

ONKYO. SERVICE MANUAL

STEREO CASSETTE TAPE DECK TA-2060 TA-2070

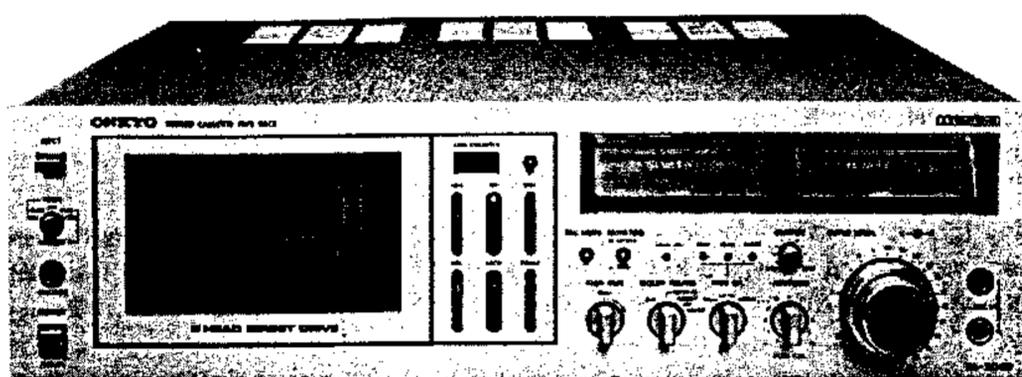


TABLE OF CONTENTS

Item	Page
Specifications	2
Features	3
Common modes of operation	3
Adjustment procedures	4
Service procedures	7
Exploded view	8
Mechanism-exploded view	9
Record and playback amplifier pc board view from bottom side (220V model)	11
Control pc board view from bottom side	14
Record and playback amplifier pc board view from bottom side (120V model)	15
Line amplifier pc board view from bottom side	18
Back tension and motor control pc board view from bottom side	19
Connection diagram for motor control pc board	19
Power supply pc board view from bottom side	20
Semi-conductor view	20
Component location	21
Packing procedures	22

ONKYO.
AUDIO COMPONENTS

FEATURES

Three Head Design with Sendust for Superior Metal Tape Performance

Three heads means you can monitor the actual recorded signal as you record instead of having to rewind the tape to check your recording. The combination 3-head system also features separate record and playback gaps in a special sendust head formulation boasting high saturation flux density and abrasion resistance perfect for metal tape compatibility.

AUTO-ACCUBIAS System

The Onkyo AUTO-ACCUBIAS system lets you quickly and accurately match the recording bias to any tape formulation to optimize frequency response and other performance parameters to get the most out of all your tapes.

Dolby NR/HX System

In addition to the standard Dolby NR (Noise Reduction) system which reduces tape hiss noise, the TA-2060 is also equipped with the new Dolby HX (Headroom Extension) circuitry which significantly improves dynamic range in the high frequencies to permit higher recording levels above 10 kHz even when you don't use expensive tape formulations.

Fade Out Mechanism

This convenient function enables smooth fade-ins and fade-outs to be inserted at the beginning and end of each tape to eliminate sudden cut-offs and starts.

Remove Control Unit Terminal

With an optional remote control unit (the RC-5T), you can switch all tape transport modes from the comfort of your listening position.

COMMON MODES OF OPERATION

Auto ACCUBIAS Operation

1. Set the Memory switch to the STOP position and the Tape Counter to '000'.
2. Insert the tape in the cassette holder and set the Tape Selector switch to the appropriate position.
(Use the NORM setting for FeCr tapes.)
3. Set the Dolby NR/HX switch to the OUT position.
4. Set the Monitor button to the SOURCE position.
5. Pull out on the Auto ACCUBIAS Control knob to start the test signal generator. A high (approx. 10 kHz) and low (approx. 333 Hz) signal will be generated alternately and register on the level meters.
6. Press the Record and Play buttons together to record the test signal. This will not be possible if the erasure prevention tabs have been broken off.
7. Change the Monitor button to the TAPE position. The test signal can now be monitored through the speakers or headphones. While watching the level meters, adjust the Auto ACCUBIAS Control knob so the position of the needles does not change when the test signal switches between high and low. Turn in the + direction when the high frequency is larger than the low and in the - direction when the low frequency is larger. The bias is now set to the optimum value for the tape in use. For tapes where the deflections can not be matched, adjust the Auto ACCUBIAS Control to the point where the meter needles move back and forth the least.
8. With the Auto ACCUBIAS Control knob in the setting described above, depress the knob to return in to the in position.
9. Press the Rewind button and the tape will automatically be rewound to '999'.
10. Turn the Memory switch OFF.
11. Begin recording operations.
12. The position of the Auto ACCUBIAS Control knob has no effect on sound quality during playback.

About the Dolby NR/HX Switch

The Dolby Noise Reduction system has been developed to reduce tape hiss. The Dolby system boosts the higher frequencies (where the hiss is most apparent) during the recording process and reduces them again during playback thereby reducing the background hiss at the same time. In the TA-2060 the Dolby NR circuitry reduces the background hiss by 5 dB at 1 kHz and about 10 dB above 5 kHz.

Any tape recorded using the Dolby system must be played back using the Dolby system, and any tape not recorded using the Dolby system must not be played back using the Dolby system because the Dolby system would suppress most of the high range frequencies.

The Dolby HX (Headroom Extension) system functions to significantly improve the usable dynamic range of any tape, particularly at high frequencies. Note that the Dolby HX system does not operate for metal tapes because metal formulations already have excellent high frequency characteristics. Dolby HX also optimized performance at low and middle frequencies for minimum distortion, modulation noise and drop-out effects. To use this system when recording, set the Dolby NR/HX switch in the NR + HX position. To enjoy the benefits of these noise reduction systems during playback, the Dolby NR/HX switch should be in the DOLBY NR IN/FILTER OUT position. Tapes recorded using the Dolby HX system can be played back on tape decks not equipped with HX circuitry if the deck is set to the Dolby NR IN position.

Fade Out Function

To fade out the sound at the end of a recording, depress the Fade Out control and turn it slowly clockwise as far as it will go. Fade Out should be performed while listening to a tape so the speed of the fading out (i.e., rate at which the control is turned) can be matched to each tape.

ADJUSTMENT PROCEDURES

PRECAUTIONS

- Before adjustment, clean the following parts with an alcohol moistened swab.
 - * record/playback head
 - * erase head
 - * pinch roller
 - * capstan
 - * rubber belt
- Do not use magnetized screwdriver for adjustments.
- Damagnetize record/playback head with a head demagnetizer.
- The switches and controls should be set as follows unless otherwise specified.

TAPE SEL.	NORM
DOLBY NR/HX	OUT
FADE OUT	OUT
OUTPUT	MAX
INPUT LEVEL	0
ACCUBIAS	Center
TIMER/MEMORY	OFF

TEST EQUIPMENT/TOOLS REQUIRED:

Audio oscillator	
Digital frequency counter	
Oscilloscope	
Attenuator	
AC voltmeter	
Non-magnetic screw driver	
Blank tapes (completely erased)	
NORMAL	UD-XL/ I
HIGH	UD-XL/ II
METAL	MX
Test tapes	
VTT-658	: 10 kHz, -15 dB
MTT-111	: 3 kHz, -10 dB
MTT-150	: Dolby level calibration 400 Hz tone 200 nWb/m
TW-2111	: Torque meter
MC-12C or MC-9C	: Mirror tape

1. Hall IC position adjustment

Press the eject button to open the cassette lid, then lift the lid up and out to remove. Remove the two screws holding the cassette chassis and holder plate.

Adjust the clearance between the hall IC and magnet becomes 0.3 to 0.9 mm as shown below.

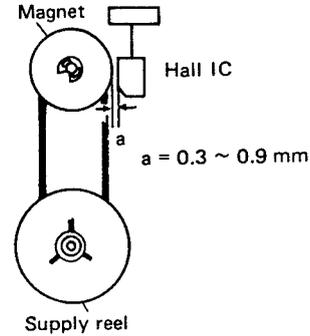


Fig. 1

2. Back tension adjustment

Play the torque meter TW-2111 back.

Adjust the VR21 on the motor control pc board so that the torque of supply reel hand becomes 3 to 6 gr-cm.

3. Play torque adjustment

Play the torque meter TW-2111 back.

Adjust the R721 so that the torque of take-up reel hand becomes 40 gr-cm.

4. Tape speed adjustment

Play the 3 kHz portion of the test tape MTT-111 back.

Adjust the VR1 on the motor control pc board so that the counter indication reads 3,000 Hz.

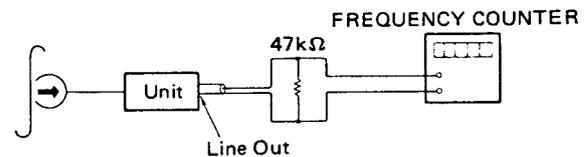


Fig. 2

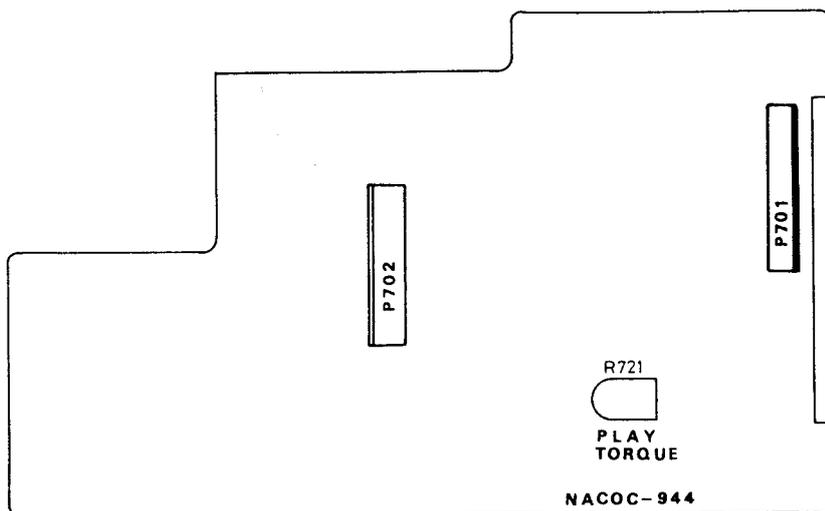


Fig. 3 Control pc board-adjustment point

5. Head azimuth adjustment

- 1) Play the test tape VTT-658 back.
- 2) Adjust the head azimuth screw (3) so that the phase relationship between L- and R-channels approximates 0 degrees as indicated on the oscilloscope.
- 3) At this time confirm that play back output level is approximately the maximum value on the AC voltmeter.
- 4) Then confirm that the phase difference of the respective frequency is within the rated value. 90 degrees or less in the range of 40 Hz to 10 kHz is required.
- 5) Secure the screw with the locking paint.

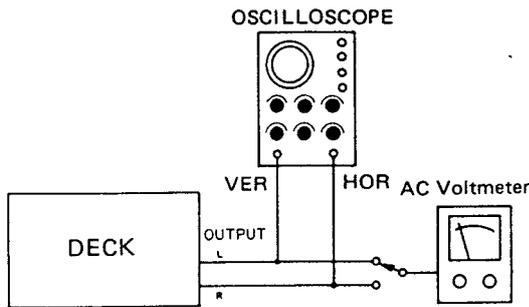


Fig. 4

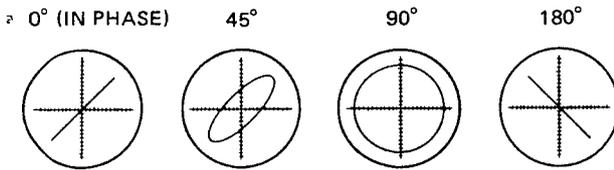


Fig. 5 Confirming phase relationship

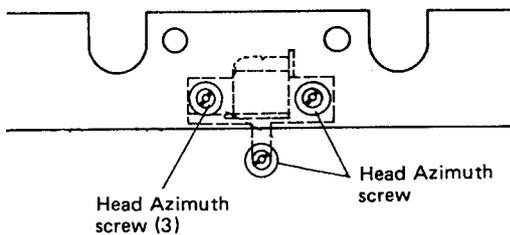


Fig. 6

Note: Perform the adjustment as shown below when the record/playback head is replaced.

1. Insert the mirror cassette tape into the cassette holder.
2. Play the mirror tape back.
3. Adjust the three azimuth screws so that the tape passes to the center of cassette guide as shown below.

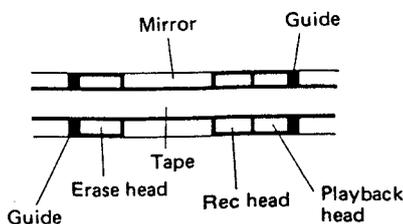


Fig. 7

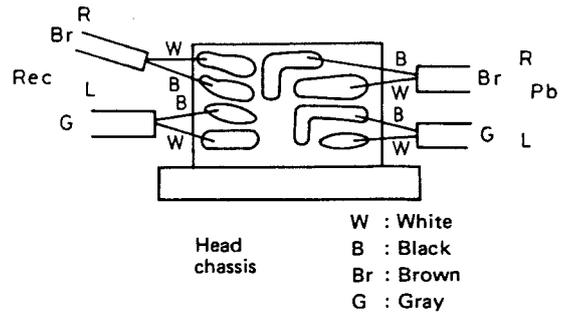


Fig. 8 Wiring view

4. Play the test tape VTT-658 back.
5. Adjust the head azimuth screws so that the AC voltmeter reads maximum.
6. Insert the normal blank tape into the cassette holder.
7. Apply the 10 kHz signal to the line-in terminals.
8. Set the monitor switch to the source position.
9. Adjust the AF oscillator output or input level volume so that the peak level meter reads 0VU.
10. Then set the attenuator for -10 dB input level, put the tape deck into the recording mode.
11. Set the monitor switch to the tape position.
12. Adjust the three azimuth screws so that the left and right channel outputs become the same and maximum level.

