

TEKTRONIX®

**P7001
POWER SUPPLY**

SERVICE

INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97077

Serial Number _____

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P7001 Power Supply

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INTRODUCTION

The P7001 Power Supply is designed to provide considerable savings in volume, weight, and power consumption. It is essentially a DC-to-DC converter. The line voltage is rectified, filtered, and used to power an inverter which runs at approximately 25 kHz. The inverter drives the primary of the power transformer, which supplies the desired secondary voltages. These are then rectified, filtered, and regulated for circuit use. Figure 1 is a simplified block diagram of the power supply.

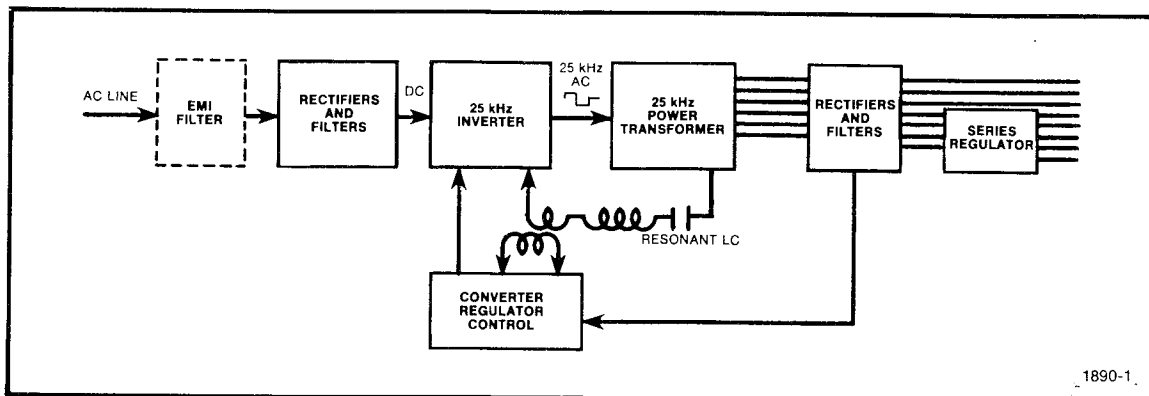


Fig. 1 - Simplified Block Diagram of the P7001 Power Supply.

Pre-regulation of the voltage applied to the power transformer is accomplished by controlling the switching frequency of the inverter. Operating frequency is basically determined by the resonant frequency of a series-LC network (L37, C37) placed in series with the primary of the power transformer. A sample of the primary current in T101 is rectified and used to trigger U01. U01, in turn, controls the time that either half of the inverter can be triggered. Pre-regulation to about 1% is achieved by this means.

CIRCUIT DESCRIPTION

Inverter & Rectifiers

The Inverter & Rectifiers circuit provides the operating power for the P7001 from the AC line (see Diagram 11). A block diagram of the Inverter & Rectifiers circuit is shown in Fig. 2.

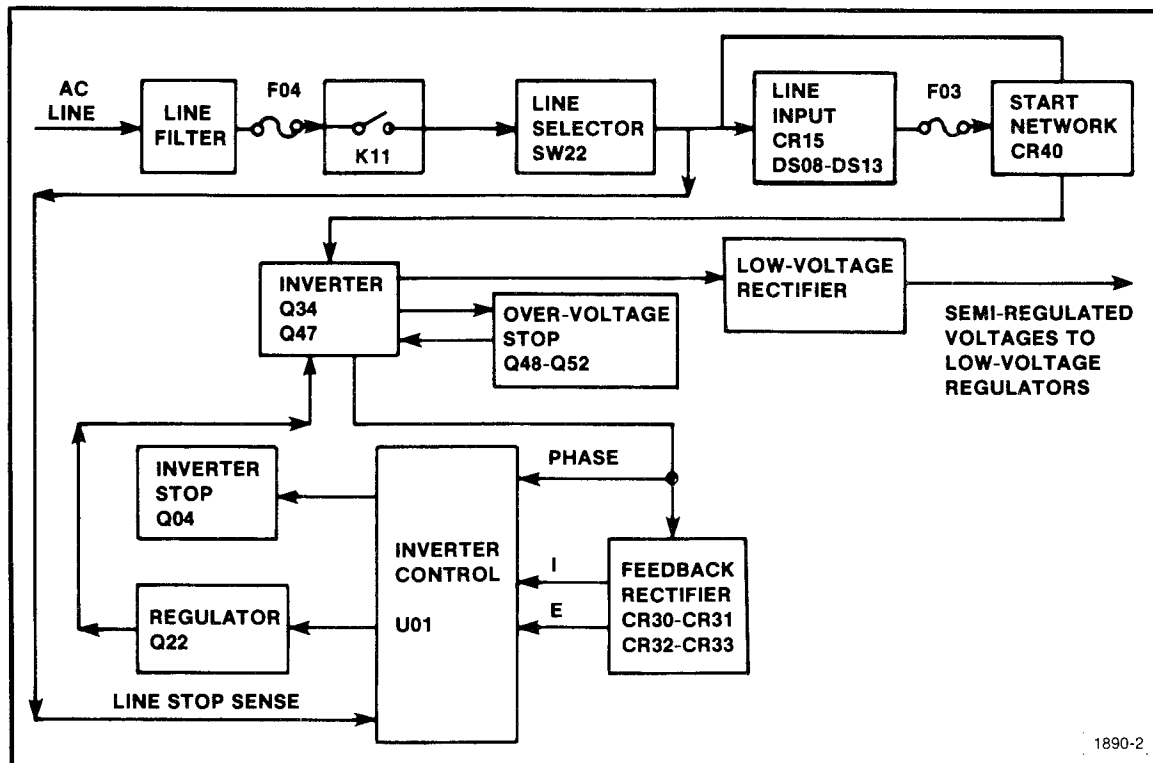


Fig. 2 - Inverter/Rectifier Block Diagram

AC Line Input

Power is applied through the Line Filter, Line Fuse F04, the contacts of K11, and the Line Selector switch S22. K11 is energized by the -15 V supply in the A7704 Acquisition Unit. The Line Filter serves to keep power-line interference from entering the instrument.

Line Selector switch S22 permits the instrument to operate from either a 115-volt nominal or a 230-volt nominal line-voltage source. In

the 115-volt position, rectifier CR15 operates as a full-wave doubler with C16 and C17, so the voltage across the two capacitors in series will be the peak-to-peak value of the line voltage. For 230-volt operation, CR15 is connected as a bridge rectifier and C16-C17 operate as energy-storage filter capacitors. As a result, the output voltage applied to the Inverter stage is essentially the same for either 115-volt or 230-volt operation.

Thermistor RT09 limits the surge current demanded by the power supply when it is first turned on. After the instrument is in operation, the thermistor resistance drops to a negligible value.

When power is turned off, the voltage drop at Line Stop Sense (Pin 4 of U01) initiates the Stop Trigger Out signal. This signal disables the Inverter.

CAUTION

Since C16 and C17 discharge slowly, dangerous potentials exist within the power supply for several minutes after the POWER switch is turned off. The presence of voltage in the circuit is indicated by the relaxation oscillator, R19-C19-DS19. Neon bulb DS19 will blink until the potential across C16-C17 drops to about 80 volts.

Surge Protectors

DS08 and DS13 are surge voltage protectors. For 115-volt operation, only DS08 is connected across the line input. If a peak-voltage surge in excess of about 230 volts is present on the line (or if the

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instrument is accidentally connected to a 230-volt source), DS08 will break down, passing high current. This excess current will quickly open line fuse F04 to interrupt the input power before the instrument can be damaged. For 230-volt operation, DS08 and DS13 are connected in series across the line input to provide protection for peak voltages in excess of about 460 volts.

Line Stop

The Line Stop portion of U01 protects the Line-Input components and the P7001 Circuit Card components from damage due to quick turn-on surge current after a short turn-off time; i.e., while thermistor RT09 still has low resistance and C16 & 17 are still charged. This is achieved by triggering the Inverter Stop stage to stop the Inverter when the POWER switch is turned off. The Line Stop stage will also stop the Inverter if the AC line voltage falls below a minimum value.

The line-frequency signal from transformer T01 is connected to the Line Stop Sense input of U01 at pin 4. During normal operation, the line-frequency signal causes the Line Stop Timer terminal (pin 3) to be near a zero-volt level (ground). This zero-volt level keeps C17 from being charged toward +7.5 volts through R17. When the line-frequency signal is interrupted or falls below a minimum value, C17 will begin to charge to +7.5 volts. When the voltage at pin 3 reaches approximately +0.7 volt, the Line Stop stage will produce a positive Stop Trigger output at pin 8 of U01 to trigger the Inverter Stop stage.

Start Network

The input line voltage is applied to divider R10-R48. This voltage

charges C48. When the charge on C48 reaches about 32 volts above -e peak of the input line voltage, trigger diode CR40 conducts to provide a turn-on trigger current to Q47 via C42. This current starts operation of the Inverter stage. When the Inverter stage is operating, the recurrent waveform at the collector of Q47 keeps C48 discharged through CR46. This disables the Start Network during operation.

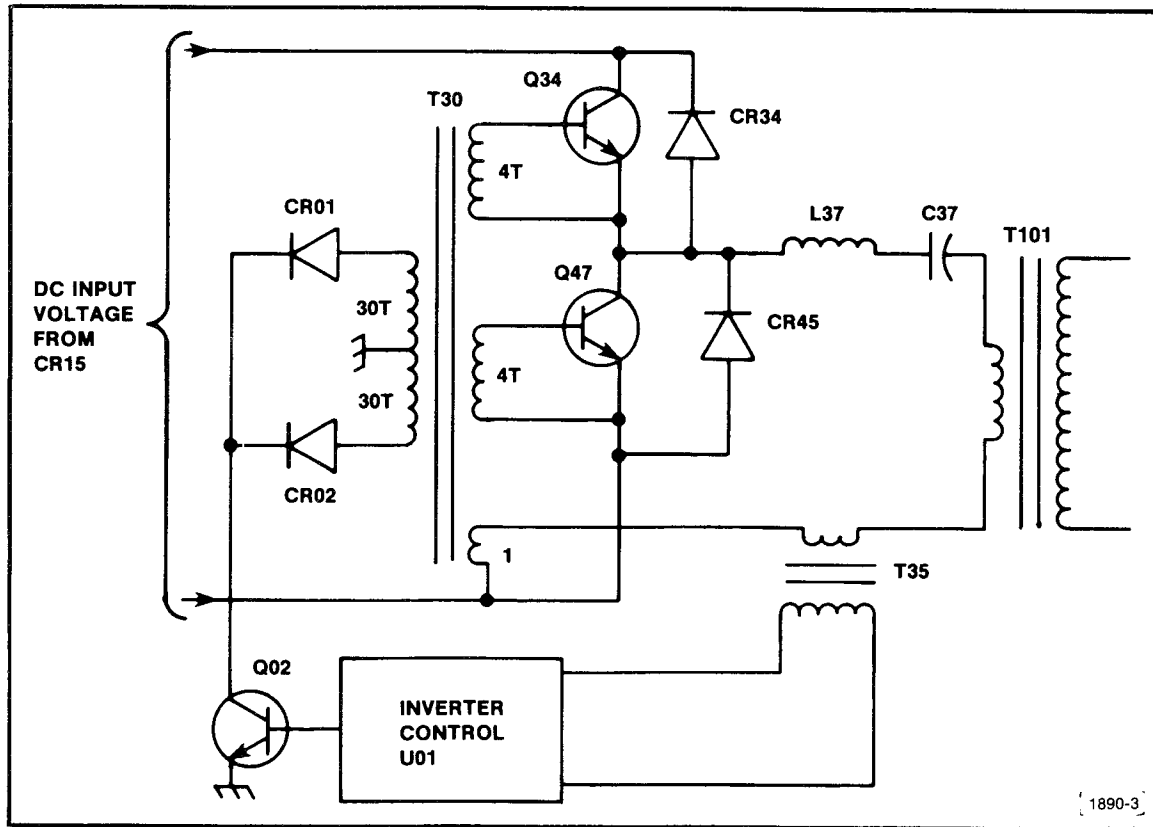


Fig. 3 - Simplified Schematic of Inverter and Regulator.

Inverter

A simplified schematic of the Inverter, Regulator, and Inverter Control stages is shown in Figure 3. After the Inverter has been started by the Start Network, the Inverter is self-oscillating. Feedback for oscillation is provided by base-drive transformer T30. Polarity of the windings causes Q34 and Q47 to conduct alternately. This

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generates a squarewave voltage at the emitter of Q34 with an amplitude approximately equal to the DC voltage at the input to this stage. Frequency of the switching action of Q34 and Q47 is determined basically by the series resonant circuit L37 & C37.

Q02 is the Regulator stage, which is controlled by the Inverter Control stage (U01). These stages delay the turn-on of Q34 or Q47 to provide pre-regulation of the voltage induced in the secondary of T101. When Q02 is on, the voltages on all secondaries of T30 will be zero, and both Q34 and Q47 will be off. Current in the resonant circuit will flow alternately through CR34 and CR45 when Q34 and Q47 are off. Transformer T35 samples the resonant-circuit current to provide current-phase information to the Pre-Regulator inputs of the Inverter Control stage to control conduction of the Regulator stage.

The normal sequence of operation is as follows: Assume that the sinewave current in the series resonant circuit (L37-C37) is passing through zero and is increasing in the direction to cause CR34 to conduct. At zero crossing, Q02 turns on to hold Q47 off (CR34 will conduct as long as Q47 is off). At a controlled time after zero crossing, Q02 is turned off by the Inverter Control stage. Q47 then turns on, causing CR34 to be reverse biased. Q47 conducts as the current goes through its peak and back to zero.

At zero crossing, with current increasing in the opposite direction, Q02 turns on to hold Q34 off. During this Inverter Control time, CR45 conducts while Q34 is off. When the Inverter Control stage turns Q02 off, Q34 will be turned on, causing CR45 to be reverse biased. Q34 conducts as the current goes through its peak and back to zero. The

cycle then repeats, with Q02 turning on to hold Q47 off.

Refer to the Inverter/Rectifiers Diagram #11 fold out from the back of this manual. After the Inverter stage has been started by the Start Network, as discussed previously, L37-C37 resonates at a frequency of about 25 kilohertz. The feedback to the base circuits of Q34 and Q47, through T30, alternately turns Q34 and Q47 on. These transistors operate at a forced beta of four due to the turns ratio of T30, and their output current sustains oscillation in L37-C37. The 60-turn center-tapped winding of T30 serves to delay the turn-on of Q34 or Q47 to provide pre-regulation of the voltages produced in the secondary of R101. This operation will be discussed in more detail under Pre-Regulator.

Over-Voltage Stop

Q48 and Q52 provide a means to stop the Inverter whenever the voltage across the primary of T101 exceeds a safe level. This stage is activated whenever the load on T101 is removed or the normal voltage-regulating path through Q02 and T30 is inoperative.

CR57 charges C49 to the peak of the voltage across the primary of T101. If this voltage exceeds a safe level (approximately 100V), VR54 will conduct and turn on Q52. C49 will discharge through R52, Q52, and the base-emitter junction of Q48. This current turns Q48 on to cause Q47 to be held off and stop the Inverter. The Inverter cannot restart until the start network raises CR40 to 32 volts (the breakdown voltage of CR40) to energize the Inverter.

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Inverter Control

The Inverter Control stage, made up primarily of U01, provides pre-regulation and fault protection for the low-voltage power supplies. For pre-regulation purposes, U01 provides the regulator output to the Regulator stage to vary the Inverter frequency. Fault protection is achieved through the Regulator output (as for pre-regulation) or by providing the Stop Trigger output to the Inverter Stop stage to turn the Inverter off.

U01 includes a monostable multivibrator that is initially triggered by current-phase information fed back from the Inverter stage. The sensing inputs to U01 determine the multivibrator pulse width. The multivibrator Regulator output drives the Regulator stage through pin 9 of U01. Under normal operating conditions, only the E Sense input at pin 15 has control over the output pulse width for pre-regulation. However, an error detected by any of the sensing inputs will produce a Stop Trigger to the Inverter Stop stage. The operation of each individual function of the Inverter Control stage is described in the following discussions.

Pre-Regulator

The Pre-Regulator portion of U01, in conjunction with the Regulator stage, maintains constant voltages at the outputs of the Low-Voltage Rectifiers.

Transformer T35 provides Inverter power and phase information to U01. The phase information is connected to the trigger input of the Inverter Control multivibrator via pins 10 and 11 (through C25 and C26). Bridge rectifier CR30-CR31-CR32-CR33 provides positive and negative operating voltages to U01. A shunt regulator in U01 regulates the +7.5-volt output of the bridge rectifier connected to pin 6. The -2 volt output

connected to pin 7 is unregulated. VR47 provides a stable reference voltage for the sensing-divider resistors R42-R43-R44-R46-R47. In this divider, R43 adjusts the voltage level at the E Sense input to the Pre-Regulator (pin 15-U01) to set the output voltage of the Low-Voltage Rectifiers.

In the stable state of the Inverter Control multivibrator, the Regulator output at pin 9 is near ground to turn off the Regulator stage. After the Inverter current passes through zero, either pin 10 or pin 11 will go positive to trigger the Inverter Control multivibrator into its astable state. While the multivibrator is in the astable state, the Regulator output voltage level is positive to turn on the Regulator stage. The duration of the astable state is determined by the voltage level at the E Sense input at pin 15. If this voltage level is low, the duration is short. As this voltage level increases, the duration increases.

Fault Protection

The fault-protection portions of U01 protect the power-supply components from damage due to short circuits, excessive current loads, and other malfunctions. When a fault is detected at the I Sense input (pin 13), current at the Sample Period Timer output (pin 1) charges C14. If the detected fault lasts longer than about 30 milliseconds, C14 (a timing component of a timer circuit in U01) charges positive enough to produce a Stop Trigger output at pin 8 to turn the Inverter off. When the Inverter is shut off, the current charging C14 is interrupted and C14 will discharge. After about 450 milliseconds, the Stop Trigger output will return to a near zero-volt level to allow the Inverter to be

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triggered by the start network. This cycle repeats until the fault is corrected; the Inverter is on for about 30 milliseconds, then off for about 450 milliseconds.

