

**Kachina 500DC
Solid State
Linear Power Amplifier**

KACHINA
Archive

OPERATING & MAINTENANCE MANUAL

**MODEL KC500-DC LINEAR POWER AMPLIFIER
MODEL KC500-PS A.C. POWER SUPPLY**

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CHAPTER 1 - GENERAL INFORMATION

1-1 KC500-DC, GENERAL

The KACHINA KC500-DC is a compact, lightweight, solid state linear amplifier. Power output is typically 500-550 watts for a 50-80 watt input drive level. The amplifier operates from 12-14 volts D.C., which allows the amplifier to be used as a base station in remote areas away from AC mains supply or mobile.

Features of the KC500-DC Amplifier include:

- 1.8 - 30 MHz frequency coverage.
- Broadbanded design.
- Fast transmit/receive switching, allows operation in modes such as QSK CW (full break-in), SITOR, PACTOR and packet (AX.25) operation.
- Automatic remote bandswitching from Kachina transceivers.
- Built-in cooling fan
- Over-voltage and over-current protection circuits.
- 100% transmit duty cycle on SSB voice, 50% CW/RTTY
- Operates from 12-14 volts D.C.

Amplifier bandswitching is made remotely from the Kachina KC100, KC101, KC102 or KC103 transceivers so that the correct low pass filter is employed automatically whenever the radio transceiver is tuned to a new frequency.

The amplifier uses ducted forced air cooling and operates at a continuous 550 watts output SSB PEP or 50% duty cycle CW; 15 minutes maximum key-down RTTY/SSTV/FM.

The front panel multimeter can be switched to monitor forward power output, SWR (calibrated @ 500 watts forward power), I_{cc} (collector current), or V_{cc} (collector voltage). A ten element LED bargraph display continuously monitors peak output power.

An overdrive LED indicates excessive drive resulting in high I_{cc} or power output greater than 550 watts. An input attenuator is temporarily switched in during an overdriven condition. The overdrive LED also lights for an overvoltage, overcurrent, or unbalanced condition, and in this case, latches the amplifier off until the cause of the condition is remedied and the POWER switch is cycled.

1-2 KC500-PS, GENERAL.

The companion Model KC500-PS Power Supply provides 14 VDC at 80 amps to the KC500-DC for normal base station operation. This power supply also has an auxiliary output that will power most 100 watt HF transceivers, including the Kachina KC100, KC101, KC102 and KC103 models. The power supply is designed for "hands-off" operation and can be placed on the floor or in an otherwise out-of-the-way location. The KC500-PS Power Supply is not required when operating the KC500-DC Amplifier from 12 to 14 volts D.C.

Features of the KC500-PS Power Supply include:

- Operates from 110-125 or 220-250 VAC, 50 or 60 Hz (internally selectable)
- 100 ampere capacity, will power both KC500-DC amplifier and 100 watt transceiver.
- Switches on automatically when KC500-DC amplifier or transceiver are switched on.

The KC500-PS Power Supply features dual primaries on all four power transformers allowing for either 240 or 120 V.A.C. operation. The supply is shipped wired for 240 VAC operation. Modifications are required if the supply is to be operated from 120 V.A.C. See Paragraph 2-3 for information concerning this procedure.

1-3 SPECIFICATIONS, KC500-DC AMPLIFIER

OPERATING FREQUENCY:	1.8 to 30 MHz in six bands, 2-3, 3-5, 5-8, 8-13, 13-20 and 20-30 MHz.
MAXIMUM POWER:	Typically 550 watts output CW, RTTY and SSB.
DRIVE POWER REQUIRED:	40 to 80 watts typical for 550 watts output.
DUTY CYCLE:	SSB- continuous voice modulation; CW/RTTY- 50% duty cycle continuously; 15 minutes maximum continuous key-down at 550 watts output.
DISTORTION:	Third order products -35dB from 550 watt output level.
INPUT & OUTPUT IMPEDANCES:	50 ohms unbalanced, VSWR 2:1.
METERING:	Switch selectable forward power, SWR (calibrated @ 500W forward power), I _{cc} (collector current), V _{cc} (collector voltage). Ten element LED bargraph instantly displays Peak Output Power.
TX/RX SWITCHING TIME:	Less than 5 mS.
PROTECTIVE CIRCUITS:	Hot switching T/R protection. Over-voltage and over-current lockout. Automatically switched input pad in overdriven condition. Front panel overdrive LED indicates fault condition.
PRIMARY POWER:	RF Deck 12.5-14 volts @ 80 amps. (100 amps maximum)
FINAL AMP. TRANSISTORS:	Eight MRF458, SD1405, or equivalent.
COOLING:	Internal forced air, rear exhaust
FRONT PANEL CONTROLS:	Power (ON-OFF), Control (OSK/RELAY), Meter (FWD, REF, I _c , V _{cc}),
REAR PANEL:	RF Input, RF Output, DC Power, Key In, Key Out, Vox Key, Speaker, Remote Control, Ground.
SIZE: (HxWxD)	5.25" x 12" x 14.5", (13.3 x 30.5 x 36.8 cm).
WEIGHT:	15 lbs, (6.8 Kg).

1-4 SPECIFICATIONS, KC500-PS A.C. POWER SUPPLY

PRIMARY POWER:	220-250 V.A.C. 50/60 Hz @ 7 amps, or 110-125 V.A.C. (requires jumper change)
D.C. OUTPUT:	14 V.D.C. @ 100 amps maximum (25 amps maximum at transceiver power connector)
PROTECTION:	Primary line fuses, overvoltage lockout and overcurrent lockout at transceiver connector. (Overcurrent lockout on main D.C. supply lines is provided by the KC500-DC amplifier).
SIZE (WxDxH):	31.75 x 31.75 x 23.5 cm (12.5 x 12.5 x 9.25 inches)
WEIGHT:	26.3 kg (58 lbs.)

1-5 UNPACKING

Carefully remove the amplifier and/or power supply from the packing carton and inspect it for signs of shipping damage. If damage is noted, notify the delivering carrier immediately, stating the full extent of the damage. Save all damaged cartons and packing material. Liability for any shipping damage rests with the carrier.

Save the packing material for re-use in the event that moving, storage, or reshipment is necessary. Shipment in other than factory packing may result in damage which is not covered under warranty.

CHAPTER 2 - INSTALLATION

2-1 GENERAL

When setting up the station, provide adequate ventilation for the amplifier and power supply. Also, select a location that allows adequate clearance for rear panel connections.

2-2 POWER SUPPLY TO RF AMPLIFIER INTERCONNECTIONS

The KC500-DC Power Supply is normally positioned on its bottom with the carrying handle up, but can also sit on the rubber feet on the back panel if this is more convenient. Setting the supply upright with the heatsink fins running vertically maximizes the power supply's heat dissipation. Regardless of orientation, the supply needs plenty of air circulation and should not be placed on a thick carpeting or cramped under a desk. Heatsink temperature may be as much as 70° F above ambient air temperature, especially under full load in areas having high AC line voltages.

The KC500-PS Power Supply is normally factory wired for 240 VAC operation and typically draws about 9 amperes of primary current at full load (about 2 KW). Although 120 VAC operation is possible, it is not recommended since the wiring in many buildings cannot safely handle the necessary current.

Instructions are provided elsewhere in this manual for converting the KC500-PS Power Supply for operation from 110-125 VAC.

The plug supplied on the end of the power cable is of the type recommended for 240 VAC service. It may be necessary to change the plug to match local outlets. If another connector must be used it is important to note that the green wire of the amplifier power cord is the chassis safety ground. It must always (and only) be connected to the safety ground of the AC mains and never to one of the "hot" power wires. The black and white wires are interchangeable and connect to the two "hot" service conductors.

The high current 13.8 VDC output, along with several control lines, are cabled to the 12 pin output connector. A separate four pin output connector (labeled TRANSCEIVER CONNECTOR) provides power to a 100 watt HF transceiver, such as the Kachina KC100, KC101, KC102 or KC103 models. It is important to ensure that the transceiver transmitter power output is not more than 100 watts since this may overload the KC500-PS power supply. Most Kachina and many other brands of transceivers are capable of power output levels in excess of 100 watts, so we recommend adjusting the transceiver so that its transmitter does not exceed 50-80 watts maximum. The KC500-DC amplifier will typically deliver 550 watts with a 50-80 watt drive level. For Kachina transceivers, power output reduction is accomplished internally via adjustment of the ALC potentiometer. Transceivers supplied by Kachina for use with the KC500-DC amplifier are normally factory preset for approximately 75 watts.

With such high currents being conducted between the power supply and amplifier, some voltage drop will occur along the output cable. The return current in particular can raise the amplifier chassis as much as +0.3 VDC above the supply chassis. To help reduce this loss and in keeping with good RF practice, a heavy braid or ground wire should be run between the ground posts of both the power supply and the amplifier. Solid ground connections between the amplifier, transceiver and a good earth ground are also a must.

» Caution: Never use natural gas lines for grounding purposes or explosion may result.

To connect the KC500-PS Power Supply to the KC500-DC Amplifier, proceed as follows:

1] Be sure the KC500-DC Power switch is turned off and the power supply is unplugged from the wall outlet.

2] Connect the 12 pin D.C. power plug from the KC500-PS Power Supply into the mating *DC POWER* connector on the rear panel of the KC500-DC Amplifier, pushing firmly until the locking tabs snap into place.

3] If you wish to power your transceiver from the Model KC500-PS also, push one end of the double 4 pin connector DC cable supplied with the KC500-PS firmly into the mating 4 pin connector on the power supply. Turn your transceiver power switch off. Connect the other end of the cable to your transceiver.

4] Plug the power supply line cord into a wall outlet of the correct voltage and current rating. You should now be ready to connect your antenna, transceiver and other station equipment as described in the next section.

OTHER DC SUPPLIES: For mobile or portable operation, the KC500-DC can be powered from any negative ground DC power source capable of supplying 12.5-14 volts at 80 amperes. Figure 1 shows the connections required for DC operation.

2-3 Operation from 120 VAC

The KC500-PS A.C. Power Supply features dual primaries on all four power transformers allowing for either 240 or 120 VAC operation. The supply is shipped wired for 240 VAC operation and must be modified if operation from 120 VAC is required. Be warned that at full load the power supply consumes over 2,000 watts, which is well over the recommended load for standard 120 VAC wiring. You should only convert the power supply for operation from 120 VAC if you are sure that the building wiring is capable of withstanding the load. To convert the KC500-PS to 120 VAC operation proceed as follows:

1. Substitute a heavy duty 120 VAC power plug for the existing one and wire it as follows:

Black = Hot
White = Neutral
Green = Ground

2. Change the A.C. line fuses. Locate the AGC 30 rated fuses supplied with your KC500-DC and install them in the fuse holders located on the front panel of the KC500-PS. The fuse types have been specially selected to handle both the power-up current and steady state primary current. Don't try using anything but the recommended fuses.

3. Modify the Power Supply Control Board. There are four eyelets on the Control Board that are used to jumper the transformer windings for either 240 or 120 VAC. **UNPLUG THE POWER SUPPLY PRIOR TO ATTEMPTING THIS STEP.** To gain access to the circuit board remove the top cover of the power supply. Locate the four eyelets and jumper them as shown in Figure 31. A large soldering iron may be needed to solder these connections easily. A spare length of jumper wire is included with your KC500-PS for this purpose. This jumper carries a considerable amount of current and should be a heavy gauge wire similar to the wire provided (at least #16 AWG). **DO NOT** use lightweight wire for this jumper.

2-4 TRANSCEIVER/LINEAR AMPLIFIER INTERCONNECTIONS

The KC500-DC Linear Amplifier will accept RF input drive levels of approximately 40-80 watts. To prevent higher-powered transceivers from overdriving the amplifier, the KC500-DC is supplied with an attenuator box for use with transceivers having power output in excess of 75-80 watts. The attenuator box should be connected in-line between the transceiver and the KC500-DC and should be used with all Kachina KC100, 101, 102 and 103 transceivers and other 75-150 watt transceivers.

» *Note: Transceivers with power output levels in excess of 150 watts should not be used to drive the KC500-DC.*

The KC500-DC is supplied with cables necessary for connecting the transceiver, attenuator and amplifier. Figure 3 shows typical connections using the Kachina KC103 transceiver. (Note that the attenuator coaxial cable input/output lines are interchangeable, i.e. it doesn't matter which coaxial connector is used for the attenuator input and which is the output). The attenuator is equipped with a relay which switches the attenuator out of circuit in the receive mode.

Among the supplied cables is a remote control cable, used to control the transmit/receive switching and to enable the KC500-DC low pass filters automatically whenever the transceiver frequency is changed. This remote control cable is normally prewired for the Kachina KC100/101/102/103 transceivers, depending upon which transceiver was specified at the time of order. One end of this cable connects to the KC500-DC remote control socket and the other to the host transceiver accessory socket and the attenuator box (see Figure 3). If a transceiver model was not specified the KC103 cable will have been supplied and will require modification for use with another transceiver. Figure 2 provides a pin legend for the KC500-DC and Kachina KC101/102/103 transceivers. This chart will also be useful of modifying the cable for use with non-Kachina transceivers.

Coaxial RF cables are also provided and should be connected according to the information provided in Figure 3.

In most installations these will be the only connections required, however *KEY IN*, *KEY OUT*, and *VOX KEY* sockets are provided for special situations such as VOX relay control or for transceivers with slow keying. A "key" command on either of the *KEY* inputs is sufficient to place the amplifier into the transmit mode. A connection to ground on the rear panel *KEY IN* connector will place the KC500-DC in transmit (assuming no RF is present when the connection is made). A closure to ground on the *KEY IN* is fed directly to the *KEY OUT* connector, which can then be used as a key output.

The amplifier must be keyed into the transmit mode before RF drive power is delivered to the amplifier input connector. For this reason the KC500-DC incorporates protective circuitry which senses the presence of RF on the antenna coax and prevents the amplifier T/R relays from switching if RF is present.

The *VOX KEY* socket has the same function as the *KEY IN* and *KEY OUT* connectors, but is diode isolated from them and therefore can only be used as an input. Also, the *VOX KEY* input is only connected to the internal keying circuitry of the KC500-DC when the front panel control mode switch is placed in the *RELAY* position. When this switch is in the *RELAY* position, a ground at the *VOX KEY* connector will put the KC500-DC into the transmit mode. No ground signal is fed to the *KEY OUT* connector from the *VOX KEY* input. Amplifier keying via the *VOX KEY* connector permits non-QSK (semi break-in) CW and PTT/VOX SSB operation with transceivers that have fast mechanical or solid state keying relay outputs. The transceiver keying relay *MUST* provide a closure to ground *before* RF output appears or the KC500-DC will refuse to switch to transmit with the transceiver/exciter, but will wait for the first pause in drive, typically switching in after the first dit on CW or the first syllable on SSB.

Figure 3 shows a hookup that can be used with transceivers having fast keying relay outputs. When using this hookup system, the control mode switch should be placed in the *RELAY* position. This system is to be used with semi break-in CW or SSB vox relay keying only.

The *KEY IN*, *KEY OUT* and *VOX KEY* connectors are not used in most installations but may be used in special situations. For example, if your transceiver has a slow vox relay (one which closes after RF output appears), proper CW and PTT operation can be obtained by using the hookup shown in Figure 5. Vox operation may still drop the first syllable of speech if the relay is too slow. The KC500-DC control mode switch should be placed in the *QSK* position for CW and in the *RELAY* position for SSB. This hookup will also work fine for VOX if the PTT/RELAY line goes low fast enough when the VOX is activated.

Unless VOX is being used, the front panel control mode switch should always be left in the *QSK* position when using the amplifier with any KACHINA brand transceivers.

2-5 ANTENNA REQUIREMENTS

The KC500-DC amplifier has been designed for use with antennas resonant at the frequency of operation, having impedances within the limits of 25 to 100 ohms and an SWR of 2:1 or less.

The nominal output impedance of the amplifier is 50 ohms and the SWR of the load should not exceed 2:1. Many antennas exhibit an SWR range over an entire frequency band that exceeds 2:1. For operation under this condition, we recommend using an antenna matching network which will enable the KC500-DC to work into a 50 ohm load for maximum power transfer to the antenna.

» *CAUTION: Never attempt to operate the KC500-DC without first connecting a suitable antenna or 50 ohm dummy load of sufficient power rating or serious damage may result.*

2-6 GROUND CONNECTIONS

In the interest of personal safety and to reduce the possibility of stray RF pickup on interconnecting cables, all station equipment should be well grounded to earth. It is important to strap all equipment chassis together with short, heavy leads.

CHAPTER 3 - OPERATING INSTRUCTIONS

3-1 INTRODUCTION

The following instructions will enable the operator to quickly place the KC500-DC into operation. Included are descriptions of the front panel controls and rear panel connections followed by detailed alignment procedures. Refer to CHAPTER 4 for further information and operating hints.

3-2 FRONT PANEL CONTROL FUNCTIONS

The front panel controls and their functions are described below.

3-3 POWER This is the main power switch. When switched ON, the amplifier should power up and the appropriate *BAND LED* should light. Also, the meter lamps should come on and the *OVERDRIVE LED* should be turned off.

3-4 CONTROL MODE When placed in the *QSK* position, the keying of the KC500-DC is controlled by the *KEY IN* input and the *KEY OUT* signal is generated inside the KC500-DC. This position is used for CW operation where fast keying is required. Most modern (and all Kachina) transceivers exhibit relatively fast TX/RX switching, so the switch should normally be left in the *QSK* setting. Placing the switch in the *RELAY* position allows the KC500-DC to be controlled by the *VOX/KEY* input jack. When in this position, the *KEY IN* signal is connected directly to the *KEY OUT* jack. This is useful when using the KC500-DC with transceivers exhibiting slow TX/RX switching times.