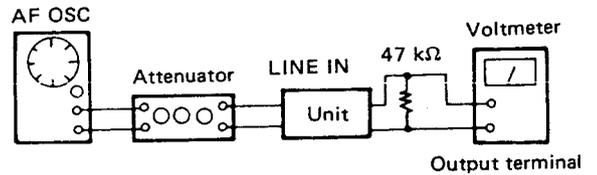


Fig. 9

6. Playback output adjustment

Play the test tape MTT-150 back.
Adjust R119 and R120 so that the AC voltmeter reads 775 mV.

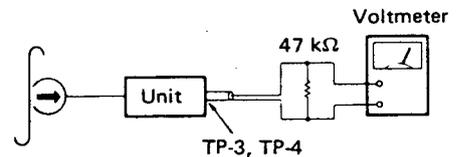


Fig. 10

7. Peak meter adjustment

- 1) Apply the 5 kHz signal to the line-in terminals.
- 2) Adjust the AF oscillator output or input level volume so that the AC voltmeter reads 1,100 mV.
- 3) Adjust the R341 and R342 so that the peak meter reads 0VU.

Note: Connect the test equipment as shown Fig. 9.

8. LAW adjustment

- 1) Connect the test equipment as shown in Fig. 10.
- 2) Apply the 5 kHz signal to the line-in terminals.
- 3) Set the monitor switch to the source position.
- 4) Adjust the attenuator so that the AC voltmeter reads 23.4 mV.
- 5) Connect the test equipment as shown in Fig. 11.
- 6) Turn the Dolby NR switch to the Dolby position.
- 7) Adjust the R351 and R352 so that the AC voltmeter reads 60 mV.

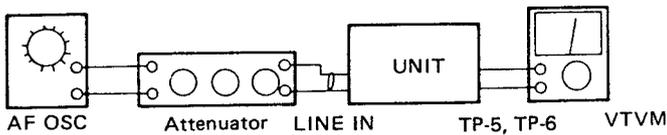


Fig. 11

10. Record level and bias current adjustment

- 1) Insert the normal blank tape into the cassette holder.
- 2) Set the monitor switch to the source position.
- 3) Apply the 1,000 Hz signal to the line-in terminals.
- 4) Press the pause and record buttons and put the tape deck into recording mode.
- 5) Adjust the AF oscillator output or input level volume so that the VU meters read 0VU. (AC voltmeter reads 775 mV.)
- 6) Then set the attenuator so that the AC voltmeter reads 77.5 mV.
- 7) Release the pause button and record on the tape.
- 8) Set the monitor switch to the tape position.
- 9) Adjust the R263 and R264 so that AC voltmeter reads 77.5 mV.
- 10) Next change the frequency of 400 Hz, and record again.
- 11) Read the output level when the monitor switch is set to the tape position.
- 12) Next change the frequency of the 10 kHz and record again.
- 13) Adjust the R574 and R575 so that the 400 Hz and 10 kHz levels become is same.

9. Accubias adjustment

- 1) Pull out the auto accubias control knob and set the monitor switch to the source position.
- 2) Set the R517 and R516 to the position as shown below.

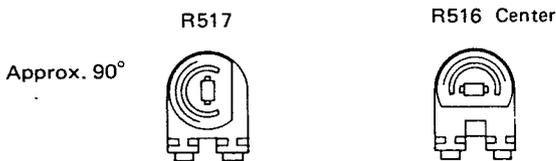


Fig. 12

- 3) Adjust the R516 so that the large indication of right channel meter becomes 0VU.
- 4) Adjust the R517 so that the meter of 333 Hz and 10 kHz indicates same calibration.
- 5) Adjust the R340 so that the meters of right and left channel indicate same calibration.
- 6) After adjustment, depress the accubias knob.

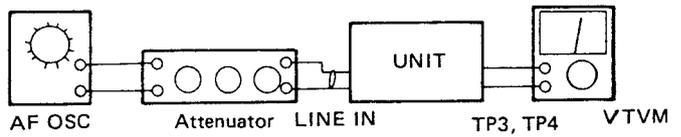


Fig. 13

11. Lid opening speed adjustment

Adjust the screw as shown below so that the lid opening speed becomes 0.3 to 2 sec.

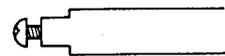


Fig. 14

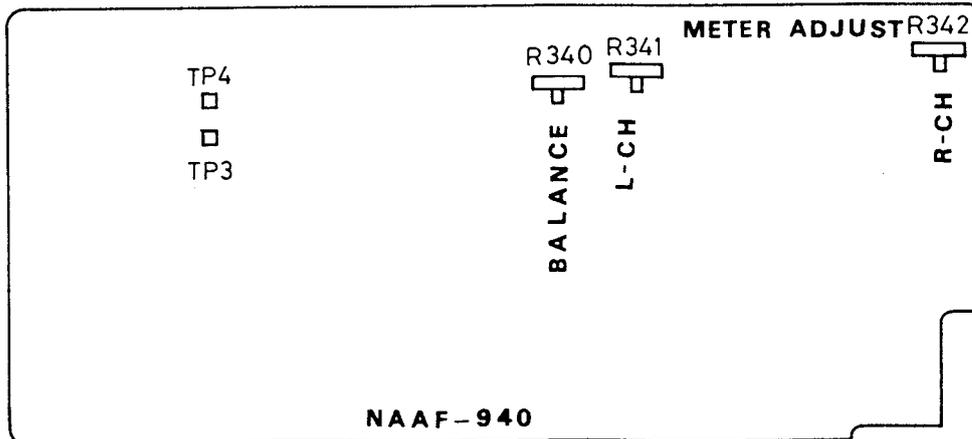


Fig. 15 Audio amplifier and meter drive pc board-adjustment points

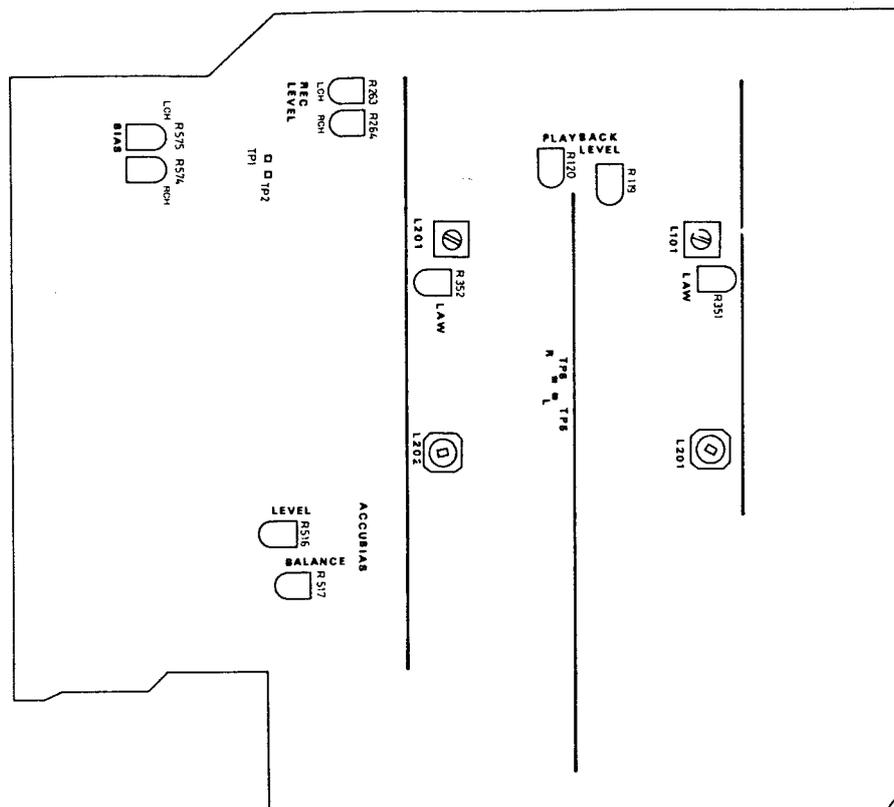


Fig. 16 Playback and record amplifier pc board-adjustment points

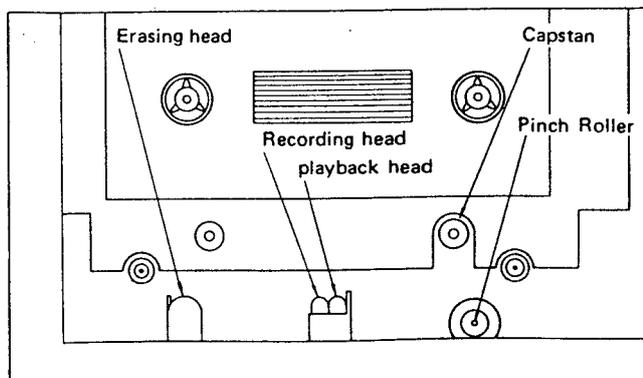
SERVICE PROCEDURES

1. Head cleaning

A dirty head will cause:

- Poor sound quality (loss of high sounds)
- Decreased volume
- Skipping
- Poor erasing (incomplete erasure of previous recording)

To prevent these problems, clean the heads and capstan shaft with a cleaning pen or cotton swab dipped in a little alcohol.



2. Pinch roller cleaning

If the pinch roller is dirty, the tape may become tangled and damaged by wrapping around the roller. Clean the pinch roller when cleaning the head. Use a special cleaner and cotton swab. Head cleaning materials must never be used for the pinch roller.

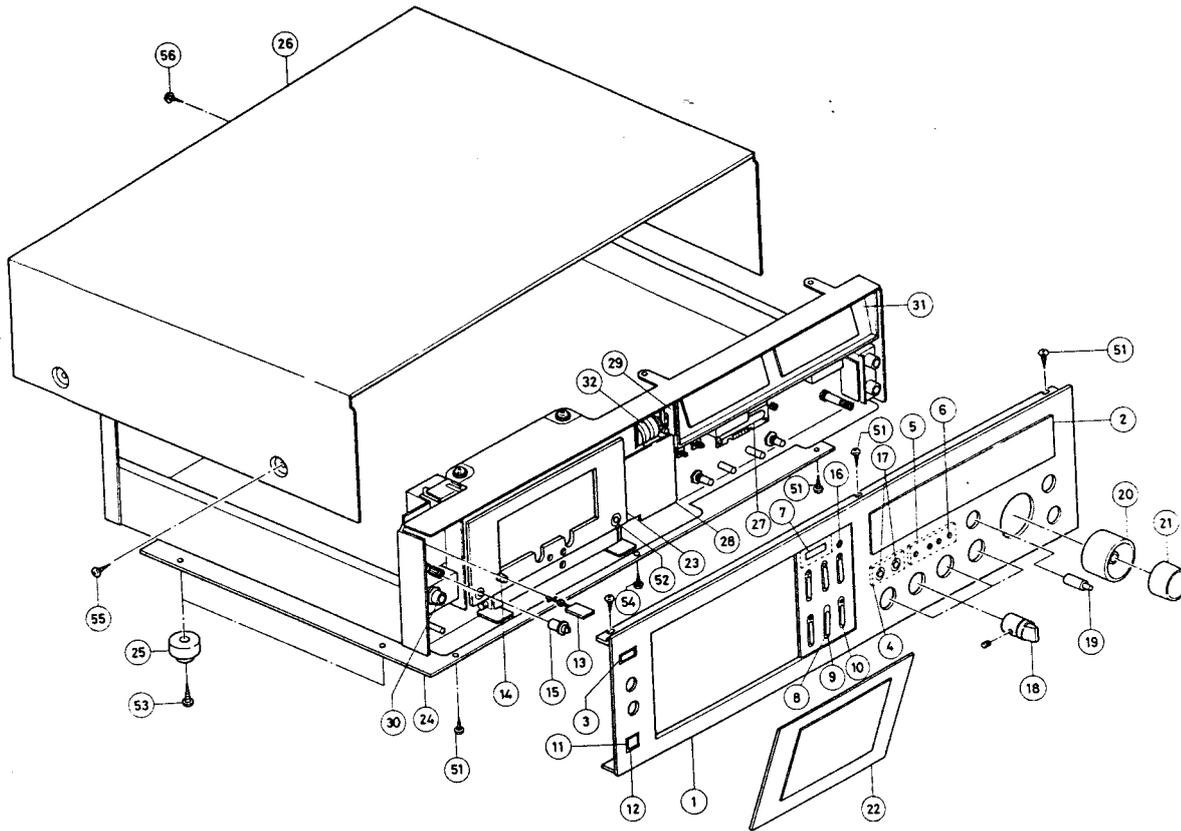
3. Demagnetizing

Residual magnetism builds up in the head after the cassette deck has been used for a long period of time. This build-up introduces noise and static into recording tapes and lowers the high frequency range. To prevent this, demagnetize the recording/playback head, as well as other affected metal parts (like the capstan shaft) once every 50 hours of use. Keep the tape deck power OFF while using the demagnetizer. Also place tapes far away from the work area.

4. DOLBY HX effect measurement

- 1) Connect the test equipment as shown in Fig. 9.
- 2) Insert the blank normal tape in the cassette holder.
- 3) Turn the tape selector switch to the normal position.
- 4) Apply to 10 kHz, 0VU signal to the line-in terminal and record on the tape.
- 5) Turn the monitor switch to the tape position.
- 6) While recording the 10 kHz signal, read the output level with the Dolby switch at OUT and Dolby HX positions.
- 7) The output level in the Dolby HX position should be more than 7 dB than the out position.
- 8) Insert the blank chrome tape and turn to the high position.
- 9) Repeat the above procedures (step 4 to step 6).
- 10) The output level in the Dolby HX position should be more than 5 dB than the out position.

