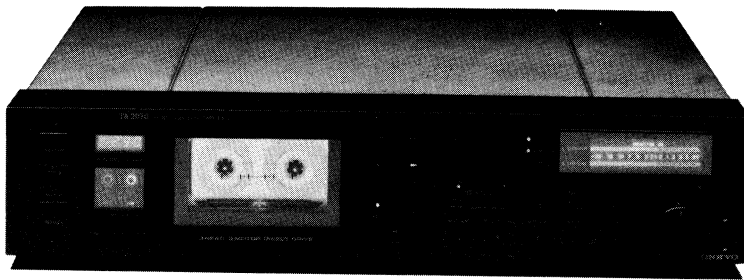


ONKYO® SERVICE MANUAL**STEREO CASSETTE
TAPE DECK
MODEL TA2070****TABLE OF CONTENTS**

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SPECIFICATIONS

D model

Track System:	4-track, 2-channel stereo
Recording System:	AC bias
Erasing System:	AC erase
Tape Speed:	4.8 cm/sec.
Wow and Flutter:	0.021% (WRMS)
Frequency Response:	20 – 17,000 Hz (20 – 16,000 Hz ± 3 dB) (normal position tape) 20 – 19,000 Hz (20 – 18,000 Hz ± 3 dB) (high position tape) 20 – 21,000 Hz (20 – 19,000 Hz ± 3 dB) (metal position tape)
Signal-to-Noise Ratio:	60 dB (Dolby NR out, metal position tape) A noise reduction of 10 dB above 5 kHz and 5 dB at 1 kHz is possible with Dolby B. A noise reduction of 20 dB at 5 kHz is possible with Dolby C.
Input Jacks:	Microphone Jacks: 2 Minimum input level: 0.3 mV/600 Ω Input impedance: 5 k Ω Optimum mic impedance: 400 Ω – 50 k Ω Line IN Jacks: 2 Minimum input level: 50 mV Input impedance: 50 k Ω
Outputs:	Line Out Jacks: 2 Standard output level: 775 mV (at -3 dB) Optimum load impedance: more than 50 k Ω Headphone Jack: 1, 8 Ω – 200 Ω
Motor:	3 Motor System Brushless DD Motor: 1 DC Torque Motor: 1 DC Motor: 1
Heads:	Rec/PB head: Sendust combination head Erase: Ferrite head
Components:	TR: 125 Diodes: 88 IC: 41 LED: 14
Power Supply:	120 V/60 Hz
Power Consumption:	45 W
Dimensions:	450(W) x 100(H) x 392(D) (17-11/16" x 3-15/16" x 15-7/16")
Weight:	9.5 kg (20.9 lbs.)
Accessories:	Pin-type connecting cords: 2

* Specifications and external appearance are subject to change without notice because of product improvements.

Mechanism specification

PLAY Torque:	35 ~ 55 grcm
FF/REW Torque:	70 ~ 140 grcm
Wow & Flutter:	Less than 0.035%
Auto-Stop Time:	5 $\pm$ 1 sec.
Timer-Start Time:	5 $\pm$ 1 sec.
Rewind Time:	less then 90 sec. (Use C-60)
Eject Time:	0.3 ~ 2 sec.

G/W Model

Track System:	4-track, 2-channel stereo
Recording System:	AC bias
Erasing System:	AC erase
Tape Speed:	4.8 cm/sec.
Wow and Flutter:	0.021% (WRMS)
Frequency Response:	20 – 17,000 Hz (20 – 16,000 Hz ± 3 dB) (normal position tape) 20 – 19,000 Hz (20 – 18,000 Hz ± 3 dB) (high position tape) 20 – 21, 000 Hz (20 – 19,000 Hz ± 3 dB) (metal position tape)
Signal-to-Noise Ratio:	Dolby NR out, 60 dB (metal position tape) A noise reduction of 10 dB above 5 kHz and 5 dB at 1 kHz is possible with the Dolby B. A noise reduction of 20 dB at 5 kHz is possible with Dolby C.
Input Jacks:	Microphone Jacks: 2 Minimum input level: 0.3 mV/600 Ω Input impedance: 5 k Ω Optimum mic impedance: 400 Ω – 50 k Ω Line In Jacks: 2 Minimum input level: 50 mV Input impedance: 50 k Ω
Outputs:	DIN Jack: 1 Minimum input level: 0.1 mV/1 k Ω Input impedance: 2.7 k Ω Line Out Jacks: 2 Standard output level: 775 mV (at -3 dB) Optimum load impedance: more than 50 k Ω Headphone Jack: 1 8 Ω – 200 Ω
Motor:	3 Motor System Brushless DD Motor: 1 Torque DC Motor: 1 DC Motor: 1
Heads:	Rec/PB head: Sendust combination head Erase: Ferrite head
Components:	TR: 127 Diodes: 88 IC: 41 LED: 14 220 V/50 Hz, 120/220 V 50/60 Hz
Power Consumption:	45 W
Dimensions:	450(W) x 100(H) x 392(D) mm (17-11/16" x 3-15/16" x 15-7/16")
Weight:	9.5 kg (20.9 lbs.)
Assessories:	Pin-type connecting cords: 2

* Specifications and external appearance are subject to change without notice because of product improvements.

FRONT AND BACK PANEL FACILITIES

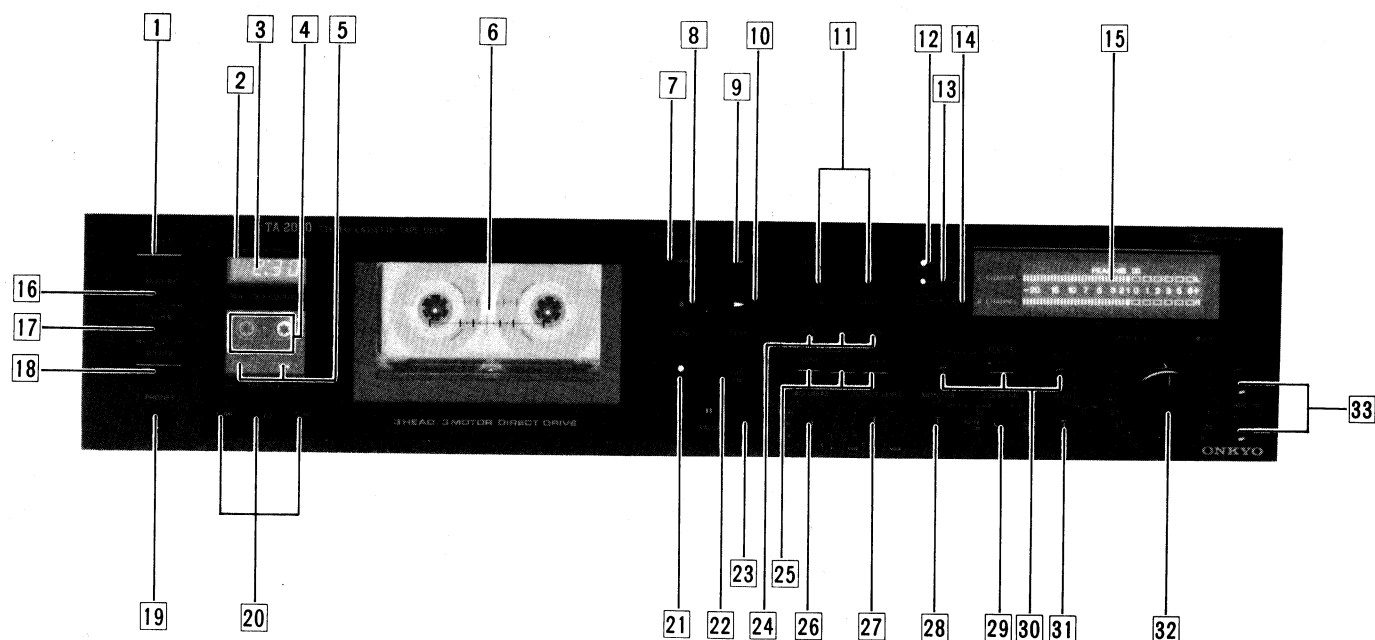


Fig. 1 Front panel view

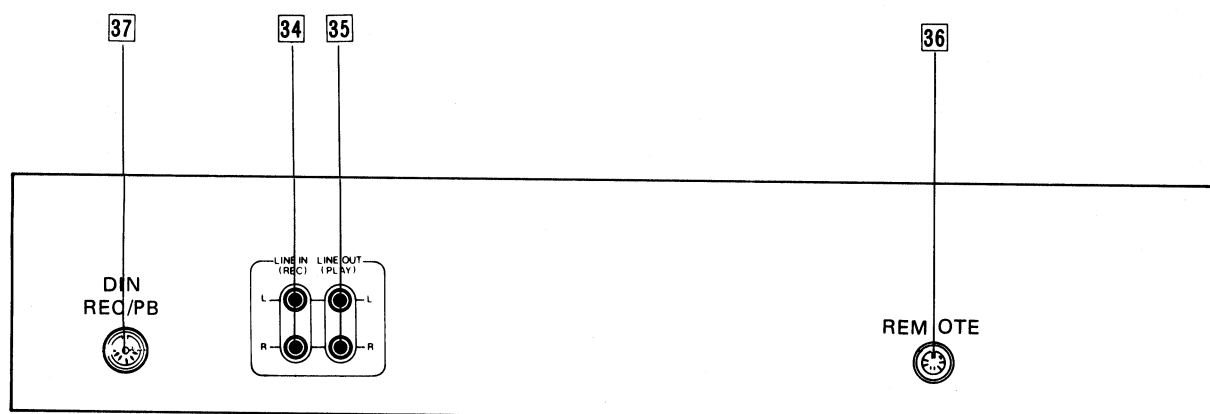


Fig. 2 Back panel view

- | | | | |
|----|---|----|---|
| 1 | Eject Button (EJECT) | 21 | Record Button (● REC) |
| 2 | Reset Button (Push • Reset) | 22 | Auto Space Button (AUTO SPACE) |
| 3 | Real Time Counter (REAL TIME COUNTER) | 23 | Pause Button (PAUSE) |
| 4 | LED Indicator (REMA/CONS) | 24 | Tape Selector Indicator |
| 5 | Monitor Indicator (SOURCE/TAPE) | 25 | Tape Selector Buttons (METAL/HIGH/NORM) |
| 6 | Cassette Door | 26 | ACCUBIAS Control Knob (PUSH ACCUBIAS) |
| 7 | Rewind Button (◀◀) | 27 | Output Level Control Knob (OUTPUT LEVEL) |
| 8 | Stop Button (■ STOP) | 28 | Monitor Knob (TAPE/SOURCE) |
| 9 | Fast Forward Button (▶▶) | 29 | Dolby NR Selector (B/C/Filter on, out, B/C/Filter off) |
| 10 | Play Button (▶ PLAY) | 30 | Dolby Recording Calibration Controls (REC CAL LEFT/RIGHT) |
| 11 | Auto ACCUBIAS Buttons (START/RESET) | 31 | Input Selector Knob (LINE/MIC/DIN) |
| 12 | ACCUBIAS Indicator (ACCUBIAS) | 32 | Input Recording Level Control Knob (INPUT LEVER L/R) |
| 13 | Dolby B Indicator (DOLBY NR B) | 33 | Microphone Input Jacks (MIC L/R) |
| 14 | Dolby C Indicator (DOLBY NR C) | 34 | Line In (LINE IN REC L/R) |
| 15 | Peak Level Meters (LEFT CHANNEL /RIGHT CHANNEL) | 35 | Line Out (LINE OUT PLAY L/R) |
| 16 | Memory Switch (MEMORY STOP/OFF/PLAY) | 36 | Remote Control Terminal (REMOTE) |
| 17 | Timer Switch (TIMER REC/OFF/PLAY) | 37 | DIN Terminal (DIN REC/PB) [Only G/W model] |
| 18 | Power Switch (POWER PUSH ON) | | |
| 19 | Headphone Jack (PHONES) | | |
| 20 | Tape Size Buttons (TAPE SIZE C-90, C-60, C-46) | | |

SPECIAL MODES OF OPERATION

Real Time Tape Counter

The real time tape counter can be used in two ways:

1. Elapsed Time Indication (CONS)

When power is turned on, the Real Time Counter [3] will read 0:00 and the green CONS indicator immediately below the counter will come on. Once tape transport has begun in the record or play mode, the counter will begin counting the elapsed time. The two digits on the left side are the minutes and the two digits on the right are the seconds. To return the counter to 0:00, gently press the Reset button.

2. Remaining Time Indication (REMA)

The real time counter can also be used to show the amount of time remaining on a cassette as it is being recorded or played back. To use this function, gently press the Tape Size button [20] corresponding to the cassette about to be used. When one of the Tape Size buttons has been pressed, the red REST indicator will come on and the counter will display the cassette length selected (for example [C:60] if C-60 has been selected) for about five seconds. During this time, the microcomputer is calculating the amount of remaining time. Once the calculations have been completed, the remaining time will be displayed. Note that this function is possible only during the record or play mode.

- * If you mistakenly press the incorrect Tape Size button [20], the remaining time indication will be shorter than the actual remaining time if a cassette length shorter than the correct length is pressed (for example when C46 is pressed when a C-60 cassette is used) and longer than the actual remaining time if a cassette length longer than the correct length is pressed (for example when C-90 is pressed when a C-60 cassette is used).
- * Follow the directions below when using cassettes of a length other than C-46, C-60 and C-90 to obtain the correct remaining time indication:

C-50: press C-46 and C-60 simultaneously
 C-80: press C-60 and C-90 simultaneously
 C-120: press C-46 and C-90 simultaneously

Note: Once the time indication has been changed from elapsed time to remaining time, it can not be returned to the elapsed time (CONS) mode. Also, if the reset button is pressed during the remaining time (REMA) mode, the display will return to 0:00 and begin counting tape transport time from that point.

3. To Obtain the Most Accurate Time Indications Possible:

The real time counter is not a clock so there is a slight difference between the tape transport time as shown by the counter and the actual time that has elapsed over that period. Including the small differences in tape lengths between different manufacturers, this error is about 30 seconds for C-46 cassettes (from start to finish), about 40 seconds for C-60 cassettes and about 60 seconds for C-90 cassettes. To obtain a more precise reading of remaining time near the end of a cassette, press the correct Tape Size button [20] once again to repeat the remaining time calculations. When a cassette of a different length is inserted, press the Tape Size button [20] for the new length. Once the new remaining time value is displayed, press the reset button to return the display to 0:00 and then press the correct Tape Size button [20] a second time to obtain an even more precise remaining time value.

Note: The real time counter is designed on the assumption that one side of a C-60 cassette is 30 minutes and 40 seconds. In general, most tapes are slightly longer than this, so the counter will return to about 99:20 instead of 0:00 when a tape is rewound to the beginning.

When using cassettes with large hubs, the remaining time indication does not operate accurately so only the elapsed time should be used.

Automatic ACCUBIAS Operation

To set the optimum bias level, follow the steps listed below.

1. Reset the counter to 0:00.
2. Insert a cassette in the compartment and depress the appropriate Tape Selector button [25].
3. Set the NR Selector knob [29] to the OUT position.
4. Press the ● Record [21] and || Pause [23] buttons together.
5. Press the Auto ACCUBIAS START button [11]. The play and pause indicators will flash on and off, tape transport will begin and the green ACCUBIAS indicator [12] will come on to show that bias adjustment has started.
6. When the optimum bias level has been set, the play and pause indicators will go out and the tape will be automatically rewound to the point where the ACCUBIAS adjustment process was begun. The ACCUBIAS indicator will remain lit to show that bias adjustment has been performed and the deck will return to the normal REC/PAUSE standby mode.
7. This completes the ACCUBIAS adjustment procedure. Begin recording operations in the normal manner.
8. The Auto ACCUBIAS buttons [11] have no effect on the deck during playback.
9. To cancel the automatic ACCUBIAS setting, press the AUTO ACCUBIAS RESET button [11].

Using the ACCU-Memory

1. After performing steps 1 through 6 in the ACCUBIAS section before, turn the ACCUBIAS Control knob [26] from left to right while pushing it in until the ACCUBIAS indicator [12] changes from green to red. The ACCUBIAS Control knob [26] is now set to the automatic ACCUBIAS value obtained during the automatic ACCUBIAS procedure.
2. At this point, release the ACCUBIAS Control knob [26] and the ACCUBIAS indicator [12] will return to green. The ACCUBIAS memory function operates mechanically through the ACCUBIAS Control knob [26] so the bias level value stored in this manner is preserved even when power is turned off. Consequently, the ACCUBIAS level can be recalled and used even for timer recording operations.
3. When ACC-Memory operations have been completed, do not change the position of the ACCUBIAS control knob [26]. If the knob is turned, the ACCUBIAS level will be lost.
4. When you no longer want to use the ACCU-Memory bias setting, return the ACCUBIAS control knob [26] to the center position.

The Dolby NR Selector FILTER ON and OFF Positions

The Dolby NR selector [29] has Dolby B and C positions on both the FILTER ON and FILTER OFF sides. The FILTER ON side should only be used when recording FM stereo broadcasts using Dolby NR. When one of the FILTER ON side positions is used, the filter suppresses the 38 kHz subcarrier signal that is included in FM stereo broadcasts to prevent mistaken operations by the Dolby circuitry that this signal could cause. Use the FILTER OFF side positions when making Dolby encoded recordings from all other program sources.

About the Dolby NR System

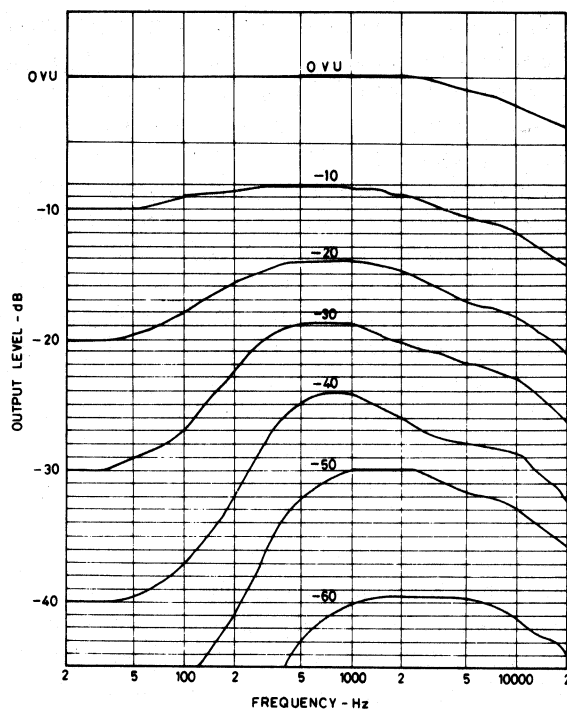
A hissing noise is inherent in all cassette tapes and is particularly noticeable during quiet portions of a program. The Dolby Noise Reduction system was developed to suppress this annoying background hissing noise. The two standard Dolby systems are Dolby A (for professional use) and Dolby B which is used in almost all consumer cassette decks. Recently, Dolby Laboratories developed a third noise reduction system, Dolby C, in its continuing efforts to improve the quality of cassette tape sound. Dolby C was developed in response to the ever increasing performance levels of cassette decks and tapes and to satisfy the demand for cassette tape sound with the least amount of noise possible. Consequently, Dolby C features a significantly improved noise reduction capability over the standard Dolby B system.

How Dolby Works

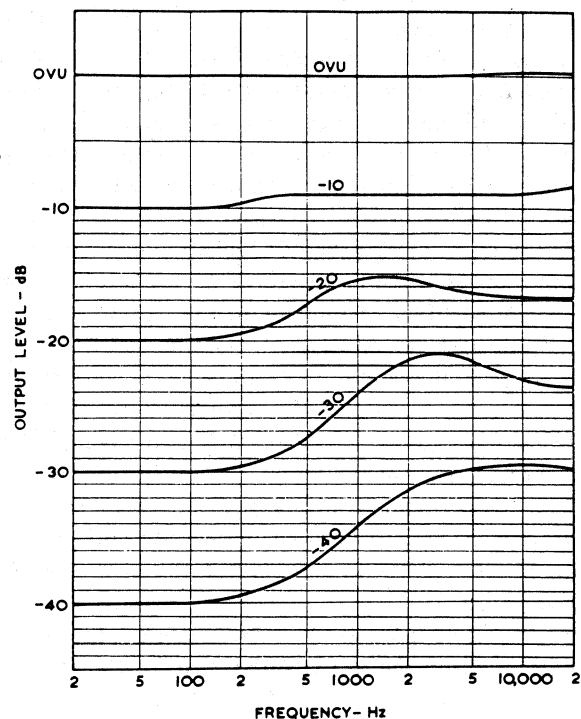
The Dolby Noise Reduction system works by boosting input levels during recording that fall below a certain level. The system only affects mid to high range signals because this is where background noise and hiss are most prominent. These same signals are then reduced back to their original strength during playback thereby reducing the background noise by the same amount.

Dolby B can reduce background noise by up to 10 dB while Dolby C can reduce background noise by as much as 20 dB (above 5 kHz). Because Dolby C has a much larger noise reducing capability, it can extend its noise reduction effect to lower frequencies than Dolby B. In addition to its noise reduction function, Dolby C uses an antisaturation network to lower high input levels before recording them and return the signals to their original strength during playback. This greatly raises the high frequency saturation level of cassette tapes (over 4 dB higher at 10 kHz at the standard 0 dB level). But no matter which NR system you use, the Dolby NR Selector [29] must be in the same position during playback as it was when the tape was recorded.

Note: Be sure to write the noise reduction system used on each cassette immediately after it has been recorded.



Dolby C



Dolby B

Dolby encoder

Fig. 3

Dolby Recording Calibration Controls

The Dolby Noise Reduction system is set to a standardized level that is obtained by using a standard tape. As a result, when different types of tapes are used, the recording sensitivity varies and the full benefits of Dolby NR can not be obtained. Perform the following procedure before starting recording operations to be sure you obtain optimum performance from the Dolby Noise Reduction system.

1. Insert a cassette, set the Monitor knob [28] to the SOURCE position and depress the appropriate Tape Selector button [25].
2. Switch the Dolby Rec. Cal. control [30] to the ON (—) position and set the NR Selector knob [29] to the DOLBY NR B position.
3. Adjust the Input Level Control knob [32] so that Peak Level Meters [15] are at about the Dolby Level 0 mark.
4. Press the Real Time Counter Reset button [2] to return the counter to 0:00, set the Memory switch [16] to the STOP position and press the ● Record [21] and ► Play [10] buttons simultaneously. Next, adjust the Dolby Recording Calibration controls [30] (LEFT and RIGHT) so that the peak level meter readings are the same when the Monitor knob [28] is switched back and forth between the SOURCE and TAPE MONITOR positions.
5. After this adjustment has been made, return the Dolby Rec. Cal. controls [30] to the OFF (■) position, press the ◀◀ Rewind button [7] to return the tape to the point where calibrations were started and start recording operations.

Auto Space Recording Pause

The || Pause button [23] is normally used to cut out unwanted portions of a program (commercials, conversations, etc.) during recording operations. However, this often results in a tape where the next song begins immediately after the last one. The Auto Space button [22] is provided to solve this problem. To use this button, just press it once at the point in the recording where you want to enter a blank section about five seconds long. When the Auto Space button [22] is pressed, the play indicator flashes on and tape transport continues. However, no signal is recorded on the tape for a period of about five seconds. After the blank portion has been inserted, tape transport automatically stops and the deck returns to the REC/PAUSE standby mode. To insert a blank section of tape less than five seconds long, press the ► Play button [10] before the five second period has elapsed to return to the recording mode or press the || Pause button [23] to return to the REC/PAUSE standby mode. To insert a blank section of tape more than five seconds long, keep the Auto Space button [22] depressed for as long as you want the blank section to be. The deck will return to the REC/PAUSE standby mode immediately after the button is released. To continue recording, press the ► Play button [10] to release the pause mode. This button is very convenient for making blank sections of sufficient length for automatic program sensing systems that operate by detecting the blank sections between songs.