Inverter Current Limiter

The Inverter Current Limiter provides protection for the Inverter components from damage due to excessive current. Operation of this stage is similar to the Pre-Regulator (voltage regulation). The Inverter Current Limiter takes control of the Inverter Control Regulator output pulse width during turn-on or whenever an overload causes the Inverter current to reach the limit value.

R37 is the current-sensing resistor. The voltage at the junction of R36-R37-CR38 is the negative rectified Inverter voltage. The I Sense input at pin 13 is normally held positive through R35. If the Inverter current increases, the voltage at the I Sense input will become more negative. The Inverter Control Regulator output pulse width increases until the Inverter current reaches a value to hold pin 13 near the zero-volt level. If the voltage at pin 13 remains near zero for more than approximately 30 milliseconds, the Stop Trigger output at pin 8 will go positive to trigger the Inverter Stop stage.

Regulator

The Regulator stage operates in conjunction with the Inverter Control and Inverter Stop stages to regulate the Inverter switching. Q02 acts as a switch, controlled by the Regulator output of U01 (pin 9) or by the Inverter Stop stage. When Q02 is turned on, CR01 and CR02 are forward biased. This effectively short-circuits the 60-turn

center-tapped winding of T30 to shut off the Inverter. For further information, please see the discussion of the Inverter stage.

Inverter Stop

The Inverter Stop stage, Q04, is controlled by the Stop Trigger output of U01 (pin 8) to shut off the Inverter through the Regulator stage. During the start period, T30 supplies current to charge C06 and C08 via CR06 and CR08. Also, during this time, Q04 is reverse biased by U01. Once triggered on by a positive Stop Trigger, Q04 will stay on while C06 and C08 discharge through the base of Q04. If U01 is removed from its socket or is otherwise non-functional, the Inverter Stop stage will stop the Inverter after the first few cycles of operation. In this mode, the duty cycle will be much shorter because C06 and C08 will not have sufficient time to charge.

Low-Voltage Rectifiers

The rectifiers and filter components in the secondaries of T101 provide rectified, pre-regulated voltages for further regulation by the Low-Voltage Regulators circuit. Error-sense voltage from the +5.1 volt supply is fed back to U01 to control the current of the Inverter drive to the Low-Voltage Rectifiers stage.

Voltage Regulators

The Voltage Regulators circuit (see Diagram 12) converts semi-regulated voltages from the Inverter & Rectifiers circuit to stabilized, low-ripple output voltages. The -50 Volt and +50 Volt supplies are referenced to zener diodes. The remaining supplies (excepting V_{mem}) are

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referenced to the -50 Volt supply. Each supply (except +50 V) includes a short-protection circuit to prevent instrument damage if a supply is shorted to ground or to another supply.

-50 Volt Supply

The following discussion includes the description of the -50 V Series Regulator, -50 V Feedback Amplifier, -50 V Reference, and -50 V Current Limiting stages. Since these stages are closely related in producing the -50 V regulated output voltage, their operation is most easily understood when discussed as a unit. Refer to Fig. 4 and Voltage Regulators Schematic Diagram 12.

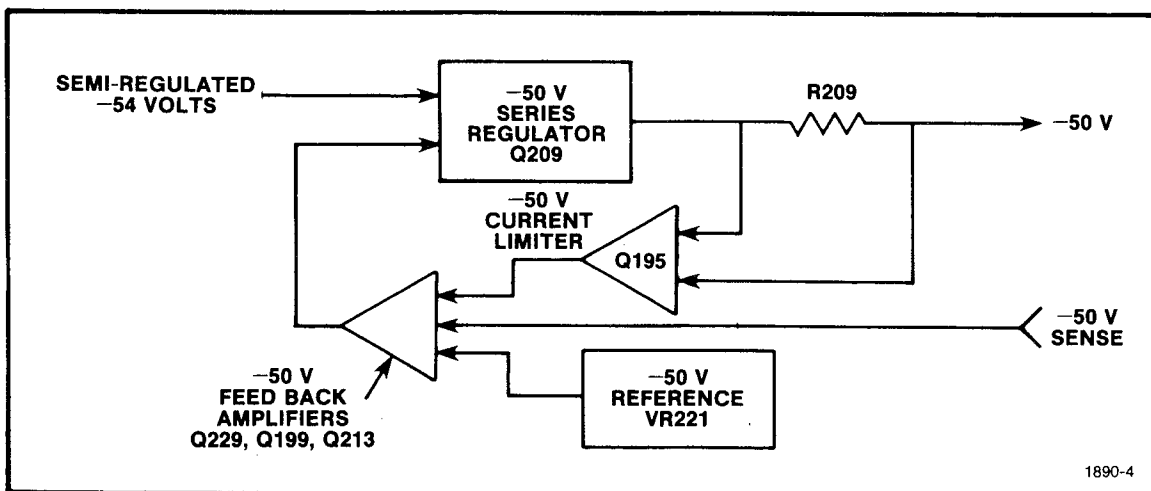


Fig. 4 - -50V Regulator Block Diagram.

Semiregulated -54 volts from the Inverters & Rectifiers circuit provides the unregulated voltage source for this supply. Q199, Q213, and Q229 operate as a feedback-stabilized regulator circuit to maintain a constant -50 volt output level. Q229 is connected as a differential amplifier to compare the feedback voltage at the base of Q229B against the reference voltage at the base of Q229A. The error output at the collector of Q229B reflects the difference, if any, between these two inputs. The change in error-output level at the collector

of Q229B always in the opposite direction to the change in the feedback input at the base of Q229B.

Zener diode VR221 sets a reference level of about -9 volts at the base of Q229A. The -50 V sense voltage is connected to the base of Q229B via divider R231, R233, And R235. R233 is this divider is adjustable to set the output level of the -50 V supply. The feedback voltage to this divider is obtained from the -50 V Sense. If the feedback voltage were obtained at the supply, the voltage at the load would not stay constant, due to the inherent resistance of the interconnecting cable between the supply and its load (as the load current varies, cable voltage drop also varies). The Sense configuration overcomes this problem by sensing the voltage at the load. Since the current in the Sense line is small and constant, the load voltage is held constant regardless of the load current.

Regulation occurs as follows: If the output level of this supply decreases (less negative) due to an increase in load or a decrease in input voltage (as a result of line-voltage changes or ripple), the voltage across divider R231-R233-R235 decreases also. This results in a more positive feedback level at the base of Q299B than that established by the -50 V Reference stage at the base of Q229A. Since the transistor with the more positive base controls the conduction of the differential amplifier, the output current at the collector of Q229B increases. This increase in output from Q229B increases the current through Q199. This causes the current through Q213 to increase, resulting in increased conduction of the -50 V Series Regulator (Q209). As available load current increases, the output voltage

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of this supply also rises (more negative). As a result, the feedback voltage from the -50 V Sense line increases and the base of Q229B returns to the same level as the base of Q229A.

If the output level of the -50 V supply rises, correction is made in the same manner as described above, but in the opposite direction for each transistor.

The -50 V Current Limiting stage (Q195) protects the -50 V Supply if excess current is demanded. Since the supply is connected to the load through R209, all current from the supply must flow through this resistor. Q195 senses the voltage drop across R209. In normal operation, this voltage drop is insufficient to forward bias Q195. However, when excess current is demanded due to a short circuit or similar malfunction in the load, the drop across R209 increases until Q195 is forward biased. The resulting collector current from Q195 reduces current through Q199 and Q213, limiting the current through Q209.

CR209 prevents the output of this supply from going more positive than about +0.6 V if it is shorted to a positive supply. VR223 and CR221 supply a turn-on voltage for Q229 to start the -50 V Supply when the instrument is first turned on. As soon as the -50 V Supply output rises, VR223, and CR221 are reverse biased to disconnect the turn-on voltage.

-15 Volt Supply

Basic operation of all stages in the -15 V Supply is the same as for the -50 V Supply. Reference level for this supply is established by divider R187-R189, between ground and the -50 V Sense voltage. The

divider sets a level of -15 V at the base of Q191A. The level on the -50 V Sense line is held constant by the -50 V Supply. Any change at the output of the -15 V Supply appears at the base of Q191B as an error signal. The output voltage is regulated in the same manner as described for the -50 V Supply.

CR177 limits the output of this supply from going more positive than about +0.6 V if it is shorted to one of the positive supplies. CR191 and CR193 provide reverse-voltage protection for Q191A and B.

Remaining Supplies

The remaining supplies operate in the same manner as the -50 V and -15 V supplies, with the following exceptions:

The +50 V Supply uses a zener diode (VR03) as a reference, setting the voltage on the base of Q05. CR05 prevents the supply from going negative more than approximately -0.6 V in the event that the supply becomes shorted to a negative supply.

The output of V_{mem} is used when a core memory is installed in the P7001. If Semiconductor memory is used, then the V_{mem} output voltage is not used. V_{mem} output voltage is controlled by the resistance of a thermistor, located on the Memory Mat board. The voltage is set by the Memory Volts adjustment on the Memory Data Register board Diagram 8A (Core Memory manual).

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POWER FAIL SIGNAL

The Power Fail signal serves to prevent operation of the various circuit cards until the power supplies have reached their regulated levels, and also retains status of vital information in the Memory and other cards in the event that AC power to the P7001 is interrupted during operation (see Fig. 5 Power Fail signal).

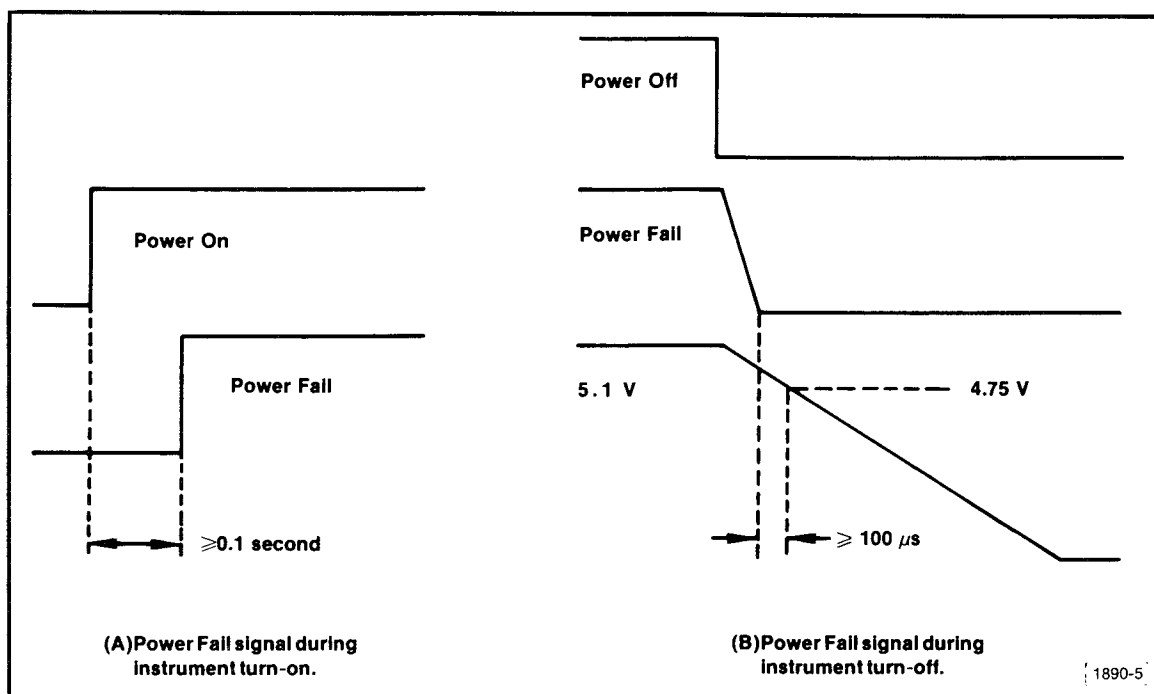


Fig. 5 - Power Fail Signal.

Normal state of the Power Fail signal during operation is a TTL high logic level. This is generated as follows:

Please refer to the Inverter & Rectifiers 11 schematic. The secondary of T35 drives the bridge rectifier CR30, CR31, CR32, and CR33. The positive output across C27 is applied to the emitter of Q27, and through R27 to pin 6 or the Inverter Control stage (U01).

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Circuitry within the Inverter Control clamps this voltage at +7.5 V. Q27 serves as protection for the Inverter Control in the event that the output current from the bridge rectifier rises to a dangerous level.

The bridge output at the emitter of Q27 is coupled to P61, terminal 2 as a Power Fail Sense signal. Note that failure of output from the Inverter stage would cause the Power Fail Sense signal to be a low level.

On the Voltage Regulators board (Diagram #12), the Power Fail Sense signal appears on P61, terminal 2. VR111 serves to drop the voltage to a proper level to turn on U11A. Assuming normal operating conditions, a positive level appears at the base of U11A. The resulting drop at the collector of U11A turns off Q117. The voltage at the junction of R117/R119 (collector circuit of Q117) attempts to rise. R119/C119 serve to slow this rise, causing a delay. After this delay (approximately 0.1 second), U111D and U111E turn on, and the collector of U111E drops sufficiently to turn off U111C. This allows the Power Fail line at P14, terminal 6, to rise to the TTL high state (see Fig. 5A).

At instrument turn-off (or power failure), the Power Fail signal drops rapidly to a low state before critical DC voltages in the instrument have dropped sufficiently to cause loss of Memory information (must go TTL low at least 100 μ s before the +5.1 V supply falls to +4.75 V). This is accomplished as follows:

The loss of power causes the Power Fail Sense signal at P61, terminal 2, to drop to low (as previously described). This turns off

U111A, which turns U111B on, pulling down the Power Fail line (see Fig. 5B).

Due to the unpredictability of which power supply voltage will drop to zero first (depends on loading conditions at the time), the +7 V supply in the collector circuit of U111E may drop to the point which could allow U111C to turn off before desired, allowing Power Fail to rise again. This is prevented by the forward-biasing of U111C via R01, CR01, and CR03 to the +54 V supply.

TROUBLESHOOTING

The following information is provided to facilitate troubleshooting of the P7001 power supply. Before doing any extensive troubleshooting of the P7001 power supply, insure that neither the P7001 nor the 7704A is causing the problem. Attempting to operate the DPO with some of the circuit cards or all of the Plug-ins removed sometimes causes the power supply to operate in the "burst" mode. Also check the APD interconnect (P20-J20) for proper seating. Information contained in the P7001 Service Manual should be used along with the following information to aid in locating the defective component. An understanding of the circuit operation is very helpful in locating troubles. See the P7001 Service Manual for further information on test equipment and general troubleshooting techniques.

Troubleshooting Procedures

Valuable time can be saved by noting symptoms that can serve as clues to the section in trouble. For example, the power supply has two basic failure modes:

- 1) The inverter is working in the "burst" mode, as evidenced by a ticking sound occurring about four times a second.
- 2) The P7001 is dead, no inverter operation at all, possible the sign of a blown fuse. The relay voltage (+15V) is present at K-11 (Diagram 11), as evidenced by the click heard when the DPO is turned on.

Let's examine these two problems separately.

PROBLEM 1: The inverter is working in the burst mode.

PROCEDURE: Remove the line plug. Remove the instrument side panels and locate the test points on the Main Interface board located on the right side of the P7001 near the center (see Fig. 6).

Using a VOM, take resistance readings between the supply test points on the Main Interface board and ground. These resistances are not exact and up to a 20% difference may be encountered in a normally operating instrument and/or a different VOM. The VOM used for these readings was a Triplet model 630-NA. A low resistance reading usually indicates trouble in the mainframe or in the circuit cards. Refer to the P7001 Service Manual for further information.

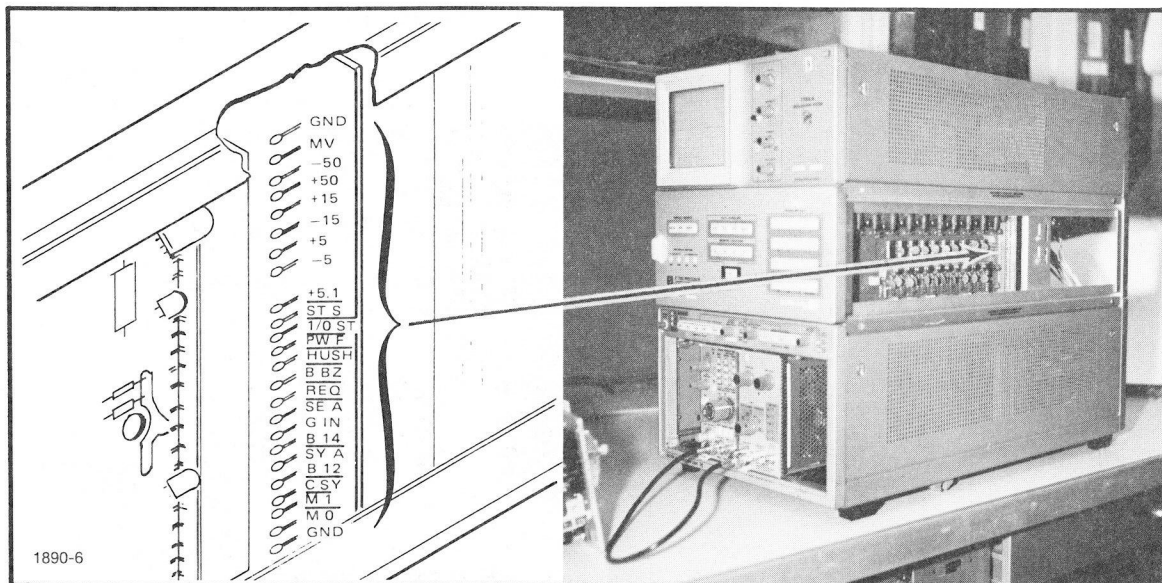


Fig. 6 - Main Interface Board Test Points.

