

TEAC®



SERVICE MANUAL

MA-7

Power Amplifier

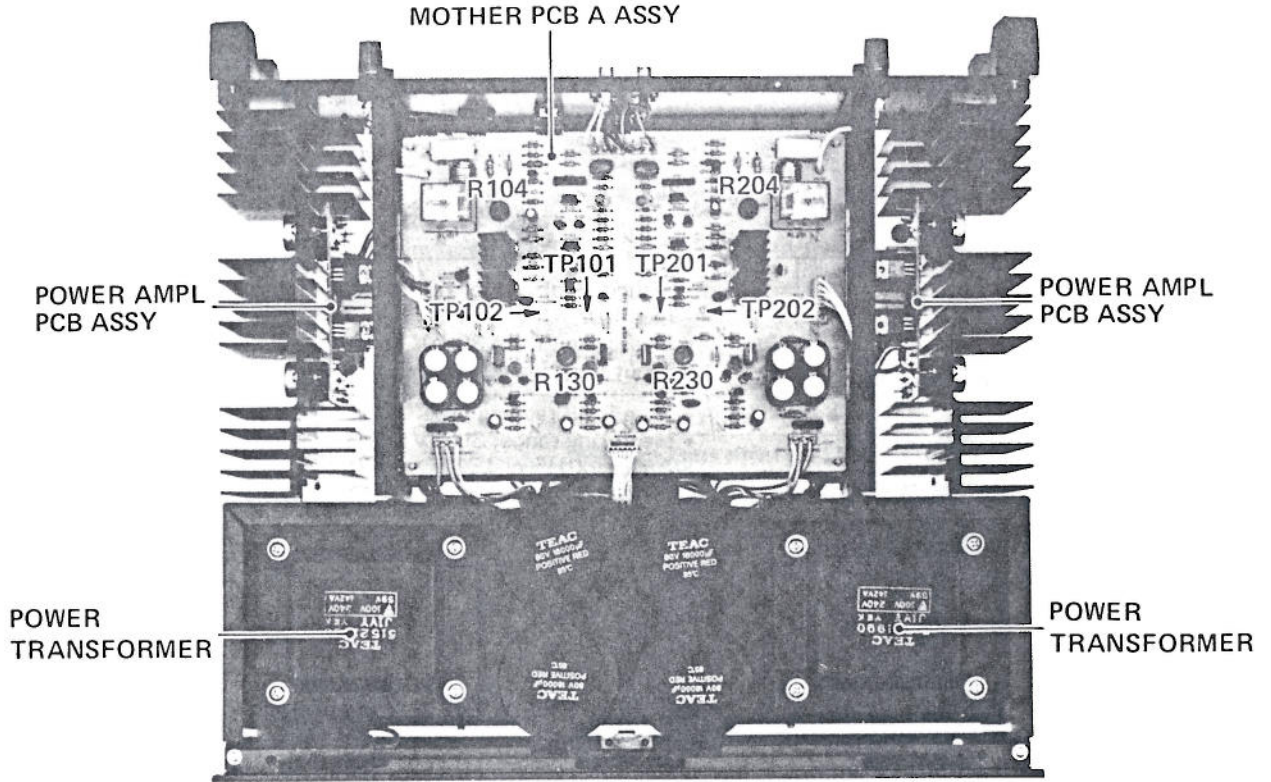
SPECIFICATIONS

Type	<ul style="list-style-type: none"> • Class B DC Amplifier (fully separate twin mono amplifiers)
Rated Output Power	<ul style="list-style-type: none"> • 150 W + 150 W (8 ohms, 7 Hz ~ 100 kHz)
Total Harmonic Distortion	<ul style="list-style-type: none"> • 0.003% (8 ohms, at rated output 10 Hz ~ 20 kHz)
Intermodulation Distortion	<ul style="list-style-type: none"> • 0.002% (8 ohms, at rated output, SMPTE)
Output Bandwidth	<ul style="list-style-type: none"> • 7 Hz ~ 100 kHz (8 ohms THD 0.02%)
Frequency Response	<ul style="list-style-type: none"> • DC ~ 200 kHz +0, -1 dB
Input Sensitivity/Impedance	<ul style="list-style-type: none"> • 1 V_{RMS}/50 kohms
Signal-to-Noise Ratio	<ul style="list-style-type: none"> • 120 dB (IHF A Network)
Residual Noise	<ul style="list-style-type: none"> • 35 μV (Input shorted, A Curve)
Damping Factor	<ul style="list-style-type: none"> • 100 (DC ~ 20 kHz)
Channel Separation	<ul style="list-style-type: none"> • 120 dB or more (1 kHz, input shorted)
Slew Rate	<ul style="list-style-type: none"> • ±120 V/μsec
Power Requirement	<ul style="list-style-type: none"> • 100/117/220 /240 V AC 50/60 Hz (General Export Model) • 117 V AC 60 Hz (U.S.A. Model)
Power Consumption	<ul style="list-style-type: none"> • 300 W
Weight	<ul style="list-style-type: none"> • 22 kg (48-8/16 lbs)
Dimensions (W x H x D)	<ul style="list-style-type: none"> • 432 x 148 x 396 mm (17" x 5-13/16" x 15-9/16")