ADJUSTMENT PROCEDURES

PRECAUTIONS

1. Before adjustment, clean the following parts with an alcohol moistened swab.

- * record/playback head
- * erase head
- * pinch roller
- * capstan
- * rubber belt

2. Do not use magnetized screwdriver for adjustments.

3. Demagnetize record/playback head with a head demagnetizer.

4. The switches and controls should be set as follows unless otherwise specified.

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

1. Play torque adjustment

Play the torque meter TW-2111 back.

Adjust the R796 so that the torque of take-up reel becomes 40 gr-cm.

2. Tape speed adjustment

Connect the frequency counter to the line output terminal. Play the MTT-111 back.

Adjust the semi-fixed resistor on the motor control pc board so that the counter indication becomes 3,000 Hz.

TEST EQUIPMENT/TOOLS REQUIRED:

Audio oscillator

Digital frequency counter

Oscilloscope

Attenuator

AC voltmeter

Non-magnetic screw drive

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

MTT-215C : 315 Hz, 10 kHz

TW-2111 : Torque meter

MC-12C or : Mirror tape

MC-9C

3. Real time counter adjustment

Connect the frequency counter to the F290 terminal on the control pc board.

Adjust the R797 so that the frequency counter indication becomes 289 Hz.

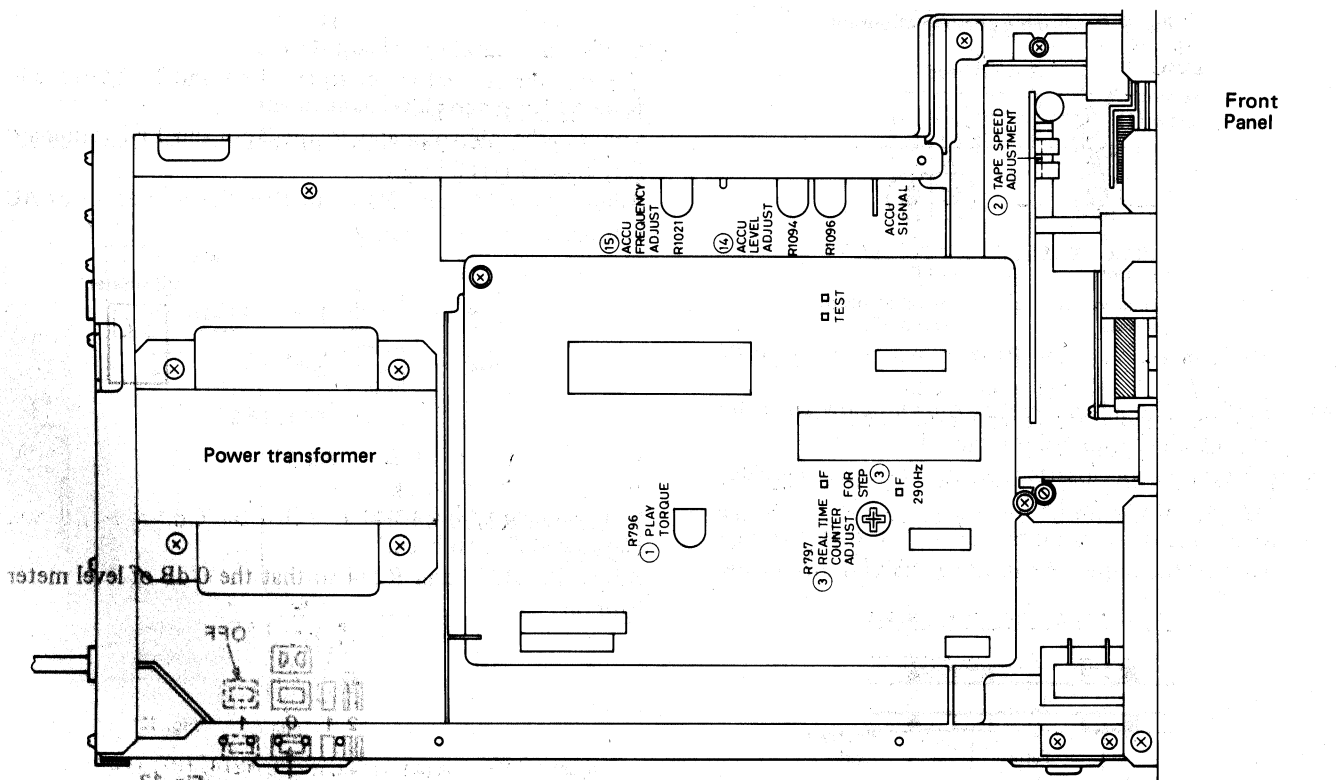


Fig. 4

4. Head azimuth adjustment

- 1) Play the test tape VTT-658 back.
- 2) Adjust the head azimuth screw (2) 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.

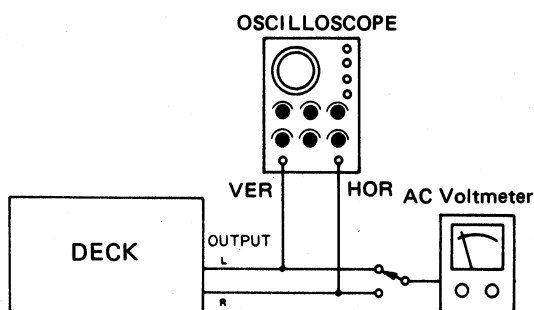


Fig. 5

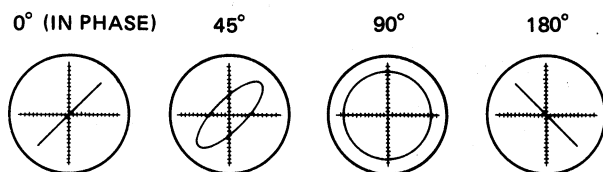


Fig. 6 Confirming phase relationship

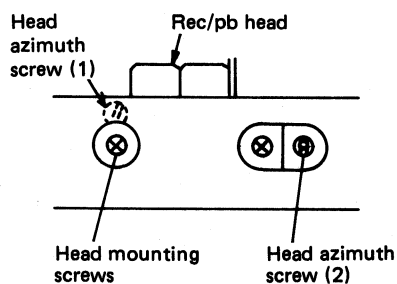


Fig. 7

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 two azimuth screws so that the tape passes to the center of cassette guide as shown below.

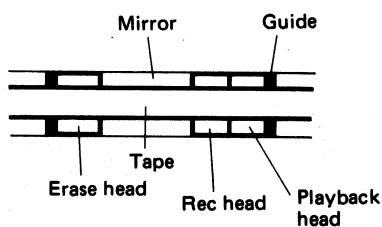


Fig. 8

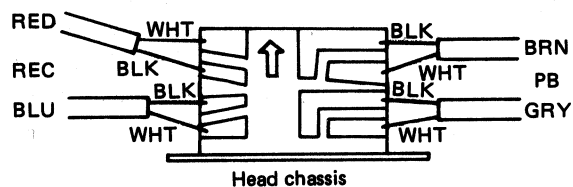


Fig. 9

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 two azimuth screws so that the left and right channel outputs become the same and maximum level.

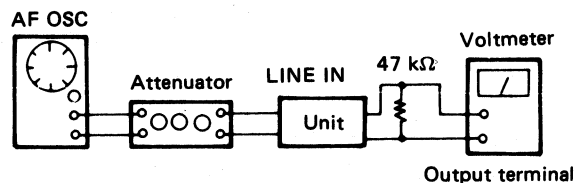


Fig. 10

5. Playback output level adjustment

Connect the AC voltmeter to the TP-1 and TP-2 terminals. Play the MTT-150 back.

Adjust the R141 and R142 so that the indication of AC voltmeter becomes 775mV.

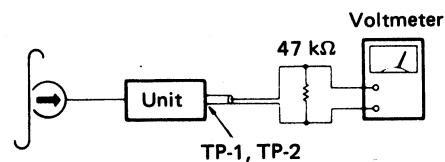


Fig. 11

6. Level meter adjustment

Play the MTT-150 back.

Adjust the R273 and R274 so that the 0 dB of level meter light on.

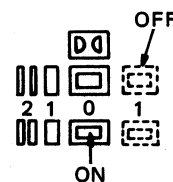


Fig. 12

Adjust points

R141, R142, R273, R274, TP1, TP2
... NAAF-1182 (See Page 10).

7. Playback frequency adjustment

Connect the AC voltmeter to the line output terminal. Play the MTT-215C back. Adjust the R163 and R164 so that the 315 Hz and 10 kHz signal level become same. (See Page 10)

8. Dolby encoder level adjustment

Connect the AC voltmeter to the TP-10 and TP-11 terminal. Apply the 700 Hz signal to the line input terminals. Adjust the input level volume or AF oscillator output so that the indication of voltmeter becomes 775mV. Connect the AC voltmeter to the TP-201 and TP-202 terminals. Adjust the R425 and R426 so that the indication of voltmeter becomes 775mV.

9. Dolby encoder law adjust

Connect the elect. capacitor of $10\mu\text{F}/16\text{V}$ between Q201 pin no. 4 and 18 (Ground) terminals. Connect the AC voltmeter to the TP-201 and TP-202 terminals. Apply the 700Hz signal to the line input terminals. Adjust the input level volume or AF oscillator output so that the indication of voltmeter becomes 23.5mV. Connect the AC voltmeter

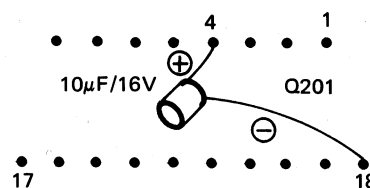


Fig. 13 Soldering side

to the DOL ECORD OUT terminal. Record the output level of DOL ECORD OUT. Set the DOLBY NR switch to FILTER OUT C position. Adjust the R455 so that the level of FILTER OUT C is increased $6.5\text{dB} \pm 0.25\text{ dB}$ than level of OUT. Remove the elect. capacitor. Adjust the R415 so that the level of FILTER OUT C is increased $11.0\text{ dB} \pm 0.25\text{ dB}$ than level of OUT. Set the DOLBY NR switch to the OUT position after adjustment.

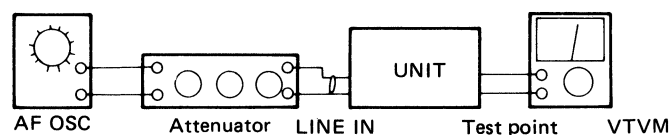
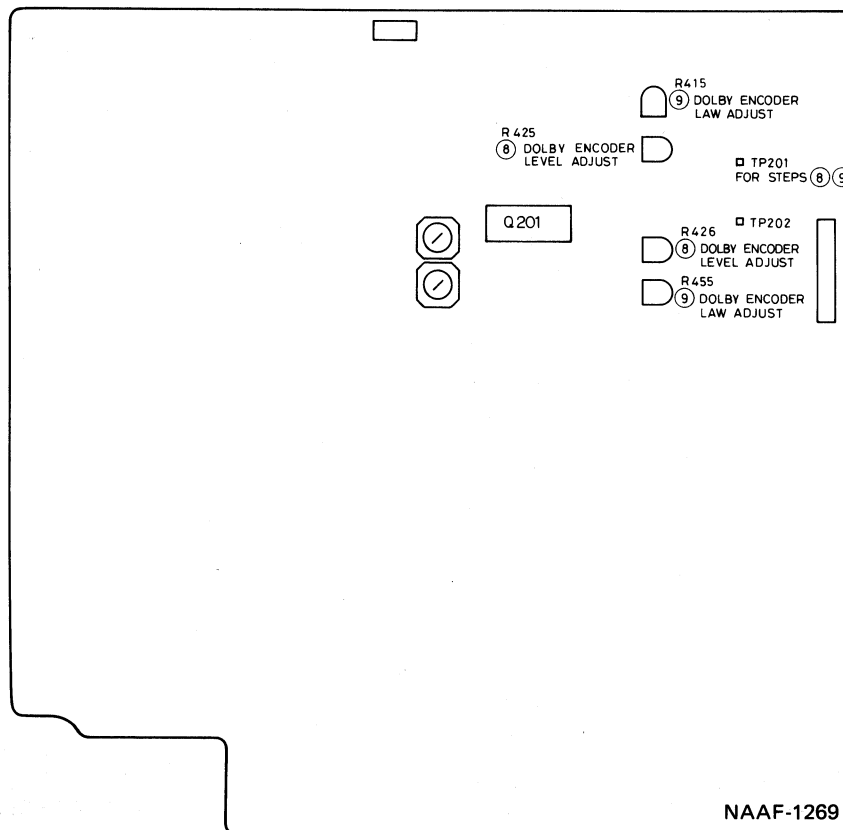


Fig. 14



NAAF-1269

Fig. 15

10. Dolby decoder level adjustment

Remove the socket P101 and apply the 700 Hz signal to the terminal P101. Connect the AC voltmeter to the TP-1 and TP-2 terminals. Adjust the input level volume or AF oscillator output so that the indication of voltmeter becomes 755 mV. Connect the AC voltmeter to the TP-8 and TP-9 terminals. Adjust the R233 and R234 so that the indication of voltmeter becomes 775 mV.

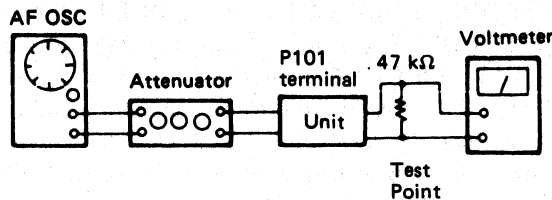


Fig. 16

11. Bias current adjustment

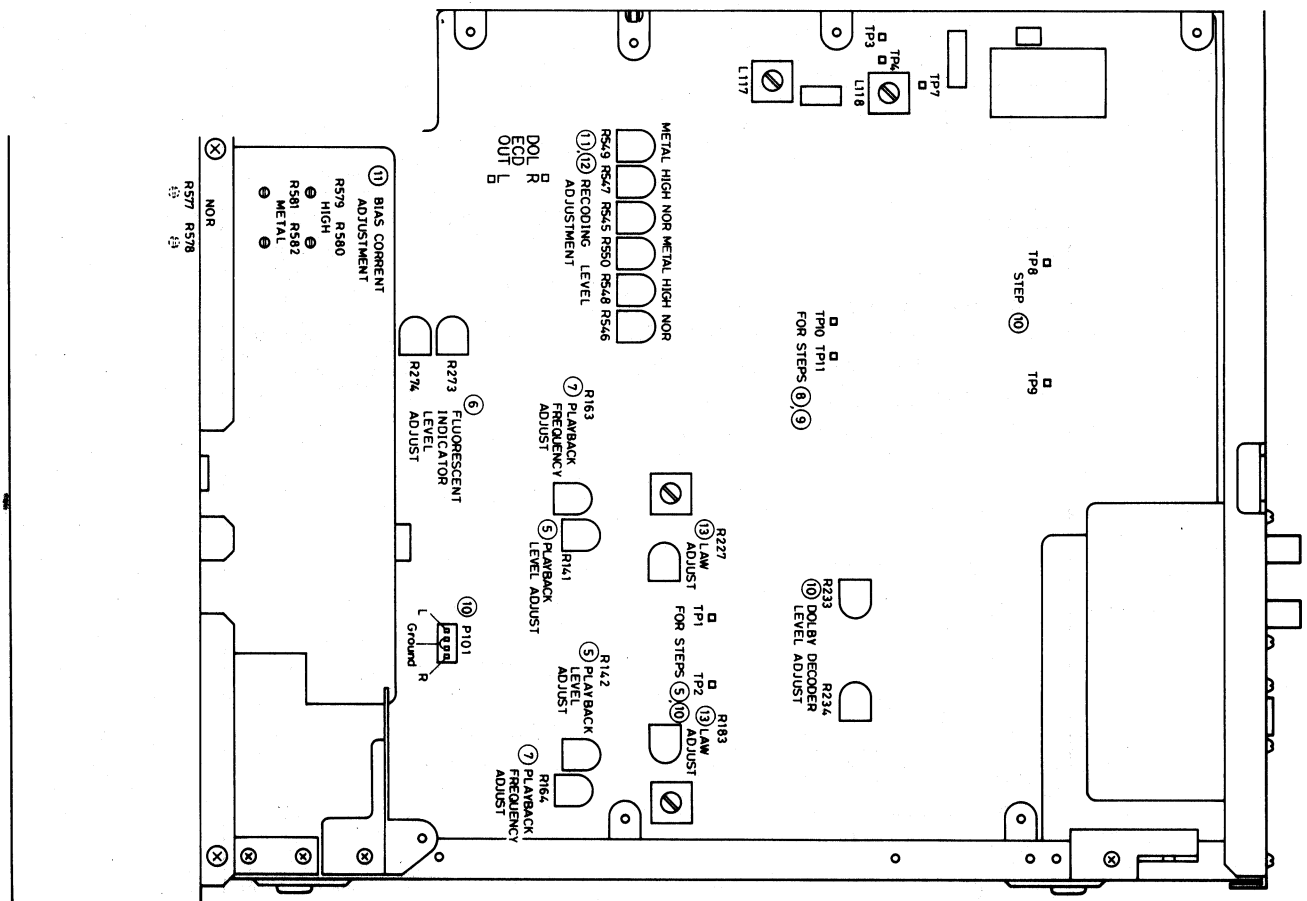
Set the semi-fixed resistors R545 to R550 to the center position. (See Fig. 17)

Insert the normal blank tape into the cassette holder. Apply the 400 Hz signal to the line input terminal. Press the rec and pause button together and set the tape deck to the recording mode. Adjust the input level volume or AF oscillator so that the 0 dB of level meter light on. Reduce the input level by 20 dB with the attenuator. Record the 400 Hz and 10 kHz signals on the tape. Set the tape monitor switch to the tape position. Adjust the R577 and R578 so that the 400 Hz and 10 kHz signal become the same level. Proceed the HIGH and METAL positions as same manners.

	left	right
HIGH	R579	R580
METAL	R581	R582



Fig. 17

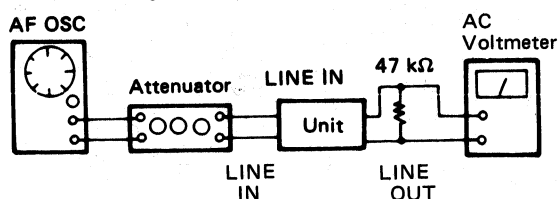


12. Recording level adjustment

Apply the 700 Hz signal to the line input terminal. Insert the normal blank tape into the cassette holder. Connect the AC voltmeter to the line output terminal. Set the tape deck to the recording mode and the tape monitor switch to the source position. Adjust the input volume or AF oscillator output so that the 0 dB of level meter light on. Reduce the input level by 3 dB. Record the 700 Hz signal on the tape and adjust the R545 and R546 so that the level of source and tape position become same. Proceed the HIGH and METAL position as same manner.

	Left	right
HIGH	R547	R548
METAL	R549	R550

Connection diagram



Steps 11, 12, 13 and 15 Fig. 19

13. Dolby decoder law adjustment

Insert the normal blank tape into the cassette holder. Apply the 400 Hz signal to the line input terminal of right channel and adjust the input level volume so that the 0 dB of level meter lights on. Reduce the input level by 25 dB with the attenuator. Set the DOLBY NR switch to the FILTER OUT B position. Record the 400 Hz and 10 kHz signal on the tape. Adjust the R227 so that the 400 Hz and 10 kHz signal become the same level.

Next, set the DOLBY NR switch to FILTER OUT C position. Record the 400 Hz and 10 kHz signal on the tape and adjust the R183 so that the 400 Hz and 10 kHz signal become the same level.

14. Accubias signal adjustment

Connect the oscilloscope and AC voltmeter to the ACCU SIG terminal. Press the REC CAL switch to on position. Adjust the R1094 so that the 400 Hz and 10 kHz signal become the same level as shown below.

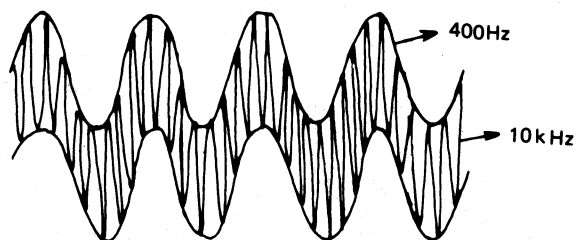


Fig. 20

Adjust the R1096 so that the indication of voltmeter becomes 5 mV.

15. Accubias frequency adjustment

- 1) Insert the normal blank tape into the cassette holder.
- 2) Set the tape counter to 0:00.
- 3) Press the pause and recording buttons together.
- 4) Press the accubias switch.
- 5) Apply the 400 Hz and 10 kHz signal of -20 dBV to the line input terminals and connect the AC voltmeter to the line output terminal.
- 6) Record the 400 Hz and 10 kHz signal on the tape.
- 7) When the 400 Hz and 10 kHz playback signal differ, turn the R1021 as shown below.
400 Hz signal > 10 kHz signal : Counter-clockwise
400 Hz signal < 10 kHz signal : Clockwise
- 8) Press the accubias reset switch.
- 9) Repeat the steps 2 through 8 until 400 Hz and 10 kHz playback level become same.