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A. Check resistances of the supplies and mainframe:

<u>Supply Point</u>	<u>Norm Res</u>	<u>VOM Scale</u>
+15M	5k Ω	X 1k
-50V	3k Ω	X 1k
+50V	10k Ω	X 1k
+15V	300 Ω	X 100
-15V	200 Ω	X 100
+5V	200 Ω	X 100
-5V	60 Ω	X 10
+5.1V	10 Ω	X 1

To perform the next step it is necessary to remove the Display Unit from the DPO. To do this:

- 1) remove the side panels,
- 2) lift J-20 off the APD Interconnect board on the right side of the Display Unit and store it in its holder (see Fig. 7),

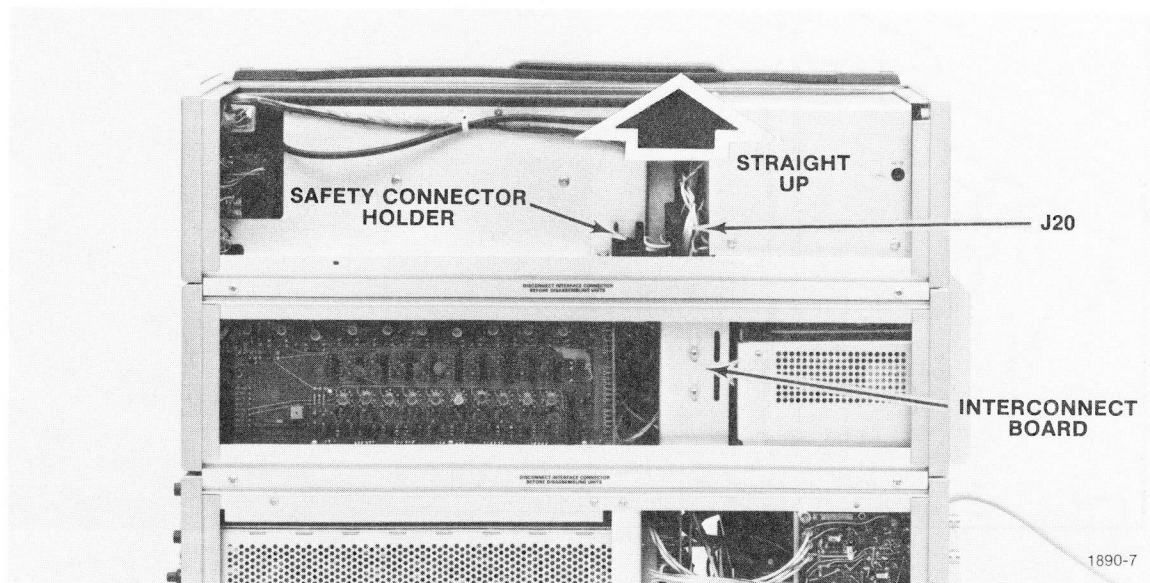


Fig. 7 - J 20/APD Interconnect Board.

- 3) remove the four screws holding the side rails onto the Display Unit, and
- 4) the Display Unit may now be lifted up and off the DPO. (Refer to the P7001 Main Interface manual for exact procedures.)

Disconnect all connections between the power supply and the mainframe. Refer to Fig. 16 fold out from the back of this manual.

B. Check resistances of the mainframe only, taking readings at the same test points on the Main Interface board.

<u>Supply Point</u>	<u>Norm Res</u>	<u>VOM Scale</u>
+15M	15k Ω	X 1k
-50V	10k Ω	X 1k
+50V	12k Ω	X 1k
+15V	300 Ω	X 100
-15V	200 Ω	X 100
+5V	250 Ω	X 100
-5V	60 Ω	X 10
+5.1V	10 Ω	X 1

If the mainframe readings are close to those listed, the trouble is probably in the power unit.

To gain access to components inside the power supply, remove the four screws holding the power unit into the rear frame of the P7001. Slide the unit out the rear. Remove the ground connecting wire at the mainframe end. The supply is now free of the mainframe, making it easy to remove the covers.

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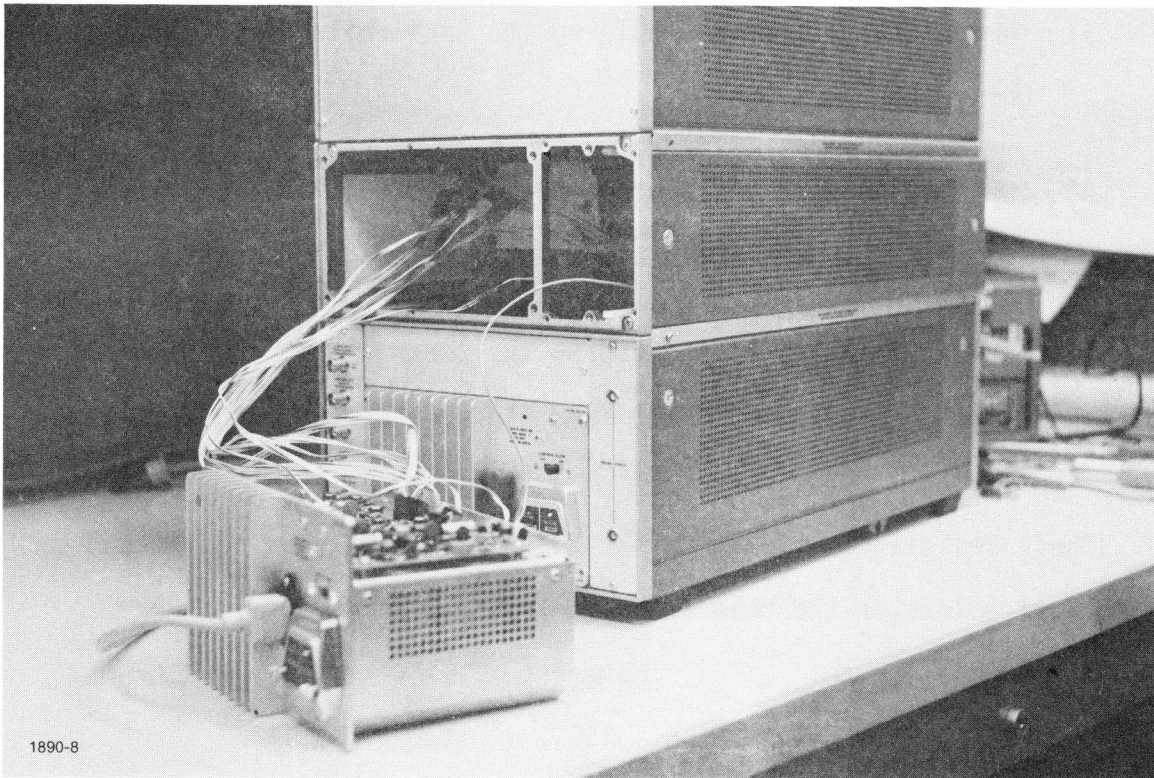


Fig. 8 - P7001 Power Supply with Extension Cables.

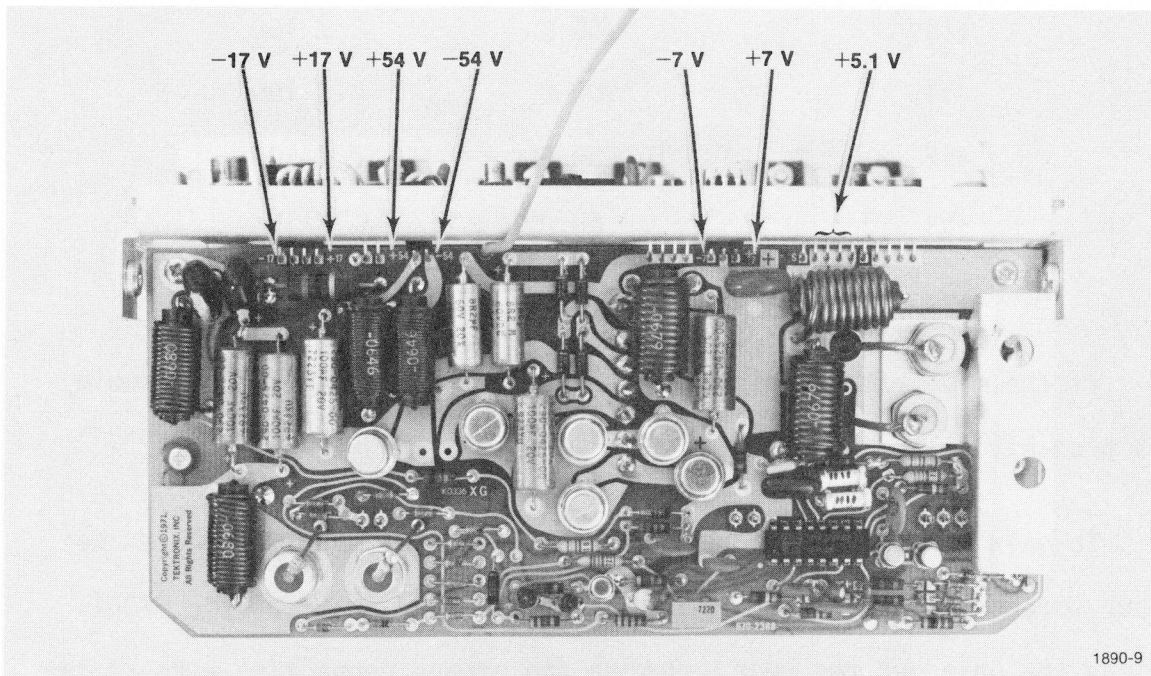


Fig. 9 - Rectifier-Filter Board.

WARNING

The primary storage capacitors, C16 and C17, remain charged with high dc voltage for several minutes after the line power is disconnected. A neon bulb located on the power supply inverter board (see Fig. 11, page 28) flashes when this stored voltage exceeds about 80 volts. Do not remove the power unit covers while this light is flashing.

After removing the covers the power supply can be positioned with extension leads connected so the DPO can operate (see Fig. 8). Extensions lead part numbers will be available at a later date.

Replace the Display Unit on the P7001 and carefully reconnect J-20 onto the APD Interconnect Card.

There are a number of faults that will cause the supply to operate in the burst mode. Let's examine the symptoms and the probable causes individually.

SYMPTOM 1: Burst operation---resistances normal.

PROBABLE CAUSE: One of the semi-regulated voltages at the points indicated on the rectifier-filter board (Fig. 9) is inoperative. With your test scope set for a sweep of 50 mS/div, vertical sensitivity for an on-screen display using a 10X probe and dc coupling, the voltage waveforms should resemble that of Fig. 10.

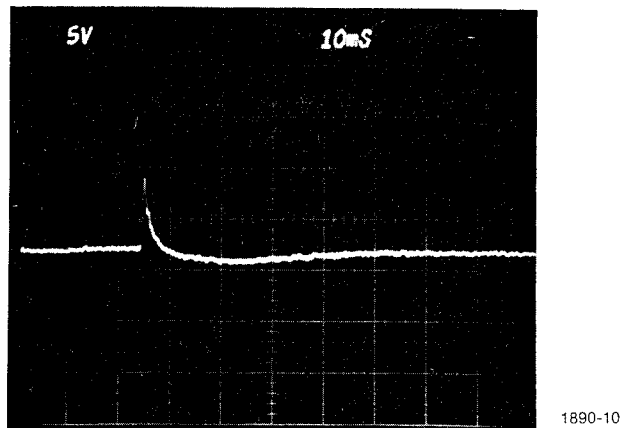


Fig. 10 - Typical Supply Voltage Waveform

If the burst voltage is within about 15% of the stated semi-regulated value the supply is probably all right. If abnormally low, remove the power, wait two or three minutes for the large filter capacitors to discharge and then check the tantalum filter capacitors associated with the supply for shorts or leakage. For example: check C51 and C55 if the +54V & -54V supply is low.

NOTE

To speed servicing, you can use a 1.5 k ohm, 2 watt insulated resistor to discharge the storage capacitors (C16 and C17). Do not place a dead short across the capacitors as this can damage them.

SYMPTOM 2: Burst operation---semi-regulated voltages normal.

PROBABLE CAUSE: Inverter control circuit problems.

PROCEDURE: Check U01 and the components in the inverter control loop. A good place to start checking is pins 6, 7, 10, and 11 back to T35 and then pins 8 and 9 back to T30.

Another point to check is the over-voltage protection circuitry Q52 and VR54. If the zener voltage of VR54 has shifted it can cause erratic operation.

If these circuits are normal, check on the Inverter and Rectifier board for shorted or leaky components.

PROBLEM 2: Now let's consider the conditions which cause either the 2 amp or the 4 amp fuse to blow.

SYMPTOM: The P7001 is inoperative and the 4 amp fuse is blown.

PROBABLE CAUSE: Trouble in the line input circuitry or in the inverter section.

PROCEDURE: Remove the line plug from ac power and allow capacitors, C16 and C17, to discharge. Check diode bridge, CR15, and the associated line input circuit for a shorted component. If a shorted component is found and replaced and if these circuits appear normal, replace the 4 amp fuse. Connect the line plug to a variable line source and advance the line voltage from 0 to 20 V ac. Using your test scope, check the waveform on each of the storage capacitors (C16, C17). The capacitors should have a 60 Hz waveform displaced by some amount of dc as in Fig. 11. The dc voltages should be equal in amplitude and of opposite polarity.

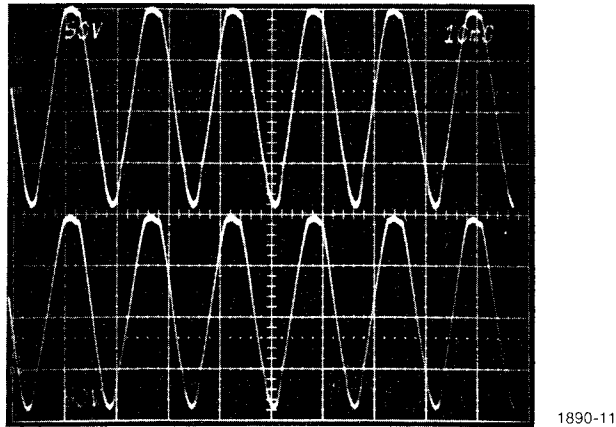


Fig. 11 - Waveform at C16 and C17.

SYMPTOM: The P7001 is inoperative and the 2 amp fuse is blown.

PROBABLE CAUSE: Malfunction in the inverter.

PROCEDURE: Remove the line plug from the variable line source and allow the storage capacitors to discharge as before. Remove the gray cover from the Inverter board. Remove Q34, Q47, CR34, and CR45 from the Inverter board and check their characteristics with a curve tracer or VOM.

Install the checked components in the Inverter board and replace the 2 amp fuse. Locate T30 on the Inverter board and note a black wire loop that passes through small toroid T35. Connect a current probe (Tektronix P6021 with passive termination, or equivalent) to the black lead and set the test scope for an equivalent vertical sensitivity of 1 A/div and set the time base for 2 ms/div.

Connect the line plug to the variable line control which should

be set at 0V. Slowly increase the line voltage and note a burst waveform of about 20 kHz occurring at about 60 V ac (see Fig. 12). As you continue to increase the line voltage, stable operation should occur at about 85 V ac. Analysis of these waveforms should give you a clue to the circuitry in trouble.

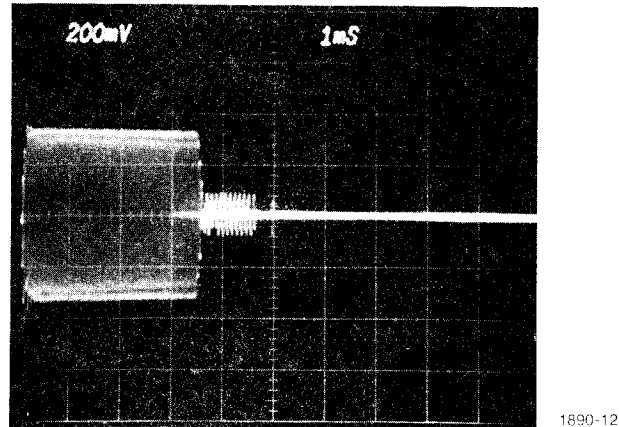


Fig. 12 - "Burst" Signals.

SYMPTOM: The inverter does not run and the fuses are good.

PROBABLE CAUSE: Inverter circuit malfunction.

PROCEDURE: Remove the line plug and allow storage capacitors to discharge as before. Remove Q34, Q47, CR34, and CR45 and check their characteristics with a curve tracer.

Install the checked components and check the circuit for operation as in the preceding procedure. If the power unit is still inoperable, connect your test scope, using a 10X probe, to TP34 on the Inverter board (see Fig. 13). Set the variable line control at 20 V ac and check to see that the 60 Hz waveform is approximately dc centered (see Fig. 14). If not centered, check Q48, CR32, CR46, CR42, CR50, and CR57 for shorts or leakage.

