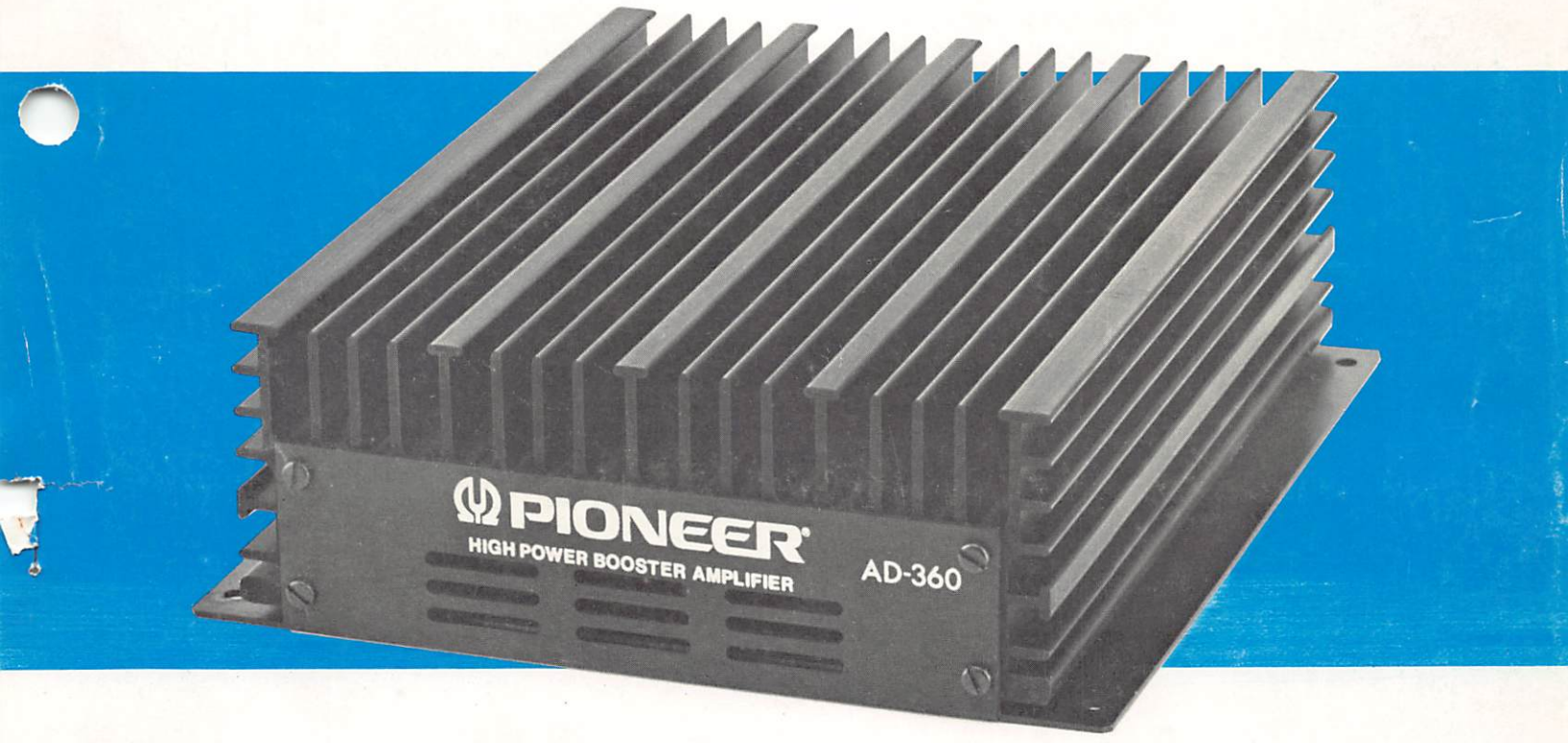
AD-360

CAR STEREO HIGH-POWER BOOSTER AMPLIFIER

SERVICE MANUAL



PIONEER®

