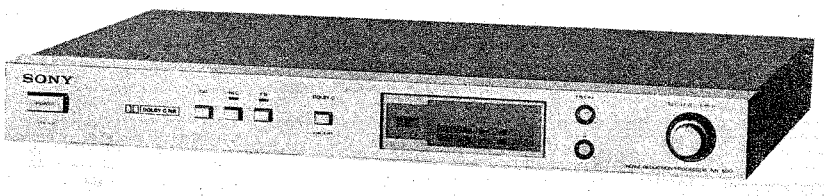
NR-500

US Model
Canadian Model
AEP Model



'Dolby' and the double-D symbol are the trade marks of Dolby Laboratories. Noise reduction system manufactured under license from Dolby Laboratories.

NOISE REDUCTION PROCESSOR

SPECIFICATIONS

Noise reduction system:	Dolby C-type NR (Noise Reduction) System switchable for stereo recording or playback
Improvement of signal-to-noise ratio:	18 dB at 1 kHz, 20 dB at 2 kHz–8 kHz
Tape saturation level improvement:	4 dB at 10 kHz
Frequency response:	20–20,000 Hz ±3 dB
Encoder inputs (LINE IN):	Sensitivity 77.5 mV (–20 dB) (max.) Input impedance 50 k ohms or more
Encoder outputs (REC OUT):	Output level 0.245 V (–10 dB) Load impedance 10 k ohms or less
Decoder inputs (TAPE):	Sensitivity 77.5 mV (–20 dB) (max.) Input impedance 50 k ohms or more
Decoder outputs (LINE OUT):	Output level 0.435 V (–5 dB) Load impedance 10 k ohms or less
Calibration indicator:	Accuracy of PROPER LEVEL: ±0.5 dB
Power requirements:	120 V ac, 60 Hz (US, Canadian model) 220 V ac, 50 Hz (AEP model)
Power consumption:	7 watts
AC outlet:	1 unswitched, 300 watts (max.) (US, Canadian model)
Dimensions:	Approx. 430 x 55 x 285 mm (w/h/d) (17 x 2¼ x 11¼ inches) including projecting parts and controls
Weight:	Approx. 3.2 kg (7 lb 1 oz)

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS RUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

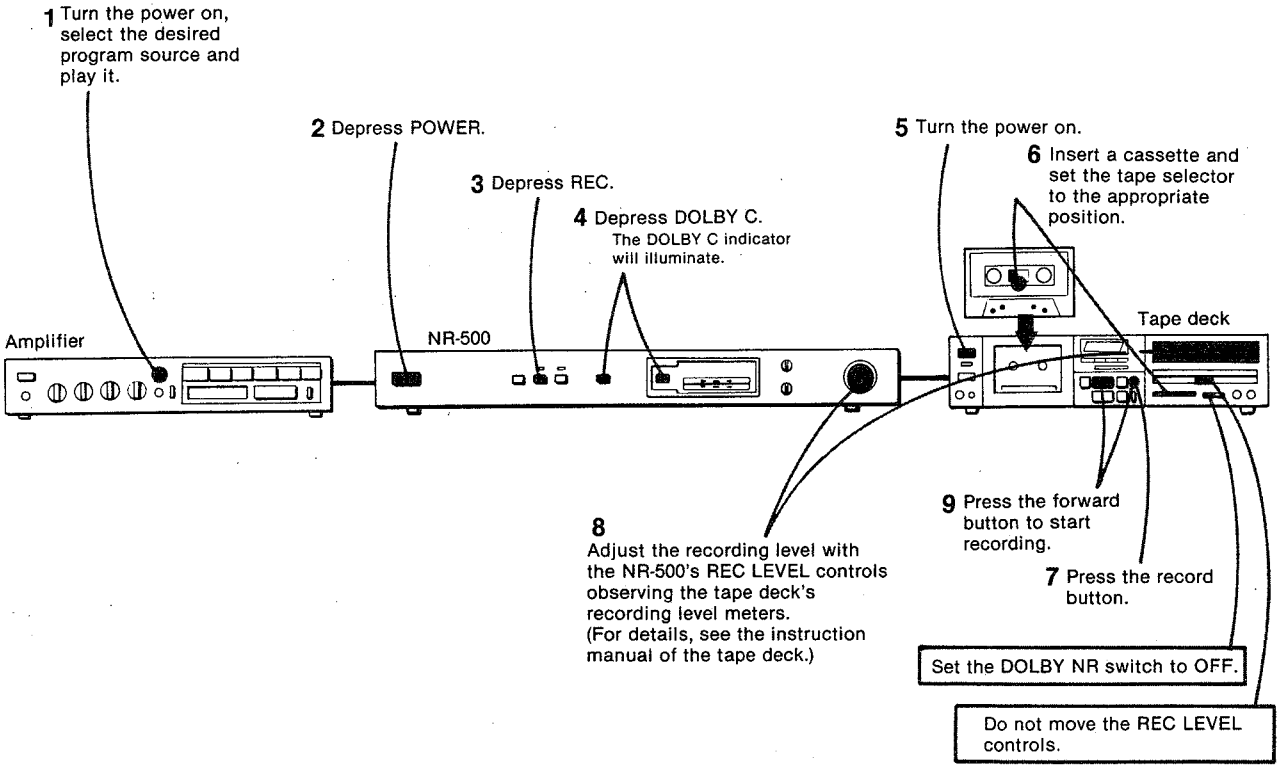
LES COMPOSANTS IDENTIFIÉS PAR UNE TRAME ET UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES, LES VUES EXPLOSÉES ET LA LISTE DES PIÈCES SONT CRITIQUÉS POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