3-5 METER. This switch is used to select what is being displayed on the built-in illuminated meter. When in the *Ic* position it selects collector current, 150 Amps DC full scale. The *Vcc* position selects collector voltage, 20 VDC full scale. When placed in the *FWD* position it selects forward power, 1000 watts full scale. The *REF* position selects reverse power and SWR scales (3:1 full scale).

3-6 PEAK POWER METER This is a ten segment LED readout used to display the peak output power of the KC500-DC. Please note that the last LED (red) of the bargraph display has been calibrated to light with approximately 550 watts output power.

3-7 OVERDRIVE This LED annunciator is used to alert the operator to a possible fault condition which needs correction. This may either be a transient fault or a latching type fault. For more information see section 3-18.

3-8 REAR PANEL CONNECTOR FUNCTIONS

The following sections describe the rear panel connectors and their function.

3-9 RF INPUT This is a standard SO-239 receptacle designed for a mating PL-259 ("UHF" type) plug. RG-58/U or similar small 50 ohm coaxial cable is required to connect to the station exciter or transceiver's output or antenna jack. This cable should be as short as possible, preferably 3 feet or less.

3-10 RF OUTPUT The antenna must be connected to this socket. This is a standard SO-239 receptacle designed for a mating PL-259 plug. RG-8/U, RG-213/U or similar large coaxial cable rated for 1 KW must be used to connect to the antenna system.

3-11 DC POWER This connector provides the DC operating voltage to the amplifier and is designed for use with the Model KC500-PS Power Supply or for connecting another source of 12-14 VDC power to the KC500-DC. If a supply other than the KC500-PS is used, it must be capable of supplying 100 amps at 12-14 VDC. You should use four #12 gauge or larger wires for the positive and negative supply leads and keep the cable lengths as short as possible.

3-12 KEY IN This jack controls the KC500-DC's transmit/receive relay system.. When used with KC103 transceiver, a key or keyer is plugged into the jack.

3-13 KEY OUT When used with the KC100, KC101, KC102 or KC103 transceivers, this jack is connected to the transceiver KEY input jack.

3-14 VOX KEY IN This jack is used to control the KC500-DC's transmit/receive system when the Control Mode switch is placed in the *RELAY* position. It is not normally used when operating with Kachina transceivers. Some transceiver/exciter have an external T/R connector which may be used for keying the KC500-DC in SSB and VOX modes of operation.

3-15 INITIAL POWER-ON

The following steps should be followed when turning on your KC500-DC:

- 1] Place the POWER switch in the OFF position.
- 2] Place the METER switch in the Vcc position to monitor the collector voltage at turn on.
- 3). Place the CONTROL MODE switch in the QSK position. (This applies to all Kachina and most other solid state transceivers).

3-16 TUNE UP PROCEDURE (CW/RTTY)

The following procedure should be used for tuning up in all modes except SSB.

1. Turn the POWER switch ON. The meter lights and the proper band indicator should come on. The voltmeter should read about 14 volts and the fan should be running at low speed.
2. Place the meter in the forward power (FWD) position.
3. Place the Control switch in either QSK or RELAY (see Paragraph 3-14 above).
4. Using the METER switch, check that Icc is less than 80 amps, Vcc is 12.5-14 volts, and SWR is less than 2:1. The bargraph display should be indicating approximately 500 watts output.
5. Place the transceiver/exciter in the CW mode and key a few characters. The bargraph should indicate approximately 500 watts peak output.
6. If either the OVERDRIVE indicator or the red segment of the bargraph display lights, reduce the exciter output slightly.

3-17 TUNE UP PROCEDURE (SSB)

The following procedure should be used for tuning up in SSB mode:

1. Follow the tune up procedure in paragraph 3-16 for steps 1-4.
2. Key the transceiver/exciter in SSB (voice) mode and adjust the MIC gain for normal ALC action. The bargraph display should indicate 500 watts output on voice peaks. On all Kachina transceivers this is an internal adjustment and has been accomplished at the factory if your Kachina transceiver and amplifier have been ordered together. If not, refer to the Operation and Maintenance Manual supplied with your transceiver for information on ALC adjustment.

3. If either the OVERDRIVE indicator or the red segment of the bargraph lights on voice peaks, reduce the transceiver/exciter output slightly. The red bargraph segment lights at about 550 watts output. Occasionally check the SWR while operating to make sure it remains below 2:1. Also, monitoring reflected power is useful in that any sudden change provides warning of antenna problems such as bad connections, antenna coupler faults, transmission line flaws, or trap or balun failure. Particularly in the case of flashover (arcing) problems, the reflected power indication may flicker sharply upward only on high voice peaks.

3-18 FAULT CONDITIONS

Fault conditions can be divided into two groups: transient and latching. The transient conditions are 1) overdrive and 2) excessive power output. Overdrive is indicated by the OVERDRIVE LED and output power in excess of 550 watts is indicated by the red segment of the bargraph display. Either of these transient indications are temporary. That is, when drive is reduced to remove the fault condition, the indicator is extinguished and normal operation can continue. The latching fault conditions are 1) overvoltage, 2) overcurrent, 3) amplifier unbalance, and 4) disabled band selected. These conditions result in a constant illumination of the OVERDRIVE indicator and the amplifier is automatically placed in the BYPASS mode, connecting the exciter directly through to the antenna. To clear a latching fault, turn the POWER switch off, correct the condition that caused the fault, and turn the POWER switch back on. Since most latching faults indicate a system defect of some kind, you may have to refer to the schematic diagrams in this manual and troubleshoot the cause. The disabled band selected fault is cleared by simply switching to a valid frequency band.

3-19 REMOTE BANDSWITCHING

The KC500-DC amplifier is designed to be remotely controlled by the Kachina KC100, KC101, KC102 or KC103 transceivers so that the amplifier automatically selects the correct frequency band whenever a new frequency is input from the radio front panel. The frequency band is determined by band information input to the REMOTE CONTROL connector on the rear panel. Most transceivers that provide parallel band outputs (one wire for each band) can be adapted to control the KC500-DC. Some transceivers made by other manufacturers have a rear panel accessory connector. These can often be connected to the KC500-DC with an adapter cable constructed according to FIGURE 2.

CHAPTER 4 - CIRCUIT DESCRIPTION

4-1 CIRCUIT DESCRIPTION, KC500-PS POWER SUPPLY

To deliver the huge currents required and because of the nature of the KC500-DC Linear Amplifier load, the KC500-PS Power Supply contains four separate regulators. The output of each regulator is independent and powers one of four amplifier stages in the KC500-DC. A controller board controls the power supply on-off switching, current sensing for the transceiver and over-voltage protection.

The controller uses transformer T5, diodes D1-D4 and regulator U1 to develop a regulated +15 VDC standby voltage. This voltage is used to actuate the main power-on relays, K1 and K2 by one of two methods. When the KC500-DC Amplifier is switched on, +15 VDC is routed down the amplifier power cable to Q7, the relay switching transistor. Q7 actuates the power-on relays and powers up the four high-current regulators. Alternatively, the amplifier can be left off and if a load is connected to the POWER ON pin of the TRANSCEIVER CONNECTOR (pin 3), Q1 will be biased on and will provide the power on signal to Q7. In this way the supply can detect when the transceiver has been turned on and will automatically power itself up.

Assuming that the four output voltages are identical, the transceiver borrows current from the four regulators equally. Diodes in bridge D2, on the DC Summing Board, combine the four outputs through current shunt resistors which help equalize the current sharing. The voltage drop created by current through each shunt resistor is monitored by op-amps U2A and U2B. If the current delivered to the transceiver output becomes too large, comparator Q4 and Q5 fire the overcurrent SCR Q3. The SCR causes relay K4 to open and disconnects power from the transceiver connector. To reset the over current condition, all load must be removed from the transceiver output.

Over-voltage checking is done with zener diode D8 and SCR Q6. If any of the regulated outputs go higher than 16 volts the zener begins to conduct and actuates Q6. This latches the power supply off until it is unplugged from the A.C. power line.

Each high current output consists of a transformer, full wave bridge rectifier, and filter capacitor, which together provide unregulated DC for each regulator. The regulator consists of a reference diode D2, error amplifier Q1 and Q2, current gain stage Q3 and pass elements Q4 and Q5. The circuit is unconventional in that regulation occurs in the negative return path to the bridge rectifier. This arrangement allows the use of cost effective NPN power transistors as pass elements and lets the collectors operate at chassis ground potential. No mica insulators are needed between the transistors and the heatsink.

The differential amplifier of Q1 and Q2 compares a sample of the output from zener diode D2. The differential stage works to keep the voltage at both bases equal and generates an error signal at the collector of Q2. This signal is the feedback that drives the current gain stage Q3 and regulator transistors Q4 and Q5.

4-3 BRIEF THEORY OF OPERATION

The KACHINA KC500-DC consists of four, separate, push-pull, linear amplifiers, their inputs and outputs connected in parallel through phase splitting and combining transformers.

The combined output is fed to the antenna output socket through one of six low pass filter circuits which are automatically selected on command from the KACHINA driving transceiver. The low pass filter circuits remove harmonics generated in the amplifiers.

Control circuits protect the amplifier against overdrive and mismatched antennas.

The amplifier is constructed on a number of modules each of which is given its own circuit diagram. Each module is described separately.

4-4 INPUT BOARD (See Figure 7)

The input to the transceiver is split into four separate signals in transformer T1 and from the output connectors A, B, C and D is fed by co-axial cables to the respective linear amplifiers.

In the event of overdrive, an attenuator, consisting of resistors R1-R7 and R8-R18, is brought into circuit when relay KA is caused to open and relay KB close. The relays are actuated by DC voltages supplied by the Control Board. See Figure 13.

As the amplifier is connected in series between the driver transceiver and the antenna the amplifier must be by-passed in the receive mode. This is accomplished by relay K1 and the VAC relay on the VAC Relay Board. See Figures 5 and 10.

In the QSK mode (Packet, Sitor, Pactor, etc.) relay K1 stays closed and relays K2 and K3 operate. Timing circuits on the Control Board ensue that the relays are properly sequenced.

4-5 POWER AMPLIFIER BOARD (See Figure 8)

There are two identical amplifier board modules. Only one is described. Each module contains two separate amplifiers. In Figure 7, transistors Q1 and Q2 constitute one amplifier and Q3 and Q4 the other. As each is identical, only one amplifier is described.

Signal input is received from the Input Board (Figure 6) through transformer T1 and fed to the bases of transistors Q1 and Q2. The resistors R1 through R6 help stabilize the circuit.

Resistors R7, R8, R9, R10 and capacitors C35, C36 are part of a frequency compensation network.

Bias for the stage is received from the Power Amplifier Bias Board (Figure 12) and fed to bases of Q1 and Q2 through inductors L1 and L2. Damping of the inductors is effected with resistors R11 and R12.

Device stability is obtained with negative feedback using components R13, C4 and C5, and R14 and C8 and C9.

Output from transistors Q1 and Q2 is combined in transformer T2. Capacitors C12, C13 and C40 tune out transformer leakage reactance.

Diode D1 senses the temperature of Q2 and through an amplifier, part of U1, on Bias Board (Figure 12), and adjusts the bias to Q1 and Q2 to compensate.

The outputs from the amplifiers on the Power Amplifier Module are summed in transformers T2 and T3.

Any difference in outputs between the two amplifiers is absorbed in resistors R1-R14 on the Power Amplifier Dump Board (Figure 20) at connections 1A, 1B and 2A, 2B.

Note that a diode D2 also senses module temperature. Its output is fed to the Bias Board (Figure 12) where it is used with amplifiers U3A and U3B to turn on a cooling fan.

4-6 POWER AMPLIFIER DUMP BOARD (See Figure 9)

Operation of this module has been covered in the preceding paragraph.

4-7 LOW PASS FILTER MODULE (See Figure 10)

Outputs from the two pairs of amplifiers are combined in transformer T1.

Difference between outputs of the amplifiers is absorbed in dump resistors R9-R17.

Output from T1 is connected to through relays to a set of six low pass filters and from the filters to a further set of relays the outputs of which are connected to the antenna through the SWR bridge T2. The appropriate relay is energized from the transceiver through the Bandswitch Board module shown in Figure 14.

Outputs from the VSWR bridge, consisting of transformer T2, diodes D3, D4, D5 and the associated components, are fed via cable to the Control Board. See Figure 13. These outputs supply the panel meter and through the Control Board to the attenuators located on the INPUT SPLITTER BOARD, Figure 6. The outputs are also brought to the accessory socket on the rear panel.

4-8 VAC RELAY BOARD (See Figure 11)

This relay is part of the bypass circuit to bypass the amplifier when in the receive mode or when the amplifier is turned off or inoperative. See the discussion under INPUT BOARD, at the beginning of this chapter.

4-9 DC DISTRIBUTION BOARD (Figure 12)

Four operational amplifiers, U1 and U2, sense voltage drop across resistors R1, R2, R3 and R4. Each resistor is in series with one of the supply leads to the four power amplifier modules. When the current drawn by an amplifier is excessive, such as when the amplifier is connected to an antenna with a high VSWR, or the amplifiers are over driven, the voltage across the resistors will rise and trigger the silicon controlled rectifier, SCR, and through DC amplifier transistor Q1, shut off relays K1, K2, K3 and K4, interrupting the supply voltages to the amplifiers. To restore power, the SCR must be reset by turning the supply voltage off and then back on. If the relays trip again, the problem must be cleared.

4-10 POWER AMPLIFIER BIAS BOARD (See Figure 13)

There are four bias identical amplifiers, U1A, U1B, U2A and U2B. Only one amplifier is described, U2A.

The heart of the bias system is a temperature sensing diode, D1, located on the RF POWER AMPLIFIER BOARD (Figure 7) and connected to the BIAS BOARD by cable (Designated BIAS 1 DIODE)

Current through the diode is controlled by potentiometer R10 and resistor R9. The resultant voltage drop is amplified by U2A the output of which is applied to the bases of the linear amplifiers, Q1 and Q2, located on the POWER AMPLIFIER MODULE, via RF chokes, L1 and L2.

4-11 CONTROL BOARD (See Figure 14)

The CONTROL BOARD does as the name suggests, it controls various switching functions in the amplifier. The linear amplifier is designed for ARQ/FSK operation and must therefore be capable of being switched quickly. The switching must also be done in a certain order. For example, the antenna must be connected to the amplifier output before signal is applied to the amplifier input.

Transmit receive sequencing is controlled by the gates, U2. By suitably delaying the bias to the linear amplifiers out is prevented until the antenna has been connected.

The latching device, U1, protects the amplifier against excessive RF output voltages such as may be obtained if the load is lost or if the low pass filter selection has been incorrectly programmed.

Integrated circuit, U3, and transistors Q7 and Q8 give a degree of protection against over drive from an exciter. See the section describing the INPUT BOARD at the beginning of this section. Potentiometers R3 and R7 control the point at which the attenuators are brought into circuit.

Signal from the SWR bridge located on the LOW PASS FILTER BOARD, Figure 9, is supplied to the bar graph located on the front panel through the gain control potentiometer R4 located on this board.

4-12 BANDSWITCH BOARD (See Figure 15)

The KACHINA KC500-DC Linear amplifier may be fitted with one of two BANDSWITCH BOARDS (Figure 14) for use with the KACHINA KC101 or KACHINA KC102 transceivers or Figure 14a for use with the KACHINA model KC103 transceiver.

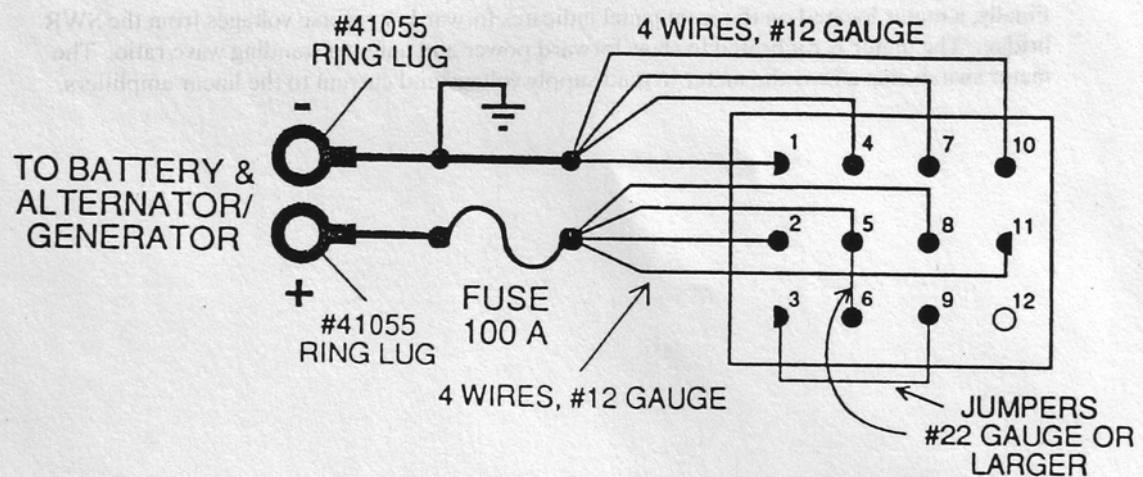
Integrated circuit U1 is a relay driver. Its purpose is to actuate the correct relays on the LOW PASS FILTER BOARD, Figure 9, on receiving a control signal from the driving transceiver. The relay driver also supplies current to the appropriate LED located on the front panel.

