	DIODE, part no. MZ500-20	04713	5-3
D4	DIODE, part no. 1N914	01295	5-3
D5	DIODE, part no. 1N914	01295	5-3
HS1	HEAT SINK, part no. 2131	05820	5-3
HS2	HEAT SINK, part no. 2131	05820	5-3
L1	INDICATOR, FIXED, 1 MH, part no. MIC-1	95105	5-3
L2	INDICATOR, FIXED, 20 MH, part no. MIC-18	95105	5-3
PC1	P.C. BOARD, part no. 7558B	77954	5-3
Q1	TRANSISTOR, part no. TIS34	01295	5-3
Q2	TRANSISTOR, part no. MFE3006	04713	5-3
Q3	TRANSISTOR, part no. MPS6507	04713	5-3
Q4	TRANSISTOR, part no. MPS6507	04713	5-3
Q5	TRANSISTOR, part no. MFE3006	04713	5-3
Q6	TRANSISTOR, part no. 2N3391	03508	5-3
Q7	TRANSISTOR, part no. 2N3391	03508	5-3
Q8	TRANSISTOR, part no. 2N3391	03508	5-3
Q9	TRANSISTOR, part no. 2N3391	03508	5-3
Q10	TRANSISTOR, part no. 2N5306	04713	5-3
Q11	TRANSISTOR, part no. 2N5306	04713	5-3
Q12	TRANSISTOR, part no. 2N4238	06840	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
Q13	TRANSISTOR, part no. 2N3740	04713	5-3
Q14	TRANSISTOR, part no. 2N4235	04713	5-3
Q15	TRANSISTOR, part no. 2N3766	04713	5-3
Q16	TRANSISTOR, part no. 2N5306	04713	5-3
Q17	TRANSISTOR, part no. 2N4235	04713	5-3
Q18	TRANSISTOR, part no. 2N4238	06840	5-3
Q19	TRANSISTOR, part no. 2N5306	04713	5-3
Q20	TRANSISTOR, part no. 2N5306	04713	5-3
R1	RESISTOR, 200 K, 1/4 W, part no. CB2045	01121	5-3
R2	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-3
R3	RESISTOR, 120 K, 1/4 W, part no. CB1245	01121	5-3
R4	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-3
R5	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-3
R6	RESISTOR, 150 K, 1/4 W, part no. CB1545	01121	5-3
R7	RESISTOR, 11 K, 1/4 W, part no. CB1135	01121	5-3
R8	RESISTOR, 13 K, 1/4 W, part no. CB1335	01121	5-3
R9	RESISTOR, 510 OHMS, 1/4 W, part no. CB5115	01121	5-3
R10	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-3
R11	RESISTOR, 6.2 K, 1/4 W, part no. CB6225	01121	5-3
R12	RESISTOR, 200 OHM, 1/4 W, part no. CB2015	01121	5-3
R13	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-3
R14	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-3
R15	RESISTOR, 1.2 K, 1/4 W, part no. CB1225	01121	5-3
R16	RESISTOR, 1.5 MEG, 1/4 W, part no. CB1555	01121	5-3
R17	RESISTOR, 820 OHM, 1/4 W, part no. CB8215	01121	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R18	RESISTOR, 6.8 K, 1/4 W, part no. CB6825	01121	5-3
R19	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-3
R20	RESISTOR, 820 OHM, 1/4 W, part no. CB8215	01121	5-3
R21	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-3
R22	RESISTOR, 1.5 MEG, 1/4 W, part no. CB1555	01121	5-3
R23	RESISTOR, 1.2 K, 1/4 W, part no. CB1225	01121	5-3
R24	RESISTOR, 110 OHM, 1/4 W, part no. CB1115	01121	5-3
R25	RESISTOR, 220 OHM, 1/4 W, part no. CB2215	01121	5-3
R26	RESISTOR, 110 OHM, 1/4 W, part no. CB1115	01121	5-3
R27	RESISTOR, 220 OHM, 1/4 W, part no. CB2215	01121	5-3
R28	RESISTOR, 6.8 K, 1/4 W, part no. CB6825	01121	5-3
R29	RESISTOR, 1.8 K, 1/4 W, part no. CB1825	01121	5-3
R30	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-3
R31	RESISTOR, 27 K, 1/4 W, part no. CB2735	01121	5-3
R32	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-3
R33	RESISTOR, 820 OHM, 1/4 W, part no. CB8215	01121	5-3
R34	RESISTOR, 390 OHM, 1/4 W, part no. CB3915	01121	5-3
R35	RESISTOR, 100 OHM, 1/4 W, part no. CB1015	01121	5-3
R36	RESISTOR, 1.8 K, 1/4 W, part no. CB1825	01121	5-3
R37	RESISTOR, 390 OHMS, 1/4 W, part no. CB3915	01121	5-3
R38	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-3
R39	RESISTOR, 2.4 K, 1/4 W, part no. CB2425	01121	5-3
R40	RESISTOR, 11 K, 1/4 W, part no. CB1135	01121	5-3
R41	RESISTOR, 1 K, 1/4 W, part no. CB9115	01121	5-3
R42	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R43	RESISTOR, 62 OHMS, 1/4 W, part no. CB6205	01121	5-3
R44	RESISTOR, 910 OHMS, 1/4 W, part no. CB1655	01121	5-3
R45	RESISTOR, 120 K, 1/4 W, part no. CB1245	01121	5-3
R46	RESISTOR, 3.9 K, 1/4 W, part no. CB3925	01121	5-3
R47	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-3
R48	RESISTOR, 240 OHMS, 1/4 W, part no. EB2415	01121	5-3
R49	RESISTOR, 910 OHMS, 1/2 W, part no. EB9115	01121	5-3
R50	RESISTOR, 1.1 K, 1/2 W, part no. EB1125	01121	5-3
R51	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-3
R52	RESISTOR, 4.3 K, 1/4 W, part no. CB4325	01121	5-3
R53	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-3
R54	RESISTOR, FACTORY ADJUST, part no. EB9115	01121	5-3
R55	RESISTOR, 20 OHMS, 1/4 W, part no. EB2005	01121	5-3
R56	RESISTOR, FACTORY ADJUST, part no. CB6235	01121	5-3
R57	RESISTOR, 3.3 OHMS, 1/4 W, part no. EB33G5	01121	5-3
R58	RESISTOR, 240 OHMS, 1/2 W, part no. CB2415	01121	5-3
R59	RESISTOR, 5.1 OHMS, 1/2 W, part no. EB51G5	01121	5-3
R60	RESISTOR, 51 OHMS, 1/2 W, part no. CB5105	01121	5-3
R61	RESISTOR, 51 OHMS, 1/2 W, part no. CB5105	01121	5-3
R62	RESISTOR, 1 K, 1/2 W, part no. CB1025	01121	5-3
R63	RESISTOR, 240 OHMS, 1/2 W, part no. CB2415	01121	5-3
R64	RESISTOR, 5.1 OHMS, 1/2 W, part no. EB51G5	01121	5-3
R65	RESISTOR, 1 OHM, 1/2 W, part no. EB10G5	01121	5-3
R66	RESISTOR, 430 K, 1/4 W, part no. CB4345	01121	5-3
R67	RESISTOR, 200 K, 1/4 W, part no. CB2045	01121	5-3

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

CHANNEL B AUDIO CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R68	RESISTOR, 120 OHMS, 1/4 W, part no. CB1215	01121	5-3
R69	RESISTOR, 620 OHMS, 1/2 W, part no. CB6215	01121	5-3
R70	RESISTOR, 15 OHMS, 1/4 W, part no. EB1505	01121	5-3
R71	RESISTOR, 430 OHMS, 1/2 W, part no. EB4315	01121	5-3
R72	RESISTOR, 5.1 K, 1/4 W, part no. CB5125	01121	5-3
R73	RESISTOR, part no. EB6215	01121	5-3
R74	RESISTOR, part no. EB1505	01121	5-3
R75	RESISTOR, part no. CB6225	01121	5-3
R76	RESISTOR, part no. CB6225	01121	5-3
R77	RESISTOR, part no. EB6215	01121	5-3
R78	RESISTOR, part no. EB1505	01121	5-3
R79	RESISTOR, part no. CB1055	01121	5-3
R80	RESISTOR, part no. CB5154	01121	5-3
R81	RESISTOR, part no. CB1035	01121	5-3
R82	RESISTOR, part no. CB1015	01121	5-3
R83	RESISTOR, part no. EB6215	01121	5-3
R84	RESISTOR, part no. CB2015	01121	5-3
R85	RESISTOR, part no. CB5145	01121	5-3
AFC NO. 1 CARD			
C1	CAPACITOR, 5.5-18 PF, VARIABLE, part no. 538-006COPO-92R	72982	5-4
C2	CAPACITOR, 10 PF, 100 V, MICA, part no. D10-100J	84171	5-4
C3	CAPACITOR, 1500 PF, 100 V, MICA, part no. DM19-152J	84171	5-4
C4	CAPACITOR, 300 PF, 100 V, MICA, part no. DM15-331J	84171	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 1 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C5	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C6	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C7	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C8	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C9	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C10	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C11	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C12	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C13	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C14	CAPACITOR, 2400 PF, 100 V, MICA, part no. D19-242J	84171	5-4
C15	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C16	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C17	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C18	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C19	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C20	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C21	CAPACITOR, 2400 PF, 100 V, MICA, part no. D19-242J	84171	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 1 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C22	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C23	CAPACITOR, 2400 PF, 100 V, MICA, part no. D19-242J	84171	5-4
C24	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C25	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C26	CAPACITOR, 2400 PF, 100 V, MICA, part no. D19-242J	84171	5-4
C27	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-4
C28	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C29	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-4
C30	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-4
C31	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C32	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-4
C33	CAPACITOR, 50 UF, 25 V, ELECTROLYTIC, part no. TE1209	56289	5-4
C34	CAPACITOR, 0.001 UF, 100 V, MICA, part no. 6DP1-102	84171	5-4
C35	CAPACITOR, 0.001 UF, 100 V, MICA, part no. 6DP1-102	84171	5-4
C36	CAPACITOR, 100 UF, 25 V, ELECTROLYTIC, part no. TE1211	56289	5-4
C37	CAPACITOR, 5 UF, 50 V, ELECTROLYTIC, part no. TE1303	56289	5-4
C38	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 1 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C39	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-4
C40	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-4
D1	DIODE, part no. 1N914	01295	5-4
D2	DIODE, part no. 1N914	01295	5-4
D3	DIODE, part no. 1N914	01295	5-4
D4	DIODE, part no. 1N914	01295	5-4
D5	DIODE, part no. 1N914	01295	5-4
D6	DIODE, part no. 1N914	01295	5-4
D7	DIODE, part no. 1N914	01295	5-4
D8	DIODE, part no. 1N914	01295	5-4
D9	DIODE, part no. 1N914	01295	5-4
D10	DIODE, part no. 1N914	01295	5-4
D11	DIODE, part no. MZ500-22	04713	5-4
L1	INDICATOR, FIXED, 1 MH, part no. MIC-1	95105	5-4
L2	INDICATOR, FIXED, 1 MH, part no. MIC-1	95105	5-4
L3	INDICATOR, FIXED, 1 MH, part no. MIC-1	95105	5-4
L4	INDICATOR, FIXED, 1 MH, part no. MIC-1	95105	5-4
PC1	P.C. BOARD, part no. 7559	77954	5-4
Q1	TRANSISTOR, part no. MPS6507	04713	5-4
Q2	TRANSISTOR, part no. 2N5306	03508	5-4
Q3	TRANSISTOR, part no. 2N5306	03508	5-4
Q4	TRANSISTOR, MPS6507	04713	5-4
Q5	TRANSISTOR, part no. 2N5306	03508	5-4
Q6	TRANSISTOR, MPS6507	04713	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 1 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
Q7	TRANSISTOR, MPS6507	04713	5-4
Q8	TRANSISTOR, MPS6507	04713	5-4
Q9	TRANSISTOR, part no. 2N3391	03508	5-4
Q10	TRANSISTOR, part no. 2N5306	03508	5-4
Q11	TRANSISTOR, part no. 2N5306	03508	5-4
R1	RESISTOR, 300 K, 1/4 W, part no. CB3045	03508	5-4
R2	RESISTOR, 1.5 K, 1/4 W, part no. CB1525	01121	5-4
R3	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R4	RESISTOR, 300 OHM, 1/4 W, part no. CB3015	01121	5-4
R5	RESISTOR, 160 K, 1/4 W, part no. CB1645	01121	5-4
R6	RESISTOR, 200 K, 1/4 W, part no. CB2045	01121	5-4
R7	RESISTOR, 390 OHM, 1/4 W, part no. CB3915	01121	5-4
R8	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-4
R9	RESISTOR, 1.6 MEG, 1/4 W, part no. CB1655	01121	5-4
R10	RESISTOR, 110 K, 1/4 W, part no. CB1145	01121	5-4
R11	RESISTOR, 2 K, 1/4 W, part no. CB2025	01121	5-4
R12	RESISTOR, 7.5 K, 1/4 W, part no. CB7525	01121	5-4
R13	RESISTOR, 100 OHMS, 1/4 W, part no. CB1015	01121	5-4
R14	RESISTOR, 68 K, 1/4 W, part no. CB6835	01121	5-4
R15	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R16	RESISTOR, 4.3 K, 1/4 W, part no. CB4325	01121	5-4
R17	RESISTOR, 510 OHMS, 1/4 W, part no. CB5115	01121	5-4
R18	RESISTOR, 10 K, 1/2 W, VARIABLE, part no. RV6LAYSA103A	12697	5-4
R19	RESISTOR, 51 K, 1/4 W, part no. CB5135	01121	5-4
R20	RESISTOR, 1.6 MEG, 1/4 W, part no. CB1655	01121	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 1 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R21	RESISTOR, 110 K, 1/4 W, part no. CB1145	01121	5-4
R22	RESISTOR, 910 K, 1/4 W, part no. CB9145	01121	5-4
R23	RESISTOR, 2.7 K, 1/4 W, part no. CB2725	01121	5-4
R24	RESISTOR, 7.5 K, 1/4 W, part no. CB7525	01121	5-4
R25	RESISTOR, 750 OHMS, 1/4 W, part no. CB7515	01121	5-4
R26	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R27	RESISTOR, 68 K, 1/4 W, part no. CB6835	01121	5-4
R28	RESISTOR, 4300 OHMS, 1/4 W, part no. CB4325	01121	5-4
R29	RESISTOR, 510 OHMS, 1/4 W, part no. CB5515	01121	5-4
R30	RESISTOR, 68 K, 1/4 W, part no. CB6835	01121	5-4
R31	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R32	RESISTOR, 4.3 K, 1/4 W, part no. CB4325	01121	5-4
R33	RESISTOR, 510 OHMS, 1/4 W, part no. CB5115	01121	5-4
R34	RESISTOR, 68 K, 1/4 W, part no. CB6835	01121	5-4
R35	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R36	RESISTOR, 4.3 K, 1/4 W, part no. CB4325	01121	5-4
R37	RESISTOR, 510 OHMS, 1/4 W, part no. CB5115	01121	5-4
R38	RESISTOR, 160 K, 1/4 W, part no. CB1645	01121	5-4
R39	RESISTOR, 9.1 K, 1/4 W, part no. CB9125	01121	5-4
R40	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-4
R41	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R42	RESISTOR, 510 OHMS, 1/4 W, part no. CB5115	01121	5-4
R43	RESISTOR, 9.1 K, 1/4 W, part no. CB9125	01121	5-4
R44	RESISTOR, 1 MEG, 1/4 W, part no. CB1055	01121	5-4
R45	RESISTOR, 1 MEG, 1/4 W, part no. CB1055	01121	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 1 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R46	RESISTOR, 1 MEG, 1/4 W, part no. CB1055	01121	5-4
R47	RESISTOR, 1 MEG, 1/4 W, part no. CB1055	01121	5-4
R48	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-4
R49	RESISTOR, 1 MEG, 1/4 W, part no. CB1055	01121	5-4
R50	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-4
R51	RESISTOR, 220 K, 1/4 W, part no. CB2245	01121	5-4
R52	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-4
R53	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-4
R54	RESISTOR, 1.5 MEG, 1/4 W, part no. CB1555	01121	5-4
R55	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-4
R56	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R57	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-4
R58	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-4
R59	RESISTOR, 560 K, 1/4 W, part no. CB5645	01121	5-4
R60	RESISTOR, 100 K, 1/4 W, part no. CB1045	01121	5-4
R61	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R62	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-4
R63	RESISTOR, 2 MEG, 1/4 W, part no. CB2055	01121	5-4
R64	RESISTOR, 10 K, 1/4 W, part no. CB1035	01121	5-4
R65	RESISTOR, 10 K, 1/4 W, part no. DB1035	01121	5-4
R66	RESISTOR, 1 K, 1/4 W, part no. CB1025	01121	5-4
SKT1	SOCKET, CRYSTAL, part no. 8000D4	91506	5-4
T1	TRANSFORMER, part no. PM19-M	00348	5-4
Y1	CRYSTAL UNIT QUARTZ, 100 KHZ, part no. HC13/U	13571	5-4