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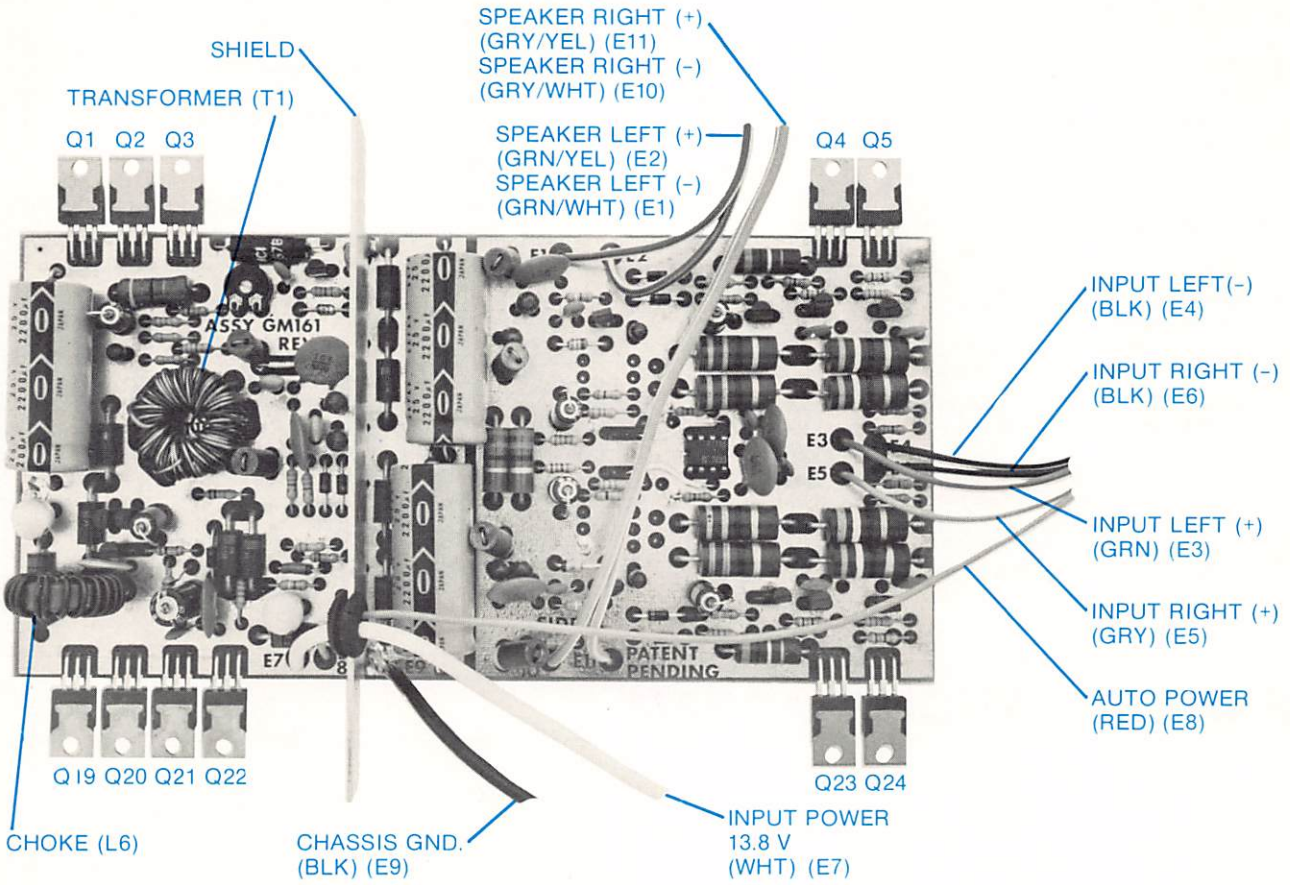
SPECIFICATIONS