MICROFILM

SONY®
SERVICE MANUAL

RECORDING WITH THE DOLBY C-TYPE NR SYSTEM

Follow the numbered sequence.
- If you are using two NR-500s, operate **the NR-500 for recording.**

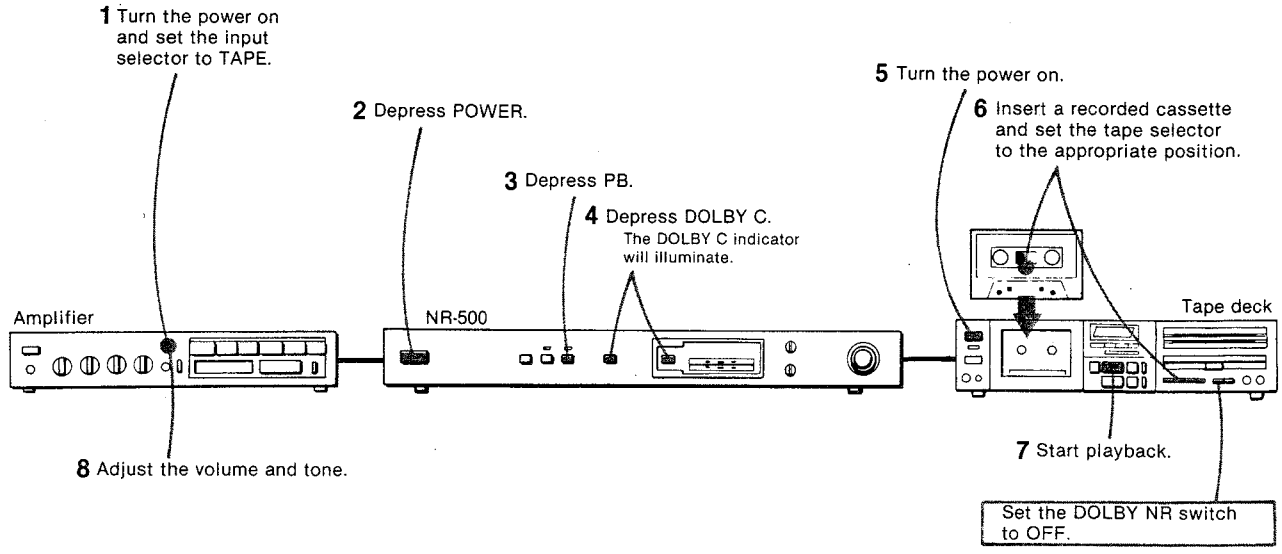


- If your tape deck has 2 heads, you can hear the program source sound through the speakers or headphones during the Dolby C NR recording.
- If you use a 3-head tape deck with only one NR-500, you cannot monitor the recorded sound during the Dolby C NR recording. Even if the monitor switch of the tape deck is set to TAPE, the program source sound will be heard. (During a recording without the Dolby C-type NR system, you can monitor the recorded sound using the monitor switch.)