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

IF CARD

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C1	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C2	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-5
C3	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-5
C4	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-5
C5	CAPACITOR, 9 UF, 100 V, TANTALUM, part no. 1DP5-105	84171	5-5
C6	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, part no. TE1204	56289	5-5
C7	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C8	180 PF, 500 V, MICA, part no. DM15-181J	84171	5-5
C9	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C10	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-5
C11	CAPACITOR, 0.01 UF, 100 V, MYLAR, part no. 1DP1-103	84171	5-5
C12	CAPACITOR, 2600 PF, 500 V, MICA, part no. DM19-252J	84171	5-5
C13	CAPACITOR, 10 UF, 25 V, ELECTROLYTIC, TE1204	56289	5-5
C14	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C15	CAPACITOR, 510 PF, 300 V, MICA, part no. DM15-511J	84171	5-5
C16	CAPACITOR, 0.2 UF, 100 V, MYLAR, part no. 1DP3-204	84171	5-5
C17	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

IF CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C18	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C19	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C20	CAPACITOR, 6800 PF, 100 V, CERAMIC, part no. CK06CW682K	72982	5-5
C21	CAPACITOR, 15-60 PF, VARIABLE, part no. 538-006P3P9-112R	72982	5-5
C22	CAPACITOR, 200 PF, 500 V, MICA, part no. 10TCUT20	84171	5-5
C23	CAPACITOR, 600 PF, NPO, part no. 10TCCT20	56289	5-5
C23A	CAPACITOR, part no. 10TCCT30	56289	5-5
C24	CAPACITOR, 0.01, 100 V, CERAMIC, part no. 805-000X5VO-1032	72982	5-5
C25	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C26	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C27	CAPACITOR, 0.02 UF, 25 V, DISC CERAMIC, part no. 5835-000X5UO-203Z	84171	5-5
C28	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C29	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-5
C30	CAPACITOR, 0.02 UF, 25 V, DISC CERAMIC, part no. 5835-000X5UO-203Z	84171	5-5
C31	CAPACITOR, 750 PF, 500 V, MICA, part no. DM15-751J	84171	5-5
C32	CAPACITOR, 390 PF, 500 V, MICA, part no. DM15-391J	84171	5-5
C33	CAPACITOR, 33 PF, 500 V, MICA, part no. DM15-330J	84171	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

IF CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C34	CAPACITOR, 5.5-18 PF, VARIABLE, part no. 538-00692A	72982	5-5
C35	CAPACITOR, 0.01 UF, 100 V, CERAMIC, part no. 805-000X5V0-103Z	72982	5-5
C36	CAPACITOR, 0.01 UF, 100 V, CERAMIC, part no. 805-000X5V0-103Z	72982	5-5
D1	DIODE, part no. MZ500-20	04713	5-5
D2	DIODE, part no. 1N5148A	04713	5-5
D3	DIODE, part no. MZ500-12	04713	5-5
D4	DIODE, part no. 1N5148A	04713	5-5
L1	INDICATOR, FIXED, 560 UH, part no. MIH37	95105	5-5
L2	INDICATOR, FIXED, 5 MH, part no. MIC10	95105	5-5
L3	INDICATOR, FIXED, 1 MH, part no. MIH43	95105	5-5
L4	INDICATOR, FIXED, 100 UH, part no. MPF054-5	95105	5-5
PC1	P.C. BOARD, part no. 7555	77954	5-5
Q1	TRANSISTOR, part no. MFE3006	04713	5-5
Q2	TRANSISTOR, part no. MFE3006	04713	5-5
Q3	TRANSISTOR, part no. 2N3391	03508	5-5
Q4	TRANSISTOR, part no. MPF103	04713	5-5
Q5	TRANSISTOR, part no. MPS6507	04713	5-5
Q6	TRANSISTOR, part no. 2N3391	03508	5-5
Q7	TRANSISTOR, part no. MPS6507	04713	5-5
R1	RESISTOR, 51 OHM, 1/2 W, part no. EB5105	01121	5-5
R2	RESISTOR, 1.8 K, 1/2 W, part no. EB1825	01121	5-5
R3	RESISTOR, 10 MEG, 1/2 W, part no. EB1065	01121	5-5
R4	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-5
R5	RESISTOR, 470 OHM, 1/2 W, part no. EB4715	01121	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

IF CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R6	RESISTOR, 3 K, 1/2 W, part no. EB3025	01121	5-5
R7	RESISTOR, 100 K, 1/2 W, part no. EB1045	01121	5-5
R8	RESISTOR, 270 OHM, 1/2 W, part no. EB2715	01121	5-5
R9	RESISTOR, 180 K, 1/2 W, part no. EB1845	01121	5-5
R10	RESISTOR, 100 K, 1/2 W, part no. EB1045	01121	5-5
R11	RESISTOR, 12 K, 1/2 W, part no. EB1235	01121	5-5
R12	RESISTOR, 680 OHM, 1/2 W, part no. EB6815	01121	5-5
R13	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-5
R14	RESISTOR, 100 OHM, 1/2 W, part no. EB1045	01121	5-5
R15	RESISTOR, 220 OHM, 1/2 W, part no. EB2245	01121	5-5
R16	RESISTOR, 36 K, 1/2 W, part no. EB3635	01121	5-5
R17	RESISTOR, 43 K, 1/2 W, part no. EB4335	01121	5-5
R18	RESISTOR, 470 OHM, 1/2 W, part no. EB4715	01121	5-5
R19	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-5
R20	RESISTOR, 22 MEG, 1/2 W, part no. EB2265	01121	5-5
R21	RESISTOR, 1.8 K, 1/2 W, part no. EB1825	01121	5-5
R22	RESISTOR, 510 OHM, 1/2 W, part no. EB5115	01121	5-5
R23	RESISTOR, 4.3 K, 1/2 W, part no. EB4325	01121	5-5
R24	RESISTOR, 510 OHM, 1/2 W, part no. EB5115	01121	5-5
R25	RESISTOR, 430 OHM, 1/2 W, part no. EB4315	01121	5-5
R26	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-5
R27	RESISTOR, 2.4 K, 1/2 W, part no. EB2425	01121	5-5
R28	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-5
R29	RESISTOR, 62 K, 1/2 W, part no. EB6235	01121	5-5
R30	RESISTOR, 24 K, 1/2 W, part no. EB2435	01121	5-5

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

IF CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R31	RESISTOR, 5.1 K, 1/2 W, part no. EB5125	01121	5-5
R32	RESISTOR, 6.2 K, 1/2 W, part no. EB6225	01121	5-5
R33	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-5
R34	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-5
R35	RESISTOR, 3.3 K, 1/2 W, part no. EB3325	01121	5-5
R36	RESISTOR, 36 K, 1/2 W, part no. EB3635	01121	5-5
R37	RESISTOR, 22 K, 1/2 W, part no. EB2235	01121	5-5
R38	RESISTOR, 22 MEG, 1/2 W, part no. EB2265	01121	5-5
SKT1	SOCKET CRYSTAL, part no. 8000D4	91506	5-5
V1	OVEN, part no. ER0450KR2	13571	5-5
Y1	CRYSTAL, UNIT QUARTZ, part no. HC6/U	13571	5-5
	NOTE: THE FOLLOWING LIST OF ITEMS ARE LOCATED IN A SEALED UNIT, PART OF THE IF CARD ASSEMBLY. C20 THRU C36, D1 THRU D4, L4, Q4 THRU Q7, R20 THRU 38, SKT1, V1 AND Y1.		
METER CARD			
C1	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-6
C2	CAPACITOR, 1 UF, 100 V, MYLAR, part no. 1DP5-106	84171	5-6
C3	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-6
C4	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-6
C5	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-6

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

METER CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
D1	DIODE, part no. 1N5231	04713	5-6
D2	DIODE, part no. 1N914	01295	5-6
D3	DIODE, part no. 1N914	01295	5-6
D4	DIODE, part no. MZ2361	04713	5-6
D5	DIODE, part no. 1N914	01295	5-6
D6	DIODE, part no. 1N914	01295	5-6
D7	DIODE, part no. 1N914	01295	5-6
D8	DIODE, part no. 1N914	01295	5-6
D9	DIODE, part no. 1N914	01295	5-6
D10	DIODE, part no. 1N5252B	04713	5-6
D11	DIODE, part no. 1N914	04713	5-6
D12	DIODE, part no. 1N914	04713	5-6
D13	DIODE, part no. MZ500-22	04713	5-6
D14	DIODE, part no. MZ500-22	04713	5-6
K1	RELAY, part no. WJSO-6D	70309	5-6
PC1	P.C. BOARD, part no. 7563	77954	5-6
Q1	TRANSISTOR, part no. 2N3906	04713	5-6
Q2	TRANSISTOR, part no. 2N3904	04713	5-6
Q3	TRANSISTOR, part no. 2N5306	03508	5-6
Q4	TRANSISTOR, part no. 2N3391	03508	5-6
Q5	TRANSISTOR, part no. 2N5086	04713	5-6
Q6	TRANSISTOR, part no. 2N4409	04713	5-6
Q7	TRANSISTOR, part no. 2N3904	04713	5-6
Q8	TRANSISTOR, part no. 2N5306	03508	5-6
Q9	TRANSISTOR, part no. 2N3906	04713	5-6

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

METER CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
Q10	TRANSISTOR, part no. 2N3904	04713	5-6
Q11	TRANSISTOR, part no. 2N5306	03508	5-6
Q12	TRANSISTOR, part no. 2N5306	03508	5-6
Q13	TRANSISTOR, part no. 2N5306	03508	5-6
Q14	TRANSISTOR, part no. 2N3904	03508	5-6
R1	RESISTOR, 2.2 K, 1/2 W, part no. EB2225	01121	5-6
R2	RESISTOR, 200 K, 1/2 W, part no. EB2045	01121	5-6
R3	RESISTOR, 3.3 K, 1/2 W, part no. EB3325	01121	5-6
R4	RESISTOR, 6.2 K, 1/2 W, part no. EB6225	01121	5-6
R5	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-6
R6	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-6
R7	RESISTOR, 1 MEG, 1/2 W, part no. EB1055	01131	5-6
R9	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-6
R10	RESISTOR, 27 K, 1/2 W, part no. EB2735	01121	5-6
R11	RESISTOR, 5.1 K, 1/2 W, part no. EB5125	01121	5-6
R12	RESISTOR, 1 K, 1/2 W, VARIABLE, part no. RV6LAYSA102A	12697	5-6
R13	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-6
R14	RESISTOR, 100 OHM, 1/2 W, part no. EB1015	01121	5-6
R15	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
R16	RESISTOR, 16 K, 1/2 W, part no. EB1635	01121	5-6
R18	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
R19	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
R20	RESISTOR, 100 K, 1/2 W, part no. EB1045	01121	5-6
R21	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
R22	RESISTOR, 510 K, 1/2 W, part no. EB5145	01121	5-6

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

METER CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R23	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
R24	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-6
R25	RESISTOR, 10 OHM, 1/2 W, part no. EB1005	01121	5-6
R26	RESISTOR, 12 K, 1/2 W, part no. EB1235	01121	5-6
R27	RESISTOR, 15 OHM, 1/2 W, part no. EB1505	01121	5-6
R28	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-6
R29	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-6
R30	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-6
R31	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
R32	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-6
R33	RESISTOR, 7.5 K, 1/2 W, part no EB7525	01121	5-6
R34	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-6
R35	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-6
R36	RESISTOR, 24 OHM, 1/2 W, part no. EB5105	01121	5-6
R37	RESISTOR, 24 OHM, 1/2 W, part no. EB5105	01121	5-6
R38	RESISTOR, 1.8 K, 1/2 W, part no. EB1825	01121	5-6
R39	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-6
R40	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-6
R41	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-6
R42	RESISTOR, 3.6 K, 1/2 W, part no. EB3625	01121	5-6
R43	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-6
AGC CARD			
C1	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C2	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AGC CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C3	CAPACITOR, 1100 PF, 500 V, MICA, part no. DM19-112J	84171	5-7
C4	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C5	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C6	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C7	CAPACITOR, 0.025 UF, 600 V, MYLAR, part no. 1DP1-253	84171	5-7
C8	CAPACITOR, 1300 PF, 500 V, MICA, part no. DM19-132J	84171	5-7
C9	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C10	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C11	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C12	CAPACITOR, 0.025 UF, 600 V, MYLAR, part no. 1DP1-253	84171	5-7
C13	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C14	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C15	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C16	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C17	CAPACITOR, 1200 PF, 500 V, MICA, part no. D19-122J	84171	5-7
C18	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7
C19	CAPACITOR, 0.1 UF, 100 V, MYLAR, part no. 1DP2-104	84171	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AGC CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
D1	DIODE, part no. 1N914	01295	5-7
D2	DIODE, part no. 1N914	01295	5-7
D3	DIODE, part no. 1N914	01295	5-7
D4	DIODE, part no. 1N914	01295	5-7
D5	DIODE, part no. 1N914	01295	5-7
D6	DIODE, part no. 1N914	01295	5-7
D7	DIODE, part no. 1N914	01295	5-7
D8	DIODE, part no. 1N914	01295	5-7
D9	DIODE, part no. 1N914	01295	5-7
D10	DIODE, part no. 1N914	01295	5-7
D11	DIODE, part no. 1N5230B	04713	5-7
D12	DIODE, part no. 1N704A-0	95105	5-7
D13	DIODE, part no. 1N914	01295	5-7
D14	DIODE, part no. 1N914	01295	5-7
L1	INDICATOR, FIXED, 2 MH, part no. MIC 5	95105	5-7
L2	INDICATOR, FIXED, 2 MH, part no. MIC 5	95105	5-7
L3	INDICATOR, FIXED, 2 MH, part no. MIC 5	95105	5-7
PC1	P.C. BOARD, part no. 7556	77954	5-7
Q1	TRANSISTOR, part no. 2N3391	03508	5-7
Q2	TRANSISTOR, part no. 2N3906	04713	5-7
Q3	TRANSISTOR, part no. 2N3391	03508	5-7
Q4	TRANSISTOR, part no. 2N3391	03508	5-7
Q5	TRANSISTOR, part no. 2N3906	04713	5-7
Q6	TRANSISTOR, part no. 2N3391	03508	5-7
Q7	TRANSISTOR, part no. 2N3391	03508	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AGC CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
Q8	TRANSISTOR, part no. 2N3391	03508	5-7
Q9	TRANSISTOR, part no. 2N3906	04713	5-7
Q10	TRANSISTOR, part no. 2N3391	03508	5-7
R1	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-7
R2	RESISTOR, 270 K, 1/2 W, part no. EB2745	01121	5-7
R3	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-7
R4	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-7
R5	RESISTOR, 1.3 K, 1/2 W, part no. EB1325	01121	5-7
R6	RESISTOR, 6.2 K, 1/2 W, part no. EB6225	01121	5-7
R7	RESISTOR, 430 K, 1/2 W, part no. EB4345	01121	5-7
R8	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-7
R9	RESISTOR, 300 OHM, 1/2 W, part no. EB3015	01121	5-7
R10	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-7
R11	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-7
R12	RESISTOR, 200 K, 1/2 W, part no. EB2045	01121	5-7
R13	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-7
R14	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-7
R15	RESISTOR, 200 K, 1/2 W, part no. EB2045	01121	5-7
R16	RESISTOR, 270 K, 1/2 W, part no. EB2745	01121	5-7
R17	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-7
R18	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-7
R19	RESISTOR, 1.3 K, 1/2 W, part no. EB1325	01121	5-7
R20	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-7
R21	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-7
R22	RESISTOR, 6.2 K, 1/2 W, part no. EB6225	01121	5-7
R23	RESISTOR, 430 K, 1/2 W, part no. EB4345	01121	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R24	RESISTOR, 200 K, 1/2 W, part no. EB2045	01121	5-7
R25	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-7
R26	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-7
R27	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-7
R28	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-7
R29	RESISTOR, 220 K, 1/2 W, part no. EB2245	01121	5-7
R30	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-7
R31	RESISTOR, 3.6 K, 1/2 W, part no. EB3625	01121	5-7
R32	RESISTOR, 9.1 K, 1/2 W, part no. EB9125	01121	5-7
R33	RESISTOR, 510 OHM, 1/2 W, part no. EB5115	01121	5-7
R34	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-7
R35	RESISTOR, 270 K, 1/2 W, part no. EB2745	01121	5-7
R36	RESISTOR, 30 K, 1/2 W, part no. EB3035	01121	5-7
R37	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-7
R38	RESISTOR, 1.3 K, 1/2 W, part no. EB1325	01121	5-7
R39	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-7
R40	RESISTOR, 200 K, 1/2 W, part no. EB2045	01121	5-7
R41	RESISTOR, 300 OHMS, 1/2 W, part no. EB3015	01121	5-7
R42	RESISTOR, 1 K, 1 W, part no. GB1025	01121	5-7
R43	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-7
R44	RESISTOR, 1 K, 1 W, part no. GB1025	01121	5-7
R45	RESISTOR, 1 MEG, 1/2 W, part no. EB1055	01121	5-7
R46	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-7