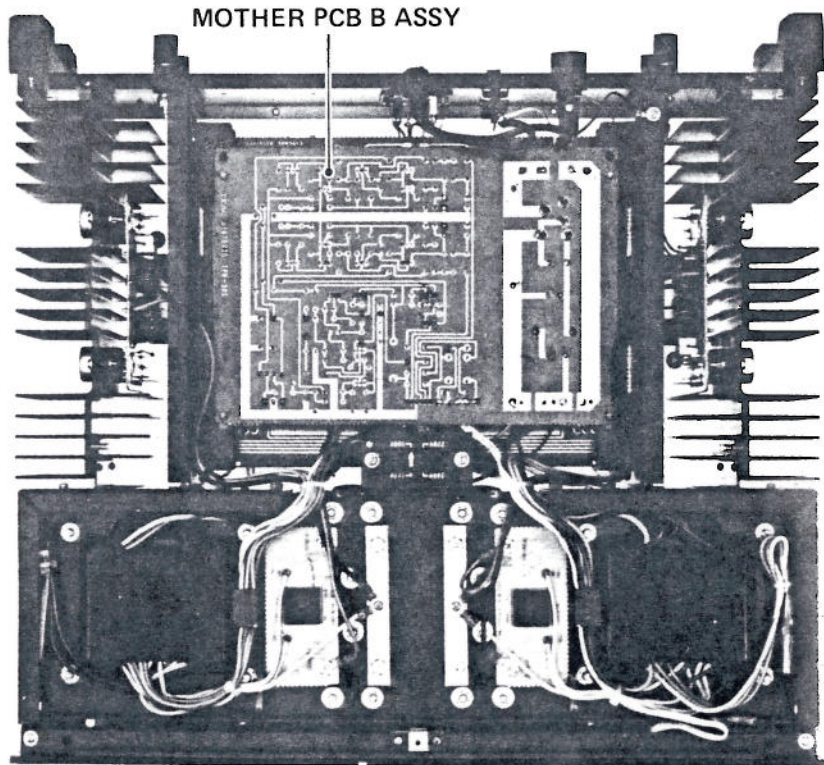
* Improvements may result in specification or feature changes without notice.

- NOTES:**
1. PC boards shown viewed from foil side.
 2. \triangle Parts marked with this sign are safety critical components. They must always be replaced with identical components – refer to the TEAC Parts List and ensure exact replacement.

PARTS AND ADJUSTMENT LOCATIONS



Top View



Bottom View

ADJUSTMENTS AND CHECKS

MEASURING INSTRUMENTS

- Measuring instruments indicated on the chart below are necessary when doing performance checks.
- When measuring, only a DC voltmeter is needed.

DC voltmeter	<ul style="list-style-type: none"> • A digital voltmeter or zero-center type meter is recommended. • Measuring range: 30 mV ~ 100 V • Input impedance: 20 kohms or more
AC voltmeter	<ul style="list-style-type: none"> • True RMS reading type • Measuring range: 30 mV ~ 100 V • A curve (IHF or IEC) with filter
Oscillator	<ul style="list-style-type: none"> • Maximum output: 1 V_{RMS} or more • Frequency: 2 Hz ~ 100 kHz • Harmonic distortion: 0.002% or less/10 Hz ~ 20 kHz
Harmonic distortion meter	<ul style="list-style-type: none"> • Combined use with AC voltmeter • Fundamental rejection ratio: 90 dB or more
Dummy load resistor	<ul style="list-style-type: none"> • Resistance value: 8 ohms • Inductance: 2 μH or less • Power rating: 150 W or more
Oscilloscope	<ul style="list-style-type: none"> • Bandwidth: 10 MHz or more • Vertical sensitivity: 10 mV/div or more
Attenuator	<ul style="list-style-type: none"> • General type

ADJUSTMENT PREPARATION

Before adjusting, set each semi-fixed resistor as follows.

R104, R204, R130, R230	mid-point
R402 (of both L- and R-ch's)	mid-point

ADJUSTMENT PROCEDURE

- Adjustments are done with an open circuit input and no load condition.
- Adjustments are conducted in the sequence in the following chart.
- Idling current adjustment should be performed 7 minutes after power of MA-7 is thrown ON. Also readjustment should be made after 5 minutes warm-up time following adjustment.
- Idling current adjustment and output DC voltage adjustment should be made alternately.

Item		Adjusting Point	Measuring Point	Adjustment Value
Amplifier supply voltage adjustment	L-ch	R130	Between TP101/GND	+60 V ~ +61 V
		Check	Between TP102/GND	-60 V ~ -61 V
	R-ch	R230	Between TP201/GND	+60 V ~ +61 V
		Check	Between TP202/GND	-60 V ~ -61 V
Idling current adjustment	L-ch	R402 (Left)	Between TP(+)/TP(-)	26 mV ±3 mV
	R-ch	R402 (Right)		
Output DC voltage adjustment	L-ch	R104 (Left)	Between (+)/(-) on OUTPUT terminal	0 ±10 mV
	R-ch	R204 (Right)	Between (+)/(-) on OUTPUT terminal	

PERFORMANCE CHECKS

- Measurement should be made 10 minutes or more after warming-up of MA-7.
- In the chart below, the measuring point is always the OUTPUT terminal/s on the MA-7 except in items 2 and 3. Do not measure across the dummy load resistor.
- Do not connect L-ch and R-ch OUTPUT minus (-) terminals.
- Employ the DIRECT input terminals as input terminals for all checks except the 7 Hz frequency characteristic check, item 7.
- Signal impedance should be 300 ohms or less.