Power Source DC 13.8V	(11~16V Allowable)
Grounding System	Negative Type
Dimensions (WXHXD)	228 x 64 x 204mm 9" x 2½" x 8"
Weight	5.5 lbs. (2.5 kg)
Max. Current Consumption	12A
Load Impedance	4Ω(4-8Ω Allowable)
Frequency Response	20-20,000 Hz (-3dB)
Signal-to-Noise Ratio	More Than 70 dB
Input Level	2V/150Ω
Power Output (RMS):	50 Watts/channel (Both channel driven) into 4Ω with no more than 0.8% THD at 1 KHz.
Maximum Power Output (RMS):	70 Watts/channel

1. PARTS LOCATION



2. CIRCUIT DESCRIPTION

The following is a brief description of the AD-360 Amplifier and its operation. Reference to the accompanying schematic diagram will assist in understanding the various circuits described. Voltages denoted on the schematic and component connection diagrams assume the amplifier is connected as follows (without speaker load):

A. Supply Voltage—A supply voltage of 13.8 volts is connected between the "white" power lead (E7) and the "black" ground lead (E9).

B. Inputs—The "gray" (E5) and "green" (E3) input leads are connected to the "black" input ground leads (E4 and E6).

C. Outputs—The "gray" (E10 and E11) and "green" (E1 and E2) leads *must* be open (no load).

D. The "red" Auto Power lead (E8) should be connected through a 1K ohm, ¼ watt resistor to ground. This will cause the amplifier to turn ON.

1. Auto Power Circuit

Voltage divider CR10, CR18 and R50 serves to bias the Auto Power Switch (Q18) "ON" until such time as current is drawn by the Auto Power output (E8). With the 1K ohm "test" resistor connected to ground (see Item D above), Q18 will turn "OFF" and the emitter voltage will drop to about 13.1 volts. With Q18 OFF, current will decrease through R49... establishing base drive for the Power Switch (Q11 and Q12). With Q11 and Q12 conducting, current is supplied through the temperature switch (S1) to voltage regulator Q6, allowing the regulator to conduct. Q6 then supplies regulated current to Q22, which in turn enables the DC-to-DC converter. The converter supplies +25 and -25 volts for use by the audio power amplifier circuits. The converter voltages are adjusted by potentiometer R3.

It should be noted that during normal (installed) operation, the Auto Power output lead (E8) is connected to the source unit "red" power lead (with fuse). In this way, the source unit receives all its power from the AD-360 and should *not* be connected to the battery. Auto Power circuit operation is as follows: When the source unit is turned ON, it draws current through diodes CR11 and CR12 from the amplifier unit battery supply. The voltage drop across CR11 and CR12 causes the Auto Power Switch (Q18) to turn OFF... thus notifying the amplifier that the source unit has been turned ON. When Q18 turns OFF, the converter is enabled as described above. When the source unit is turned OFF, Q18 turns ON and disables converter operation. In the OFF condition, the unit requires about 60 microamperes which is less than an automotive clock or source memory.

2. Short Circuit Protection

This circuit provides "short circuit" protection against three possible conditions.

A. R15 provides "hold off" bias voltage to Q13 to prevent the amplifier converter from turning ON, except as controlled by the Auto Power Switch (Q18) discussed in paragraph 1 above. The base of Q13 will be about 23.3 volts when potentiometer R3 is properly adjusted.

B. Should a malfunction occur which "pulls" the positive (+25V) side of the converter below 14 volts, Q13 will conduct... causing C30 to charge and "cut off" the base drive to Q11 and Q12... thus turning OFF the converter. A typical condition which could cause the converter to fall below 14 volts would be an "overload" which could be caused by a "shorted" speaker.

C. Each amplifier channel also provides a protecting input to Q13 through R62. Should either amplifier channel conduct more than 7.5 amps through the output driver transistors (Q4 and Q23), the protection transistors (Q8 and Q15) will turn ON, thus biasing Q13 ON and causing the converter to turn OFF. After approximately one (1) second, the circuit will neutralize and attempt to turn ON again. If the excessive load has been removed, normal operation will resume. Should the load remain, the protection circuit will continue to cycle ON and OFF at approximately on (1) second intervals... causing a "popping" sound in the speaker system. Excessive loads can be caused by grounded (shorted) speaker leads, shorted power output transistors, etc.