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 2 CARD

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
C1	CAPACITOR, 0.03 UF, 100 V, MYLAR, part no. 1DP1-303J	84171	5-8
C2	CAPACITOR, 10 UF, 50 V, ELECTROLYTIC, TE1304	56289	5-8
C4	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-8
C6	CAPACITOR, 60 UF, 30 V, NP, TANTALUM, part no. CL27BH6000UN3	03508	5-8
C7	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-8
C8	CAPACITOR, 0.01 UF, 100 V, CERAMIC DISC, part no. 805-000X5V0-103Z	72982	5-8
C9	CAPACITOR, 0.1 UF, 100 V, MONOLITHIC, part no. 8131-100-651-104M	72982	5-8
C10	CAPACITOR, 0.1 UF, 100 V, MONOLITHIC, part no. 8131-100-651-104M	72982	5-8
D1	DIODE, part no. MZ500-22	04713	5-8
D2	DIODE, part no. MZ500-22	04713	5-8
PC1	P.C. BOARD, part no. 7562	77954	5-8
Q1	TRANSISTOR, part no. 2N4409	04713	5-8
Q2	TRANSISTOR, part no. 2N1711	04713	5-8
Q3	TRANSISTOR, part no. 2N5306	03508	5-8
Q4	TRANSISTOR, part no. 2N3906	04713	5-8
Q5	TRANSISTOR, part no. 2N3904	04713	5-8
Q6	TRANSISTOR, part no. 2N3906	04713	5-8
Q7	TRANSISTOR, part no. TIS34	01295	5-8
R1	RESISTOR, 10 K, 1/2 W, part no. EB1035	01121	5-8
R2	RESISTOR, 5 K, 1/2 W, VARIABLE, part no. RV6LAYSA502A	44655	5-8

TABLE 6-2. MAINTENANCE PARTS LIST (Continued)

AFC NO. 2 CARD (Continued)

REF DES	NAME AND DESCRIPTION	MFR CODE	FIG. NO.
R3	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-8
R4	RESISTOR, 51 OHMS, 1/2 W, part no. EB5105	01121	5-8
R5	RESISTOR, 100 OHMS, 1/2 W, VARIABLE, part no. RV6LAYSA101A	44655	5-8
R6	RESISTOR, 51 OHMS, 1/2 W, part no. EB5105	01121	5-8
R7	RESISTOR, 12 K, 1/2 W, part no. EB1235	01121	5-8
R8	RESISTOR, 13 K, 1/2 W, part no. EB1335	01121	5-8
R9	RESISTOR, 2 K, 1/2 W, part no. EB2025	01121	5-8
R10	RESISTOR, 20 K, 1/2 W, part no. EB2035	01121	5-8
R11	RESISTOR, 1 K, 1/2 W, part no. EB1025	01121	5-8
R12	RESISTOR, 470 K, 1/2 W, part no. EB4745	01121	5-8
R13	RESISTOR, 1 MEG., 1/2 W, part no. EB1055	01121	5-8
R14	RESISTOR, 3 MEG., 1/2 W, part no. EB3055	01121	5-8
R15	RESISTOR, 2 MEG., 1/2 W, part no. EB2055	01121	5-8
R16	RESISTOR, 2.4 K, 1/2 W, part no. EB2425	01121	5-8
R17	RESISTOR, 2.7 K, 1/2 W, part no. EB2725	01121	5-8
Z-1	CIRCUIT, part no. KRL-RISC-Z1	17591	5-8
Z-2	CIRCUIT, part no. KRL-RISC-Z2	17591	5-8

TABLE 6-3. LIST OF MANUFACTURERS

MFR CODE	MANUFACTURER
00348	MICROTRAN COMPANY 145 East Mineola Avenue Valley Stream, New York
00815	NORTHERN ENGINEERING LABS 357 Beloit Street Burlington, Wisconsin
01121	ALLEN-BRADLEY 1201 South Second Street Milwaukee, Wisconsin
01295	TEXAS INSTRUMENT Box 5012 Dallas, Texas
03508	GENERAL ELECTRIC Electronics Park Syracuse 1, New York
04397	HILL ELECTRONICS INC. 300 N. Chestnut Street Mechanicsburg, Pa. 17055
04713	MOTOROLA SEMICONDUCTORS Box 20912 Phoenix, Arizona
05820	WAKEFIELD ENGINEERING 139 Foundry Street Wakefield, Mass.
05955	EDKO ELECTRONICS 397 Bedford Avenue Brooklyn, 11, New York
06840	BENDIX CORPORATION Elmira, New York
12672	RCA SEMICONDUCTOR DIV. 744 Broad Street Newark, New Jersey
12697	CLAROSTAT CORPORATION Dover, New Hampshire
13103	THERMALLOY COMPANY 1817 Diplomacy Row Dallas, Texas
13571	ELECTRONIC RESEARCH 10,000 West 75th Street Overland Park, Kansas

TABLE 6-3. LIST OF MANUFACTURERS (Continued)

MFR CODE	MANUFACTURER
17591	KAHN RESEARCH LABORATORIES, INC. 81 South Bergen Place Freeport, New York
21689	FILTAIRE INC. 706 Forrest Street Charlottesville, Virginia 22901
31336	ASM CORPORATION P.O. Box 860, 525 Truck Lane Smithfield, North Carolina
31356	JBT INSTRUMENTS 133 Hamilton Street New Haven, Conneticut
31433	UNION CARBIDE 11901 Madison Avenue Cleveland, Ohio
37942	P.R. MALLORY & COMPANY INC. 3029 E. Washington Street Indianapolis, Indiana 46206
44655	OHMITE MANUFACTURING COMPANY 3601 Howard Skokie, Illinois
56289	SPRAGUE ELECTRIC COMPANY 50 E. 41st Street New York, New York
63743	WARD LEONARD 31 South Street Mt. Vernon, New York 10550
70309	ALLIED CONTROL COMPANY 2 East End Avenue New York, New York
71400	BUSSMAN MANUFACTURING DIV. 2536 W. University Street St. Louis, Mo. 63107
71590	CENTRALAB CORPORATION 900 Keefe Avenue Milwaukee, Wisconsin

TABLE 6-3. LIST OF MANUFACTURERS (Continued)

MFR CODE	MANUFACTURER
71744	CHICAGO MINIATURE LAMP 4433 Ravenswood Chicago, Illinois
72619	DIALIGHT 60 Stewart Brooklyn, New York
72982	ERIE TECH. PRODUCTS 645 W. 12th Street Erie, Pennsylvania
75915	LITTLEFUSE INCORPORATED 800 E. Northwest Highway Des Plains, Illinois
81030	INTERNATIONAL INSTRUMENTS INC. 88 Marsh Hill Road Orange, Conneticut
81073	GRAYHILL INCORPORATED 569 Hillgrove Avenue La Grange, Illinois
82389	SWITCHCRAFT INC. 5555 N. Elston Avenue Chicago, Illinois 60630
84171	ARCO ELECTRONICS INCORPORATED Community Drive Great Neck, New York
88245	USECO DIV. LITTON INDUSTRIES 13536 Saticoy Street Van Nuys, California
89280	QVS, INCORPORATED 20 North 15th Street East Orange, New Jersey
95105	COLLINS RADIO COMPANY 19700 San Joaquin Road Newport Beach, California
97794	YELLOW SPRINGS INSTRUMENT COMPANY Box 279 Yellow Springs, Ohio