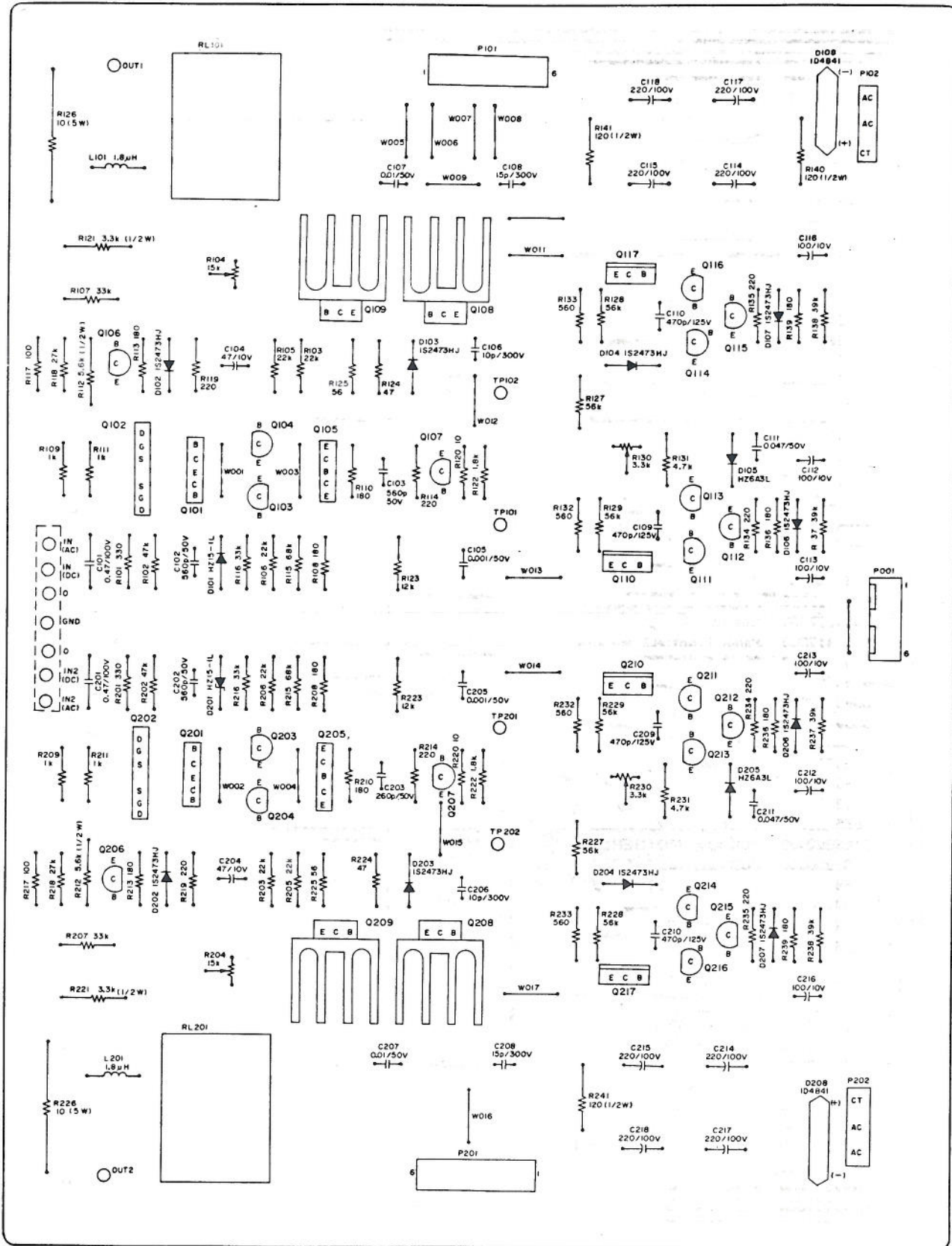
ITEM	INPUT SIGNAL	OUTPUT TERMINAL	SPECIFICATION	REMARKS
1. Power muting time	1 kHz/30 mVrms (-30.5 dB)	Open circuit (Level: approx.1 Vrms)	2 ~ 3 secs after POWER ON, signal is output and LED goes from RED to GREEN	
2. Amplifier supply voltage	No signal	Open circuit	Between TP101/GND +60 V ~ +61 V Between TP102/GND -60 V ~ -61 V Between TP201/GND +60 V ~ +61 V Between TP202/GND -60 V ~ -61 V	
3. Output DC voltage	Input shorted or open	Open circuit	With input shorted or open 0 ±40 mV	
4. Idling current	Input shorted or open	Open circuit	With input shorted or open, between TP(+) and TP(-) (both L- and R-ch's) 26 mV ±5 mV	Do not ground any terminals
5. Maximum output (8 ohms)	1 kHz/1.1 Vrms (0.83 dB)	*Connect 8 ohms dummy resistor	No distortion visible on output waveform (170W, approx. 37 Vrms)	*Connect dummy resistor only to channel to be measured, measure channel by channel.
6. Harmonic distortion	10 Hz, 1 kHz, 20 kHz, 100 kHz/ 1 Vrms (0 dB)	*Connect 8 ohms dummy resistor	Harmonic distortion at each freq. 10 Hz 0.003% or less 1 kHz 0.002% or less 20 kHz 0.005% or less 100 kHz 0.04% or less	*Same as above when low pass filter is used, be careful that the filter does not affect the 3rd harmonic.
7. Frequency characteristics	3 Hz ~ 100 kHz/ approx. 30 mVrms (-30.5 dB) (Set 1 kHz output level to 1 Vrms (0 dB).)	8 ohms	Reference: 1 kHz output level *3 Hz 0 dB 7 Hz { 0 dB -3 dB (C-COUPLED input term.) 1 kHz 0 dB 20 kHz 0 dB (+0, -0.1 dB) 100 kHz -0.5 dB (+0, -0.2 dB)	*In case difficulty measuring 3 Hz, doing 5 ~ 10 Hz is permissible.
8. Damping factor (DF)	1 kHz, 20 kHz, 100 kHz/approx. 300 mVrms (-10.5 dB). (Set no load output voltage to 10 Vrms (20 dB).)	Open or connect dummy resistor	With output level with no load as reference, value of reduced output level when connected to 8 ohm dummy resistor. 1 kHz 0.1 dB or less (DF ≧ 80) 20 kHz 0.2 dB or less (DF ≧ 40) 100 kHz 0.5 dB or less (DF ≧ 16)	$DF = \frac{E_L}{E_0 - E_L}$ E ₀ : No load output voltage E _L : Output voltage with load
9. Noise	Input shorted	Open or 8 ohms	*Output residual noise voltage 34 μVrms or less (-89.4 dB or more)	*Use A curve (IHF or IEC)
	Open circuit	Open or 8 ohms	*Output residual noise voltage 150 μVrms or less (-76.5 dB or more)	
10. DC sensor operation	7 Hz/1 Vrms (0 dB)	Open or connect 8 ohm dummy resistor	Output should not be cut off	*Refer to "NOTE 1" below chart.
	2 Hz/30 mVrms (-30.5 dB)		* Output should be cut off	
	DC 0V → +60mV DC 0V → -60 mV		*When input voltage is changed quickly from 0 V → +60 mV, 0 V → -60 mV, output should be cut off.	
11. Overload detecting operation	1 kHz/300 mVrms (-10.5 dB) (Output approx. 10 Vrms) (20 dB)	Connect 8 ohms dummy resistor	*When shorting output terminal, output should cut off.	*Refer to "NOTE 1" below chart.