The only difference between the two PC boards is that the board shown in Figure 14 operates from a positive going input signal and the board in Figure 14a operates from a negative going input signal.

IMPORTANT NOTE: The low pass filters will not be switched if the wrong BANDSWITCH BOARD is used.

4-13 BANDSWITCH LED BOARD (See Figure 16)

This board consists of seven LEDs. Voltage from the BANDSWITCH BOARD switches off the appropriate lamp.



PIN NUMBER	FUNCTION	PIN NUMBER	FUNCTION
1	GROUND	7	GROUND
2	+14V @ 80A	8	+14V @ 80A
3	PWR SWITCH OUT	9	+14V SWITCHED
4	GROUND	10	GROUND
5	+14V @ 80A	11	+14V @ 80A
6	PWR SWITCH IN	12	NO CONNECTION

Figure 1 - D.C. Power Cord Connections

4-14 LED BARGRAPH DISPLAY BOARD (See Figure 17)

Integrated circuit U1 is a bargraph driver. Signal developed in the forward reading portion of the SWR bridge located on the LOW PASS FILTER BOARD (Figure 9) is fed through the CONTROL BOARD (Figure 13) on which is located potentiometer R4. R4 is used to set the level of the signal suitable to drive U1 on this board. U1 in turn sequentially turns on the LEDs D2-D11, indicating linear amplifier output power.

LED D1 is used to indicate a fault due to overdrive of the linear.

4-15 METER

Finally, a meter located on the front panel indicates forward or reverse voltages from the SWR bridge. The meter is calibrated to show forward power and antenna standing wave ratio. The meter switch also allows the meter to read supply voltage and current to the linear amplifiers.

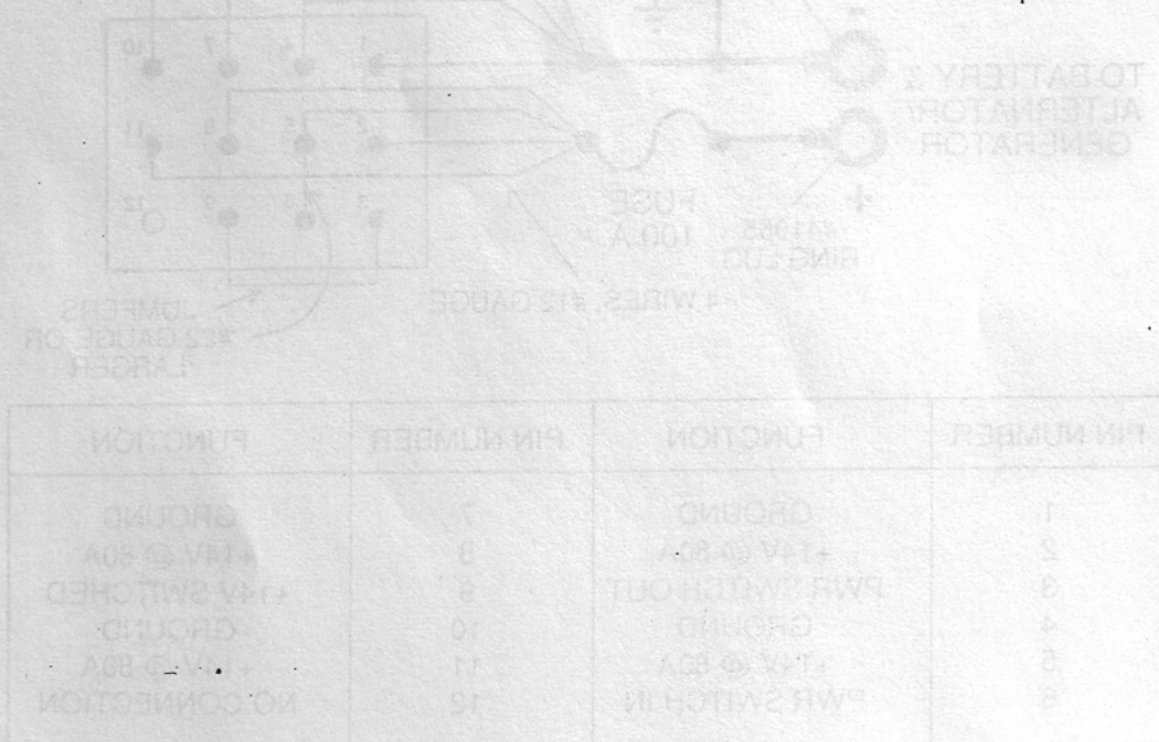


Figure 17 - D.C. Power Cord Connections

Pin Legend for Interfacing KC500-DC Amplifier with Kachina Transceivers

- Note: KC500-DC remote control plug shell is numbered to show locations of pins.

KC500-DC REMOTE CONTROL SOCKET	KACHINA KC101 TRANSCEIVER	KACHINA KC102 TRANSCEIVER	KACHINA KC103 TRANSCEIVER
PIN # (DESCRIPTION)	ACC. SOCKET PIN #	ACC. SOCKET PIN #	ACC. SOCKET PIN #
1 (2-3 MHz)	4, 5, 6, 7, 8, 13, 14, 15*	3, 4, 5, 6*	9
2 (20-30 MHz)	-	-	4
3 (forward)	-	-	-
4 (3-5 MHz)	4, 5, 6, 7, 8, 13, 14, 15*	3, 4, 5, 6*	8
5 (not used)	-	-	-
6 (PTT)	2	11	18
7 (5-8 MHz)	4, 5, 6, 7, 8, 13, 14, 15* ^	3, 4, 5, 6* ^	7
8 (+ reg)	-	-	-
9 (fault)	-	-	-
10 (8-13 MHz)	4, 5, 6, 7, 8, 13, 14, 15* ^	3, 4, 5, 6* ^	6
11 (ground & shield)	9 or 10	15	12 or 14
12 (key out))	-	-	-
13 (13-20 MHz)	-	-	5
14 (power on)	-	-	-
15 (rev.)	-	-	-

* KC101/KC102: The pins to be connected depend upon the operating frequency and the channel number. For example, if the channel 1 frequency is 7.509 MHz, pin 3 of the KC102 accessory socket (channel 1 output) would connect to pin 7 of the KC500-DC remote control socket (5-8 MHz input) since the frequency falls within the 5-8 MHz range. Refer to the KC101 and KC102 Operation and Maintenance Manuals for detailed pin-out information.

^ KC101/KC102 (5-8 & 8-13 MHz lines only): Connect a 1N4005 diode in series, anode towards the transceiver.

Figure 2 - Pin Legend, for Interfacing KC500-DC Amplifier with Kachina Transceivers