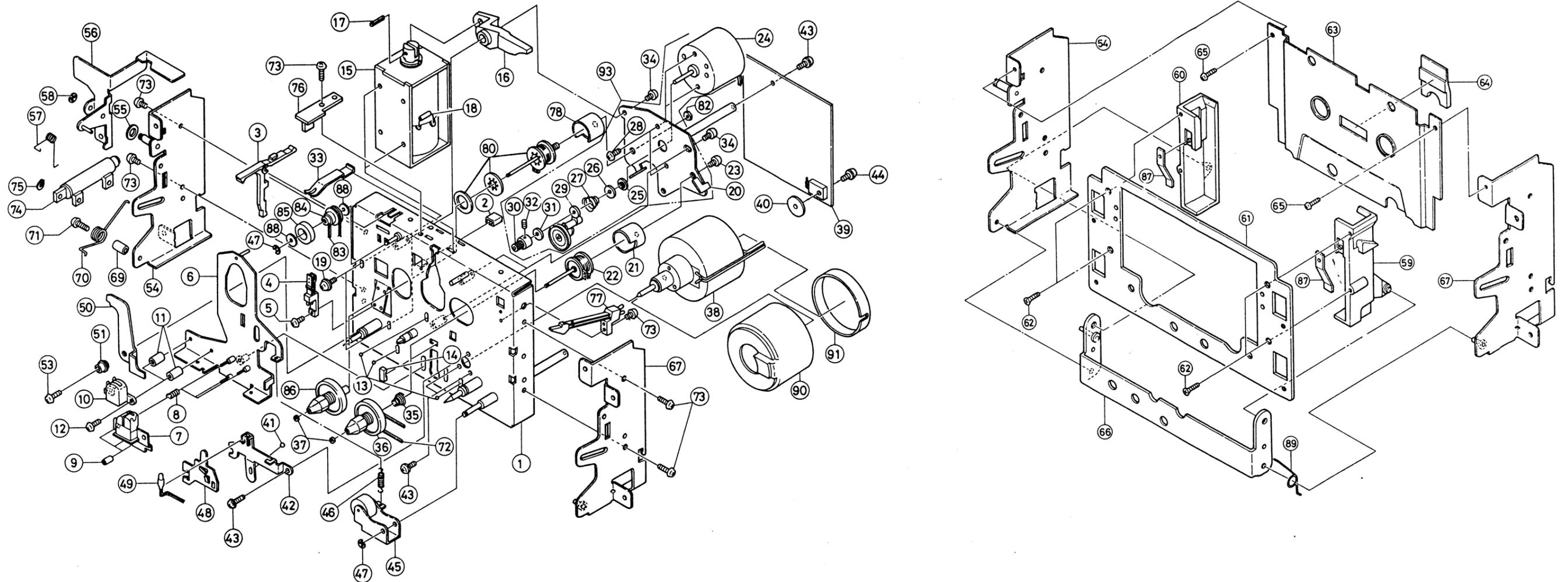
EXPLODED VIEW



EXPLODED VIEW-PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	16299121	Front panel ass'y (1-8)	20	28320393	Knob, left
2	28191065	Clear plate	21	28320459	Knob, right
3	27267061	Guide, eject	22	16299901	Cassette lid ass'y
4	27267076	Guide, push	23	28400005	Cassette holder
5	27267077	Guide, indicator	24	27170087	Bottom board
6	28198534	Facet	25	27175009	Leg
7	27300148	Window, counter	26	28184093	Top cover
8	27267075	Guide	27	16299543	NAPL-943, Lamp p.c.b.
9	28320450	Knob, push	28	16299547	NASW-947, Operation key p.c.b.
10	28320451	Knob, record	29	16299549	NAPL-949, Meter illumination lamp p.c.b.
11	27267048	Guide, power	30	25045077	HLJ0605-01-020, Stereo headphone jack
	16299902	Power knob ass'y	31	27300329	Meter frame
12	28320470	Knob, power	32	24601075	Counter
	27180038	Spring	51	838130062	3STS+6BQ, Tapping screw
13	28320453	Knob, eject	52	82522004	2B+4FN(Ni), Tapping screw
14	27180021	Spring	53	831130102	3STW+10BQ, Tapping screw
15	28320454	Knob, timer/memory	54	831130082	3STW+8BQ, Tapping screw
16	28320455	Knob, counter	55	838440109	4TTB+10C(BC), Tap screw
17	28320456	Knob, push	56	834430102	3STS+10BQ(BC), Tapping screw
18	28320469	Knob, selector			
19	28320458	Knob, output			

MECHANISM-EXPLODED VIEW



REF. NO. PARTS NO. DESCRIPTION

1	24610491	Chassis ass'y
2	24610376	Rubber, brake
3	24603130	Lever, chrome tape detector
4	24603128	Leaf switch, record preventing
5	82112004	M2x4, Pan head machine screw
6	24610492	Chassis, head
7	24600024	Head, record and playback
8	24605243	Spring
9	24610495	Nut, head azimuth
10	24600025	Erase head
11	24610493	Spacer
12	82512012	Bind screw
13	24610351	Steelball
14	24610350	Stopper
15	24606098	Solenoid
16	24603131	Lever, head
17	24610369	Pin, spring
18	223848	GP-08B, Diode
19	801220	M3x6, Pan head screw with spring washer
20	24610372	Bracket, motor
21	24610371	Case, reel platform
22	24610494	Bobbin ass'y

REF. NO. PARTS NO. DESCRIPTION

23	82512304	M2.3x4, Bind screw
24	24601054	Reel motor
25	24610373	Catcher, spring
26	24610374	Washer
27	24605194	Spring
28	82512603	M2.6x3, Bind screw
29	24602076	Lever, idler
30	24601052	Pulley, motor
31	24610375	Felt
32	801221	Screw
33	24605183	Spring, cassette holding
34	801176	Pan head screw
35	24605193	Spring
36	24602098	Take-up reel
37	24610349	Washer
38	24601055	Capstan motor
39	24606106	Motor and back tension control p.c.b.
40	24610377	Insulator washer
41	24610279	3φ, steelball
42	24610496	Plate, head pressure
43	801181	M2.6x6, Pan head screw
44	801178	M2.6x8, Pan head screw

REF. NO. PARTS NO. DESCRIPTION

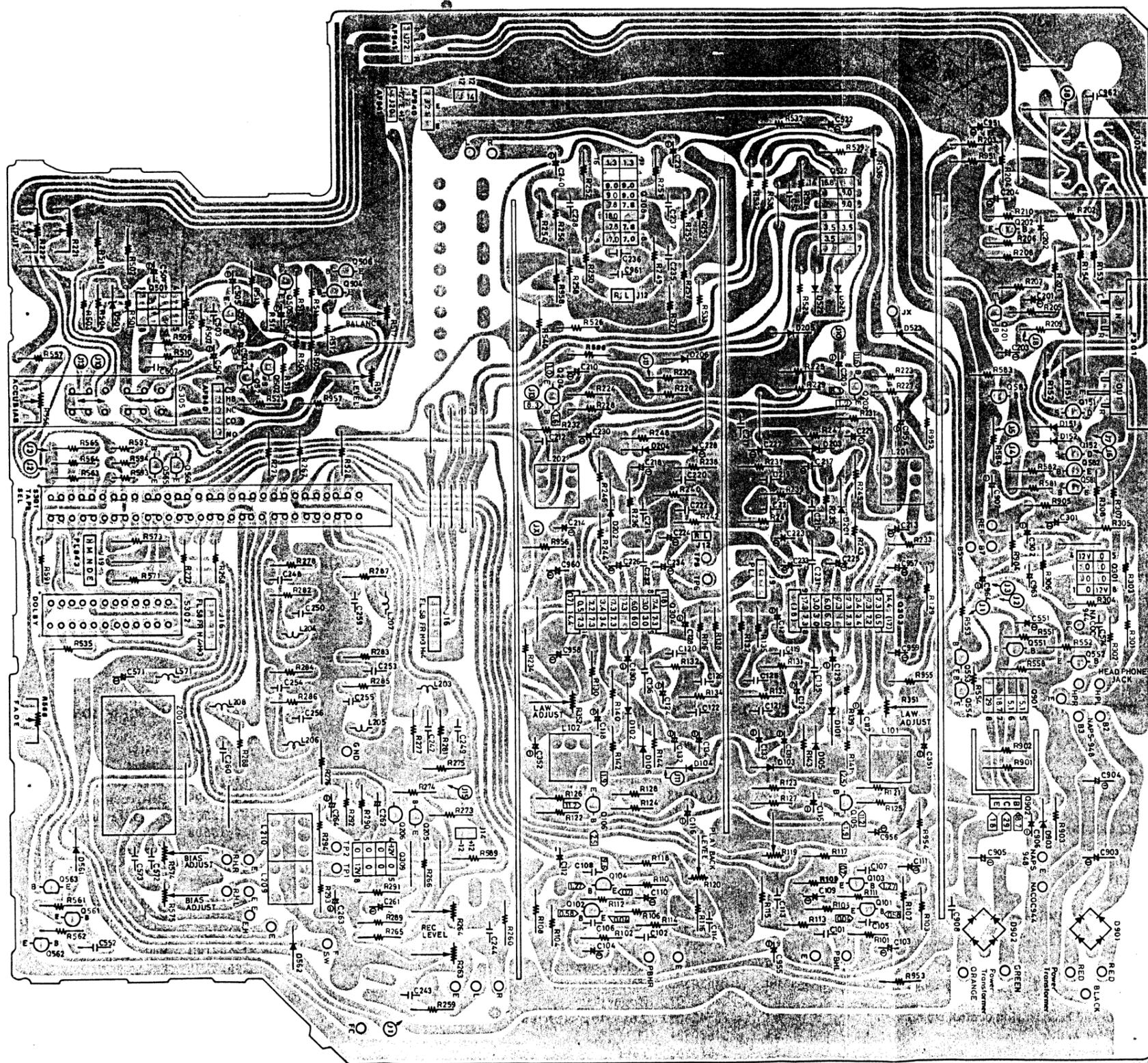
45	24610497	Pinch arm ass'y
46	24605244	Spring
47	8930201	Circlip
48	24610498	Holder, lamp
49	24606107	50mA, 8V, Lamp
50	24610345	Lock plate
51	24610344	Collar
53	833125089	2.5x8, Pan head screw
54	24610499	Bracket, side
55	24610452	Washer
56	24610500	Lever, canceller
57	24605245	Spring
58	8930302	E3, Circlip
59	24610501	Holder, cassette
60	24610502	Holder, cassette
61	24610503	Mount plate
62	835426082	2.6x8, Tapping screw
63	24610504	Plate
64	24610505	Tube
65	833225059	Screw
66	24610506	Bracket ass'y, cassette holder
67	24610507	Bracket, side

REF. NO. PARTS NO. DESCRIPTION

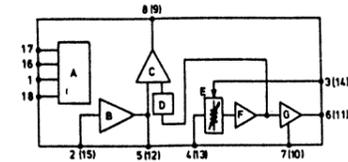
69	24610516	Spacer
70	24605246	Spring
71	833130129	3x12, Pan head screw
72	24602099	Belt, counter
73	833125059	2.5x5, Pan head screw
74	24610508	Damper
75	24610514	Clip link
76	24606105	Hall IC p.c.b.
77	24606104	Leaf switch
78	24610509	Case, reel platform
80	24610519	Brake ass'y
82	863730	M3, Nut
83	24602100	Belt
84	24602101	Pulley
85	24610512	Magnet
86	24602102	Reel, supply
87	24605188	Spring
88	24610515	φ2.5, washer
89	24605247	Spring
90	24610517	Cap
91	24610518	Cap
93	24601056	Reel motor/Idler ass'y (20, 24~32)

REC. AND PLAYBACK AMPLIFIER PC BOARD VIEW FROM BOTTOM SIDE

220V model

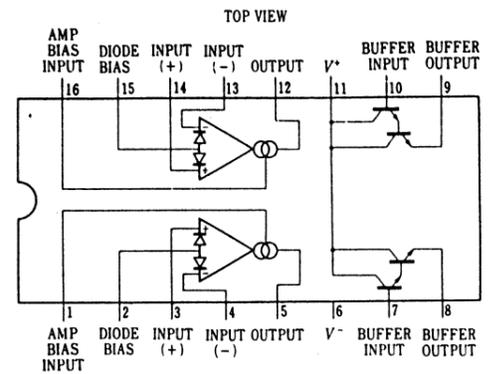


HA-11226 BLOCK DIAGRAM

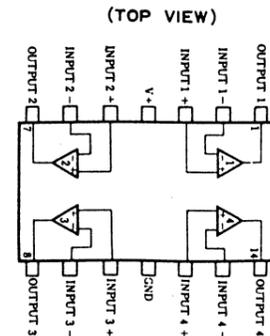


- A : POWER SUPPLY
- B : INPUT AMP
- C : ADDER
- D : OVER SHOOT SUPPRESSION
- E : VARY RESISTANCE
- F : SIDE CHAIN AMP
- G : RECTIFIER AMP