3. Voltage Regulators

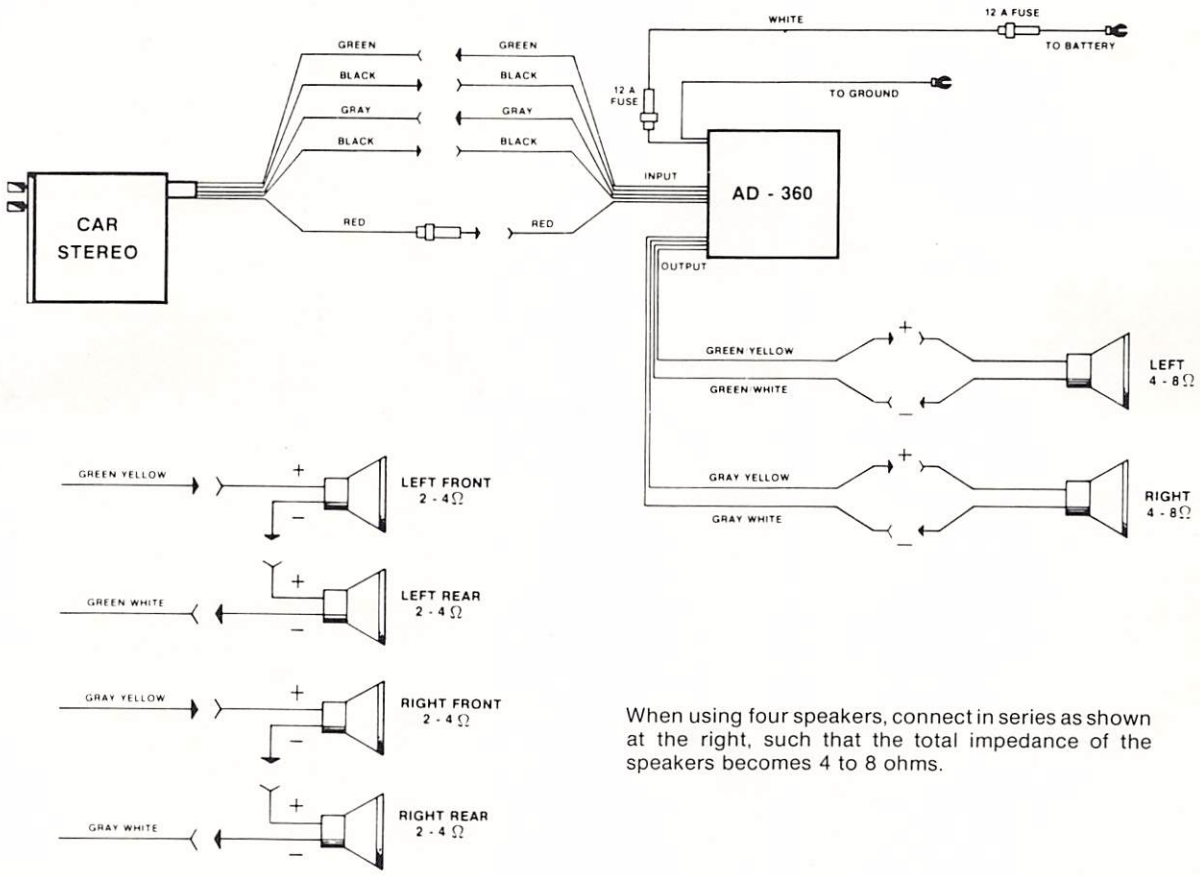
Two voltage regulators supply power to the IC Amplifier (U2).