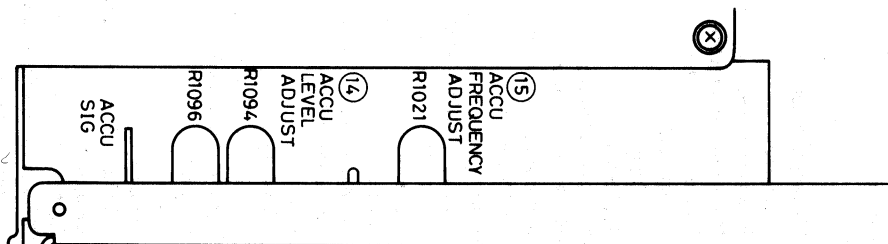
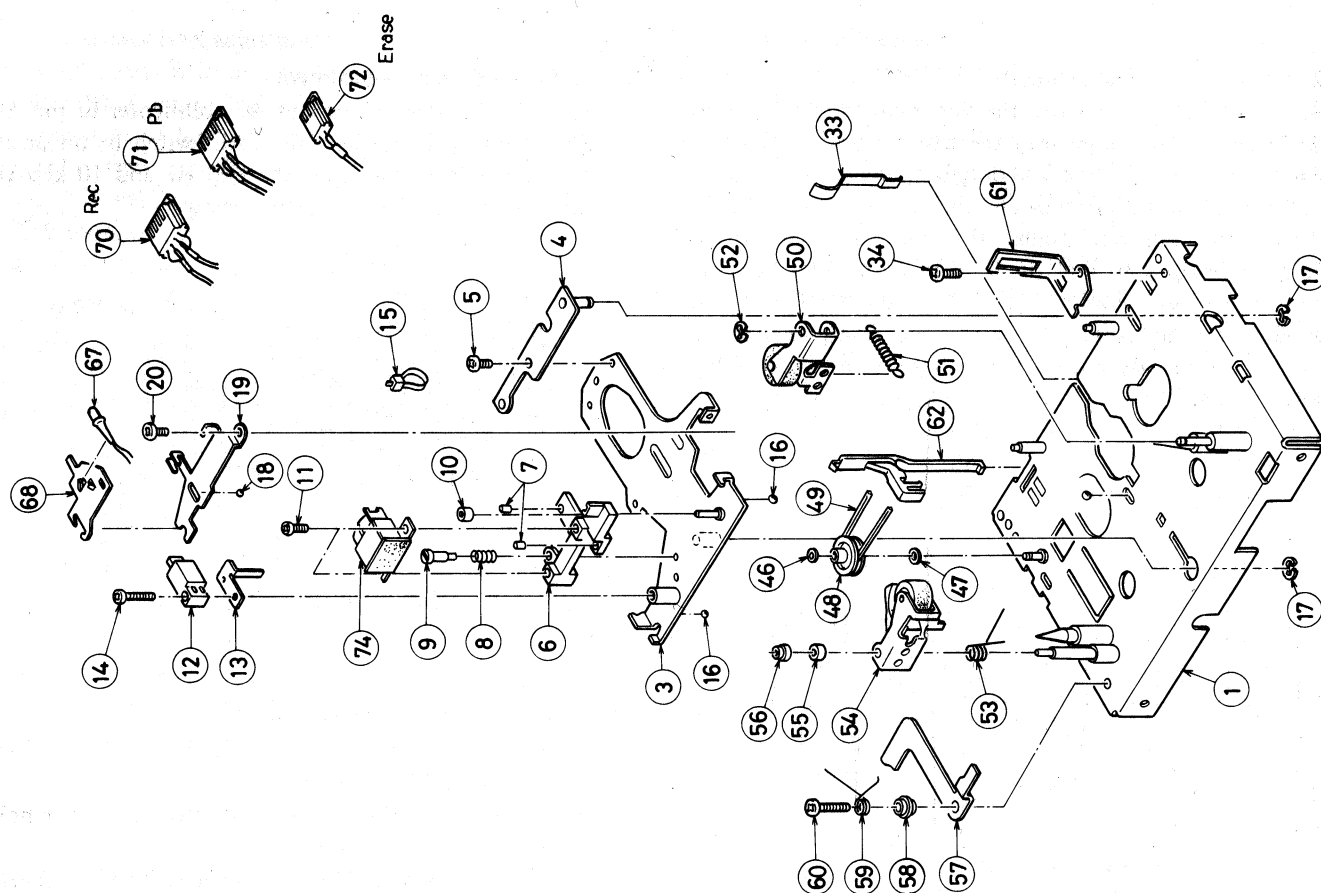


Fig. 21

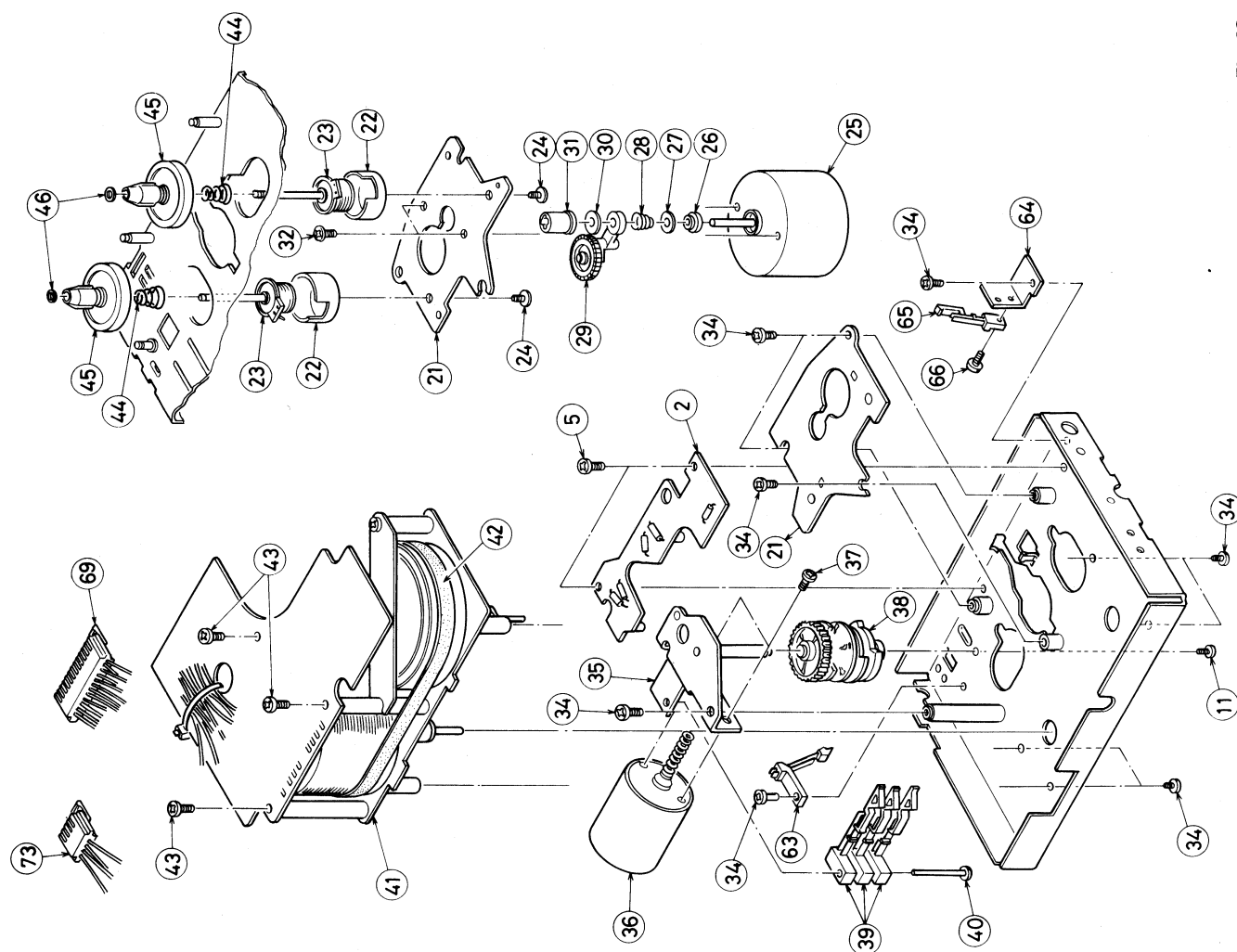
TAPE MECHANISM-EXPLODED VIEW



REF. NO. PARTS NO. DESCRIPTION

1	24610648	Mechanism chassis
2	24606118	Sensor pc board ass'y
3	24610649	Head base ass'y
4	24610650	Connector plate ass'y
5	833125049	M2.5 x4mm, Pan head screw
6	24610651	Head stand
7	801251	M2x4mm, Screw
8	24605302	Spring, head
9	24610652	Shaft
10	24610495	Nut
11	801250	M2x4mm, Screw
12	24600014A	Erase head
13	24610653	Plate, erase head
14	82512012	M2x12mm, Bind screw
15	260208	Binder
16	24610351	2φ, Steelball
17	8930302	E3, Circlip
18	24610279	3φ, Steelball
19	24610496	Plate, head holding
20	833130049	M3x4mm, Pan head screw
21	24610654	Motor mounting bracket
22	24610371	Reel Stand case
23	24610494	Brake
24	82512304	M2.3x4mm, Bind screw
25	24601054	Reel motor
26	24610373	Spacer
27	24610374	Washer
28	24605194	Spring, motor
29	24602076	Idle lever ass'y
30	24610375	Felt
31	24601102	Motor pulley
32	82512603	M2.6x3mm, Bind screw
33	24605183	Cassette holding spring
34	833125059	M2.5x5mm, Pan head screw
35	24610655	Bracket
36	24601103	Motor, assist
37	801259	M2x3mm, Pan head screw
38	24602133	Cam gear
39	24606119	Leaf switch, code
40	833125209	M2.5x20mm, Pan head screw
41	24601104	DD motor unit
42	24602129	Belt
43	833130069	M3x6mm, Pan head screw

Fig. 23



REF. NO. PARTS NO. DESCRIPTION

44	24605193	Spring
45	24602130	Reel stand
46	24610349	Washer
47	870081	2x4x0.5mm, Washer
48	24602131	Pulley
49	24602132	Belt
50	24610656	Pinch arm ass'y
51	24605244	Spring
52	8930201	E2, Circlip
53	24605301	Spring
54	24610657	Pinch roller ass'y
55	24610662	Spacer
56	24610661	M2, Nylon washer
57	24610658	Lock plate
58	24610344	Collar
59	24605184	Spring
60	833125109	M2.5x10mm, Pan head screw
61	24610659	Protection plate
62	24603205	Recording lever
63	24606104	Leafswitch
64	24610660	Mounting plate
65	24603129	Leafswitch
66	833125069	M2.5x6mm, Pan head screw
67	24606107	Lamp
68	24610498	Lamp holder
69	25050110	Connector, 12P
70	25050111	Connector, 4P, Rec. head
71	25050112	Connector, 4P, Playback head
72	25050113	Connector, 2P, Erase head
73	25050114	Connector, 4P, Sensor
74	24600030	Recording/playback head

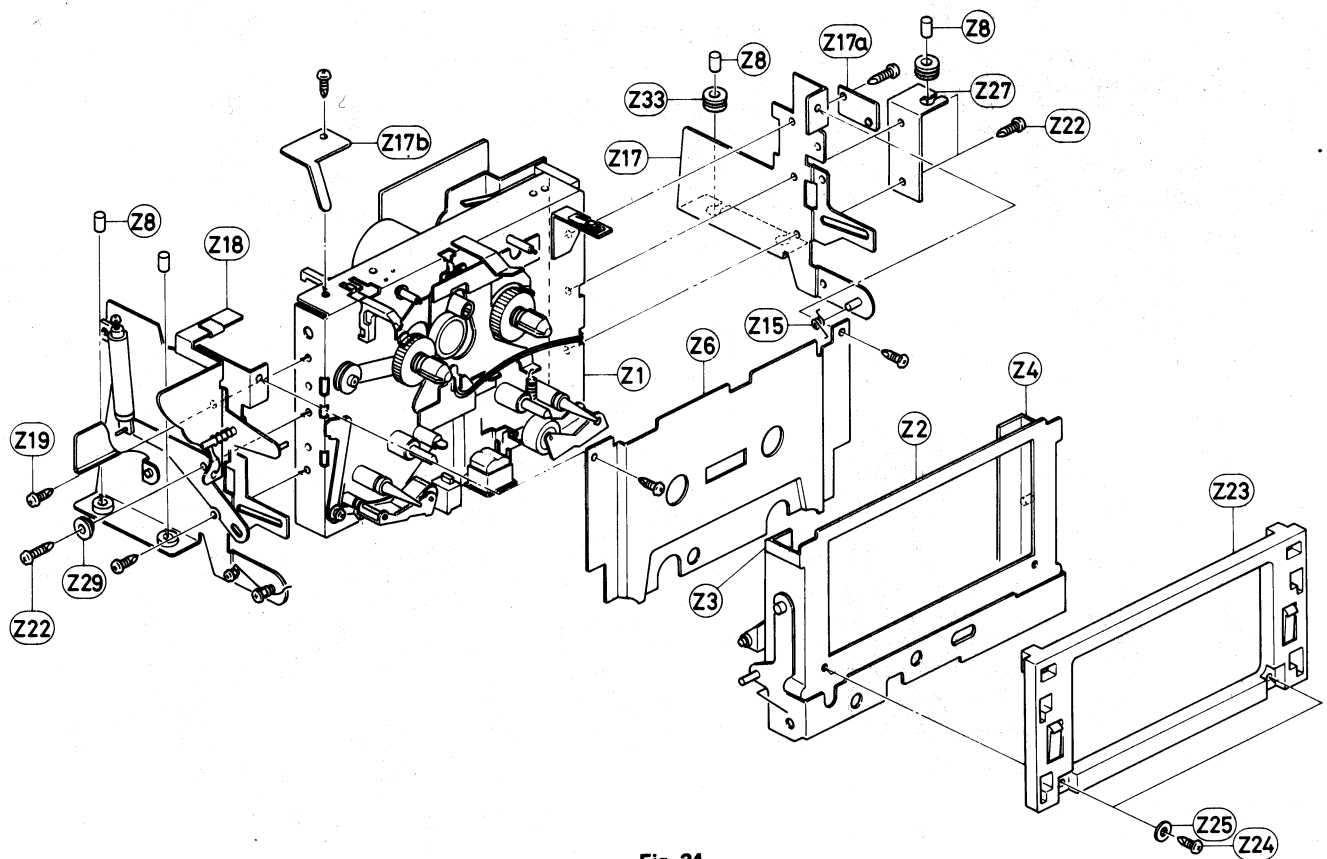


Fig. 24

REF. NO. PARTS NO. DESCRIPTION

Z1	244024	NDM-19, Tape deck
Z2	24610630-1	Mounting plate
Z3	24610631-1	Holder, left
Z4	24610632-1	Holder, right
Z5	24605300	Spring
Z6	16239903	Plate ass'y
Z8	24610645	Link
Z9	838126088	2.6TTB+8B, Tap screw
Z10	833425059	2.5TTP+5C(BC), Tap screw
Z11	24610508	Damper
Z12	24605296	Spring
Z13	23605297	Spring
Z15	24605299A	Spring
Z16	24603203	Lever
Z17	24610646	Side plate (R)
Z17a	27140631	Bracket
Z17b	27140632	Bracket
Z18	24610647	Side plate (L)
Z19	833425059	2.5TTP+5C(BC), Tap screw
Z20	833130127	3TTP+12S, Tap screw
Z21	27265057	φ3xφ4x5t, Ring
Z22	833425089	2.5TTP+8C(BC), Tap screw
Z23	24610641	Holder (CA)
Z24	82522004	2B+4FN(Ni), Bind screw
Z25	8762200604	W2x6B(Ni), Flat washer

REF. NO. PARTS NO. DESCRIPTION

Z26	24603204A	Lever
Z27	27140578	Bracket
Z28	890012	2φ, Link
Z29	24610644	Spacer
Z30	893030S	ES-3, Circlip
Z31	223004	LUGB-5, Terminal

FRONT PANEL-EXPLODED VIEW

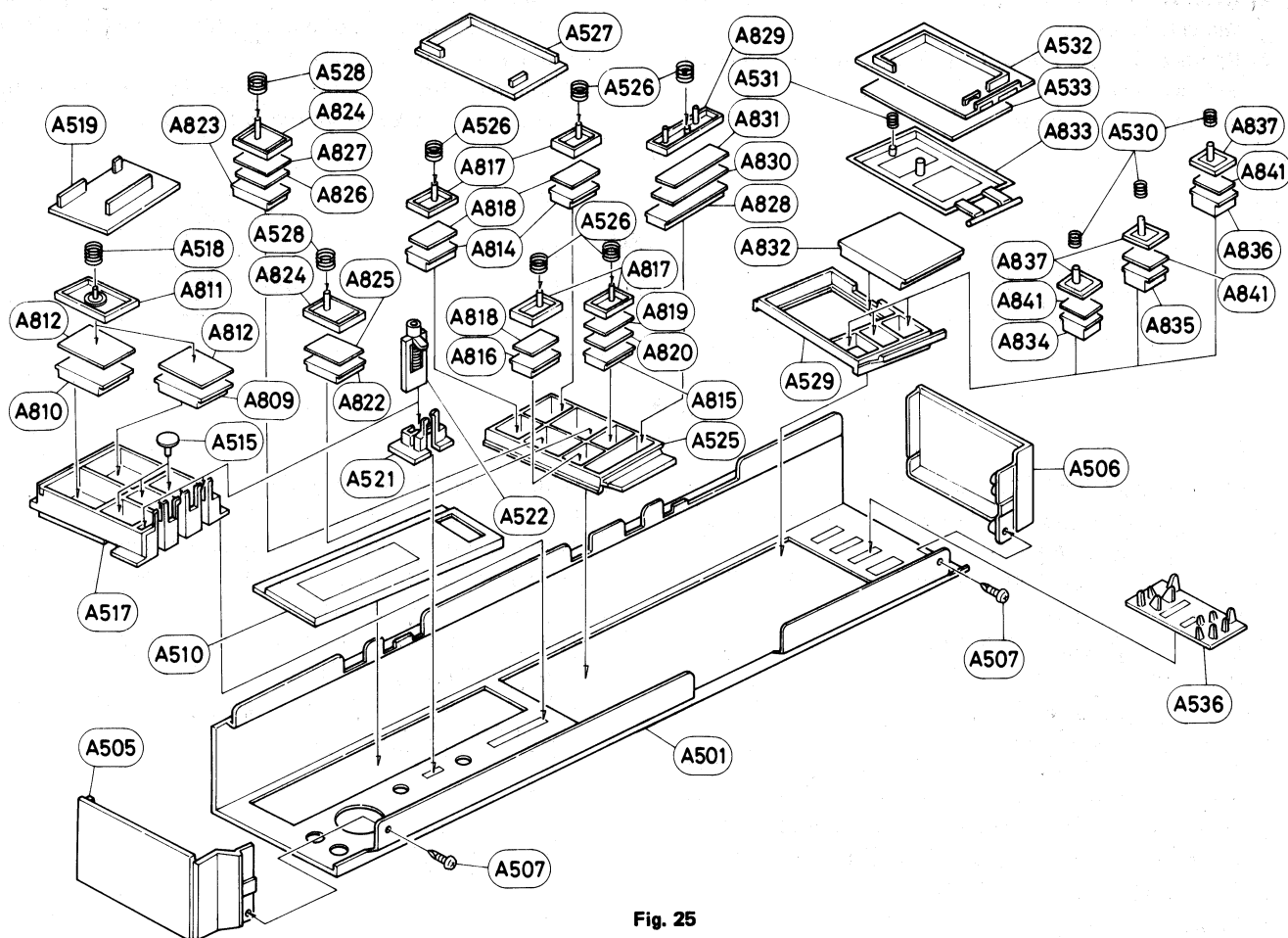


Fig. 25

REF. NO. PARTS NO. DESCRIPTION

A501	16239121	Front panel ass'y (D)
	16242121	Front panel ass'y (G/W)
A505	28125094	End cap, right side
A506	28125095	End cap, left side
A507	838430088	3TTB+8B(BC), Tap screw
A510	16239901	Clear plate ass'y
A515	28189558	Facet
A517	27267132A	Guide, accu.
A518	27180090	Spring
A519	2840041A	Lid, accu.
A521	27267131	Guide, push
A522	27180091	Spring
A525	27267134A	Guide (R)
A526	27180090	Spring
A527	28400043A	Lid (R)
A528	27180095	Spring
A529	27267135A	Guide (L)
A530	27180093	Spring
A531	27180094	Spring
A532	28400044A	Lid (L)
A533	27262117A	Plate (C)
A536	27267133	Guide, switch
A809	28320599A	Knob (S)
A810	28320696	Knob (R)
A811	28320600B	Knob, base

REF. NO. PARTS NO. DESCRIPTION

A812	27262118A	Plate (S)
A814	28320697	Knob, fast forward
A815	28320699	Knob, recording
A816	28320700	Knob, auto-stop
A817	28320602A	Knob, base
A818	26262155	Plate (A)
A819	27262157	Plate (R)
A820	27262156	Plate, recording
A822	28320701	Knob, stop
A823	28320702	Knob, play
A824	28320604A	Knob, base
A825	27262158	Plate, stop
A826	27262159	Plate, play
A827	27262160	Plate (P)
A828	28320703	Knob, pause
A829	28320606B	Knob, base
A830	27262161	Plate, pause
A831	27262162	Plate, pause
A832	28320607-1	Knob, counter
A833	28320610	Knob, base
A834	28320704	Knob, 46
A835	28320705	Knob, 60
A836	28320706	Knob, 90
A837	28320609B	Knob, base
A841	27262163	Plate (T)

DISASSEMBLING PROCEDURES

1. Front panel

- 1) Remove the four screws (A302) holding the top cover and side brackets.
- 2) Remove the two screws (A303) holding the top cover and back panel.
- 3) Remove the top cover.

4) Press the eject button and remove the cassette lid.

5) Remove the cushion (A504) on the front panel and the three screws holding the front panel and front bracket from the top side.

6) Remove the five screws (A) holding the front panel and front bracket from the bottom side.

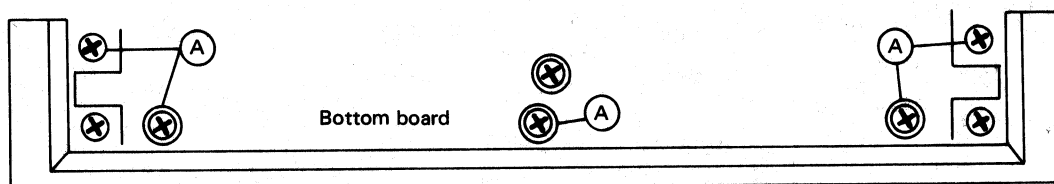


Fig. 26

2. Power supply pc board (NAAF-1269)

- 1) Remove the stopper (A11) holding the power supply pc board and back panel.
- 2) Remove the two screws of front side holding the pc board and brackets.
- 3) Lift up the pc board from front side.

3. Cassette mechanism ass'y

- 1) Remove the front panel.
- 2) Remove the two sockets (P701 and P703) on the control pc board (NACOC-1143) and the three sockets (P101, P102, and P104) on the recording and playback amplifier pc board (NAAF-1182).
- 3) Remove the control pc board.
- 4) Remove the four screws (A9).
- 5) Remove the cassette mechanism ass'y.

4. Switch pc board (NASW-1185)

- 1) Remove the front panel.
- 2) Remove the socket of level meter from back side.
- 3) Remove the two screws holding the level meter ass'y and bracket from back side.
- 4) Remove the two REC CAL knob and two nuts holding the REC CAL volume.
- 5) Remove the two screws holding the switch bracket and front bracket.