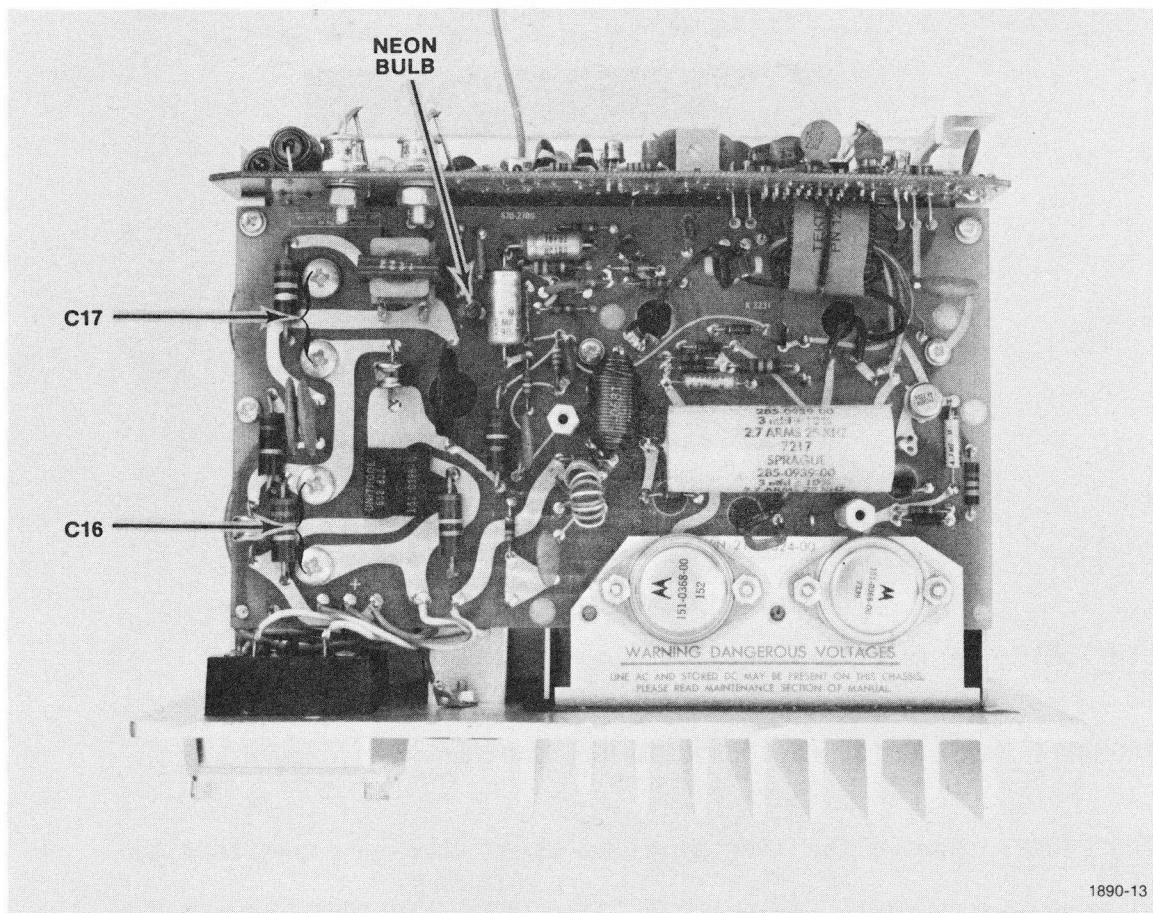
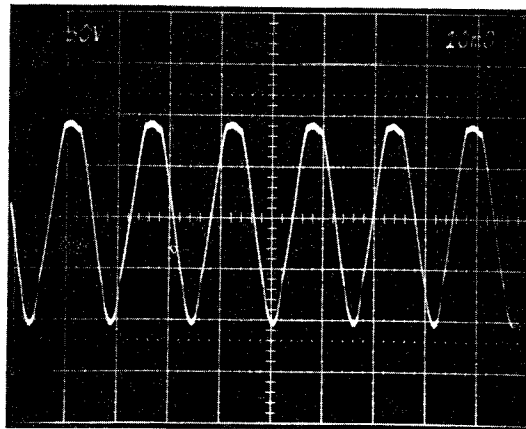


Fig. 13 - Inverter Board.



1890-14

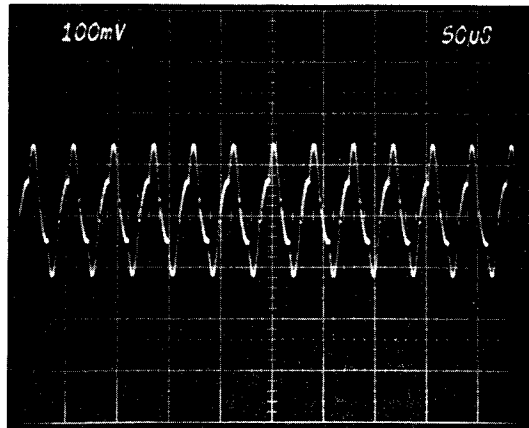
Fig. 14 - Waveform at TP34.

Increase the line voltage to 60 V ac and check to see that the 60 Hz waveform has start triggers at each negative tip. If no start triggers occur, check CR40 characteristics on the curve tracer.

SYMPTOM: Unstable inverter operation.

PROBABLE CAUSE: One of the semi-regulated voltages is of improper value.

PROCEDURE: With the current probe attached to the black wire loop associated with T30, adjust the variable line voltage for the most stable waveform. (The 20 kHz waveform should be limited to 5 amps peak-to-peak.) Check the raw voltages on the rectifier board with your VOM. They should be approximately as printed on the board. Fig. 15 shows the proper current waveform in the primary winding of T30 during normal operation of the Power Supply.



1890-15

Fig. 15 - Normal Current in Primary of T30.

A QUICK OPERATIONAL AND CALIBRATION CHECK

After locating and repairing the malfunction, it would be a good idea to make a quick operational and calibration check before installing the power unit back into the mainframe. Here are the points to check and adjust:

NOTE

The cable extender may introduce errors in the calibration of the power supplies. Re-calibrate, using these procedures, after the supply is installed back in the P7001.

- 1) If Core Memory is installed, check V_{mem} before proceeding.
 - a. Connect a DC voltmeter between the V test point on the Core Memory board and ground.
 - b. CHECK -- Meter reading should be approximately 13 volts. If this reading is other than 13 volts refer to the Calibration Procedure given in the Core Memory manual.

- 2) 5.1 Volt Power Supply
 - a. Connect the DC voltmeter between the 5.1 V test point on the Main Interface board and ground.
 - b. CHECK - Meter reading: 5.1 volts \pm 0.25 volts.
 - c. ADJUST - R43 the variable resistor on the Rectifier-Filter Board (Fig. 9, page 24) for a meter reading of 5.1 volts.

P7001 Power Supply

3) -50 V Power Supply

- a. Connect the DC voltmeter between the -50 volt test point on the Main Interface board and ground.
- b. CHECK - Meter reading: -50 volts \pm 0.5 volt.
- c. ADJUST - -50 volt adjustment R233, the variable resistor on the Regulator Board, for a meter reading of -50 volts.

4) Remaining supplies

- a. CHECK the remaining power supply voltages in the sequence given in Table 1. Test points are located on the Main Interface board.

TABLE 1

P7001 REGULATED POWER SUPPLY TOLERANCE

P7001 Power Supply	Output Voltage Tolerance
-15 V	\pm 0.18 V
- 5 V	\pm 0.1 V
+ 5 V	\pm 0.1 V
+15 V	\pm 0.3 V
+50 V	\pm 2.5 V

Note: Checking power supply voltages in the given sequence facilitates isolation of a regulated supply which may be affecting another regulated supply.

This completes the troubleshooting and recalibration procedure. Remove the extender cables and other connections, replace the power unit cover and reinstall the power unit in the mainframe. Refer to Fig. 16 fold out from the back of this manual for cable connecting instructions.

P7001 Power Supply

REPLACEABLE ELECTRICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number

00X Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
02735	RCA CORPORATION, SOLID STATE DIVISION	ROUTE 202	SOMERVILLE, NY 08876
02777	HOPKINS ENGINEERING COMPANY	12900 FOOTHILL BLVD.	SAN FERNANDO, CA 91342
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MURTL BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
05397	UNION CARBIDE CORPORATION, MATERIALS SYSTEMS DIVISION	11901 MADISON AVENUE	CLEVELAND, OH 44101
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
12969	UNITRODE CORPORATION	580 PLEASANT STREET	WATERTOWN, MA 02172
15454	RODAN INDUSTRIES, INC.	2905 BLUE STAR ST.	ANAHEIM, CA 92806
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
53944	ELT INC., GLOW LITE DIVISION	BOX 698	PAULS VALLEY, OK 73075
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73138	BECKMAN INSTRUMENTS, INC., HELIPOT DIV.	2500 HARBOR BLVD.	FULLERTON, CA 92634
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
77342	AMF INC., POTTER AND BRUMFIELD DIV.	200 RICHLAND CREEK DRIVE	PRINCETON, IN 47671
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
81483	INTERNATIONAL RECTIFIER CORP.	9220 SUNSET BLVD.	LOS ANGELES, CA 90069
84411	TRW ELECTRONIC COMPONENTS, TRW CAPACITORS	112 W. FIRST ST.	OGALLALA, NE 69153
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E WASHINGTON STREET	INDIANAPOLIS, IN 46206
91637	DALE ELECTRONICS, INC.	P O BOX 372 P. O. BOX 609	COLUMBUS, NE 68601

Replaceable Electrical Parts—P7001 Power Supply

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2377-01			CKT BOARD ASSY:VOLTAGE REGULATOR	80009	670-2377-01
A2	670-2388-01			CKT BOARD ASSY:RECTIFIER	80009	670-2388-01
A3	670-2700-01			CKT BOARD ASSY:INVERTER	80009	670-2700-01
A1	670-2377-01			CKT BOARD ASSY:VOLTAGE REGULATOR	80009	670-2377-01
C21	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C25	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C37	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C55	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C63	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C73	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C93	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C107	290-0194-00			CAP.,FXD,ELCTLT:10UF,+50-10%,100V	56289	30D106F100DC4
C109	290-0194-00			CAP.,FXD,ELCTLT:10UF,+50-10%,100V	56289	30D106F100DC4
C119	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C129	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C137	283-0001-00			CAP.,FXD,CER DI:0.005UF,+100-0%,500V	72982	831-559E502P
C147	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C169	283-0001-00			CAP.,FXD,CER DI:0.005UF,+100-0%,500V	72982	831-559E502P
C181	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C201	283-0001-00			CAP.,FXD,CER DI:0.005UF,+100-0%,500V	72982	831-559E502P
C211	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C227	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C235	283-0178-00			CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
CR01	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR03	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR05	152-0066-01			SEMICONV DEVICE:SILICON,400V,1A	80009	152-0066-01
CR07	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR33	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR39	152-0066-01			SEMICONV DEVICE:SILICON,400V,1A	80009	152-0066-01
CR41	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR71	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR73	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR75	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR77	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR97	152-0066-01			SEMICONV DEVICE:SILICON,400V,1A	80009	152-0066-01
CR131	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR135	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR139	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR157	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR159	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR161	152-0066-01			SEMICONV DEVICE:SILICON,400V,1A	80009	152-0066-01
CR165	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR167	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR171	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR177	152-0066-01			SEMICONV DEVICE:SILICON,400V,1A	80009	152-0066-01
CR191	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR193	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR195	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR197	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR199	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152

Replaceable Electrical Parts—P7001 Power Supply

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR209	152-0066-01			SEMICON D DEVICE:SILICON,400V,1A	80009	152-0066-01
CR221	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR227	152-0233-00			SEMICON D DEVICE:SILICON,85V,100MA	80009	152-0233-00
CR229	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
CR235	152-0141-02			SEMICON D DEVICE:SILICON,30V,150MA	07910	1N4152
Q03	151-0350-00			TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q07	151-0350-00			TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q15A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q27	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q29	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q33A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q41	151-0350-00			TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q49A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q55	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q67	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q69A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q81A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q95	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q97	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q99A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q105	151-0150-00			TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q117	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q135	151-0216-00			TRANSISTOR:SILICON,PNP	80009	151-0216-00
Q139A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q147	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q159A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q167	151-0216-00			TRANSISTOR:SILICON,PNP	80009	151-0216-00
Q171A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q183	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q191A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q195	151-0347-00			TRANSISTOR:SILICON,NPN	80009	151-0347-00
Q199	151-0350-00			TRANSISTOR:SILICON,PNP	80009	151-0350-00
Q213	151-0136-00			TRANSISTOR:SILICON,NPN	02735	35495
Q229A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
R01	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R03	315-0301-00			RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R05	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R07	315-0182-00			RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R09	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R11	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R13	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R15	315-0134-00			RES.,FXD,CMPSN:130K OHM,5%,0.25W	01121	CB1345
R17	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R19	315-0820-00			RES.,FXD,CMPSN:82 OHM,5%,0.25W	01121	CB8205
R21	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R23	315-0334-00			RES.,FXD,CMPSN:330K OHM,5%,0.25W	01121	CB3345
R25	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R27	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R29	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R31	308-0701-00			RES.,FXD,WW:0.12 OHM,5%,2W	75042	BWH-R1200J
R33	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R35	321-0924-07			RES.,FXD,FILM:40K OHM,0.1%,0.125W	91637	MFF1816C40001B
R37	321-1296-07			RES.,FXD,FILM:12K OHM,0.1%,0.125W	91637	MFF1816C12001B

Replaceable Electrical Parts—P7001 Power Supply

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R39	315-0151-00			RES., FXD, CMPSN:150 OHM, 5%, 0.25W	01121	CB1515
R41	315-0182-00			RES., FXD, CMPSN:1.8K OHM, 5%, 0.25W	01121	CB1825
R43	315-0511-00			RES., FXD, CMPSN:510 OHM, 5%, 0.25W	01121	CB5115
R45	315-0153-00			RES., FXD, CMPSN:15K OHM, 5%, 0.25W	01121	CB1535
R47	315-0753-00			RES., FXD, CMPSN:75K OHM, 5%, 0.25W	01121	CB7535
R49	315-0134-00			RES., FXD, CMPSN:130K OHM, 5%, 0.25W	01121	CB1345
R51	315-0622-00			RES., FXD, CMPSN:6.2K OHM, 5%, 0.25W	01121	CB6225
R53	315-0750-00			RES., FXD, CMPSN:75 OHM, 5%, 0.25W	01121	CB7505
R55	315-0103-00			RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R59	308-0701-00			RES., FXD, WW:0.12 OHM, 5%, 2W	75042	BWH-R1200J
R61	315-0334-00			RES., FXD, CMPSN:330K OHM, 5%, 0.25W	01121	CB3345
R63	315-0152-00			RES., FXD, CMPSN:1.5K OHM, 5%, 0.25W	01121	CB1525
R65	315-0153-00			RES., FXD, CMPSN:15K OHM, 5%, 0.25W	01121	CB1535
R67	315-0681-00			RES., FXD, CMPSN:680 OHM, 5%, 0.25W	01121	CB6815
R69	315-0184-00			RES., FXD, CMPSN:180K OHM, 5%, 0.25W	01121	CB1845
R75	315-0273-00			RES., FXD, CMPSN:27K OHM, 5%, 0.25W	01121	CB2735
R77	315-0431-00			RES., FXD, CMPSN:430 OHM, 5%, 0.25W	01121	CB4315
R79	315-0562-00			RES., FXD, CMPSN:5.6K OHM, 5%, 0.25W	01121	CB5625
R81	315-0223-00			RES., FXD, CMPSN:22K OHM, 5%, 0.25W	01121	CB1525
R83	315-0152-00			RES., FXD, CMPSN:1.5K OHM, 5%, 0.25W	01121	CB1525
R85	315-0750-00			RES., FXD, CMPSN:75 OHM, 5%, 0.25W	01121	CB7505
R87	308-0701-00			RES., FXD, WW:0.12 OHM, 5%, 2W	75042	BWH-R1200J
R89	315-0273-00			RES., FXD, CMPSN:27K OHM, 5%, 0.25W	01121	CB2735
R91	315-0224-00			RES., FXD, CMPSN:220K OHM, 5%, 0.25W	01121	CB2245
R93	315-0103-00			RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R95	315-0103-00			RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R97	315-0681-00			RES., FXD, CMPSN:680 OHM, 5%, 0.25W	01121	CB6815
R99	315-0274-00			RES., FXD, CMPSN:270K OHM, 5%, 0.25W	01121	CB2745
R101	321-0924-07			RES., FXD, FILM:40K OHM, 0.1%, 0.125W	91637	MFF1816C40001B
R103	321-0926-07			RES., FXD, FILM:4K OHM, 0.1%, 0.125W	91637	MFF1816C40000B
R105	315-0470-00			RES., FXD, CMPSN:47 OHM, 5%, 0.25W	01121	CB4705
R111	315-0104-00			RES., FXD, CMPSN:100K OHM, 5%, 0.25W	01121	CB1045
R113	315-0103-00			RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R115	315-0472-00			RES., FXD, CMPSN:4.7K OHM, 5%, 0.25W	01121	CB4725
R117	315-0101-00			RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R119	315-0105-00			RES., FXD, CMPSN:1M OHM, 5%, 0.25W	01121	CB1055
R121	315-0472-00			RES., FXD, CMPSN:4.7K OHM, 5%, 0.25W	01121	CB4725
R123	315-0244-00			RES., FXD, CMPSN:240K OHM, 5%, 0.25W	01121	CB2445
R125	315-0751-00			RES., FXD, CMPSN:750 OHM, 5%, 0.25W	01121	CB7515
R131	315-0184-00			RES., FXD, CMPSN:180K OHM, 5%, 0.25W	01121	CB1845
R135	315-0272-00			RES., FXD, CMPSN:2.7K OHM, 5%, 0.25W	01121	CB2725
R137	315-0471-00			RES., FXD, CMPSN:470 OHM, 5%, 0.25W	01121	CB4715
R139	301-0103-00			RES., FXD, CMPSN:10K OHM, 5%, 0.50W	01121	EB1035
R141	315-0203-00			RES., FXD, CMPSN:20K OHM, 5%, 0.25W	01121	CB2035
R143	315-0391-00			RES., FXD, CMPSN:390 OHM, 5%, 0.25W	01121	CB3915
R145	308-0701-00			RES., FXD, WW:0.12 OHM, 5%, 2W	75042	BWH-R1200J
R147	315-0101-00			RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R149	315-0681-00			RES., FXD, CMPSN:680 OHM, 5%, 0.25W	01121	CB6815
R150	315-0470-00			RES., FXD, CMPSN:47 OHM, 5%, 0.25W	01121	CB4705
R151	315-0222-00			RES., FXD, CMPSN:2.2K OHM, 5%, 0.25W	01121	CB2225
R153	315-0152-00			RES., FXD, CMPSN:1.5K OHM, 5%, 0.25W	01121	CB1525
R155	321-0926-07			RES., FXD, FILM:4K OHM, 0.1%, 0.125W	91637	MFF1816C40000B
R157	321-0343-00			RES., FXD, FILM:36.5K OHM, 1%, 0.125W	91637	MFF1816G36501F