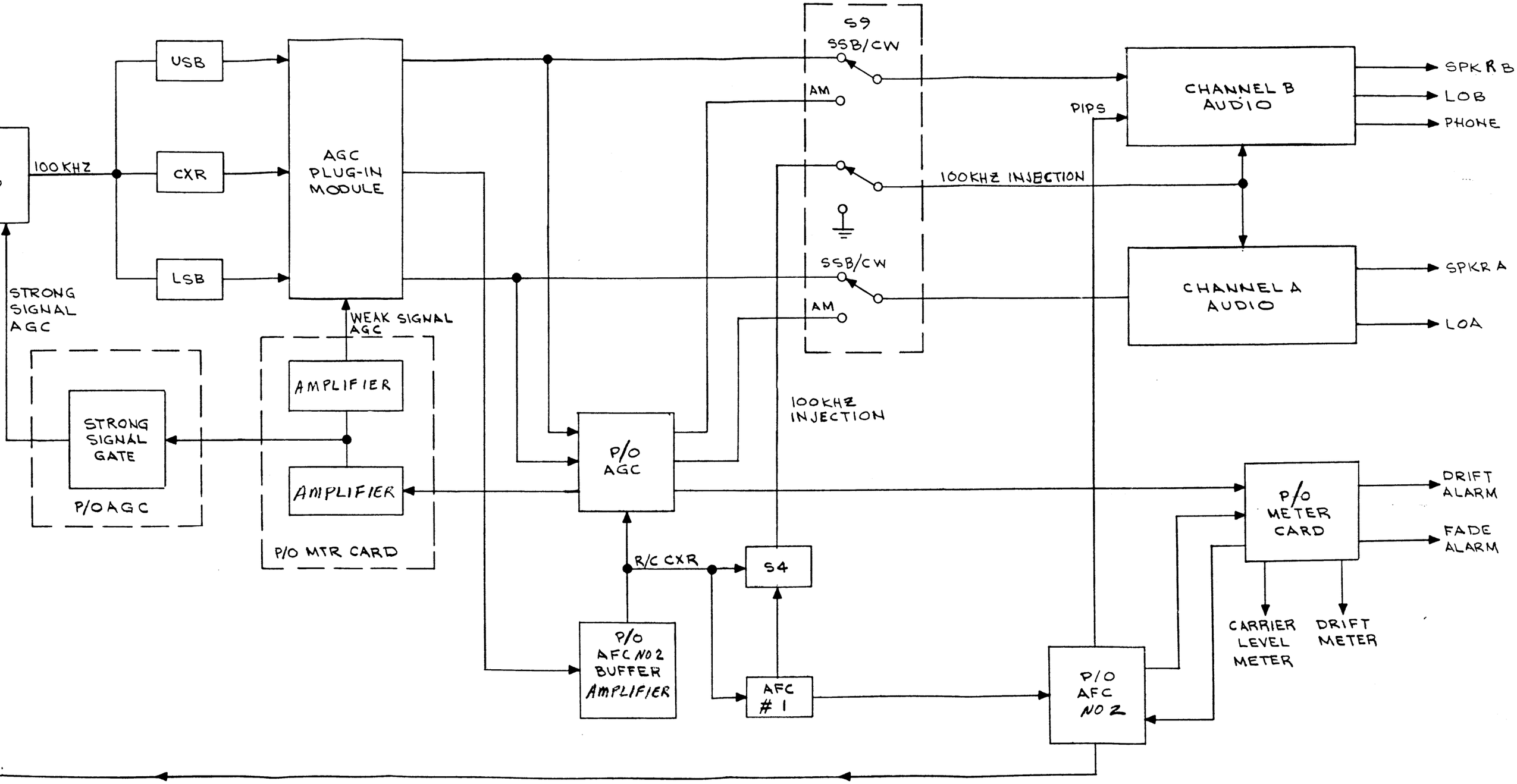
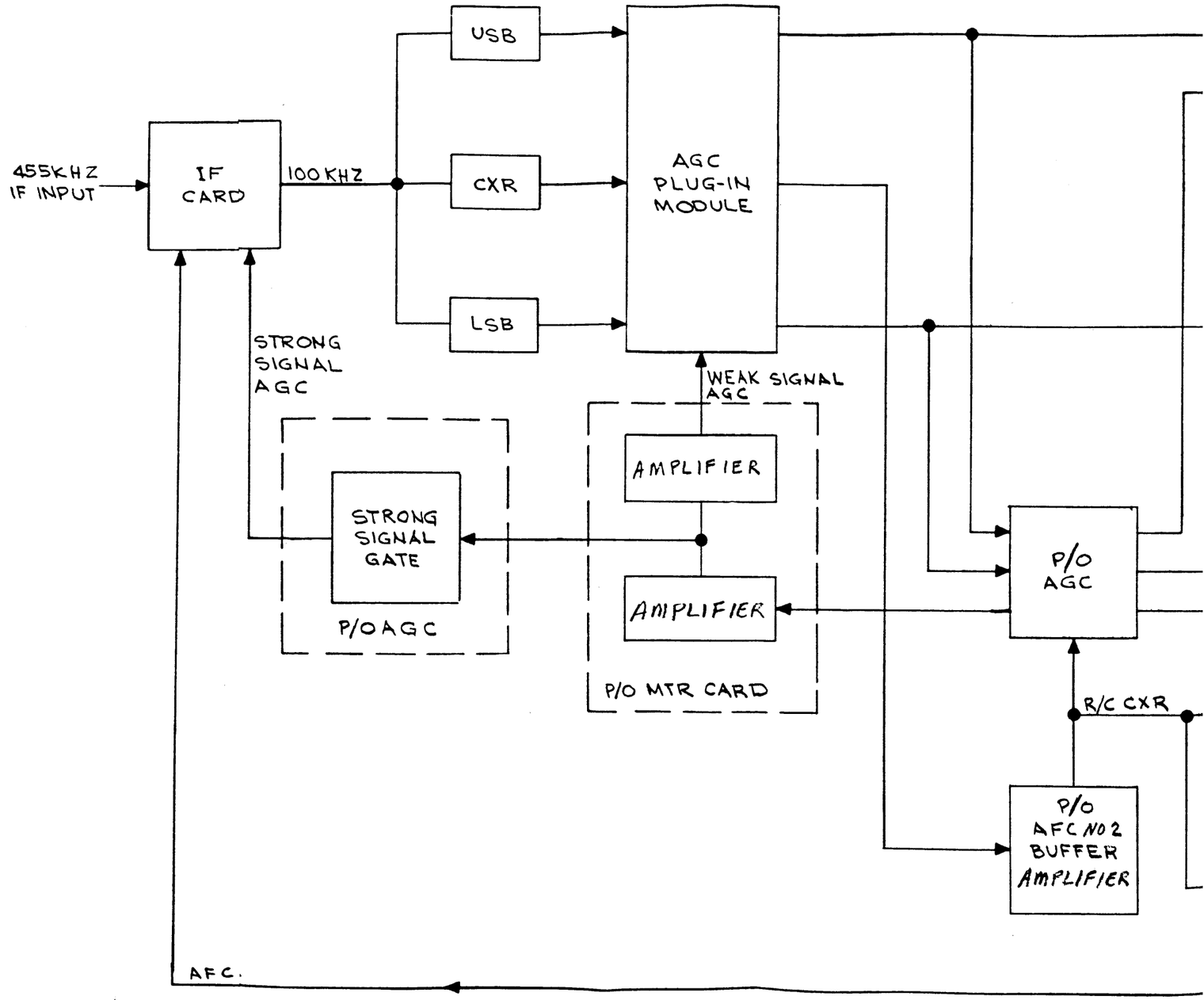
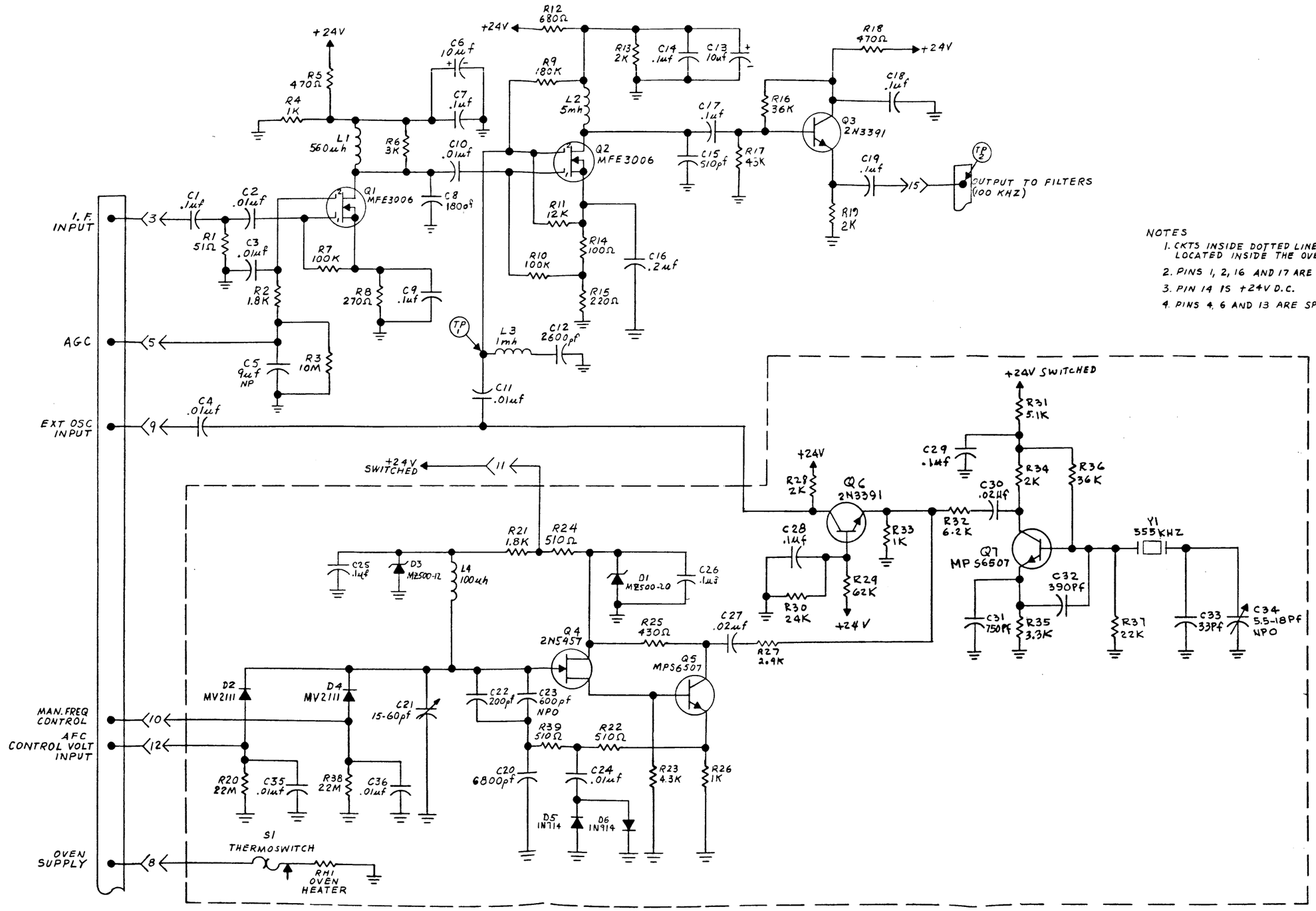


Figure 4-1. Overall Functional Block Diagram

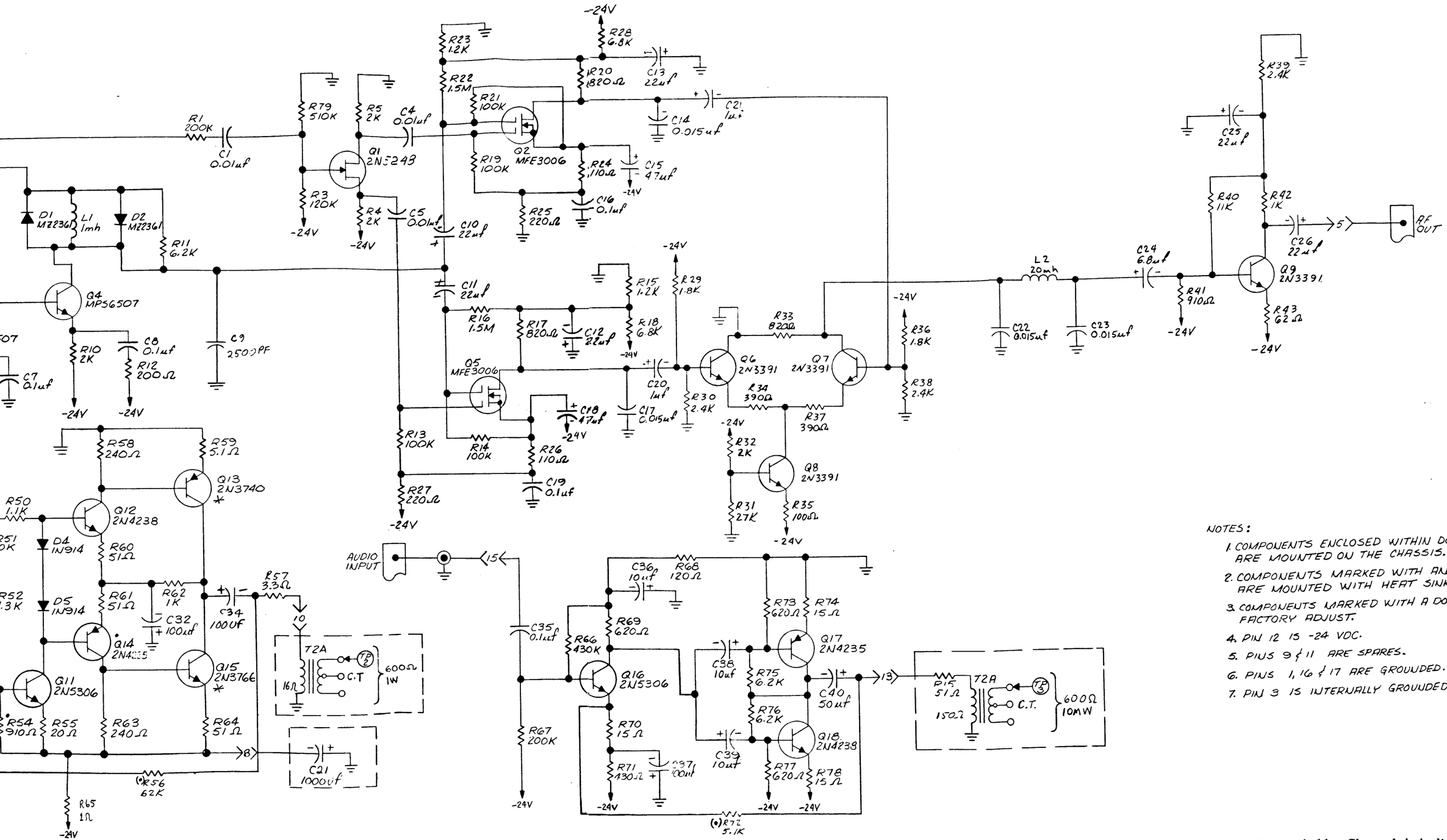

455KHZ
IF INPUT
IF
CARD
100KHZ
USB
CXR
LSB
AGC
PLUG-IN
MODULE
STRONG
SIGNAL
AGC
WEAK SIGNAL
AGC
AMPLIFIER
STRONG
SIGNAL
GATE
P/O AGC
AMPLIFIER
P/O MTR CARD
P/O
AGC
R/C CXR
P/O
AFC NO 2
BUFFER
AMPLIFIER
AFC.



NOTES

1. CKTS INSIDE DOTTED LINE ARE LOCATED INSIDE THE OVEN.
2. PINS 1, 2, 16 AND 17 ARE GROUNDED.
3. PIN 14 IS +24V D.C.
4. PINS 4, 6 AND 13 ARE SPARES.