NOTE: When the output is cut off due to the operation of the DC sensor and/or the overload detecting circuit, indicator (LED) should change from green to red. Then 2 to 3 secs after the cause of the cut off is removed, the amplifier should return to the normal condition.

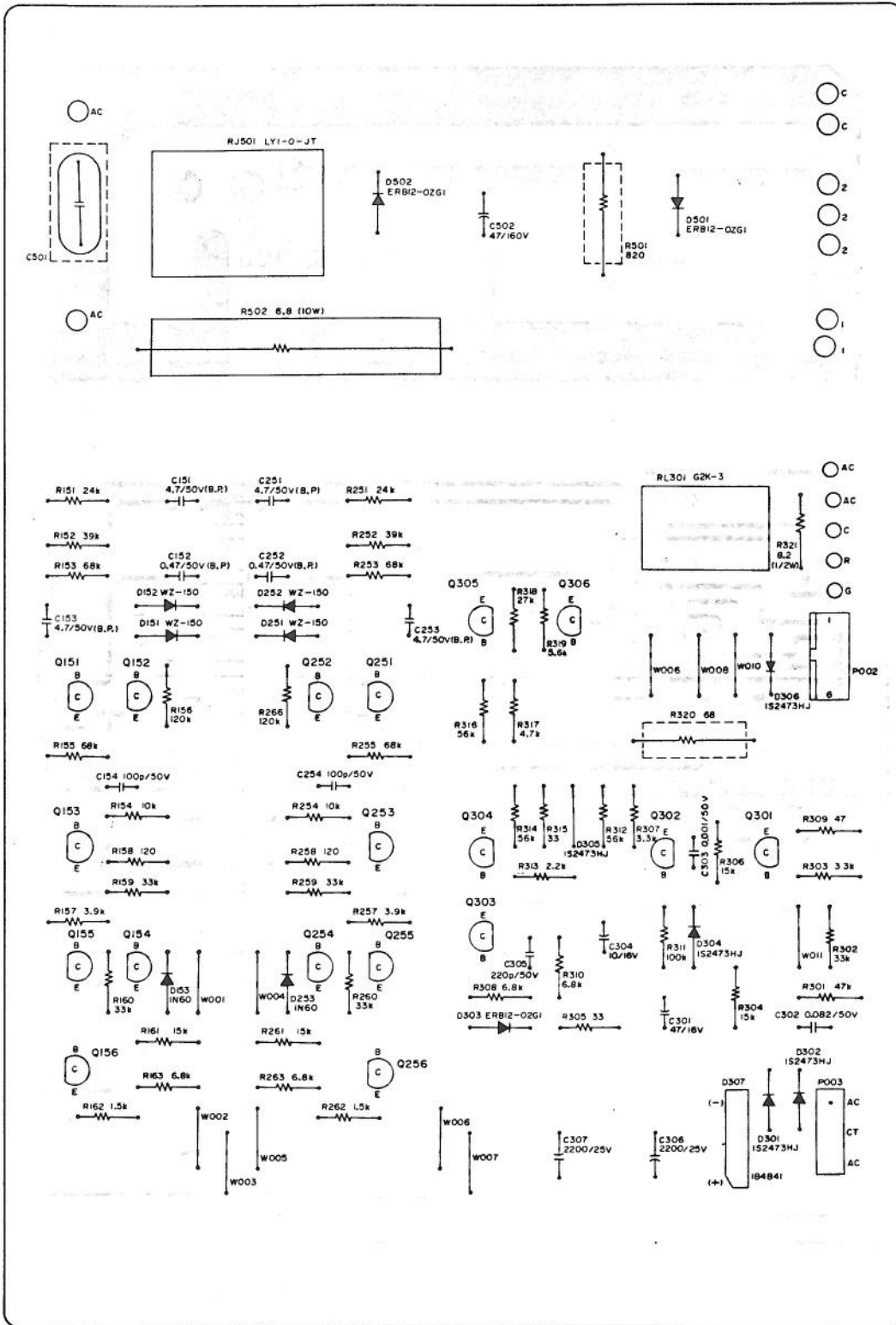
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
1	5503208000	Cover Assy, Top	
2	5168958000	PCB Assy, POWER AMPL	
3	5553132000	Heat Sink	Part of 2
4	5147060000	Socket, Power Transistor	
5	5552409000	Heat Sink	
6	5145161000	Transistor, 2SC2460B-0	A 1073
7	5145160000	Transistor, 2SA1050B-0	C 2523
8	5555740000	Bracket, Handle; A	JAPAN
	5555997000	Bracket, Handle; B	U.S.A., GENERAL EXPORT
9	5555741000	Spacer, Handle Bracket	
10	5504567000	Handle Assy	
11	5552416000	Panel, Side	
12	5553310001	Chassis, Side	
13	5555724000	Bracket, Side Chassis; L	
14	△ 5152198000	Transformer, Power	JAPAN, U.S.A.
	△ 5152199000	Transformer, Power	GENERAL EXPORT
15	5171609000	Capacitor, Elec.; 1800 mfd 80V	
16	5555725000	Bracket, Side Chassis; R	
17	5552410001	Chassis, Main	
18	5553349000	Bracket, Power Transformer	
19	5555723000	Plate, Grounding	
20	5168959000	PCB Assy, RECTIFIER	Part of 20
	5167959000	PCB, RECTIFIER	Part of 20
	5143147000	Diode, Silicon Stack (D001)	Part of 20
	5122422000	Pin	
21	5168953000	PCB Assy, LAMP	part of 21
	5167953000	PCB, LAMP	Part of 21
	5142035000	LAMP (DS001, DS002)	
22	5533205000	Holder, Lamp	
23	5555729000	Plate, Color (Red)	
24	5555728000	Plate, Color (Green)	
25	5555746000	Plate, Light Shield	
26	5555735000	Angle, A	
27	5534737000	Cushion, A	
28	5552412000	Panel, Front; A	JAPAN
	5552501000	Panel, Front; B	U.S.A., GENERAL EXPORT
29	5555998000	Plate, Front; A	JAPAN
	5555999000	Plate, Front; B	U.S.A., GENERAL EXPORT
30	5534736000	Lens	
31	5534034000	Foot	
32	5553312000	Cover, Bottom	
33	5133014000	Plug, Voltage Selector	GENERAL EXPORT
34	5133015000	Socket, Voltage Selector	GENERAL EXPORT
35	5555726000	Bracket, Voltage Selector	GENERAL EXPORT
36	5168962000	PCB Assy, MOTHER; B	JAPAN
	5168966000	PCB Assy, MOTHER; B	U.S.A.
	5168970000	PCB Assy, MOTHER; B	GENERAL EXPORT
37	5534726000	Support, PCB	
38	5552411000	Bracket, PCB	
39	5553311000	Angle, PCB	
40	5168957000	PCB Assy, MOTHER; A	
41	5122168000	Housing, Connector; 6P	
42	5122395000	Housing, Connector; 6P	
43	5124060000	Jack, Pin; 4P	
44	△ 5134114000	Switch, Power	JAPAN, GENERAL EXPORT
	△ 5134103000	Switch, Power	U.S.A.
45	5552414000	Panel, Rear	
46	5533206000	Foot, Rubber	
47	5120011000	Terminal, Speaker (Red)	
48	5120010000	Terminal, Speaker (Black)	
49	5142243000	Holder, Fuse	
50	△ 5142215000	Fuse, 7A 250V	JAPAN, GENERAL EXPORT (100, 117V)
	△ 5142117000	Fuse, 7A 250V	U.S.A.
	△ 5142211000	Fuse, 3A 250V	GENERAL EXPORT (220, 240V)
51	5534661000	Strain Relief, AC Power Cord	
52	△ 5128099000	Cord, AC Power	JAPAN, GENERAL EXPORT
	△ 5128098000	Cord, AC Power	U.S.A.
53	5581059000	Screw, Trim; B	JAPAN
54	5200006900	PCB Assy, LIMITER	