MPX FILTER switch (on the rear panel)
Normally set this switch to OFF.
When recording FM stereo broadcasts with the Dolby C-type NR system, set it to ON if the 19 kHz pilot signal and the 38 kHz sub-carrier have not been adequately suppressed by the FM tuner or receiver. If the tuner or the receiver suppresses such signals adequately (most high-quality tuners and receivers will), you do not have to set this switch to ON.

PLAYBACK WITH THE DOLBY C-TYPE NR SYSTEM

Follow the numbered sequence.
- If you are using two NR-500s, operate **the NR-500 for playback.**

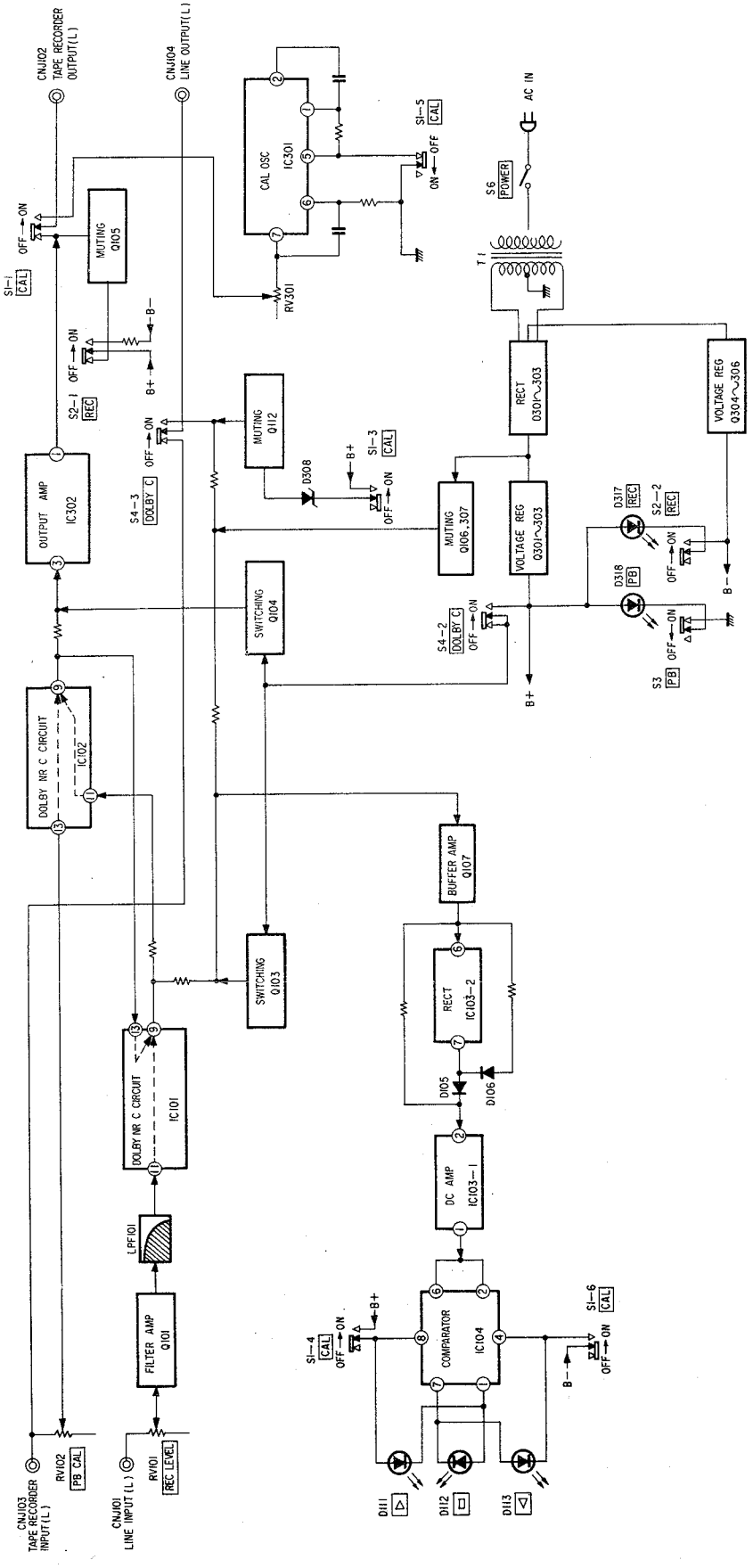


RECORDING/PLAYBACK WITHOUT THE DOLBY C-TYPE NR SYSTEM

Press to release the DOLBY C switch of the NR-500, so that you can record or play back without the Dolby C-type NR process. In this case, perform the following:
- Depress the POWER switch of the NR-500(s).
- For recording, depress the REC switch of the NR-500; for playback, depress the PB switch.
- Adjust the recording level with the REC LEVEL controls of the NR-500. Do not move the REC LEVEL controls of the tape deck.

SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM



1-2. CIRCUIT OPERATION

DOLBY NR (NOISE REDUCTION) SYSTEM