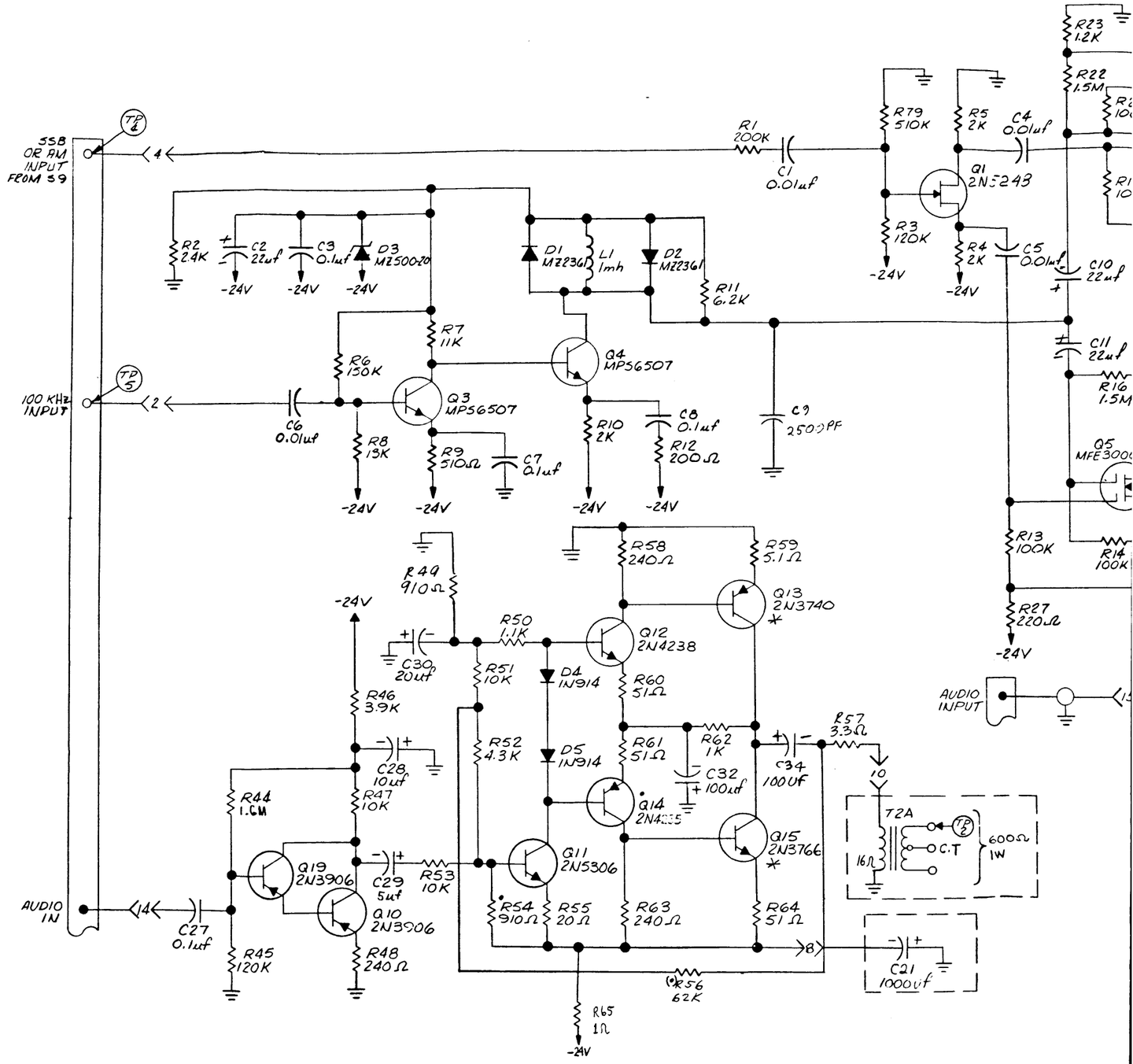
Figure 4-10. IF Card Schematic Diagram

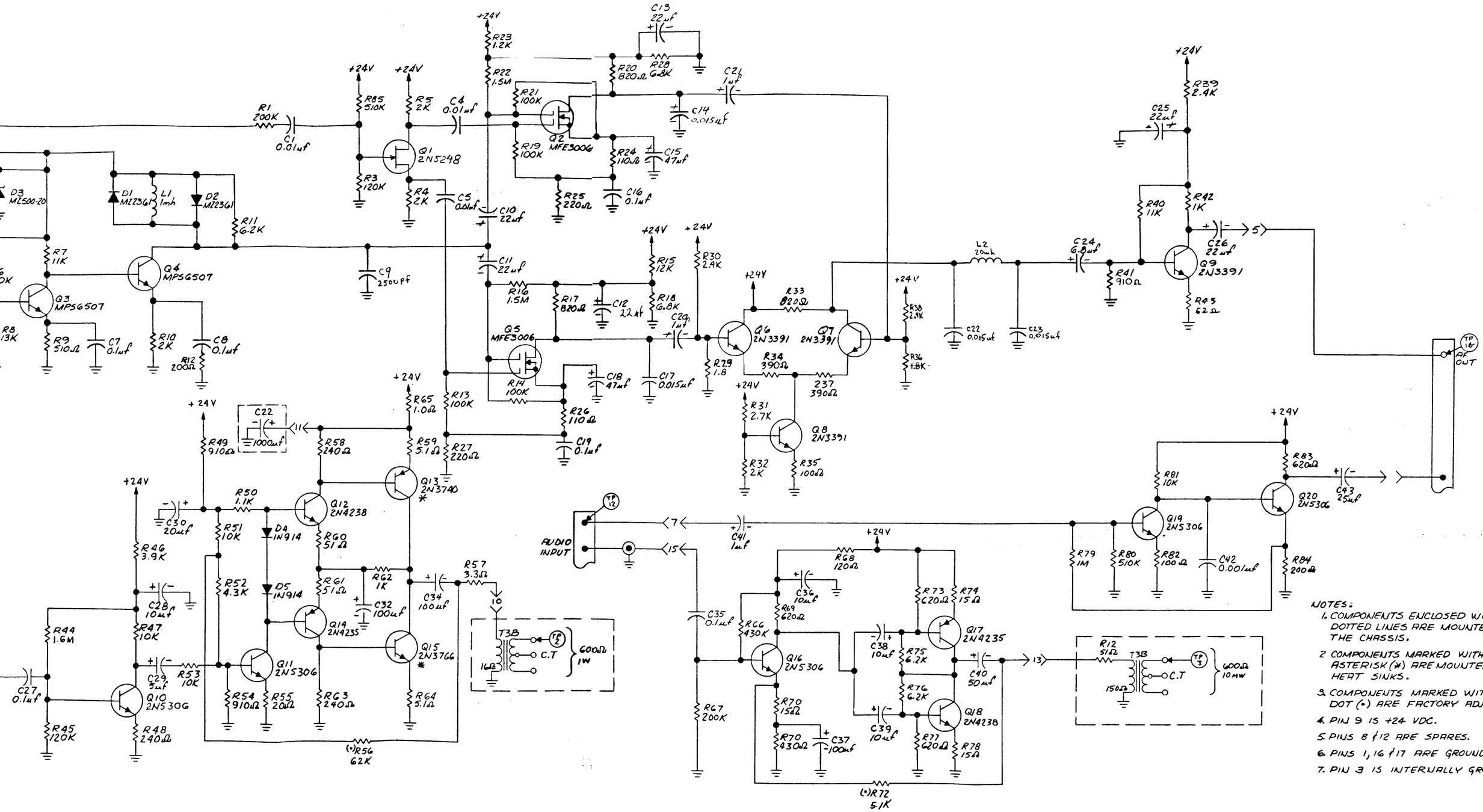


NOTES:

1. COMPONENTS ENCLOSED WITHIN DOTTED LINES ARE MOUNTED ON THE CHASSIS.
2. COMPONENTS MARKED WITH AN ASTERISK (*) ARE MOUNTED WITH HEAT SINKS.
3. COMPONENTS MARKED WITH A DOT (•) ARE FACTORY ADJUST.
4. PIN 12 IS -24 VDC.
5. PINS 9 & 11 ARE SPARES.
6. PINS 1, 16 & 17 ARE GROUNDED.
7. PIN 3 IS INTERNALLY GROUNDED.

Figure 4-11. Channel A Audio Card Schematic Diagram

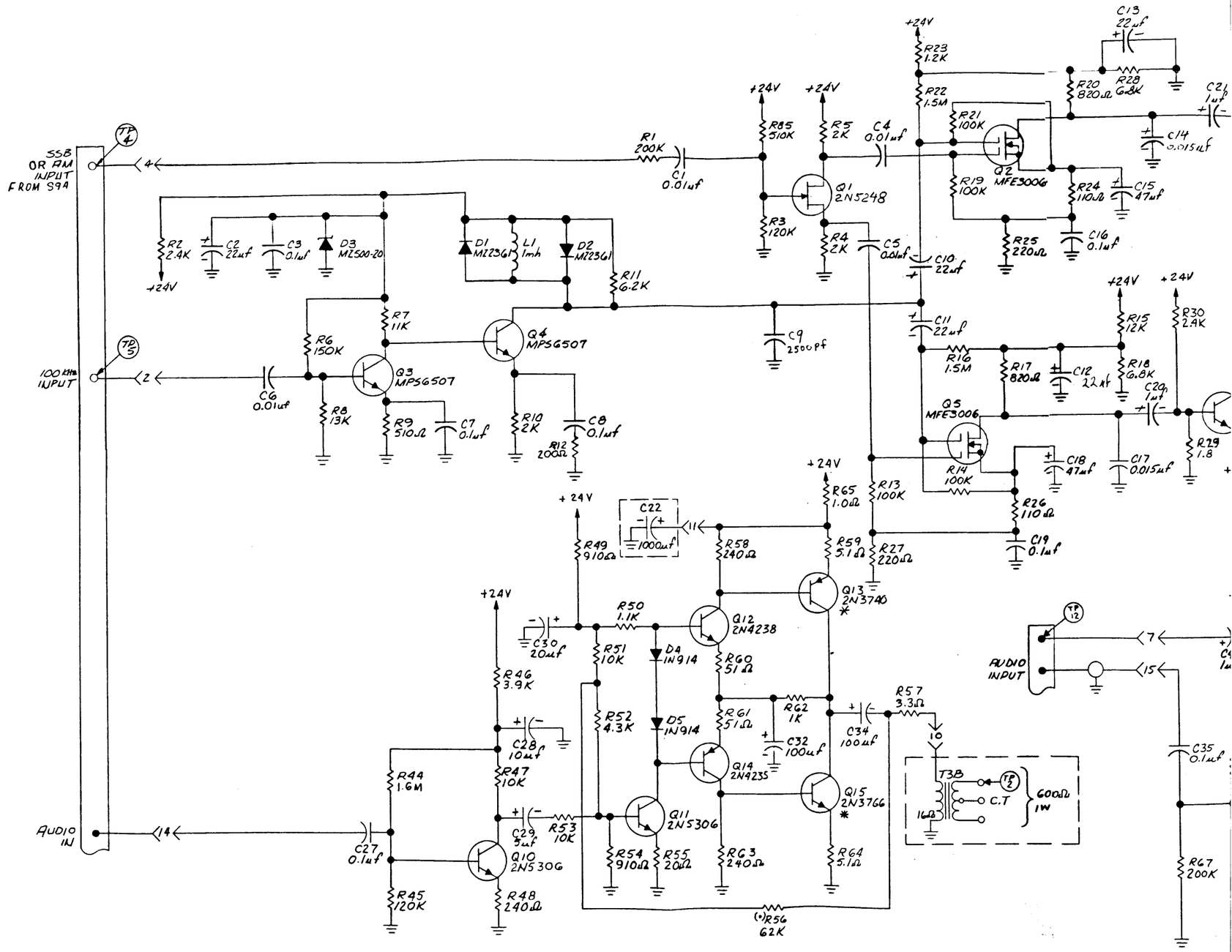

SSB OR AM INPUT FROM S9
TP4
4
R1 200K
C1 0.01uf
R79 510K
R5 2K
C4 0.01uf
Q1 2N5243
R3 120K
R4 2K
C5 0.01uf
C10 22uf
R23 1.2K
R22 1.5M
-24V
R2 2.4K
C2 22uf
C3 0.1uf
D3 MZ500-20
D1 MZ2361
L1 1mh
D2 MZ2361
R11 6.2K
R7 11K
R6 150K
Q4 MPS6507
Q3 MPS6507
C11 22uf
R16 1.5M
100 KHz INPUT
TP5
2
C6 0.01uf
R8 19K
R9 510Ω
C7 0.1uf
R10 2K
C8 0.1uf
R12 200Ω
C9 250 PF
Q5 MFE300
R13 100K
R14 100K
R27 220Ω
R49 910Ω
R58 240Ω
R59 5.1Ω
Q13 2N3740 *
R50 1.1K
Q12 2N4238
C30 20uf
R51 10K
D4 IN914
R60 51Ω
AUDIO INPUT
R46 3.9K
R52 4.3K
D5 IN914
R61 51Ω
R62 1K
C32 100uf
C34 100uf
R57 3.3Ω
10
C28 10uf
R44 1.6M
R47 10K
Q14 2N4235
Q15 2N3766 *
T2A
TP2
C.T
16Ω
600Ω 1W
Q11 2N5306
Q19 2N3906
C29 5uf
R53 10K
AUDIO IN
14
C27 0.1uf
R54 910Ω
R55 20Ω
R63 240Ω
R64 51Ω
8
C21 1000uf
R45 120K
Q10 2N3906
R48 240Ω
(*)R56 62K
R65 1Ω
-24V



NOTES:

1. COMPONENTS ENCLOSED WITHIN DOTTED LINES ARE MOUNTED ON THE CHASSIS.
2. COMPONENTS MARKED WITH AN ASTERISK (*) ARE MOUNTED WITH HEAT SINKS.
3. COMPONENTS MARKED WITH A DOT (•) ARE FACTORY ADJUST.
4. PIN 9 IS +24 VDC.
5. PINS 8 & 12 ARE SPARES.
6. PINS 1, 16 & 17 ARE GROUNDED.
7. PIN 3 IS INTERNALLY GROUNDED.

Figure 4-12. Channel B Audio Card Schematic Diagram


SSB OR AM INPUT FROM S9A
100 kHz INPUT
AUDIO IN
AUDIO INPUT
TP 4
TP 5
TP 12
TP 2
+24V
R1 200K
C1 0.01uf
R2 2.4K
C2 22uf
C3 0.1uf
D3 MZ500-20
D1 MZ2361
L1 1mh
D2 MZ2361
R11 6.2K
R3 120K
R85 510K
R5 2K
C4 0.01uf
Q1 2N5248
R4 2K
C5 0.01uf
C10 22uf
C9 2500pf
R7 11K
R6 150K
Q4 MPSG507
Q3 MPSG507
C6 0.01uf
R8 13K
R9 510Ω
C7 0.1uf
R10 2K
R12 200Ω
C8 0.1uf
R23 1.2K
C13 22uf
R22 1.5M
R20 820Ω
R28 6.8K
C21 1uf
R21 100K
C14 0.015uf
Q2 MFE3006
R19 100K
R24 110Ω
C15 47uf
R25 220Ω
C16 0.1uf
C11 22uf
R15 12K
R30 2.4K
R16 1.5M
R17 820Ω
C12 22uf
R18 6.8K
C20 1uf
Q5 MFE3006
R14 100K
C18 47uf
C17 0.015uf
R29 1.8
R65 1.0Ω
R13 100K
R26 110Ω
C19 0.1uf
C22 1000uf
R58 240Ω
R59 5.1Ω
R27 220Ω
Q13 2N3740 *
R49 910Ω
R50 1.1K
Q12 2N4238
C30 20uf
R51 10K
D4 1N914
R60 51Ω
R46 3.9K
R52 4.3K
D5 1N914
R61 51Ω
R62 1K
C32 100uf
C34 100uf
R57 3.3Ω
Q14 2N4235
Q15 2N3766 *
C28 10uf
R44 1.6M
R47 10K
C29 5uf
R53 10K
Q11 2N5306
C27 0.1uf
Q10 2N5306
R54 910Ω
R55 20Ω
R63 240Ω
R64 5.1Ω
R45 120K
R48 240Ω
(+)R56 62K
T3B
C.T
16Ω
600Ω 1W
C35 0.1uf
R67 200K

NOTES:-

1. ALL DIODES ARE IN914 UNLESS OTHERWISE SPECIFIED
2. PINS 1, 2, 8 THRU 12, 16 AND 17 ARE GROUNDED
3. PINS 4, 5, 13 AND 14 ARE +24VDC
4. PIN 7 IS A SPARE