PC BOARDS AND PARTS LIST

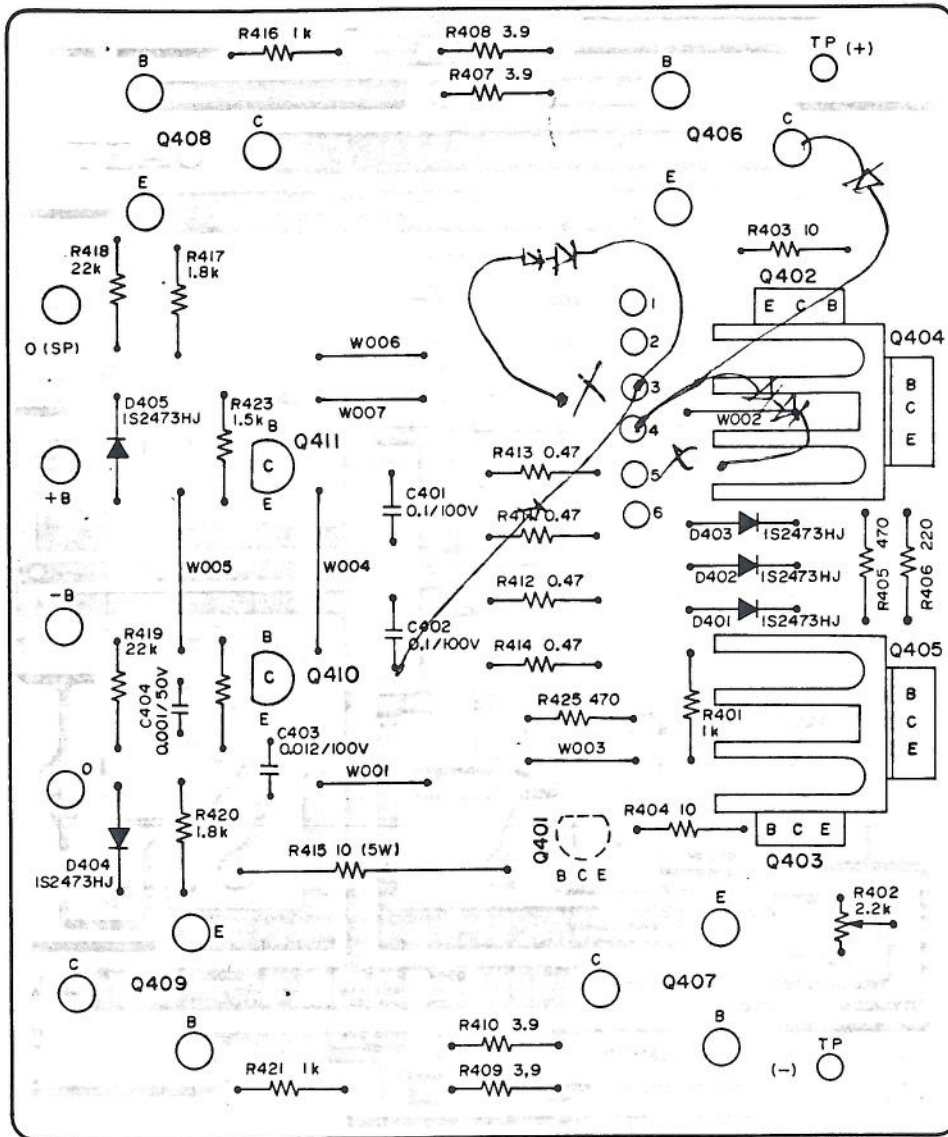
MOTHER PCB A ASSY



MOTHER PCB B ASSY

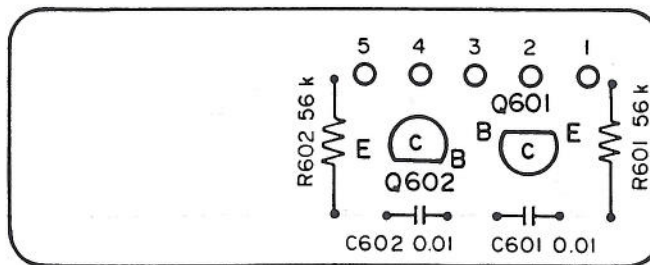


POWER AMPL PCB ASSY



P-1076

LIMITER PCB ASSY



P-1077

MOTHER PCB A ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168957000	PCB A Assy
	5167957000	PCB A
TRANSISTORS		
Q101, Q201	5145154000	Dual, 2SC2259 (F)
Q102, Q202	5145156000	Dual FET, 2SK109 (C)
Q103, Q203	5145153000	2SC2240 (GR)
Q104, Q204	5145153000	2SC2240 (GR)
Q105, Q205	5145155000	Dual, 2SA995 (F)
Q106, Q206	5145153000	2SC2240 (GR)
Q107, Q207	5145149000	2SA970 (GR)
Q108, Q208	5145158000	2SA939 (B) (V)
Q109, Q209	5145159000	2SC2071 (B) (V)
Q110, Q210	5145152000	2SC2238 (Y)
Q111, Q211	5145153000	2SC2240 (GR)
Q112, Q212	5145149000	2SA970 (GR)
Q113, Q213	5145153000	2SC2240 (GR)
Q114, Q214	5145149000	2SA970 (GR)
Q115, Q215	5145153000	2SC2240 (GR)
Q116, Q216	5145149000	2SA970 (GR)
Q117, Q217	5145148000	2SA968 (Y)
DIODES		
D101, D201	5143145000	Zener, Hz 15-1L
D102, D202	5143118000	1S2473HJ
D103, D203	5143118000	1S2473HJ
D104, D204	5143118000	1S2473HJ
D105, D205	5143144000	Zener, Hz 6A3L
D106, D206	5143118000	1S2473HJ
D107, D207	5143118000	1S2473HJ
D108, D208	5143149000	Si Stack, 1D4B41
RESISTORS		
All resistors are rated $\pm 5\%$ tolerance, $\frac{1}{4}W$ and of carbon type unless otherwise noted.		
R101, R201	5183070000	330 ohm
R102, R202	5183122000	47 k ohm
R103, R203	5185554000	22 k ohm 2%, Metal Film
R105, R205	5185554000	22 k ohm 2%, Metal Film
R106, R206	5183114000	22 k ohm
R107, R207	5185558000	33 k ohm 2%, Metal Film
R108, R208	5185504000	180 ohm 2%, Metal Film
R109, R209	5185522000	1 k ohm 2%, Metal Film
R110, R210	5185504000	180 ohm 2%, Metal Film
R111, R211	5185522000	1 k ohm 2%, Metal Film
R112, R212	5180100000	5.6 k ohm $\frac{1}{2}W$