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R159	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R161	315-0151-00			RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R165	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R167	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R169	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R171	301-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.50W	01121	EB8225
R173	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R175	315-0391-00			RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R177	308-0701-00			RES.,FXD,WW:0.12 OHM,5%,2W	75042	BWH-R1200J
R179	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R181	315-0221-00			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R183	315-0681-00			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R185	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R187	321-1296-07			RES.,FXD,FILM:12K OHM,0.1%,0.125W	91637	MFF1816C12001B
R189	321-0332-07			RES.,FXD,FILM:28K OHM,0.1%,0.125W	91637	MFF1816C28001B
R191	315-0184-00			RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R195	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R197	315-0124-00			RES.,FXD,CMPSN:120K OHM,5%,0.25W	01121	CB1245
R199	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R201	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R203	301-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.50W	01121	EB1235
R205	301-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.50W	01121	EB1235
R207	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R209	308-0703-00			RES.,FXD,WW:1.8 OHM,5%,2W	75042	BWH-1R800J
R211	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R213	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R221	323-0264-00			RES.,FXD,FILM:5.49K OHM,1%,0.50W	91637	MFF1226G54900F
R223	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R227	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R229	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R231	321-0272-00			RES.,FXD,FILM:6.65K OHM,1%,0.125W	91637	MFF1816G66500F
R233	311-1225-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	32997	3386F-T04-102
R235	321-0338-00			RES.,FXD,FILM:32.4K OHM,1%,0.125W	91637	MFF1816G32401F
R239	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
U111	156-0048-00			MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY	80009	156-0048-00
VR03	152-0255-00			SEMICONV DEVICE:ZENER,0.4W,51V,5%	80009	152-0255-00
VR111	152-0280-00			SEMICONV DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR153	152-0226-00			SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	81483	69-6584
VR221	152-0212-00			SEMICONV DEVICE:ZENER,0.5W,9V,5%	80009	152-0212-00
VR223	152-0149-00			SEMICONV DEVICE:ZENER,0.4W,10V,5%	04713	1N961B
A2	670-2388-01			CKT BOARD ASSY:RECTIFIER	80009	670-2388-01
C05	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C06	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C08	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C13	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C14	290-0525-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
C17	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8131N075 E224M
C25	281-0605-00			CAP.,FXD,CER DI:200PF,10%,500V	04222	7001-1375
C26	281-0605-00			CAP.,FXD,CER DI:200PF,10%,500V	04222	7001-1375
C27	290-0572-00			CAP.,FXD,ELCTLT:0.1UF,20%,50V	56289	196D104X0050HA1

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
C29	290-0572-00		CAP., FXD, ELCTLT:0.1UF, 20%, 50V	56289	196D104X0050HA1
C34	283-0092-00		CAP., FXD, CER DI:0.03UF, +80-20%, 200V	72982	845-534E303Z
C43	283-0028-00		CAP., FXD, CER DI:0.0022UF, 20%, 50V	56289	19C606
C49	283-0111-00		CAP., FXD, CER DI:0.1UF, 20%, 50V	72982	8121-N088Z5U104M
C50	283-0594-00		CAP., FXD, MICA D:0.001UF, 1%, 100V	00853	D151F102F0
C51	290-0716-00		CAP., FXD, ELCTLT:8.2UF, 20%, 75V	05397	T11C825M075AS
C53	283-0003-00		CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-558Z5U-103Z
C55	290-0716-00		CAP., FXD, ELCTLT:8.2UF, 20%, 75V	05397	T11C825M075AS
C61	290-0425-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	THF107M020P1G
C63	290-0425-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	THF107M020P1G
C65	290-0519-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	TDC107M020WLD
C67	290-0425-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	THF107M020P1G
C69	290-0519-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	TDC107M020WLD
C71	290-0425-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	THF107M020P1G
C73	290-0519-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	TDC107M020WLD
C75	290-0425-00		CAP., FXD, ELCTLT:100UF, 20%, 20V	90201	THF107M020P1G
C81	290-0630-00		CAP., FXD, ELCTLT:300UF, +75-10%, 12V	56289	432D123
C83	290-0533-00		CAP., FXD, ELCTLT:330UF, 20%, , 6V	90201	TDC337M006WLD
CR01	152-0061-00		SEMICONV DEVICE:SILICON, 175V, 100MA	80009	152-0061-00
CR02	152-0061-00		SEMICONV DEVICE:SILICON, 175V, 100MA	80009	152-0061-00
CR03	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR06	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR08	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR17	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR18	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR19	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR20	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR30	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR31	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR32	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR33	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR38	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR39	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR40	152-0333-00		SEMICONV DEVICE:SILICON, 55V, 200MA	80009	152-0333-00
CR44	152-0141-02		SEMICONV DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR51	152-0413-00		SEMICONV DEVICE:SILICON, 400V, 750MA	80009	152-0413-00
CR53	152-0413-00		SEMICONV DEVICE:SILICON, 400V, 750MA	80009	152-0413-00
CR55	152-0413-00		SEMICONV DEVICE:SILICON, 400V, 750MA	80009	152-0413-00
CR57	152-0413-00		SEMICONV DEVICE:SILICON, 400V, 750MA	80009	152-0413-00
CR61	152-0397-00		SEMICONV DEVICE:SILICON, 50V, 12A	80009	152-0397-00
CR63	152-0412-00		SEMICONV DEVICE:SILICON, 50V, 3A	80009	152-0412-00
CR65	152-0412-00		SEMICONV DEVICE:SILICON, 50V, 3A	80009	152-0412-00
CR67	152-0397-00		SEMICONV DEVICE:SILICON, 50V, 12A	80009	152-0397-00
CR71	152-0412-00		SEMICONV DEVICE:SILICON, 50V, 3A	80009	152-0412-00
CR73	152-0412-00		SEMICONV DEVICE:SILICON, 50V, 3A	80009	152-0412-00
CR75	152-0412-00		SEMICONV DEVICE:SILICON, 50V, 3A	80009	152-0412-00
CR77	152-0412-00		SEMICONV DEVICE:SILICON, 50V, 3A	80009	152-0412-00
CR81	152-0540-00		SEMICONV DEVICE:RECTIFIER, 20V, 25A	04713	1N5829
CR83	152-0540-00		SEMICONV DEVICE:RECTIFIER, 20V, 25A	04713	1N5829
L51	108-0646-00		COIL, RF:80UH	80009	108-0646-00
L55	108-0646-00		COIL, RF:80UH	80009	108-0646-00
L61	108-0680-00		COIL, RF:27UH	80009	108-0680-00

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
L63	108-0680-00			COIL,RF:27UH	80009	108-0680-00
L71	108-0679-00			COIL,RF:12UH	80009	108-0679-00
L75	108-0679-00			COIL,RF:12UH	80009	108-0679-00
L81	108-0747-00			COIL,RF:7.5UH	80009	108-0747-00
Q02	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q04	151-0302-00			TRANSISTOR:SILICON,NPN	80009	151-0302-00
Q27	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
R05	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R06	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R08	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R09	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R10	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R11	304-0560-00			RES.,FXD,CMPSN:56 OHM,10%,1W	01121	GB5601
R17	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R19	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R27	315-0270-00			RES.,FXD,CMPSN:27 OHM,5%,0.25W	01121	CB2705
R29	315-0181-00			RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R34	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R35	321-0313-00			RES.,FXD,FILM:17.8K OHM,1%,0.125W	91637	MFF1816G17801F
R36	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R37	307-0108-00			RES.,FXD,CMPSN:6.8 OHM,5%,0.25W	80009	307-0108-00
R42	321-0282-00			RES.,FXD,FILM:8.45K OHM,1%,0.125W	91637	MFF1816G84500F
R43	311-1239-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.50W	73138	72X-76-0-252K
R44	321-0283-00			RES.,FXD,FILM:8.66K OHM,1%,0.125W	91637	MFF1816G86600F
R46	321-0282-00			RES.,FXD,FILM:8.45K OHM,1%,0.125W	91637	MFF1816G84500F
R47	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R49	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R50	321-0359-00			RES.,FXD,FILM:53.6K OHM,1%,0.125W	91637	MFF1816G53601F
R60	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
T101	120-0836-00			XFMR,PWR,STPDN:	80009	120-0836-00
U01	155-0067-02			MICROCIRCUIT,DI:ML,POWER SUPPLY REGULATOR	80009	155-0067-02
VR05	152-0149-00			SEMICONV DEVICE:ZENER,0.4W,10V,5%	04713	1N961B
VR29	152-0304-00			SEMICONV DEVICE:ZENER,0.4W,20V,5%	04713	1N968B
VR47	152-0212-00			SEMICONV DEVICE:ZENER,0.5W,9V,5%	80009	152-0212-00
A3	670-2700-01			CKT BOARD ASSY:INVERTER	80009	670-2700-01
C05	283-0006-00			CAP.,FXD,CER DI:0.02UF,+80-20%,500V	72982	0841545Z5V00203Z
C06	283-0006-00			CAP.,FXD,CER DI:0.02UF,+80-20%,500V	72982	0841545Z5V00203Z
C19	283-0057-00			CAP.,FXD,CER DI:0.1UF,+80-20%,200V	56289	274C10
C27	283-0280-00			CAP.,FXD,CER DI:2200PF,10%,2000V	56289	29C558
C29	285-0939-00			CAP.,FXD,PLSTC:3UF,5%,400V	84411	TEK111-30594
C30	283-0279-00			CAP.,FXD,CER DI:0.001UF,20%,3000V	56289	55C153
C31	290-0395-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	150D475X0050B2
C39	283-0280-00			CAP.,FXD,CER DI:2200PF,10%,2000V	56289	29C558
C40	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C42	290-0395-00			CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	150D475X0050B2
C48	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C49	290-0159-00			CAP.,FXD,ELCTLT:2UF,+50-10%,150V	56289	30D205F150BB9
C50	290-0164-00			CAP.,FXD,ELCTLT:1UF,+50-10%,150V	56289	30D105F150BA2

Replaceable Electrical Parts—P7001 Power Supply

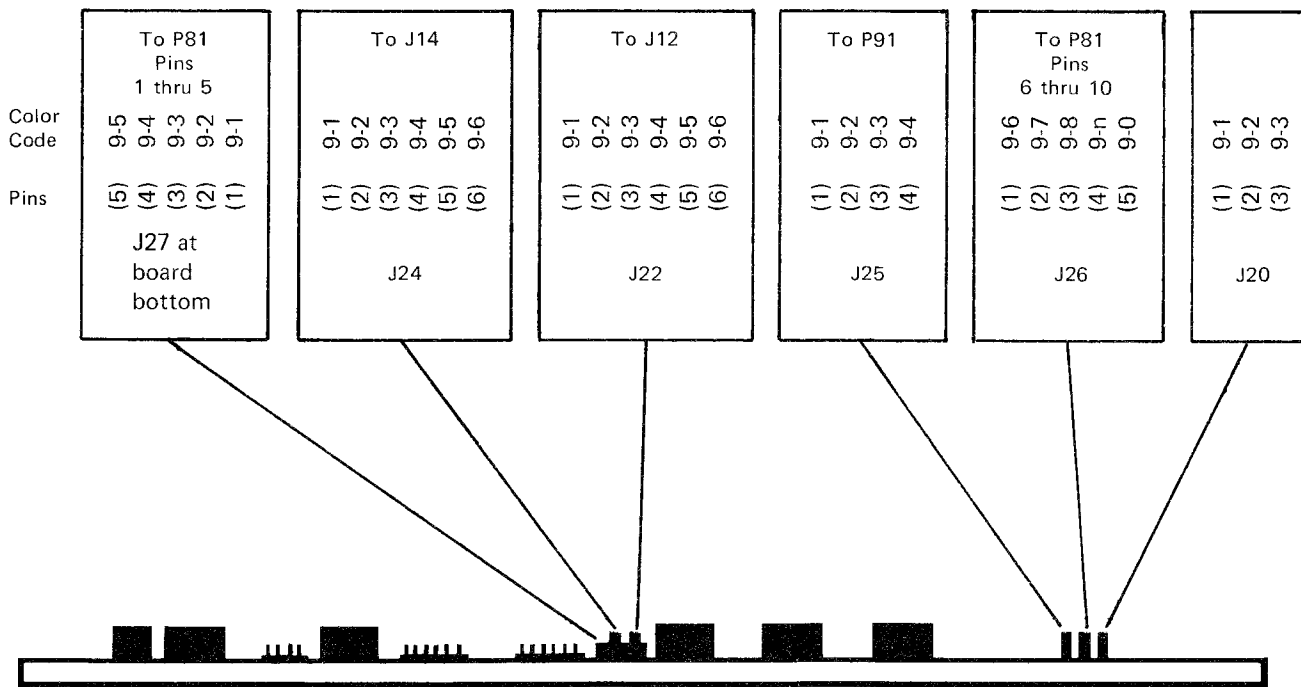
Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C52	283-0003-00			CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-558Z5U-103Z
CR15	152-0396-01			SEMICONV DEVICE:SILICON, 400V, 3A	12969	652-821
CR32	152-0107-00			SEMICONV DEVICE:SILICON, 400V, 400MA	80009	152-0107-00
CR34	152-0400-00			SEMICONV DEVICE:SILICON, 400V, 1A	80009	152-0400-00
CR40	152-0401-00			SEMICONV DEVICE:SILICON, 3-LAYER, TRIGGER	04713	1N5761
CR42	152-0107-00			SEMICONV DEVICE:SILICON, 400V, 400MA	80009	152-0107-00
CR45	152-0400-00			SEMICONV DEVICE:SILICON, 400V, 1A	80009	152-0400-00
CR46	152-0107-00			SEMICONV DEVICE:SILICON, 400V, 400MA	80009	152-0107-00
CR50	152-0061-00			SEMICONV DEVICE:SILICON, 175V, 100MA	80009	152-0061-00
CR57	152-0107-00			SEMICONV DEVICE:SILICON, 400V, 400MA	80009	152-0107-00
DS08	119-0181-00			SURGE VOLTAGE P:230VAC, +/-15%	80009	119-0181-00
DS13	119-0181-00			SURGE VOLTAGE P:230VAC, +/-15%	80009	119-0181-00
DS19	150-0035-00			LAMP, GLOW:90V, 0.3MA	53944	A1B-3
L29	108-0681-00			COIL, RF:140UH	80009	108-0681-00
Q48	151-0260-00			TRANSISTOR:SILICON, NPN	80009	151-0260-00
Q52	151-0519-00			TRANSISTOR:SILICON, SCR	80009	151-0519-00
R05	304-0270-00			RES., FXD, CMPSN:27 OHM, 10%, 1W	01121	GB2701
R08	303-0243-00			RES., FXD, CMPSN:24K OHM, 5%, 1W	01121	GB2435
R10	304-0224-00			RES., FXD, CMPSN:220K OHM, 10%, 1W	01121	GB2241
R13	303-0243-00			RES., FXD, CMPSN:24K OHM, 5%, 1W	01121	GB2435
R19	302-0565-00			RES., FXD, CMPSN:5.6M OHM, 10%, 0.50W	01121	EB5651
R21	304-0154-00			RES., FXD, CMPSN:150K OHM, 10%, 1W	01121	GB1541
R25	315-0471-00			RES., FXD, CMPSN:470 OHM, 5%, 0.25W	01121	CB4715
R31	307-0057-00			RES., FXD, CMPSN:5.1 OHM, 5%, 0.50W	01121	EB51G5
R32	315-0220-00			RES., FXD, CMPSN:22 OHM, 5%, 0.25W	01121	CB2205
R34	315-0684-00			RES., FXD, CMPSN:680K OHM, 5%, 0.25W	01121	CB6845
R39	315-0103-00			RES., FXD, CMPSN:10K OHM, 5%, 0.25W	01121	CB1035
R42	307-0057-00			RES., FXD, CMPSN:5.1 OHM, 5%, 0.50W	01121	EB51G5
R43	315-0220-00			RES., FXD, CMPSN:22 OHM, 5%, 0.25W	01121	CB2205
R48	315-0433-00			RES., FXD, CMPSN:43K OHM, 5%, 0.25W	01121	CB4335
R49	315-0184-00			RES., FXD, CMPSN:180K OHM, 5%, 0.25W	01121	CB1845
R50	315-0101-00			RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R52	302-0332-00			RES., FXD, CMPSN:3.3K OHM, 10%, 0.50W	01121	EB3321
R54	315-0561-00			RES., FXD, CMPSN:560 OHM, 5%, 0.25W	01121	CB5615
R56	315-0101-00			RES., FXD, CMPSN:100 OHM, 5%, 0.25W	01121	CB1015
R57	315-0270-00			RES., FXD, CMPSN:27 OHM, 5%, 0.25W	01121	CB2705
RT09	307-0350-00			RES., THERMAL:7.5 OHM, 10%, 3.9%/DEG C	15454	75DJ7R5R0220SS
T01	120-0636-00			XFMR, PWR, STPDN:PRI 2.625V, SEC 1V, 0.005A	80009	120-0636-00
T25	120-0743-00			XFMR, TOROID:13 TURNS, BIFILAR	80009	120-0743-00
T30	120-0744-00			XFMR, TOROID:5 WINDINGS	80009	120-0744-00
T35	120-0747-00			XFMR, TOROID:55 TURNS, SINGLE	80009	120-0747-00
TP31	214-0579-00			TERM., TEST PT:0.40 INCH LONG	80009	214-0579-00
TP34	214-0579-00			TERM., TEST PT:0.40 INCH LONG	80009	214-0579-00
TP40	214-0579-00			TERM., TEST PT:0.40 INCH LONG	80009	214-0579-00
VR54	153-0056-00			SEMICONV DVC, DI:ZENER, 0.4W, 150V, 5%, SEL	80009	153-0056-00

Replaceable Electrical Parts—P7001 Power Supply

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CHASSIS PARTS						
C16	290-0576-00			CAP., FXD, ELCTLT: 550UF, +50-10%, 200V	56289	36D7135
C17	290-0576-00			CAP., FXD, ELCTLT: 550UF, +50-10%, 200V	56289	36D7135
C37	285-0980-00			CAP., FXD, PLSTC: 0.02UF, 5%, 1000V	56289	AF9A1G203J004
F03	159-0021-00			FUSE, CARTRIDGE: 3AG, 2A, 250V, FAST-BLOW	71400	AGC 2
F04	159-0017-00			FUSE, CARTRIDGE: 3AG, 4A, 250V, FAST BLOW	71400	MTH4
FL01	119-0389-00			FILTER, RAD INTE: 115/230V, 3A	02777	F11935-3
K11	148-0089-00			RELAY, ARMATURE: DPDT, 12VDC, 3A, 243VAC	77342	KNP11D12
L37	108-0748-00			COIL, RF: 1.5MH	80009	108-0748-00
Q31	151-0349-00			TRANSISTOR: SILICON, NPN, SEL FROM MJE2801	80009	151-0349-00
Q34	151-0368-00			TRANSISTOR: SILICON, NPN	80009	151-0368-00
Q47	151-0368-00			TRANSISTOR: SILICON, NPN	80009	151-0368-00
Q59	151-0349-00			TRANSISTOR: SILICON, NPN, SEL FROM MJE2801	80009	151-0349-00
Q87	151-0349-00			TRANSISTOR: SILICON, NPN, SEL FROM MJE2801	80009	151-0349-00
Q145	151-0349-00			TRANSISTOR: SILICON, NPN, SEL FROM MJE2801	80009	151-0349-00
Q177	151-0349-00			TRANSISTOR: SILICON, NPN, SEL FROM MJE2801	80009	151-0349-00
Q209	151-0349-00			TRANSISTOR: SILICON, NPN, SEL FROM MJE2801	80009	151-0349-00
SW22	204-0278-01			BODY ASSY, LINE: W/CLIPS AND CONTACTS	80009	204-0278-01

This figure shows the Power Supply to Main Interface board connections. For example: J14 on the Power Supply Regulator board goes to J24 on the Main Interface board via a six wire cable.

