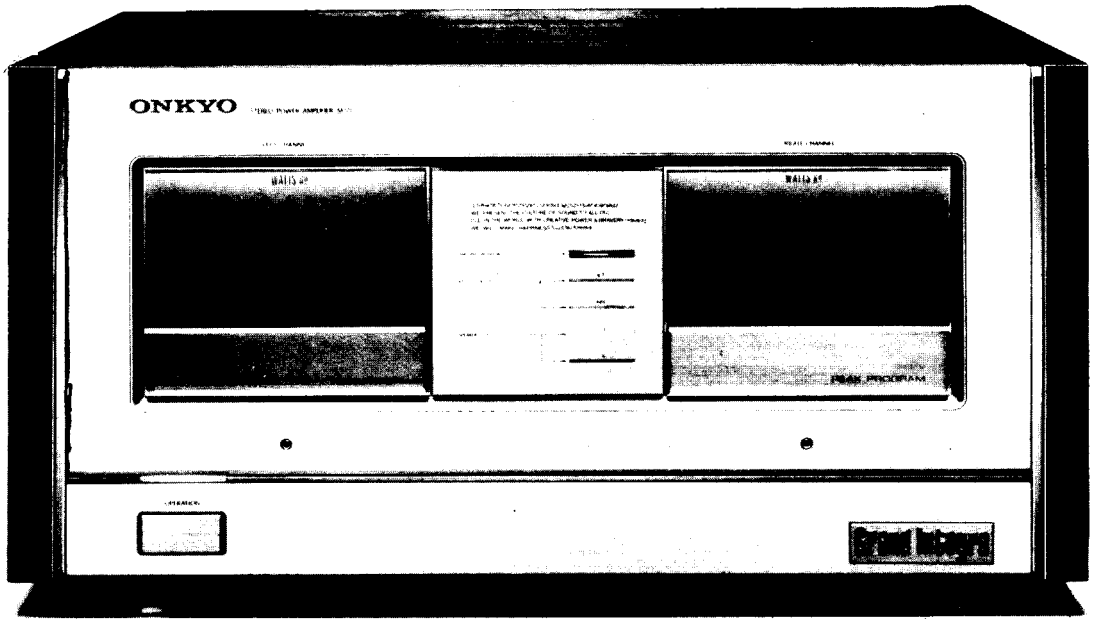
SERIAL No.

ONKYO® SERVICE MANUAL

Power Amplifier

Grand Integra M-510



UD	120V AC, 60Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

TABLE OF CONTENTS

ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

Power Output:	300 watts per channel, RMS into 8 ohms
	500 watts per channel, RMS into 4 ohms
	800 watts per channel, RMS into 2 ohms
IHF Dynamic Power Output	
	>400 watts per channel, 8 ohms
	>750 watts per channel, 4 ohms
	>1.3 kilowatts per channel, 2 ohms
	>2.1 kilowatts per channel, 1 ohm
Harmonic Distortion:	<.005%
Intermodulation Distortion:	<.003%
Power Bandwidth (IHF)	5 Hz to 100 kHz, -3 db, THD .2%
Gain:	33.8 db
Frequency Response:	1 Hz - 100 kHz, +0, -1.5 db
Input Sensitivity:	1 Volt for full output
Input Impedance:	20 kOhm (direct inputs)
S/N, A weighted:	120 db
Load Impedance:	1 ohm to 16 ohms, nominal speaker impedance 4 ohms to 16 ohms, EIAJ specification
Damping Factor:	>300; 8 ohms at 50 Hz
Meter Range:	44 db
Meter Accuracy:	0 db indicated: + or - 1 db -10 db indicated: + or - 2 db -20 db indicated: + or - 3 db
Meter Rise Time:	Minimum to 0 db - 100 microseconds
Decay Time:	0 db to -20 db - 1 second
Power Requirement:	120 Volts, 60 Hz (USA model)
Power Consumption:	720 watts EIAJ specification 160 watts idle, no signal
Dimensions:	507 mm wide X 264 mm high X 512 mm deep
Weight (Shipping):	72 Kg 160 lbs.

CIRCUIT DESCRIPTION

1. Protection circuit

The M-510's protection circuit is of a completely different type from that found in previous Onkyo components. It has the following features:

1) The control section has been digitized, for extremely fast response and stable operation.

2) The sensor and control sections are electrically isolated (by photo-coupler) from each other. In order to prevent deterioration in the quality of sound, both sections are isolated from the power amp circuit proper.

3) Not only the output (speaker) relays, but the input terminals as well are equipped with lead relays, insuring speedy protection when a load is shorted.

4) The protection circuit and power amp circuit proper have completely separate power supplies. Since the power supply on/off switch of power amp is linked to the protection circuit via a relay, protection is provided even in cases of malfunctions caused by internal factors such as abnormal idling current. Furthermore, these relays are coupled to delay circuits to delay the relays for when the left and right channel power supllies are switched on. The inrush current generated when the power is switched on is thus suppressed to much the same level as a peak current in large sized stereo amplifiers.

2. The structure of the protection circuit

Fig. 1 is a block diagram of the M-510's protection circuit.

The protection circuit detects the left and right channel DC output levels, the temperature of the radiator,and power transistor current.It controls the input relays, output (speaker) relays, waiting monitor, power supply (primary side) relays, meter lamp switching relays and the meter muting circuits and relays, and protects the power amp circuit.

The speaker output DC sensor turns the photocoupler LED on during normal operation. If, however, the left or right channel main power supply is shut off, the detector power supply is also shut off, thereby also turning off the photocoupler LED. Since, the protection circuit is triggered whenever a DC current is detected, it also functions, as it were, as a "power sensor," sensing when the main power supplies are turned on. The protection circuit control section sends to and receives signals from the waiting monitor, controls the power-on timing and turns the LEDs on the front panel on and off during malfunctions. Aside from the relays related to the power supply, all of the other relays operate simultaneously with the protection circuitry. The exception is the meter lamp relay which stays on when all the others are shut off. This relay is turned on after muting is released when the power is switched on, and remains on even if the protection circuitry is activated by a malfunction.

Therefore, the meter lamps will not switch off even if when a load is shorted.

The actual layout of the circuit is as follows: the sensors are located on PC board near the left and right channel radiators the input relays are on the input terminal PC board and the control section, waiting monitor circuit, warm-up simulator circuit, delay circuit and all the relay drivers are on the protection circuit pc board.

3. Circuit description (see circuit diagram)

3-1 DC detector circuit

After passing through a low-pass filter incorporating R1158, R1159,C1045 and C1046, the speaker output voltage drives the LED of photocoupler Q1073 by means of a comparator utilizing op. amps Q1071a and b.

The voltage reference for the comparator is obtained by dividing the voltage of the op. amp power supply consisting of Zener diodes D1041 and

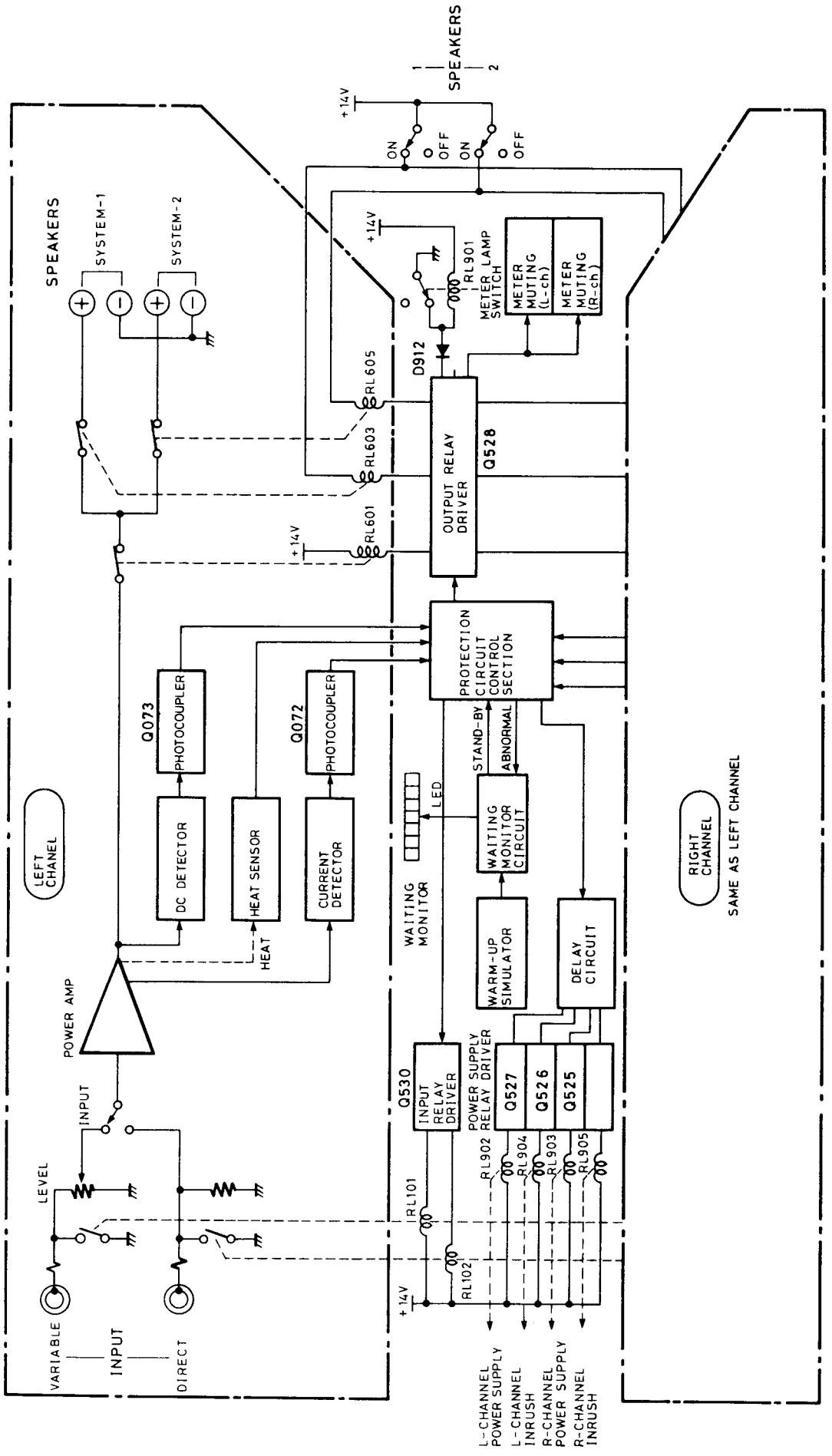


Fig-1 Protection Circuitry Block Diagram

D1042 which is then fed into the inverted inputs (pins #2 and #6).Q1071a detects DC on the positive side and Q1071b on the negative side. Since the output voltages of the op. amps are closer to 0V than the reference voltage during normal operation, so voltages approximating the op. amp power supply voltage (but with opposite polarity) appear as the output voltages. Current flows from Q1071b (+) through the photocoupler's LED and then to Q1071a (-); i.e. the LED is on. If, however, a DC input exceeding either the positive or negative voltage reference voltage occurs, the output of the op. amp on that side is reversed, making the voltage on both sides of the LED the same and shutting off the LED. If this happens, the transistor at the receiving end of the photocoupler is in turn shut off and a high level signal is passed to the control section.