CHASSIS EXPLODED VIEW-PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
A1	27110146A	Front bracket	A39	28170016	Bushing
A2	834130088	3TTS+8B, Tap screw	A40	27140599	Bracket, switch
A3	834130168	3TTS+16B, Tap screw	A42	27260073A	Shaft
A4	82113006	3P+6FN, Pan head screw	A43	28320135	Connector
A5	831130088	3TTW+8B, Tap screw	A44	27270081A	Spacer
A6	27140577	Bracket, DIN terminal [G/W]	A45	27270082	Spacer
A9	831130128	3TTW+12B, Tap screw	A46	27120334	Back panel [D]
A10	223004	LAGB-5, Terminal		27120336	Back panel [G]
A12	27140533	Bracket, headphone		27120344	Back panel [W]
A15	27140534	Bracket, microphone	A49	82142604	2.6P+4F(BC), Pan head screw
A18	27115092	Side bracket	A50	82143006	3P+6FN(BC), Pan head screw
A21	27140535	Bracket (S)	A51	270025	SR-3P-4, Strainrelief [D]
A24	27140537	Bracket (P)		270280	SR-4K-4, Strainrelief [G/W]
A28	27130261	Bracket, pc board	A53	27140536	Bracket, pc board
A31	27140598	Bracket (R)	A57	28175043	Insulation plate
A32	27130262	Bracket, power transformer	A58	27130275A	Bracket (ML)
A34	834430068	3TTS+6B(BC), Tap screw	A59	831430088	3TTS+8B, Tap screw
A36	833140087	4TTP+8S, Tap screw	A301	28184065A	Top cover
A37	27300412	Base, power transformer	A302	838440109	4TB+10C(BC), Tap screw
A38	27190009	Holder	A303	834430108	3TTS+10B(BC), Tap screw

CHASSIS -EXPLODED VIEW

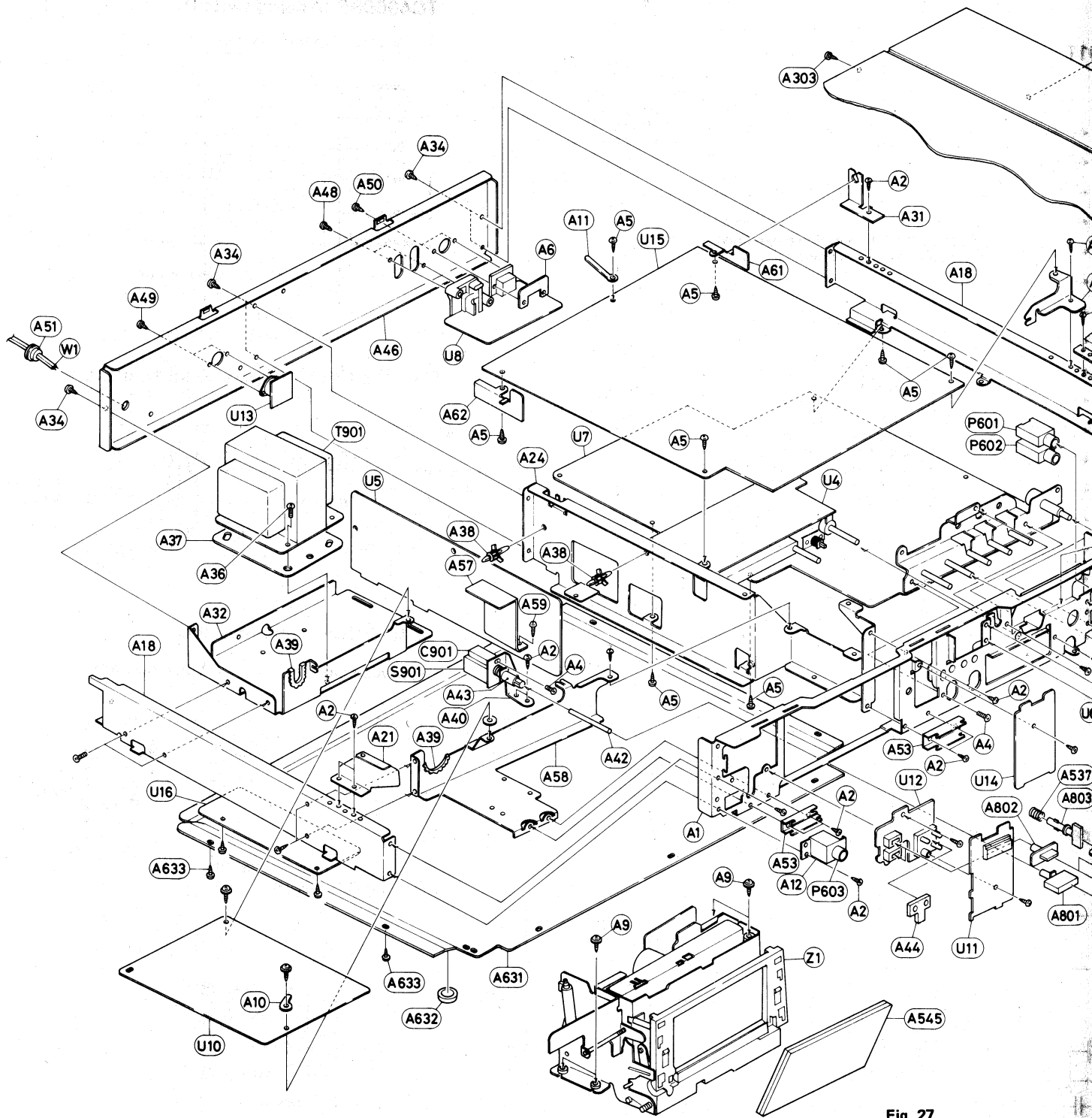
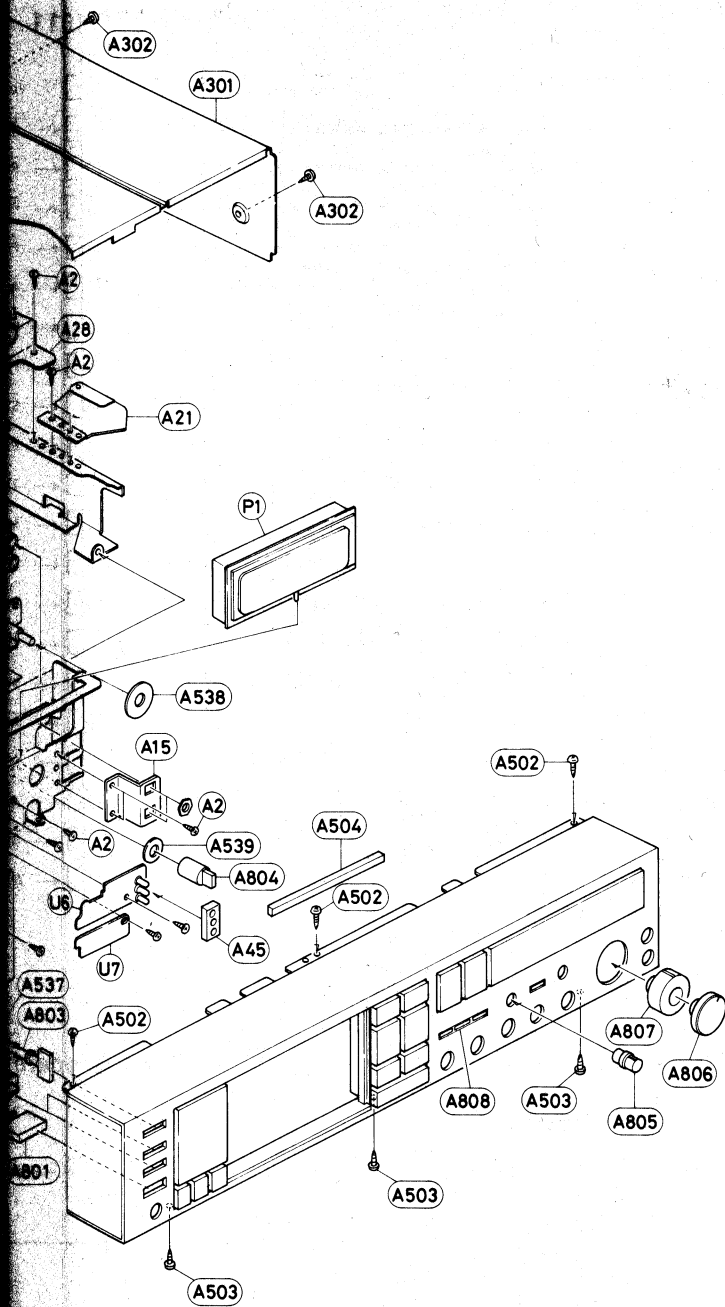


Fig. 27

REF. NO.	PARTS NO.	DESCRIPTION
A501	16239121	Front panel ass'y [D]
	16242121	Front panel ass'y [G/W]
A502	834130068	3TTS+6B, Tap screw
A503	838430088	3TTB+8B(BC), Tap screw
A504	28140298	Cushion
A507	838430088	3TTB+8B(BC), Tap screw
A508	27262155	Plate A
A537	27180021	Spring
A538	28140185	Cushion

REF. NO.	PARTS NO.	DESCRIPTION
A539	28140219	Cushion
A545	16239902	Cassette lid ass'y
A631	27170110	Bottom board
A632	27175028	Leg
A633	838430088	3TTB+8B(BC), Tap screw
A634	28140380	Cushion
A801	28320591	Knob, power
A802	28320592	Knob, switch
A803	28320593	Knob, eject



REF. NO.	PARTS NO.	DESCRIPTION
P601	25045090	HLJ0606-01-020, Microphone jack
P602		
P603	25045089	HLJ0606-01-030, Stereo headphone jack
P1	212012	LB100-L14, Output/input level meter
S901	23035224	NPS-121-L188P, Power switch [D]
S901	25035192	NPS-122-L156P, Power switch [G]
S901	2503083	NPS-121-L171P, Power switch [W]
T901	230530	NPT-752D, Power transformer [D]
	230539	NPT-752G, Power transformer [G]
	230549	NPT-752DG, Power transformer [W]
U1	16239582	NAAF-1182, Rec./Palyback amplifier pc board ass'y
U4	16239585	NASW-1185, Tape selector switch pc board ass'y
U5	16239586	NACOC-1186, Accubias control pc board ass'y
U6	16239587	NAPL-1187, Accubias display pc board ass'y
U7	16239588	NAPL-1188, Tape selector display pc board ass'y
U8	16239589	NAAF-1189, Input/Output terminal pc board ass'y [D]
	16242589A	NAAF-1189a, DIN amplifier and input/output terminal ass'y [G/W]
U10	16239543	NACOC-1143, Mechanism control pc board ass'y
U11	16239544	NADIS-1144, Tape counter pc board ass'y
U12	16239545	NASW-1145, Counter key input pc board ass'y
U13	16239546	NARM-1146, Remote control pc board ass'y
U14	16239547	NASW-1147, Control key input pc board ass'y
U15	16239569	NAAF-1269, Power supply and line amplifier pc board ass'y
U16	16239504	NAMU-1304, Muting circuit pc board ass'y
W1	253099A	AS-UC3, Power supply cable [D]
	253083	AS-CEE, Power supply cable [G/W]
	260208	Binder
	25050096	NSAS-6P-072, Socket
S902	25065123	NSS-1258P, Voltage selector switch [W]

[D] : Only 120 V model

[G] : Only 220 V model

[W] : Only 120/220 model

REF. NO.	PARTS NO.	DESCRIPTION
A804	28320594	Knob, selector
A805	28320595	Knob, calibration
A806	28320596	Knob, input level, left side
A807	28320597A	Knob, input level, right side
A808	28320598	Knob, push
C901	3500057	0.01 μ F, 125V, Capacitor, ULCS[D]
C901	3500058	PME265MB510, Capacitor, IS [G]
C901, C902	3500058	PME265MB510, Capacitor, IS [W]

IC BLOCK DIAGRAM

TMP4315AP-1001

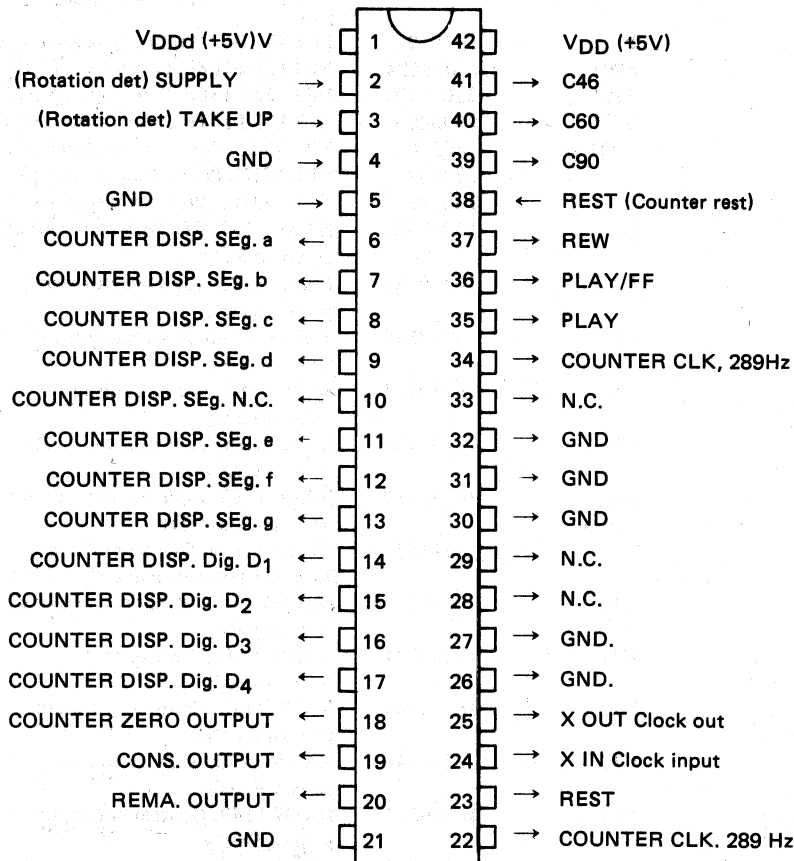


Fig. 28

TMP4315AP-10

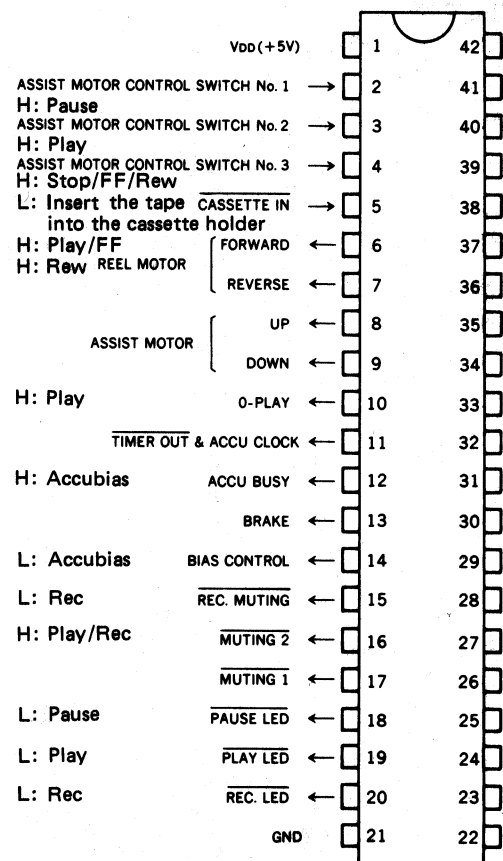


Fig. 29

μPC741C (Operational amplifier)
Equivalent circuit

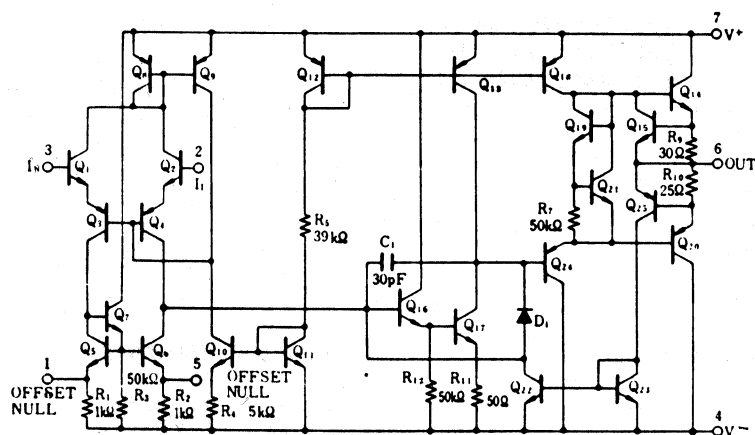
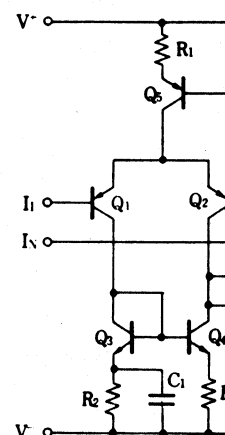
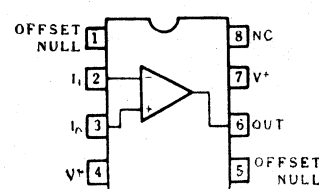


Fig. 30

μPC4557 (Dual op)



11

- V_{DD} (+5V)
- ← SEARCH (not used)
 - ← REW
 - ← FF
 - ← PLAY
 - ← ACCU START ACCU START. (Acception when press the rec and pause together)
 - ← REC
 - ← PAUSE
 - ← STOP
 - ← REC. INH H: Recording inhibiting
 - ← TIMER ON/OFF H: TIMER OFF
L: TIMER ON
 - ← MEMORY PLAY/STOP H: MEMORY STOP
L: MEMORY PLAY
 - ← MEMORY ON/OFF H: MEMORY ON
L: MEMORY OFF
 - ← 2 head/3 head 2 head deck: H
2 head deck: L
 - ← TAPE COUNTER
 - ← SEARCH SIG. (not used)
 - ← AUTO SPACE
 - X OUT Clock output
 - ← X IN Clock input
 - ← RESET
 - ← AUTO STOP (Rotation detector pulse input)

operational amplifier)

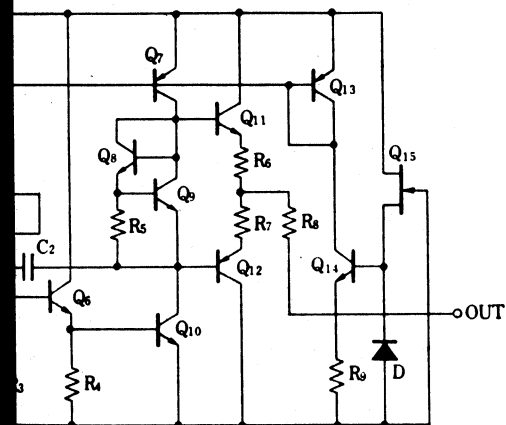
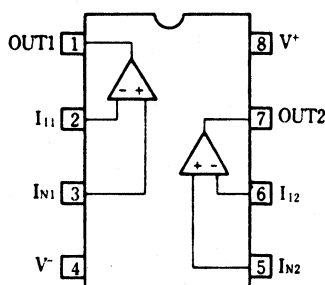


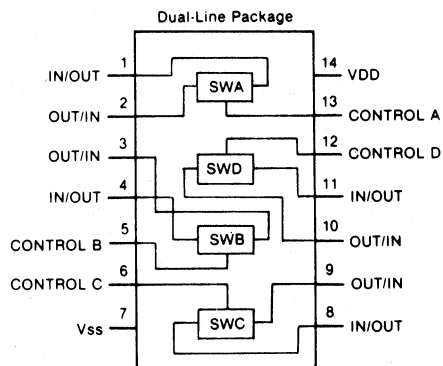
Fig. 31



TOP VIEW

Fig. 32

TC4066BP (Analog switch)



NJM4558/4559 (Operational amplifier)

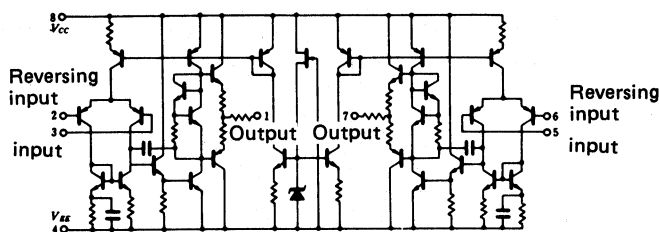
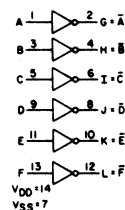


Fig. 33

TC4069UBP (Hex. inverter)

Block diagram



Logic diagram

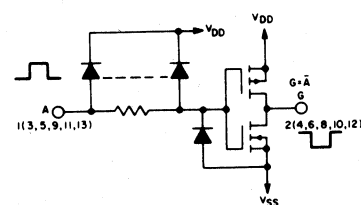


Fig. 34

LB1275 (Inverter)

LB1275

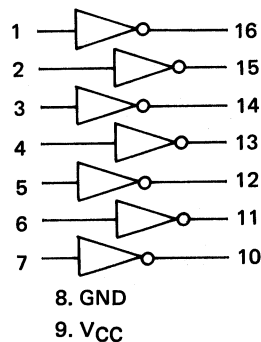


Fig. 35

HA11226 (Dolby decoder/encoder)

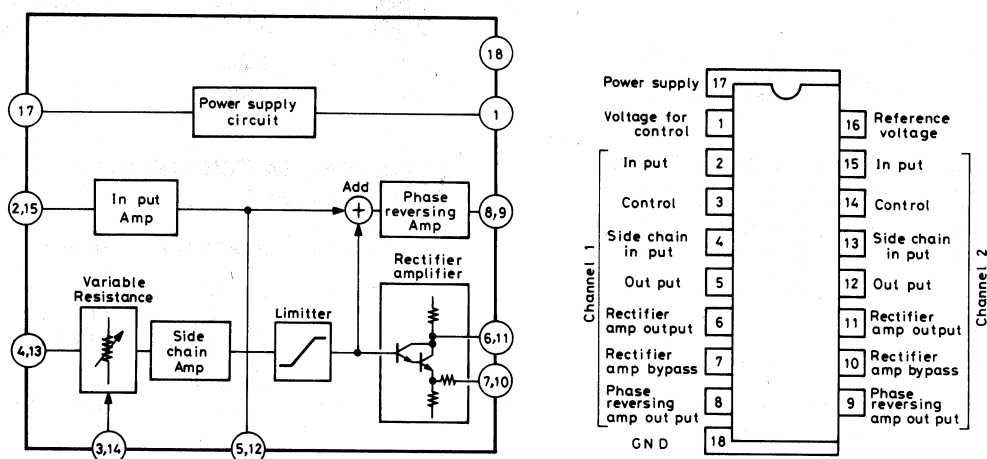


Fig. 36

HD7493A (4-bit binary counter)

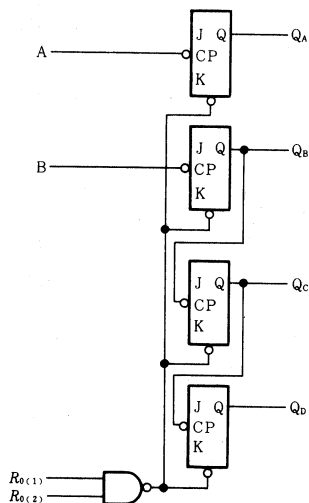
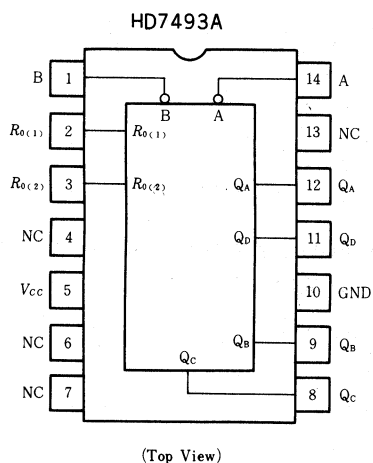


Fig. 37

COUNT SEQUENCE

Count	Output			
	Q _D	Q _C	Q _B	Q _A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

HD7400 (NAND gate)

PIN ARRANGEMENT

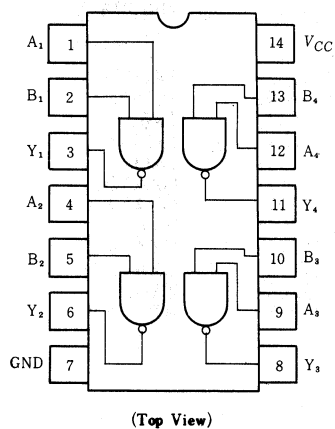


Fig. 38

SEMICONDUCTOR VIEW

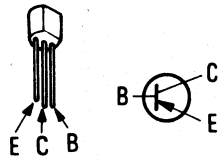
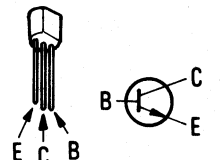
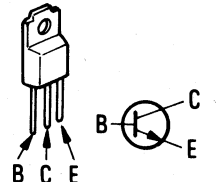
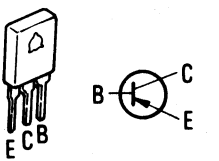
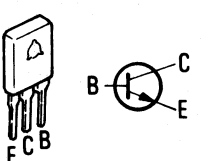
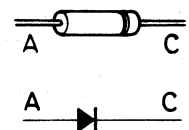
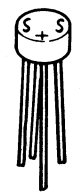
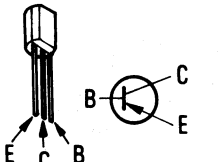
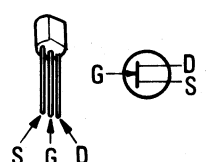
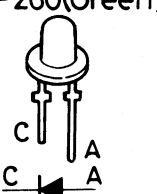
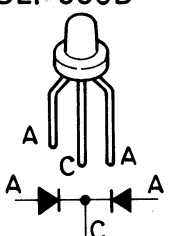
2 SA 562 TM 2 SA 733 2 SA 1015 	2 SC 1472 2 SC 1815 2 SC 1959 2 SC 2240 2 SD 655 	2 SD 235 2 SD 880 	2 SB 772 	2 SD 549 2 SD 882 
05Z 1N60 1K60 1S1555 	GZA 5.1L GZA 5.6L GZA 7.5L GZA 12L	GZA 15L GZA 18L RD3.0EB RD7.5EB	WL01 2W02 	2 SB 562 
				2 SK 30A 
				SLP160(Red) SLP260(Green) 
				SLP 530D 