A. VR2 and Q7 serve to regulate the +25 volt converter voltage to +18 volts for use as the positive IC supply.

B. VR3 and Q14 serve to regulate the -25 volts converter voltage to -18 volts for use as the negative IC supply.

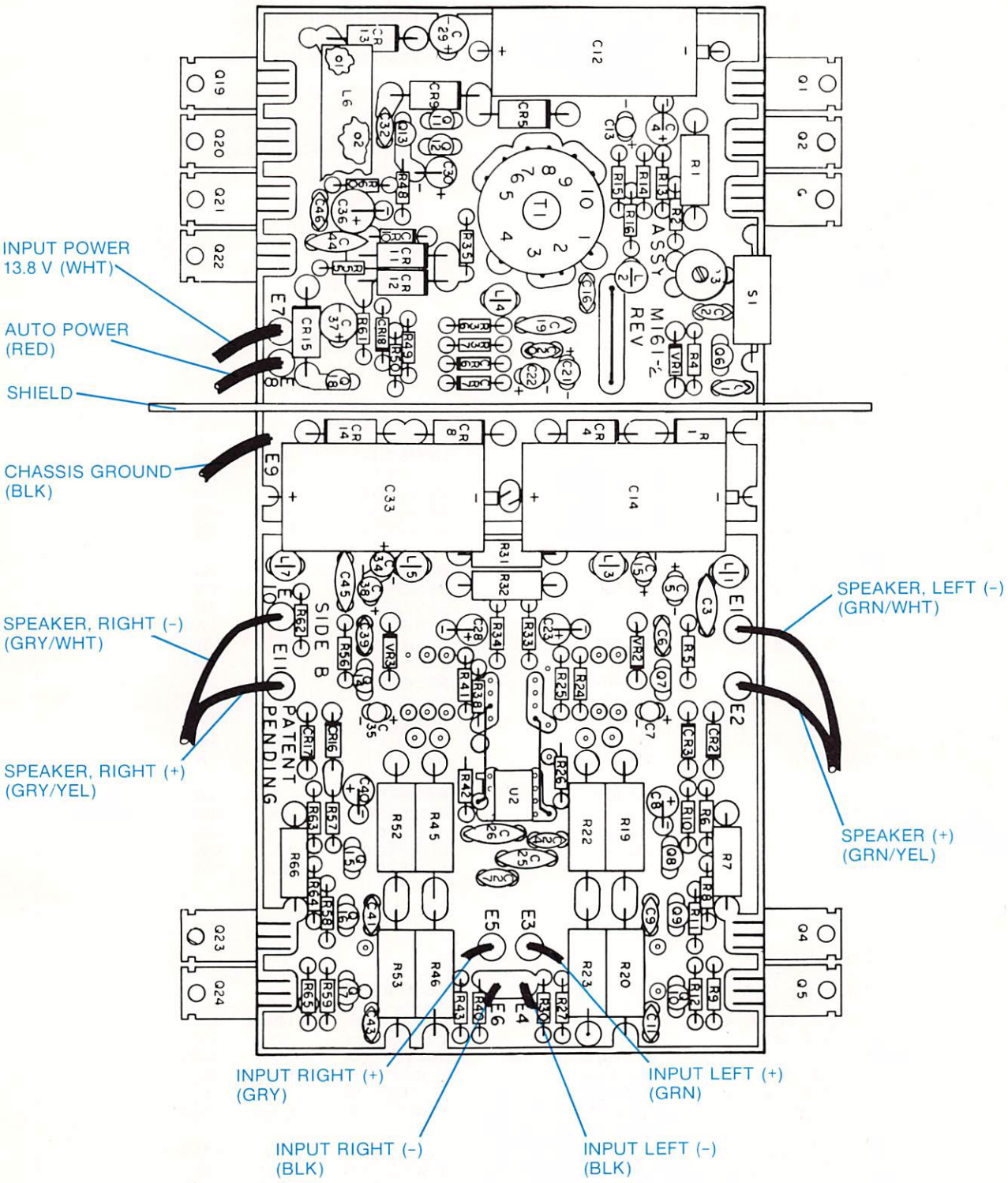
Characteristic operating voltages are shown on the schematic diagram and also on the PCB component connection diagram. Note that the component connection diagram shows the "reverse" (solder) side of the board, thus allowing all troubleshooting to be performed on the solder side of the board. All troubleshooting should be performed without removing the board from the heat sink. Should the amplifier be operated under load (speakers connected) while removed from the heat sink, the power output transistors will be damaged or fail due to excessive temperature.