Color code of wires is also shown on this figure. First number indicates the background color of the wire; the second number indicates the color of the stripe. Color coding is according to the EIA color code standards for resistors. For example: 9-5 means a green (5) stripe on a white (9) wire; 9-n means a solid white (9) wire.



Top-Front view of Main Interface

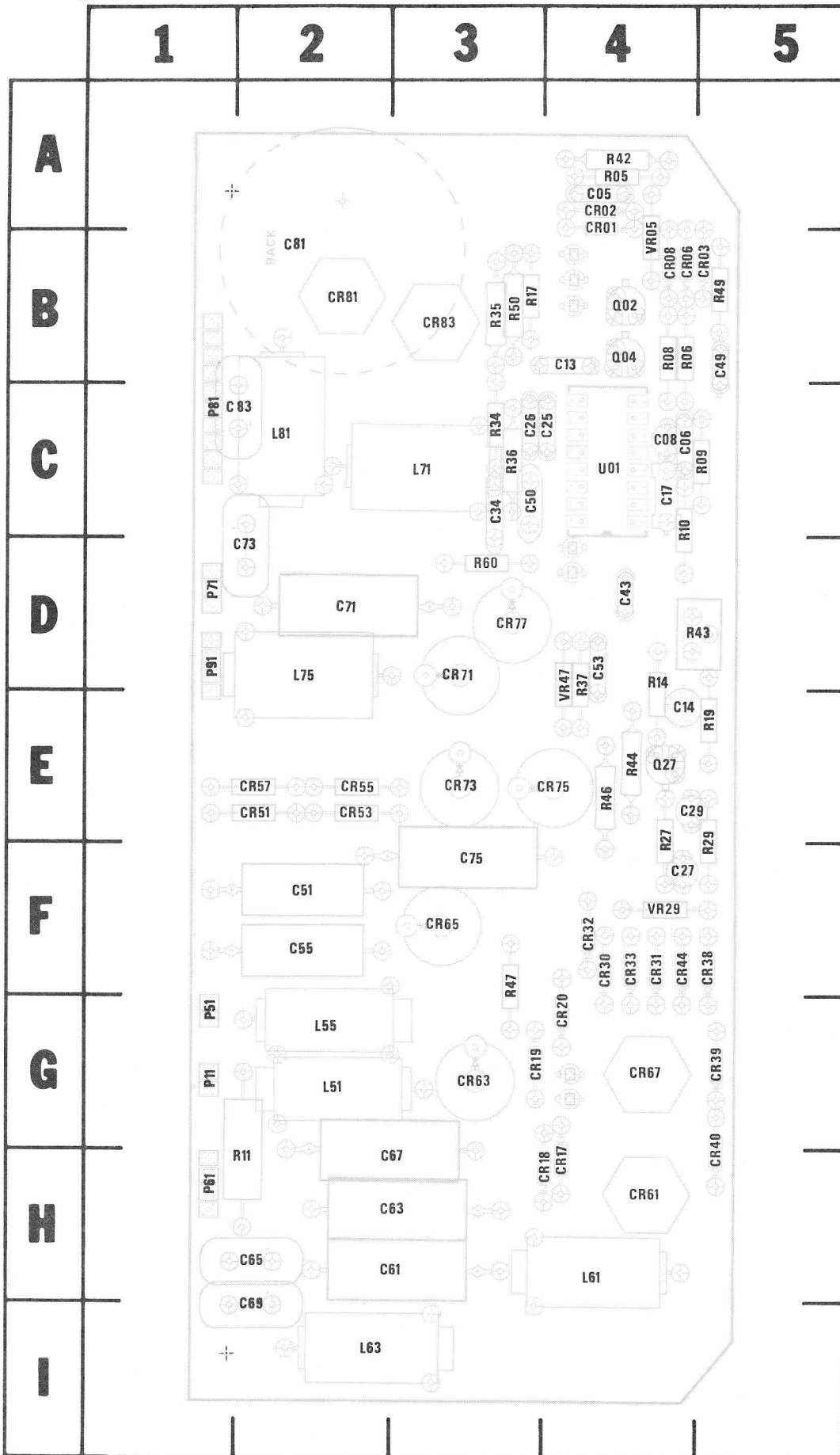
1890-17

P61
Regu
from
Pin 1
Pin 2
Pin 3

P11
K11
Pin 1
Pin 2

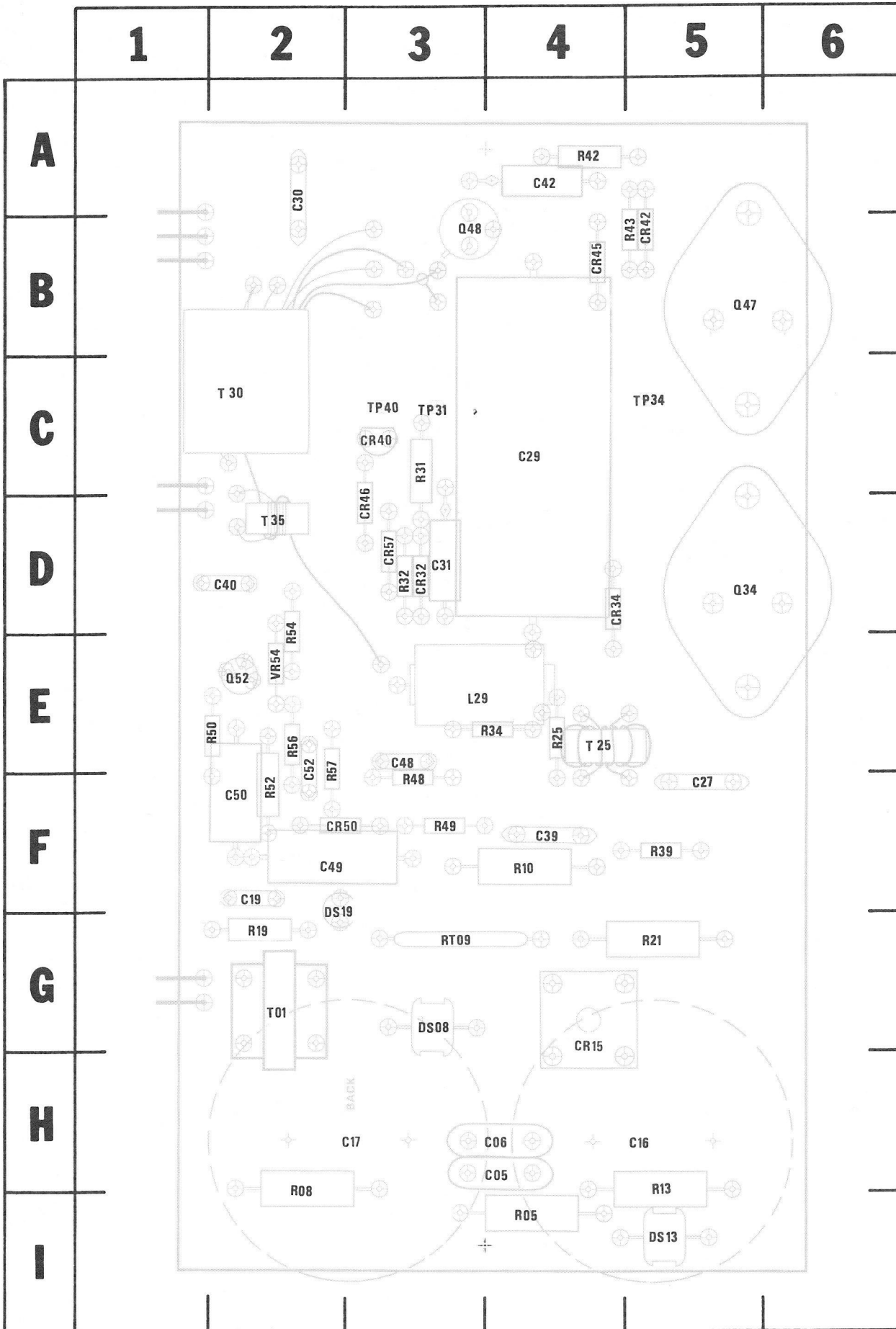
P51
Regu
from
Pin 1
Pin 2

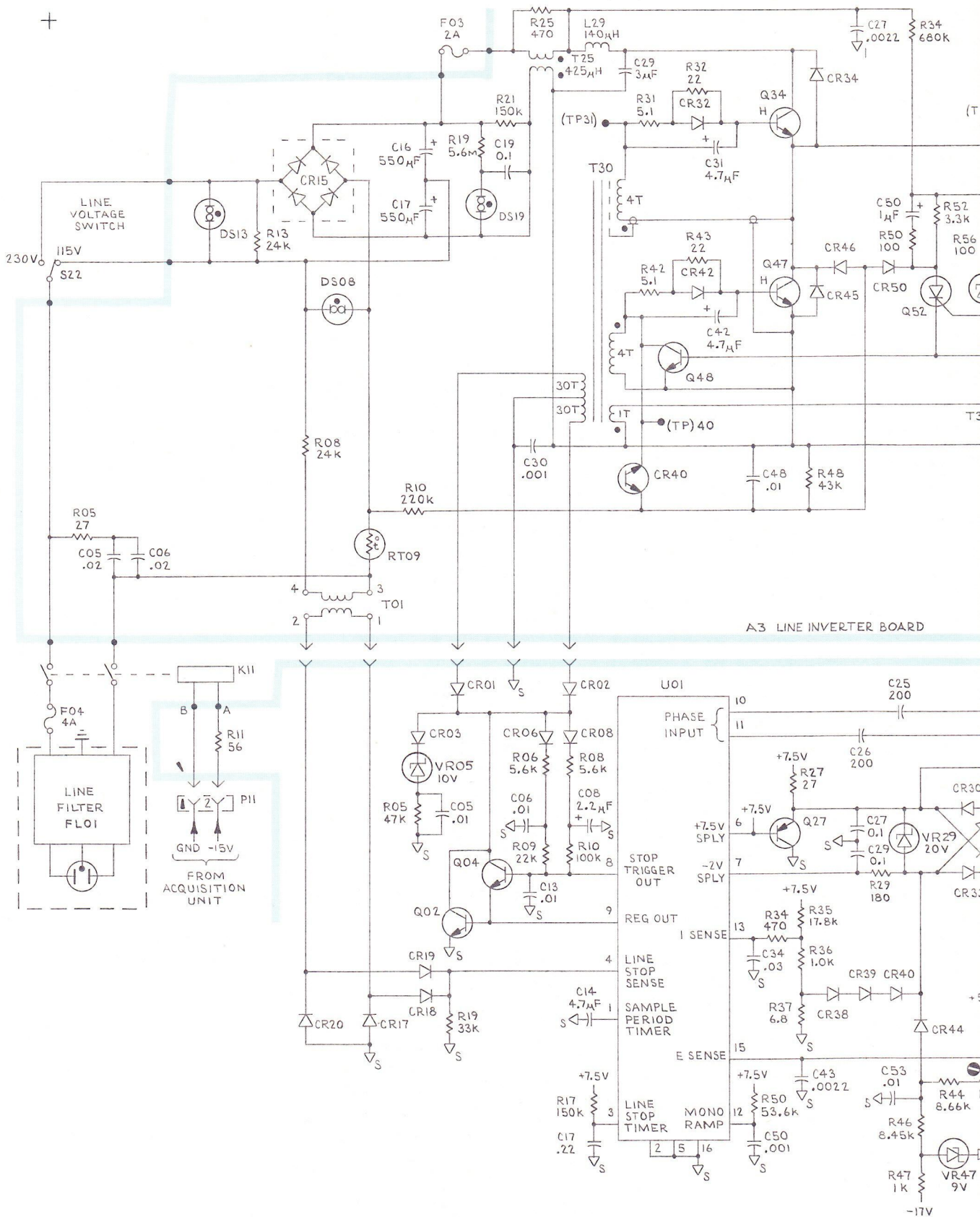
P7001 Power Supply

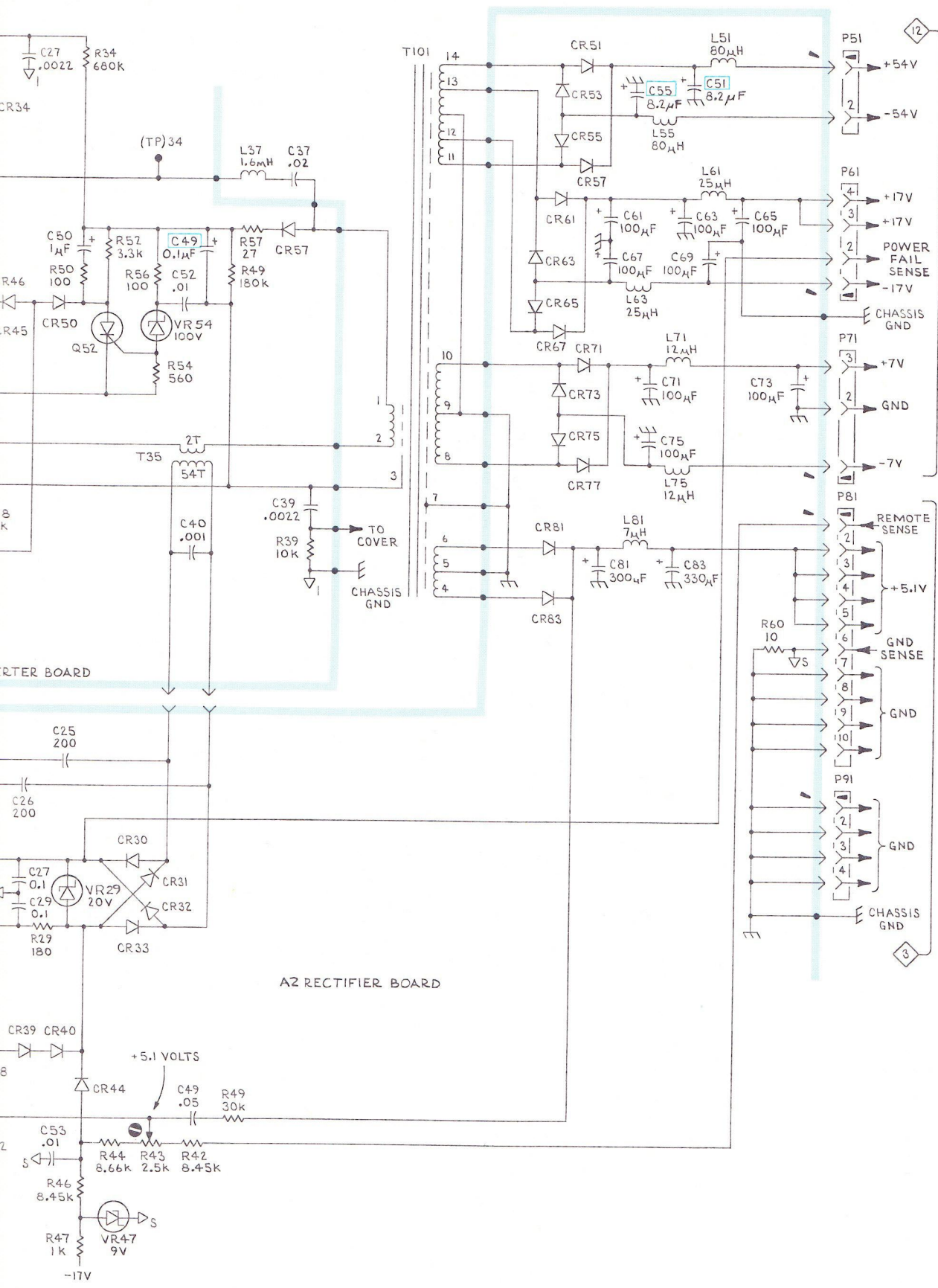


CKT NO	GRID LOC	CKT NO	GRID LOC
C05	A4	L51	G2
C06	C4	L55	G2
C08	C4	L61	H4
C13	B4	L63	I2
C14	E4	L71	C3
C17	C4	L75	D2
C25	C4	L81	C2
C26	C3		
C27	F4	P11	G1
C29	E4	P51	G1
C34	C3	P61	H1
C43	D4	P71	D1
C49	B5	P81	C1
C50	C3	P91	D1
C51	F2		
C55	F2	Q02	B4
C61	H3	Q04	B4
C63	H3	Q27	E4
C65	H2		
C67	H3	R05	A4
C69	H2	R06	B4
C71	D2	R08	B4
C73	D2	R09	C5
C75	F3	R10	C4
C81	B2	R11	H2
C83	C2	R14	D4
		R17	B3
		R19	E5
CR01	A4	R27	E4
CR02	A4	R29	E5
CR03	B5	R34	C3
CR06	B4	R35	B3
CR08	B4	R36	C3
CR17	H4	R37	D4
CR18	H4	R42	A4
CR19	G3	R43	D5
CR20	G4	R44	E4
CR30	F4	R46	E4
CR31	F4	R47	F3
CR32	F4	R49	B5
CR33	F4	R50	B3
CR38	F5	R53	D4
CR39	G5	R60	D3
CR40	G5		
CR44	F4	U01	C4
CR51	E2		
CR53	E2	VR05	B4
CR55	E2	VR29	F4
CR57	E2	VR47	D4
CR61	H4		
CR63	G3		
CR65	F3		
CR67	G4		
CR71	D3		
CR73	E3		
CR75	E4		
CR77	D3		
CR81	B2		
CR83	B3		