Fig. 39

PRINTED CIRCUIT BOARD-PARTS LIST

MECHANISM CONTROL PC BOARD (NACOC-1143) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
ICs		
Q701	222637	TMP4315AP-1011, Mechanism control
Q702	222638	TMP4315AP-1001, Tape counter control
Q703	222639	LB1275, Hex inverter
Q704	222840692	TC4069UBP, Hex inverters
Transistors		
Q705	2211253 or 2211254	2SC1815(O) or 2SC1815(Y)
Q706	2211706	2SD655(F)
Q707	2201074	2SD880(Y)
Q708, Q709	2211554	2SA562TM(Y)
Q710, Q712	2211253 or 2211254	2SC1815(O) or 2SC1815(Y)
Q715	2211543 or 2211544	2SC1959(O) or 2SC1959(Y)
Q714	2201060	2SD549
Q716, Q717	2211554	2SA562TM(Y)
Q718, Q719	2211951 or 2211952	2SC1472K(A) or 2SC1472K(B)
Q 720—Q725	2211454	2SA1015(Y)
Q726—Q728	2211253 or 2211254	2SC1815(O) or 2SC1815(Y)
Q729	2211454	2SA1015(Y)
Q731	2211253 or 2211254	2SC1815(O) or 2SC1815(Y)
Q732—Q735	2211706	2SD655(F)
Q736, Q737	2211253 or 2211254	2SC1815(O) or 2SC1815(Y)
Q738	2211563	2SB562(C)
Diode		
D701	224173 or 224102	05Z7.5Z or GZA7.5U

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Capacitors		
C701	352736829	6,800 μ F, 10V, Elect.
C704—C706	352780109	1 μ F, 50V, Elect.
C709	352781099	0.1 μ F, 50V, Elect.
C712	352734709	47 μ F, 10V, Elect.
Resistors		
R726—R728	49121222404	2.2 Ω x4, 1/8W, Network
R734—R742	49121222409	3.9k Ω x9, 1/8W, Network
R743—R751	49121222409	22 Ω x4, 1/8W, Network
R762—R774	49121392413	100 Ω , 1/2W, Metal oxide film
R775—R778	49121223404	10 Ω , 1/2W, Metal oxide film
R793	441521014	100 Ω , 1/2W, Metal Oxide film
R794	441521004	10 Ω , 1/2W, Metal Oxide film
R795	441722704	27 Ω , 2W, Metal oxide film
R796	5215020	N08HR5K BC, Semi-fixed
R797	5225076	N10HR22KBDM, Semi-fixed
Transformer		
L701	232100	NMIF-6030
Plugs		
P701	25055047	NPLG-12P35
P703	25055045	NPLG-4P-33

TAPE COUNTER PC BOARD (NADIS-1144) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
L.E.D		
D731	225094	SL-2405-20, Tape counter
Switches		
S701—S704	25035275	NPS-111-S239, Reset/C-90/C-60/C46

MEMORY/TIMER SWITCH PC BOARD (NASW-1145)**— PARTS LIST**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Diodes		
D751-D753	223103 or 223132	1N60 or 1K60
L.E.Ds		
PL701	225093	SLP-260C
PL703	225092	SLP-160C
PL704, PL706	225093	SLP-260C
Switches		
S731, S732	25065170	NSS-2377, Memory/Timer
Holder		
	27190130	L.E.D.

REMOTE CONTROL TERMINAL PC BOARD (NARM-1146)**— PARTS LIST**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
P701	25050070	NSCT-7P20, DIN terminal

CONTROL KEY PC BOARD (NASW-1147) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
L.E.Ds		
PL751, PL753	225092	SLP160C
PL752	225093	SLP260C
Switches		
S751-S754	25035275	NPS-111-S239, Rewind/FF/Play/
S756-S759		Rec./Stop/Auto space/Pause
Spacers		
	27270071	

RECORDING AND PLAYBACK AMPLIFIER PC BOARD (NAAF-1182) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Transistors		
Q101, Q102	2211406	2SC2240(BL)
Q103, Q104	2211255	2SC1815(GR)
Q105, Q106	2211406	2SC2240(BL)
Q107, Q108	2211255	2SC1815(GR)
Q109, Q110	2211454	2SA1015(Y)
Q111-Q118	2211255	2SC1815(GR)
Q121-Q124	2211255	2SC1815(GR)
Q135-Q137	2211255	2SC1815(GR)
Q139, Q141	2211255	2SC1815(GR)
Q159, Q160	2211255	2SC1815(GR)
Q189, Q190	2211255	2SC1815(GR)
Q193	2211454	2SA1015(Y)
Q194	2211255	2SC1815(GR)
Q608	2200014	2SD235(Y)
Q609	2211554	2SA562TM(Y)
ICs		
Q119	222465	NJM-4558D
Q120	222575	TC4066BP
Q134, Q138	222465	NJM-4558D
Q140, Q142	222460	HA11226
Q143	222603	μPC4557C
Q144	222575	TC4066BP
Q161, Q188	222465	NJM-4558D
Q191	222534	NJM-4559DX
Q198	222502	NJM-4558DX
Q199, Q200	222575	TC4066BP
Q617	222465	NJM-4558D
Q618	222545	μPC741C

CIRCUIT NO. PARTS NO. DESCRIPTION

Diodes		
D101, D102	223132	1K60
D103-D114	223105	1S1555
D115, D116	223132	1K60
D117, D118	223105	1S1555
D119, D120	223132	1K60
D121, D123	223105	1S1555
D143, D144	223105	1S1555
D150	223105	1S1555
D909	224260	RD3.0E-B
D911	223953	RD7.5EB

Capacitors		
C103, C104	352751019	100μF, 25V, Elect.
C105, C106	392850337	3.3μF, 25V, LL
C109, C110	352732209	22μF, 10V, Elect.
C113, C114	379128224	8,200pF±5%, 50V, DEW
C115, C116	352750479	4.7μF, 25V, Elect.
C117, C118	379125624	5,600pF±5%, 50V, DEW
C121, C122	392850477	4.7μF, 25V, LL
C123, C124	352752219	220μF, 25V, Elect.
C125	352754719	470μF, 25V, Elect.
C127, C128	392853397	0.33μF, 50V, Elect.
C129, C130	352780109	1μF, 50V, Elect.
C131, C132	352750109	1μF, 25V, Elect.
C133	352744719	470μF, 16V, Elect.
C135-C138	379121534	15,000pF±5%, 50V, DEW
C141, C142	352741009	10μF, 16V, Elect.
C143, C144	378124724	4,700pF±5%, 50V, DEW
C145, C146	379124734	47,000pF±5%, 50V, DEW
C147, C148	379121545	0.15μF±5%, 50V, DEW
C149, C150	392850107	1μF, 50V, LL
C151, C152	352741009	10μF, 16V, Elect.
C155-C157	352741009	10μF, 16V, Elect.
C159	352744719	470μF, 16V, Elect.
C161, C162	379124734	47,000pF±5%, 50V, DEW
C163-C166	379121534	15,000pF±5%, 50V, DEW
C167, C168	379124724	4,700pF±5%, 50V, DEW
C169, C170	392850107	1μF, 50V, LL
C171, C172	379121045	0.1μF±10%, 50V, DEW
C173, C174	352741009	10μF, 16V, Elect.
C175-C178	392851097	0.1μF, 50V, LL
C179-C182	392853397	0.33μF, 50V, LL
C183	352741009	10μF, 16V, Elect.
C185, C186	392850107	1μF, 50V, Elect.
C203-C206	352742209	22μF, 16V, Elect.
C207	352733319	330μF, 10V, Elect.
C209	352781009	10μF, 50V, Elect.
C251, C252	352741009	10μF, 16V, Elect.
C335, C336	352784799	0.47μF, 50V, Elect.
C341, C342	352781009	10μF, 50V, Elect.
C371, C372	352781099	0.1μF, 50V, Elect.
C375, C376	352741009	10μF, 16V, Elect.
C618	352752219	220μF, 25V, Elect.
C619	352752209	22μF, 25V, Elect.
C905	352721019	100μF, 6.3V, Elect.
C910, C920	352741019	100μF, 16V, Elect.

Resistors		
R141, R142	5215046	N08HR50KBC, Semi-fixed
R149, R150	5104123	N16RKL50KA40F, Input level variable
R163, R164	5215046	N08HR50KBC, Semi-fixed
R183	5215021	N08HR10KBC, Semi-fixed
R227	5215021	N08HR10KBC, Semi-fixed
R233, R234	5215043	N08HR2KBC, Semi-fixed
R273, R274	5215021	N08HR10KBC, Semi-fixed
R301, R302	5104121	N12RGL10KB25M, Output level variable
R545-R550	5215022	N08HR20KBC, Semi-fixed
R1062	5104120	N12RLSC5KB25M, Accubias variable

Coils		
L101, L102	233146	NCH4021
L103, L104	233245	NMC-2029
L109, L110	233245	NMC-2029
L111, L112	24606108	NCH-1048
L113, L114	24606070	NCH-1008
L115, L116	24606069	NCH-1007
L117, L118	233256	NCH-4055

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Z001	Oscillator block	
	24606114	NOB-015
S101 S102 S103	Switches	
	25030203	NRSM-185-25SS, Dolby NR
	25030205	NRSM-142-25SS, Input selector
	25030204	NRSM-162-25SS, Tape monitor
	Sockets	
	25050098A	NSAS-6P-074, dbx EXDR OUT
	25050097	NSAS-4P-073, dbx ECDR IN
	25050104	NSAS-10P-079, Level meter
	25050099A	NSAS-9P-075, DOLBY ECDR IN
	25050100A	NSAS-12P-076, DOLBY ECDR OUT
	25050101	NSAS-12P-077, dbx DCOR IN
	Plugs	
	25055045	NPLG-4P33, playback/recording head
	25055038	NPLG-2P-29, Erase head
	25055037	NPLG-6P28, Bias
	Bracket	
	27130269	

TAPE SELECTOR PC BOARD (NASW-1185) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D146, D147	Diodes	
	223105	1S1555
C801	Capacitor	
	352751009	10 μ F, 25V, Elect.
R531, R532 R577-R582	Resistors	
	5104122	N12RLC10KB30, Rec. calibration
	5215023	N08HR50KBC, Semi-fixed
	Plugs	
	25055037	NPLG6P28
	25055067	NPLG9P53
	25055047	NPLG12P35
S104 S106	Switch	
	25035273 25035272A	NPS-142-L237, Rec. calibration NPS-362-L236, Tape selector

ACCUBIAS CONTROL PC BOARD (NACOC-1186) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q601 Q602-Q607 Q610, Q611 Q612-Q614 Q615	Transistors	
	2211454	2SA1015(Y)
	2211255	2SC1815(GR)
	2211454	2SA1015(Y)
	2211255	2SC1815(GR)
	2211454	2SA1015(Y)
Q616, Q619 Q620 Q621-Q623	ICs	
	222465	NJM4558D
	222576	HD7493A
	222478	HD7400
D602-D607 D608 D609-D612 D613 D614 D615, D616	Diodes	
	223105	1S1555
	224093	GZA5.1-L
	223103	1N60
	223105	1S1555
	224093	GZA5.1-L
C602, C604 C606 C607 C608, C612 C623, C625 C624, C626 C631	Capacitors	
	352750479	4.7 μ F, 25V, Elect.
	352741009	10 μ F, 16V, Elect.
	352742209	22 μ F, 16V, Elect.
	352784799	0.47 μ F, 50V, Elect.
	352741009	10 μ F, 16V, Elect.
	352780339	3.3 μ F, 50V, Elect.
	352734709	47 μ F, 10V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R1021 R1094 R1096	Resistors	
	5215033	N08HR10KBA, Semi-fixed
	5215036	N08HR100KBA, Semi-fixed
	5215035	N08HR50KBA, Semi-fixed
RY601	Relay	
	25065174	NRL-2P1A-DC12-019

ACCUBIAS SWITCH CIRCUIT PC BOARD (NAPL-1187) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL104, PL105 PL601	L.E.Ds	
	225092	SLP-160C
	225102	SLP-530D
	Switches	
	25035275	NPS-111-S239
	Spacers	
	27270072	
	27270071	

TAPE SELECTOR DISPLAY PC BOARD (NAPL-1188) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL101-PL103	L.E.Ds	
	225093	SLP-260C
	Spacer	
	27270071	

POWER SUPPLY AND LINE AMPLIFIER PC BOARD (NAAF-1269) — PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q201, Q202	ICs	
	222460	HA11226, Dolby
Q125, Q126 Q129-Q132 Q147, Q148 Q149-Q158 Q163-Q172 Q173-Q176 Q179, Q180 Q181 Q901 Q902, Q903 Q904 Q905 Q906 Q907	Transistors	
	2211454	2SA1015(Y)
	2211454	2SA1015(Y)
	2211454	2SA1015(Y)
	2211255	2SC1815(GR)
	2211255	2SC1815(GR)
	2211454	2SA1015(Y)
	2211454	2SA1015(Y)
	2211255	2SC1815(GR)
	2201074	2SD880(Y)
	2201285	2SD882(Q)
	2211255	2SC1815(GR)
	2201285	2SD882(Q)
	2201275	2SB772(Q)
	2210274	2SK30A(Y)
D125, D126 D127-D138 D139, D140 D141, D142 D157, D158 D901 D902, D905 D903, D904 D906 D907, D908 D910 D911	Diodes	
	223132	1K60
	223105	1S1555
	223132	1K60
	223105	1S1555
	223132	1K60
	224112	GZA12U
	224095	GZA5.6-L
	223862	WL01
	224119	GZA18-L
	224115	GZA15-L
	223868	2W02
	223953	RD7.5EB

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Capacitors		
C231	352752219	220 μ F, 50V, LL
C233, C234	392880477	4.7 μ F, 50V, LL
C235, C236	352780109	1 μ F, 50V, Elec.
C237, C238	392880107	1 μ F, 50V, LL
C239, C240	352781009	10 μ F, 50V, Elect.
C243	352754719	470 μ F, 25V, Elect.
C245	352744719	470 μ F, 16V, Elect.
C253-C256	379121534	15,000pF $\pm$ 5%, 50V, DEW
C257, C258	392880107	1 μ F, 50V, LL
C259, C260	379121045	0.1 μ F $\pm$ 5%, 50V, DEW
C261, C262	379124724	4,700pF $\pm$ 5%, 50V, DEW
C263, C264	392880107	1 μ F, 50V, Elect.
C265, C266	352741009	10 μ F, 16V, Elect.
C267, C268	392881097	0.1 μ F, 50V, LL
C269, C270	392883397	0.33 μ F, 50V, LL
C271, C272	379121834	0.018 μ F $\pm$ 5%, 50V, DEW
C273, C274	392881097	0.1 μ F, 50V, LL
C275, C276	392883397	0.33 μ F, 50V, LL
C277	352741009	10 μ F, 16V, Elect.
C279	352744719	470 μ F, 16V, Elect.
C281, C282	379121534	15,000pF $\pm$ 5%, 50V, DEW
C283, C284	379124724	4,700pF $\pm$ 5%, 50V, DEW
C285, C286	379121534	0.015 μ F $\pm$ 5%, 50V, DEW
C289, C290	352741009	10 μ F, 16V, Elect.
C291, C292	379124734	47,000pF $\pm$ 5%, 50V, DEW
C293, C294	379121545	0.15 μ F $\pm$ 5%, 50V, DEW
C295-C297	352741009	10 μ F, 16V, Elect.
C901	352741029	1,000 μ F, 16V, Elect.
C902	352742219	220 μ F, 16V, Elect.
C903	352752229	2,200 μ F, 25V, Elect.
C904	352744709	47 μ F, 16V, Elect.
C906	352733309	33 μ F, 10V, Elect.
C907	352724719	470 μ F, 6.3V, Elect.
C909	352781529	1,500 μ F, 50V, Elect.
C911, C913	352754719	470 μ F, 25V, Elect.
C912	352763319	330 μ F, 35V, Elect.
C914, C915	352761029	1,000 μ F, 35V, Elect.
C916, C917	352741019	100 μ F, 16V, Elect.
C918, C919	352744719	470 μ F, 16V, Elect.
C921-C925	352752229	2,200 μ F, 25V, Elect.

Resistors		
R415	5215021	N08HR10KBC, Semi-fixed
R425, R426	5215043	N08HR2KBC, Semi-fixed
R455	5215021	N08HR10KBC, Semi-fixed
R901	441524794	0.47 Ω , 1/2W, Metal oxide film
R902	442621024	1k Ω , 1W, Metal oxide film
R905	442522724	2.7k Ω , 1/2W, Metal oxide film
R904	441820684	6.8 Ω , 3W, Metal oxide film
R906	441824704	47 Ω , 3W, Metal oxide film
R911	442528204	82 Ω , 1/2W, Metal oxide film
R912	441622714	270 Ω , 1W, Metal oxide film
R917, R918	442520684	6.8 Ω , 1/2W, Metal oxide film

Coils		
L105, L106	233245	NMC-2029
L107, L108	233221	NMC-5021

Plug		
25055047	NPLG-12P35	

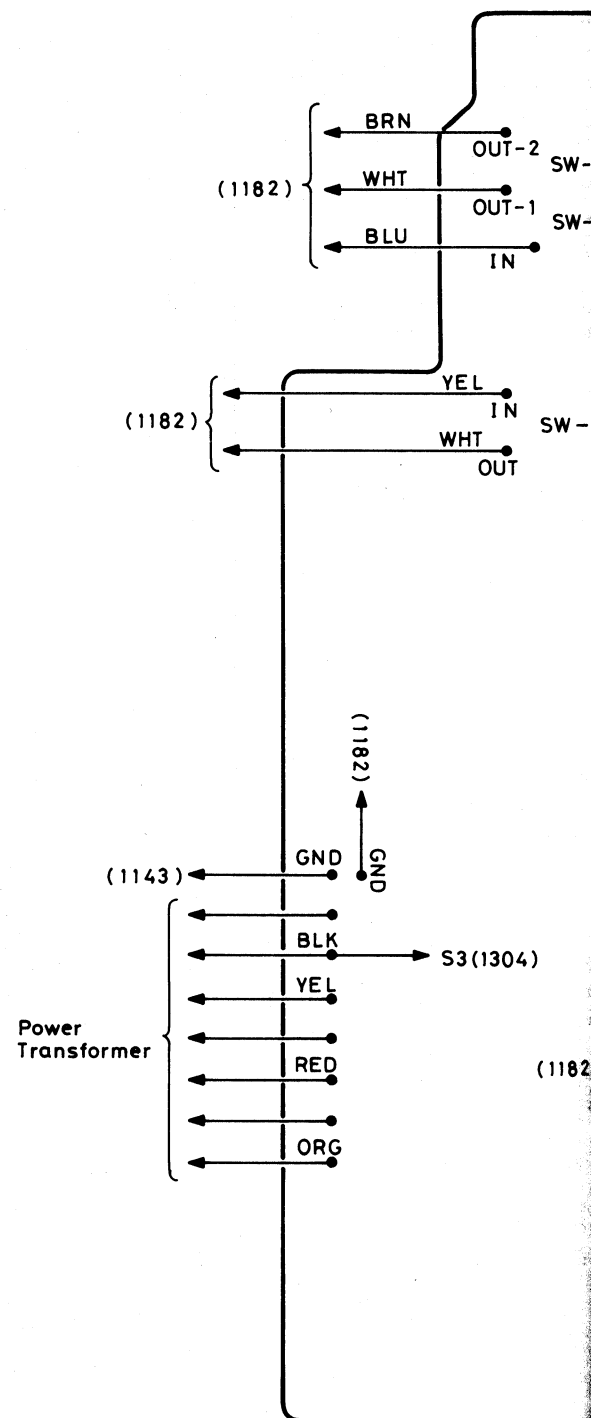
Radiator		
27160096		

Spacer		
223019	AC-229, Transistor	

Bush		
223017	AC-310	
A61	27140596	Bracket, pc board, right
A62	27140597	Bracket, pc board, left

CONNECTION VIEW

POWER SUPPLY AND LINE AMPLIFIER



PC BOARD (NAAF-1269)

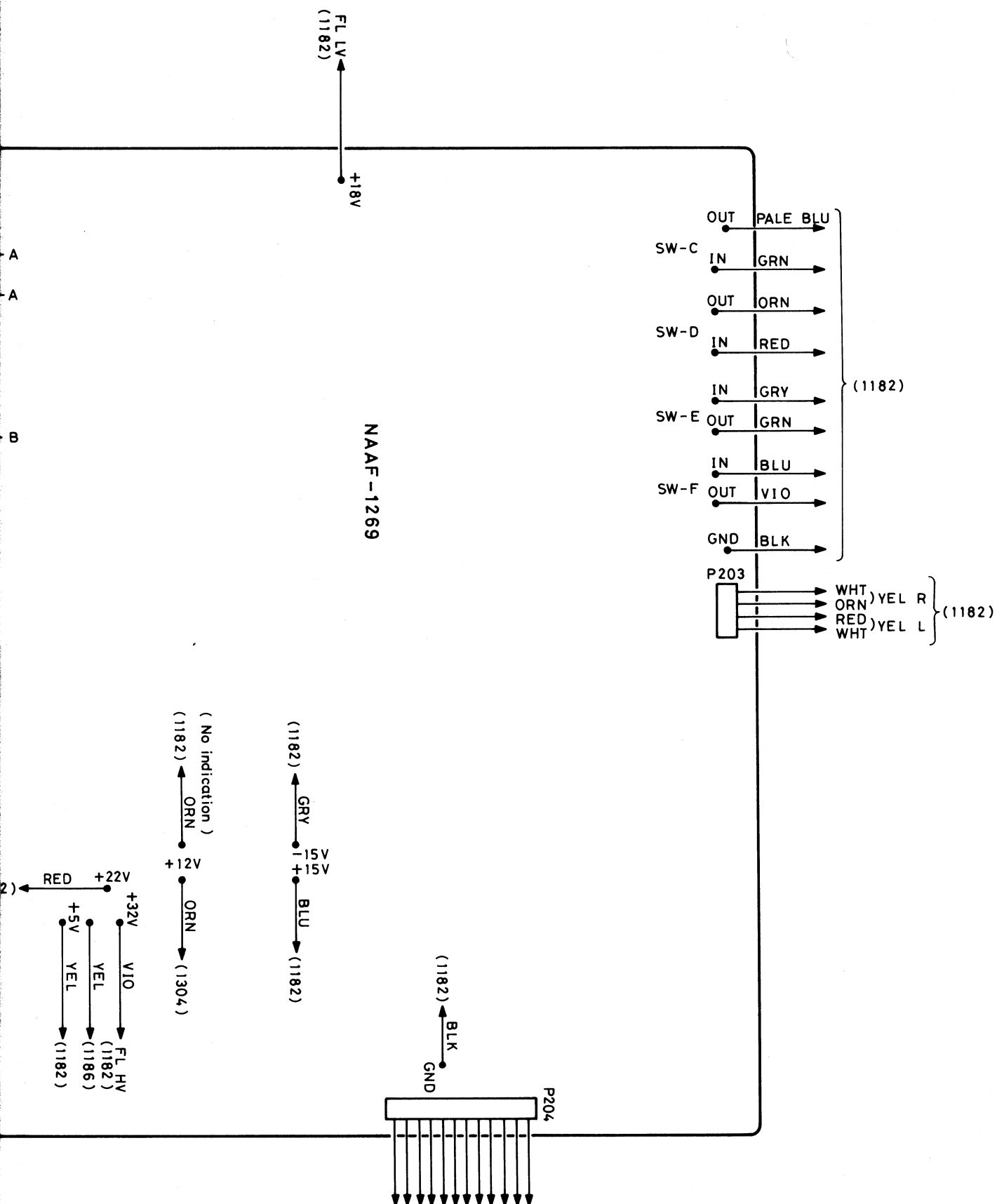


Fig. 40

REC /PB AMPLIFIER PC BOARD (NAAF-1182)