3. INSTALLATION DIAGRAM



When using four speakers, connect in series as shown at the right, such that the total impedance of the speakers becomes 4 to 8 ohms.

6. COMPONENT LAYOUT



7. PARTS LIST

MISCELLANEOUS

REF. KEY	PART NO.	DESCRIPTION
U2	SS-133	IC (NE5538)
Q5, 24	SS-052	TRANSISTOR (2N2955)
Q1, 2, 3, 4, 19, 20, 21, 22, 23	SS-062	TRANSISTOR (2N3055)
Q6, 11, 12, 13, 18	SS-071	TRANSISTOR (2N5227)
Q9, 14, 16	SS-101	TRANSISTOR (MPSA55)
Q7, 10, 17	SS-102	TRANSISTOR (MPSA05)
Q8, 15	SS-103	TRANSISTOR (2N3392)
VR1	SS-171	DIODE, ZENER (1N4736)
VR2, 3	SS-172	DIODE, ZENER (1N4746)
CR1, 4, 5, 8, 9, 14	SS-151	DIODE (MR850)
CR11, 12, 13, 15	SS-152	DIODE (MR500)
CR2, 3, 6, 7, 16, 17, 10	SS-161	DIODE (1N4003)
CR18	SS-212	DIODE (1N270)
L6	FA-504	INDUCTOR
L1, 2, 3, 4, 5, 7	FA-520	INDUCTOR
T1	FA-519	TRANSFORMER
S1	SW-509	THERMAL SWITCH (MC170B)

RESISTORS

REF. KEY	PART NO.	DESCRIPTION		
R3	PT10V	RESISTOR	1K	¼W
R7, 66	R0-010	RESISTOR	0.1	2W
R31, 32	R1-220	RESISTOR	22	1W
R30, 40	R4-220	RESISTOR	22	¼W
R19, 22, 45, 52	R0-330	RESISTOR	33	2W
R20, 23, 46, 53	R0-390	RESISTOR	39	2W
R9, 11, 58, 60, 65	R4-680	RESISTOR	68	¼W
R1	R1-820	RESISTOR	82	1W
R33, 34	R4-151	RESISTOR	150	¼W
R4, 16, 36, 37	R4-221	RESISTOR	220	¼W
R5, 56, 61	R4-391	RESISTOR	390	¼W
R2, 8, 26, 42, 64	R4-102	RESISTOR	1K	¼W
R13	R4-222	RESISTOR	2.2K	¼W
R6, 12, 25, 38, 55, 59, 63	R4-272	RESISTOR	2.7K	¼W
R10, 57	R4-392	RESISTOR	3.9K	¼W
R27, 43	R4-622	RESISTOR	6.2K	¼W
R35, 48, 62, 50	R4-103	RESISTOR	10K	¼W
R24, 41	R4-203	RESISTOR	20K	¼W
R14, 15	R4-273	RESISTOR	27K	¼W
R49	R4-224	RESISTOR	220K	¼W

CAPACITORS

REF. KEY	PART NO.	DESCRIPTION		
C2, 6, 24, 27, 39, 46	CD-102	CAPACITOR	.001μF	100V
C9, 11, 41, 43	CY-272	CAPACITOR	.0027	100V
C1,	CD-103	CAPACITOR	.01μF	100V
C16, 20	CY-123	CAPACITOR	.012μF	100V
C3, 19, 25, 26, 32, 44, 45, 47	CD-104	CAPACITOR	.1μF	50V
C7, 13, 35	CT-225	CAPACITOR	2.2μF	35V
C4, 8, 23, 30, 40, 28	CE-106	CAPACITOR	10μF	16V
C5, 15, 21, 22, 34, 38	CT-156	CAPACITOR	15μF	25V
C29, 37	CT-686	CAPACITOR	68μF	25V
C36	CE-107	CAPACITOR	100μF	16V
C12, 14, 33	CE-228	CAPACITOR	2200μF	25V