LM1360N BLOCK DIAGRAM



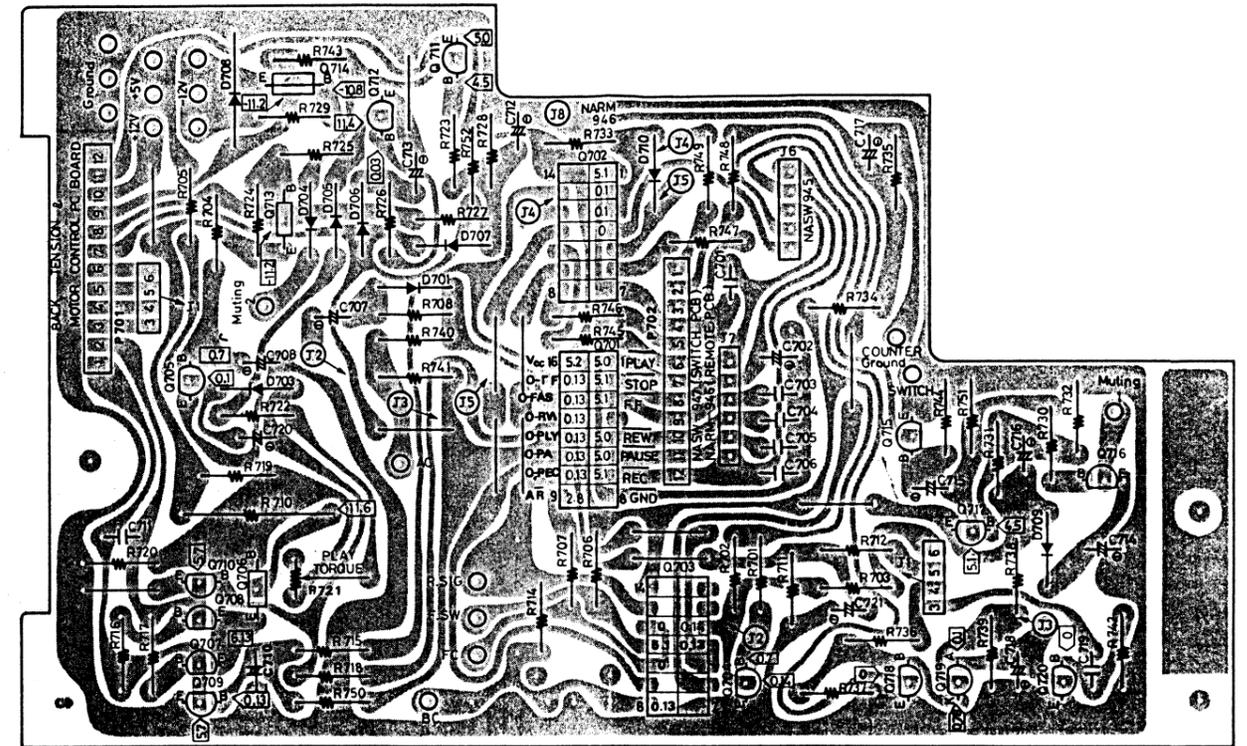
LM324N BLOCK DIAGRAM



RECORD AND PLAYBACK AMPLIFIER PC BOARD (NAAF-939a) - PARTS LIST

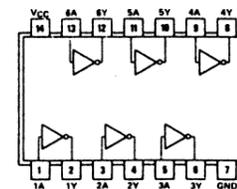
CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs					
Q301	222603	μPC4557C	C227, C228	392881097	0.1μF, 50V, LL
Q303, Q304	222460	HA-11226	C229, C230	392883397	0.33μF, 50V, LL
Q308	222602 or 222617	LM13600N or NE5517N	C231, C232	384121044	0.1μF±2%, 50V, DT
Q309, Q501	222465	NJM4558D	C233, C234	352780229	2.2μF, 50V, Elect.
Q522	222604	LM324N	C237, C238	379121524	1.500pF±5%, 50V, DEW
Q901	222465	NJM4558D	C239, C240	352741009	10μF, 16V, Elect.
Transistors					
Q101-Q104	2211406	2SC2240(BL)	C243, C244	379121824	1.800pF±5%, 50V, DEW
Q105, Q106	2211255	2SC1815(GR)	C249, C250	379121234	12,000pF±5%, 50V, DEW
Q151, Q152	2210274	2SK30A(Y), F.E.T	C255, C256	379121234	12,000pF±5%, 50V, DEW
Q201, Q202	2211406	2SC2240(BL)	C259, C260	379121034	10,000pF±5%, 50V, DEW
Q203-Q206	2211255	2SC1815(GR)	C261, C262	352781099	0.1μF, 50V, Elect.
Q502-Q506	2211255	2SC1815(GR)	C263, C264	352781009	10μF, 50V, Elect.
Q521	2211255	2SC1815(GR)	C301, C302	352741009	10μF, 16V, Elect.
Q551, Q561	2211554	2SA562TM(Y)	C351, C352	352741009	10μF, 16V, Elect.
Q552, Q553	2211255	2SC1815(GR)	C501	352741009	10μF, 16V, Elect.
Q554	2211683	2SD468(C)	C502	352784799	0.47μF, 50V, Elect.
Q562	2211255	2SC1815(GR)	C503	379121234	0.012μF±5%, 50V, DEW
Q563	2211683	2SD468(C)	C504	352784799	0.47μF, 50V, Elect.
Q564, Q565	2211255	2SC1815(GR)	C505	352780109	1μF, 50V, Elect.
Q581-Q583	2211255	2SC1815(GR)	C506	352781099	0.1μF, 50V, Elect.
Q902	2201074	2SD880(Y)	C522	352741009	10μF, 16V, Elect.
Diodes					
D101, D102	223103 or 223132	1N60 or 1K60	C551	352722219	220μF, 6.3V, Elect.
D103-D106	223105 or 223133	1S1555 or DS-442X	C552	379124734	0.047μF±20%, 50V, DEW
D151, D152	223103 or 223132	1N60 or 1K60	C571	352781099	0.1μF, 50V, Elect.
D201, D202	223105 or 223133	1S1555 or DS-442X	C903, C904	352752229	2,200μF, 25V, Elect.
D203-D206	223105 or 223133	1S1555 or DS-442X	C905	352761029	1,000μF, 35V, Elect.
D501	224038 or 224093	05Z5.1L or GZA5.1L	C906	352780109	1μF, 50V, Elect.
D521-D523	223105 or 223133	1S1555 or DS-442X	C907, C951	352741009	10μF, 16V, Elect.
D561, D562	223804 or 223848	SR1K-2 or GP08B	C954, C956	352752219	220μF, 25V, Elect.
D901	223868	2W02	C955	352751019	100μF, 25V, Elect.
D902	223862	WL-01	C957, C958	352744719	470μF, 16V, Elect.
D903	224038 or 224093	05Z5.1L or GZA5.1L	C959, C960	352752219	220μF, 25V, Elect.
Coils					
L101, L102	233146	NCH4021	R119, R120	5215023	N08HR50KBC, Semi-fixed
L201, L202	233221	NMC5021	R221, R222	5104106	N16RKL50KA40F, Variable
L203, L204	24606070	NCH-1008	R263, R264	5215020	N08HR5KBC, Semi-fixed
L205, L206	24606069	NCH-1007	R351, R352	5215021	N08HR10KBC, Semi-fixed
L207, L208	24606108	NCH-1048	R516, R517	5215019	N08HR2KBC, Semi-fixed
L209, L210	233186	NCH-3032	R556	5104105	N16RLS10KB20M, Variable
L571	233188	NCH-1033	R566	5104107	N16RLS5K20M, Variable
Oscillator block					
Z001	24606103	NOB-011	R571	441521514	150Ω, 1/2W, Metal oxide film
Resistors					
C103, C104	392850337	3.3μF, 25V, LL	R573	441523314	330Ω, 1/2W, Metal oxide film
C109, C110	352732209	22μF, 10V, Elect.	R574, R575	5215023	N08HR50KBC, Semi-fixed
C111, C112	352750479	4.7μF, 25V, Elect.	Switches		
C113, C114	379128224	8,200pF±5%, 50V, DEW	S301	25030174	NRSM-1103-20SS, Tape selector
C115, C116	392850477	4.7μF, 25V, LL	S302	25030173	NRSM-144-20SS, Dolby NR
C117, C118	352741009	10μF, 16V, Elect.	Terminal		
C119, C120	384124723	4,700pF±2%, 50V, DT	P301	25045020	NPI-4PDBL11, Tape input/output
C121, C122	384121533	15,000pF±2%, 50V, DT	Socket		
C123, C124	392883397	0.33μF, 50V, LL	P302	25050064	NSCT5P18, DIN
C125, C126	384121533	15,000pF±2%, 50V, DT	Radiator		
C127-C130	352741009	10μF, 16V, Elect.	27160029		
C131, C132	392881097	0.1μF, 50V, LL	Lead wires		
C133, C134	392883397	0.33μF, 50V, LL	J9	79119	JL-4-290-5-5-P2.5
C135, C136	384121044	0.1μF±5%, 50V, DT	J16	79124	JL-5-110-5-5-P2.5
C201, C202	392880107	1μF, 50V, LL	J18	79120	JL-5-140-5-5-P2.5
C203, C204	352780109	1μF, 50V, Elect.	J21	79118	JL-4-160-5-5-P2.5
C209, C210	392850477	4.7μF, 25V, LL	J22	79122	JL-4-145-5-5-P2.5
C213, C214	352741009	10μF, 16V, Elect.	Screws		
C215, C216	384124723	4,700pF±2%, 50V, DT	831130082	3STW+8BQ, Tapping	
C217, C218	392883397	0.33μF, 50V, LL	82113006	3P+6FN, Pan head	
C219-C222	384121533	15,000pF±2%, 50V, DT	Plates		
C223, C224	352741009	10μF, 16V, Elect.	27300130	Ground Insulator	
C225, C226	352741009	10μF, 16V, Elect.	28175032		

CONTROL CIRCUIT PC BOARD VIEW FROM BOTTOM SIDE

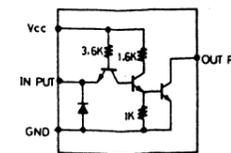


CONTROL PC BOARD (NACOC-944) - PARTS LIST

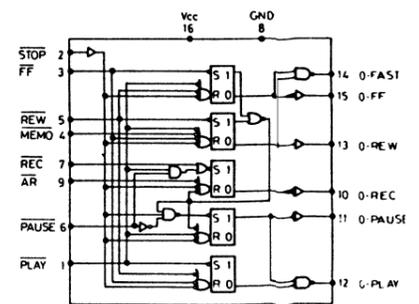
CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs					
Q701	222555	M54410P	C702	352784799	0.47μF, 50V, Elect.
Q702, Q703	222556	HD7405P or F7405	C707	352750479	4.7μF, 25V, Elect.
Transistors					
Q704, Q705	2211255	2SC1815(GR)	C708	352780229	2.2μF, 50V, Elect.
Q706	2201060	2SD549	C710	352724709	47μF, 6.3V, Elect.
Q707, Q708	2211554	2SA562TM(Y)	C712	352732209	22μF, 10V, Elect.
Q709, Q710	2211706	2SD655(F)	C713	352784799	0.47μF, 50V, Elect.
Q711	2211454	2SA1015(Y)	C714	352724719	470μF, 6.3V, Elect.
Q712	2211255	2SC1815(GR)	C715	352723309	33μF, 6.3V, Elect.
Q713	2201275 or 2201276	2SB772(Q) or 2SB772(R)	C716	352722219	220μF, 6.3V, Elect.
Q714	2211612 or 2211611	2SD471(L) or 2SD471(K)	C717	352731009	10μF, 10V, Elect.
Q715	2211255	2SC1815(GR)	C718	352732209	22μF, 10V, Elect.
Q716, Q717	2211454	2SA1015(Y)	C720	352731009	10μF, 10V, Elect.
Q718, Q720	2211255	2SC1815(GR)	C721	352724709	47μF, 6.3V, Elect.
Q719	2211571	TN41A, F.E.T	Resistors		
Diodes					
D701, D703	223105 or 223133	1S1555 or DS-442X	R710	442722704	27Ω, 2W, Metal oxid: film
D704-D707	223804 or 223848	SR1K-2 or GP08B	R721	5215020	N08HR5KBC, Semi-fixed
D708	223105 or 223133	1S1555 or DS-442X	Plugs		
D709, D710	223105 or 223133	1S1555 or DS-442X	P701, P702	25065133	NPLG-12P-18
Lead wires					
J1 79118 JL4-160-5-5-P2.5					
J6 79120 JL5-220-5-5-P2.5					



HD7405, F7405



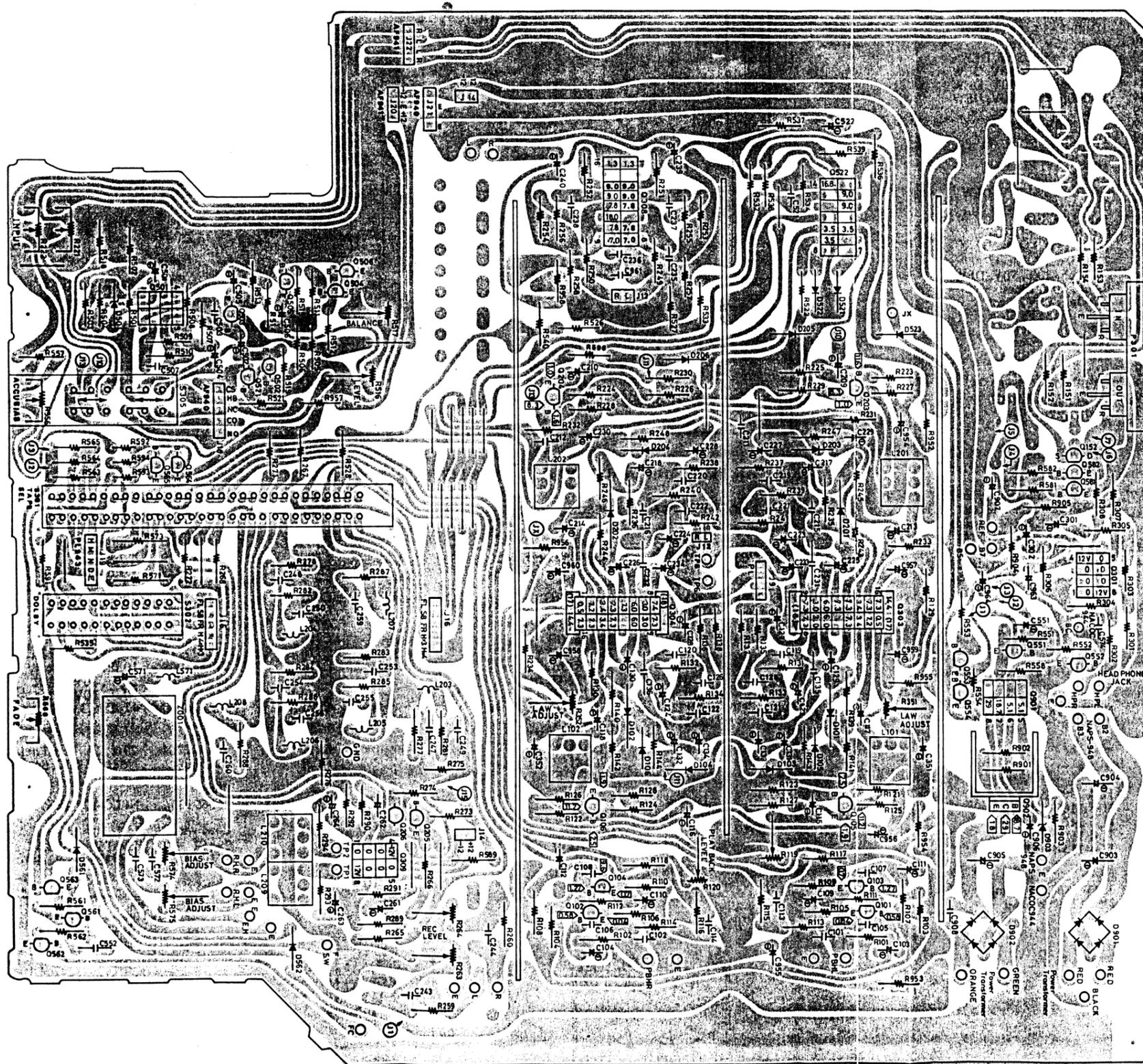
M54410P BLOCK DIAGRAM (ONE CIRCUIT SHOWN)