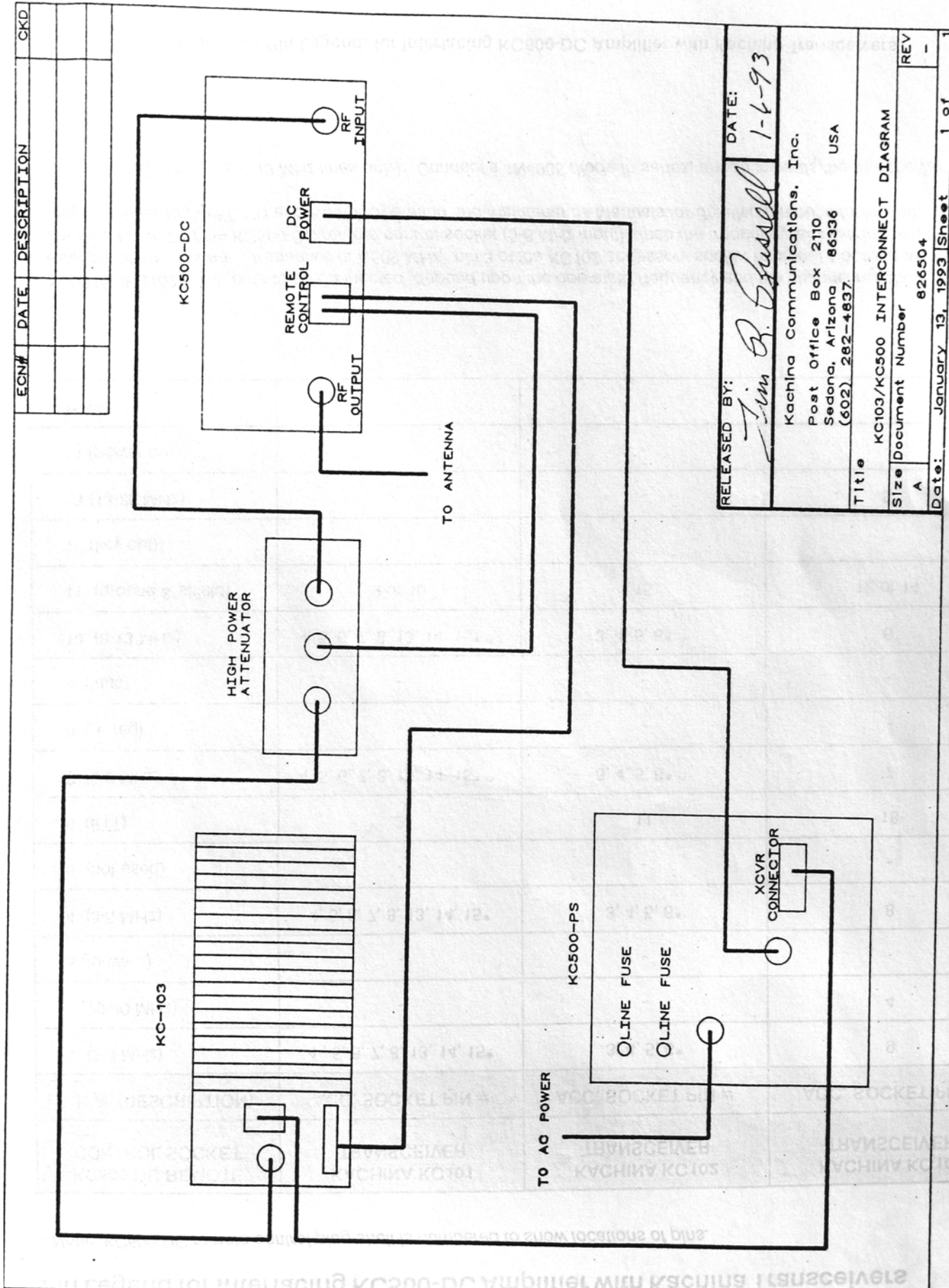


Figure 3 - Interconnection Diagram, KC103/KC500

CONTROL MODE

SSB (VOX / PTT) — RELAY

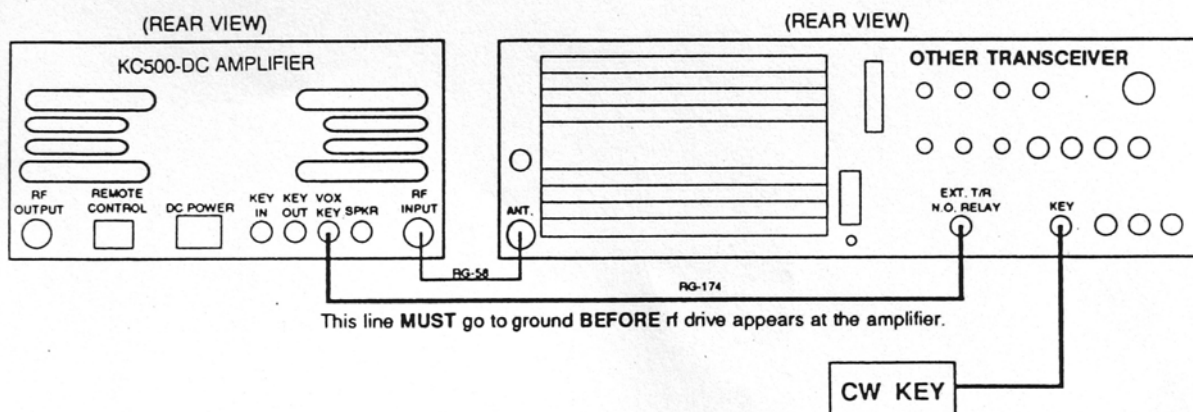


Figure 4 - Interconnection Diagram for Vox Relay Control

CONTROL MODE

CW — QSK

SSB — RELAY

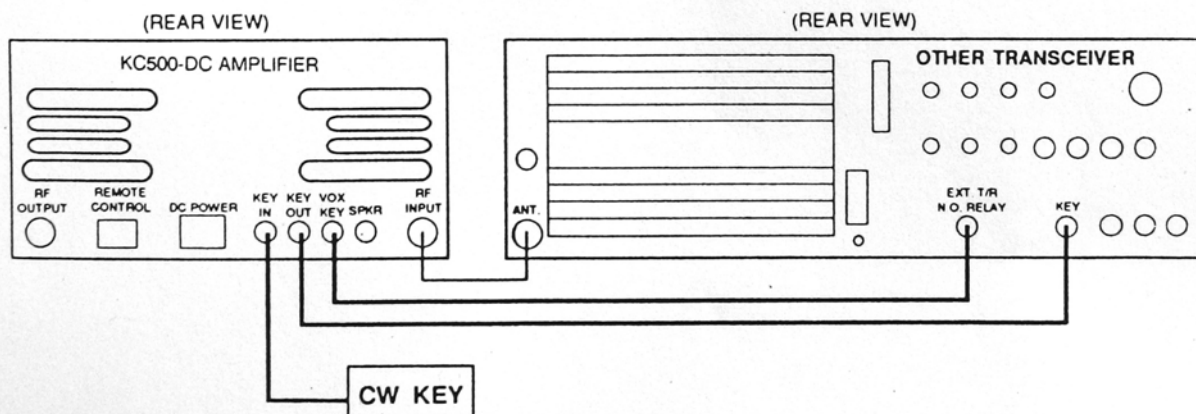


Figure 5 - Interconnection Diagram for Transceivers with Slow Keying

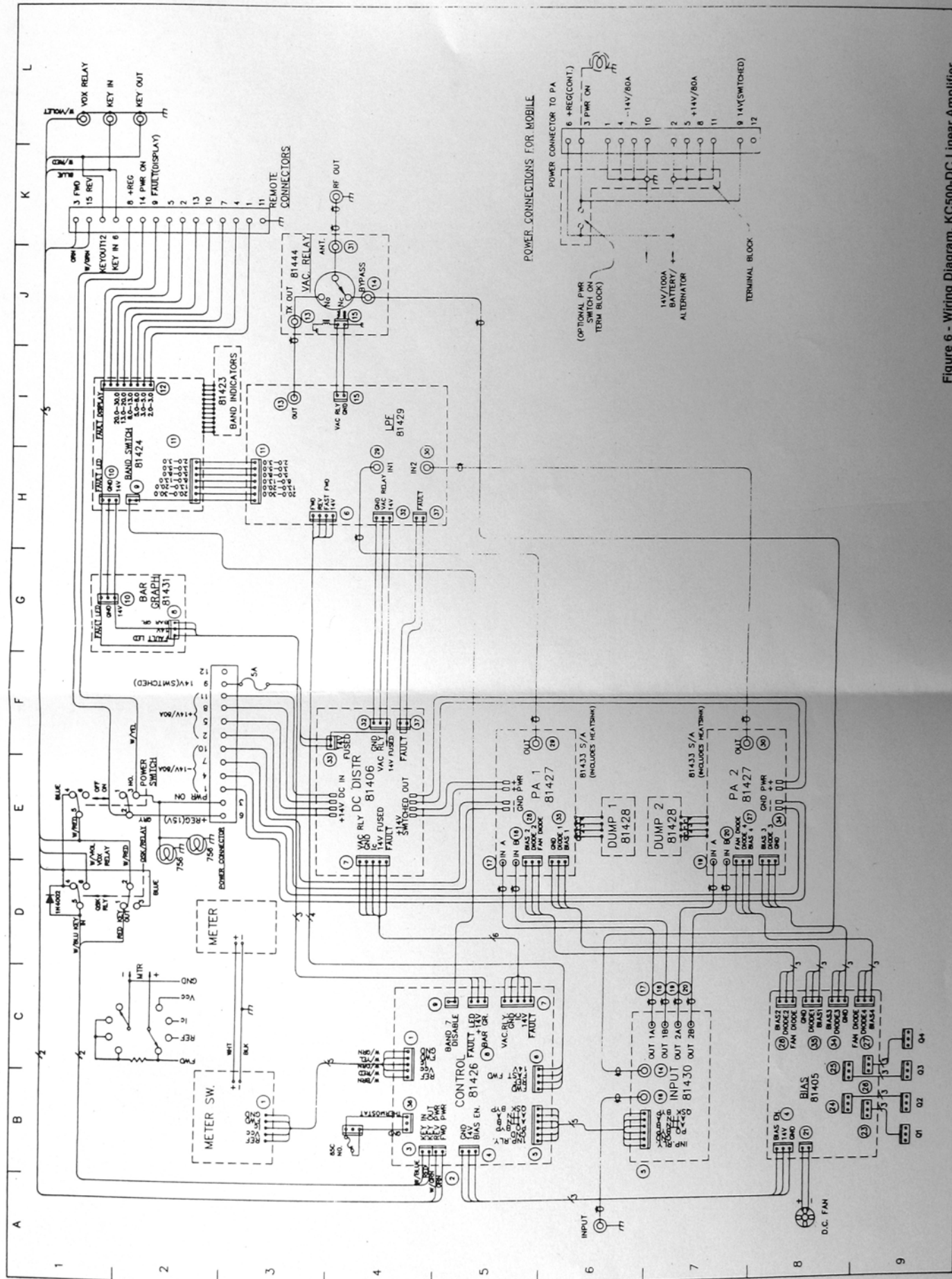


Figure 6 - Wiring Diagram, KC500-DC Linear Amplifier