CKT NO	GRID LOC	CKT NO	GRID LOC
C05	H4	RT09	G3
C06	H4		
C16	H5	T01	G2
C17	H3	T25	E4
C19	F2	T30	C2
C27	F5	T35	D2
C29	C4		
C30	A2	TP31	C3
C31	D3	TP34	C5
C39	F4	TP40	C3
C40	D2		
C42	A4	VR54	E2
C48	E3		
C49	F2		
C50	F2		
C52	E2		
CR15	G4		
CR32	D3		
CR34	D4		
CR40	C3		
CR42	B5		
CR45	B4		
CR46	D3		
CR50	F2		
CR57	D3		
DS08	G3		
DS13	I5		
DS19	G2		
L29	E3		
Q34	D5		
Q47	B5		
Q48	B3		
Q52	E2		
R05	I4		
R08	H2		
R10	F4		
R13	H5		
R19	G2		
R21	G5		
R25	E4		
R31	C3		
R32	D3		
R34	E4		
R39	F5		
R42	A4		
R43	B5		
R48	F3		
R49	F3		
R50	E2		
R52	F2		
R54	D2		
R56	E2		
R57	E2		

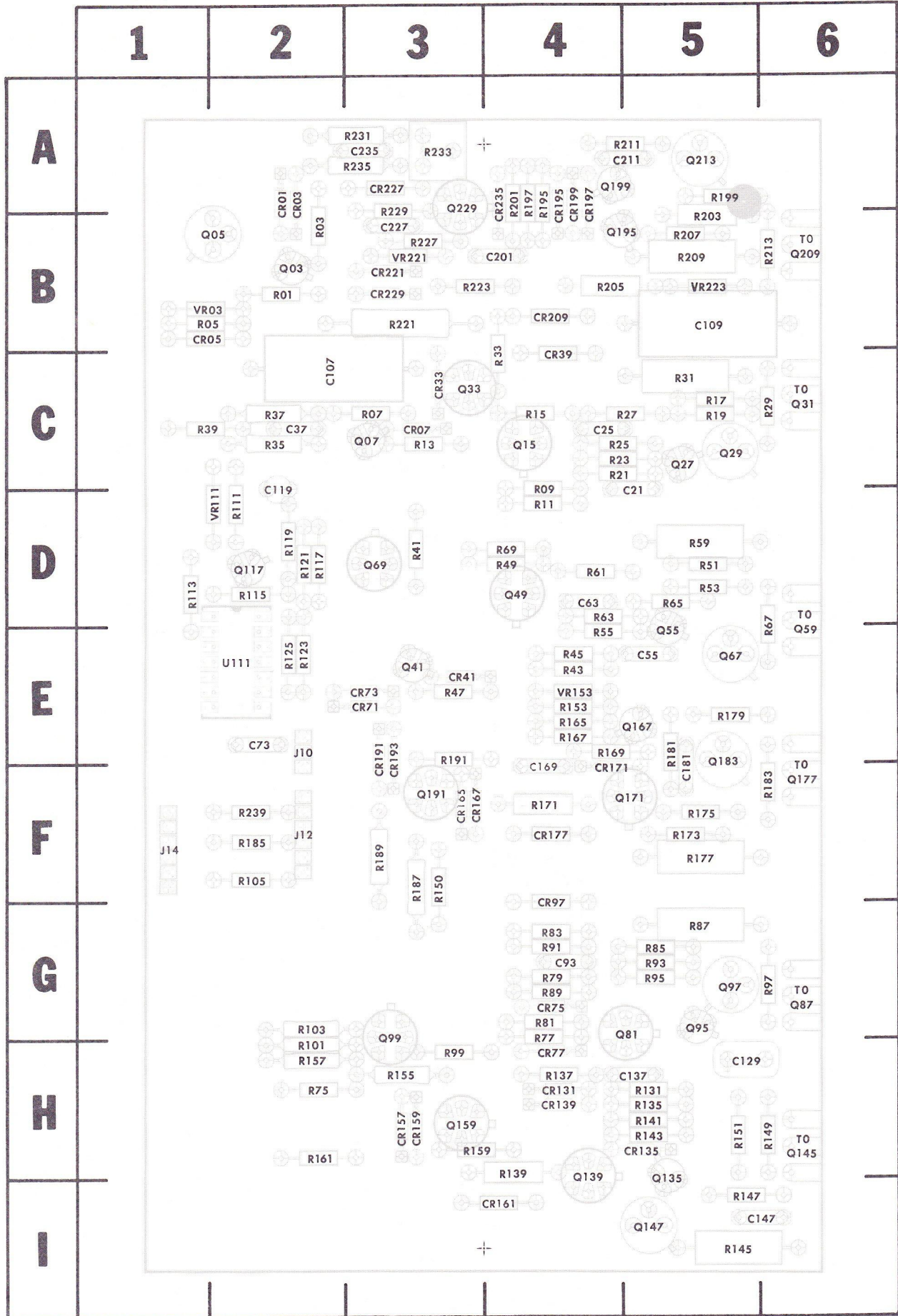




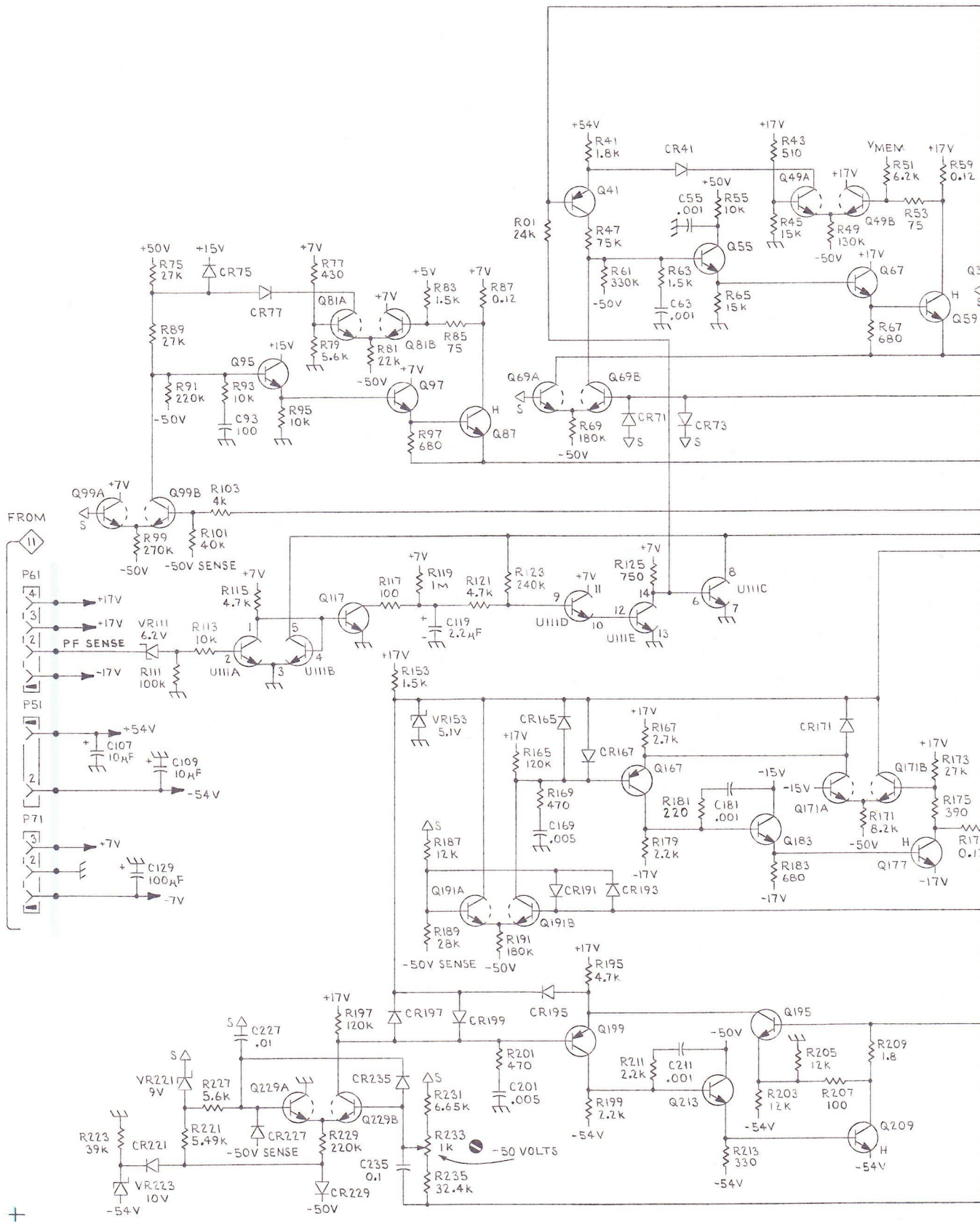


P7001 Power Supply

REGULATOR COMPONENT LOCATIONS

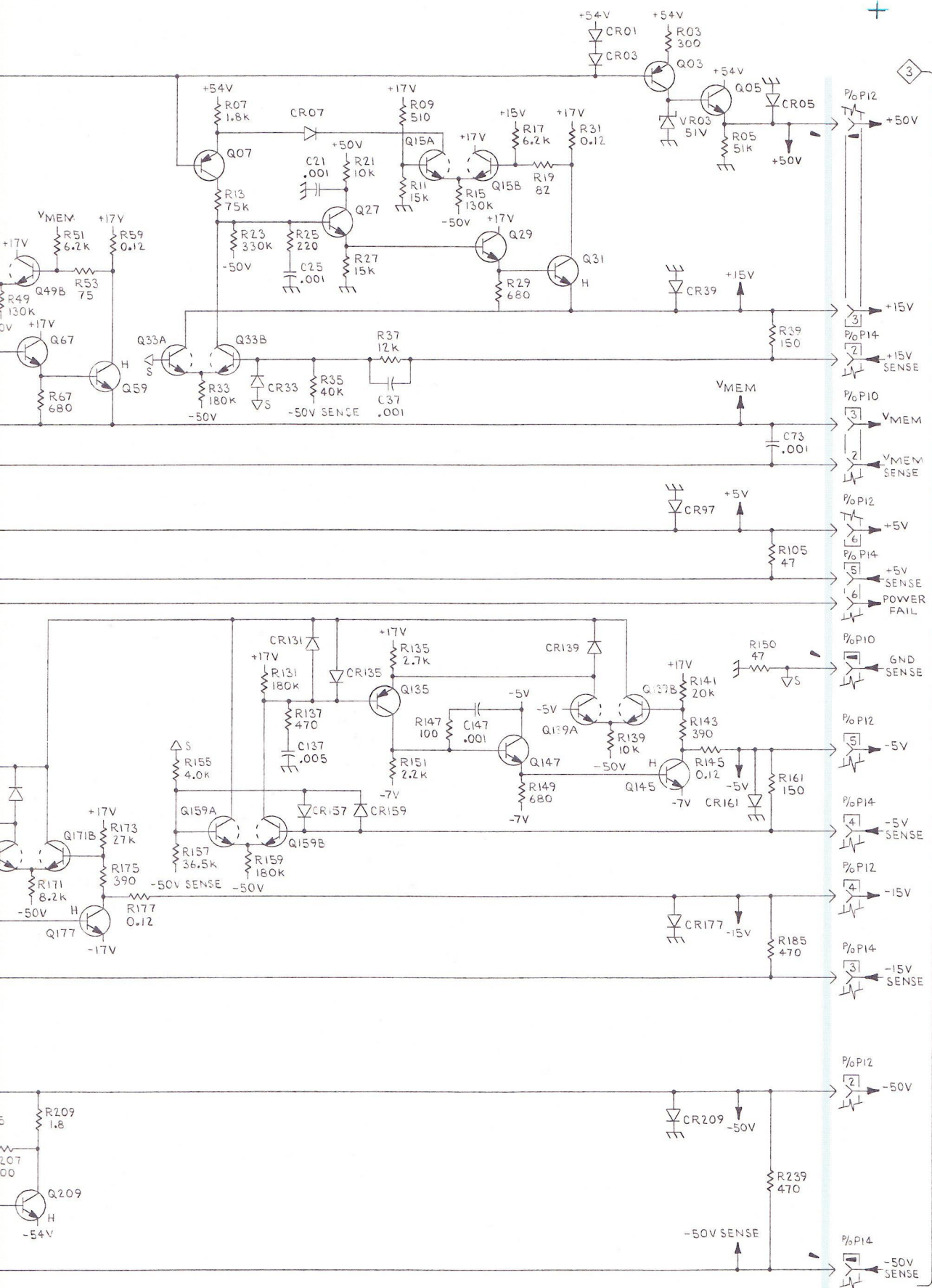


CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C107	C2	Q03	B2	R59	D5	R203	B5
C109	B5	Q05	B2	R61	D4	R205	B4
C119	D2	Q07	C3	R63	D4	R207	B5
C129	H5	Q15	C4	R65	D5	R209	B5
C137	H5	Q27	C5	R67	E6	R211	A5
C147	I5	Q29	C5	R69	D4	R213	B6
C169	F4	Q31	C6	R75	H2	R221	B3
C181	F5	Q33	C3	R77	G4	R223	B3
C25	C4	Q41	E3	R79	G4	R227	B3
C27	C2	Q49	D4	R81	G4	R229	A3
C55	E5	Q55	E5	R83	G4	R231	A3
C63	D4	Q59	E6	R85	G5	R233	A3
C73	E2	Q67	E5	R87	G5	R235	A3
C93	G4	Q69	D3	R89	G4	R239	F2
C201	B4	Q81	G5	R91	G4		
C211	A5	Q87	G6	R93	G5	U111	E2
C227	B3	Q95	G5	R95	G5		
C235	A3	Q97	G5	R97	G6	VR03	B1
		Q99	G3	R99	H3	VR111	D2
CR01	A2	Q117	D2	R101	H2	VR153	E4
CR03	A2	Q135	H5	R103	G2	VR221	B3
CR05	B1	Q139	H4	R105	F2	VR223	B5
CR07	C3	Q145	H6	R111	D2		
CR33	C3	Q147	I5	R113	D1		
CR39	C4	Q159	H3	R115	D2		
CR41	E3	Q167	E5	R117	D2		
CR71	E3	Q171	F5	R119	D2		
CR73	E3	Q177	F6	R121	D2		
CR75	G4	Q183	E5	R123	E2		
CR77	H4	Q191	F3	R125	E2		
CR97	G4	Q195	B4	R131	H5		
CR131	H4	Q199	A4	R135	H5		
CR135	H5	Q209	B6	R137	H4		
CR139	H4	Q213	A5	R139	H4		
CR157	H3	Q229	A3	R141	H5		
CR159	H3			R143	H5		
CR161	I4	R01	B2	R145	I5		
CR165	F3	R03	B2	R147	I5		
CR167	F3	R05	B1	R149	H6		
CR171	F4	R07	C3	R150	F3		
CR177	F4	R09	D4	R151	H5		
CR191	E3	R11	D4	R153	E4		
CR193	E3	R13	C3	R155	H3		
CR195	A4	R15	C4	R157	H2		
CR197	A4	R17	C5	R159	H3		
CR199	A4	R19	C5	R161	H2		
CR209	B4	R21	C4	R165	E4		
CR221	B3	R23	C4	R167	E4		
CR227	A3	R25	C4	R169	E4		
CR229	B3	R27	C5	R171	F4		
CR235	A4	R29	C6	R173	F5		
		R31	C5	R175	F5		
J10	E2	R33	C4	R177	F5		
J12	F2	R35	C2	R179	E5		
J14	F1	R37	C2	R181	E5		
		R39	C1	R183	F6		
		R41	D3	R185	F2		
		R43	E4	R187	F3		
		R45	E4	R189	F3		
		R47	E3	R191	E3		
		R49	D4	R195	A4		
		R51	D5	R197	A4		
		R53	D5	R199	A5		
		R55	E4	R201	A4		



P7001

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REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

- X000 Part first added at this serial number
- 00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

```

1 2 3 4 5           Name & Description
Assembly and/or Component
Attaching parts for Assembly and/or Component
    --- * ---
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
    --- * ---
Parts of Detail Part
Attaching parts for Parts of Detail Part
    --- * ---
    
```

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol --- * --- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH	ELCTR	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMCOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

Replaceable Mechanical Parts—P7001 Power Supply

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD, PO BOX 20923	PHOENIX, AZ 85036
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
24011	ELECTRONIZED CHEMICALS CORPORATION	S BEDFORD STREET	BURLINGTON, MA 01803
26365	GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
93907	CAMCAR SCREW AND MFG. CO.	600 18TH AVE.	ROCKFORD, IL 61101
98159	RUBBER TECK, INC.	19115 HAMILTON AVE., P O BOX 389	GARDENA, CA 90247