R113, R213	5183064000	180 ohm
R114, R214	5183066000	220 ohm
R115, R215	5183126000	68 k ohm
R116, R216	5183118000	33 k ohm
R117, R217	5185498000	100 ohm 2%, Metal Film
R118, R218	5183116000	27 k ohm
R119, R219	5183066000	220 ohm
R120, R220	5183034000	10 ohm
R121, R221	5185364000	3.3 k ohm 1%, Metal Film, $\frac{1}{2}W$
R122, R222	5183088000	1.8 k ohm
R123, R223	5183108000	12 k ohm
R124, R224	5183050000	47 ohm
R125, R225	5183052000	56 ohm

REF. NO.	PARTS NO.	DESCRIPTION
R126, R226	5184416000	10 ohm 5W Cement
R127, R227	5185564000	56 k ohm 2%, Metal Film
R128, R228	5185564000	56 k ohm 2%, Metal Film
R129, R229	5183124000	56 k ohm
R131, R231	5183098000	4.7 k ohm
R132, R232	5183076000	560 ohm
R133, R233	5183076000	560 ohm
R134, R234	5183066000	220 ohm
R135, R235	5183066000	220 ohm
R136, R236	5183064000	180 ohm
R137, R237	5183120000	39 k ohm
R138, R238	5183120000	39 k ohm
R139, R239	5183064000	180 ohm
R140, R240	△ 5185863000	120 ohm $\frac{1}{2}W$, Fusible
R141, R241	△ 5185863000	120 ohm $\frac{1}{2}W$, Fusible

CAPACITORS

C101, C201	5170019000	Meta. Mylar 0.47 mfd 100V
C102, C202	5172618000	Polyst. 560 pfd 50V
C103, C203	5172618000	Polyst. 560 pfd 50V
C104, C204	5173180000	Elec. 47 mfd 10V
C105, C205	5170376000	Mylar 0.001 mfd 50V
C106, C206	5173213500	Dip. Mica 10 pfd 300V
C107, C207	5171880000	Mylar 0.01 mfd 50V
C108, C208	5173215500	Dip. Mica 15 pfd 300V
C109, C209	5172736000	Polyst. 470 pfd 125V
C110, C210	5172736000	Polyst. 470 pfd 125V
C111, C211	5171896000	Mylar 0.047 mfd 50V
C112, C212	5173192000	Elec. 100 mfd 10V
C113, C213	5173192000	Elec. 100 mfd 10V
C114, C214	5172949000	Elec. 220 mfd 100V
C115, C215	5172949000	Elec. 220 mfd 100V
C116, C216	5173192000	Elec. 100 mfd 10V
C117, C217	5172949000	Elec. 220 mfd 100V
C118, C218	5172949000	Elec. 220 mfd 100V