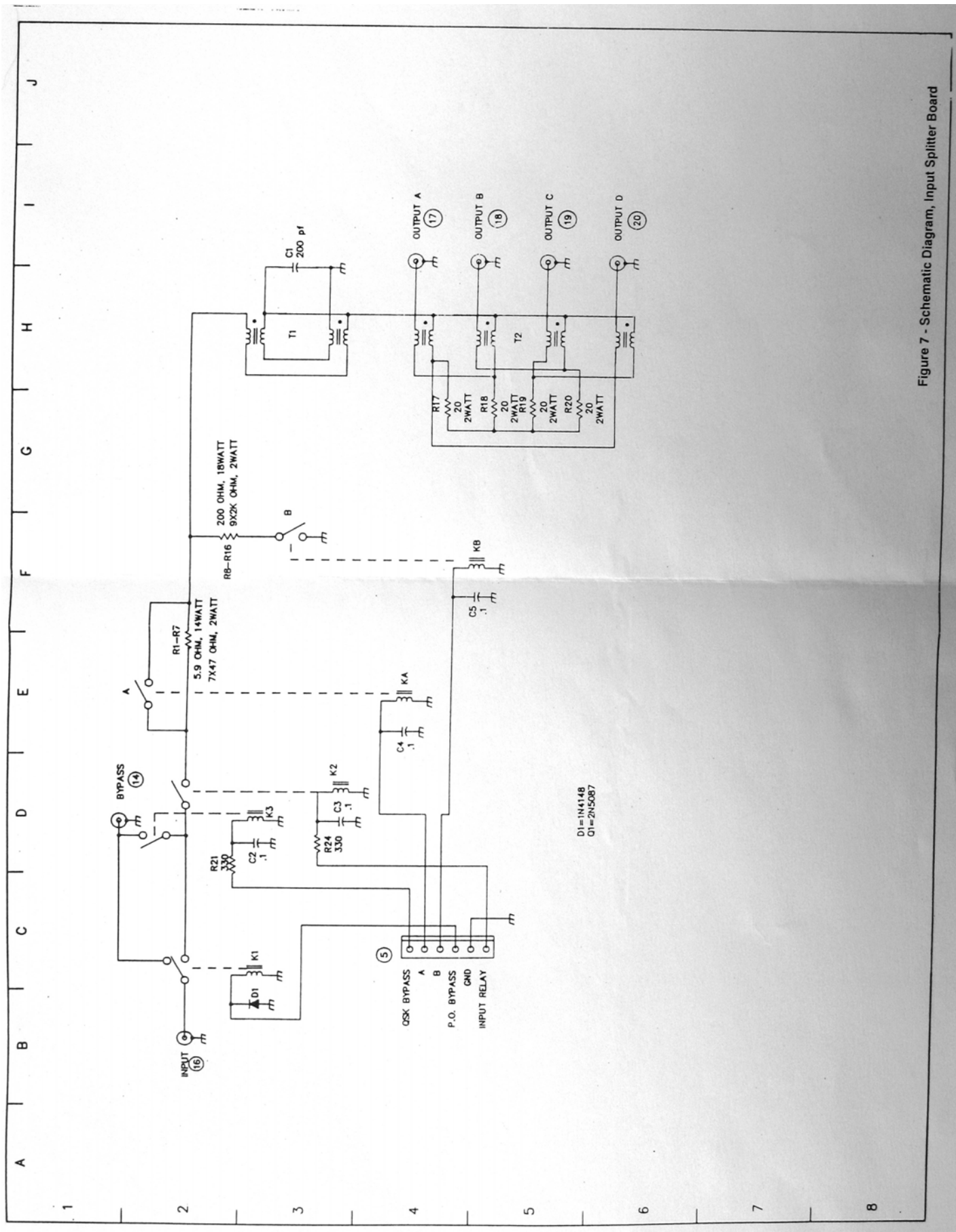


Figure 7 - Schematic Diagram, Input Splitter Board

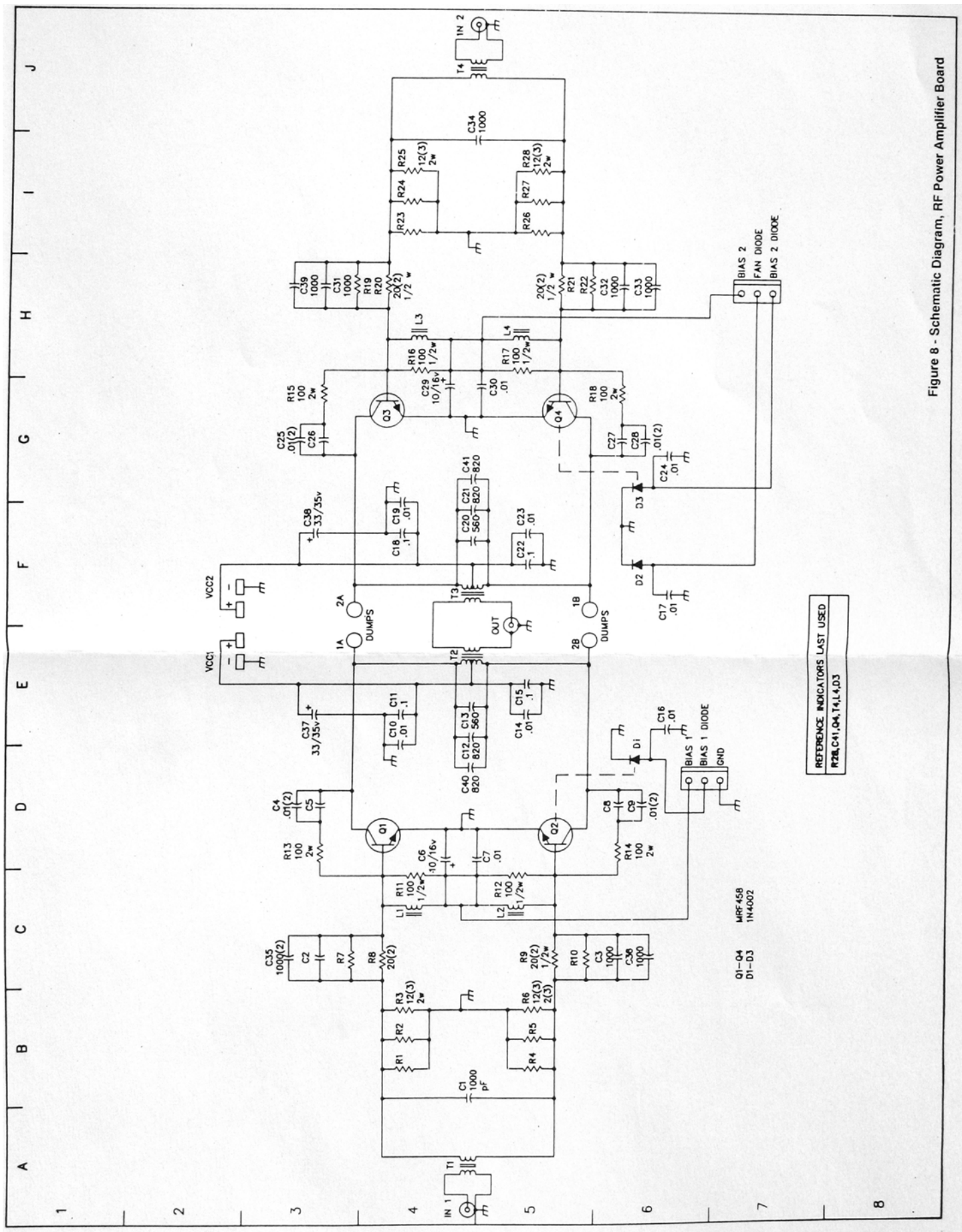


Figure 8 - Schematic Diagram, RF Power Amplifier Board

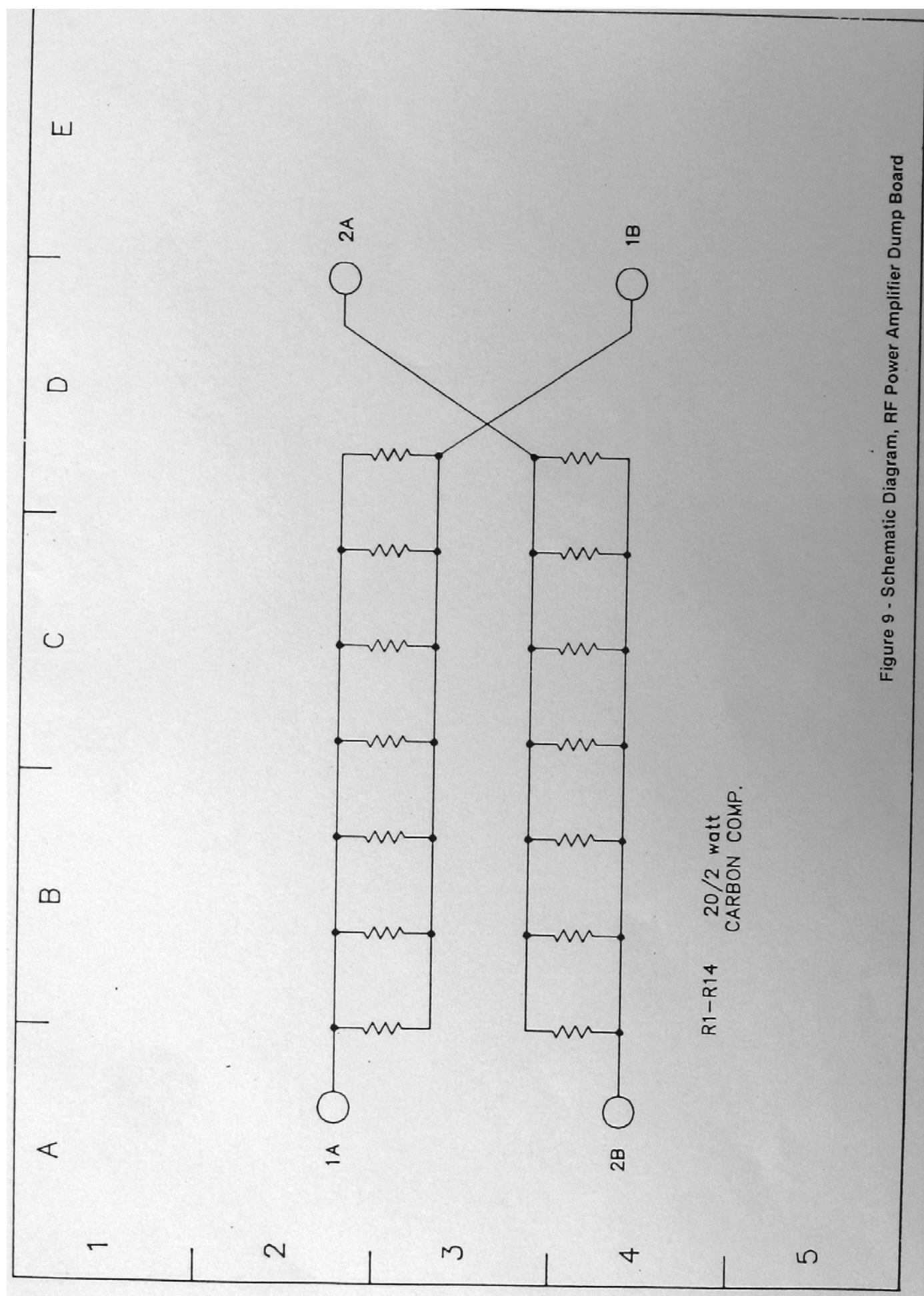


Figure 9 - Schematic Diagram, RF Power Amplifier Dump Board

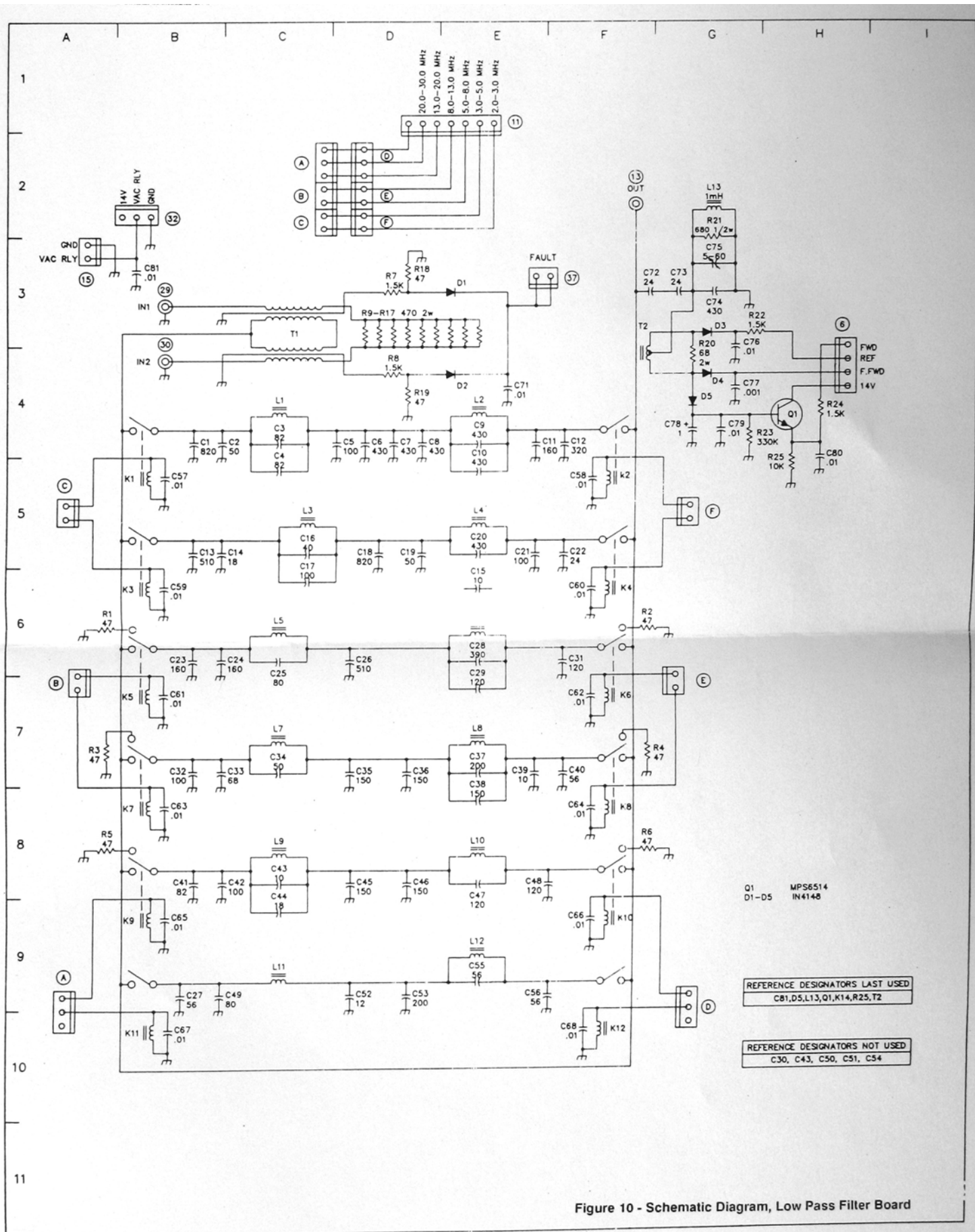


Figure 10 - Schematic Diagram, Low Pass Filter Board

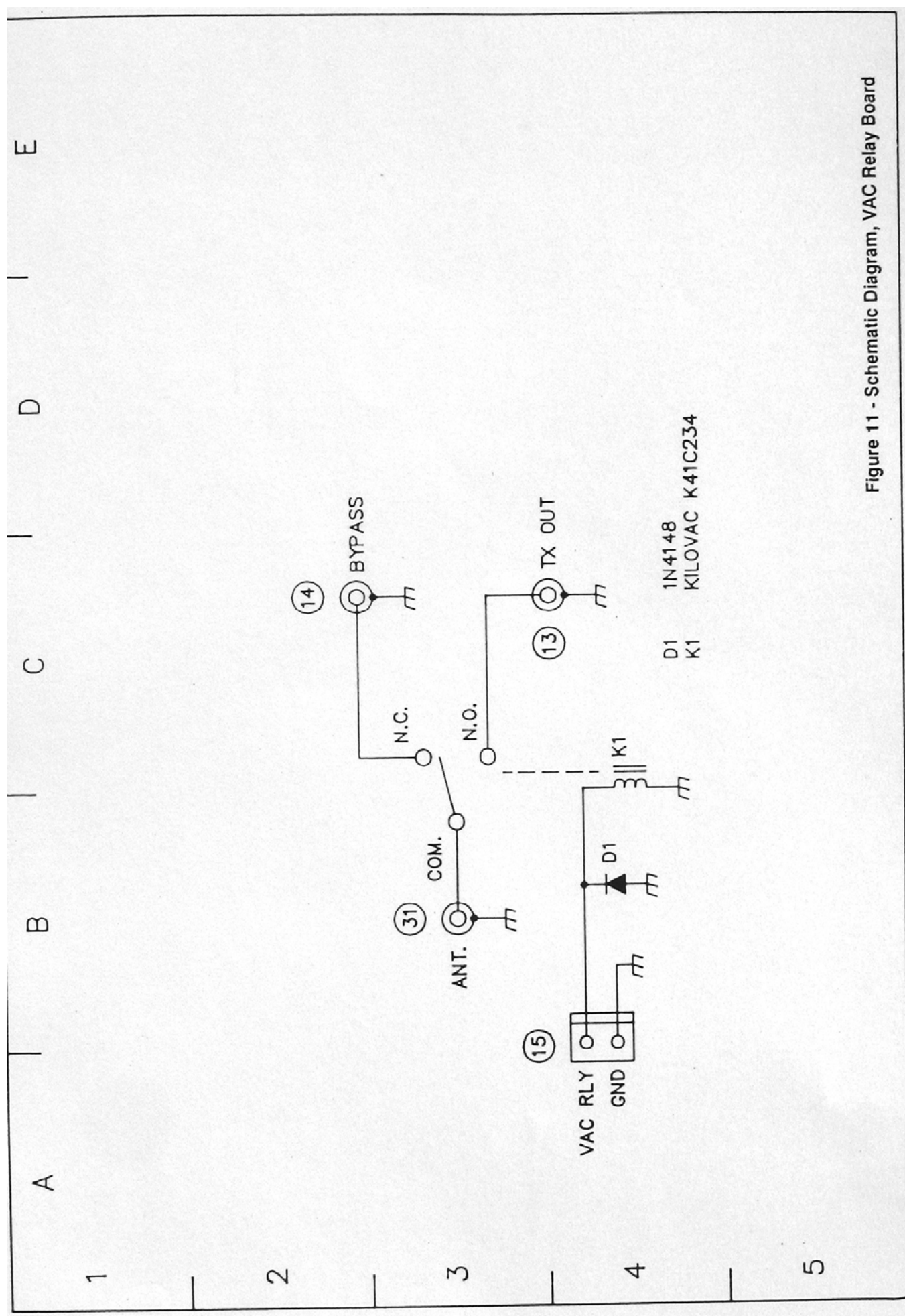


Figure 11 - Schematic Diagram, VAC Relay Board

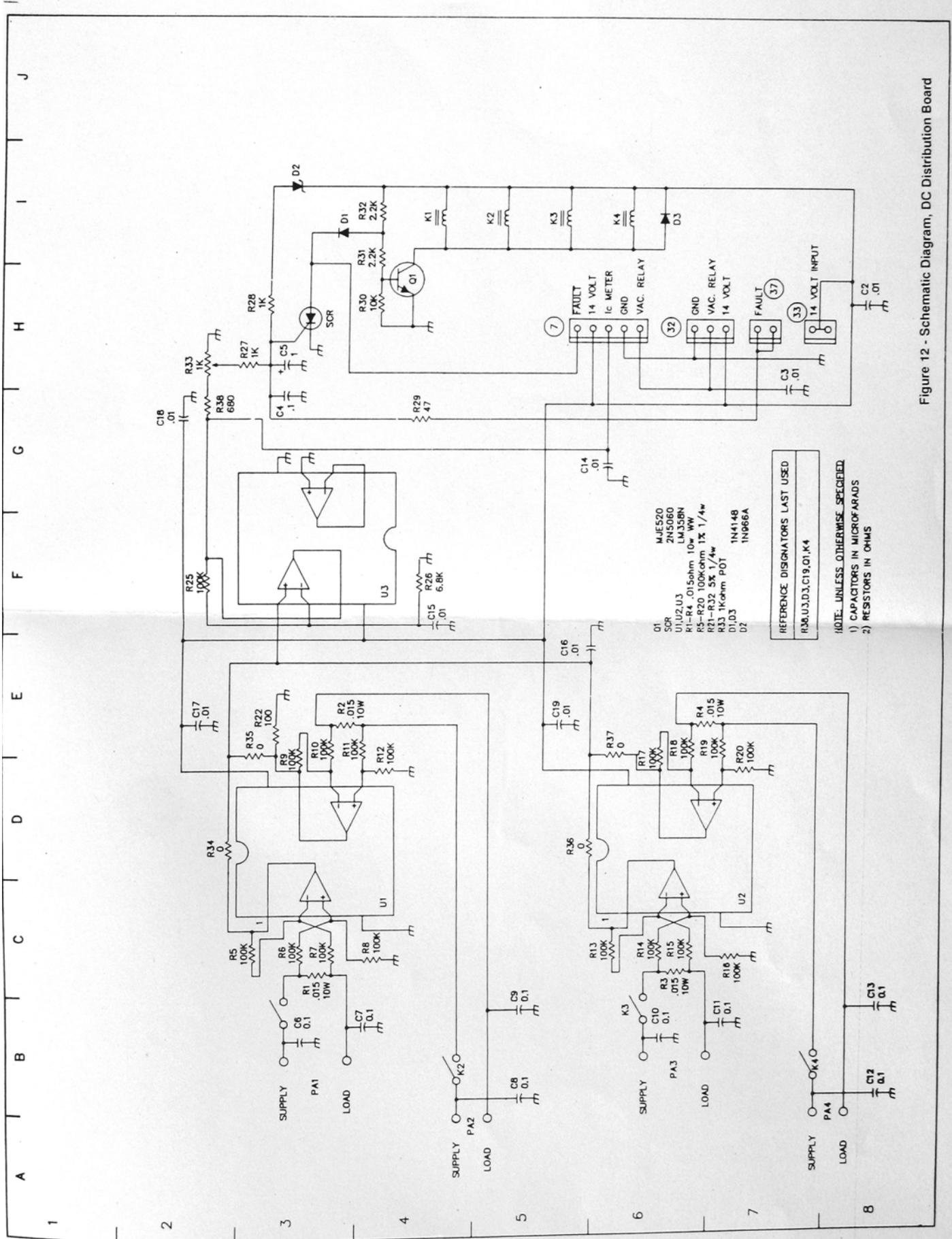