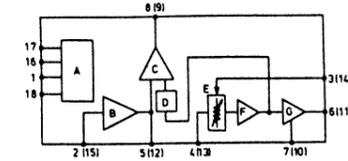
M54410P BLOCK DIAGRAM

REC. AND PLAYBACK AMPLIFIER PC BOARD VIEW FROM BOTTOM SIDE

120V model

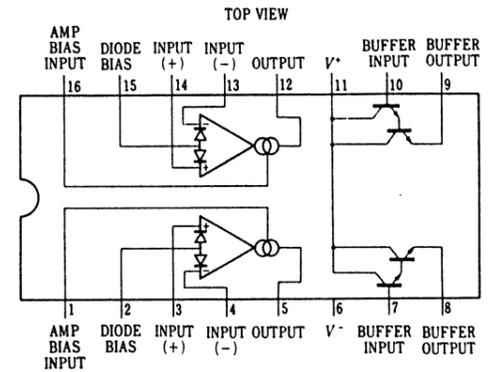


HA-11226 BLOCK DIAGRAM

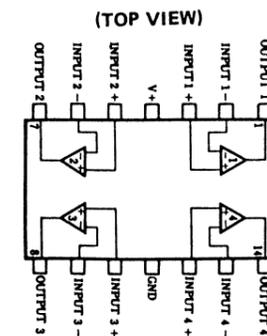


- A : POWER SUPPLY
- B : INPUT AMP
- C : ADDER
- D : OVER SHOOT SUPPRESSION
- E : VARY RESISTANCE
- F : SIDE CHAIN AMP
- G : RECTIFIER AMP

LM1360N BLOCK DIAGRAM



LM324N BLOCK DIAGRAM

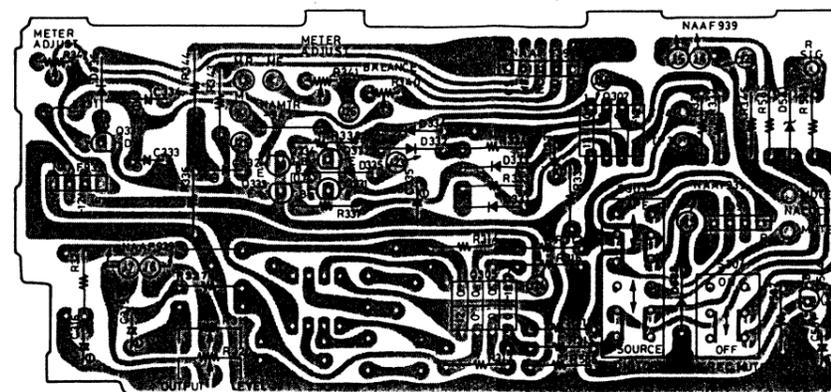


RECORD AND PLAYBACK AMPLIFIER PC BOARD (NAAF-939) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q301	222603	μPC4557C
Q303, Q304	222460	HA-11226
Q308	222602 or 222617	LM13600N or NE5517N
Q309, Q501	222465	NJM4558D
Q522	222604	LM324N
Q901	222465	NJM4558D
Transistors		
Q101-Q104	2211406	2SC2240(BL)
Q105, Q106	2211255	2SC1815(GR)
Q203-Q206	2211255	2SC1815(GR)
Q502-Q506	2211255	2SC1815(GR)
Q521	2211255	2SC1815(GR)
Q551, Q561	2211554	2SA562TM(Y)
Q552, Q553	2211255	2SC1815(GR)
Q554	2211683	2SD468(C)
Q562	2211255	2SC1815(GR)
Q563	2211683	2SD468(C)
Q564, Q565	2211255	2SC1815(GR)
Q581, Q582	2211255	2SC1815(GR)
Q902	2201074	2SD880(Y)
Diodes		
D101, D102	223103 or 223132	1N60 or 1K60
D103-D106	223105 or 223133	1S1555 or DS-442X
D201, D202	223103 or 223132	1N60 or 1K60
D203-D206	223105 or 223133	1S1555 or DS-442X
D501	224038 or 224093	05Z5.1L or GZA5.1L
D521-D523	223105 or 223133	1S1555 or DS-442X
D561, D562	223804 or 223848	SR1K-2 or GP08B
D901	223868	2W02
D902	223862	WL-01
D903	224038 or 224093	05Z5.1L or GZA5.1L
Coils		
L101, L102	233146	NCH4021
L201, L202	233221	NMC5021
L203, L204	24606070	NCH-1008
L205, L206	24606069	NCH-1007
L207, L208	24606108	NCH-1048
L209, L210	233186	NCH-3032
L571	233188	NCH-1033
Oscillator block		
Z001	24606103	NOB-011
Capacitors		
C103, C104	392850337	3.3μF, 25V, LL
C109, C110	352732209	22μF, 10V, Elect.
C111, C112	352750479	4.7μF, 25V, Elect.
C113, C114	379128224	8,200pF±5%, 50V, DEW
C115, C116	392850477	4.7μF, 25V, LL
C117, C118	352741009	10μF, 16V, Elect.
C119, C120	384124723	4,700pF±2%, 50V, DT
C121, C122	384121533	15,000pF±2%, 50V, DT
C123, C124	392883397	0.33μF, 50V, LL
C125, C126	384121533	15,000pF±2%, 50V, DT
C127-C130	352741009	10μF, 16V, Elect.
C131, C132	392881097	0.1μF, 50V, LL
C133, C134	392883397	0.33μF, 50V, LL
C135, C136	384121044	0.1μF±5%, 50V, DT
C209, C210	392850477	4.7μF, 25V, LL
C213, C214	352741009	10μF, 16V, Elect.
C215, C216	384124723	4,700pF±2%, 50V, DT
C217, C218	392883397	0.33μF, 50V, LL
C219-C222	384121533	15,000pF±3%, 50V, DT
C223, C224	352741009	10μF, 16V, Elect.
C225, C226	352741009	10μF, 16V, Elect.
C227, C228	392881097	0.1μF, 50V, LL
C229, C230	392883397	0.33μF, 50V, LL
C231, C232	384121044	0.1μF±2%, 50V, DT
C233, C234	352780229	2.2μF, 50V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Capacitors		
C237, C238	379121524	1,500pF±5%, 20V, DEW
C239, C240	352741009	10μF, 16V, Elect.
C243, C244	379121824	1,800pF±5%, 50V, DEW
C249, C250	379121234	12,000pF±5%, 50V, DEW
C255, C256	379121234	12,000pF±5%, 50V, DEW
C259, C260	379121034	10,000pF±5%, 50V, DEW
C261, C262	352781099	0.1μF, 50V, Elect.
C263, C264	352781009	10μF, 50V, Elect.
C301, C302	352741009	10μF, 16V, Elect.
C351, C352	352741009	10μF, 16V, Elect.
C501	352741009	10μF, 16V, Elect.
C502	352784799	0.47μF, 50V, Elect.
C503	379121234	0.012μF±5%, 50V, DEW
C504	352784799	0.47μF, 50V, Elect.
C505	352780109	1μF, 50V, Elect.
C506	352781099	0.1μF, 50V, Elect.
C522	352741009	10μF, 16V, Elect.
C551	352722219	220μF, 6.3V, Elect.
C552	379124734	0.047μF±20%, 50V, DEW
C571	352781099	0.1μF, 50V, Elect.
C903, C904	352752229	2,200μF, 25V, Elect.
C905	352761029	1,000μF, 35V, Elect.
C906	352780109	1μF, 50V, Elect.
C907	352741009	10μF, 16V, Elect.
C954, C956	352752219	220μF, 25V, Elect.
C955	352751019	100μF, 25V, Elect.
C957, C958	352744719	470μF, 16V, Elect.
C959, C960	352752219	220μF, 25V, Elect.
C963, C964	352741009	10μF, 16V, Elect.
Resistors		
R119, R120	5215023	N08HR50KBC, Semi-fixed
R221, R222	5104106	N16RKL50KA40F, Variable
R263, R264	5215020	N08HR5KBC, Semi-fixed
R351, R352	5215021	N08HR10KBC, Semi-fixed
R516, R517	5215019	N08HR2KBC, Semi-fixed
R556	5104105	N16RLS10KB20M, Variable
R566	5104107	N16RLS5K20M, Variable
R571	441521514	150Ω, ½W, Metal oxide film
R573	441523314	330Ω, ½W, Metal oxide film
R574, R575	5215023	N08HR50KBC, Semi-fixed
Switches		
S301	25030174	NRSM-1103-20SS, Tape selector
S302	25030173	NRSM-144-20SS, Dolby NR
Terminal		
P301	25045020	NPJ-4PDBL11, Tape input/output
Radiator		
	27160029	
Lead wires		
J9	79119	JL4-290-5-5-P2.5
J16	79124	JL5-110-5-5-P2.5
J18	79120	JL5-140-5-5-P2.5
J21	79118	JL4-160-5-5-P2.5
J22	79122	JL4-145-5-5-P2.5
Screws		
	831130082	3STW+8BQ, Tapping
	82113006	3P+6FN, Pan head
Plates		
	27300130	Ground
	28175032	Insulator

LINE AMPLIFIER PC BOARD VIEW FROM BOTTOM SIDE



LINE AMPLIFIER AND METER DRIVE CIRCUIT PC BOARD (NAAF-940) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
IC		
Q305, Q307	222465	NJM-4558D
Transistors		
Q331-Q334	2211255	2SC1815(GR)
Q335	2210274	2SK30A(Y), F.E.T
Q584	2211255	2SC1815(GR)
Diodes		
D331-D336	223105 or 223133	1S1555 or DS-442X
D582	224059 or 224114	05Z13U or (Only G model) GZA13U
Capacitors		
C315, C316	352741009	10μF, 16V, Elect.
C331, C332	352741009	10μF, 16V, Elect.
C333, C334	352721019	100μF, 6.3V, Elect.
C335	352741019	100μF, 16V, Elect.
C581	352733309	33μF, 10V, Elect.
Resistors		
R319, R320	5148053	N16RGL10KB15, Output level variable
R340, R342	5215011	N08HR20KBA, Semi-fixed
R341	5215010	N08HR10KBA, Semi-fixed
Coil		
L331	233188	NCH-1033
Switches		
S303, S304	25035219	NPS-142-123-LS183, Tape monitor/Rec. mute push
MICROPHONE AMPLIFIER PC BOARD (NAAF-941) — PARTS LIST		
IC		
Q302	222502	NJM-4558DX
Capacitors		
C205, C206	392883397	0.33μF, 50V, LL
C207, C208	352780109	1μF, 50V, Elect.
C952, C953	352741009	10μF, 16V, Elect.
Jack		
P303	25045078	HLJ0296-01-010, Microphone

METER PC BOARD (NAMTR-942) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	243113	NIND-0850S133, Output meter

TAPE INDICATOR PC BOARD (NAPL-943) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL706-PL708	225060	L.E.D.s SEL1301E, Green, High, Metal & Normal
PL709	225059	SEL1110S, Red, Dolby HX
	79129	Lead wire JL5-250-5-5-P2.5
	27190086	Holder

METER ILLUMINATION LAMP PC BOARD (NAPL-949) — PARTS LIST

210090	PL14V150mA, Lamp
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TIMER/MEMORY SWITCH PC BOARD (NASW-945) — PARTS LIST

D711, D712	223133 or 223105	DS-442X or 1S1555, Diode
S707	25030171	NRS-225-20SBU, Rotary switch