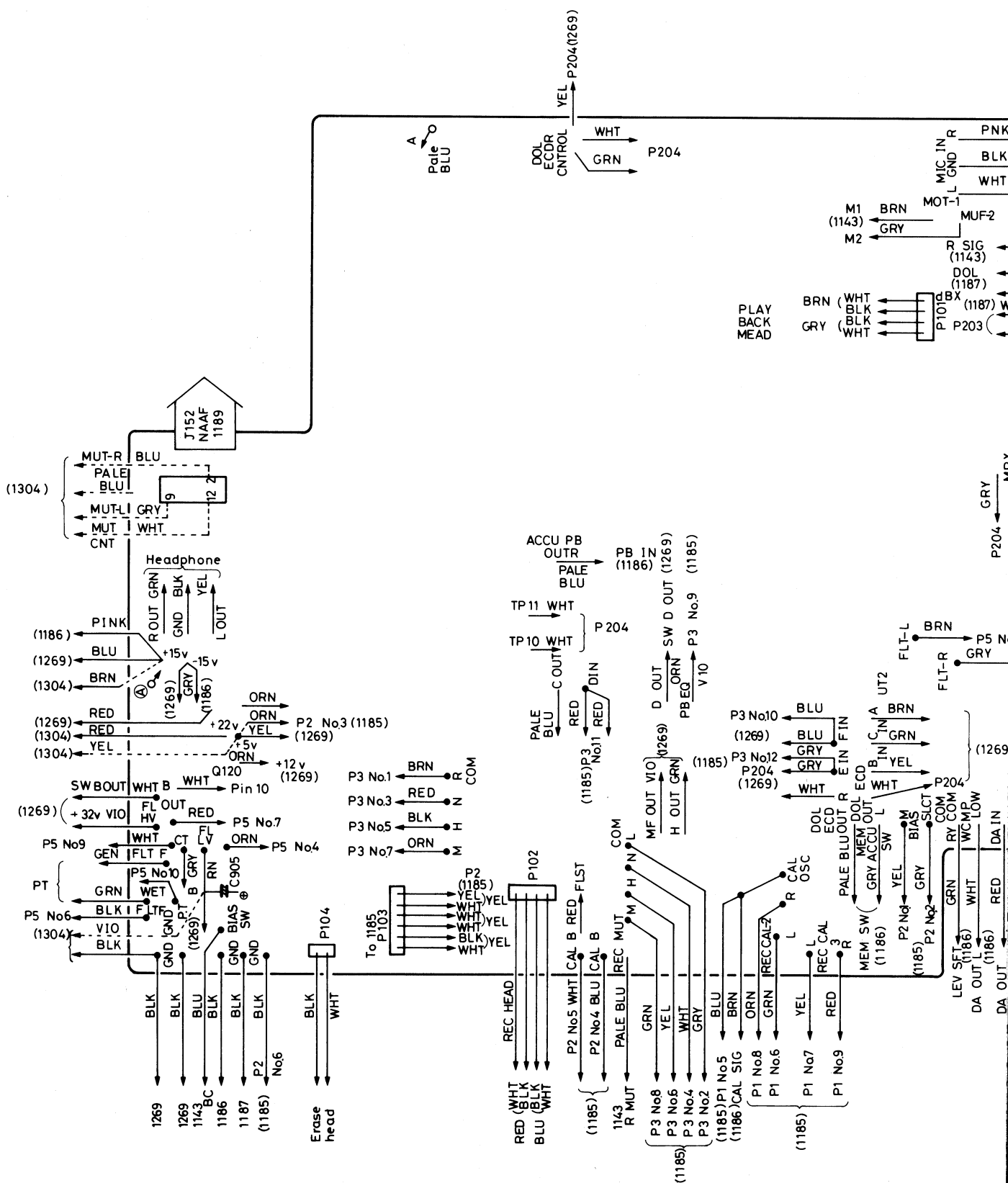


Fig. 41



NAAF 1189

Only 220V model

R

GND

L

DIN AMP

To Mic Jack

LINE IN

R

GND

L

R (1182)

LINE IN

L

J135
NAAF
1182

Fig. 43



MECHANISM CONTR



TAPE SELECTOR SWITCH PC BOARD (NASW-1185)

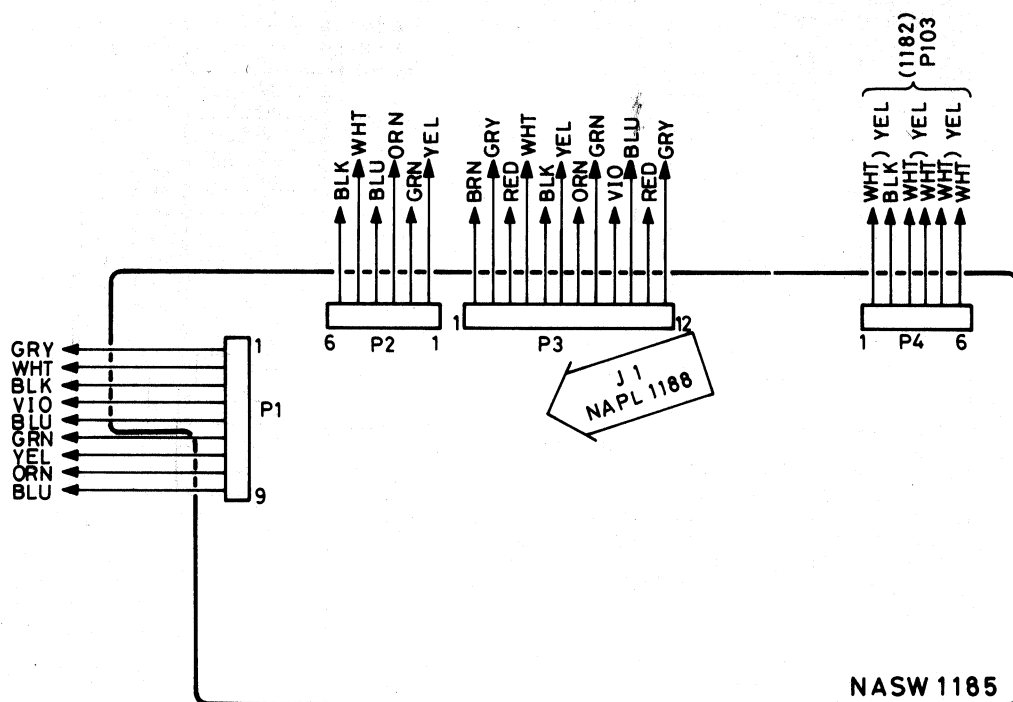


Fig. 46

ACCUBIAS DISPLAY PC BOARD (NAPL-1187)

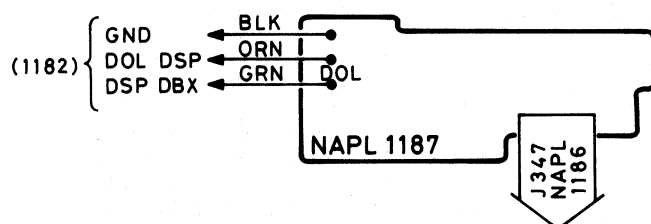


Fig. 47

MEMORY/TIMER SWITCH PC BOARD (NASW-1145)

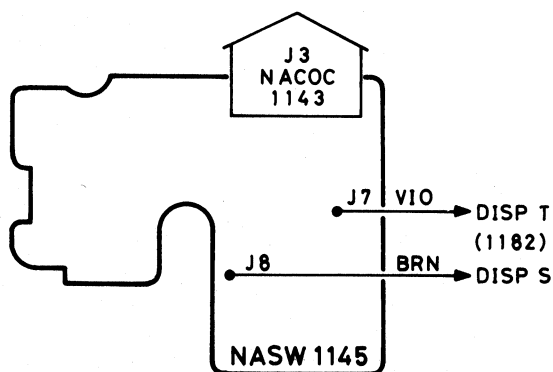


Fig. 48

WIRING DIAGRAM

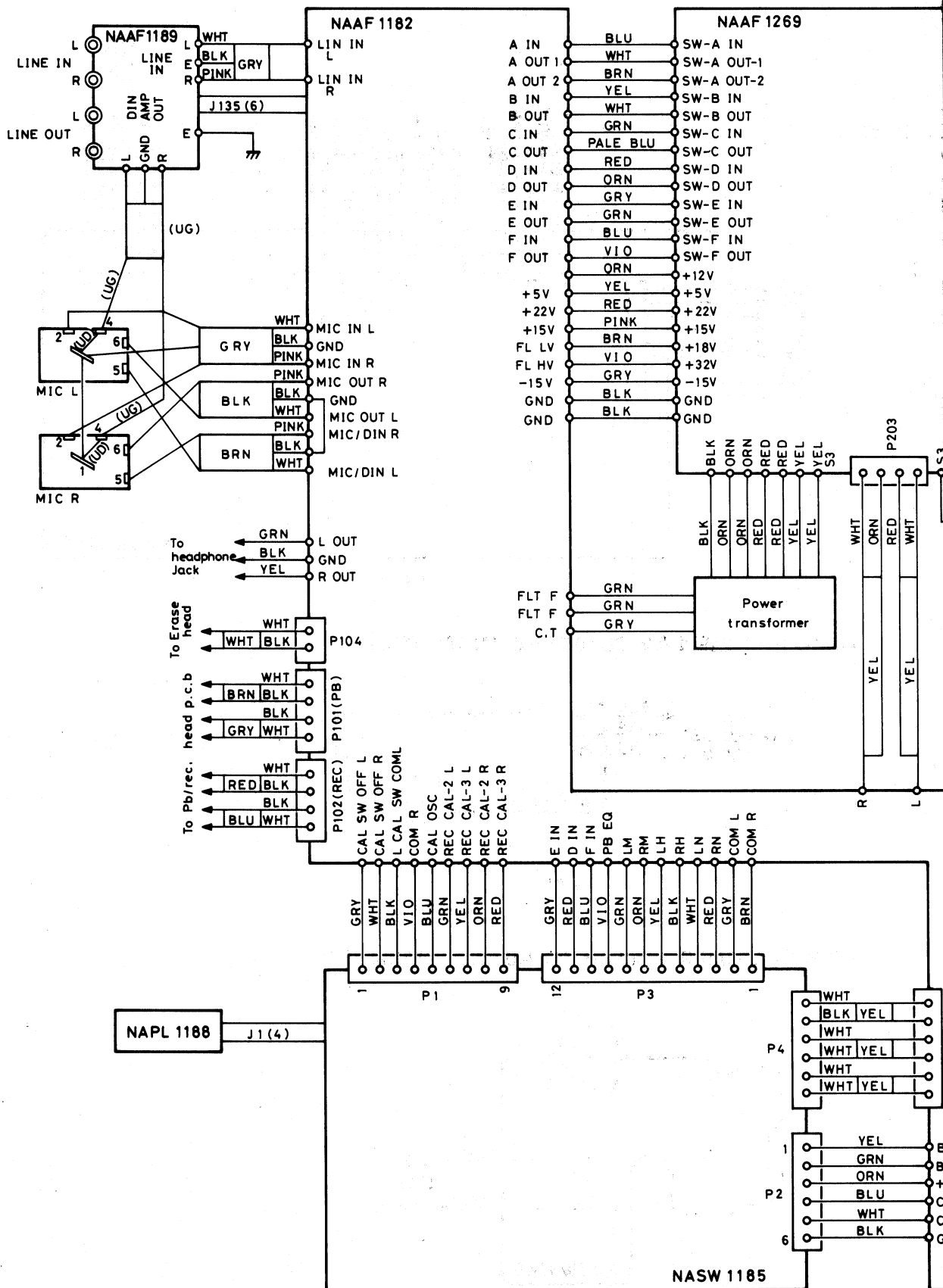
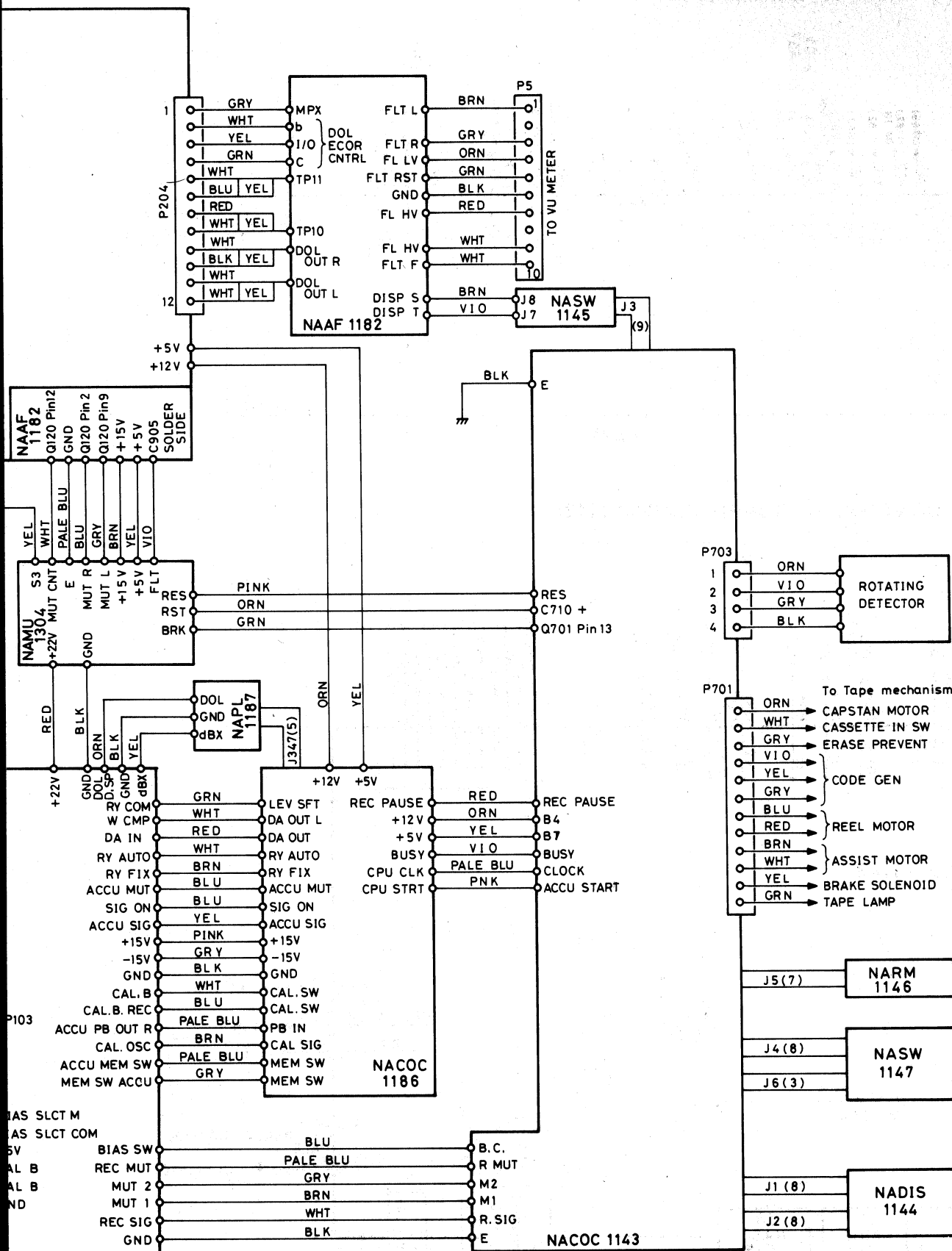
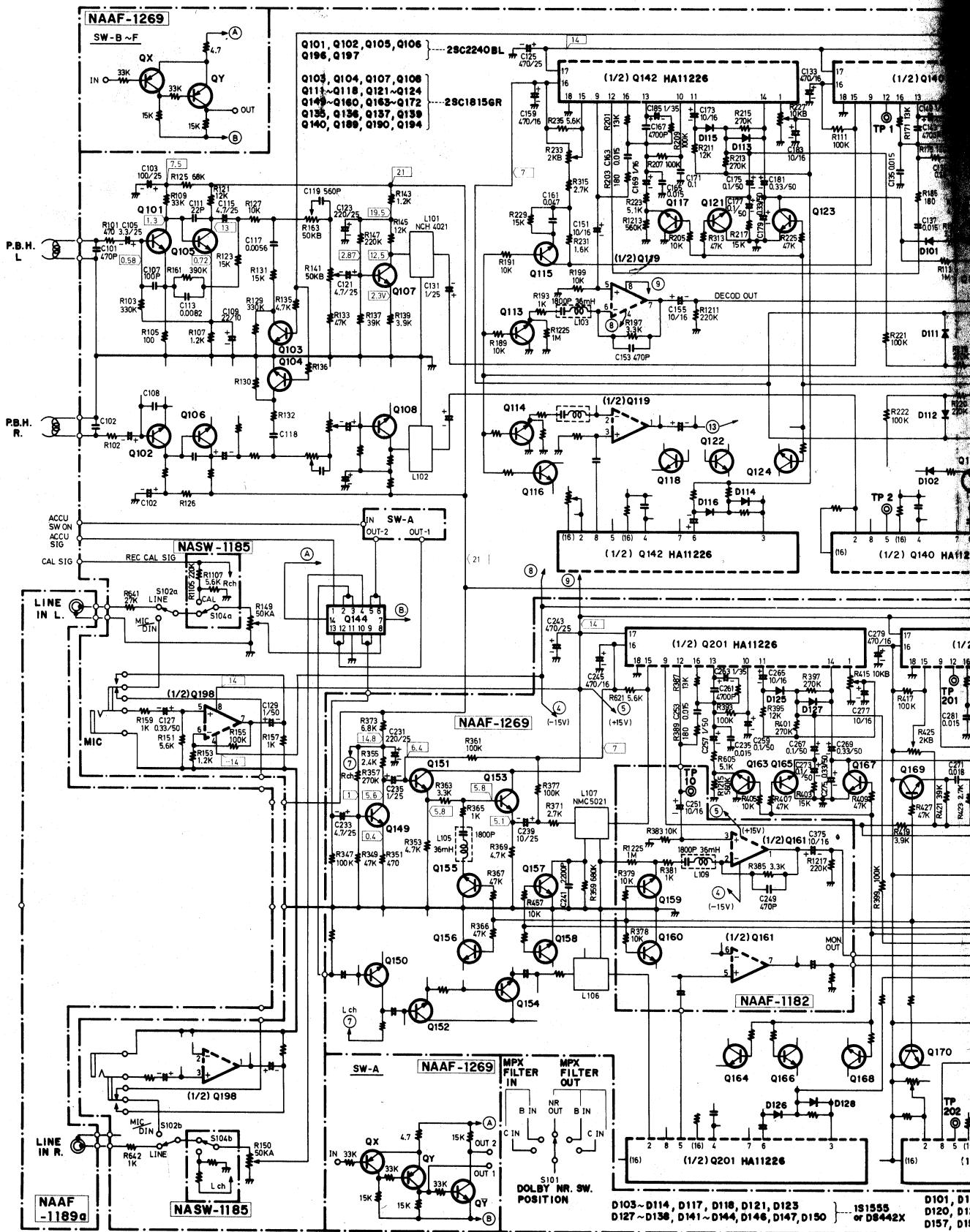


Fig. 49

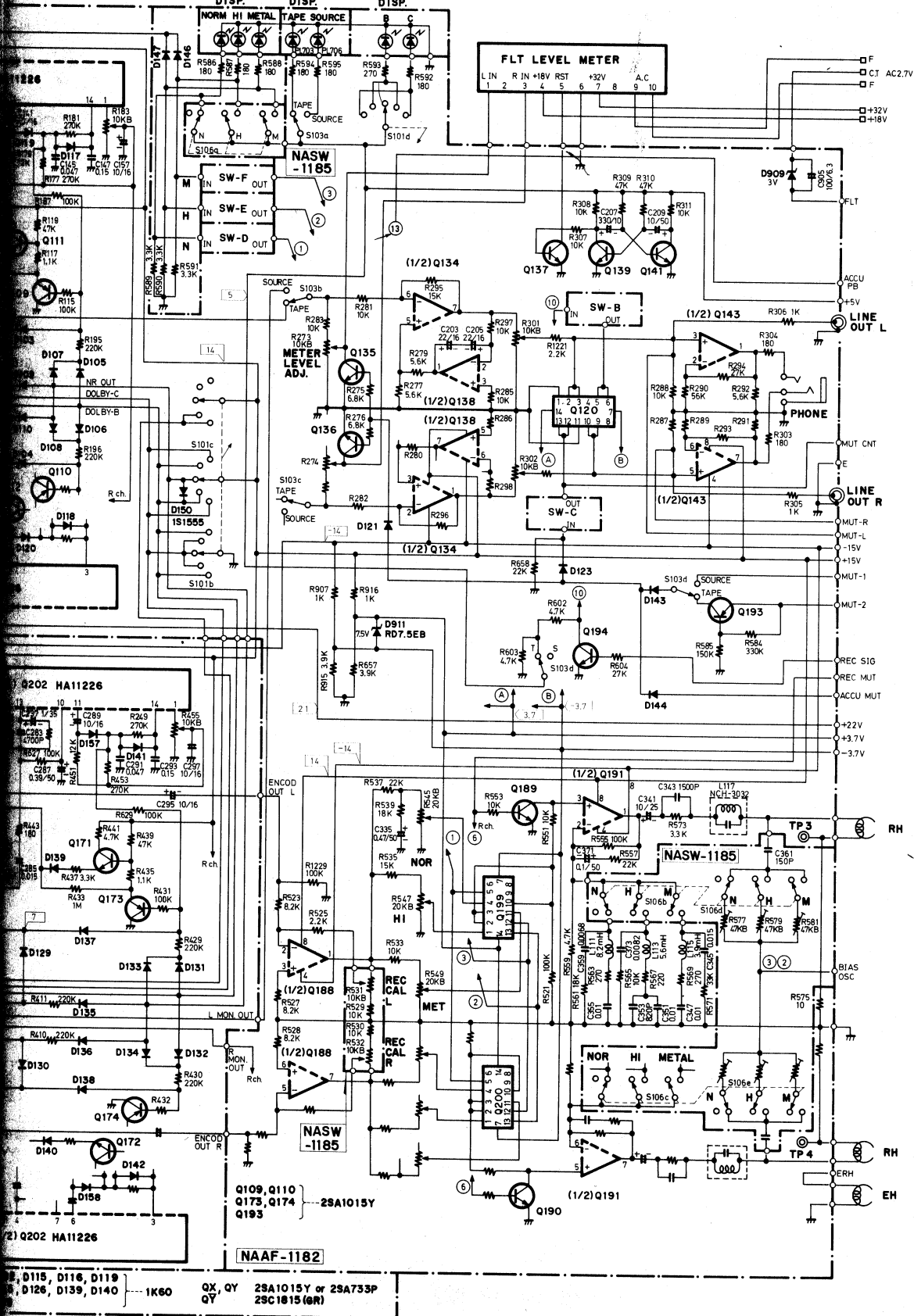
ACCUBIAS CONTROL PC BOARD (NACOC 1182)