VARIABLE RESISTORS

R104, R204	5053924000	Semi-fixed, 15 k ohm
R130, R230	5053920000	Semi-fixed, 3.3 k ohm

MISCELLANEOUS

L101, L201	5160050000	Coil, 1.8μH 40 m ohm
RL101, RL201	5061147000	Relay
P001	5122187000	Lock Wafer, 6P
P101, P201	5122396000	Flat Wafer, 6P
P102, P202	5122425000	Wrapping Terminal, 3P
TP101, TP201	5544750000	TP, Combination
TP102, TP202	5544750000	TP, Combination
	5553132000	Heat Sink

MOTHER PCB B ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168962000	PCB B ASSY (JAPAN)
	5168966000	PCB B ASSY (U.S.A.)
	5168970000	PCB B ASSY (GENERAL EXPORT)
	5167962000	PCB B
TRANSISTORS		
Q151, Q251	5145150000	2SA1015 (GR)
Q152, Q252	5145150000	2SA1015 (GR)
Q153, Q253	5145151000	2BC1815 (GR)
Q154, Q254	5145151000	2BC1815 (GR)
Q155, Q255	5145150000	2SA1015 (GR)
Q156, Q256	5145151000	2SC1815 (GR)
Q301	5145151000	2SC1815 (GR)
Q302	5145151000	2SC1815 (GR)
Q303	5145151000	2SC1815 (GR)
Q304	5145151000	2SC1815 (GR)
Q305	5145150000	2SA1015 (GR)
Q306	5145151000	2SC1815 (GR)
DIODES		
D151, D251	5143285000	Zener, WZ-150
D152, D252	5143285000	Zener, WZ-150
D153, D253	5042213000	1N60
D301	5143118000	1S2473HJ
D302	5143118000	1S2473HJ
D303	5143243000	ERB12-02G1
D304	5143118000	1S2473HJ
D305	5143118000	1S2473HJ
D306	5143118000	1S2473HJ
D307	5143135000	Si. Stack, 1B4B41
D501	5143243000	ERB12-02G1
D502	5143243000	ERB12-02G1
CARBON RESISTORS		
All resistors are rated $\pm 5\%$ tolerance, $\frac{1}{4}$ watt.		
R151, R251	5183115000	24 k ohm
R152, R252	5183120000	39 k ohm
R153, R253	5183126000	68 k ohm
R154, R254	5183106000	10 k ohm
R155, R255	5183126000	68 k ohm
R156, R256	5183132000	120 k ohm
R157, R257	5183096000	3.9 k ohm
R158, R258	5183060000	120 ohm
R159, R259	5183118000	33 k ohm
R160, R260	5183118000	33 k ohm
R161, R261	5183110000	15 k ohm
R162, R262	5183086000	1.5 k ohm
R163, R263	5183102000	6.8 k ohm
R301	5183122000	47 k ohm
R302	5183118000	33 k ohm
R303	5183118000	33 k ohm
R304	5183110000	15 k ohm
R305	5183046000	33 ohm
R306	5183110000	15 k ohm
R307	5183094000	3.3 k ohm
R308	5183102000	6.8 k ohm
R309	5183050000	47 ohm

REF. NO.	PARTS NO.	DESCRIPTION
R310	5183102000	6.8 k ohm
R311	5183130000	100 k ohm
R312	5183124000	56 k ohm
R313	5183090000	2.2 k ohm
R314	5183124000	56 k ohm
R315	5183046000	33 ohm
R316	5183124000	56 k ohm
R317	5183098000	4.7 k ohm
R318	5183116000	27 k ohm
R319	5183100000	5.6 k ohm
R320	5184787000	68 ohm Metal Film 2W
R321	5180032000	8.2 ohm $\frac{1}{2}$ W
R501	△ 5184813000	820 ohm Metal Film 2W
R502	△ 5184469000	6.8 ohm 10W, Cement

CAPACITORS

C151, C251	5171409000	Elec.	4.7 mfd	50V (B.P.)
C152, C252	5171400000	Elec.	0.47 mfd	50V (B.P.)
C153, C253	5171400000	Elec.	4.7 mfd	50V (B.P.)
C154, C254	5172600000	Polyst.	10 pfd	10%
C301	5173183000	Elec.	47 mfd	16V
C302	5171901000	Mylar	0.082 mfd	50V
C303	5170376000	Mylar	0.001 mfd	50V
C304	5171565000	Elec.	10 mfd	16V
C305	5172608000	Polyst.	22 pfd	10%
C306	5172978000	Elec.	2200 mfd	25V
C307	5172978000	Elec.	2200 mfd	25V
C501	△ 5052909000	Spark Killer (JAPAN)		
C501	△ 5171606000	Spark Killer (U.S.A.)		
C501	△ 5052913000	Spark Killer (GENERAL EXPORT)		
C502	5171974000	Elec.	47 mfd	160V

MISCELLANEOUS

RL301	△ 5061150000	Relay
RL501	△ 5061148000	Relay (JAPAN, GENERAL EXPORT)
RL501	△ 5061149000	Relay (U.S.A.)
P002	5122130000	Lock Wafer, 6P
P003	5122425000	Wrapping Terminal, 3P



POWER AMPL PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5168958000	PCB Assy
	5167958000	PCB
TRANSISTORS		
Q401	5145151000	2SC1815 (GR)
Q402	5145147000	2SD669A-C
Q403	5145146000	2SB649A-C
Q404	5145152000	2SC2238 (Y)
Q405	5145148000	2SA968 (Y)
Q406	5145161000	2SC2460B-O
Q407	5145160000	2SA1050B-O
Q408	5145161000	2SC2460B-O
Q409	5145160000	2SA1050B-O
Q410	5145153000	2SC2240 (GR)
Q411	5145149000	2SA970 (GR)

DIODES

D401	5143118000	1S2473HJ
D402	5143118000	1S2473HJ
D403	5143118000	1S2473HJ
D404	5143148000	1S2471HJ
D405	5143148000	1S2471HJ

RESISTORS

All resistors are rated $\pm 5\%$ tolerance, $\frac{1}{4}W$ and of carbon type unless otherwise noted.