Figure 12 - Schematic Diagram, DC Distribution Board

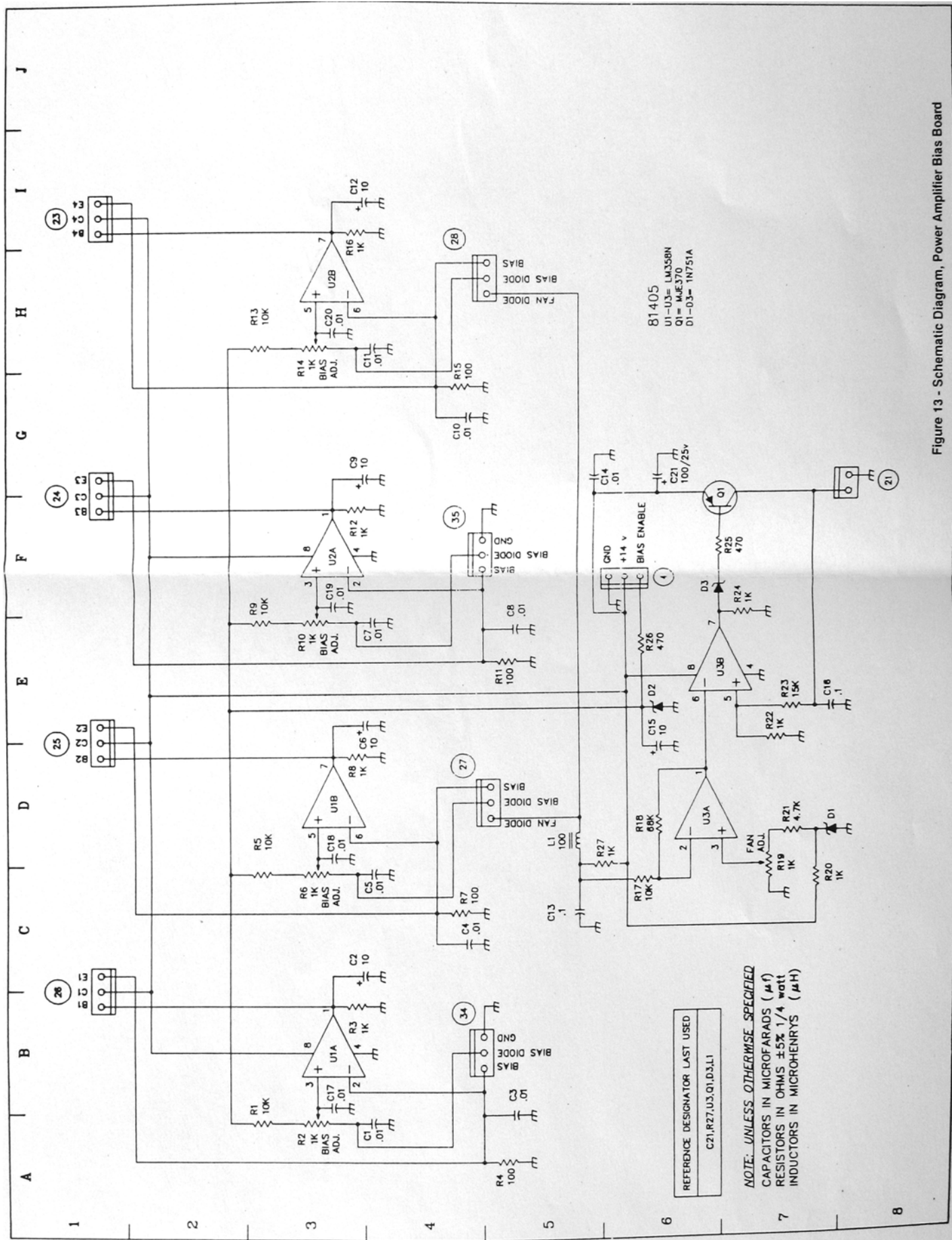


Figure 13 - Schematic Diagram, Power Amplifier Bias Board

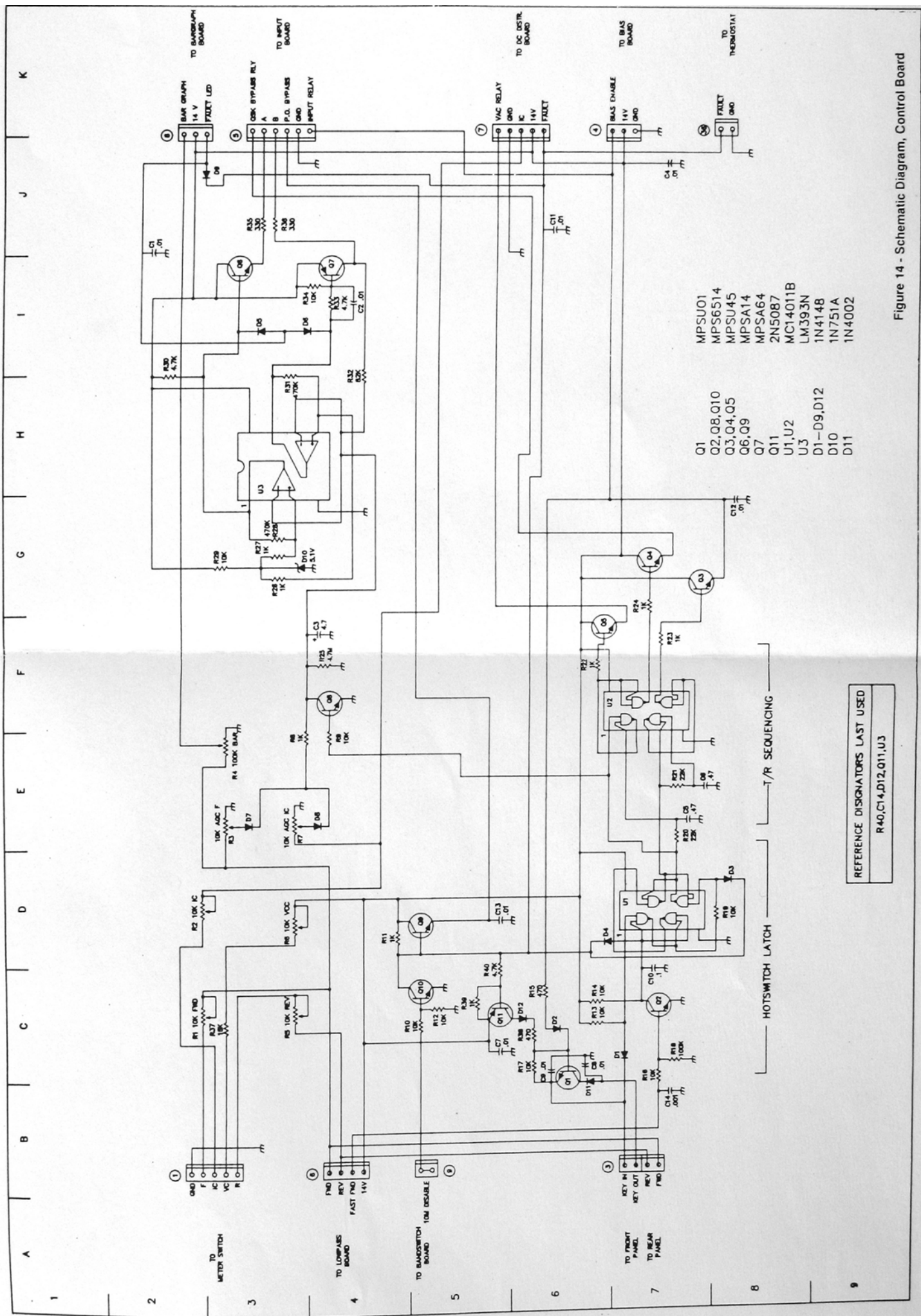


Figure 14 - Schematic Diagram, Control Board

REFERENCE DESIGNATORS LAST USED
R40, C14, D12, Q11, U3

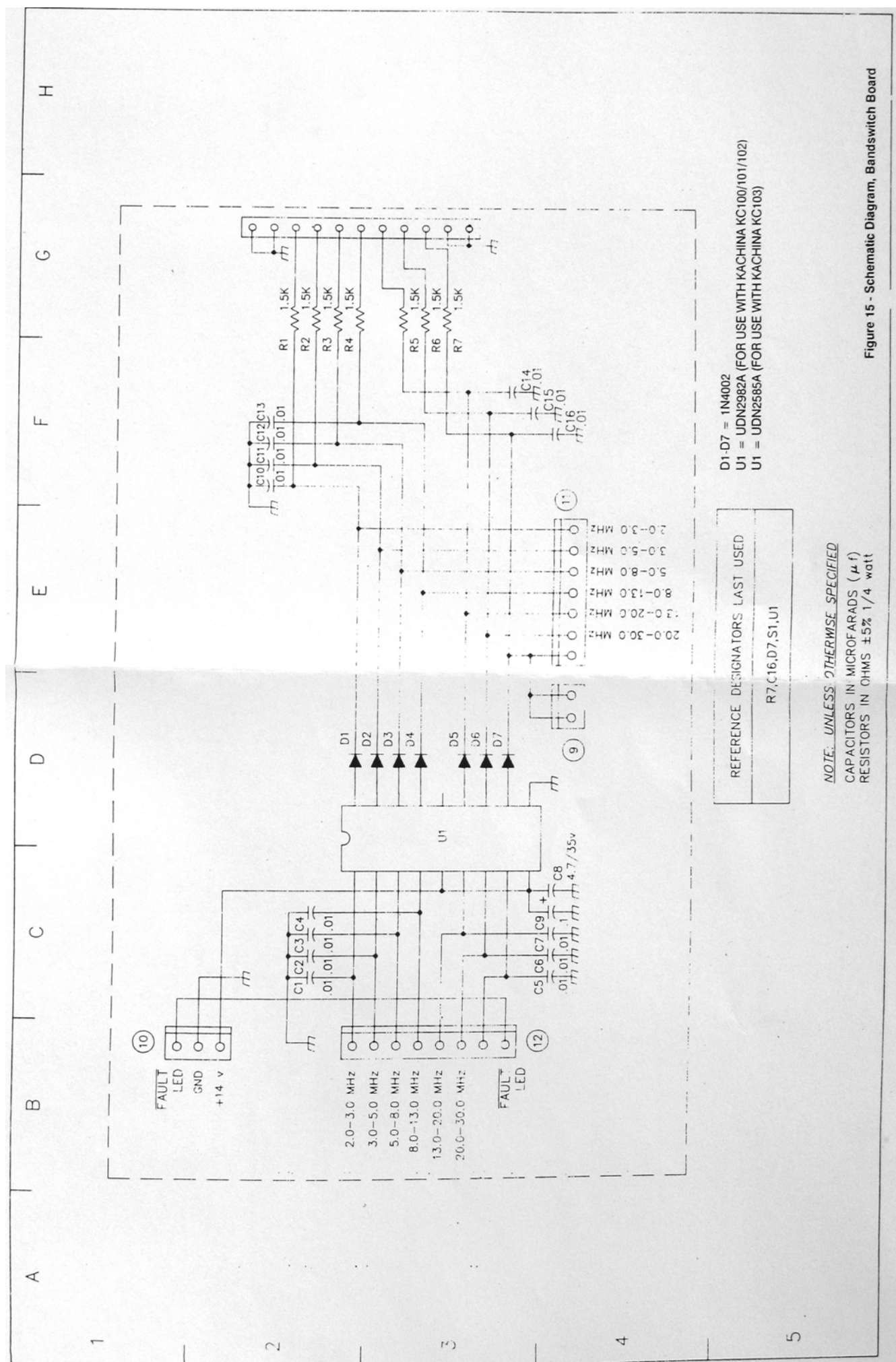


Figure 15 - Schematic Diagram, Bandswitch Board

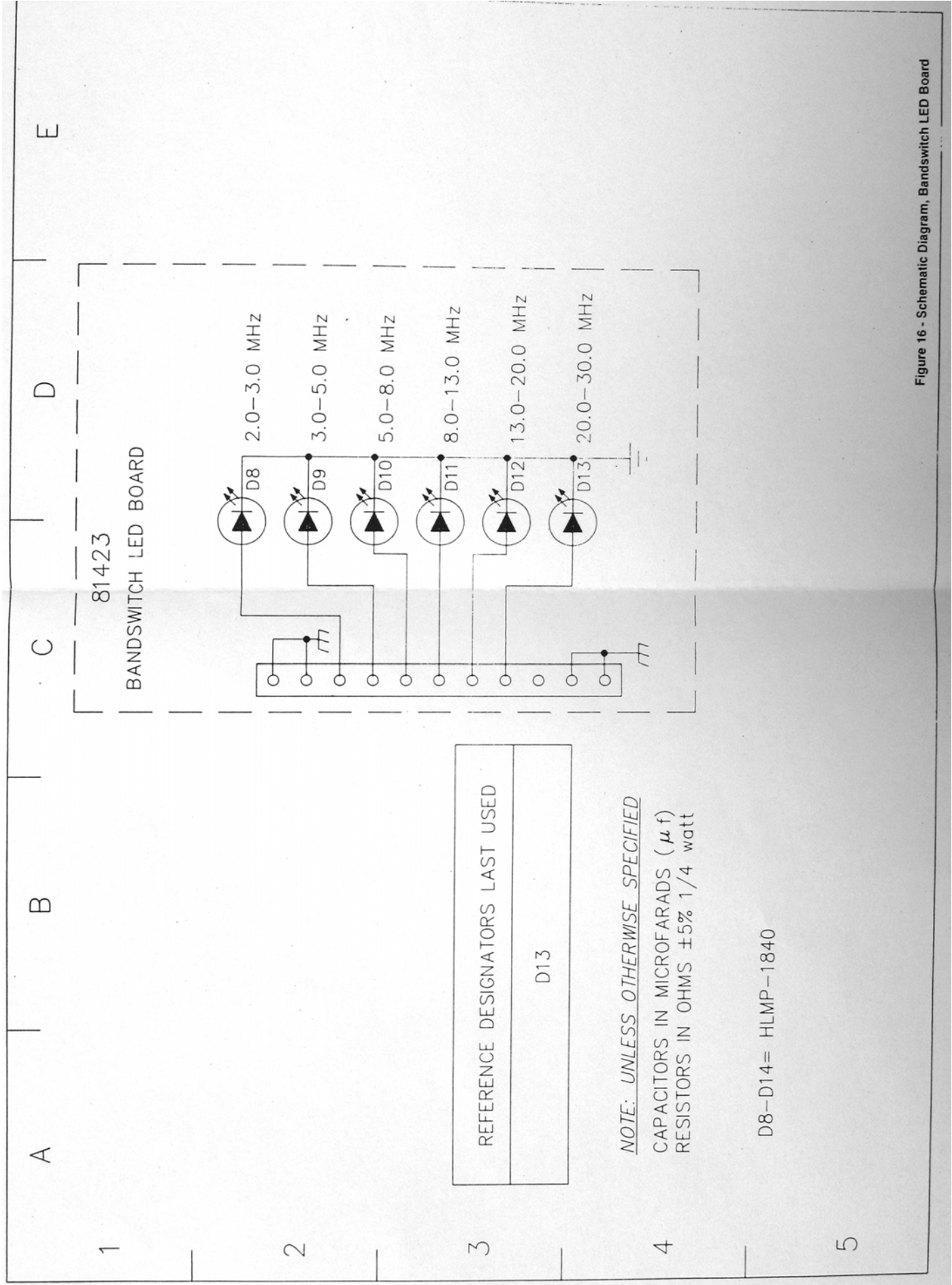
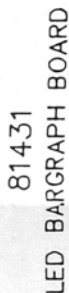