Furthermore, even though the photocoupler LED is usually on, the LED is shut off if, for example, power to the op. amp is cut off by the transformer's thermally-activated switch. The sffect is the same as when DC is detected.

Finally, D1045 is provided to prevent reverse voltages from reaching the photocoupler LED.

3-2 Heat sensor

Overheating (approx. 130℃) is detected by Q520 by dividing the voltages of heat-sensing posistors R1176 and R501. During normal operation, the posistor's resistance is sufficiently low compared with that of R1176. so Q520 is off and a high-level signal is sent to the control section. If overheating occurs, the posistor's resistance increases, Q520 turns on, and a low level signal is generated.

3-3 Current detector circuit

This circuit detects the power transistor emitter current and determines the transistor operating point on the basis of the voltage between the center and power supply voltages. If it exceeds the load limit shown in

fig. 2, a high level signal is passed to the control section.

Separate detector circuits are mounted on both the n-p-n and p-n-p sides , sharing a common output photocoupler. As both detector circuits are identical apart from the reversed polarities, only the current detector for the n-p-n side is described here.

To determine the n-p-n power transistor emitter current, the voltage drops across emitter resistors R1084, R1086, R1088, and R1090 thru R1124 of each transistor are averaged by R1070 and R1072 thru R1082. And if power transistor current fluctuations due to D1051, D1017 and D1018 thru D1027 result in a voltage higher than the average diode voltage, that voltage is used.

The emitter current obtained in this way, and a voltage between the center and power supply voltages are passed througe the circuit consisting of R1134, R1130, R1136, R1132, and D1029. The resultant voltage is applied to the base of Q1016 and compared with a reference voltage applied to the base of Q1062. The detection level line shown in fig.2 is thus obtained.

The circuit normally operates below this detection level line with Q1060 and Q1069 off, and Q1062 and Q1056 on.

Therefore, no current is passed to the LED of photocoupler Q1072, the photocoupler transistor is off, and a high-level output is passed to the control circuit.

If a load short circuit or an extremely low load results in the detection level line being exceeded, Q1060 is turned on, Q1062 and Q1056 are turned off, and Q1069 is turned on. The photocoupler LED and transistor are both turned on, and a low level output is passed the control circuit . The current passed to the photocoupler LED at this time is passed via Q1069, R1170, the photocoupler LED, and D1044. And if the circuit is activated by p-n-p half-cycle, the current is passed via D1043, the photocoupler LED, R1171, and Q1070 with the photocoupler being turned

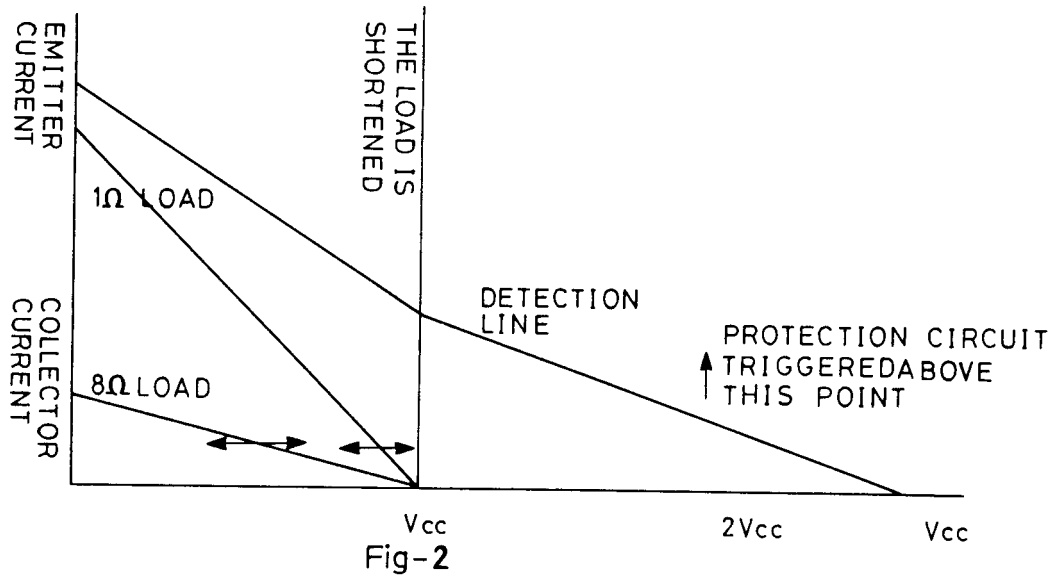


Fig-2

on if a load short circuit occurs in either positive or negative cycle. The reference voltage applied to the base of Q1062 is generated as a voltage between center and Q1062 base voltage by using the current mirror circuit (Q1066 and Q1064) to pass through R1149 a current equivalent to that obtained by converting a voltage between the power supply voltage and ground at R1155. Since the power transistor voltage Vc varies according to the power supply voltage, the a load lines shown in fig.2 shift horizontally even at the same a load impedance.

Therefore, to link movement of the detection level line at a load a load impedance to power supply fluctuations for greater precision, the reference voltage is generated from the power supply voltage as described above.

3-4 Control circuits

A block diagram of the protection circuit control section is shown in fig.3 .

The outputs from the detector section are normally applied to the control section as current detector (high), temperature detector (high), and DC detector (low) signals. Then after matching the polarities, these control signals are ORed. That is, subsequent processing in the control section is identical for each type of signal.

When any of these signals is applied, the input and SP relays in route (1) are switched, a protection activation signal PRO is passed to the waiting monitor, and the waiting monitor LED flashes on and off.

In route (2), however, the control signal is applied to monostable multivibrator A where pulse I of about two seconds is generated. Note that the length of this pulse is not shortened if the abnormal condition is corrected during generation of pulse. Since this pulse is inserted into route (1) via route (3), the time taken for the signal to be reapplied after the input and SP relays are switched off when an abnormal condition occurs is equal to the duration of the abnormal condition, or two seconds, whichever is the longer. Therefore, if the input relay is switched off as a result of a load short circuit or other abnormal condition, the signal is stopped, the current is halted immediately, and the relay is switched on again about two seconds later. (The relay is switched on and off repeatedly if the short circuit remains uncorrected,) And if a failure occurs as a result of DC generation where the abnormal condition is continuous, the relay will remain off for more than two seconds.

Signal (1) is applied via route (4) to another monostable multivibrator (B) where pulse Ⅱ of about five seconds is generated. If a sudden abnormal condition occurs, both pulse Ⅰ and Ⅱ are started at the same time with pulse Ⅰ ceasing in about half the time. A feature of monostable multivibrator B is that if the next input is applied during generation of pulse Ⅱ, the pulse is extended from that point up to the prescribed length. Hence, although pulse Ⅱ will stop after five seconds if thereis only one pulse Ⅰ when a DC is generated, it is prolonged until the consecutive pulse Ⅰ stops when caused by a load short circuit (which results in the relays being switched on and off repeatedly).

The purpose of pulse Ⅱ is to execute the function used to either switch relays off after a fixed period or hold relays if being switched

on and off repeatedly several times (this being the same function as in earlier Onkyo components). If, for example, a DC is generated by some failure, pulse Ⅰ is generated once only and the relay remains off. But after the end of the (B) pulse (five seconds later), routes (5) and (6) are both switched to high level with the condition being latched by route (7), and the signal then ORed with route (1) via route (8). Therefore, the relay subsequently remains off. At the same time, the main power supply is also switched off (via route (9)). The purpose of the delay circuit (C) is to prevent pulses from being passed to the next AND circuit and being latched when pulse Ⅰ is generated.

If a load short circuit occurs, on the other hand, generation of pulse Ⅱ is accompanied by the clear (CLR) pin of counter D being released via route (9) and the counter thus being enabled. Since pulse Ⅰ is generated continuously and pulse Ⅱ is extended if the short circuit is continuous, pulse Ⅰ is applied via route (10) to the counter clock (CLK) pin to advance the counter.

This counter consists of four D type flip-flops connected in series. The output switched to high level on the fifth count is passed via route (11) to a latch circuit where the high level is held. If the abnormal condition is corrected during this process, the counter is cleared since pulse Ⅱ is stopped after five seconds.

The latch circuit is only reset when a reset (RST) signal is received from the waiting monitor. And since this RST signal is only generated when the power is switched on, the latched SP relay is not switched on again after the abnormal condition is cleared unless the power is switched off and on again. Hence, if overheating (of either the power transistors or the heat sinks) occurs, the power relay is switched off automatically, but is not switched back on even after the overheated condition has been corrected.

When the power is switched on,the latch circuit is reset by a RST signal

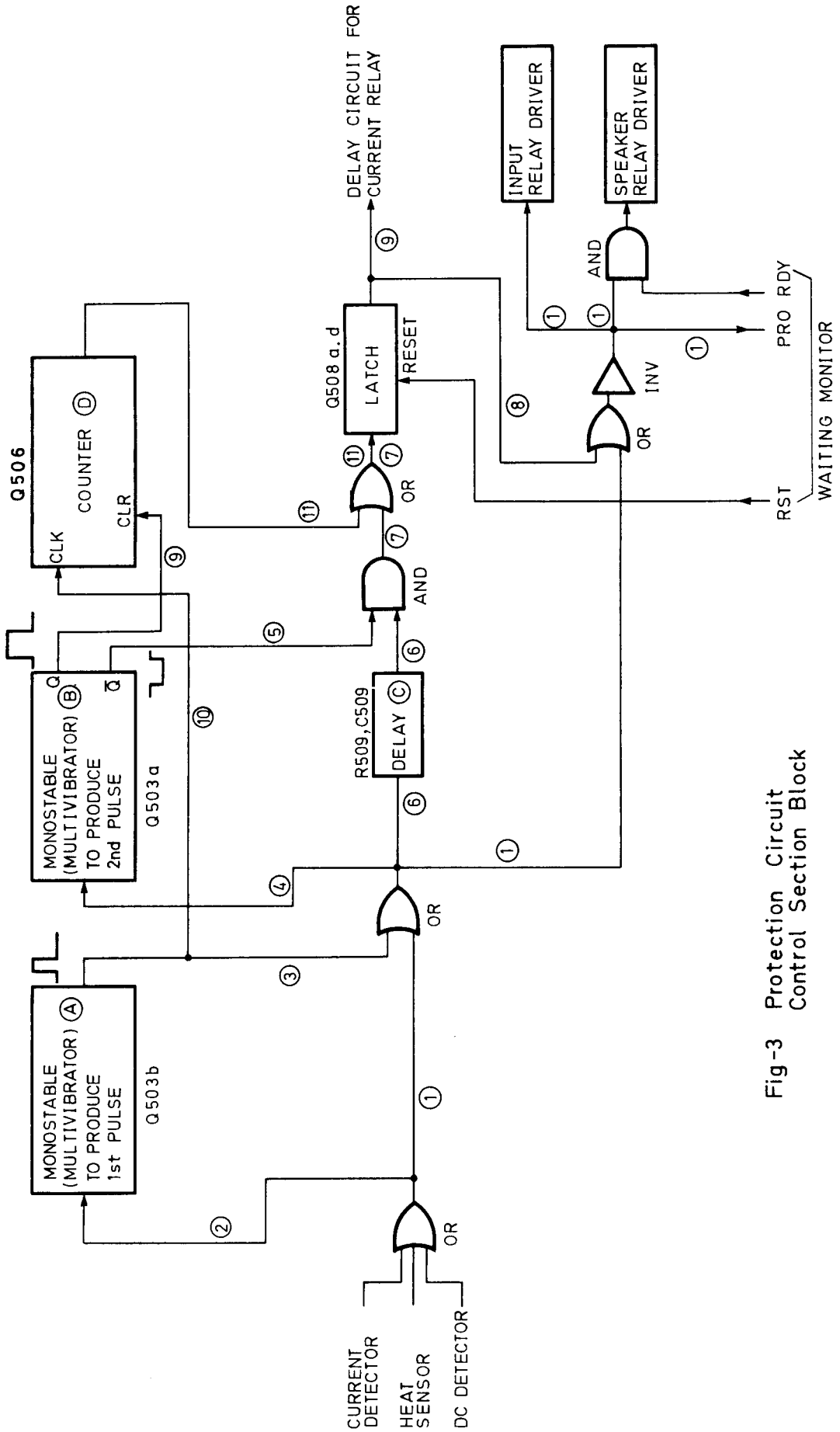


Fig-3 Protection Circuit Control Section Block

from the waiting monitor, and the power and in-rush relays are switched on one after another.