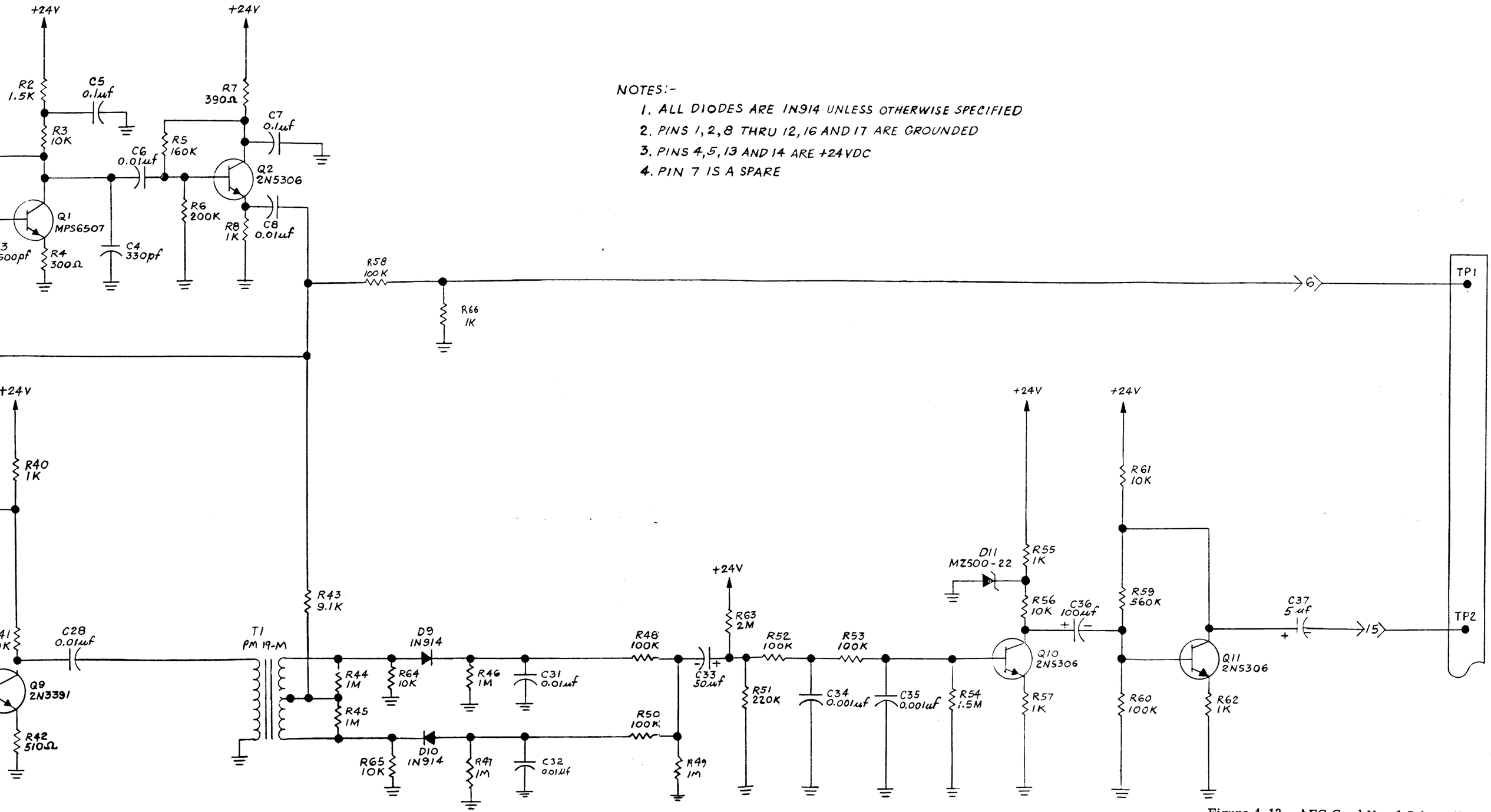
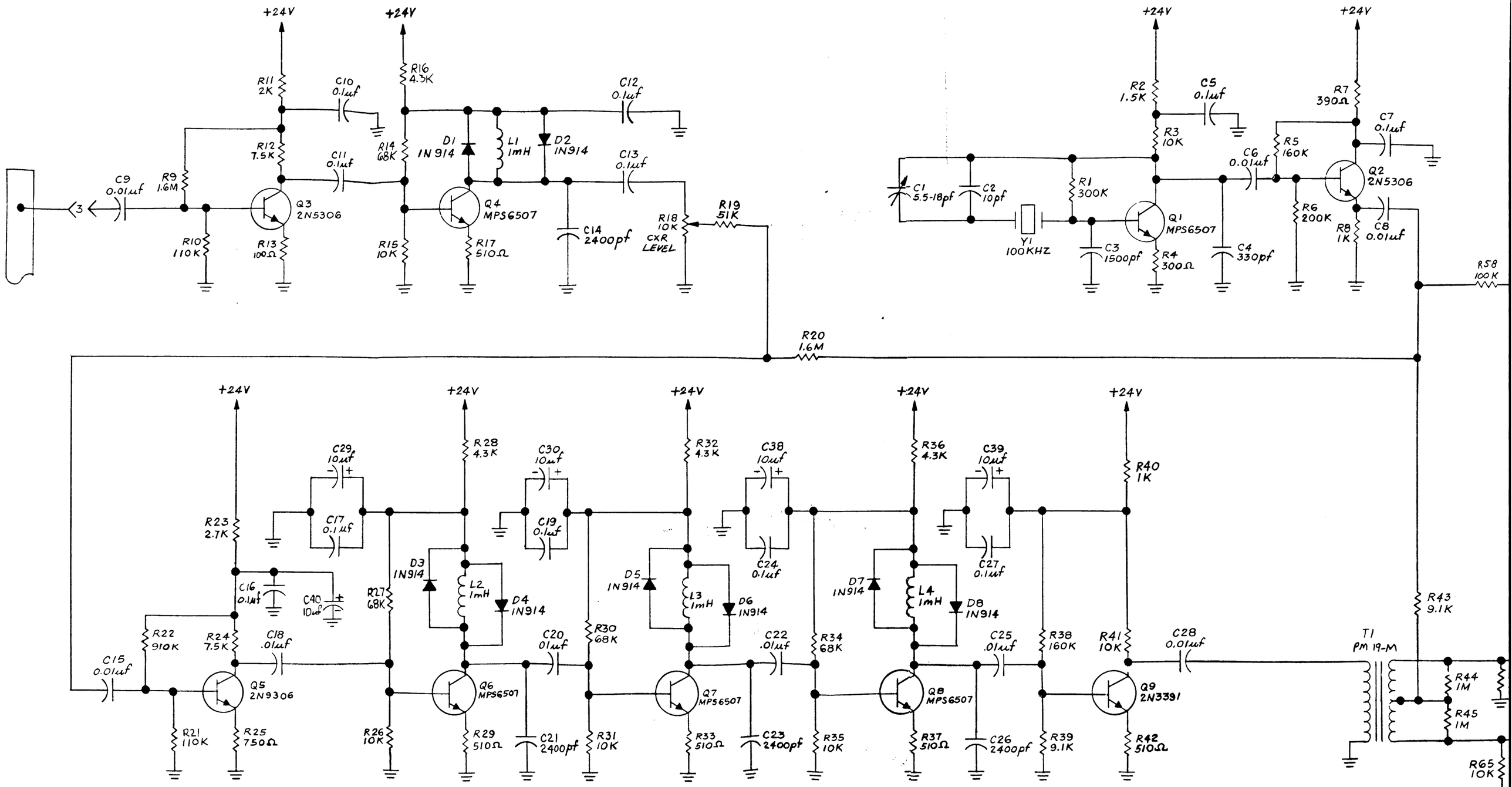
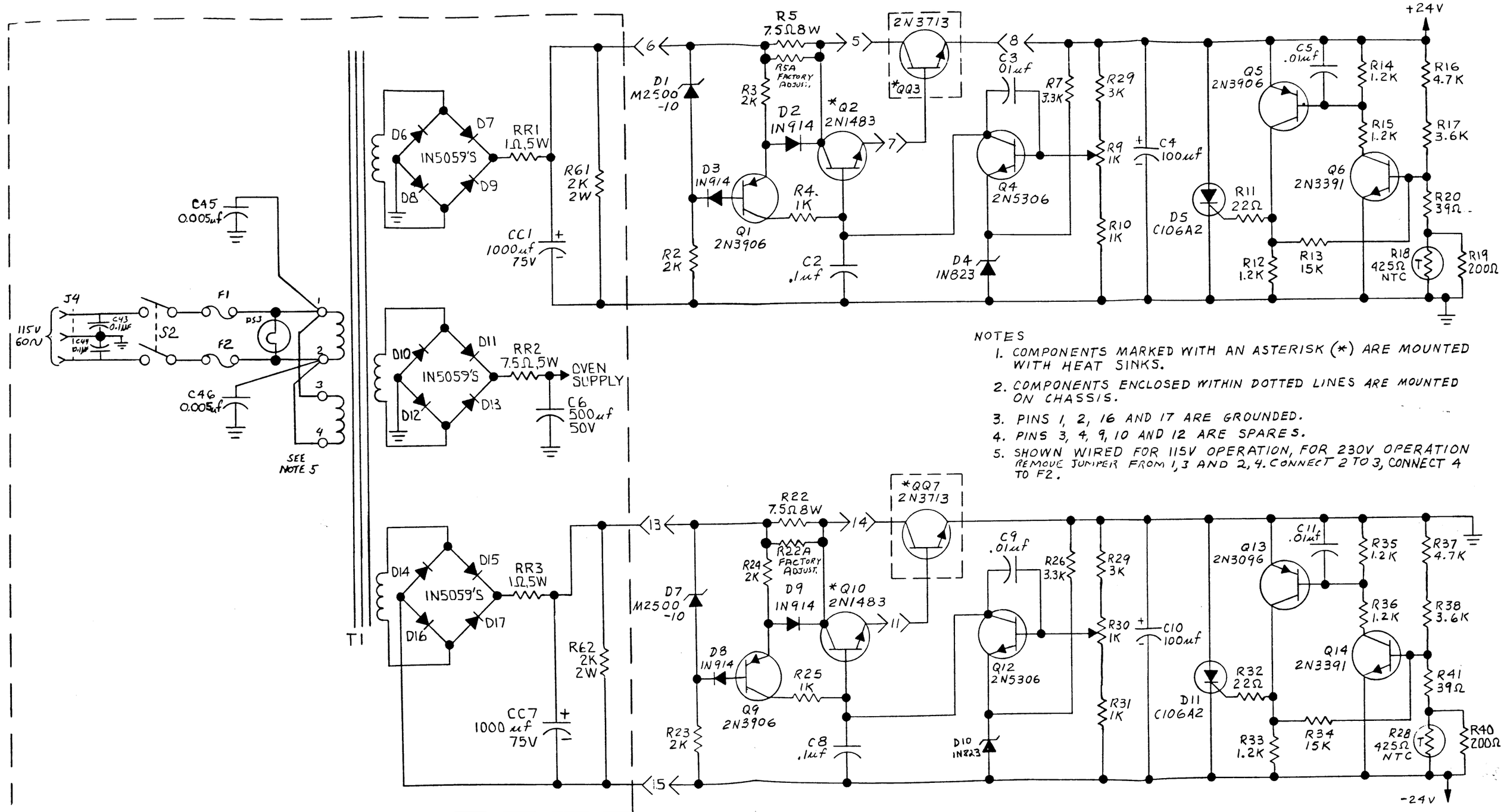


Figure 4-13. AFC Card No. 1 Schematic Diagram

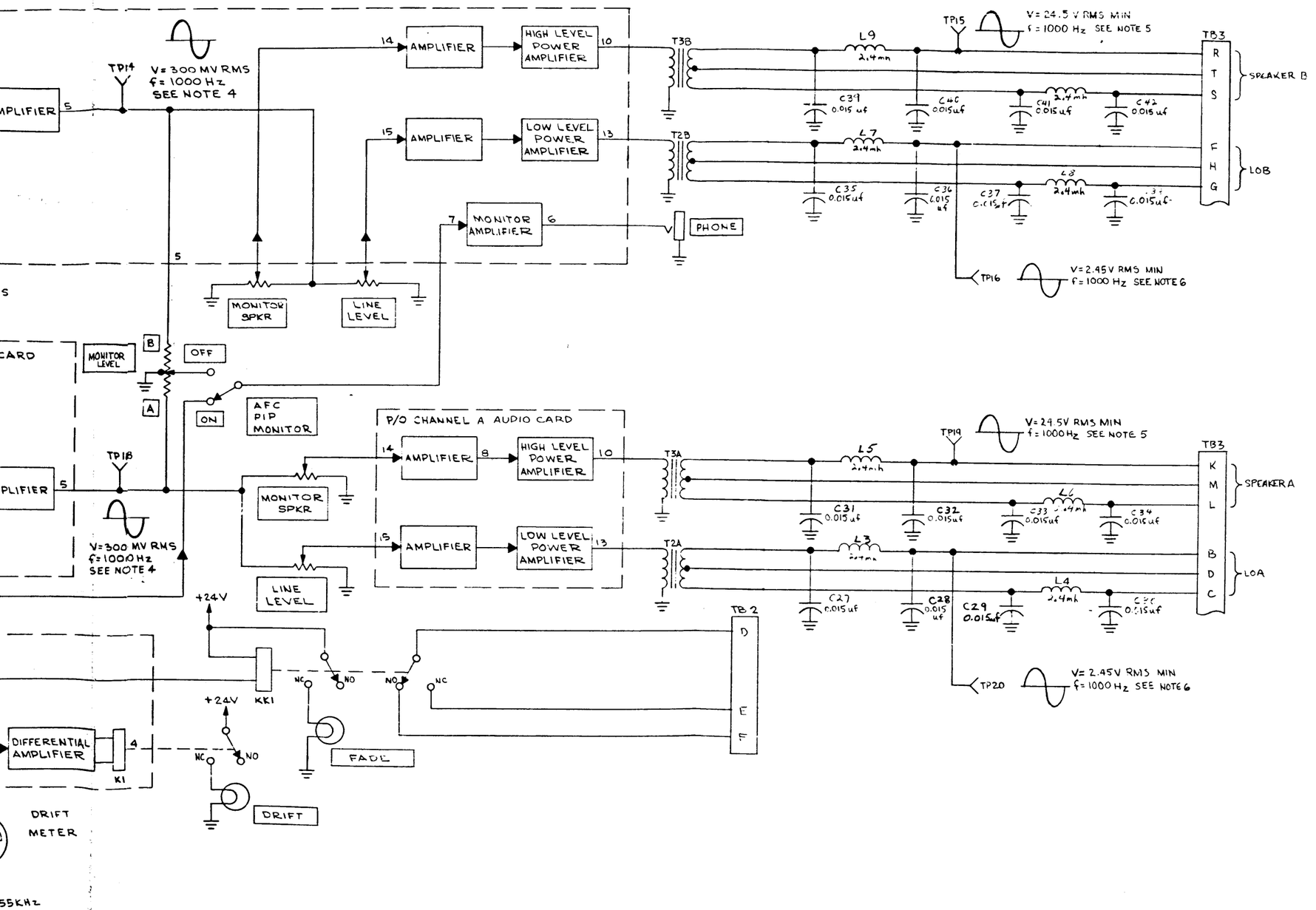

+24V
+24V
R11 2K
C10 0.1uf
R16 4.3K
C12 0.1uf
R12 7.5K
C11 0.1uf
R14 68K
D1 IN914
L1 1mH
D2 IN914
C13 0.1uf
C9 0.01uf
R9 1.6M
Q3 2N5306
Q4 MPS6507
R19 51K
R10 110K
R13 100Ω
R15 10K
R17 510Ω
C14 2400pf
R18 10K CXR LEVEL
+24V
+24V
R2 1.5K
C5 0.1uf
R7 390Ω
C7 0.1uf
R3 10K
C6 0.01uf
R5 160K
C1 5.5-18pf
C2 10pf
R1 300K
Q2 2N5306
Y1 100KHZ
C3 1500pf
Q1 MPS6507
R4 300Ω
C4 330pf
R6 200K
R8 1K
C8 0.01uf
R58 100K
R20 1.6M
+24V
+24V
+24V
+24V
+24V
R28 4.3K
R32 4.3K
C38 10uf
R36 4.3K
C39 10uf
R40 1K
C29 10uf
C30 10uf
C17 0.1uf
C19 0.1uf
C24 0.1uf
C27 0.1uf
R23 2.7K
D3 IN914
L2 1mH
D4 IN914
D5 IN914
L3 1mH
D6 IN914
D7 IN914
L4 1mH
D8 IN914
R43 9.1K
C16 0.1uf
C40 10uf
R27 68K
R30 68K
R34 68K
R41 10K
C28 0.01uf
R22 910K
R24 7.5K
C18 .01uf
C20 01uf
C22 .01uf
C25 .01uf
R38 160K
T1 PM 19-M
C15 0.01uf
Q5 2N9306
Q6 MPS6507
Q7 MPS6507
Q8 MPS6507
Q9 2N3391
R44 1M
R45 1M
R21 110K
R25 750Ω
R26 10K
R29 510Ω
C21 2400pf
R31 10K
R33 510Ω
C23 2400pf
R35 10K
R37 510Ω
C26 2400pf
R39 9.1K
R42 510Ω
R65 10K



NOTES

1. COMPONENTS MARKED WITH AN ASTERISK (*) ARE MOUNTED WITH HEAT SINKS.
2. COMPONENTS ENCLOSED WITHIN DOTTED LINES ARE MOUNTED ON CHASSIS.
3. PINS 1, 2, 16 AND 17 ARE GROUNDED.
4. PINS 3, 4, 9, 10 AND 12 ARE SPARES.
5. SHOWN WIRED FOR 115V OPERATION, FOR 230V OPERATION REMOVE JUMPER FROM 1,3 AND 2,4. CONNECT 2 TO 3, CONNECT 4 TO F2.