Replaceable Mechanical Parts—P7001 Power Supply

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-	620-0247-00		1		POWER SUPPLY:	80009	620-0247-00
-1	337-1546-00		1		. SHLD ELECTRICAL:SHIELD,POWER SUPPLY (ATTACHING PARTS)	80009	337-1546-00
-2	211-0008-00		6		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-3	-----		1		. CKT BOARD ASSY:REGULATOR(SEE A1 EPL) (ATTACHING PARTS)		
-4	211-0008-00		4		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
	-----		-		. . . CKT BOARD ASSY INCLUDES:		
-5	131-0608-00		15		. . . TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
-6	136-0252-04		136		. . . SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-7	131-0707-00		9		. . . CONNECTOR,TERM.:0.48" L,22-26AWG WIRE	22526	75691-005
-8	175-0861-00		FT		. . . WIRE,ELECTRICAL:4 WIRE RIBBON	08261	SS-0422-1910610C
-9	175-0862-00		FT		. . . WIRE,ELECTRICAL:3 WIRE RIBBON	08261	SS-0322-1910610C
-10	175-0863-00		FT		. . . WIRE,ELECTRICAL:2 WIRE RIBBON	08261	SS-0222-1910610C
-11	352-0161-02		1		. . . CONN BODY,PL,EL:3 WIRE RED	80009	352-0161-02
-12	352-0162-01		1		. . . CONN BODY,PL,EL:4 WIRE BROWN	80009	352-0162-01
-13	352-0169-00		1		. . . CONN BODY,PL,EL:2 WIRE BLACK	80009	352-0169-00
-14	-----		1		. CKT BOARD ASSY:RECTIFIER(SEE A2 EPL) (ATTACHING PARTS)		
-15	211-0008-00		6		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-16	210-0586-00		2		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL - - - * - - -	78189	211-041800-00
	-----		-		. . . CKT BOARD ASSY INCLUDES:		
-17	-----		1		. . . TRANSFORMER:(SEE T101 EPL)		
-18	131-0787-00		25		. . . CONTACT,ELEC:0.64 INCH LONG	22526	47359
-19	136-0252-04		25		. . . SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
-20	136-0263-03	B010100 B080390	7		. . . SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
	136-0263-04	B080391	7		. . . SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	22526	48059
-21	-----		1		. . . DIODE:(SEE CR81 EPL)		
-22	-----		3		. . . DIODE:(SEE CR61,CR67,CR83) (ATTACHING PARTS)		
-23	220-0410-00		1		. . . NUT,EXTENDED WA:10-32 X 0.375 INCH,STL - - - * - - -	83385	OBD
-24	214-1759-00		1		. . . HEAT SINK,ELEC:	80009	214-1759-00
-25	-----		1		. . . SEMICOND DVC,DI:(SEE C81 EPL) (ATTACHING PARTS)		
-26	212-0518-00		1		. . . SCREW,MACHINE:10-32 X 0.312 INCH,PNH STL - - - * - - -	83385	OBD
-27	-----		1		. RELAY ARMATURE:(SEE K11 EPL) (ATTACHING PARTS)		
-28	211-0512-00		1		. SCREW,MACHINE:6-32 X 0.50" 100 DEG,FLH STL - - - * - - -	83385	OBD
-29	337-1545-00		1		. SHLD,ELECTRICAL:POWER SUPPLY (ATTACHING PARTS)	80009	337-1545-00
-30	211-0008-00		2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD
-31	337-1490-00		1		. SHLD,ELECTRICAL:CIRCUIT CARD (ATTACHING PARTS)	80009	337-1490-00
-32	211-0040-00		2		. SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC - - - * - - -	26365	OBD
-33	-----		2		. CAP.,FXD,ELCTLT:(SEE C16,C17 EPL) (ATTACHING PARTS FOR EACH)		
-34	212-0518-00		2		. SCREW,MACHINE:10-32 X 0.312 INCH,PNH STL - - - * - - -	83385	OBD
-35	129-0323-00		2		. POST,ELEC-MECH:HEX,0.25 X 1 INCH LONG (ATTACHING PARTS FOR EACH)	80009	129-0323-00
-36	211-0012-00		1		. SCREW,MACHINE:4-40 X 0.375 INCH,PNH STL - - - * - - -	83385	OBD
-37	-----		2		. TRANSISTOR:(SEE Q34,Q47 EPL) (ATTACHING PARTS FOR EACH)		
-38	210-0586-00		2		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
-39	211-0008-00		2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL - - - * - - -	83385	OBD

Replaceable Mechanical Parts—P7001 Power Supply

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-40	386-0978-00		2	.	INSULATOR, PLATE: 0.002 INCH MICA, FOR TO-3	80009	386-0978-00
-41	-----		1	.	CKT BOARD ASSY: INVERTER (SEE A3 EPL) (ATTACHING PARTS)		
-42	211-0008-00		2	.	SCREW, MACHINE: 4-40 X 0.25 INCH, PNH STL	83385	OBD
	-----		-	.	CKT BOARD ASSY INCLUDES:		
-43	131-0591-00		7	.	CONTACT, ELEC: 0.835 INCH LONG	22526	47352
-44	136-0254-01		4	.	SOCKET, PIN TERM: 0.145 INCH LONG	00779	1-331892-8
-45	-----		3	.	TERM, TEST PT: (SEE TP31, TP34, TP40 EPL)		
-46	346-0032-00		1	.	STRAP, RETAINING:	98159	2859-75-4
-47	348-0023-00		6	.	PLUG, HOLE:	80009	348-0023-00
-48	426-0121-00		1	.	MT, TOROID, XFMR: PLASTIC	80009	426-0121-00
-49	358-0214-00		1	.	INSULATOR, BSHG: 0.25 DIA X 0.188 INCH L	24011	OBD
-50	214-0768-00		3	.	CONTACT, ELEC: FEMALE	80009	214-0768-00
-51	344-0230-00		1	.	CLIP, SPG, TNSN:	80009	344-0230-00
-52	337-1491-01		1	.	SHIELD, ELEC: LINE INVERTER (ATTACHING PARTS)	80009	337-1491-01
-53	211-0008-00		3	.	SCREW, MACHINE: 4-40 X 0.25 INCH, PNH STL	83385	OBD
-54	342-0103-00		1	.	INSULATOR, BLOCK: (ATTACHING PARTS)	80009	342-0103-00
-55	213-0183-00		2	.	SCR, TPG, THD FOR: 6-32 X 0.25 INCH, PNH STL	83385	OBD
-56	210-0407-00		1	.	NUT, PLAIN, HEX.: 6-32 X 0.25 INCH, BRS	73743	3038-0228-402
-57	211-0512-00		1	.	SCREW, MACHINE: 6-32 X 0.50" 100 DEG, FLH STL	83385	OBD
-58	214-1625-00		1	.	SPRING, FLAT: 2.0 INCH LONG, BOWED	80009	214-1625-00
-59	214-1624-00		1	.	HEAT SINK, ELEC:	80009	214-1624-00
-60	342-0104-00		1	.	INSULATOR, PLATE: 2 X 4.40 INCHES	80009	342-0104-00
-62	-----		1	.	TRANSISTOR: (SEE Q31, 59, 87, 145, 177, 209 EPL) (ATTACHING PARTS FOR EACH)		
-62	211-0014-00		1	.	SCREW, MACHINE: 4-40 X 0.50 INCH, PNH STL	83385	OBD
-63	210-0551-00		1	.	NUT, PLAIN, HEX.: 4-40 X 0.25 INCH, STL	83385	OBD
-64	210-0071-00		1	.	WASHER, SPR TNSN: 0.146 ID X 0.323" OD, STL	78189	4706-05-01-0531
-65	342-0136-00		6	.	INSULATOR, WSHR: 0.812 OD X 0.0025 INCH THK	04713	OBD
-66	-----		1	.	FILTER, RFI: (SEE FL01 EPL) (ATTACHING PARTS)		
-67	211-0012-00		2	.	SCREW, MACHINE: 4-40 X 0.375 INCH, PNH STL	83385	OBD
-68	210-0586-00		2	.	NUT, PLAIN, EXT W: 4-40 X 0.25 INCH, STL	78189	211-041800-00
-69	210-0201-00		1	.	TERMINAL, LUG: SE #4	78189	2104-04-00-2520N
-70	200-0763-04		1	.	COV, LINE VOLTAGE:	80009	200-0763-04
-71	352-0102-00		2	.	FUSEHOLDER: 0.262" ID TUBE FOR CRTG FUSE (ATTACHING PARTS FOR EACH)	80009	352-0102-00
-72	213-0141-00		2	.	SCR, TPG, THD FOR: 4-40 X 0.25 INCH, PNH	93907	OBD
-73	204-0278-01		1	.	BODY ASSY, LINE: (ATTACHING PARTS)	80009	204-0278-01
-74	210-0407-00		2	.	NUT, PLAIN, HEX.: 6-32 X 0.25 INCH, BRS	73743	3038-0228-402
-75	386-2573-00		1	.	PANEL, HEAT SINK:	80009	386-2573-00
	175-0825-00		FT	.	WIRE, ELECTRICAL: 2 WIRE RIBBON	08261	OBD
	210-0201-00		1	.	TERMINAL, LUG: SE #4	78189	2104-04-00-2520N

STANDARD ACCESSORIES

070-1890-00 1 MANUAL, TECH: SERVICE (NOT SHOWN)

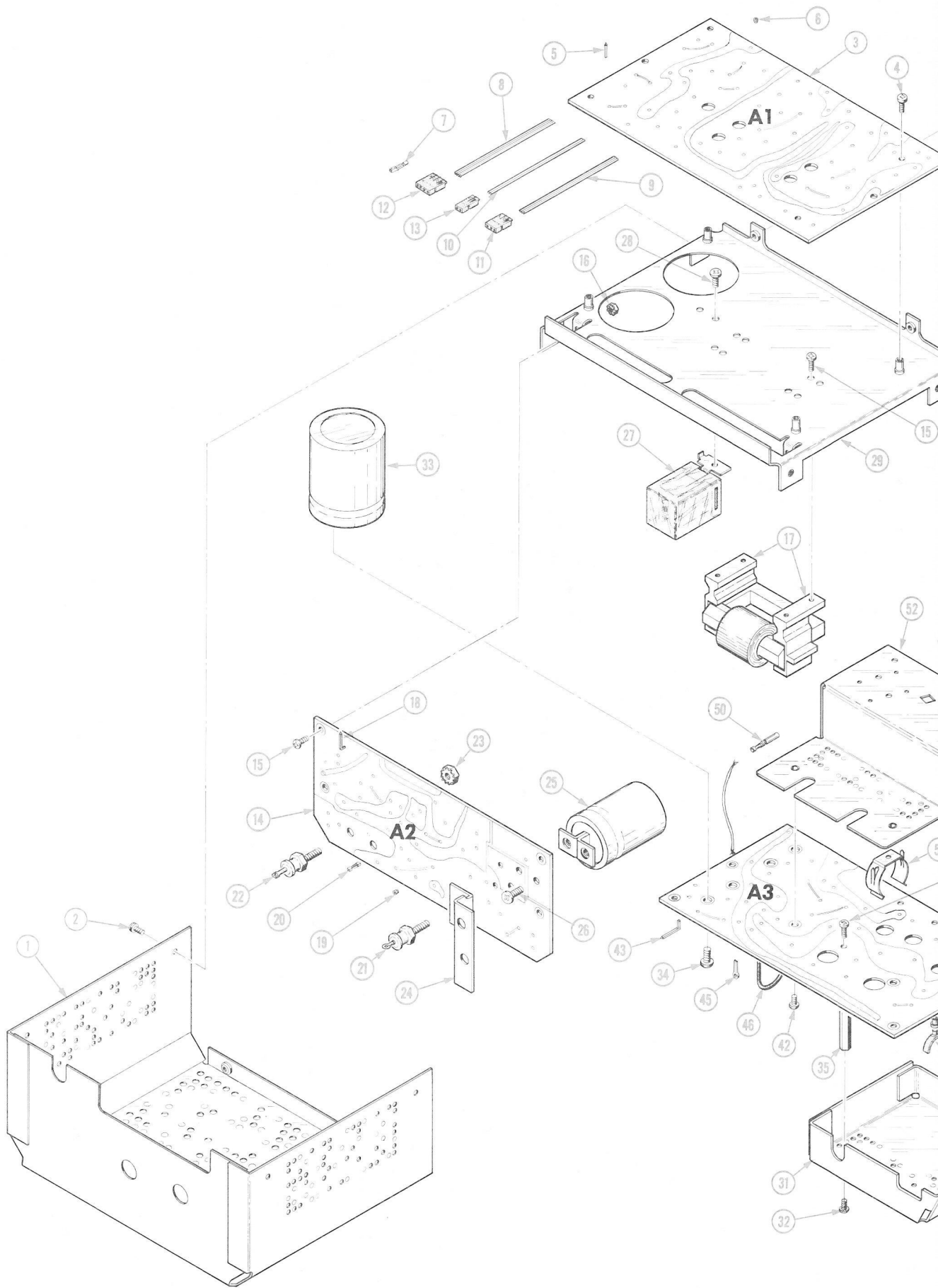
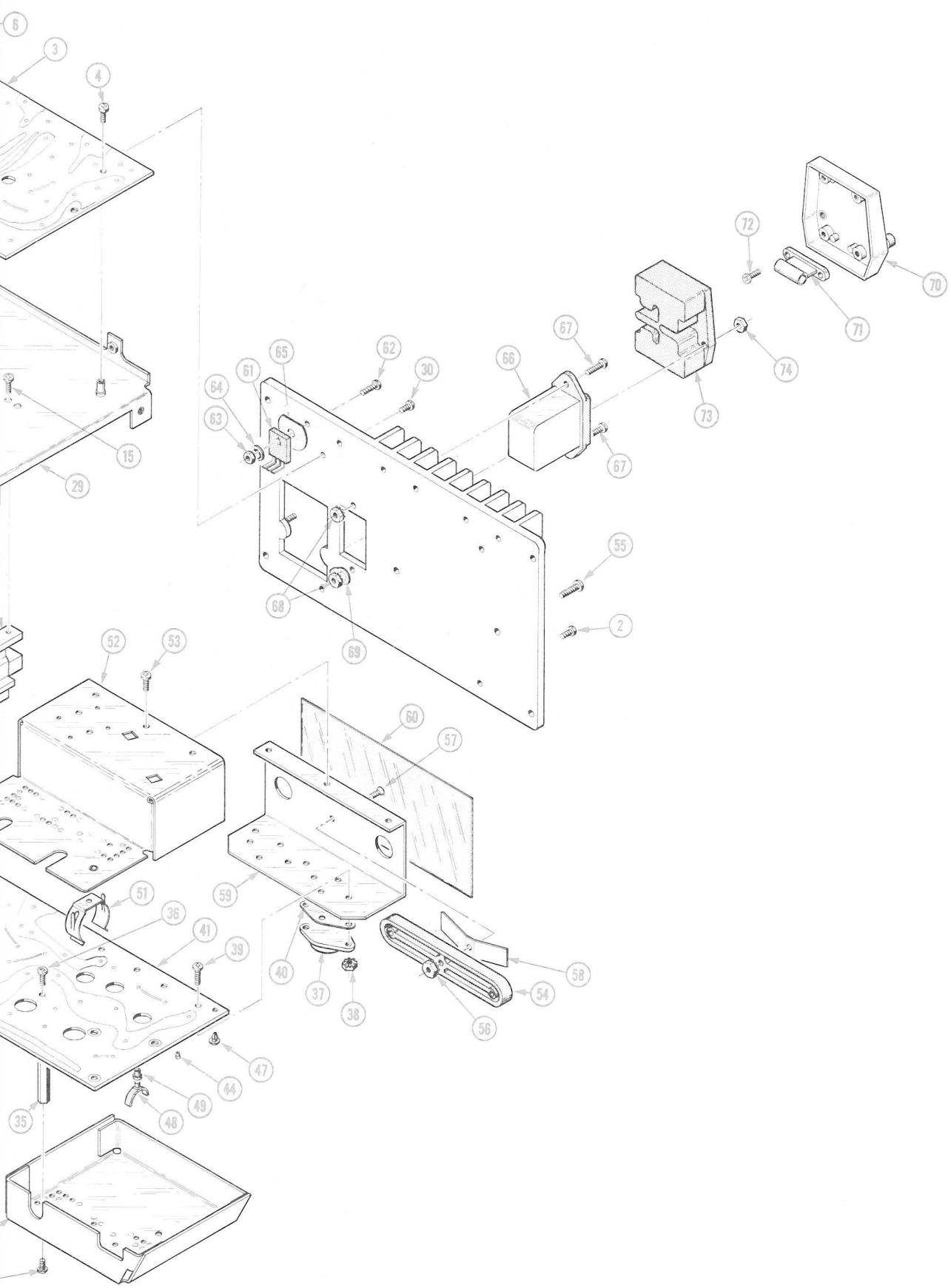


FIG. 1 EXPLODED



P7001 POWER SUPPLY

Change Reference: M34035 Date: 6-6-79
 Product: P7001 POWER SUPPLY 070-1890-00 EFF SN B100681

CHANGE	DESCRIPTION
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ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

- A1 670-2377-02 CKT BOARD ASSY:VOLTAGE REGULATOR

- R03 301-0201-00 RES.,FXD,CMPSN:200 OHM,5%,0.5W

- U111 156-0065-00 MICROCIRCUIT,LI:FIVE NPN TRANSISTOR ARRAY,SEL

ADD:

- R06 308-0431-00 RES.,FXD,CMPSN:120 OHM,5%,3W

CHASSIS PARTS

CHANGE TO:

- Q34 151-0368-01 TRANSISTOR:SILICON,NPN

- Q47 151-0368-01 TRANSISTOR:SILICON,NPN

DIAGRAM 12 VOLTAGE REGULATORS

R06 is added from the collector of Q05 to +54 V.

CHANGE	DESCRIPTION
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EFF SN B100681

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

A2	670-2388-02	CKT BOARD ASSY:RECTIFIER
C27	290-0523-00	CAP.,FXD,ELCTLT:2.2UF,20%,20V
C29	290-0523-00	CAP.,FXD,ELCTLT:2.2UF,20%,20V
R29	315-0560-00	RES.,FXD,CMPSN:56 OHM,5%,0.25W

The above parts are shown on diagram 11 INVERTER & RECTIFIERS.