Since there is no RDY signal from the waiting monitor for about the first seven seconds after the power is switched on, the system remains in standby mode without the speaker relays being switched on.

The purpose of Q536 and Q535 is to prevent the generation of relay noise caused by variations in the relay open voltage immediately after the power is switched off.

3-5 Power relay delay circuit

The control circuit latch output plus three buffer outputs (obtained by connecting three delay circuits and three buffers in series to the latch output) - a total of four outputs - are applied to the power and in-rush relay drivers. The latch circuit is reset at the same time that the power is switched on,resulting in Q527 (Lch power supply) being switched on, followed by Q526 (Lch in-rush) 0.5 second later, Q525 (Rch power supply) 0.3 second later, and Q524 (Rch in-rush) 0.5 second after that. When the power is switched off, C513, C514, and C515 are discharged via D502, D503, and D504.

3-6 Warm-up simulator

With the Q514 and Q515 op. amps used as comparators, three logic outputs are obtained from the C518 and C519 voltages. The comparison voltage of each comparator is obtained by dividing the D507 reference voltage in R537, R539, R541, and R543. After the power is switched on, the time taken for the high level on Q515a, Q514a, and Q514b to be sequentially changed to low level is about three minutes at each stage. capacitors C518 and C519 are charged up (when the power is switched on) at rates determined by the R533, R535 and R536 time constants, and discharged (when the power is switched off) at rates determined by time constants established by adding R534 to the above resistances. This discharge rate is thus a little faster than the charge-up rate.

The waiting monitor LEDs do not all come on until some ten minutes after the power is switched on. Nor are the LEDs initialized immediately the power is switched off again. If the power is switched back on almost straight away, the waiting monitor bar is reactivated from an intermediate position.

The Q509 4022B component is a counter IC. When this IC is reset, pin 2 (not used) is switched to high level, and high level outputs appear sequentially at pins 1, 3, 7, 11, and 4 at each trailing edge of the clock applied to the CE pin (pin 13), This change used to activate the standby LED when in standby mode. The clock applied to the CE pin is generated by the oscillator consisting of Q510b, Q510d, R549, R550, and C526. The cycle time of this oscillator is slightly more than one second , this corresponding to the time taken for an LED emission shift in standby mode. R546, C523, and Q511a from the reset pulse generator circuit where a high level pulse of about 0.5 second is obtained at the Q511a output after the power is switched on. The pulse is used to reset 4022B.

The clock generator starts oscillating at the end of this pulse, and the 4022B output is passed via Q512a thru Q512c to activate the LEDs in sequence. If 4022B pin 4 is switched to high level, that signal is passed via Q511 to stop the clock generator. Standby mode is thus terminated, leaving the circuit in a stabilized state.

In addition, pin 11 of Q510d is switched to low level, the gates of Q513a thru Q513d are opened, and warm-up simulator circuit data is passed to the LEDs. The R547, R548, C524 and R511, R552, C527 delay circuits delay signals by a small margin.

The generator consisting of Q510c, R553, R554, and C528 generates signals used to switch LEDs on and off when the protection circuit is activated. The generator is started when a high level signal is applied to pin 8 of Q510c.

ADJUSTMENT PROCEDURES

1. Required instruments for adjustments

   - Signal generator
   - Attenuator
   - Synchroscope
   - DC voltmeter
   - DC regulated voltage power supply (adjustable above 0 - 5V.)
   - Dummy load resistor (8 Ω)

2. Preparations

   1) Make sure that the top and bottom of the unit are parallel with the surface it is resting on. A space of 15mm should be left between the bottom of the unit and the supporting surface to allow air circulation.
   2) Without load and input signal, turn the LEVEL knob to its lowest position and ensure that speaker and power supply switches are OFF.
   3) Since the power switch has been turned OFF before adjustments, the internal components of the unit will not be warm.

   NOTE 1: Remember that DC voltage levels within the unit are high. Contacting any of the live electrical parts with your hand or a tool during adjustments or repairs is extremely dangerous. Adjustments should be made with an insulated screwdriver. Before attempting any repairs make sure that electricity has been discharged from the power supply electrolytic capacitor.

   NOTE 2: Remember that unit ventilation is very poor when it is turned on its side and the radiator have a tendency to overheat. When doing repairs be sure to turn the unit off every 10 or 20 minutes and let it cool off, or cool the unit with an electric fan during the repair process.

3. Adjusting the idling current

1) Adjustment should be made with internal components at ambient room temperature. The following sequence is to be followed for adjustment:

2) The voltage between plug P006 terminals 1 and 2 on PC board NAMA-2194a should be approximately 20mV (DC) right after turning power on, and 20 mV ten minutes later. Adjustments are made the semi-fixed resistor R003 (R004) on PC board NAMA-2194a. While doing this adjustment, short P006 terminals 3 and 4. While the unit is warming up LED D001 will light up (20mV ± 10mV).

4. Adjusting the meter circuit

1) Adjusting the " 0 " setting on the meter

While power is OFF adjust the Zero Calibration Knob so that the meter needle reads " 0 ".

NOTE 1: Do not execute this adjustment right after turning the unit off. Wait until all electricity has been discharged before adjusting.

NOTE 2: After adjusting the " 0 " setting, turn the Zero Calibration Knob back slightly to allow some play in the knob.

2) offset adjustment of the meter circuit

After power has been ON for 5 minutes and with no signal inputs, use the meter offset semi-fixed resistor R46 on PC board NAME-2198 to adjust the meter needle to " 0 ".

3) Level adjustment of the meter circuit

Apply a 1 KHz input to the input terminals at a level that yields an output of 15.49V (23.8 dBV), then use the Meter Level Adjustment semi-fixed resistor R24 on PC board NAME-2198 to adjust the meter needle to 0 dB.

4) Meter damping adjustment

Using the METER OFF switch, make the needle wave from " 0 " to 0 dB. Then overshoot the needle once and stop it there.

With the needle in that position adjust the semi-fixed resistor R37 on PC board NAME-2198. The 0 dB level may slip out of place at this time, so repeat Adjustments 3) and 4).

NOTE : The maximum range for overshoot should be between +0.5 dB ~ +1 dB.

Now execute the above adjustments in a like manner for the Right channel.

5. Checking the protection circuit

1) In-rush current suppressor relay operation

When the power is switched on, the RL902 relay on the NAPS-2197 board suould come on immediately, followed by RL904 and RL903 coming on one after another at approximately 0.3 second intervals, and RL905 coming on about 0.5 second after that.

2) Speaker relay muting operation

Relay RL601 thru RL604 on the NAOP-2195 board, RL01 and RL03 on the NAME -2198 board, and RL901 on the NAPS-2197 board will all come on within four to six seconds after switching the power on.

During this time, the meter will remain stationary even if an input is being applied, and the meter illumination lamp will gradually become brighter. The waiting monitor LEDs come on in approximately one second steps starting with the center lamp. And as soon as the speaker relays come on, the meter becomes active (if an input signal is being applied) and only the center waiting monitor LED (D171) will remain on.

The meter illumination lamp will reach full brightness by this time. If speaker switch 2 is ON, relays RL605 and RL606 will come on instead of RL603 and RL604. But if both switches 1 and 2 are OFF, relays RL603 thru RL606 will not come on when the meter muting and illumination operations are completed.

3) Protection circuit DC detection

When a DC +1V signal is applied to the VARIABLE input without a load,

and the LEVEL volume control is slowly raised (without the output exceeding 2V) while observing the level at the SPEAKER terminals by oscilloscope, the speaker relays will switch off and on four times before remaining off when the level is between 2 and 4V. While held in this position, relays RL902 thru RL905 on the NAPS-2197 board will be off and the main amplifier power supply stage will also be off.

The same result achieved when DC -1V is applied.

NOTE 1: Do NOT connect a load when executing this test.
And take every measure to ensure against short circuiting.

NOTE 2: The center waiting monitor LED will blink on and off while the speaker relays are off.

4) Muting operation when power is switched off

All relays are switched off as soon as the power is switched off. And if an input signal had been applied at that time, the meter will slowly returned to zero in the same way as when an input signal is cut off.

5) Waiting monitor operation

When the power is switched on, the waiting monitor LEDs come on stepwise (in three minute intervals) starting from the center.

It will take about ten minutes for all lamps to come on.

NOTE : When the speaker relays (RL601 thru RL606) and power relays (RL902 thru RL905) are activated for protection purposes, they are held a few seconds later and remain off even when the cause of the problem has been removed. To release the relays from this condition, switch the power off for a few seconds before switching it back on.