Figure 4-15. Power Supply Card Schematic Diagram

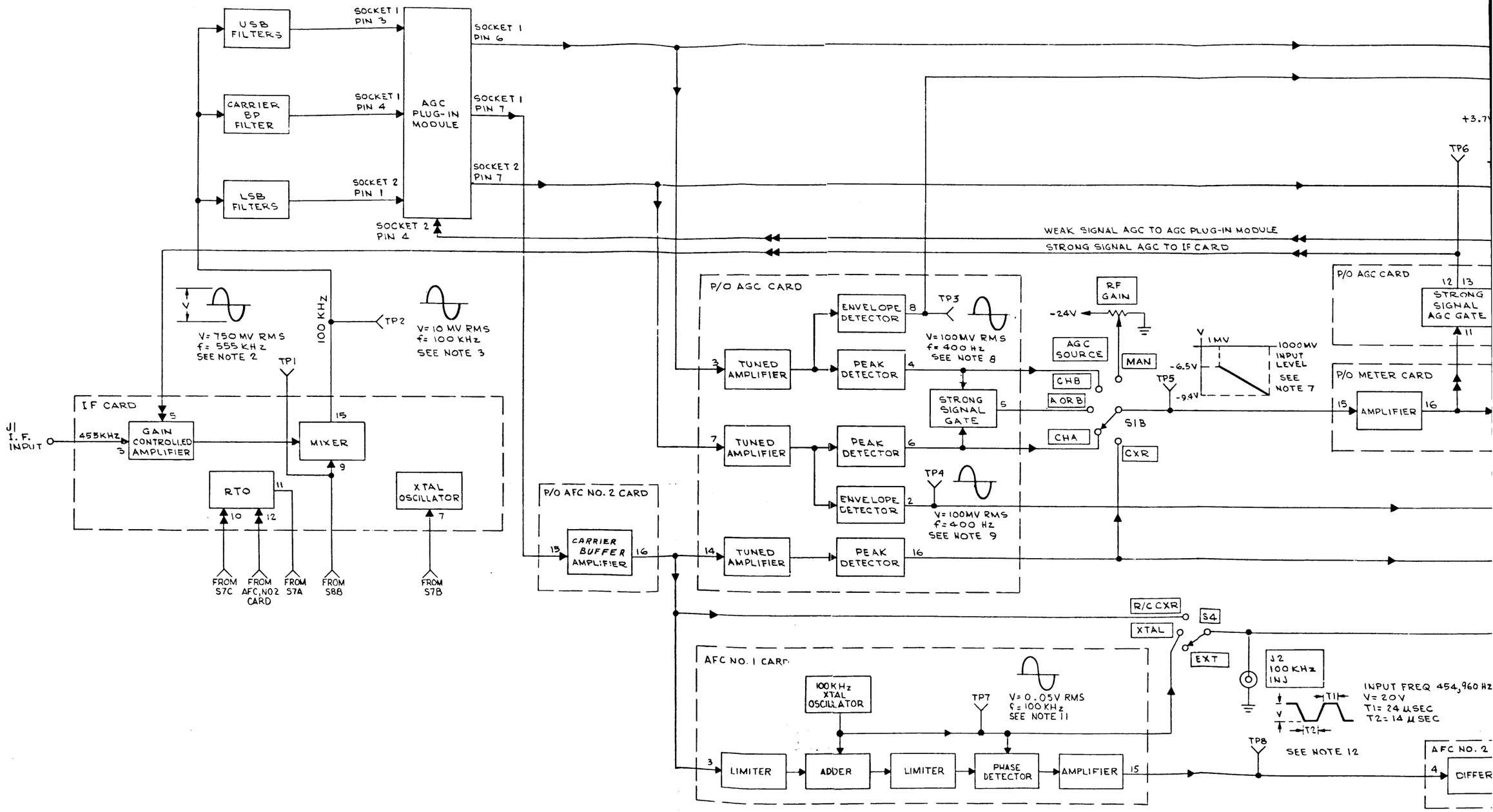


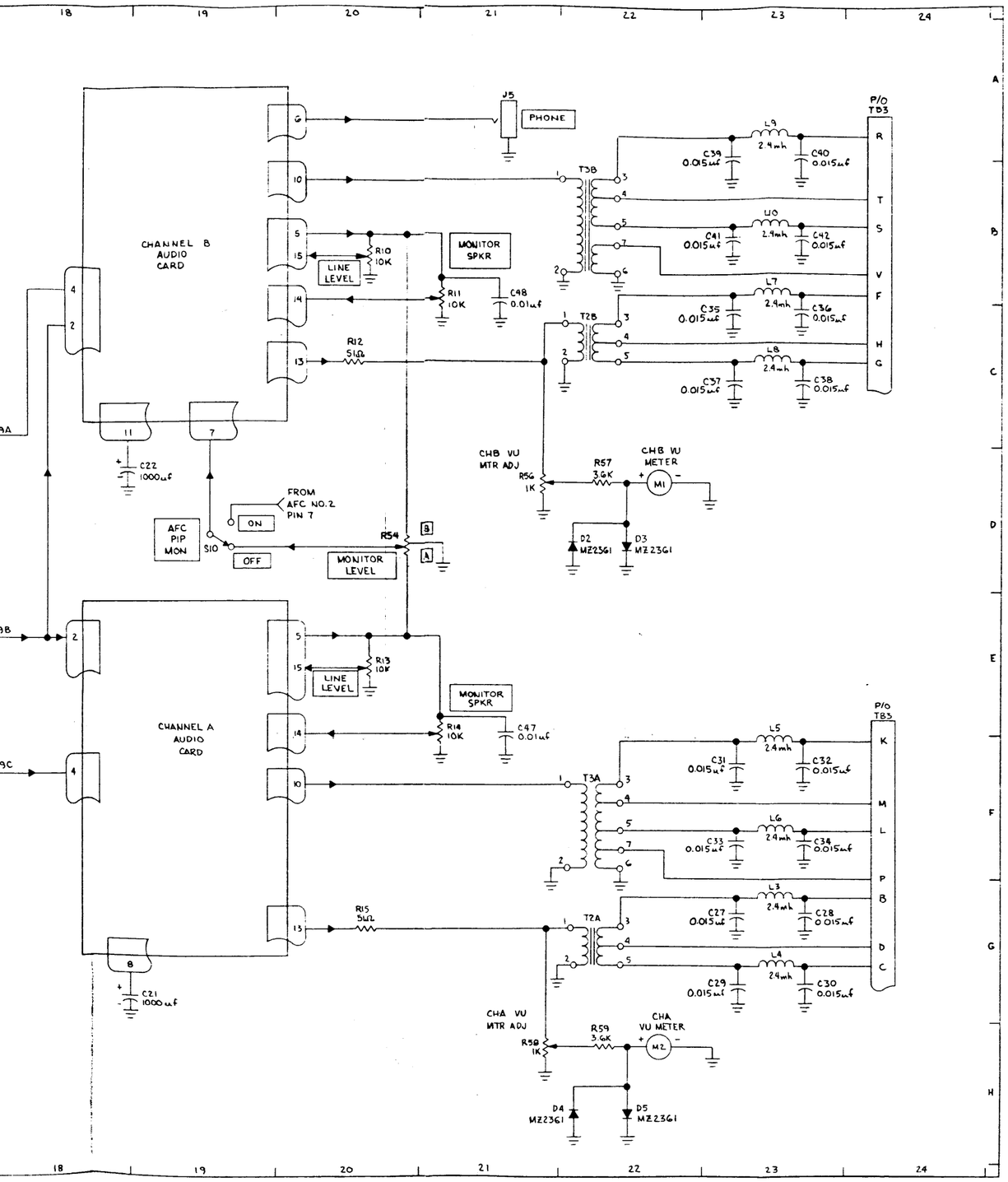
NOTES:

1. Numbers outside circuit blocks indicate pin (socket) numbers on PC boards.
2. Operating Control Settings: S8 to INT., AFC FUNCTION SW to OFF. All other controls any setting.
3. Operating Control Settings: S8 to INT., AFC FUNCTION SW OFF, AGC SOURCE SW to A or B. Carrier Level Control 50%. All other controls any setting. Input 10 mv rms, 455 KHz.
4. Operating Control Settings: S8 to INT., S4 to XTAL, Mode Sw to SSB/CW Carrier Level Control at halfway. AFC FUNCTION SW to OFF, AGC SOURCE SW to A or B. All other controls any setting. Input 454 KHz (CH A) or 456 KHz (CH B) 100 MV.
5. Operating Control Settings: Same as note four except terminate either CH A SPKR output or CH B SPKR output with a 600 ohm, 1 watt resistor. Rotate CH A or CH B Monitors SPKR Control fully CW.
6. Operating Control Settings: Same as note five, except terminate both low level (LOA and LOB) outputs and rotate both line level controls fully CW.
7. Operating Control Settings: S8 to INT., S4 to XTAL, Carrier Level Control at halfway, AFC FUNCTION SW to OFF, AGC SOURCE SW to CXR. All other controls any setting. Input, 455 KHz vary between 1 mv and 1000 mv rms.
8. Operating Control Settings: Same as note seven, except AGC SOURCE SW at A or B, CH A Bandwidth to WIDE, Mode switch to AM.
9. Operating Control Settings: Same as note eight, except set CH B Bandwidth to WIDE.
10. Operating Control Settings: S8 to INT., S4 to XTAL, Carrier Level Control at halfway, AFC FUNCTION SWITCH to OFF. AGC source switch to CH A. All other controls any setting. Input, 454 KHz vary between 1 mv and 1000 mv.
11. Operating Control Settings: All controls any setting.
12. Operating Control Settings: S8 to INT., AFC FUNCTION SWITCH to ON, Carrier Level Control half-way, AGC SOURCE SWITCH to A or B. Input, 455 KHz 100 mv rms.
13. Operating Control Settings: S8 to INT., AFC FUNCTION SWITCH to A or B. All other controls any setting. Input, initially 455 KHz, 100 mv rms. After AFC LOCK-ON, sweep from 454 KHz to 456 KHz.
14. Operating Control Settings: Same as note thirteen, except AGC SOURCE SWITCH to CXR. Input, 455 KHz vary between 1 mv and 1000 mv.

Figure 4-18. Servicing Block Diagram

MODE
SSB/CW
AM
S9A
S9B
S9C
CHANNEL B AUDIO CARD
TP13
PHASE SPLITTER
PRODUCT DEMODULATOR
PRODUCT DEMODULATOR
DIFFERENTIAL AMPLIFIER
AMPLIFIER
LIMITER
V= 300MV RMS
f= 99KHz
SEE NOTE 4
TP5
V= 0.05V RMS
f= 100KHz
SEE NOTE 4
P/O CHANNEL A AUDIO CARD
LIMITER
V= 300MV RMS
f= 101KHz
SEE NOTE 4
TP17
PHASE SPLITTER
PRODUCT DEMODULATOR
PRODUCT DEMODULATOR
DIFFERENTIAL AMPLIFIER
AMPLIFIER
+3.7V
INPUT LEVEL
1MV
100MV
-1.4V
SEE NOTE 10
TP6
WEAK SIGNAL AGC TO AGC PLUG-IN MODULE
STRONG SIGNAL AGC TO IF CARD
P/O AGC CARD
STRONG SIGNAL AGC GATE
P/O METER CARD
AMPLIFIER
AMPLIFIER
P/O AGC CARD
ENVELOPE DETECTOR
TP3
V= 100MV RMS
f= 400 Hz
SEE NOTE 8
TUNED AMPLIFIER
PEAK DETECTOR
STRONG SIGNAL GATE
RF GAIN
-24V
AGC SOURCE
MAN
CHB
A OR B
CHA
S1B
CXR
V
1MV
1000MV INPUT LEVEL
SEE NOTE 7
-6.5V
-9.4V
TP5
TUNED AMPLIFIER
PEAK DETECTOR
ENVELOPE DETECTOR
TP4
V= 100MV RMS
f= 400 Hz
SEE NOTE 9
C NO. 2 CARD
ARRIER BUFFER MPLIFIER
TUNED AMPLIFIER
PEAK DETECTOR
PIPS
METER CARD
AMPLIFIER
AMPLIFIER
SOLID STATE RELAY
R/C CXR
XTAL
EXT
S4
AFC NO. 1 CARD
100KHz XTAL OSCILLATOR
TP7
V= 0.05V RMS
f= 100KHz
SEE NOTE 11
LIMITER
ADDER
LIMITER
PHASE DETECTOR
AMPLIFIER
J2
100KHz
INJ
T1
T2
V
SEE NOTE 12
TP8
INPUT FREQ 454,960 Hz
V= 2.0V
T1= 24 μSEC
T2= 14 μSEC
2.5V
10MSEC
4.5V
5MSEC
20 MSEC
SEE NOTE 13
TP9
INPUT FREQ 455.050 Hz
AFC NO. 2 CARD
DIFFERENTIATOR
AMPLIFIER
Z1
DC AMPLIFIER
Z2 FADE GATE
AFC TO IF CARD
METER
CARRIER LEVEL
+24V
1MV
1000 MV
100MV
-24V
SEE NOTE 14
TP10
TP12
100 MV
1000MV
DC AMPLIFIER
DIFFERENTIAL AMPLIFIER
DRIFT METER
TP11
+1V
-1V
f= 455KHz
+1KHz
-1KHz
SEE NOTE 13
TO AFC FUNTION SWITCH
AFC TO IF CARD PIN 12