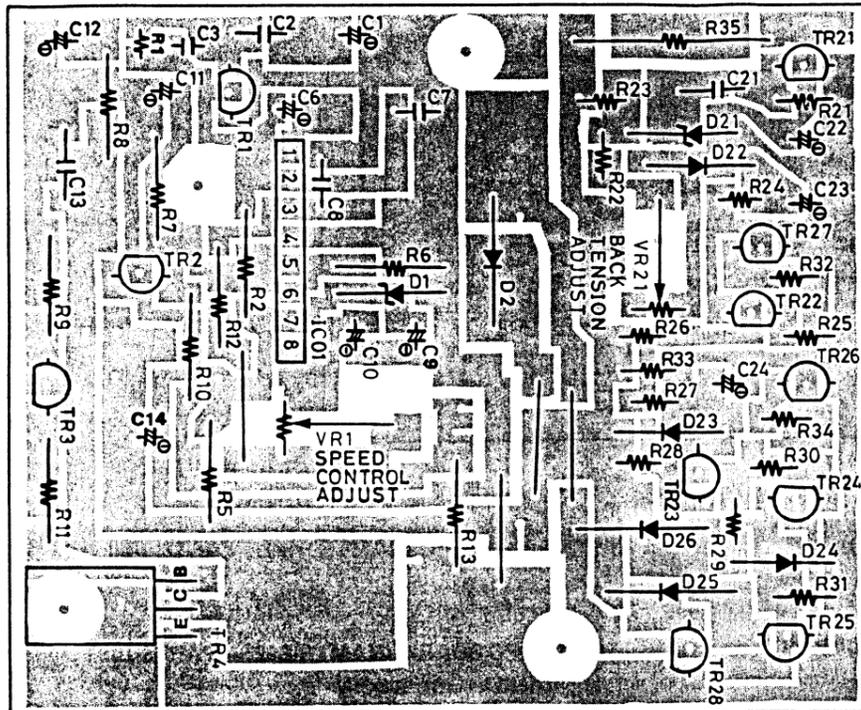
REMOTE TERMINAL PC BOARD (NARM-946) — PARTS LIST

25050070	NSCT-7P20, DIN socket
79128	JL6-240-5-5-P2.5, Lead wire

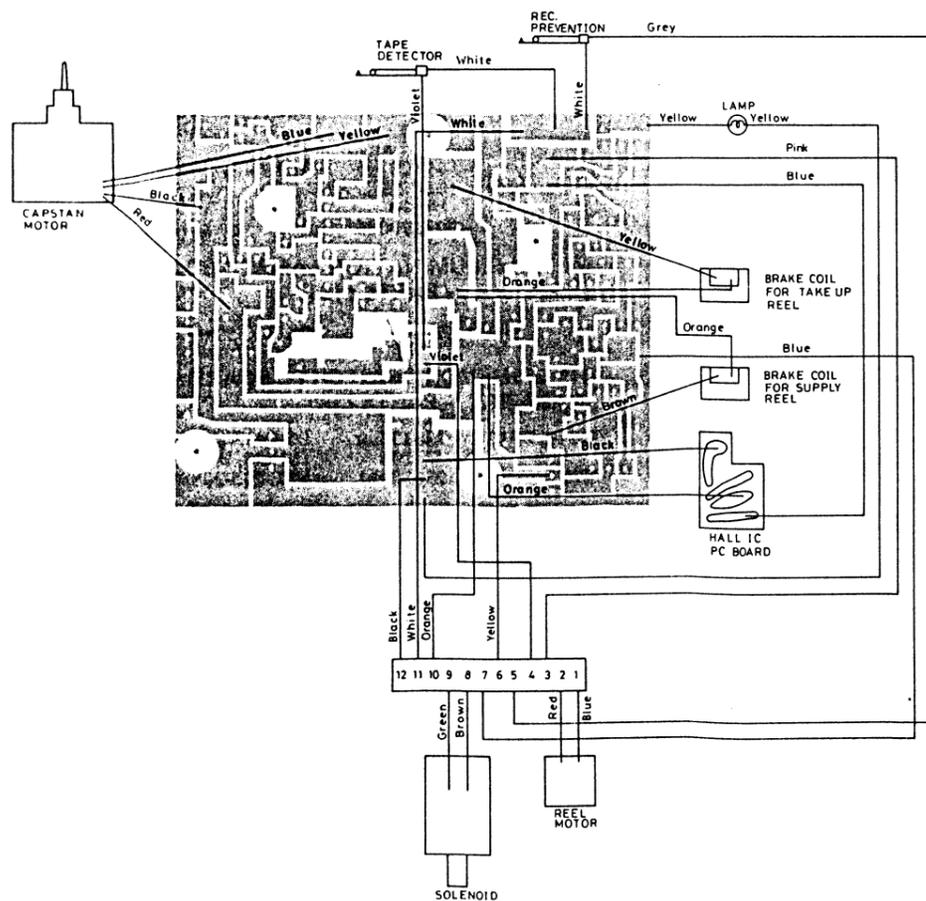
OPERATION KEY PC BOARD (NASW-947) — PARTS LIST

PL701-PL703	2250261	SEL-303G(C), L.E.D, Green
PL704, PL705	2250101	SEL-103R(C), L.E.D, Red
S701-S706	25035089	NPS-111-S54, Push switch
	25050071	NSAS-12P038, Socket
	27190085	Holder (L)

**BACK TENSION AND MOTOR CONTROL
PC BOARD VIEW FROM BOTTOM SIDE**



CONNECTION DIAGRAM FOR MOTOR CONTROL PC BOARD



**BACK TENSION AND MOTOR CONTROL
PC BOARD - PARTS LIST**

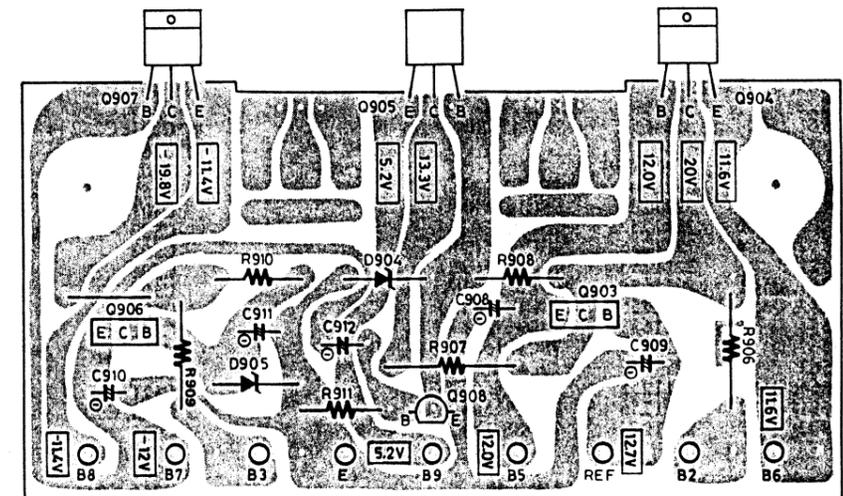
CIRCUIT NO.	PARTS NO.	DESCRIPTION
IC1	222620	CX065A
Transistors		
TR1, TR3	2210730	2SC536(H)
TR2	2212054	2SC2603(D2)
TR4	2212064	2SC1368(D)
TR21, TR22	2210736 or	2SC536(F) or
TR24	2211255	2SC1815(GR)
TR23	2211455	2SA1015(GR) or
		2SA1115(F)*
TR25	2211563	2SB562(C)
TR26, TR27	2210736 or	2SC536(F) or
	2211255	2SC1815(GR)
TR28	2211705	2SD655(E)
Diodes		
D1, D21	223953	RD7.5EB
D2, D25	223804 or	SR1K-2,
D26	223848	GP08B or S5277B*
D22, D23	223105,	1S1555,
	223133 or	DS442X or
	223137	DS-442Y
D24	223137	DS-442Y
Capacitors		
C1	352784799	0.47μF, 50V, Elect.
C6	352780109	1μF, 50V, Elect.
C9	352742209	22μF, 16V, Elect.
C10	352741009	10μF, 16V, Elect.
C11, C12	352780229	2.2μF, 50V, Elect.
C14	352744709	47μF, 16V, Elect.
C22, C23	352741009	10μF, 16V, Elect.
C24	352744709	47μF, 16V, Elect.
Resistors		
R35	441521014	100Ω, 1/4W, Metal oxide film
VR21	5215023	08HR50KBC, Semi-fixed

Notes: 1. * : There are not the stocks of service part.
2. When broken the VR1, R12 and C8, replace the motor control p.c.b ass'y.

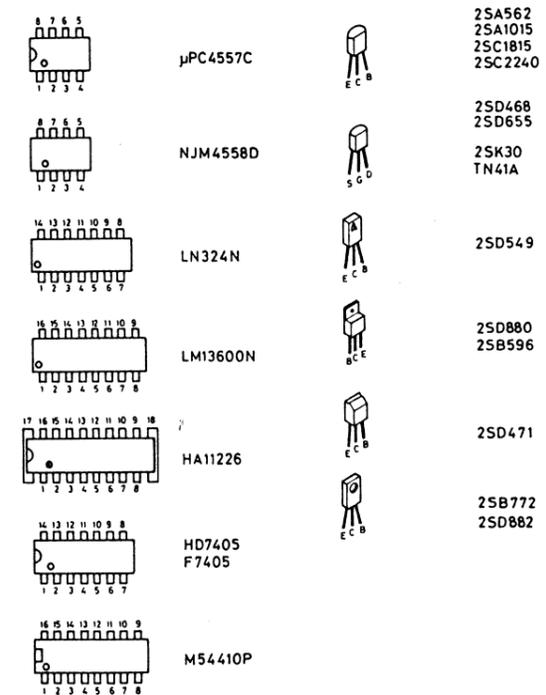
POWER SUPPLY PC BOARD (NAPS-948) -PARTS LIST

Transistors		
Q903	2201285 or	2SD882(Q) or
	2201286	2SD882(P)
Q904	2201074	2SD880(Y)
Q905	2201285 or	2SD882(Q) or
	2201286	2SD882(P)
Q906	2201275 or	2SB772(Q) or
	2201276	2SB772(P)
Q907	2200413	2SB596(Y)
Q908	2211255 or	2SC1815(GR) or
	2211254	2SC1815(Y)
Diodes		
D904	224096 or	GZA5.6U or
	224041	05Z5.6U
D905	224112 or	GZA12U or
	224057	05Z12U
Capacitors		
C908-C910	352741009	10μF, 16V, Elect.
C911	352741019	100μF, 16V, Elect.
C912	352754709	47μF, 25V, Elect.
Resistors		
R906	451534794	0.47Ω, 1/2W, Metal
R907	441625604	56Ω, 1W, Metal oxide film
R909	451534794	0.47Ω, 1/2W, Metal
Radiator		
	27160046F	
Screws		
	831130082	3STW+8BQ, Tapping
	82113010	3P+10F'N, Pan head
Spacer		
	223019	AC-229, for transistor
Insulator washer		
	223017	AC316A