EXPLODED VIEW PARTS LIST

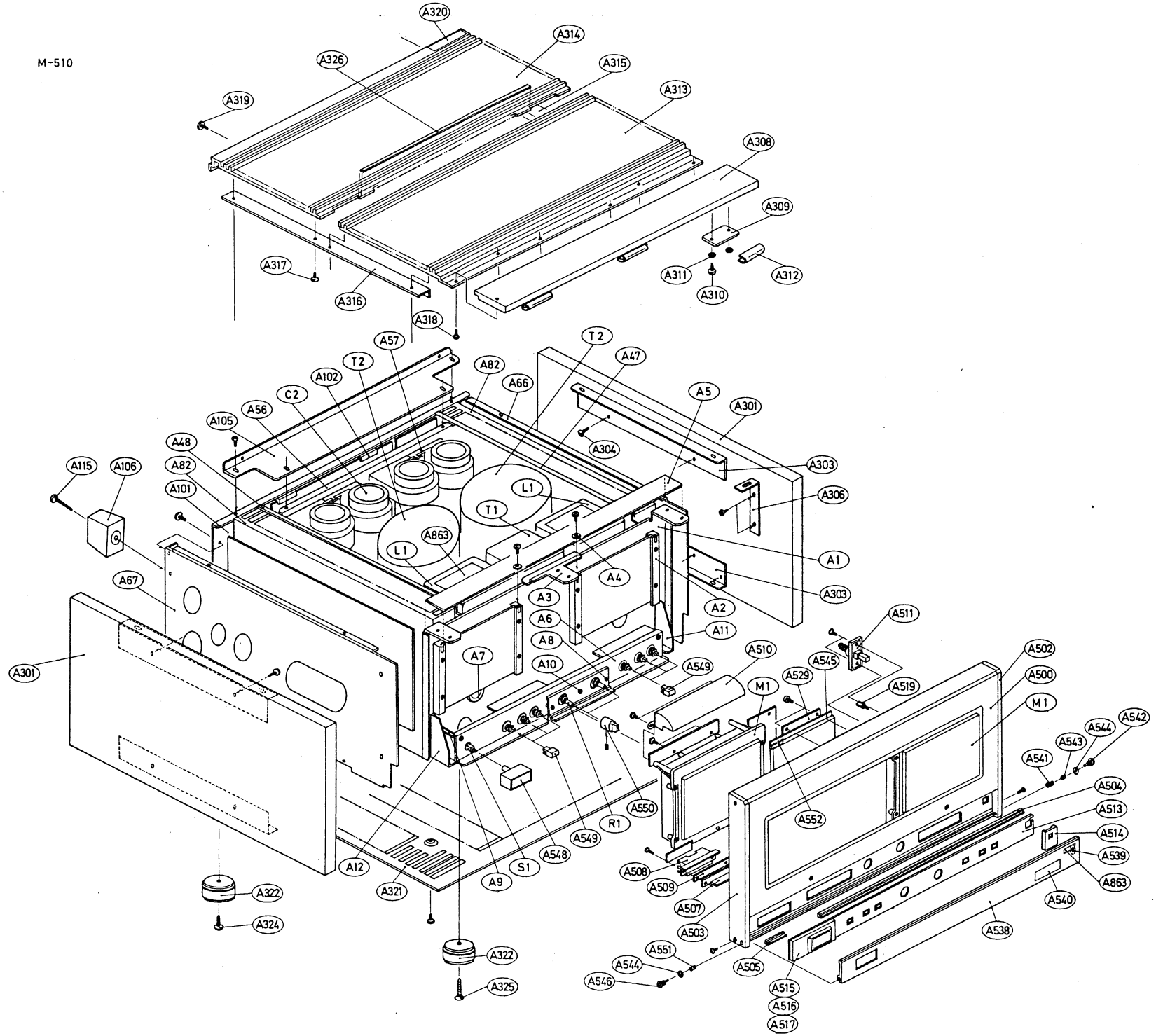
NO.	DESCRIPTION	PARTS NO.
A1	FRONT BRACKET	27110225A
A2	HOLDER	27190299
A3	BRACKET (C)	27140927
A4	W3 x 15, F WASHER	870060
A5	BRACKET (COVER)	27140925
A6	BRACKET (CONT)	27130363
A8	SHAFT (B)	27260153
A9	SHAFT (E)	27260157
A10	BRACKET (VR)	27130365
A11	BRACKET (FR)	27140955A
A12	BRACKET (FL)	27140956A
A47	CHASSIS (CR)	27100059A
A48	CHASSIS (CL)	27100060A
A56	CHASSIS (D)	27100067A
A57	HOLDER (CAPACITOR)	27190300
A58	BRACKET (F)	27140931
A66	CHASSIS (SR)	27100061
A67	CHASSIS (SL)	27100062
A82	RADIATOR	27160147A
A101	BACK PANEL	27120636B
A102	HOLDER (PC-3)	27190301
A103	SHAFT (C)	27260154
A105	BRACKET (RE)	27130364B
A106	LEG (BACK)	27175058A
A108	NPG-1SA,STRAINRELIEF	28190013
A301	SIDE BOARD →CRC23	28185225A
A303	SIDE BRACKET	27115166A
A304	M3.1+16F(BC),WOOD SCREW	85143116
A306	BRACKET (S)	27140975
A308	TOP COVER	28145116A
A309	BRACKET (B)	27140922
A310	M3.1+10F(BC),WOOD SCREW	85143110
A311	W3+8F(BC),WASHER	87643008
A312	CUSHION	28140575
A313	TOP BOARD (A)	28145112A
A314	TOP BOARD (B)	28145113A
A315	BRACKET (R)	27130367A
A316	BRACKET (L)	27130368A
A317	3P+6FN(BC),PAN HEAD SCREW	82143006
A318	M3.1+10F(BC),WOOD SCREW	85143110
A319	3TTB+8B(BC),TAPPING SCREW	838430088
A320	LABEL	29360732
A321	BOTTOM BOARD	27170185A
A322	BOTTOM LEG ASS'Y	27175057A
A324	4TTS+16B(BC),TAPPING SCREW	834440168
A325	4STV+30CQ(BC),TAPPING SCREW	836440303
A500	FRONT PANEL	27210503
A502	END CAP (R)	28125151A
A503	END CAP (L)	28125156A
A504	BAR (L)	28194203A

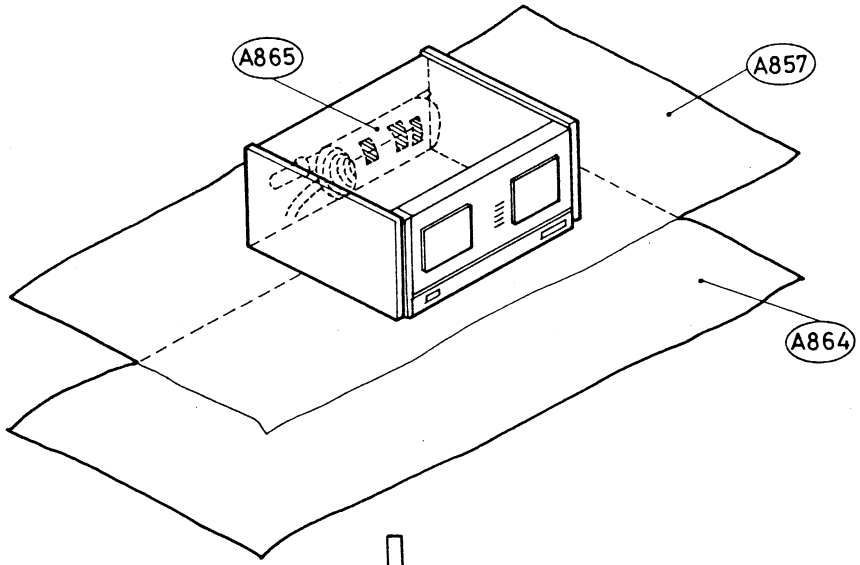
NO.	DESCRIPTION	PARTS NO.
A505	BAR (S)	28194204
A507	FACET (POW)	28198612A
A508	HOLDER (LAMP)	27190307
A509	BACK PLATE (POW)	28133108
A510	BRACKET (LAMP)	27140936
A511	PUSH LATCH	27230018
A513	PLATE	27262303
A514	ORNAMENT (R)	28400200
A515	ORNAMENT (L)	28400199
A519	SHAFT (A)	27260162
A529	ORNAMENT PLATE	27210502A
A538	DOOR	28148210A
A539	MAGNET	28181014
A540	BADGE	28135098
A541	SPRING	27180236
A542	SHAFT (DOOR)	27260159
A543	SPACER	27270139A
A544	2.1x6x0.5, WASHER	870121
A545	PLATE	27262313
A546	SHAFT (DOOR, L)	27260167
A548	KNOB (POW)	28321713
A549	KNOB(PUSH)	28321716
A550	KNOB(BASS)	28321717A
T1	NPT-857D, POWER TRANS FORMER	2300054
T2,T3	NPT-858D, POWER TRANS FORMER	2300055
L1	NCH-4105, COIL	231060

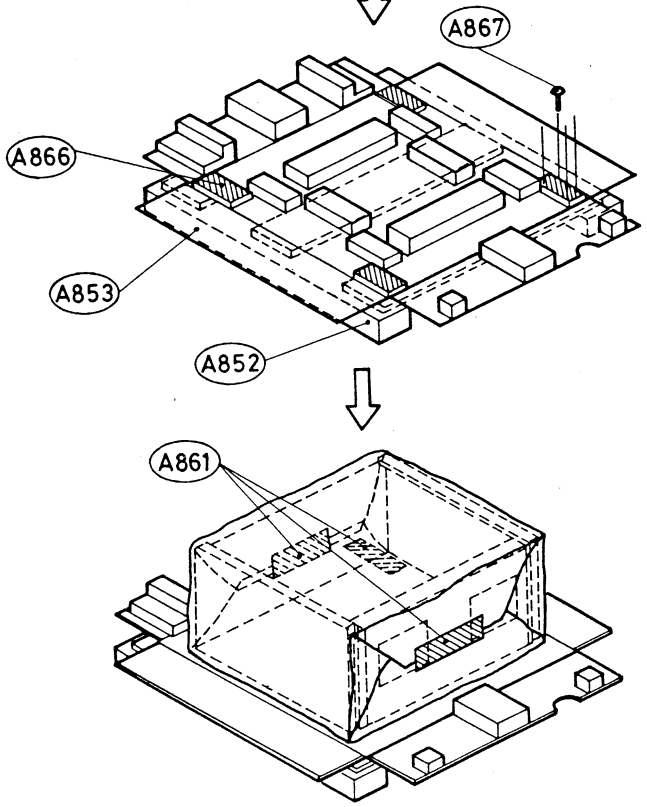
NO.	DESCRIPTION	PARTS NO.
C1	0.01μF,AC400V, CAPACITOR	3500065A
C2～C5	33000 μF,100V, CAPACITOR	3504188
R1,R2	N27D23K20M, LEVEL VR	5104166
R5	3.3 Ω,10W,CEMENT RESISTOR	4800043
S1	NPS-111-L190P,AC SWITCH	25035226
P1	GROUND TERMINAL	27300168
P1a	WASHER	WS237B
P2	AS-S,POWER SUPPLY CABLE	253120
P3	SPEAKER TERMINAL,(RED)	TP353A
P7	SPEAKER TERMINAL,(BLACK)	TP353B
M1	METER	243146
F901	TLC-2A, FUSE	252028
F902	15A-TL, FUSE	252106
F903		
F904	3A-TL, FUSE	252056
F905		
Q1001	2SA1815(GR),TRANSISTOR	2211255
Q2001		
Q1002	2SA1015(GR),TRANSISTOR	2211455
Q2002		
Q1018,Q1022,Q1024		
Q2018,Q2022,Q2024		
	2SC2238B(Y) or	2201464
	2SC2238B(O) TRANSISTOR	2201463