Figure 16 - Schematic Diagram, Bandswitch LED Board

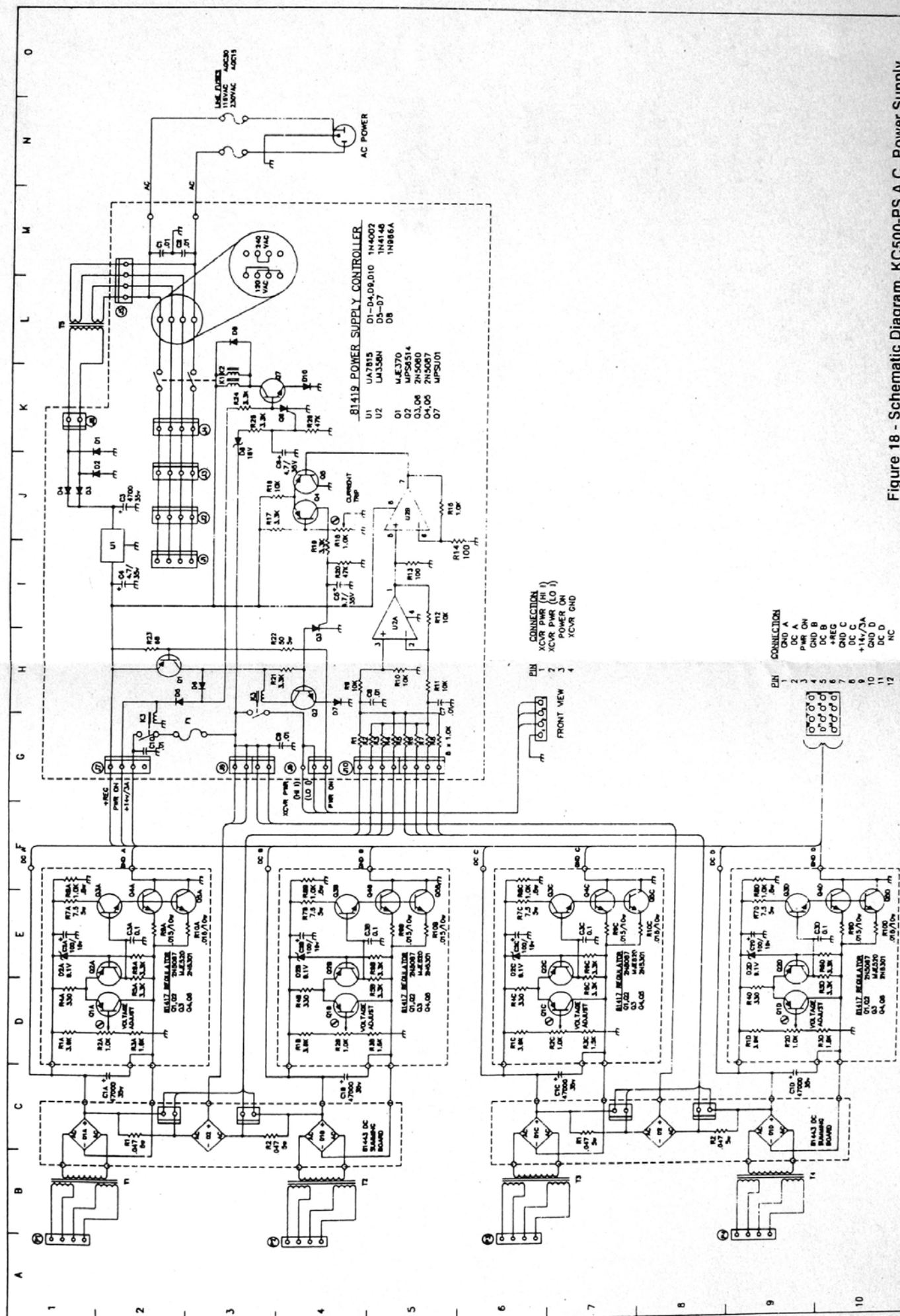


REFERENCE DESIGNATORS LAST USED
R3,C2,D11,U1

NOTE: UNLESS OTHERWISE SPECIFIED

CAPACITORS IN MICROFARADS (μf)
RESISTORS IN OHMS $\pm 5\% 1/4$ watt

Figure 17 - Schematic Diagram, LED Bargraph Display Board



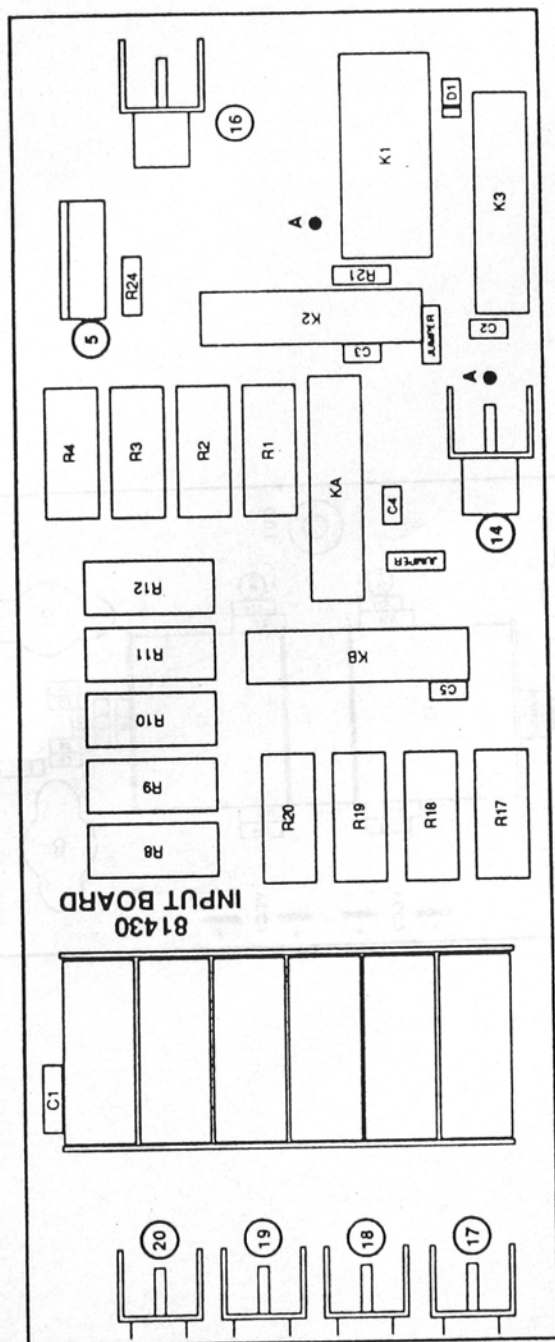


Figure 50 - Component Layout, Input Splitter Board

Figure 19 - Component Layout, Input Splitter Board

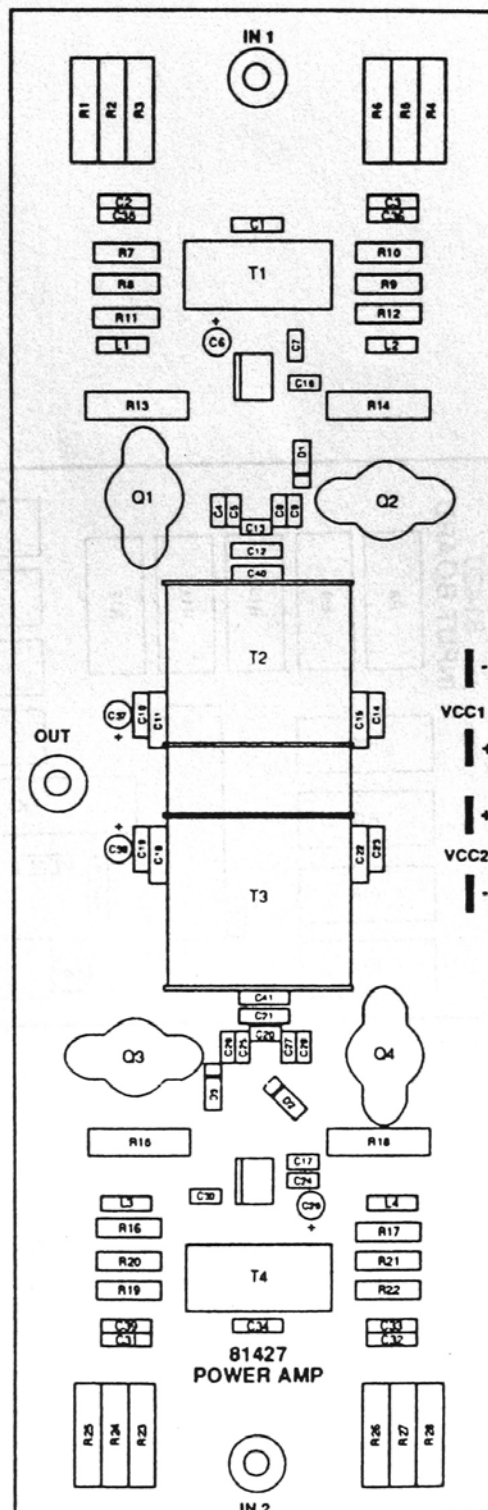


Figure 20 - Component Layout, RF Power Amplifier Board

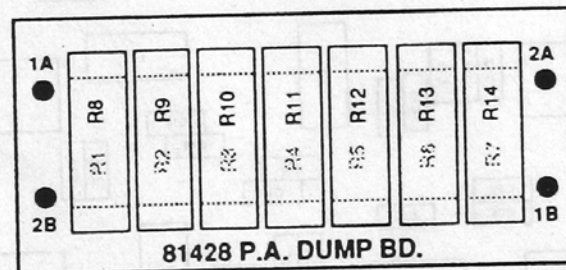


Figure 21 - Component Layout, RF Power Amplifier Dump Board

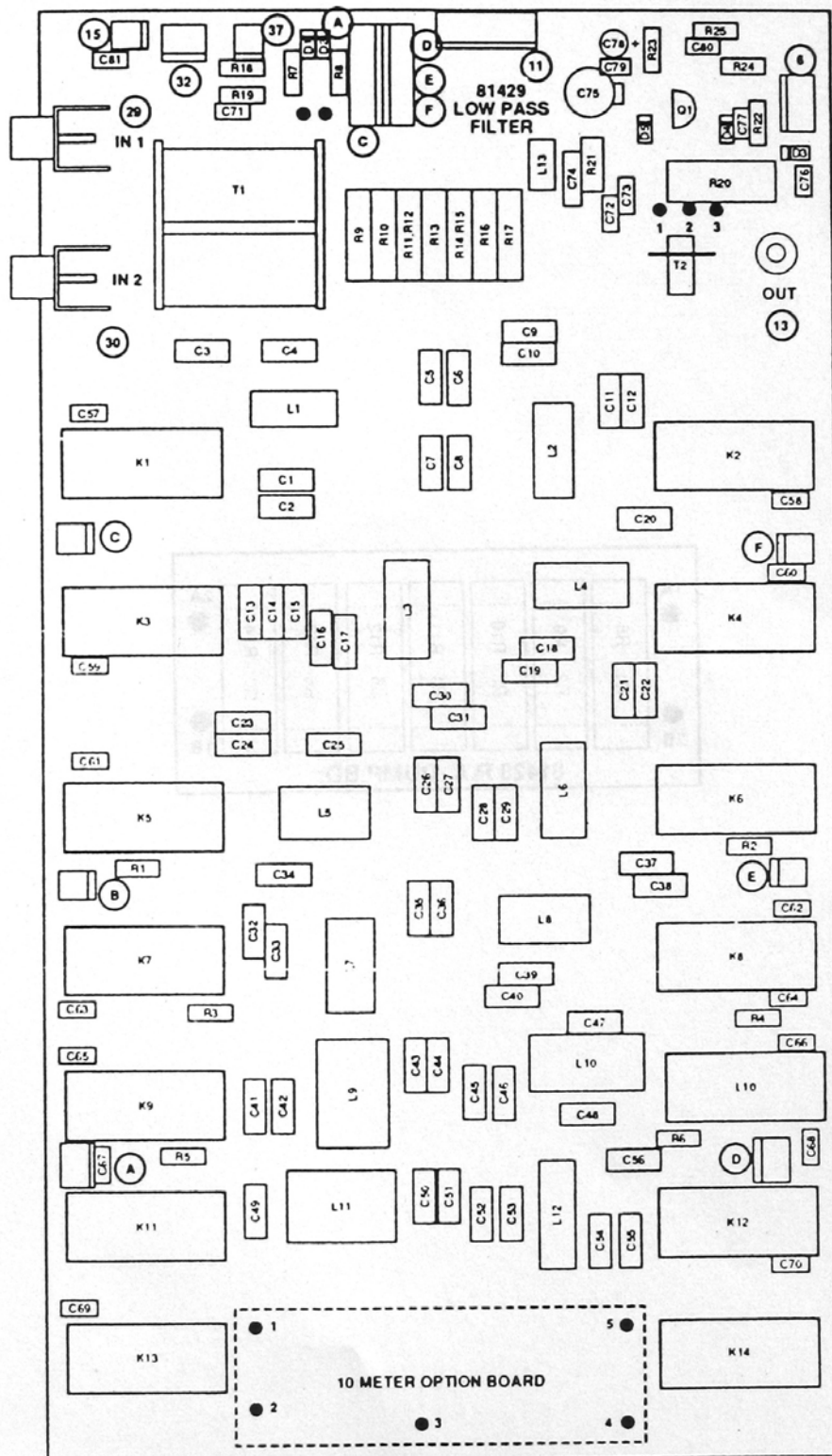


Figure 22 - Component Layout, Low Pass Filter Board

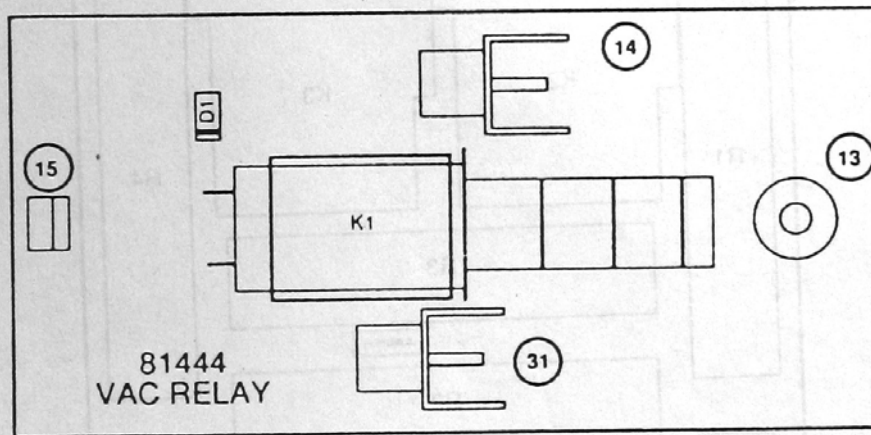


Figure 23 - Component Layout, VAC Relay Board

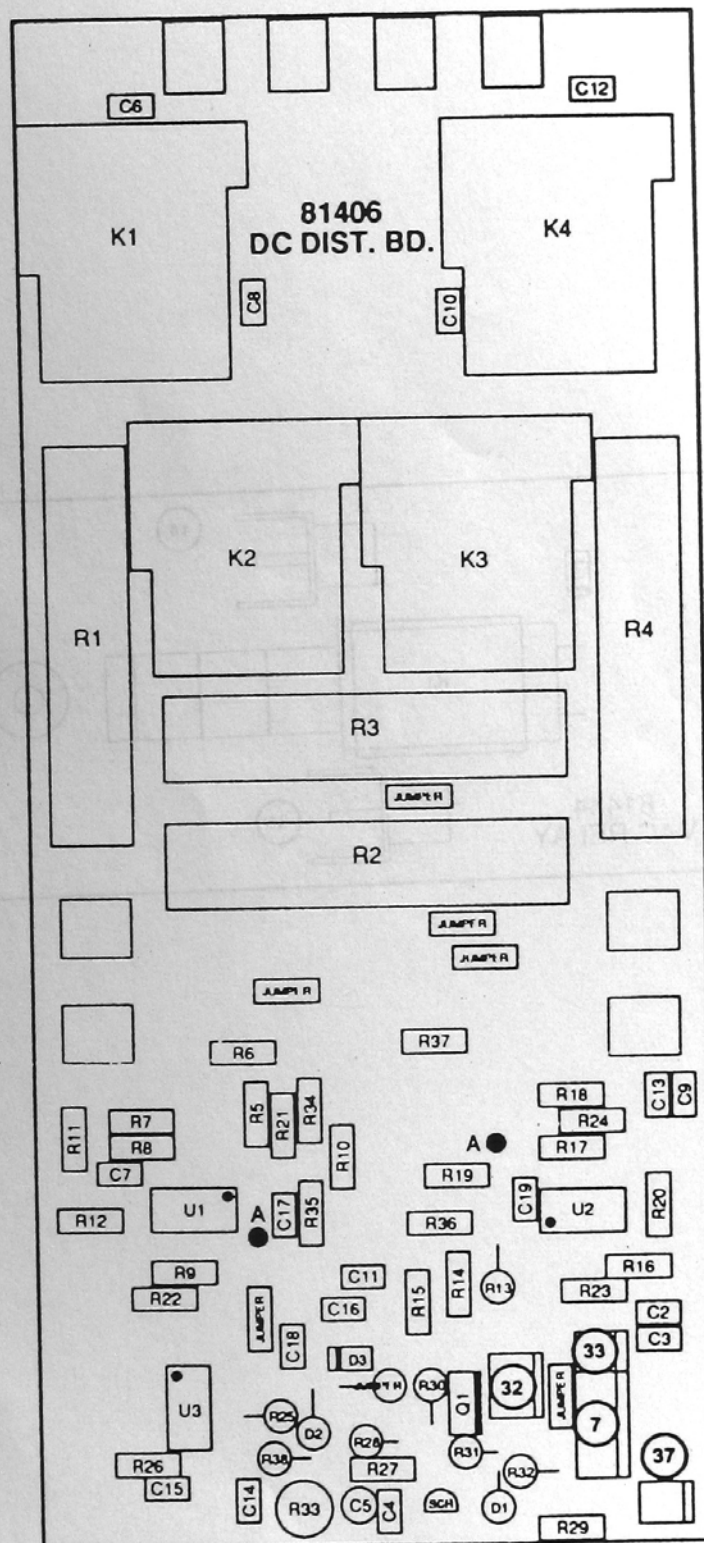


Figure 24 - Component Layout, DC Distribution Board

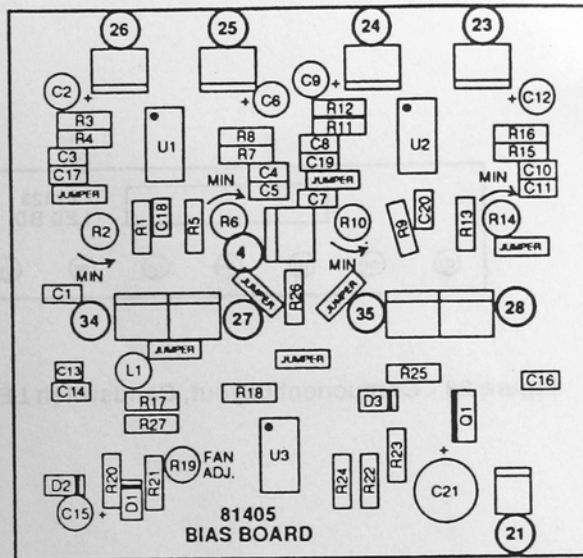


Figure 25 - Component Layout, Power Amplifier Bias Board

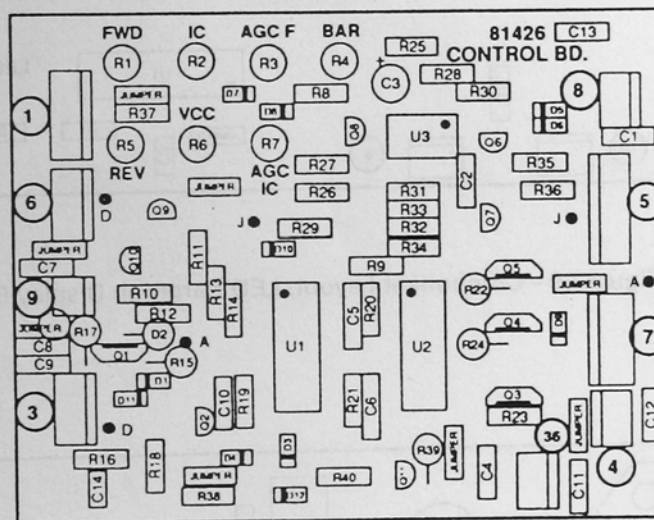


Figure 26 - Component Layout, Control Board

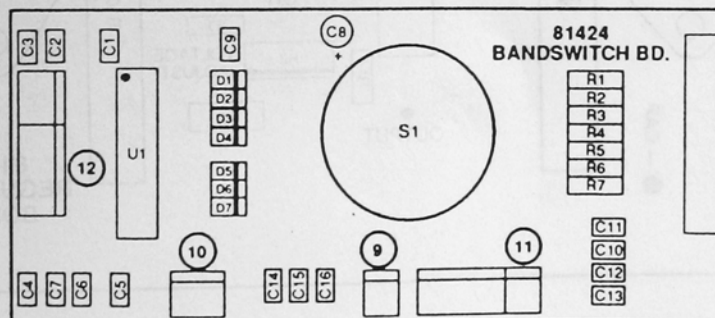


Figure 27 - Component Layout, Bandswitch Board

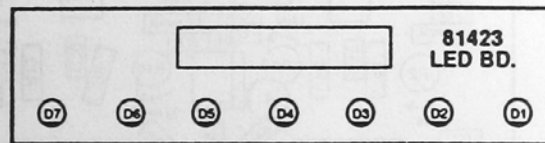


Figure 28 - Component Layout, Bandswitch LED Board

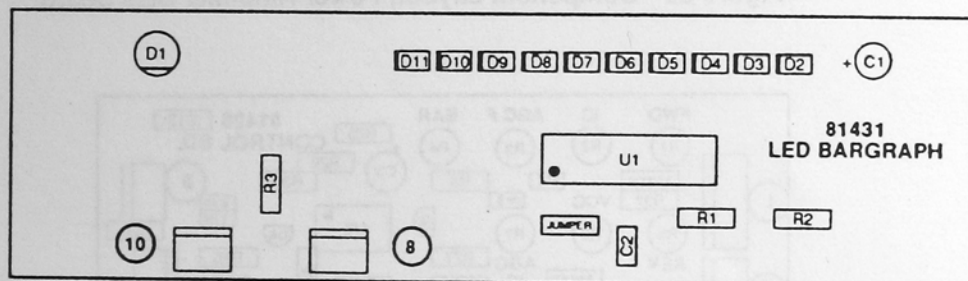


Figure 29 - Component Layout, LED Bargraph Display Board

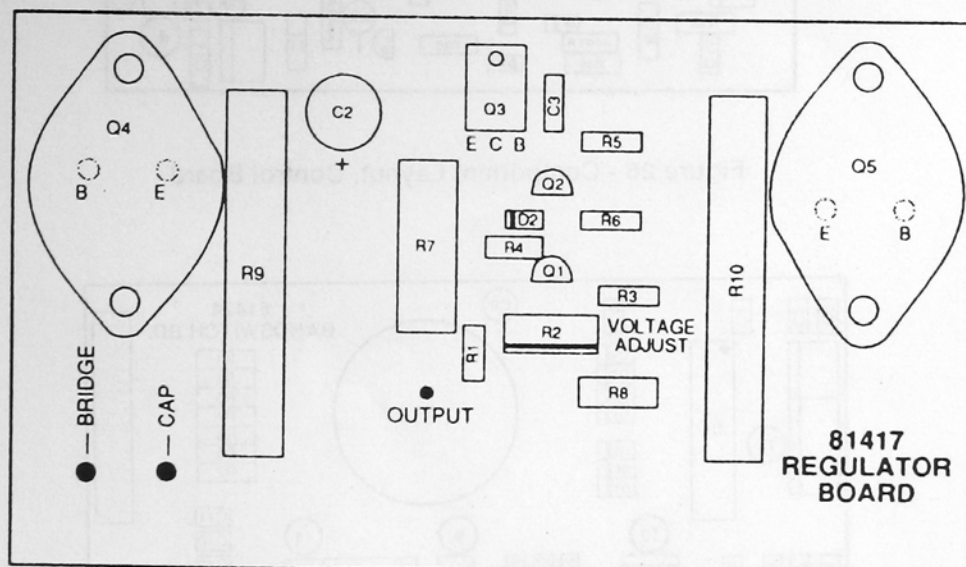


Figure 30 - Component Layout, KC500-PS Power Supply Regulator Board

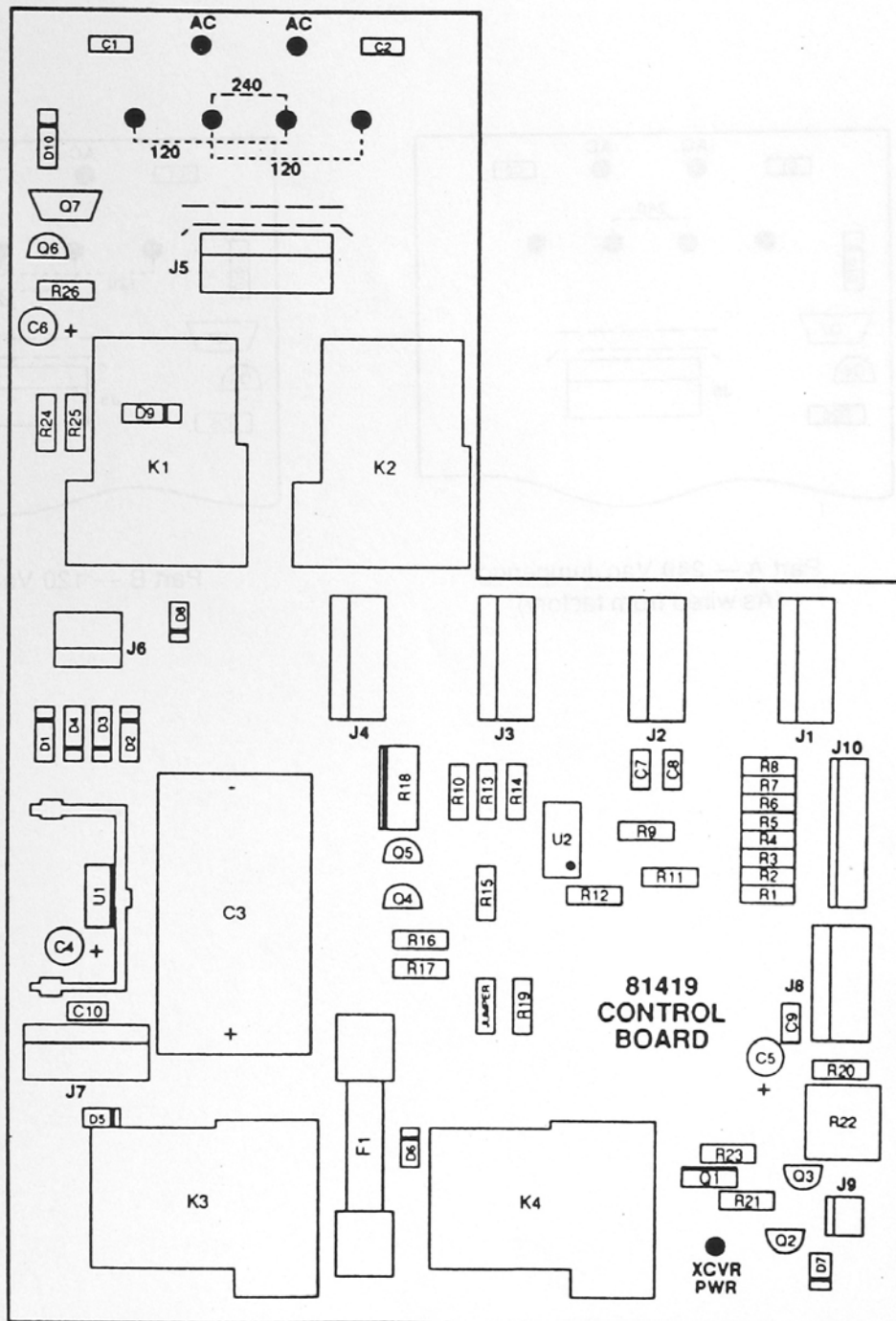
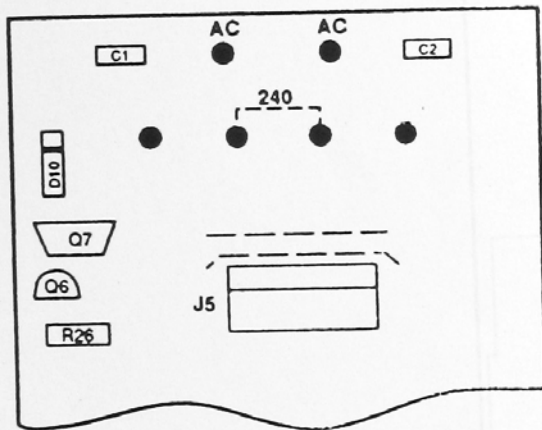
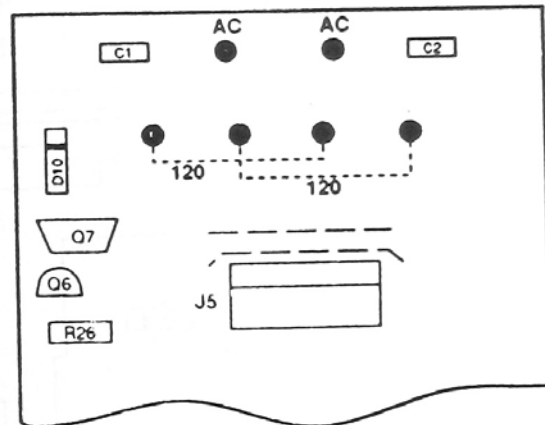


Figure 31 - Component Layout, KC500-PS Power Supply Control Board



Part A — 240 Vac Jumpering
(As wired from factory)