LINE INPUT/OUTPUT AMPLIFIER SECTION (D model)



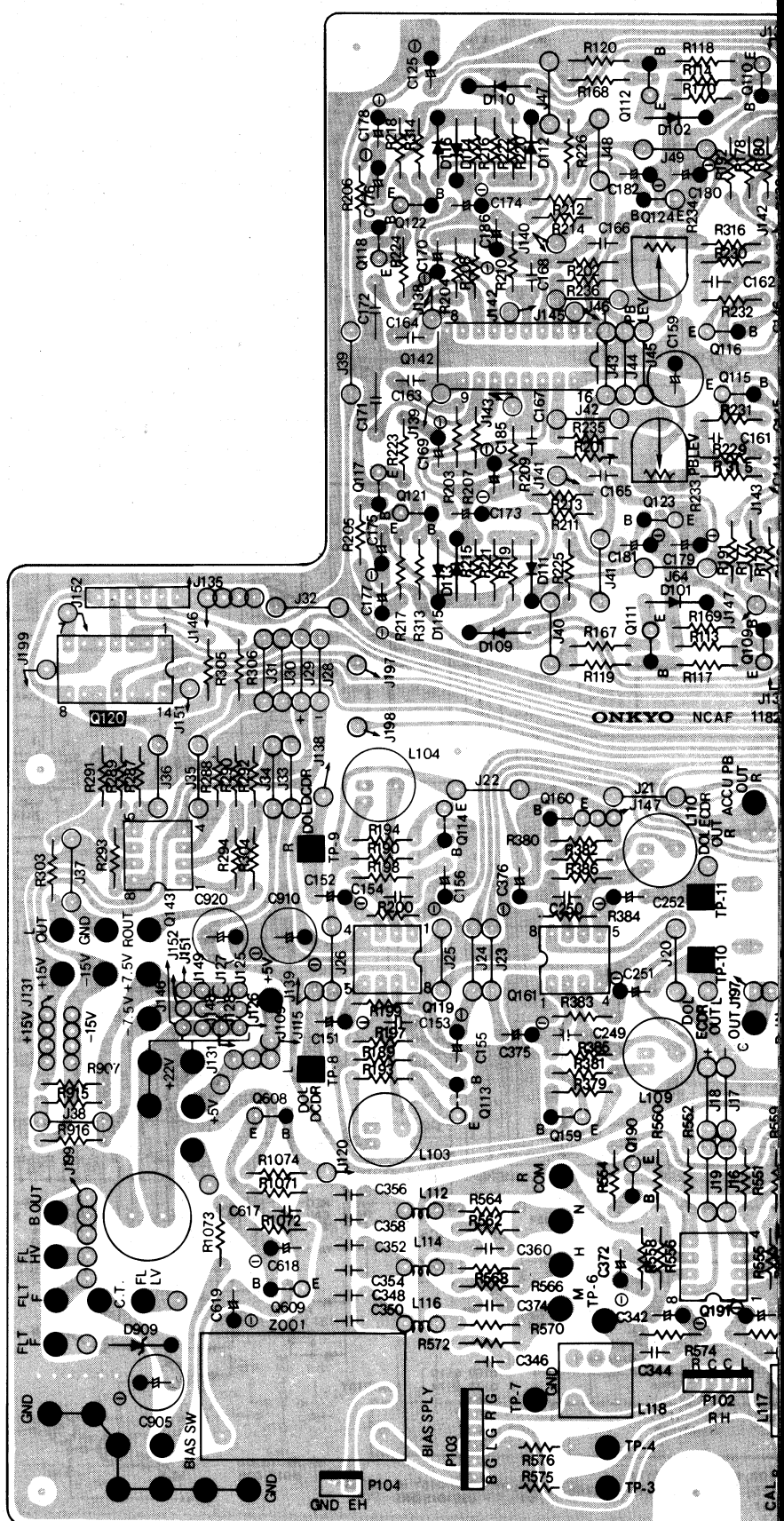
(NAPL-1188) (NASW-1145) (NAPL-1187)
TAPE SELECTOR DISF. TAPE MONITOR DISF. DOLBY NR. DISF.



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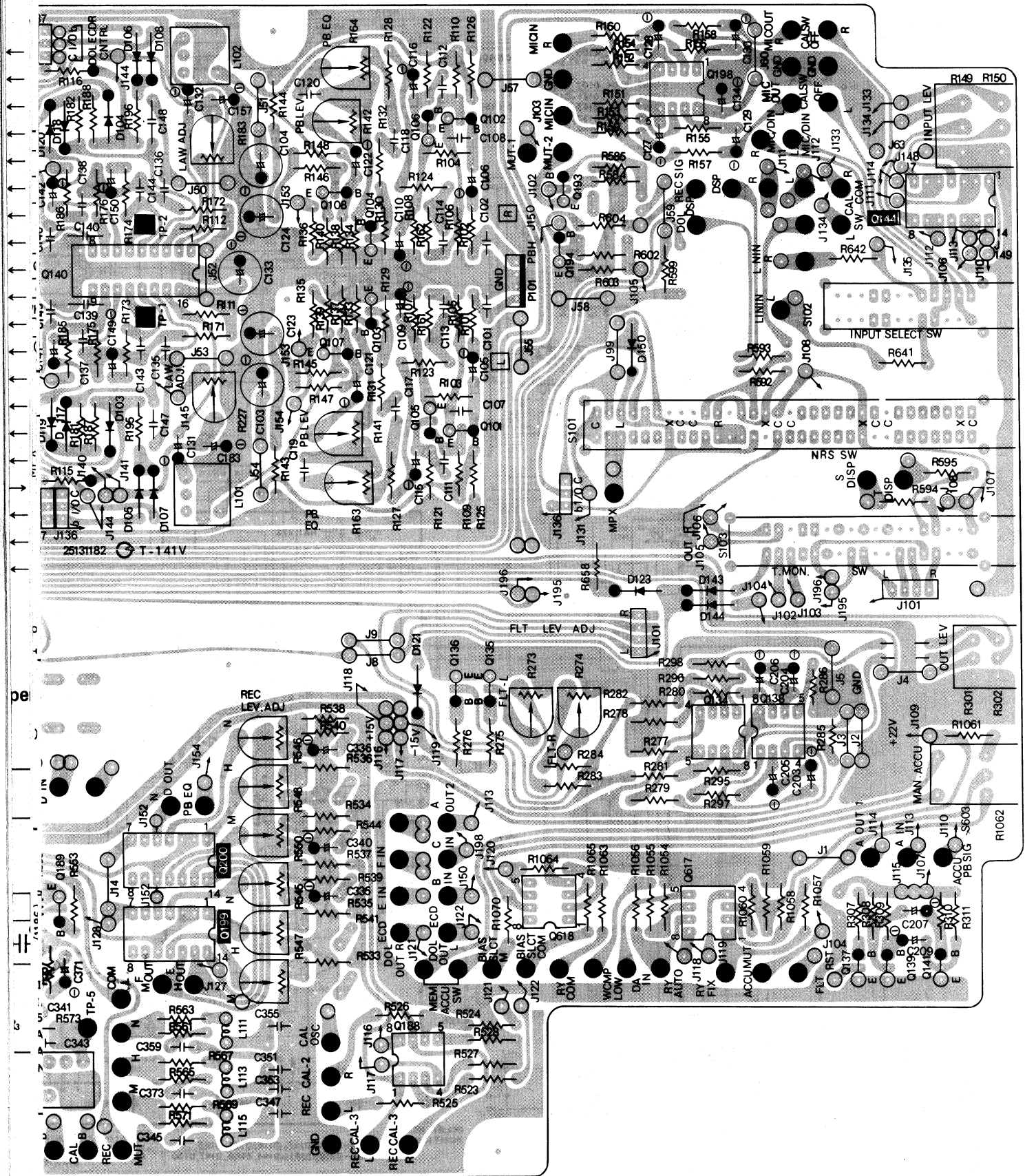
DIN AMPLIFIER PC BOARD (NAAF-1189)

REC /PLAYBACK AMPLIFIER PC BO

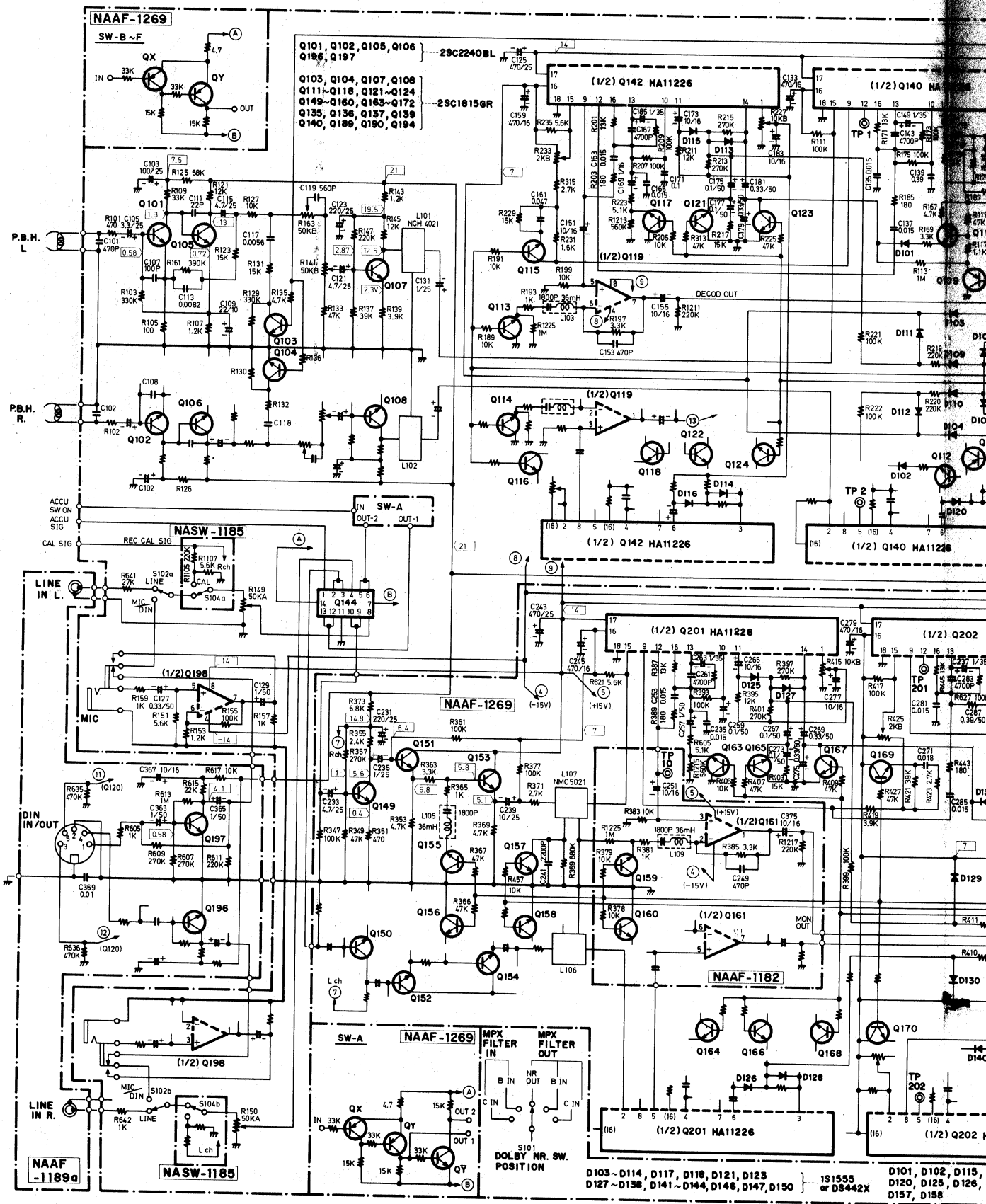


DARD (NAAF-1182)

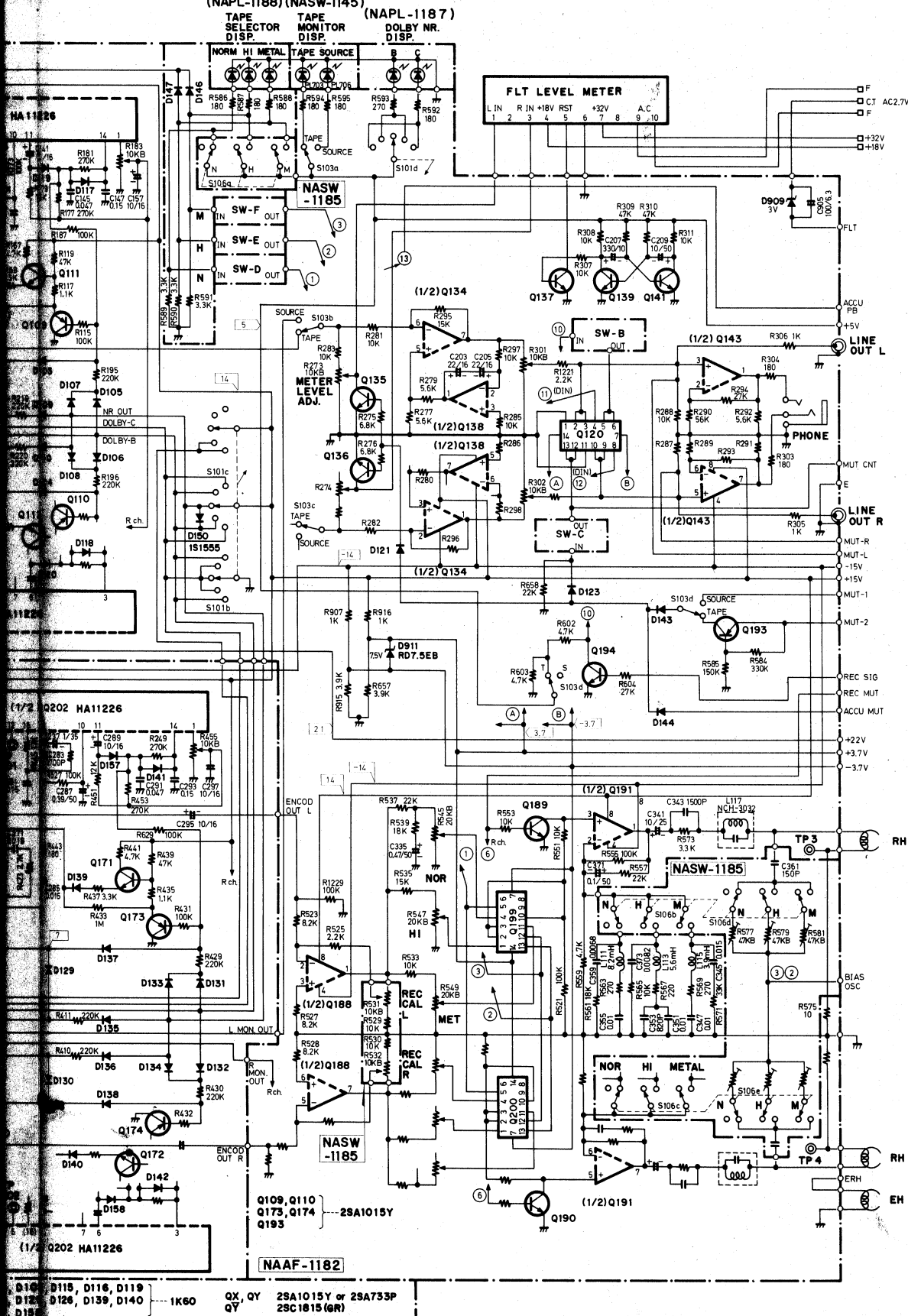
11



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



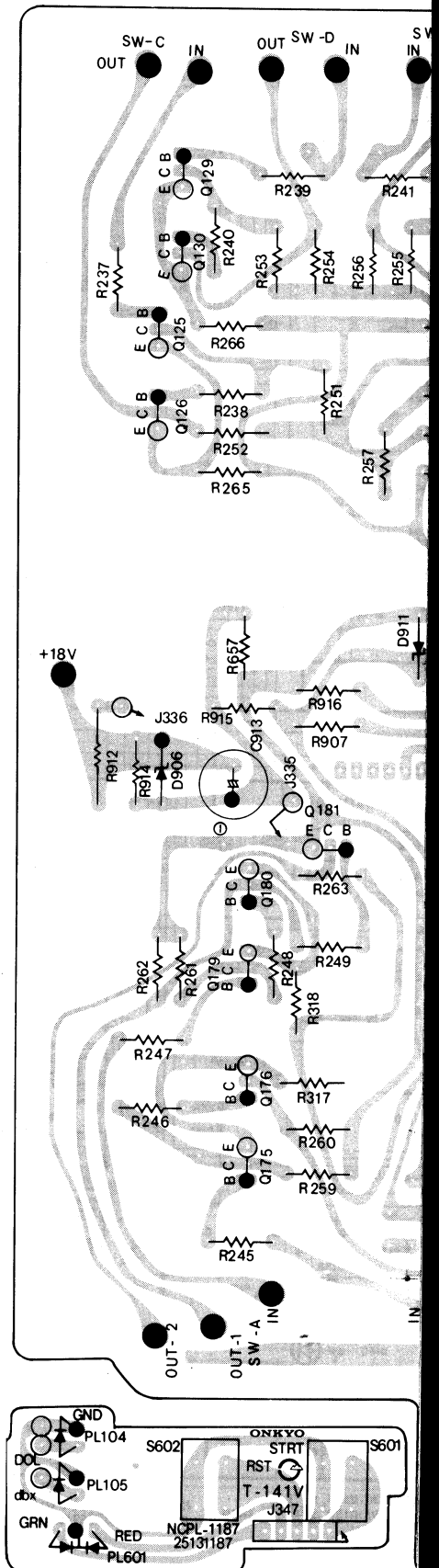
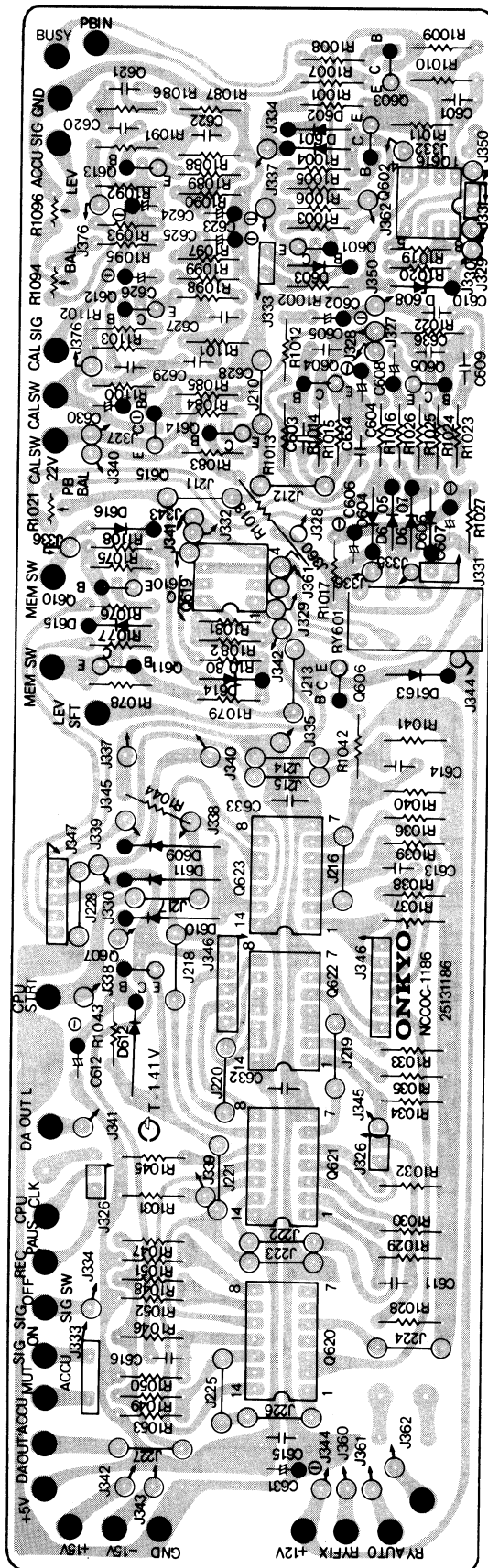
(NAPL-1188) (NASW-1145)
TAPF TAPF (NAPL-1187)



PC BOARD VIEW FROM COMPONENT SIDE

ACCUBIAS CONTROL PC BOARD (NACOC-1186)