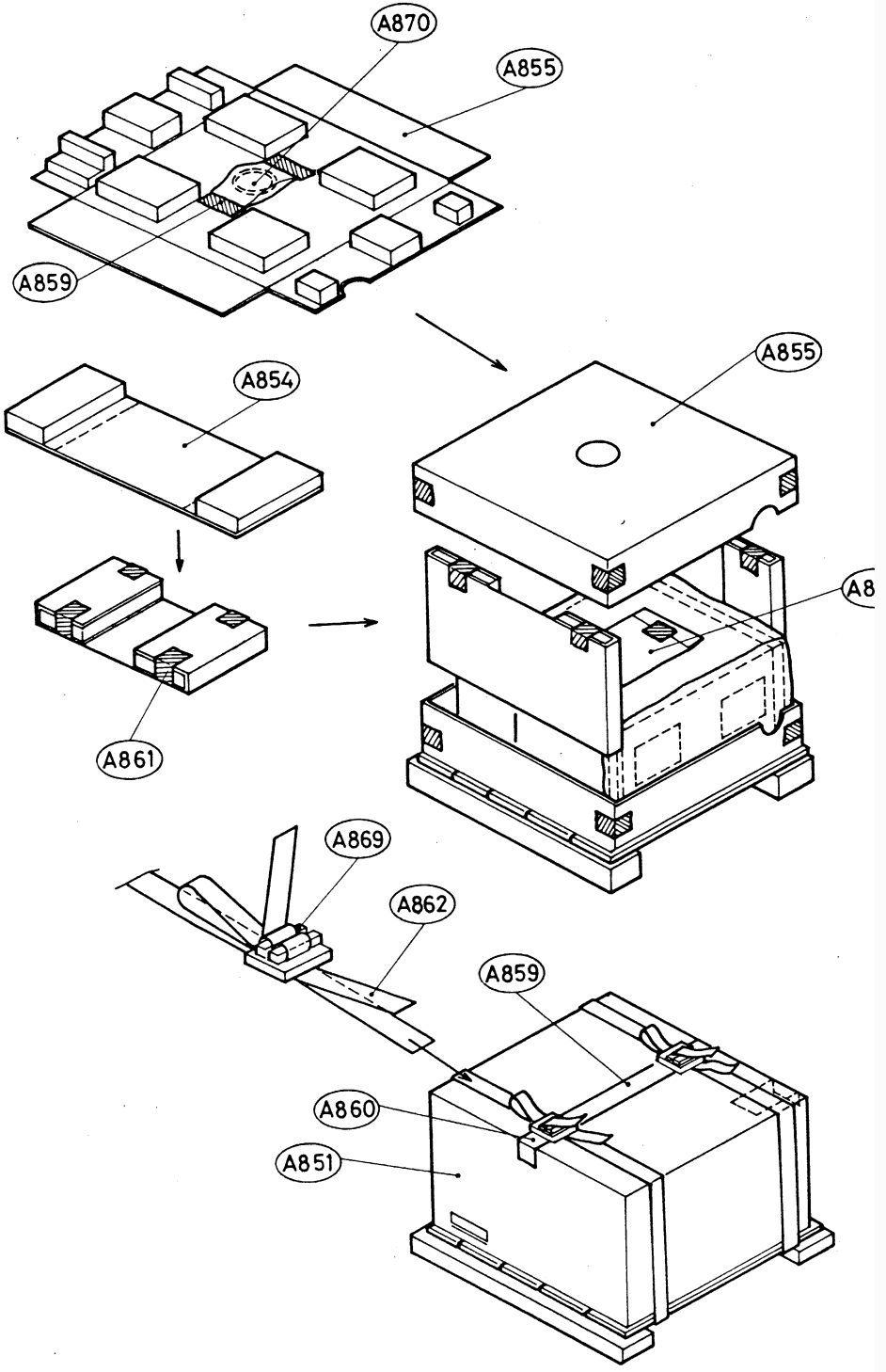
NO.	DESCRIPTION	PARTS NO.
Q1019,Q1023,Q1025		
Q2019,Q2023,Q2025		
	2SA968(Y) or	2201454
	2SA968(O) TRANSISTOR	2201453
Q1036	2SC3281(O) or	2201483
Q2036	2SC3281(R) TRANSISTOR	2201482
Q1037	2SA1302(O) or	2201473
Q2037	2SA1302(R) TRANSISTOR	2201472
Q1038,Q1040,Q1042,Q1044,Q1046,Q1048		
Q2038,Q2040,Q2042,Q2044,Q2046,Q2048		
Q1050,Q2050		
	2SC2774(G) or	2201325
	2SC2774(Y) TRANSISTOR	2201324
Q1039,Q1041,Q1043,Q1045,Q1047,Q1049		
Q2039,Q2041,Q2043,Q2045,Q2047,Q2049		
Q1051,Q2051		
	2SA1170(G) or	2201335
	2SA1170(Y) TRANSISTOR	2201334
D1,D2	KBPC25-04, DIODE	223883
D1037	TT202-50, THYRISTOR	225163
D2037		
U1	NAPJ-2186,TERMINAL PC BOARD ASS'Y	12742586
U2	NASW-2187,SWITCH CIRCUIT PC BOARD ASS'Y	12742587
U3	NASW-2188,SWITCH CIRCUIT PC BOARD ASS'Y	12742588
U4	NAPL-2189,INDICATOR CIRCUIT PC BOARD ASS'Y	12742589
U5	NAPL-2190,LAMP CIRCUIT PC BOARD ASS'Y	12742590
U6	NADA-2191,POWER DRIVER CIRCUIT PC BOARD ASS'Y	12742591
U7	NADA-2192,POWER DRIVER CIRCUIT PC BOARD ASS'Y	12742592
U8	NAPS-2193,POWER SUPPLY PC BOARD ASS'Y	12742593
U9	NAPS-2193a,POWER SUPPLY PC BOARD ASS'Y	12742593A
U10	NAMA-2194,POWER AMPLIFIER PC BOARD ASS'Y	12742594
U11	NAMA-2194a,POWER AMPLIFIER PC BOARD ASS'Y	12742594A
U12	NAOP-2195,OUTPUT RELAY PC BOARD ASS'Y	12742595
U13	NAPC-2196,PROTECTOR CIRCUIT PC BOARD ASS'Y	12742596
U14	NAPS-2197,POWER SUPPLY PC BOARD ASS'Y	12742597
U15	NAME-2198,METER CIRCUIT PC BOARD ASS'Y	12742598
U16	NAME-2198,METER DRIVER CIRCUIT PC BOARD ASS'Y	12742598
U17	NAPL-2199,METER LAMP CIRCUIT PC BOARD ASS'Y	12742599
U18	NAPL-2199a,METER LAMP CIRCUIT PC BOARD ASS'Y	12742599A

M-510









PACKING PROCEDURES PARTS LIST

REF.NO.	parts NO.	DESCRIPTION
A851	29051018A	Master carton box
A852	29090953	Pad
A853	29090954A	Pad (bottom)
A854	29090955A	Pad
A855	29090956A	Pad (top)
A857	29095370A	1750 x 1000, Protection sheet
A859	260012	Damplon tape
A860	282301	Sealing hook
A861	261504	Tape
A862	29112018	Band
A864	29095379	1750 x 1300, Protection sheet
A865	29095039	600 x 500, Protection sheet
A866	29090970	Pad
A867	800505	1.5 x 22, Nail
A869	28400219	Stoper
A880	Accessary bag ass'y	
	29340964	Instruction manual
	29358002C	Service station list
A870	2010107	Connection cable
	29100077	400 x 250< poly-vinyl bag for accessary

TERMINAL CIRCUIT PC BOARD (NAPJ-2186)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diodes	
D101,D102	4000087	NV022D10, Varistor
	Capacitors	
C101～ C104	372121024	0.001 μF,50V,Styrene
	Resistor	
R105	442523904	39Ω,1/2W,Metal oxide film
	Terminals	
P101,P102	25045161	NPJ-2PDBL58
	Plug	
P103	25055089	NPLG-3P73
	Relaies	
RL101,RL102	25065061	FRL-644D12-2B

SWITCH CIRCUIT PC BOARD (NASW-2187)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resistors	
R133,R134	441623904	39Ω,1W,Metal oxide film
	Switches	
S131～ S133	25035447	NPS-342-L411
	Plugs	
P131	25055065	NPLG-5P51
P132	25055038	NPLG-2P29
P133	25055042	NPLG-3P32

SWITCH CIRCUIT PC BOARD (NASW-2188)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resistors	
R155	441621604	16Ω, 1W, Metal oxide film
R156,R157	441623904	39Ω, 1W, Metal oxide film
	Switches	
S151～ S153	25035448	NPS-122-242-L412
	Plugs	
P151～ P154	25055045	NPLG-4P33
P155	25055038	NPLG-2P29

INDICATOR CIRCUIT PC BOARD (NAPL-2189)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diodes	
D171～ D178	225142	SEL2913K, LED
	Lamps	
PL171 ～ PL174	210089	PL14V150mA
	Plugs	
P171	25055091	NPLG-5P75
P172	25055092	NPLG-6P76
	Bracket	
PL171a ～ PL174a	27140552	Bracket (S),(lamp)
	Holder	
	27190304A	Holder (LED)

LAMP CIRCUIT PC BOARD (NAPL-2190)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Lamp	
PL191	210089	PL14V150mA

POWER DRIVER CIRCUIT PC BOARD (NADA-2191,NADA-2192)

CIRCUIT NO.	PART NO.	DESCRIPTION
	IC	
Q01	222652	M5218L
	Transistors	
Q02	2211916 or	2SK240(BL) or
	2211917	2SK240(V)
Q03 ～ Q05	2211654	2SC2235(Y)
Q06	2211793 or	2SA992(E) or
	2211792	2SA992(F)
Q07	2211455	2SA1015(GR)
Q08,Q09	2211783 or	2SA991(E) or
	2211782	2SA991(F)
Q10,Q11	2201454 or	2SA968B(Y) or
	2201453	2SA968B(O)
Q12,Q13	2211903 or	2SC1844(E) or
	2211902	2SC1844(F)
Q14	2201464	2SC2238B(Y) or
	2201463	2SC2238B(O)
	Diodes	
D01,D02	2240952	GZA5.6Y
D03,D04	2241152 or	GZA15Y or
	2241153	GZA15Z
D05,D06,D11	223145	1S2076TD
D07 ～ D10	225126	GL-3PR1
D12,D13	223858	GP08D
D14,D15	223162	1SS82
D16,D17	2240952	GZA5.6Y
	Capacitors	
C02,C03	352751019	100 μF, 25V, Elect.
C05,C06	352754709	47μF, 25V, Elect.
C10	372121214	120pF, 50V, Styrene
C12	379122034	0.02μF, 50V, Film (DEW)
C14	352722219	220 μF, 6.3V, Elect.
C15,C16	352721019	100 μF, 6.3V, Elect.
C21	379131025	0.001 μF, 100V, Film (DEW)
C23,C24	379121245	0.12μF, 50V, Film (DEW)
C27,C28	392834707	47μF, 10V, Elect.(LL)
C30,C31	379145635	0.056 μF, 200V, Film (DEW)
	Resistors	
R01,R02	441621534	15 KΩ, 1W, Metal oxide film
R15	441625624	5.6KΩ, 1W, Metal oxide film
R16	442523314	330 Ω, 1/2W, Metal oxide film
R18	442521034	10 KΩ, 1/2W, Metal oxide film
R19,R20	442521014	100 Ω, 1/2W, Metal oxide film
R21,R22	442523914	390 Ω, 1/2W, Metal oxide film
R27	442523024	3 KΩ, 1/2W, Metal oxide film
R28	442523924	3.9KΩ, 1/2W, Metal oxide film
R29	441723034	30 KΩ, 2W, Metal oxide film
R30	442527504	75Ω, 1/2W, Metal oxide film
R31	441621334	13 KΩ, 1W, Metal oxide film
R32	442521324	1.3KΩ, 1/2W, Metal oxide film
R33,R34	442521514	150 Ω,1/2W, Metal oxide film
R35,R36	442522214	220 Ω, 1/2W, Metal oxide film
R40,R41	442520474	4.7 Ω, 1/2W, Metal oxide film
	Sockets	
P02	2000384	NSAS-4P-343, Ass'y
	Plugs	
P04,P05	25055051	NPLG-8P39

POWER SUPPLY PC BOARD (NAPS-2193,NAPS-2193a)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diodes	
D91,D92	223862	WL01
D93	223884	KDPC8-02
	Capacitors	
C91,C92	352734729	4700μF, 10V, Elect.