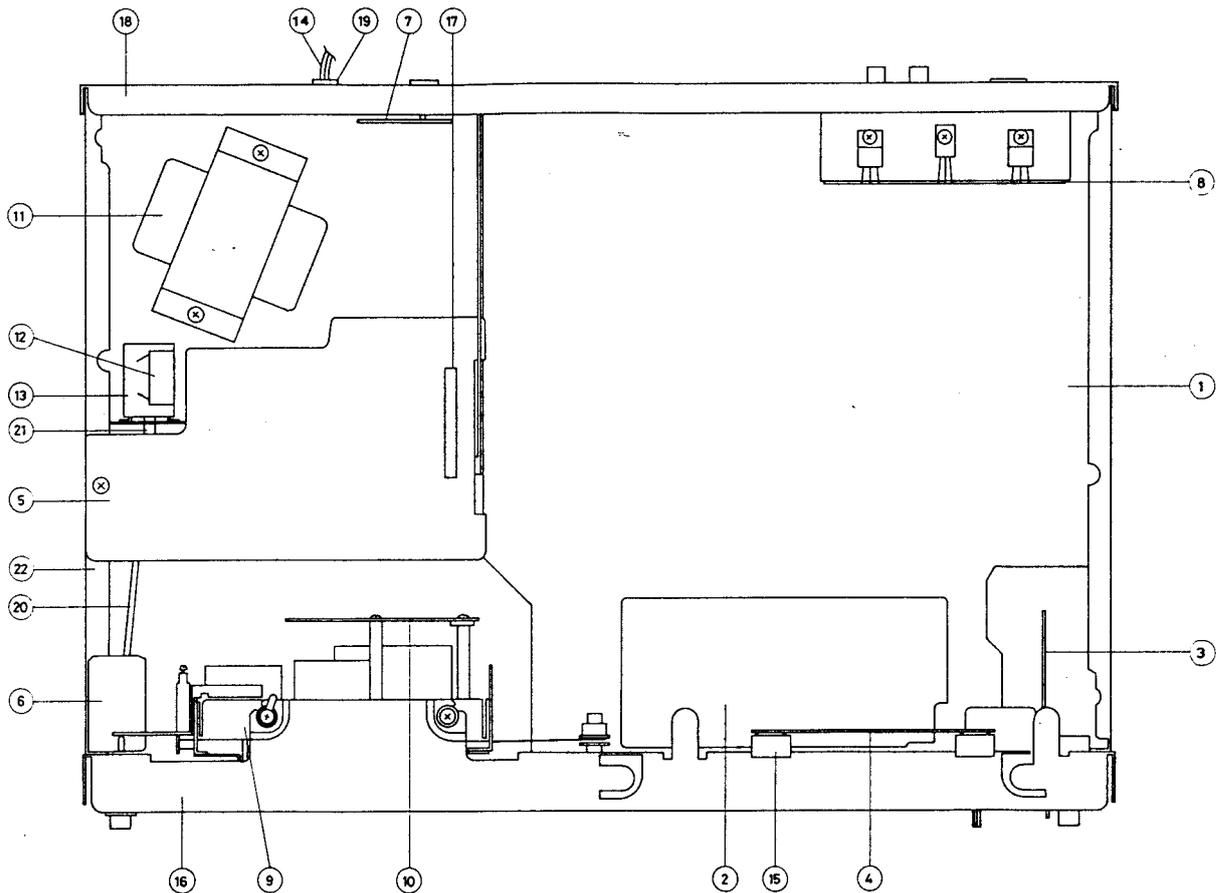
**POWER SUPPLY PC BOARD VIEW FROM
BOTTOM SIDE**



SEMI-CONDUCTOR VIEW



COMPONENT LOCATION



COMPONENT LOCATION – PARTS LIST

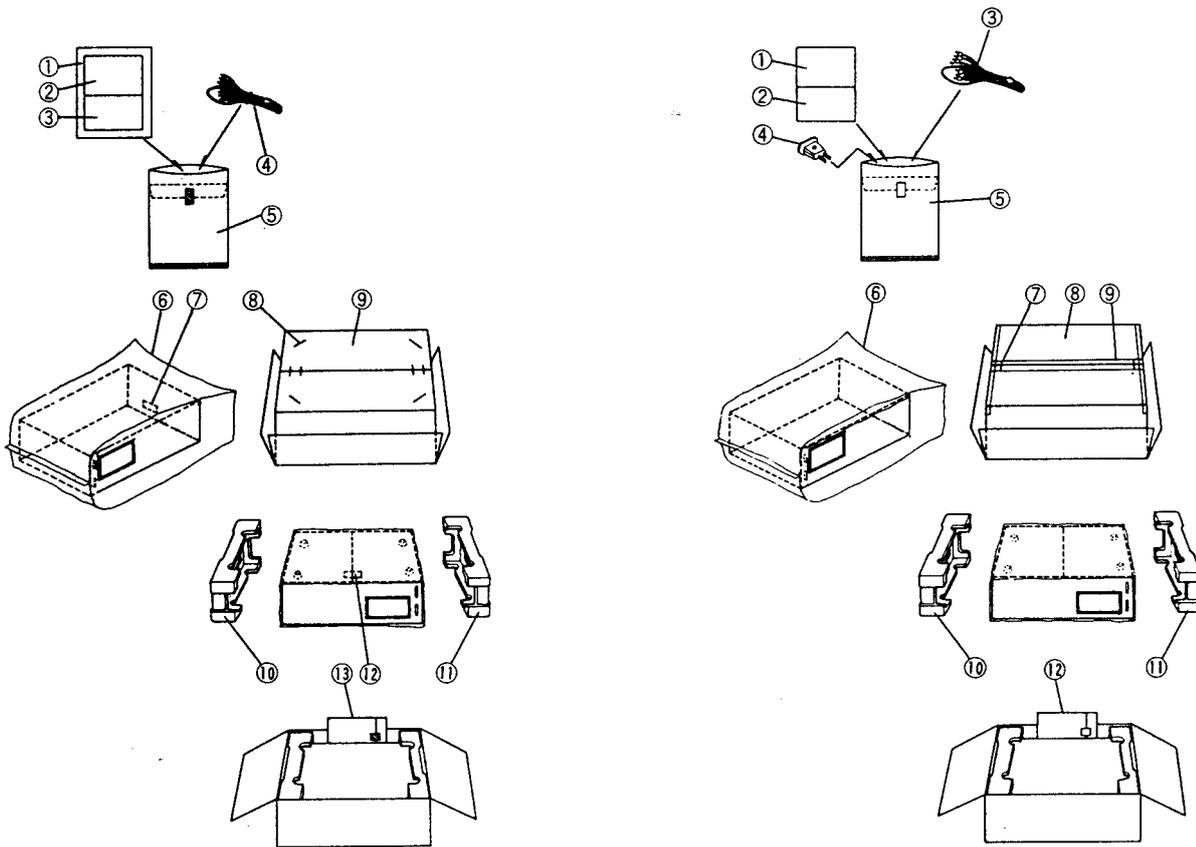
120V model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	16299539	NAAF-939, Rec. and playback amplifier p.c.b.
2	U2	16299540B	NAAF-940b, Line amplifier and meter drive circuit p.c.b.
3	U3	16299541	NAAF-941, Microphone amplifier p.c.b.
4	U4	16299542	NAMTR-942, Meter p.c.b.
5	U6	16299544	NACOC-944, Control p.c.b.
6	U7	16299545	NASW-945, Timer/memory p.c.b.
7	U8	16299546	NARM-946, Remote control p.c.b.
8	U10	16299548	NAPS-948, Power supply p.c.b.
9	Z001	244018	NDM-13, Deck mechanism ass'y
10		24606106	Motor and back tension circuit p.c.b.
11	T901	230437	NPT-717D, Power transformer
12	C901	3500057	UL125V, 103M, Capacitor
13		25035224	NPS-121-L188P, Power switch
14		253099A	AS-UC-3, Power supply cord
15		243133	NIND-0850S133, VU meter
16		27110116A	Bracket, front
17		25050069	NSAS-12P037, Socket, 12P
18		27120259	Back panel
19		270025	SR-3P-4, Strainrelief
20		27260040	Shaft, switch
21		28320135	Push knob
22		27115073	Side bracket

220V model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	16302539A	NAAF-939a, Rec. and playback amplifier p.c.b.
2	U2	16302540	NAAF-940, Line amplifier and meter drive circuit p.c.b.
3	U3	16299541	NAAF-941, Microphone amplifier p.c.b.
4	U4	16299542	NAMTR-942, Meter p.c.b.
5	U6	16299544	NACOC-944, Control p.c.b.
6	U7	16299545	NASW-945, Timer/memory p.c.b.
7	U8	16299546	NARM-946, Remote control p.c.b.
8	U10	16299548	NAPS-948, Power supply p.c.b.
9	Z001	244018	NDM-13, Deck mechanism ass'y
10		24606106	Motor and back tension circuit p.c.b.
11	T901	230438	NPT-717G, Power transformer
12	C901	3500058	PME265MB510, 0.01μF, Capacitor
13		25035192	NPS-121-L156P, Power switch
14		253083	AS-CEE, Power supply cord
15		243133	NIND-0850S133, VU meter
16		27110116A	Bracket, front
17		25050069	NSAS-12P037, Socket, 12P
18		27120260	Back panel
19		270280	SR-4K-4, Strainrelief
20		27260040	Shaft, switch
21		28320135	Push knob
22		27115073	Side bracket

PACKING PROCEDURES



120V model

Ref. No.	Parts No.	Description
1	29340456	Instruction manual
2	29358002	Service station list (D)
3	29365006	Warranty card (D)
4	253074	Pin-pin connection cord
5	29100005	330 x 220 mm, Poly bag
6	29100037	650 x 500 mm, Poly bag
7	29360378	Label (D)
8	282301	Sealing hook
9	29050392	Master carton box
10	29090543	Pad (R)
11	29090542A	Pad (L)
12	29360363	Caution label (D)
13		Accessory bag

(D) : Only U.S.A. model

220V model

Ref. No.	Parts No.	Description
1	29340457	Instruction manual
2	29365005-3	Warranty card (G)
3	253074	Pin-pin connection cord
4	25055018	Conversion plug (W)
5	29100005	330 x 220 mm, Poly bag
6	29100037	650 x 500 mm, Poly bag
7	282301	Sealing hook
8	29050392	Master carton box
9	260012	Damplon tape
10	29090543	Pad (R)
11	29090542A	Pad (L)
12		Accessory bag

(G) : Only Germany model

(W) : Only 120/220V model

ONKYO CORPORATION

International Division : No. 24 Mori Bldg., 23-5, 3-chome, Nishi-Shinbashi, Minato-ku, Tokyo Japan
Telex : 2423551 ONKYO J. Phone : 03-432-6981

ONKYO U.S.A. CORPORATION

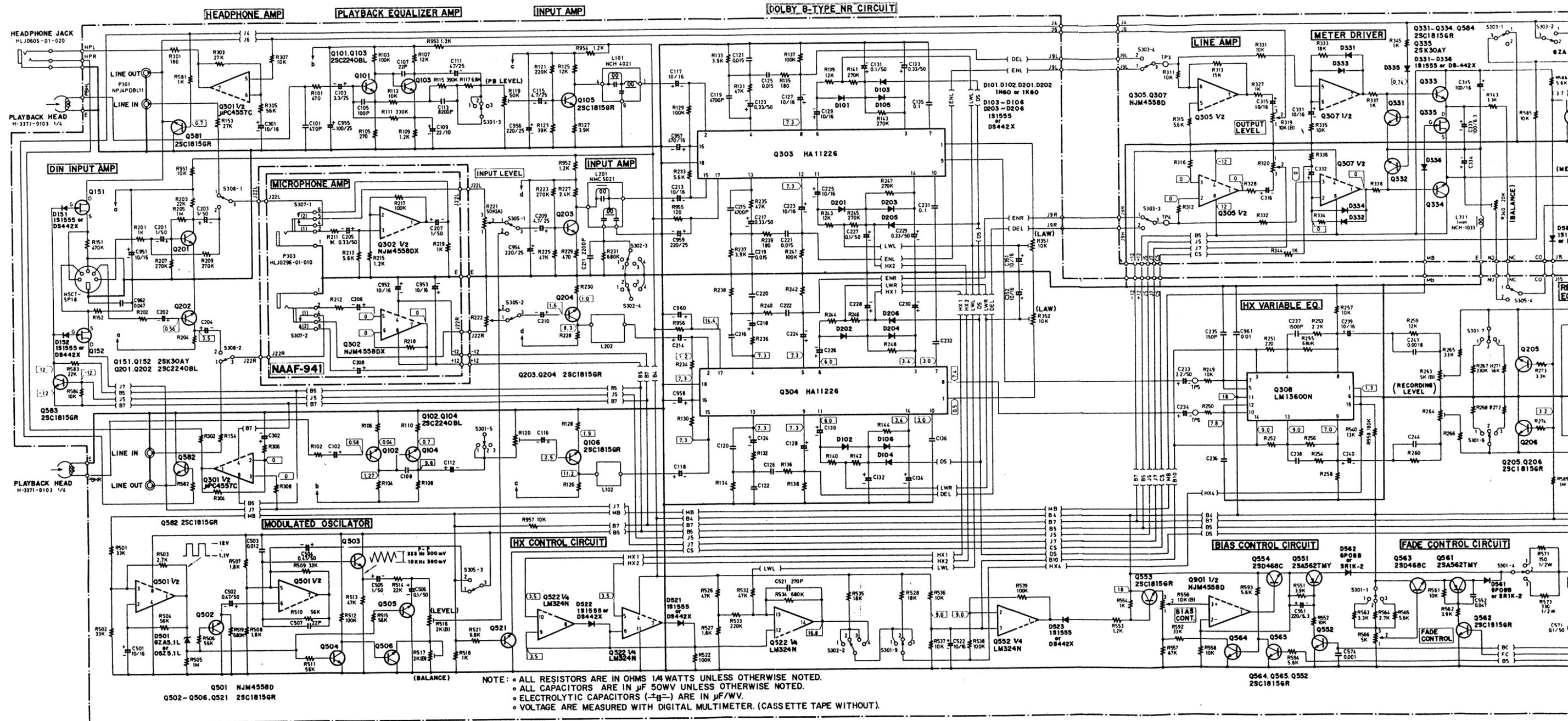
Eastern Office
42-07 20th Avenue, Long Island City, New York 11105, U.S.A. Phone : (212) 728-4639
Midwest Office
935 Sivert Drive, Wooddale, Illinois 60191, U.S.A. Phone : (312) 595-2970
C/O Damark Industries Inc.
20520 Nordhoff Chatsworth, Cal. 91311, U.S.A. Phone : (213) 998-6501