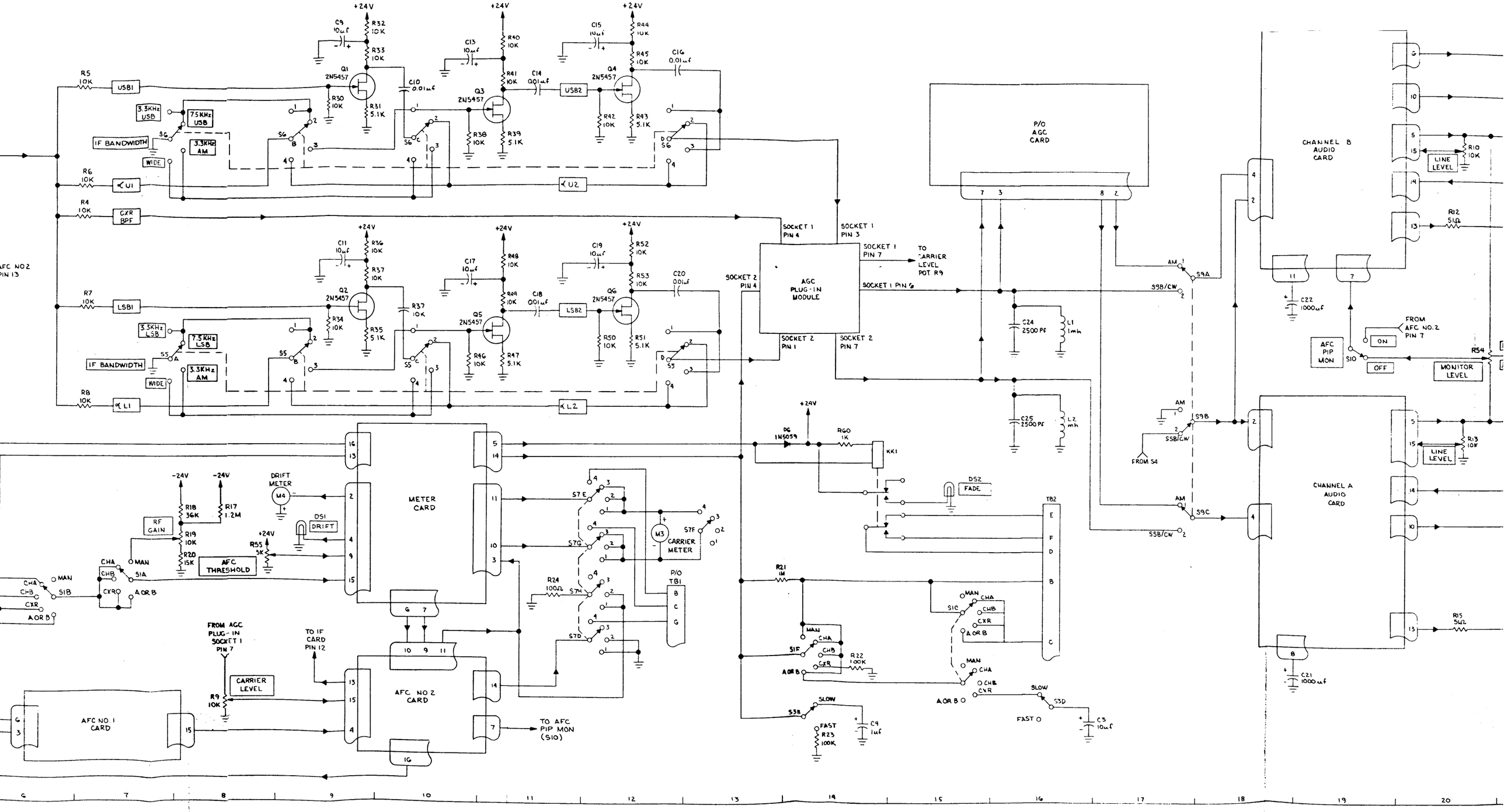

USB FILTERS
CARRIER BP FILTER
LSB FILTERS
SOCKET 1 PIN 3
SOCKET 1 PIN 4
SOCKET 2 PIN 1
AGC PLUG-IN MODULE
SOCKET 1 PIN 6
SOCKET 1 PIN 7
SOCKET 2 PIN 7
SOCKET 2 PIN 4
WEAK SIGNAL AGC TO AGC PLUG-IN MODULE
STRONG SIGNAL AGC TO IF CARD
+3.7
TP6
V
V= 750 MV RMS
f= 555 KHz
SEE NOTE 2
100 KHz
TP2
V= 10 MV RMS
f= 100 KHz
SEE NOTE 3
TP1
IF CARD
J1
I. F. INPUT
455KHz
GAIN CONTROLLED AMPLIFIER
MIXER
RTO
XTAL OSCILLATOR
FROM S7C
FROM AFC NO 2 CARD
FROM S7A
FROM S8B
FROM S7B
P/O AGC CARD
TUNED AMPLIFIER
ENVELOPE DETECTOR
PEAK DETECTOR
STRONG SIGNAL GATE
TP3
V= 100MV RMS
f= 400 Hz
SEE NOTE 8
RF GAIN
-24V
AGC SOURCE
MAN
CHB
A OR B
CHA
S1B
CXR
TP4
V= 100MV RMS
f= 400 Hz
SEE NOTE 9
P/O AFC NO. 2 CARD
CARRIER BUFFER AMPLIFIER
R/C CXR
XTAL
S4
EXT
AFC NO. 1 CARD
100 KHz XTAL OSCILLATOR
TP7
V= 0.05V RMS
f= 100 KHz
SEE NOTE 11
LIMITER
ADDER
PHASE DETECTOR
AMPLIFIER
J2
100 KHz INJ
TP8
SEE NOTE 12
INPUT FREQ 454,960 Hz
V= 20V
T1= 24 μSEC
T2= 14 μSEC
P/O METER CARD
P/O AGC CARD
STRONG SIGNAL AGC GATE
1MV
1000MV INPUT LEVEL
SEE NOTE 7
-6.5V
-9.4V
TP5
AMPLIFIER
AFC NO. 2
DIFFER

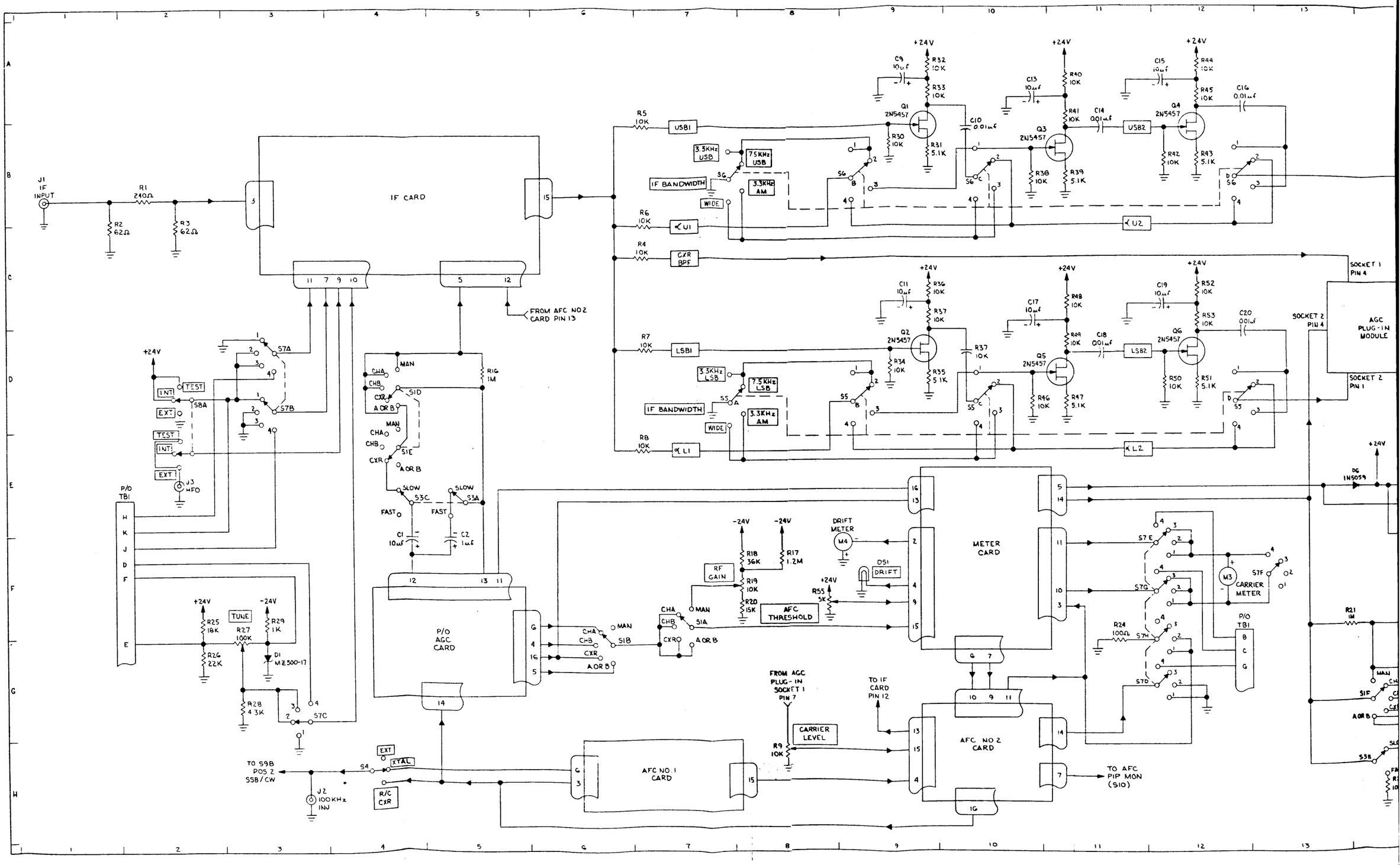


PART LOCATION INDEX

REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC	REF DESIG	LOC
IF CARD	4B	DS2 (FADE ALARM)	15E	R12	20C	R58 (CHA VU MTR ADJ)	21H
AGC CARD	4G, 16B	D1	3G	R13 (CHA LINE LEVEL)	20E	R59	22H
AFC NO. 1 CARD	7H	D2	22D	R14 (CHA MONITOR SPKR)	21E	R60	14E
AFC NO. 2 CARD	10H	D3	22D	R15	20G	S1A (AGC SOURCE)	6G
METER CARD	10F	D4	22H	R16	5D	S1B "	6G
AGC PLUG-IN MODULE	14D	D5	22H	R17	8F	S1C "	15G
CHANNEL A AUDIO CARD	19F	D6	14E	R18	8F	S1D "	4D
CHANNEL B AUDIO CARD	19C	J1 (IF INPUT)	1B	R19 (RF GAIN)	8F	S1E "	4E
C1	4F	J2 (100 kHz INJ)	3H	R20	8F	S1F "	14G
C2	5F	J3 (HFO)	2E	R21	13G	S1G "	15G
C3	16H	J5 (PHONE)	21A	R22	14G	S3A (AGC TIME CONSTANT)	5E
C4	14H	KK1	14E	R23	14H	S3B "	14H
C9	9A	L1	16D	R24	11G	S3C "	4E
C10	10B	L2	16E	R25	2F	S3D "	16H
C11	9C	L3	23G	R26	2G	S4 "	4H
C12	10D	L4	23G	R27 (TUNE)	3G	S5A (CHA-LSB IF BANDWIDTH)	8D
C13	10A	L5	23E	R28	3G	S5B "	9D
C14	11B	L6	23F	R29	3F	S5C "	10D
C15	12A	L7	23B	R30	9B	S5D "	12D
C16	12A	L8	23C	R31	9B	S6A (CHB-LSB IF BANDWIDTH)	7B
C17	10C	L9	23A	R32	9A	S6B "	9B
C18	11D	L10	23B	R33	9A	S6C "	10B
C19	12C	M1 (CHB VU METER)	22D	R34	9D	S6D "	12B
C20	12D	M2 (CHA VU METER)	22H	R35	9D	S7A (AFC FUNCTION)	3D
C21	18G	M3 (CARRIER METER)	12F	R36	9C	S7B "	3D
C22	18D	M4 (DRIFT METER)	8F	R37	9C	S7C "	3G
C24	16D	Q1	9B	R38	10B	S7D "	12G
C25	16E	Q2	9D	R39	11B	S7E "	12F
C27	23G	Q3	11B	R40	11A	S7F "	13F
C28	23G	Q4	12B	R41	11A	S7G "	12F
C29	23G	Q5	11D	R42	12B	S7H "	12G
C30	23G	Q6	12D	R43	12B	S8A	2D
C31	23F	R1	2B	R44	12A	S8B	2E
C32	23F	R2	1C	R45	12A	S9A (MODE)	17C
C33	23F	R3	2C	R46	10D	S9B "	17E
C34	23F	R4	7C	R47	11D	S9C "	17F
C35	23C	R5	7B	R48	11C	S10	19D
C36	23C	R6	7B	R49	11D	TB1	2F, 12G
C37	23C	R7	7D	R50	12D	TB2	16F
C38	23C	R8	7E	R51	12D	TB3	24F, 24B
C39	23A	R9 (CARRIER LEVEL)	8H	R52	12C	T2A	22G
C40	23A	R10 (CHB LINE LEVEL)	20B	R53	12C	T2B	22C
C41	23B	R11 (CHB MONITOR SPKR)	21B	R54 (MONITOR LEVEL)	20D	T3A	22F
C42	23B			R55 (AFC THRESHOLD)	8F	T3B	22B
C47	21E			R56 (CHB VU MTR ADJ)	21D		
C48	21B			R57	22D		
DS1 (DRIFT ALARM)	9F						

Figure 5-10.. Single Sideband Receiver Converter, CV-2712/UR, Schematic Diagram


+24V
R32 10K
C9 10µf
R33 10K
Q1 2N5457
C10 0.01µf
R30 10K
R31 5.1K
C13 10µf
R40 10K
R41 10K
Q3 2N5457
C14 0.01µf
R38 10K
R39 5.1K
C15 10µf
R44 10K
R45 10K
Q4 2N5457
C16 0.01µf
R42 10K
R43 5.1K
R5 10K
USB1
3.3KHz USB
7.5KHz USB
IF BANDWIDTH
WIDE
3.3KHz AM
S6
R6 10K
∢U1
∢U2
R4 10K
CXR BPF
C11 10µf
R36 10K
R37 10K
Q2 2N5457
C17 10µf
R48 10K
R49 10K
Q5 2N5457
C18 0.01µf
R34 10K
R35 5.1K
R37 10K
R46 10K
R47 5.1K
C19 10µf
R52 10K
R53 10K
Q6 2N5457
C20 0.01µf
R50 10K
R51 5.1K
R7 10K
LSB1
3.3KHz LSB
7.5KHz LSB
S5
R8 10K
∢L1
∢L2
LSB2
SOCKET 1 PIN 4
SOCKET 1 PIN 3
SOCKET 1 PIN 7
TO CARRIER LEVEL POT R9
SOCKET 1 PIN 6
SOCKET 2 PIN 4
AGC PLUG-IN MODULE
SOCKET 2 PIN 1
SOCKET 2 PIN 7
P/O AGC CARD
C24 2500 PF
L1 1mh
C25 2500 PF
L2 mh
AM
SSB/CW
S9A
S9B
S9B/CW
FROM S4
S9C
CHANNEL B AUDIO CARD
R10 10K
LINE LEVEL
R12 51Ω
C22 1000µf
AFC PIP MON
S10
ON
OFF
FROM AFC NO.2 PIN 7
R54
MONITOR LEVEL
CHANNEL A AUDIO CARD
R13 10K
R15 5kΩ
C21 1000 µf
C3 10µf
SLOW
FAST
S3D
R21 1M
R22 100K
C4 1µf
R23 100K
S3B
S1C
S1F
S1D
R24 100Ω
S7E
S7G
S7H
S7D
S7F
M3
CARRIER METER
P/O TB1
TB2
DS2 FADE
DS1 DRIFT
M4
DRIFT METER
-24V
R18 36K
R17 1.2M
RF GAIN
R19 10K
R20 15K
AFC THRESHOLD
R55 5K
S1A
S1B
CHA
CHB
CXR
MAN
A OR B
METER CARD
AFC NO 2 CARD
AFC NO 1 CARD
FROM AGC PLUG-IN SOCKET 1 PIN 7
CARRIER LEVEL
R9 10K
TO IF CARD PIN 12
TO AFC PIP MON (S10)
D6 1N5059
R60 1K
KK1
AFC NO 2 PIN 13


J1 IF INPUT
R1 240Ω
R2 62Ω
R3 62Ω
IF CARD
FROM AFC NO2 CARD PIN 13
+24V
S7A
S7B
S8A
INT
TEST
EXT
J3 VFO
P/O TB1
R25 18K
R26 22K
R27 100K
TUNE
R29 1K
D1 MZ500-17
R28 4.3K
S7C
S4
XTAL
R/C CXR
TO S9B POS 2 SSB/CW
J2 100KHz INJ
MAN
CHA
CHB
CXR
A OR B
S1D
S1E
SLOW
FAST
S3C
S3A
C1 10µf
C2 1µf
R16 1M
P/O AGC CARD
S1B
S1A
-24V
R18 36K
R17 1.2M
RF GAIN
R19 10K
R20 15K
AFC THRESHOLD
R55 5K
DRIFT METER
M4
DS1 DRIFT
METER CARD
S7E
S7F
S7G
S7H
M3 CARRIER METER
R24 100Ω
P/O TB1
AFC NO.1 CARD
FROM AGC PLUG-IN SOCKET 1 PIN 7
CARRIER LEVEL
R9 10K
TO IF CARD PIN 12
AFC NO.2 CARD
TO AFC PIP MON (S10)
R5 10K
R6 10K
R4 10K
R7 10K
R8 10K
USB1
LSB1
C&R BPF
≪U1
≪L1
3.3KHz USB
7.5KHz USB
3.3KHz AM
IF BANDWIDTH
WIDE
S6
Q1 2N5457
Q3 2N5457
Q4 2N5457
C9 10µf
C10 0.01µf
C13 10µf
C14 0.01µf
C15 10µf
C16 0.01µf
R30 10K
R31 5.1K
R38 10K
R39 5.1K
R40 10K
R41 10K
R42 10K
R43 5.1K
R44 10K
R45 10K
USB2
≪U2
3.3KHz LSB
7.5KHz LSB
S5
Q2 2N5457
Q5 2N5457
Q6 2N5457
C11 10µf
C17 10µf
C19 10µf
C18 0.01µf
C20 0.01µf
R34 10K
R35 5.1K
R36 10K
R37 10K
R46 10K
R47 5.1K
R48 10K
R49 10K
R50 10K
R51 5.1K
R52 10K
R53 10K
LSB2
≪L2
SOCKET 1 PIN 4
SOCKET 2 PIN 4
SOCKET 2 PIN 1
AGC PLUG-IN MODULE
D6 1N5059
R21 1M