CIRCUIT NO.	PART NO.	DESCRIPTION
	Plugs	
P93	25055165	NPLG-2P149
P95,P97	25055165	NPLG-2P149
	Socket	
P92	2000372	NSAS-13P331,(NAPS-2193)
	2000375	NSAS-13P334,(NAPS-2193a)
P98	2000374	NSAS-13P333,(NAPS-2193)
	2000373	NSAS-13P332,(NAPS-2193a)

POWER AMPLIFIER PC BOARD (NAMA-2194,NAMA-2194a)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q003	226007	TLP531, Photo coupler
Q071	222652	M5218L
Q072,Q073	226007	TLP531, Photo coupler
	Transistors	
Q004,Q006	2211504	2SA950(Y)
Q007,Q010		
Q011,Q017		
Q005,Q008	2211164	2SC2120(Y)
Q009,Q013		
Q014,Q016		
Q012,Q056	2211455	2SA1015(GR)
Q058,Q068		
Q015,Q057	2211255	2SC1815(GR)
Q059		
Q026,Q029	2212560	2SC3333
Q031,Q060		
Q062,Q065		
Q067		
Q027,Q028	2212550	2SA1320
Q030,Q061		
Q063,Q064		
Q066		
Q032,Q054	2201414	2SB1016(Y)
Q033,Q055	2201424	2SD1407(Y)
Q069	2211792 or 2211793	2SA992(F) or 2SA992(E)
Q070	2211732 or 2211733	2SC1845(F) or 2SC1845(E)
Q074	2211455 or 2211454	2SA1015(GR) or 2SA1015(Y)
Q075	2211255 or 2211254	2SC1815(GR) or 2SC1815(Y)
	Diodes	
D001～ D003	225126	GL-3PR1
D004,D005	223132	1K60
D029,D030		
D006～ D008	223145	1S2076TD
D015～ D028		
D033～ D036		
D011,D012	2241053	GZA9.1Z
D038	2240952	GZA5.6Y
D041,D042	2241152 or 2241153	GZA15Y or GZA15Z
D043～ D045	225126	GL-3PR1
	Capacitors	
C001,C002	379123935	0.039 μF, 50V, Film (DEW)
C005,C006	379128235	0.082 μF, 50V, Film (DEW)
C007,C008	352751019	100 μF, 25V, Elect.
C014,C015	352750479	4.7 μF, 25V, Elect.
C016,C017	352744709	47μF, 16V, Elect.
C024～ C037	380503345	0.33μF, 160V, Film (CF)
C040,C041	379121535	0.015, 50V, Film (DEW)
C042,C043	379132735	0.027, 100V, Film (DEW)
C045,C046	352743319	330 μF, 16V, Elect.
C047,C048	352754709	47μF, 25V, Elect.
C049,C050	352780109	1 μF, 50V, Elect.
C052,C053	379124735	0.047 μF, 50V, Film(DEW)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Resistors	
R001,R002	442528214	820 Ω, 1/2W, Metal oxide film
R003,R004	5221025	N10HR2.2KBEM, Semi fixed
R005	442522424	2.4KΩ, 1/2W, Metal oxide film
R006	442527524	7.5KΩ, 1/2W, Metal oxide film
R009	442523924	3.9KΩ, 1/2W, Metal oxide film
R010,R011	441722224	2.2KΩ, 2W, Metal oxide film
R012～ R015	442523304	33Ω, 1/2W, Metal oxide film
R016,R017	442522714	270 Ω, 1/2W, Metal oxide film
R018,R019	442522404	24Ω, 1/2W, Metal oxide film
R020,R021	442528214	820 Ω, 1/2W, Metal oxide film
R023,R024	442521004	10Ω, 1/2W, Metal oxide film
R025,R026	442521024	1 KΩ, 1/2W, Metal oxide film
R027,R028	442521004	10Ω, 1/2W, Metal oxide film
R029,R030	442521024	1 KΩ, 1/2W, Metal oxide film
R031	442521524	1.5KΩ, 1/2W, Metal oxide film
R032	442527514	750 Ω, 1/2W, Metal oxide film
R033	4000099	TD5-C230D, Thermistor
R034,R035	442522714	270 Ω, 1/2W, Metal oxide film
R036,R037	442521014	100 Ω,1/2W, Metal oxide film
R040～ R043	442520224	2.2 Ω, 1/2W, Metal oxide film
R044,R045	442526814	680 Ω, 1/2W, Metal oxide film
R046～ R049	442522414	240 Ω, 1/2W, Metal oxide film
R050,R051	442523604	36Ω, 1/2W, Metal oxide film
R054,R055	442520564	5.6 Ω, 1/2W, Metal oxide film
R056～ R069	442520224	2.2 Ω, 1/2W, Metal oxide film
R070～ R083	442521014	100 Ω, 1/2W, Metal oxide film
R084～ R099	4000101	1 Ω, 2W, Metal plate
R100～ R125		
R138,R139	442523304	33Ω, 1/2W, Metal oxide film
R140,R141	441722224	2.2KΩ, 2W, Metal oxide film
R143,R144	442526814	680 Ω, 1/2W, Metal oxide film
R145～ R148	441722204	22Ω, 2W, Metal oxide film
R149,R150	442522724	2.7KΩ, 1/2W, Metal oxide film
R151～ R154	442526214	620 Ω, 1/2W, Metal oxide film
R170,R171	441621634	16 KΩ, 1W, Metal oxide film
R176	4000045	PTHBB471TS, Posistor
R180,R181	442523334	33 KΩ, 1/2W, Metal oxide film
R183～ R186	442521014	100 Ω, 1/2W, Metal oxide film
	Plugs	
P001	25055105	NPLG-8P89
P002,P003	25055179	NPLG-7P163
P004	25055182	NPLG-10P166
P005	25055103	NPLG-6P87
P006,P007	25055101	NPLG-4P85
P008,P009		
P010,P011	25055102	NPLG-5P86

OUTPUT RELAY PC BOARD (NAOP-2195)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diodes	
D601～ D606	223145	1S2076TD
	Coils	
L601～ L604	231015	S-0.8C
	Resistors	
R601,R602	441720824	8.2 Ω, 2W, Metal oxide film
R607～ R612	442522704	27Ω, 1/2W, Metal oxide film
R613～ R616	442520224	2.2 Ω, 1/2W, Metal oxide film
	Relaies	
RL601 ～ RL606	25065036	NRL-4P3A-DC12-01
	Plugs	
P601	25055045	NPLG-4P33
P602	25055037	NPLG-6P28
P603～ P606	25055169	NPLG-6P153
P607,P608	25055168	NPLG-5P152
P609,P610	25055045	NPLG-4P33

PROTECTOR CIRCUIT PC BOARD (NAPC-2196)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q501,Q502	222840111	4011B
Q504,Q505		
Q503	222850381	4538B
Q506	222841741	40174B
Q507	222840501	4050B
Q508,Q510	222840111	4011B
Q509	222840221	4022B
Q511,Q513	222840011	4001B
Q512	222840711	4071B
Q514,Q515	222465	NJM4558D
	Transistor	
Q520,Q521	2211255	2SC1815(GR)
Q524～ Q527	2211164	2SC2120(Y)
Q528	2201286 or	2SD882(P) or
	2201285	2SD882(Q)
Q529,Q530	2211255 or	2SC1815(GR) or
Q535	2211256	2SC1815(BL)
Q531～ Q534	2212570	2SC3400
Q536	2201276	2SB772(P)
	Diodes	
D502～ D504	223145	1S2076TD
D508～ D515		
D524		
D507	2241051	GZA9.1X
D516,D523	2241031	GZA8.2X
D520	223882	KBL02
D521,D522	223848	GP08B
D523	2241031	GZA8.2X
	Capacitors	
C507,C515	352780229	2.2 μF, 50V, Elect.
C508	352750479	4.7 μF, 25V, Elect.
C513	352780339	3.3 μF, 50V, Elect.
C514,C523	352780109	1 μF, 50V, Elect.
C518,C519	392831025	1000μF, 10V, Elect. (LL)
C520	352743319	330 μ, 16V, Elect.
C524	371121034	0.01μF, 50V, Mylar
C526	352980106	1 μF, 50V, Non-polar elect.
C527	352783399	0.33μF, 50V, Elect.
C528	352982296	0.22μF, 50V,Non-polar elect.
C531	3504189	4700μF, 16V, Elect.
C532	352741019	100 μF, 16V, Elect.
	Resistors	
R527	442526814	680 Ω, 1/2W,Metal oxide film
R532	442528214	820 Ω, 1/2W,Metal oxide film
R557～ R560	442526214	620 Ω, 1/2W,Metal oxide film
R563	441624714	470 Ω, 1W, Metal oxide film
R564	442521524	1.5KΩ, 1/2W,Metal oxide film
R567	441623314	330 Ω, 1W, Metal oxide film
	Plugs	
P501	25055066	NPLG-7P52
P502	25055065	NPLG-5P51
P503	25055045	NPLG-4P33
P504,P505	25055037	NPLG-6P28
P506	25055038	NPLG-2P29

POWER SUPPLY PC BOARD (NAPS-2197)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Transistors	
Q901	2211455	2SA1015(GR)
Q902	2211255	2SC1815(GR)
Q903	2201074 or	2SD880(Y) or
	2201073	2SD880(O)
	Diodes	
D901	223860	KBF02
D902	2240932	GZA5.1Y
D903,D904	223145	1S2076TD
D915～ D918	223145	1S2076TD
D905	2241072	GZA10Y
D907,D908	225126	GL-3PR1, LED
D909	223863	GP30D
D912	223848	GP08B
	Capacitors	
C901	352744729	4700μF, 16V, Elect.
C902	392844715	470 μF, 16V, Elect. (LL)
	Resistors	
R901	441724704	47Ω, 2W, Metal oxide film
R908	442522704	27ΩF, 1/2W, Metal oxide film
R915～ R918	442523304	33Ω, 1/2W, Metal oxide film
R920～ R939	4000078	0.33Ω, 5W, Metal plate
	Relaies	
RL901	25065124	NRL-4P3A-DC12-04
RL902	25065248	NRL-1P15A-DC12-29
～RL905		
	Fuse holder	
F901a	250113	S-N5051
～ F903a		
F904a,F905a		
	Plugs	
P901	25055066	NPLG-7P52
P902	25055037	NPLG-6P28
P903	25055065	NPLG-5P51
P905～ P908	25055042	NPLG-3P32
P910	25055038	NPLG-2P29
P911	25055045	NPLG-4P33
	Radiator	
	27160146	RAD-52