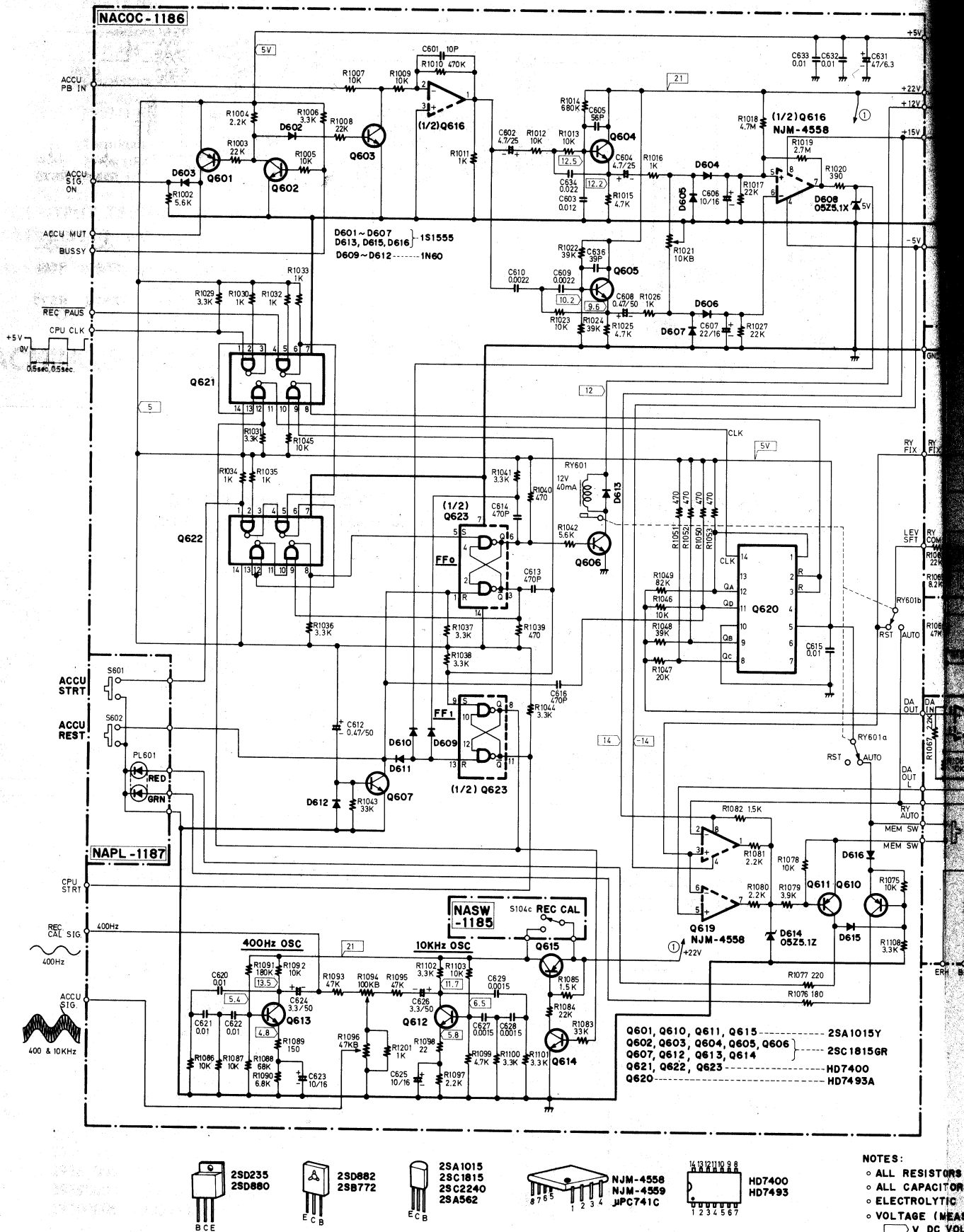
POWER SUPPLY AND LINE AM





SCHEMATIC DIAGRAM

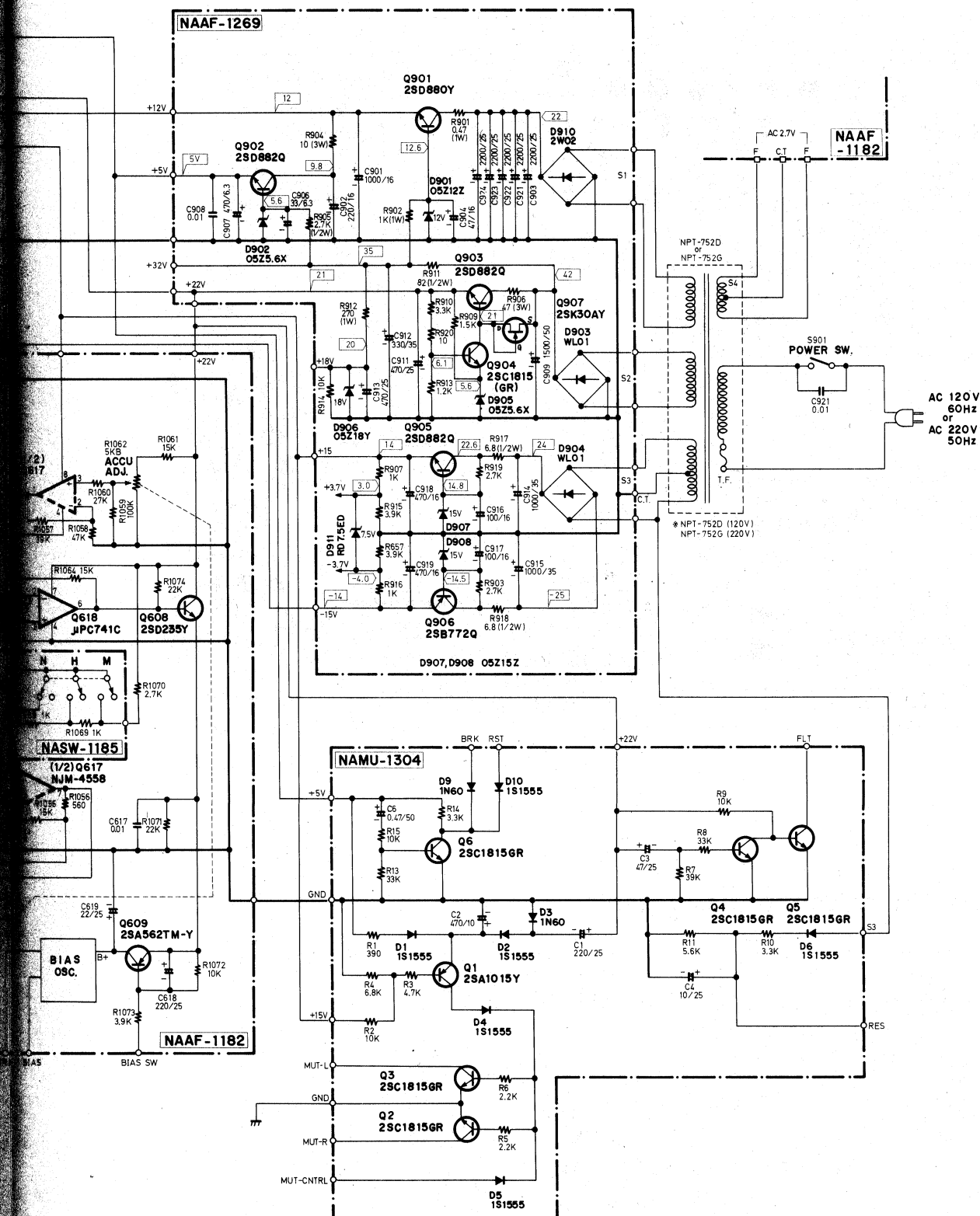
POWER SUPPLY AND ACCUBIAS CIRCUIT SECTION



NOTES:

- ALL RESISTORS
- ALL CAPACITOR
- ELECTROLYTIC
- VOLTAGE (MEAS

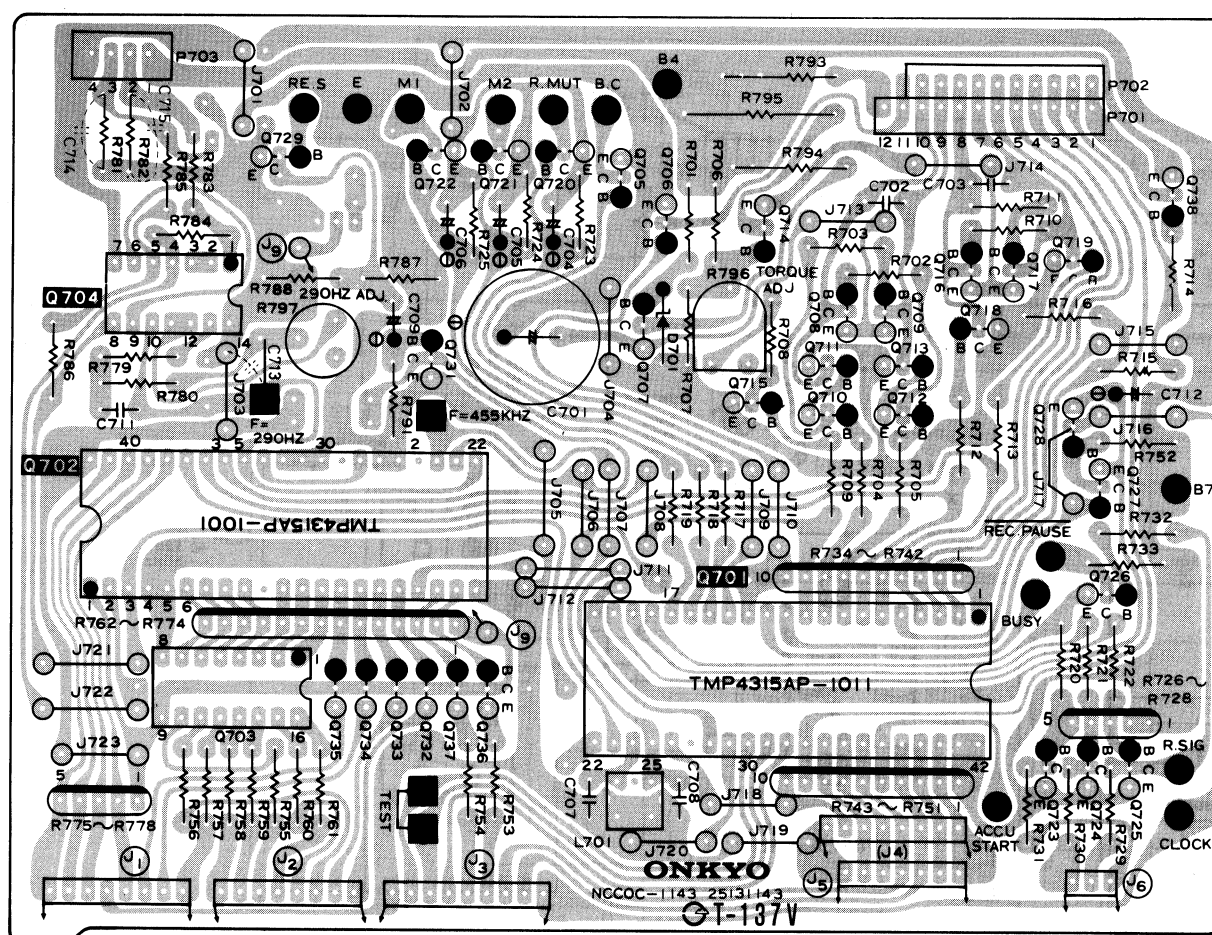
 V DC VOL



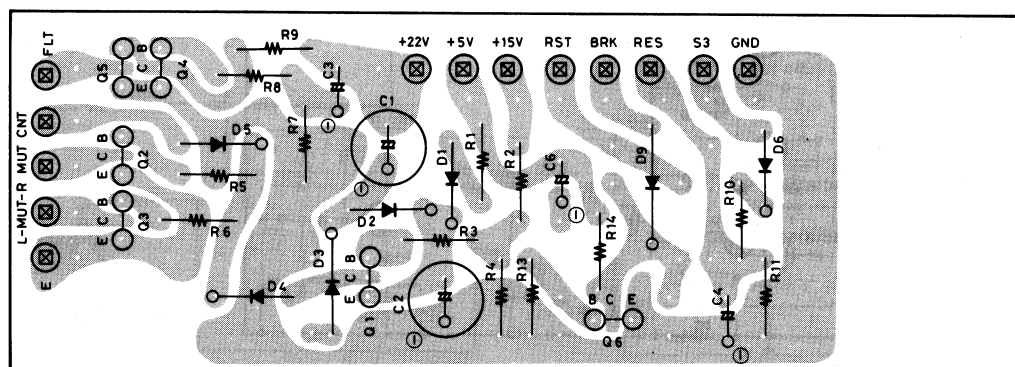
RESISTORS ARE IN OHMS, 1/4 WATT UNLESS OTHERWISE NOTED.
 CAPACITORS ARE IN μ F 50V UNLESS OTHERWISE NOTED.
 POLARIZED CAPACITORS ($\pm$) ARE IN μ F/WV.
 MEASURED WITH V.T.V.M.).
 NO INPUT SIGNAL).

PC BOARD VIEW FROM COMPONENT SIDE

MECHANISM CONTROL PC BOARD (NACOC-1143)

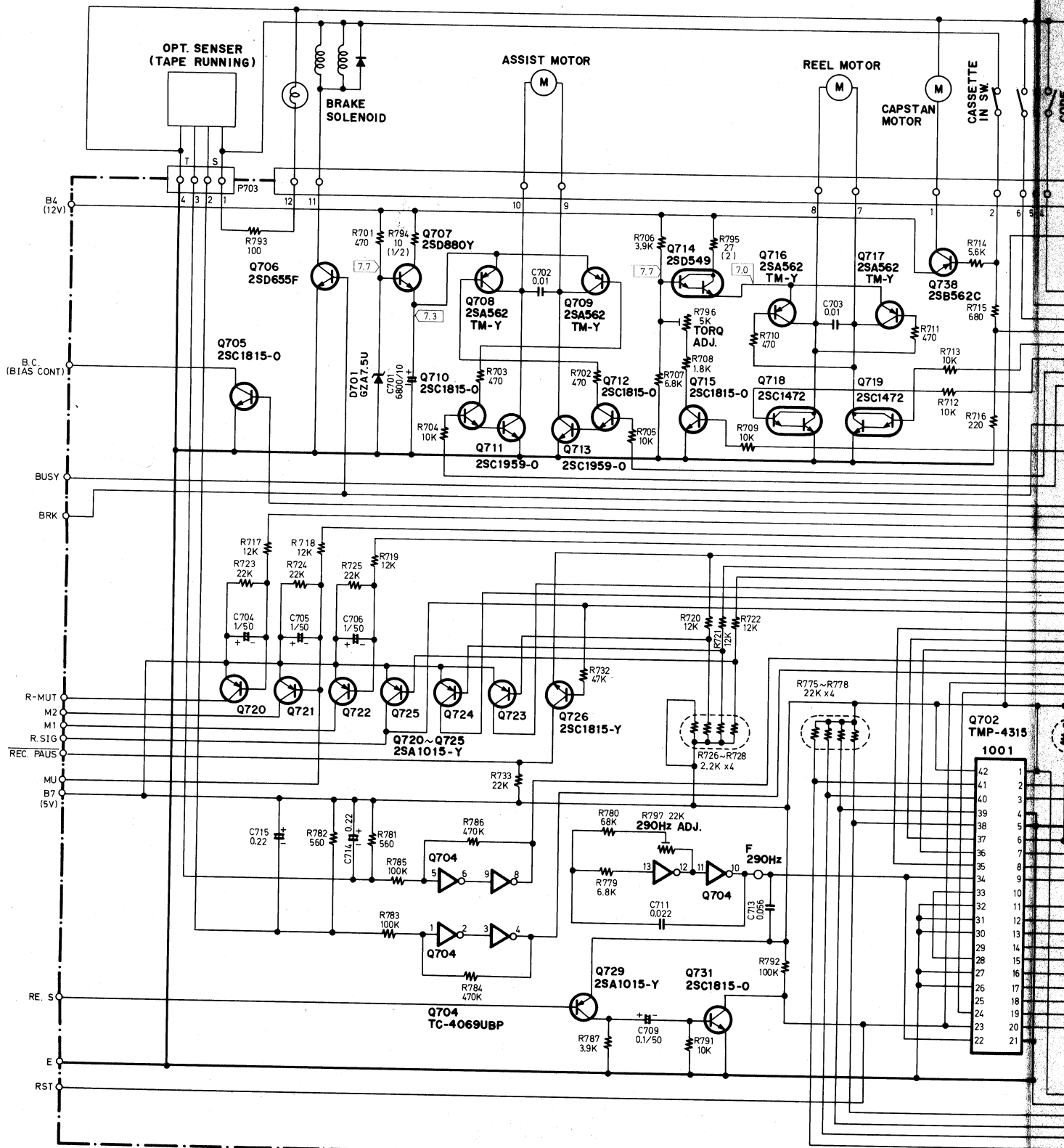


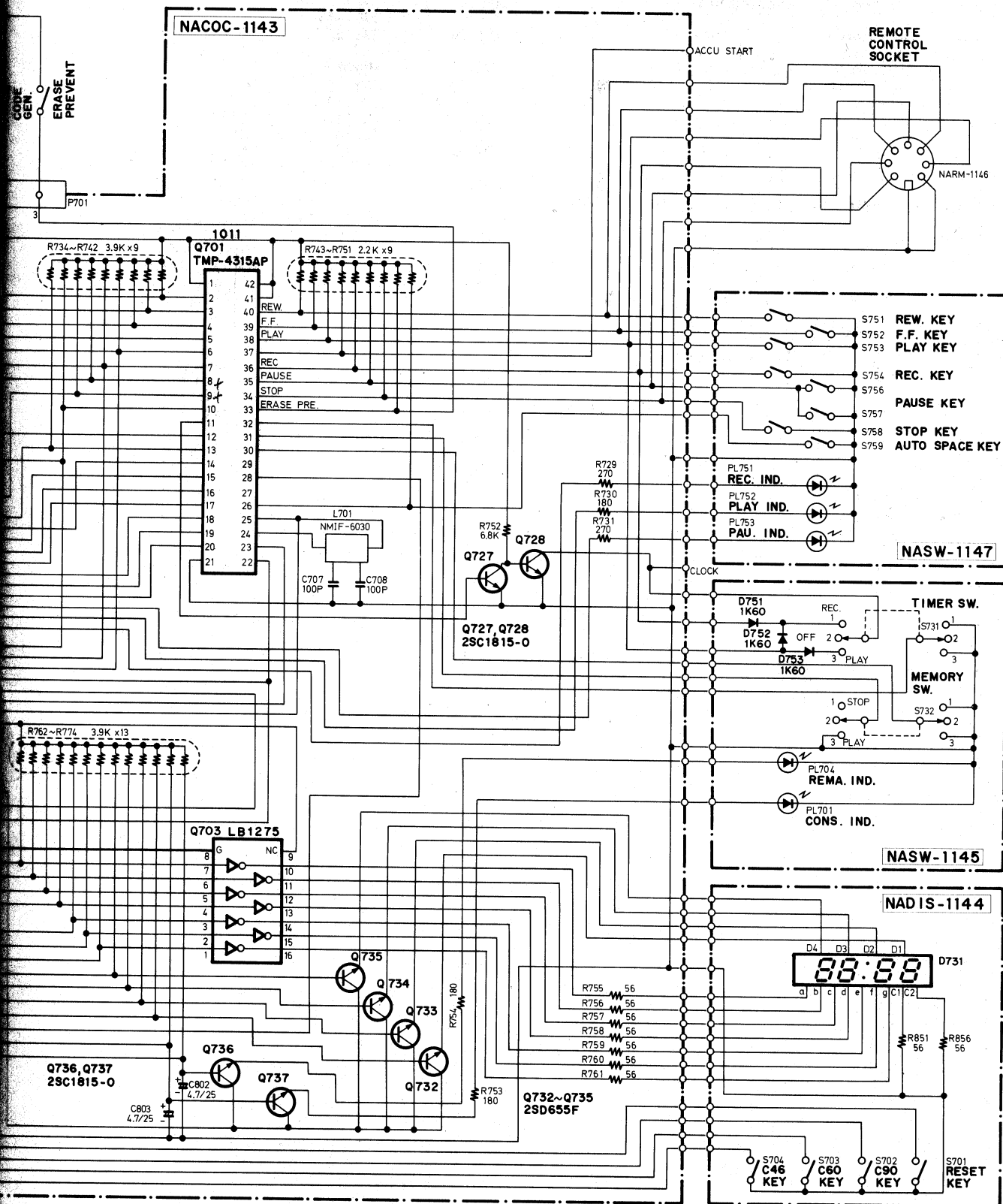
MUTING CIRCUIT PC BOARD (NAMU-1304)



SCHEMATIC DIAGRAM

CONTROL SECTION





DIN AMPLIFIER PC BOARD (NAAF-1189a)**— PARTS LIST (Only G/W models)**

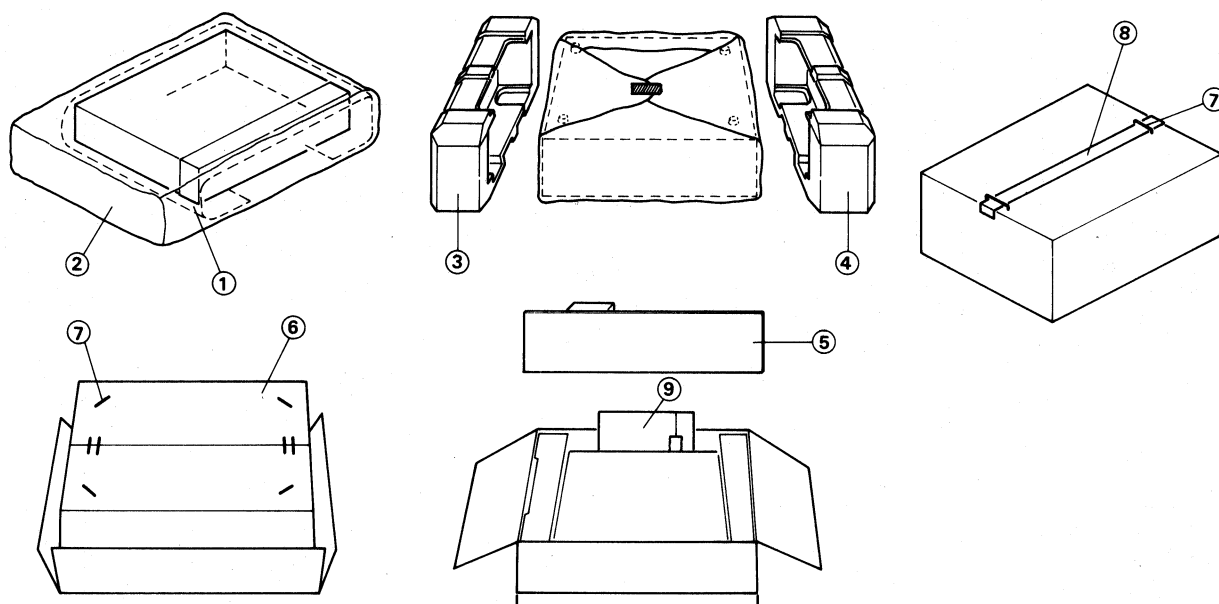
CIRCUIT NO.	PARTS NO.	DESCRIPTION
Transistors		
Q196, Q197	2211406	2SC2240(BL)
Capacitors		
C363—C366	352780109	1 μ F, 50V, Elect.
C367, C368	352741009	10 μ F, 16V, Elect.
Terminals		
	25045084	NPJ-4PDBL42, Input/output
	25050103	NSCT-5P24, DIN

INPUT/OUTPUT TERMINAL PC BOARD (NAAF-1189)**— PARTS LIST (Only D model)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	25045084	NPJ-4PDBL42, Input/output terminal

MUTING CIRCUIT PC BOARD (NAMU-1304)**— PARTS LIST**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Transistors		
Q1	2210803 or 2211454	2SA733(P) or 2SA1015(Y)
Q2—Q6	2211255	2SC1815(GR)
Diodes		
D1, D2	233105	1S1555
D3	223103	1N60
D4—D6	223105	1S1555
D9	223103	1N60
D10	223105	1S1555
Capacitors		
C1	352752219	200 μ F, 25V, Elect.
C2	352734719	470 μ F, 10V, Elect.
C3	352754709	47 μ F, 25V, Elect.
C4	352751009	10 μ F, 25V, Elect.
C6	352784799	0.47 μ F, 50V, Elect.

PACKING PROCEDURES**D model****REF. NO. PARTS NO. DESCRIPTION**

1	29095012-1	500x800mm, Protection sheet
2	29100034	650x850mm, Poly bag
3	29090624	Pad, right
4	29090625	Pad, left
5	29090672	Pad, front
6	29050481	Master carton box
7	282301	Sealing hook
8	260012	W-500mm, Damplon tape
9		Accessory bag ass'y
	29340540	Instruction manual
	253074	Connection cable
	29365006-1	Warranty card
	29358002	Service station list
	29100005	220x330mm, Poly bag

G/W model**REF. NO. PARTS NO. DESCRIPTION**

1	29095012-1	500x800mm, Protection sheet
2	29100034	650x850mm, Poly bag
3	29090624	Pad, right
4	29090625	Pad, left
5	29090672	Pad, front
6	29050481	Master carton box
7	282301	Sealing hook
8	260012	W-500mm, Damplon tape
9		Accessory bag ass'y
	29340541	Instruction manual
	253074	Connection cable
	29365005-3	Warranty card [G]
	25055040	CV-K-2, Conversion plug [W]
	29100005	220x330mm, Poly bag

[G] : Only West Germany model

[W] : Only 120/220 V model

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