R401	5183082000	1 k ohm	
R403	△ 5185902000	10 ohm	Fusible
R404	△ 5185902000	10 ohm	Fusible
R405	△ 5185942000	470 ohm	Fusible
R406	△ 5185934000	220 ohm	Fusible
R407	△ 5184215000	3.9 ohm	Non Flammable
R408	△ 5184215000	3.9 ohm	Non Flammable
R409	△ 5184215000	3.9 ohm	Non Flammable
R410	△ 5184215000	3.9 ohm	Non Flammable
R411	△ 5185202000	0.47 ohm	10%, Metal Plate 5W
R412	△ 5185202000	0.47 ohm	10%, Metal Plate 5W
R413	△ 5185202000	0.47 ohm	10%, Metal Plate 5W
R414	△ 5185202000	0.47 ohm	10%, Metal Plate 5W
R415	5184416000	10 ohm	5W, Cement
R416	5183082000	1 k ohm	
R417	5183088000	1.8 k ohm	
R418	5183114000	22 k ohm	
R419	5183114000	22 k ohm	
R420	5183088000	1.8 k ohm	
R421	5183082000	1 k ohm	
R422	5183124000	56 k ohm	
R423	5183086000	1.5 k ohm	
R424		(Not used)	
R425	5183074000	470 ohm	

CAPACITORS

C401	5054804000	Mylar	0.1 mfd	100V
C402	5054804000	Mylar	0.1 mfd	100V
C403	5054862000	Mylar	0.012 mfd	100V
C404	5054832000	Mylar	0.001 mfd	50V

REF. NO.	PARTS NO.	DESCRIPTION
MISCELLANEOUS		
R402	5053619000	Semi-fixed, 2.2 k ohm
TP	5544750000	TP, Combination
	5147060000	Socket, Transistor
	5553309000	Heat Sink
	5552409000	Heat Sink

LIMITER PCB ASSY

REF. NO.	PARTS NO.	DESCRIPTION
	5200006900	PCB Assy
	5210006900	PCB
Q601, Q602	5145151000	Transistor, 2SC1815-GR
R601, R602	5183112000	Resistor, Carbon; 18 k ohm $\frac{1}{4}W$ 5%
	5183148000	Resistor, Carbon; 560 k ohm $\frac{1}{4}W$ 5%
C601, C602	5054802000	Capacitor, Mylar; 0.01 mfd

INCLUDED ACCESSORIES

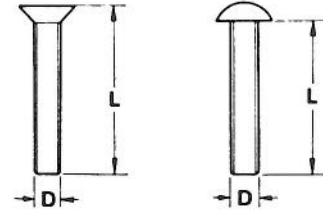
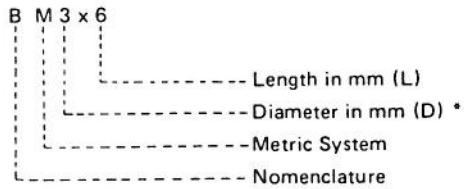
REF. NO.	PARTS NO.	DESCRIPTION	REMARKS
	5555740000	Bracket, Handle; A x 2	JAPAN U.S.A., GENERAL EXPORT
	5555997000	Bracket, Handle; B x 2	
	5504567000	Handle Assy x 2	
	5555741000	Spacer, Handle Bracket x 2	
	5534580000	Belt, C; Binding	
		Screw, B M4 x 10 x 6	
		Screw, O M5 x 15 x 4	
		Washer	
	5534659000	Washer, Shoulder	
	5101656000	Owner's Manual	
	5101658000	Owner's Manual	All except JAPAN

ASSEMBLING HARDWARE CODING LIST

All screws conform to ISO standards, and have crossrecessed heads, unless otherwise noted. ISO screws have the head inscribed with a point as in the figure to the right.



FOR EXAMPLE:



* Inner dia. for washers and nuts

	Code	Name	Type		Code	Name	Type
MACHINE SCREW	R	Round Head Screw		TAPPING SCREW	BTA	Binding Head Tapping Screw(A Type)	
	P	Pan Head Screw*			BTB	Binding Head Tapping Screw(B Type)	
	T	Stove Head Screw (Truss)			RTA	Round Head Tapping Screw(A Type)	
	B	Binding Head Screw			RTB	Round Head Tapping Screw(B Type)	
	F	Flat Countersunk Head Screw		SETSCREW	SF	Hex Socket Setscrew(Flat Point)	
	O	Oval Countersunk Head Screw			SC	Hex Socket Setscrew(Cup Point)	
WOOD SCREW	RW	Round Head Wood Screw		SS	Slotted Socket Setscrew(Flat Point)		
TAPTITE SCREW	PTT	Pan Head Taptite Screw		WASHER	E	E-Ring (Retaining Washer)	
	WTT	Washer Head Taptite Screw			W	Flat Washer (Plain)	
SEMS SCREW	BSA	Binding Head SEMS Screw(A Type)			SW	Lock Washer (Spring)	
	BSB	Binding Head SEMS Screw(B Type)			LWI	Lock Washer (Internal Teeth)	
	BSF	Binding Head SEMS Screw(F Type)			LWE	Lock Washer (External Teeth)	
	PSA	Pan Head SEMS Screw(A Type)		TW	Trim Washer (Countersunk)		
	PSB	Pan Head SEMS Screw(B Type)		NUT	N	Hex Nut	

MA-7

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