METER CIRCUIT PC BOARD (NAME-2198)

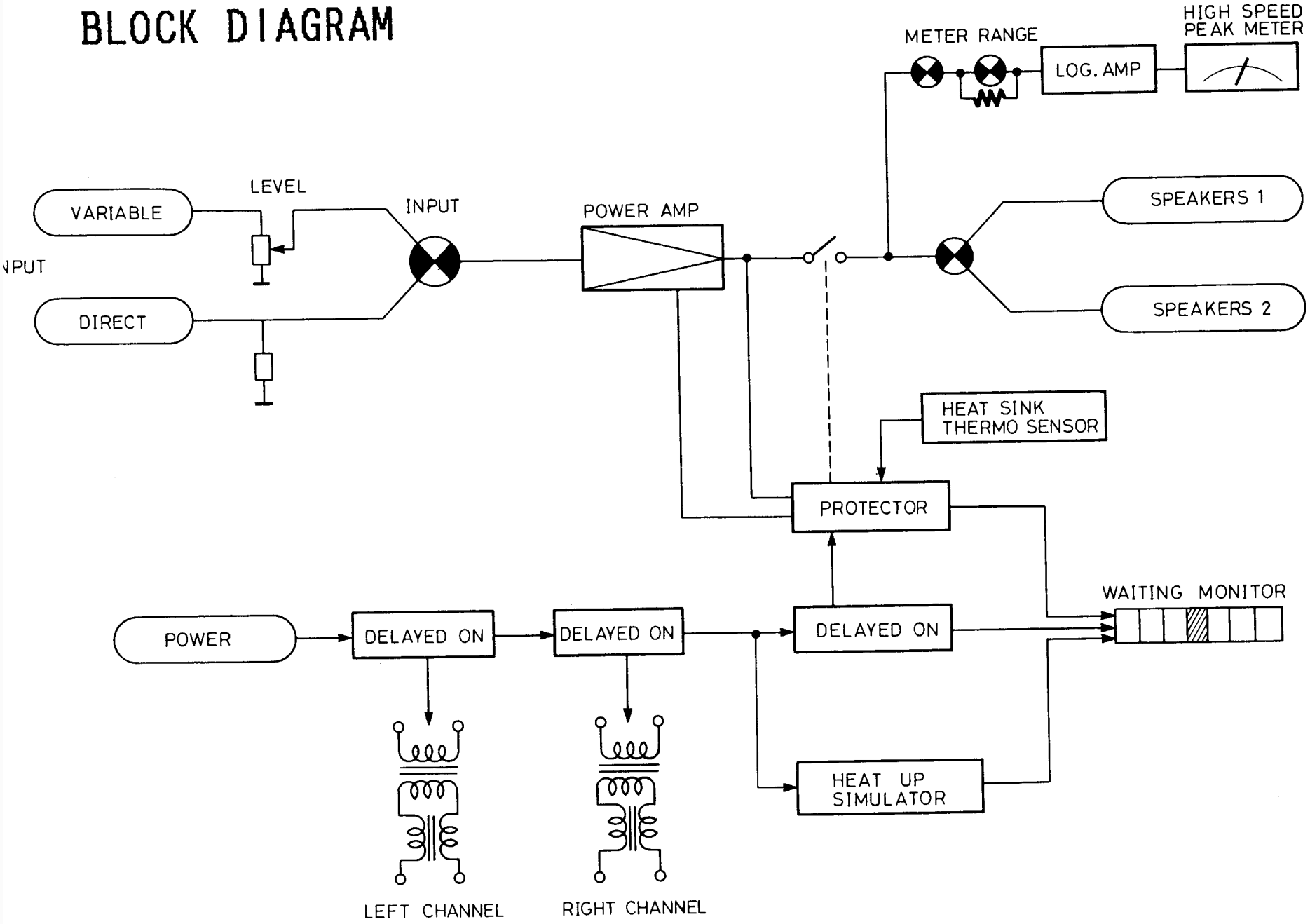
CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q01,Q03	222836	M5219L
Q02	222529	TA7318P(R)
Q05	226007	TLP531, Photo coupler
	Transistors	
Q04	2212526	2SK363(V)
Q07	2201424	2SD1407(Y)
Q08	2201414	2SB1016(Y)
Q09	2211732 or	2SC1845(F) or
	2211733	2SC1845(E)
Q10	2211792 or	2SA992(F) or
	2211793	2SA992(E)
Q11	2211255 or	2SC1815(GR) or
	2211256	2SC1815(BL)
	Diodes	
D01 ～ D05	223145	1S2076TD
D06	2240931 or	GZA5.1X or
	2240932 or	GZA5.1Y or
	2240933	GZA5.1Z
D07	223145	1S2076TD
D08	2241032 or	GZA8.2Y or
	2239552	RD8.2EB2
D09 ～ D13	223145	1S2076TD
D14,D15	2241231 or	GZA22X or
	2241232	GZA22Y
D16	2240931 or	GZA5.1X or
	2240932 or	GZA5.1Y or
	2240933	GZA5.1Z
D17,D18	223858	GP08D
D19	223145	1S2076TD
D20	223862	WL01
D21 ～ D23	223979 or	RD27EB or
	2242742	GZA27Y

CIRCUIT NO.	PART NO.	DESCRIPTION
	Capacitors	
C02,C03	352780339	3.3 μF, Elect.
C04	352780109	1 μF, 50V, Elect.
C05,C06	371121244	0.12μF, 50V, Mylar
C08	392850475	4.7 μF, 25V, Elect.(LL)
C09,C10	392841005	10μF, 16V, Elect.(LL)
C11,C12	352752209	22μF, 25V, Elect.
C13,C14	352754709	47μF, 25V, Elect.
C15,C16	352761519	150 μF, 35V, Elect.
C17,C18	352752219	220 μF, 25V, Elect.
C19,C20	352750479	4.7 μF, 25V, Elect.
C24	352780109	1 μF, 50V, Elect.
	Resistors	
R09	442523314	330 μF, 1/2W,Metal oxide film
R24	5221024	N10HR1KBEM, Semi-fixed
R35	442521614	160 Ω, 1/2W,Metal oxide film
R37	5221023	N10HR470BEM, Semi-fixed
R46	5221025	N10HR2.2KBEM, Semi-fixed
R47,R48	442521014	100 Ω, 1/2W,Metal oxide film
R49,R50	442528224	8.2KΩ, 1/2W,Metal oxide film
R51,R52	442523334	33 KΩ, 1/2W,Metal oxide film
R53	442524704	47Ω, 1/2W,Metal oxide film
R54,R55	441625614	560 Ω, 1W,Metal oxide film
	Plugs	
P01,P04	25055045	NPLG-4P33
P02,P03	25055042	NPLG-3P32
	Relaies	
RL01	25065093	FRL-644D12/1AS
RL03	25065139	NRL-2P0.3ADC12-05

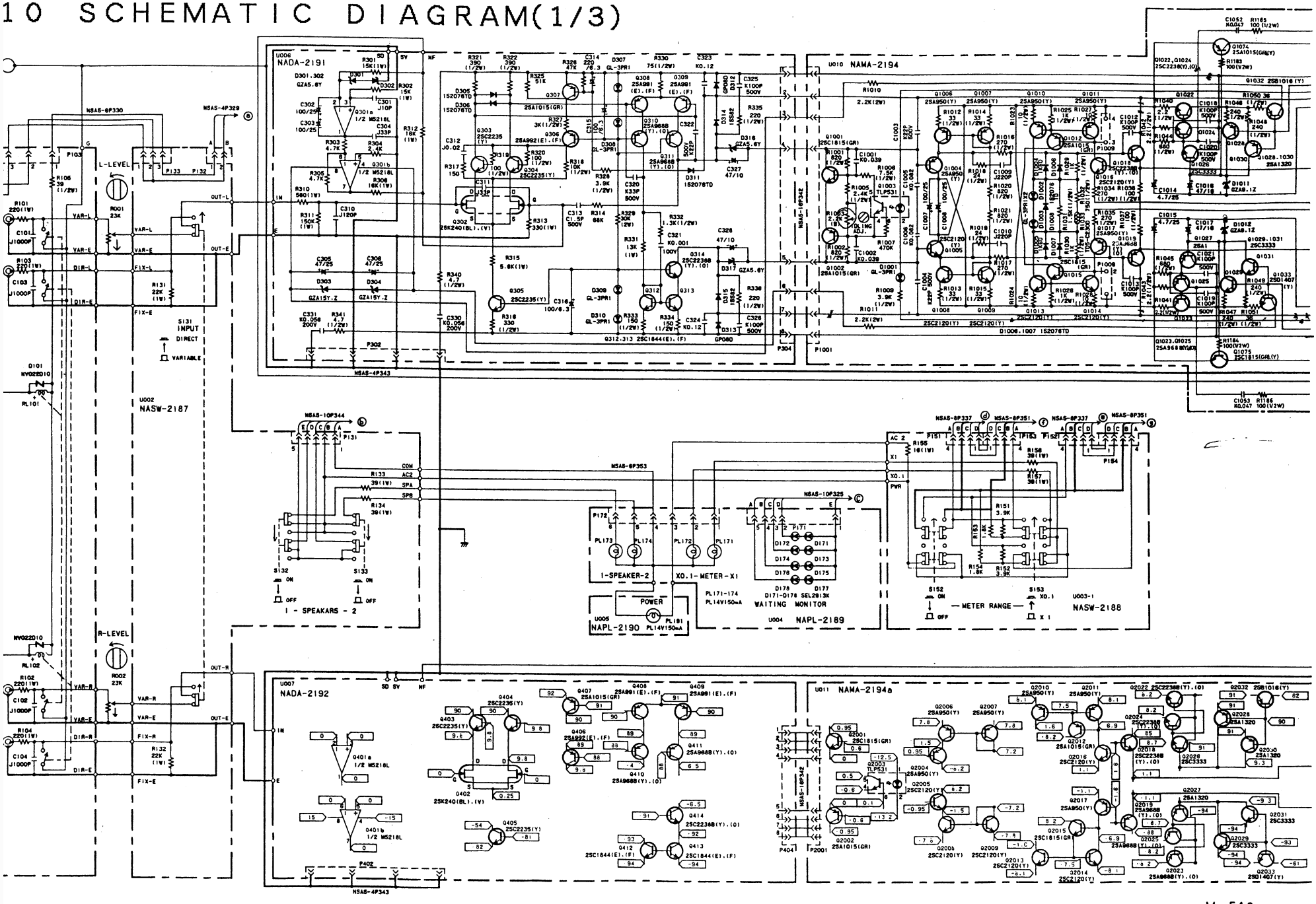
METER LAMP CIRCUIT PC BOARD (NAPL-2199,NAPL-2199a)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Lamps	
PL791 ~ PL794	210089	PL14V150mA
PL891 ~ PL894		
	Brackets	
PL791a ~ PL794a	27140552	
PL891a ~ PL894a		
	Plugs	
P791,P792	25055164	(NAPL-2199)
	Socket	
P891	2000395	NSAS-2P354 (NAPL-2199a)