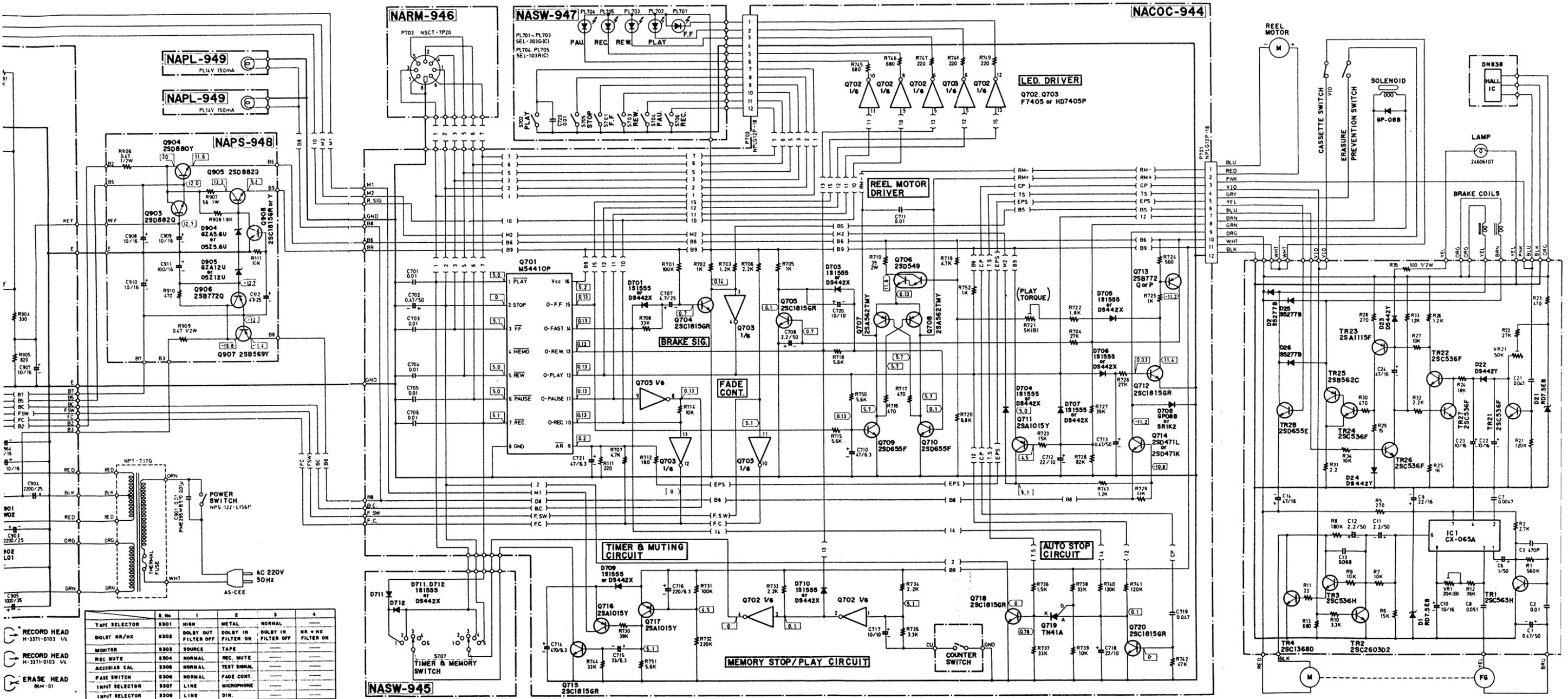
ONKYO DEUTSCHLAND GMBH, ELECTRONICS

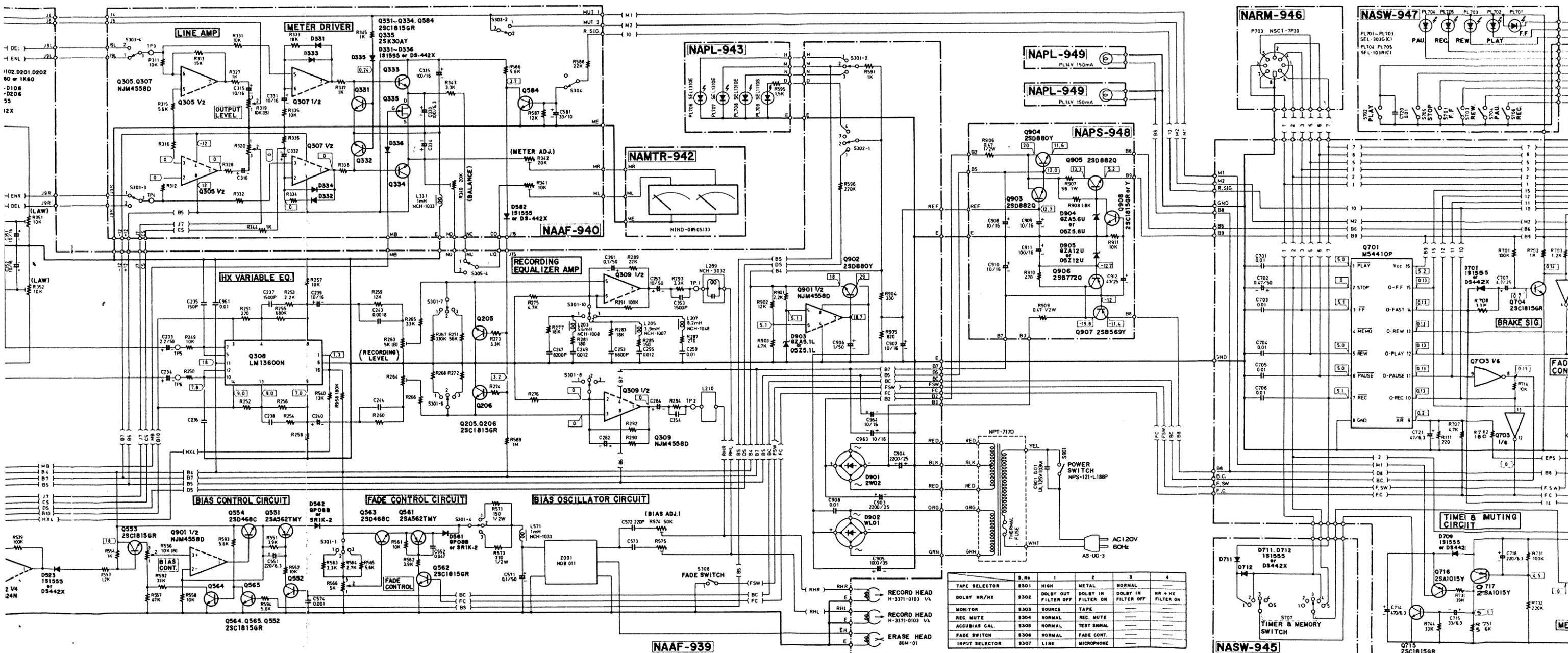
8034 München-Germering, Industriestrasse 18, West Germany. Telex : 521726 Telefon : (089) 845-5041

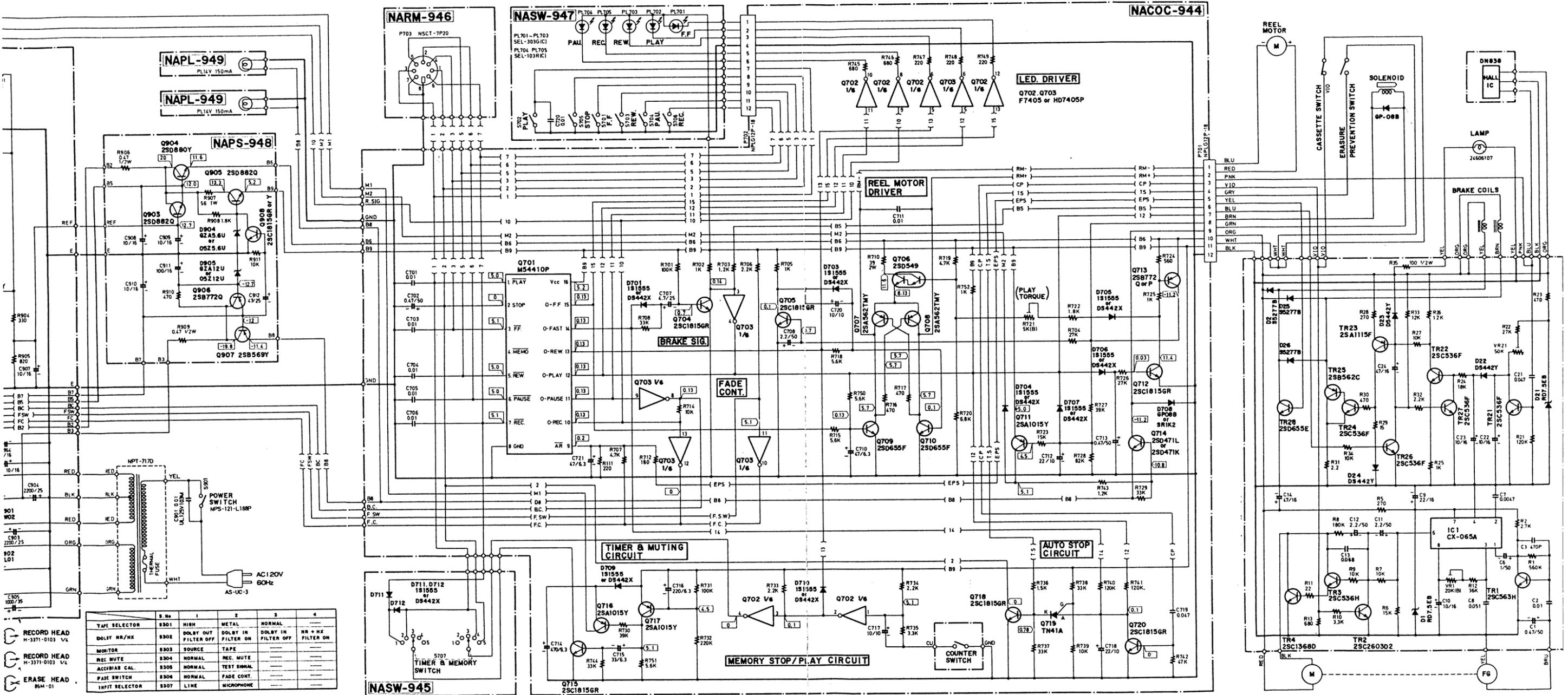
SCHEMATIC DIAGRAM

220V model



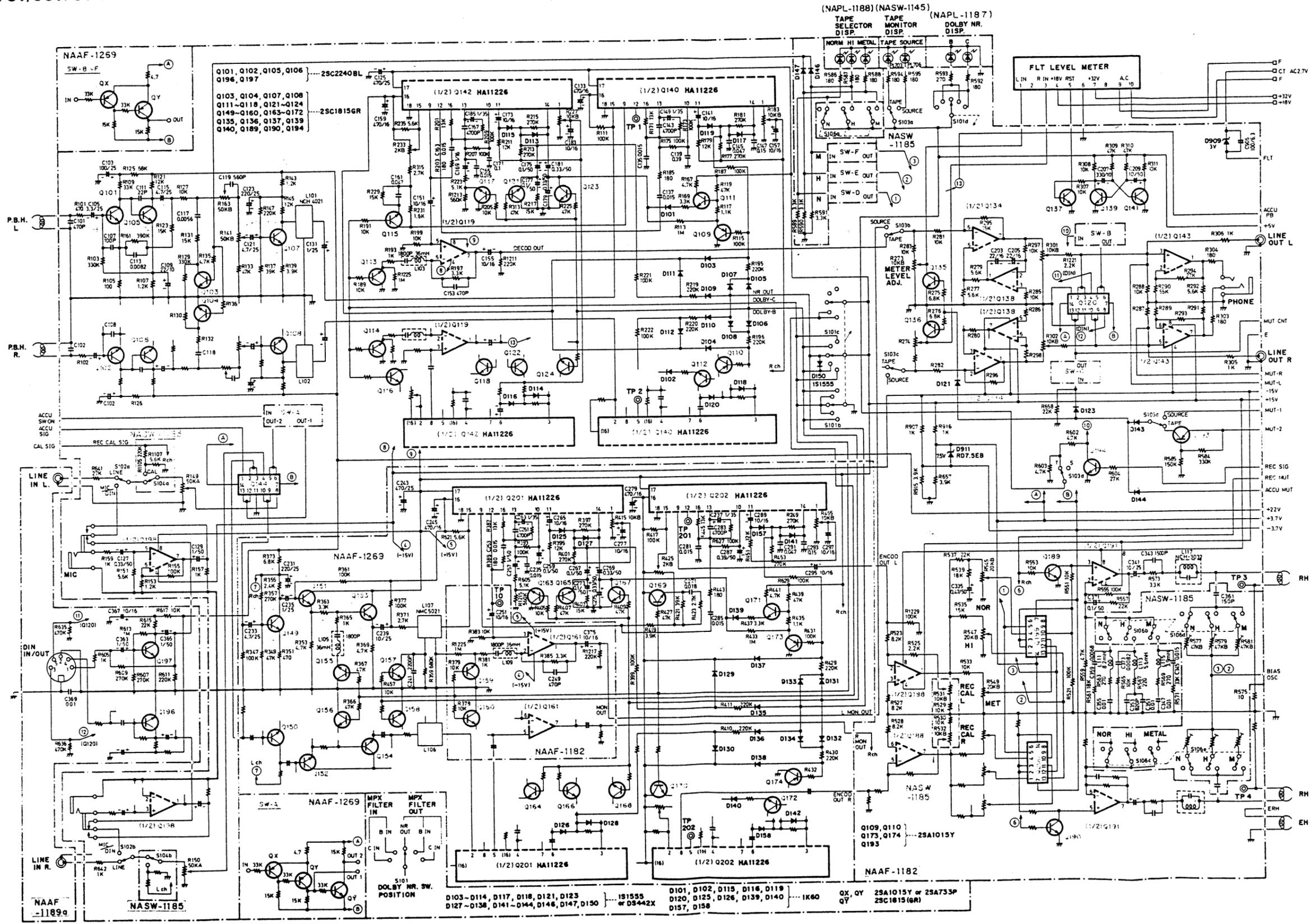






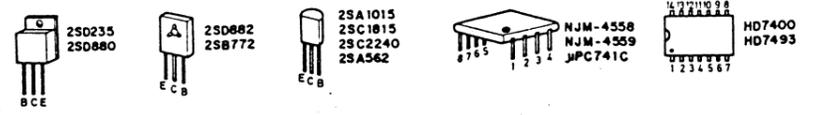
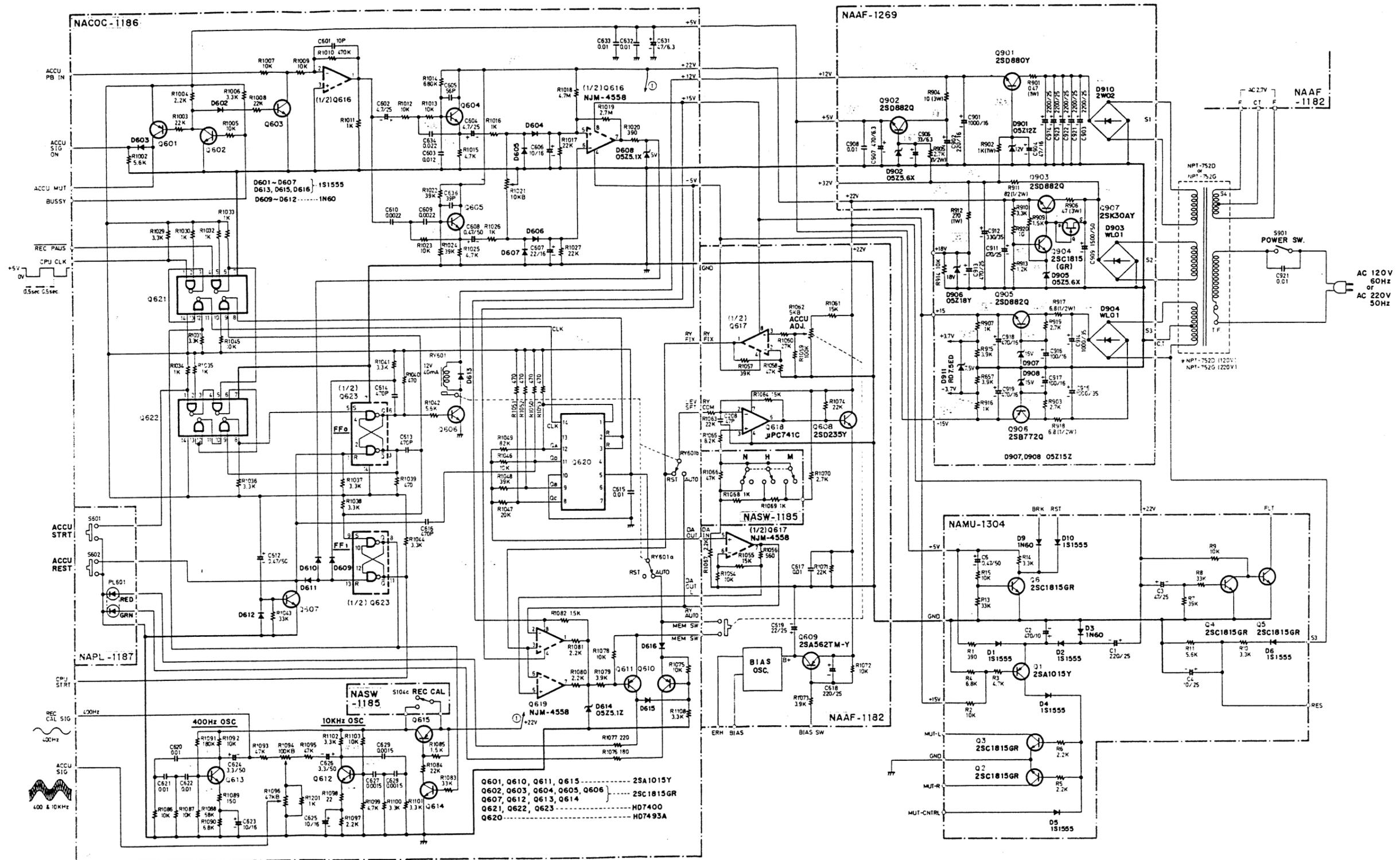
SCHEMATIC DIAGRAM

LINE INPUT/OUTPUT AMPLIFIER SECTION (G/W model)



SCHEMATIC DIAGRAM

POWER SUPPLY AND ACCUBIAS CIRCUIT SECTION



NOTES:

- ALL RESISTORS ARE IN OHMS, 1/4 WATT UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN μ F 50V UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (E.C.B.) ARE IN μ F/WV.
- VOLTAGE (MEASURED WITH V.T.V.M.).
- \square V DC VOLTAGE (NO INPUT SIGNAL).