Part B — 120 Vac Jumpering

Figure 32 - Selecting Line Voltage, KC500-PS Power Supply Control Board

APPENDIX A
PARTS LIST, KC500-DC LINEAR AMPLIFIER

MODULE	PART#	DESCRIPTION	QTY USED	UNIT

420 CONTROL BOARD				
	23245	CAP-FXD, .001 MF, 20%, 50 V, YST	1.00	EA
	23260	CAP-FXD, .01 MF, 20%, 50 V, YTV	11.00	EA
	23261	CAP-FXD, .1MF, +80, -20%, 25V	1.00	EA
	23310	CAP-FXD, 4.7MF, 35V, VERT EL	1.00	EA
	23330	CAP-FXD, .47, 5%, 50V	2.00	EA
	25001	TRANSISTOR-2N5087	1.00	EA
	25053	TRANSISTOR-MPSU01	1.00	EA
	25054	TRANSISTOR-MPS6514	3.00	EA
	25091	IC-MC14011	2.00	EA
	25252	TRANSISTOR-MPSA64	1.00	EA
	25253	MPSA14 NPN DARLINGTON	2.00	EA
	25260	IC-LM393N	1.00	EA
	25262	TRANSISTOR-MPSU45 DARLING	3.00	EA
	28000	DIODE-POWER, 1N4002, SIL	1.00	EA
	28001	DIODE-1N4148/1N914, STL	10.00	EA
	28041	DIODE-ZENER, 5.1V, 10%, 400MW	1.00	EA
	30076	RES-FXD, 15K, 5%, 1/4W	1.00	EA
	30078	RES-FXD, 470K, 5%, 1/4W	2.00	EA
	30132	RES-FXD, 330, 5%, 1/4W	2.00	EA
	30134	RES-FXD, 470, 5%, 1/4W	2.00	EA
	30138	RES-FXD, 1K, 5%, 1/4W	8.00	EA
	30146	RES-FXD, 4.7K, 5%, 1/4W	5.00	EA
	30150	RES-FXD, 10K, 5%, 1/4W	10.00	EA
	30154	RES-FXD, 22K, 5%, 1/4W	2.00	EA
	30160	RES-FXD, 82K, 5%, 1/4W	1.00	EA
	30161	RES-FXD, 100K, 5%, 1/4W	1.00	EA
	30181	RES-FXD, 4.7M, 5%, 1/4W	1.00	EA
	30263	RES-VAR, 10K, PCM, WHITE	6.00	EA
	30338	RES-VAR, 100K, PCM, WHITE	1.00	EA
	30353	RES-FXD, 0 OHM 1/4 WATT	7.00	EA
	35065	CONNECTOR-PC MTG, 2 TERM, LOCK	1.00	EA
	35066	CONNECTOR-PC MTG, 3 TERM, LOCK	3.00	EA
	35067	CONNECTOR-PC MTG, 4 TERM, LOCK	2.00	EA
	35068	CONNECTOR-PC MTG, 5 TERM, LOCK	2.00	EA
	35069	CONNECTOR-PC MTG, 6 TERM, LOCK	1.00	EA
	46013	WIRE-HOOKUP, #24 ORANGE S TRND	0.20	FT
	46014	WIRE-HOOKUP, #24 YELLOW S TRND	0.30	FT
	46019	WIRE-HOOKUP, #24 WHITE ST RND	0.20	FT
	92392-21	CONTROL PCB	1.00	EA
420 INPUT BOARD				
	23128	CAP-FXD, 200PF, 1KV, CER, 5%, N1500	1.00	EA
	23261	CAP-FXD, .1MF, +80, -20%, 25V	4.00	EA
	28001	DIODE-1N4148/1N914, SIL	1.00	EA
	30130	RES-FXD, 220, 5%, 1/4W	2.00	EA
	30353	RES-FXD, 0 OHM 1/4 WATT	2.00	EA
	30406	RES-FXD, 20 2W CC	4.00	EA
	30408	RES-FXD, 47 2W CC	7.00	EA
	30409	RES-FXD, 2K 2W CC	9.00	EA
	32049	RELAY-REED, RD SPDT 5/16 VDC	2.00	EA
	32085	RELAY SPDT 12VDC	1.00	EA
	32104	RELAY	2.00	EA
	35069	CONNECTOR-PC MTG, 6 TERM, LOCK	1.00	EA
	35213	RT-ANGLE PC MT PHONO PLUG	6.00	EA
	41003	TERMINAL-PC, .62" HOLE MAL CO	6.00	EA
	46019	WIRE-HOOKUP, #24 WHITE ST RND	0.20	FT
	81434	TRANSFORMER INPUT	1.00	EA
	92397-2C	INPUT SPLITTER PCB	1.00	EA

APPENDIX A
PARTS LIST, KC500-DC LINEAR AMPLIFIER

MODULE	PART#	DESCRIPTION	QTY USED	UNIT
BANDSWITCH BOARD				
	23260	CAP-FXD, .01 MF, 20%, 50 V, YTV	14.00	EA
	23261	CAP-FXD, .1MF, +80, -20%, 25V	1.00	EA
	23266	CAP-FXD, 10MF, 16V, VERT EL	1.00	EA
	25270	IC-OCTAL HI CURRENT DRIVE	1.00	EA
	28000	DIODE-POWER, 1N4002, SIL	7.00	EA
	30140	RES-FXD, 1.5K, 5%, 1/4W	7.00	EA
	32086	SWITCH 8 POSITION ROTARY	1.00	EA
	35116	CONNECTOR-PC MTG, 2 TERM RT ANGL	2.00	EA
	35117	CONNECTOR-PC MTG, 3 TERM RT ANGL	2.00	EA
	35118	CONNECTOR-PC MTG, 5 TERM RT ANGL	2.00	EA
	35126	CONNECTOR-PC, 11 CKT	1.00	EA
	92391-2B	BANDSWITCH PC BD	1.00	EA
DC DISTRIBUTION BOARD 420				
	21095	CHOKE-RF, 820 UH, 105 MA	1.00	EA
	23260	CAP-FXD, .01 MF, 20%, 50 V, YTV	13.00	EA
	23261	CAP-FXD, .1MF, +80, -20%, 25V	9.00	EA
	23264	CAP-FXD, 1MF, 50V, VERT EL	1.00	EA
	23385	CAP-CER 100PF 100V +- 5% N750 .2LS	4.00	EA
	25001	TRANSISTOR-2N5087	4.00	EA
	25002	TRANSISTOR-POWER, MJES20	1.00	EA
	25039	SCR-2N5060	1.00	EA
	25117	IC-LM358N	1.00	EA
	25287	IC-LM301AN OP AMP	4.00	EA
	28000	DIODE-POWER, 1N4002, STL	1.00	EA
	28001	DIODE-1N4148/1N914, STL	1.00	EA
	28035	DIODE, ZENER-16V, 10%, .4W	1.00	EA
	28071	DIODE-SCHOTTEY BAT-41	1.00	EA
	28098	RECTIFIER GI #2982	1.00	EA
	30233	RES-FXD, .015 OHM, 10W, 10%	4.00	EA
	30238	RES-FXD, 47, 5%, 1/8 W	1.00	EA
	30240	RES-FXD, 220, 5%, 1/8 W	4.00	EA
	30243	RES-FXD, 680, 5%, 1/8 W	1.00	EA
	30244	RES-FXD, 1 K, 5%, 1/6 W	1.00	EA
	30245	RES-FXD, 1.5 K, 5%, 1/8 W	1.00	EA
	30246	RES-FXD, 2.2 K, 5%, 1/8 W	2.00	EA
	30256	RES-FXD, 47 K, 5%, 1/6 W	5.00	EA
	30258	RES-FXD, 100 K, 5%, 1/6 W	1.00	EA
	30260	RES-FXD, 220 K, 5%, 1/8 W	4.00	EA
	30305	RES-FXD, 4.7 K, 5%, 1/6 W	1.00	EA
	30333	RES-FXD, 1K, 5%, 1/6W, AXL	1.00	EA
	30337	RES-VAR, 1K, PCM, WHITE	1.00	EA
	30353	RES-FXD, 0 OHM 1/4 WATT	12.00	EA
	30529	RES-FXD 0 OHM, 5%, 1/6W BENT LEADS	4.00	EA
	32067	RELAY-SPST, NO, 12V, 30A	4.00	EA
	32072	COVER FOR PB T90N RELAY-# 32067	4.00	EA
	35065	CONNECTOR-PC MTG, 2 TERM, LOCK	1.00	EA
	35066	CONNECTOR-PC MTG, 3 TERM, LOCK	1.00	EA
	35070	CONNECTOR-PC MTG, 7 TERM, LOCK	1.00	EA
	35172	CONNECTOR-SINGLE SPADE, 1/4"MM	8.00	EA
	55001	EYELET-ST, .127ODX.185LGX. 018T	8.00	EA
	92393-3E	DC DISTRIBUTION PCB	1.00	EA
LED BARGRAPH S/A				
	23261	CAP-FXD, .1MF, +80, -20%, 25V	1.00	EA
	23310	CAP-FXD, 4.7MF, 35V, VERT EL	1.00	EA
	25101	IC-LM3914	1.00	EA
	28016	LED-RED	1.00	EA
	28040	LED-RED, RECTANGULAR, PAN-LN224RP	1.00	EA

APPENDIX A
PARTS LIST, KC500-DC LINEAR AMPLIFIER

MODULE	PART#	DESCRIPTION	QTY USED	UNIT
LED BARGRAPH S/A	28067	DIODE-LED, GREEN, RECT	9.00	EA
	30132	RES-FXD, 330, 5%, 1/4W	1.00	EA
	30138	RES-FXD, 1K, 5%, 1/4W	1.00	EA
	30140	RES-FXD, 1.5K, 5%, 1/4W	1.00	EA
	30353	RES-FXD, 0 OHM 1/4 WATT	1.00	EA
	35117	CONNECTOR-PC MTG, 3 TERM RT ANGL	2.00	EA
	92401-1A	LED BARGRAPH PC BOARD	1.00	EA
LOW PASS FILTER	21118	CHOKE-RF, 3.3 UH 5%	1.00	EA
	23061	CAP-VAR, 5/60 PF, TRIMMER MEPCO	1.00	EA
	23128	CAP-FXD, 200PF, 1KV, CER, 5%, N1500	3.00	EA
	23132	CAP-FXD, .01MF, 100V, CER, 25 V, LNG	18.00	EA
	23133	CAP-FXD.001MF, 500V, CER10% 25F	1.00	EA
	23157	CAP-FXD, 430PF, 500V, 5%, N2200	1.00	EA
	23208	CAP-FXD, 68PF, 2KV, N750	3.00	EA
	23210	CAP-FXD, 100PF, 2KV, N750	10.00	EA
	23211	CAP-FXD, 120PF, 5%, 2KV, N750	3.00	EA
	23212	CAP-FXD, 150PF, 2KV, N750	6.00	EA
	23214	CAP-FXD, 220PF, 2KV, N1500	3.00	EA
	23215	CAP-FXD, 270PF, 2KV, N1500	2.00	EA
	23216	CAP-FXD, 330PF, 2KV, N1500	3.00	EA
	23217	CAP-FXD, 390PF, 2KV, N1500	3.00	EA
	23219	CAP-FXD, 820PF, 2KV, N2200	2.00	EA
	23261	CAP-FXD, .1MF, +80, -20%, 25V	1.00	EA
	23264	CAP-FXD, 1MF, 50V, VERT EL	1.00	EA
	23306	CAP-FXD, 91PF, 5%, 50V, SL	2.00	EA
	23357	CAP-FXD, 10PF, 5%, 3KV, N750	3.00	EA
	23358	CAP-FXD, 12PF, 5%, 3KV, N750	1.00	EA
	23359	CAP-FXD, 18PF, 5%, 3KV, N750	1.00	EA
	23361	CAP-FXD, 82PF, 5%, 2KV, N2200	3.00	EA
	23362	CAP-FXD, 430PF, 5%, 2KV, N2200	2.00	EA
	23363	CAP-FXD, 56PF, 5%, 3KV, N2200	1.00	EA
	23364	CAP-FXD, 50PF, 5%, 3KV, N2200	2.00	EA
	23365	CAP-FXD, 620PF, 5%, 2KV, N2200	1.00	EA
	23366	CAP-FXD, 560PF, 5%, 2KV, N2200	3.00	EA
	23367	CAP-FXD, 180PF, 5%, 2KV, N2200	2.00	EA
	23397	CAP-CER 270PF 100V +/-5% N1000 0.2"LS	1.00	EA
	25054	TRANSISTOR-MPS6514	1.00	EA
	28001	DIODE-1N4148/1N914, SIL	5.00	EA
	30034	RES-FXD, 330, 10%, 1/2W	1.00	EA
	30044	RES-FXD, 470, 10%, 2W, COMPOS	9.00	EA
	30082	RES-FXD, 68, 10%, 2W, COMPOS	1.00	EA
	30122	RES-FXD, 47, 5%, 1/4W	8.00	EA
	30131	RES-FXD, 270, 5%, 1/4W	1.00	EA
	30140	RES-FXD, 1.5K, 5%, 1/4W	4.00	EA
	30150	RES-FXD, 10K, 5%, 1/4W	1.00	EA
	30167	RES-FXD, 330K, 5%, 1/4W	1.00	EA
	32084	RELAY SPST 12VDC	12.00	EA
	32085	RELAY SPDT 12VDC	2.00	EA
	35065	CONNECTOR-PC MTG, 2 TERM, LOCK	6.00	EA
	35066	CONNECTOR-PC MTG, 3 TERM, LOCK	3.00	EA
	35067	CONNECTOR-PC MTG, 4 TERM, LOCK	1.00	EA
	35070	CONNECTOR-PC MTG, 7 TERM, LOCK	3.00	EA
	35212	VERTICAL PC MT PHONO PLUG	1.00	EA
	35213	RT-ANGLE PC MT PHONO PLUG	2.00	EA
	41003	TERMINAL-PC, .062"HOLE MAL CO	33.00	EA
	46071	WIRE-SOLID, #22 RED TEFLON 600V	0.60	FT
	46081	WIRE-#16 BLUE TEFLON STRN D	1.00	FT

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PARTS LIST, KC500-DC LINEAR AMPLIFIER

MODULE	PART#	DESCRIPTION	QTY USED	UNIT
LOW PASS FILTER	55014	EYELET-BR, .0890D, 1/8LG, GS 3-4	24.00	EA
	77007	TIE-CABLE, PANDUIT SSTIM	4.00	EA
	85380-01	L1 TOROID-RF	1.00	EA
	85380-02	L2 TOROID-RF	1.00	EA
	85380-03	L3 TOROID-RF	1.00	EA
	85380-04	L4 TOROID-RF	1.00	EA
	85380-05	L5 TOROID-RF	1.00	EA
	85380-06	L6 TOROID-RF	1.00	EA
	85380-07	L7 TOROID-RF	1.00	EA
	85380-08	L8 TOROID-RF	1.00	EA
	85380-09	L9 TOROID-RF	1.00	EA
	85380-10	L10 TOROID-RF	1.00	EA
	85380-11	L11 TOROID-RF	1.00	EA
	85380-12	L12 TOROID-RF	1.00	EA
	85380-15	TOROID-, RF, 14T#28, BIFILAR	1.00	EA
	85394	COMBINER XFORMER	1.00	EA
PA DUMP BOARD	92400-3E	LPF PC BOARD	1.00	EA
	30406	RES-FXD, 20 2W CC	14.00	EA
	55026	EYELET, BR TIN PLTD.	4.00	EA
POWER AMP BOARD	92395-1B	PA DUMP PCB	1.00	EA
	21029	BEAD-FERRITE, .5LG, 7D MATL	4.00	EA
	23006	CAP-FXD, 0.1MF, 250V, FILM, 20%	4.00	EA
	23135	CAP-FXD, 560PF, 100V, 5%, N1000	2.00	EA
	23160	CAP-FXD, 1000PF, 500V, 5%, N2200	10.00	EA
	23219	CAP-FXD, 820PF, 2KV, N2200	4.00	EA
	23260	CAP-FXD, .01 MF, 20%, 50 V, YTV	17.00	EA
	23266	CAP-FXD, 10MF, 16V, VERT EL	2.00	EA
	23407	CAP-ELECT 33/35V +/-20%	2.00	EA
	28000	DIODE-POWER, 1N4002, SIL	3.00	EA
	30025	RES-FXD, 100, 10%, 1/2W	4.00	EA
	30219	RES-FXD, 100, 10%, 2W, CARBON	4.00	EA
	30228	RES-FXD, 20, 5%, 1/2W	8.00	EA
	30405	RES-FXD, 12 2W CC	12.00	EA
	35066	CONNECTOR-PC MTG, 3 TERM, LOCK	2.00	EA
	35172	CONNECTOR-SINGLE SPADE, 1/4"MM	4.00	EA
	35212	VERTICAL PC MT PHONO PLUG	3.00	EA
	46071	WIRE-SOLID, #22 RED TEFLON 600V	11.40	FT
	46081	WIRE-#16 BLUE TEFLON STRN D	13.30	FT
	51016	WASHER-FLAT, BRASS	10.00	EA
	55001	EYELET-ST, .1270DX.185LGX. 018T	4.00	EA
	55006	55007T-13/16"LG, .175"OD	4.00	EA
	55011	EYELET-BR, GS5-6, A2198	10.00	EA
	81428	PA DUMP BOARD	1.00	EA
	81438	OUTPUT XFORMER S/A	2.00	EA
	85176	CHOKE, 2 1/2T ON 21038 COR E	4.00	EA
	92244	TRANSFORMER PLATE PC BOARD	2.00	EA
	92394-1A	PA PCB	1.00	EA
	92452	INSULATOR-FISHPAPER, PA DUMP BD	1.00	EA
VACUUM RELAY BOARD S/A	27049	SPRING CLIP-1/2" D, 3/4" LG	1.00	EA
	28001	DIODE-1N4148/1N914, STL	1.00	EA
	32091	RELAY-VACUUM, SPDT, 12V	1.00	EA
	35065	CONNECTOR-PC MTG, 2 TERM, LOCK	1.00	EA
	35212	VERTICAL PC MT PHONO PLUG	1.00	EA
	35213	RT-ANGLE PC MT PHONE PLUG	2.00	EA
	42006	GROMMET-3/8" ID	4.00	EA

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MODULE	PART#	DESCRIPTION	QTY USED	UNIT
VACUUM RELAY BOARD S/A	55014	EYELET-BR, .0890D, 1/8LG, GS 3-4	2.00	EA
	92450-2C	VAC RELAY PCB	1.00	EA