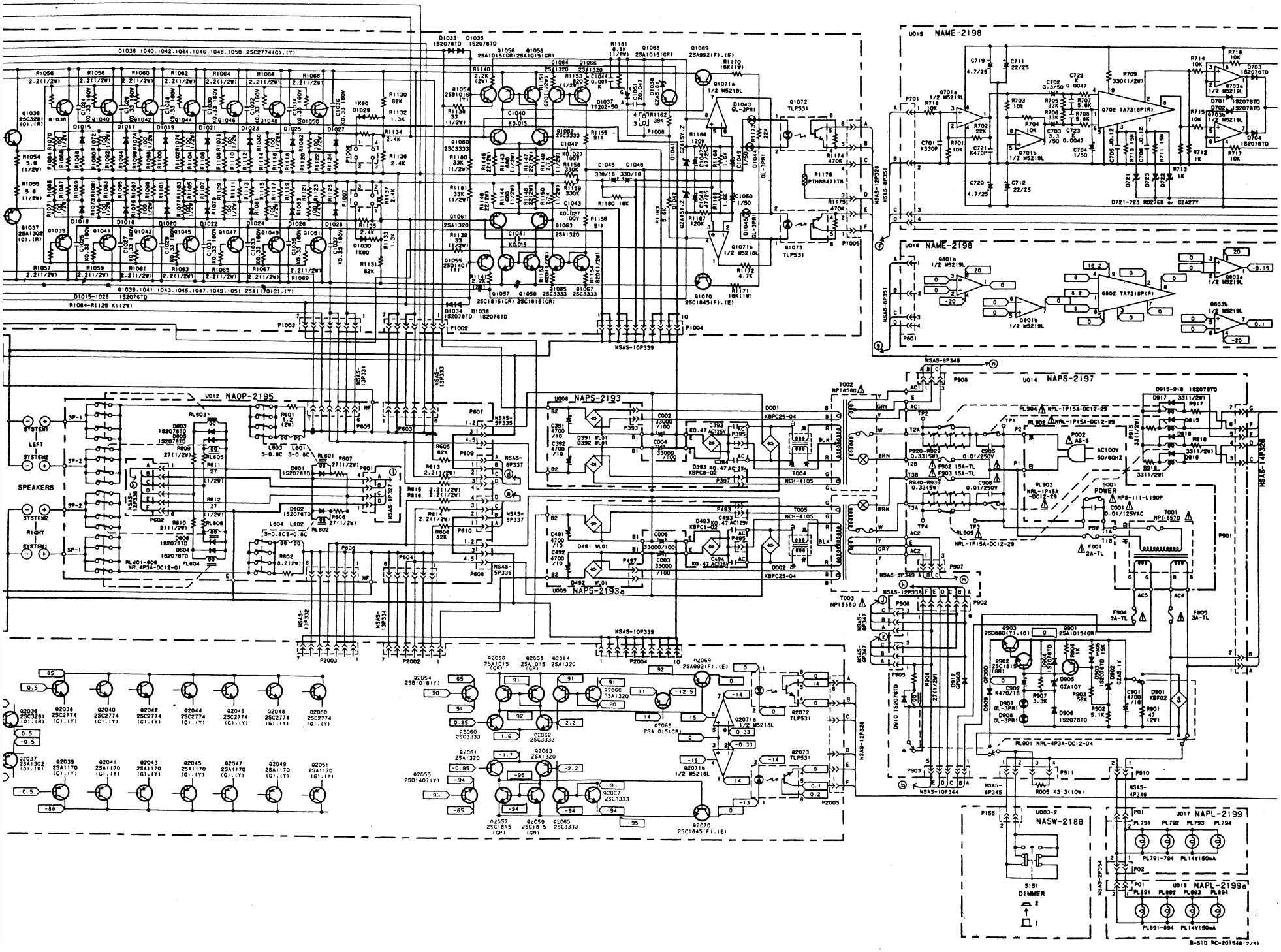
BLOCK DIAGRAM



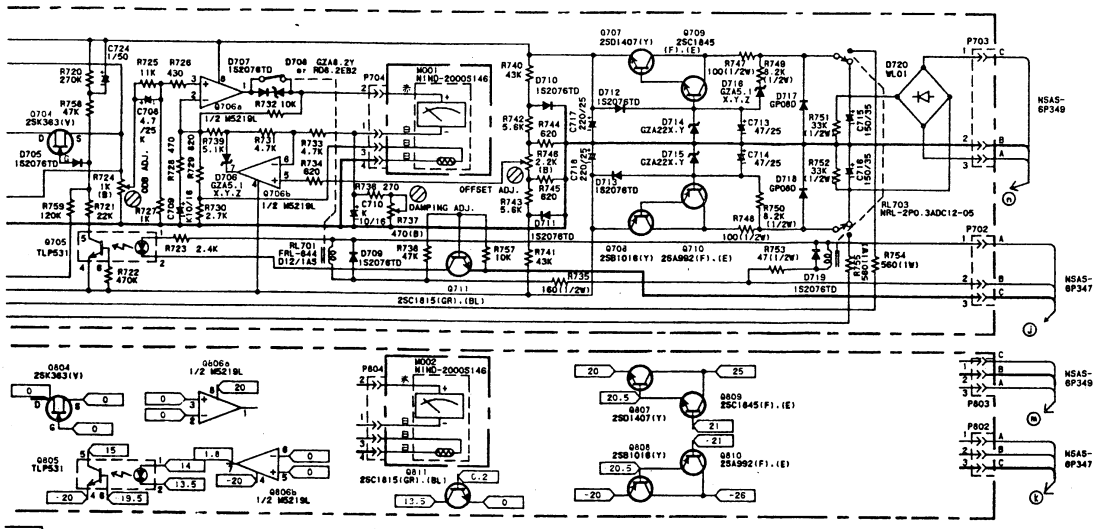
10 SCHEMATIC DIAGRAM(1/3)



0 SCHEMATIC DIAGRAM(2/3)

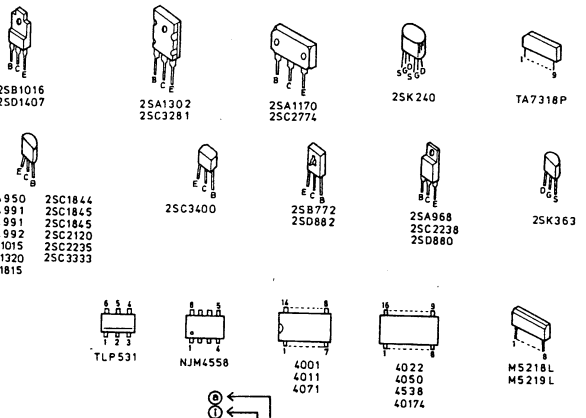


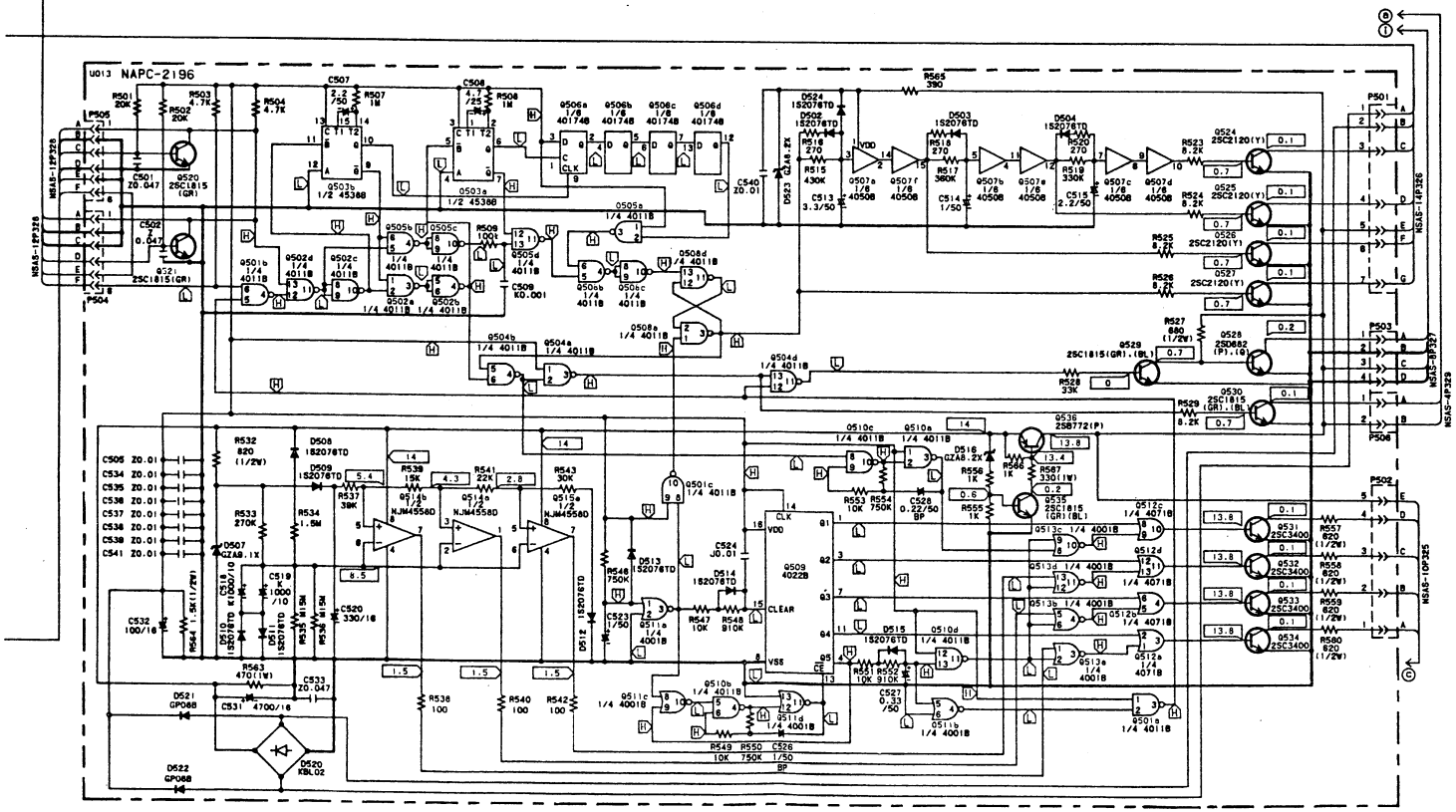
510 SCHEMATIC DIAGRAM(3/3)



NOTES

- ALL RESISTORS ARE IN OHMS, 1/4WATT UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN μF, 50WV UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (±#=) ARE IN μF/WV.
- VOLTAGE (MEASURED)WITH VTVM)(NO INPUT SIGNAL).
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT
- THE COMPONENTS IDENTIFIED BY MARK ⚠ ARE CRITICAL FOR SAFETY REPLACE ONLY WITH PART NUMBER SPECIFIED.





STEREO POWER AMPLIFIER

GRAND INTEGRA M510

SCHEMATIC DIAGRAM

RC-201546