Until recently there have been just two types of Dolby NR system: the A-type for professional use, and the B-type, a simplified version of the A-type, employed by most consumer-grade cassette decks. Now, a third type of Dolby NR system is available, the C-type. The C-type system reduces tape noise much more effectively than the B-type system.
This set can be used both of the B-type and the C-type by switching.
Simply set the TYPE switch to the B position when playing back a tape recorded using the Dolby NR B-type system. Set to C for tape recorded using the C-type system.

The DOLBY NR system reduces noise level for both recording and playback processes. Therefore, for playback, be sure that the DOLBY NR switch is in the same position as it was for recording.

During recording, low-level high-frequency signals, which tend to be obscured by tape hiss, are boosted so that they are substantially higher in level than any tape noise. When these signals are played back, the level is lowered to the original input level, while simultaneously the level of any tape noise is reduced to the same extent.
The Dolby NR B-type system thus reduces tape noise by 10 dB at 5 kHz. The C-type system reduces noise by 20 dB at 5 kHz. The Dolby NR C-type system also begins to take effect at frequencies lower than the B-type system. (Refer to Fig. 1, 2)

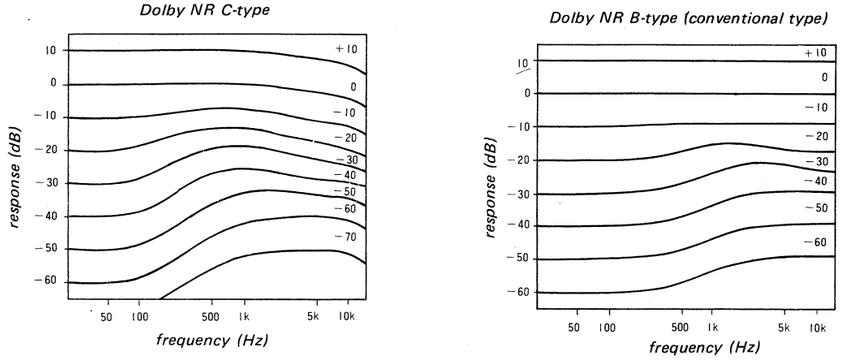


Fig. 1 Encoding characteristics

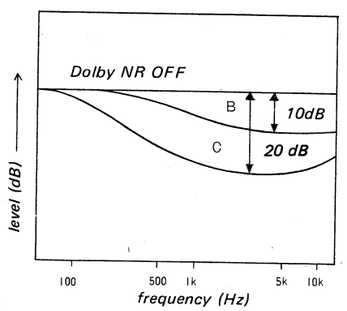
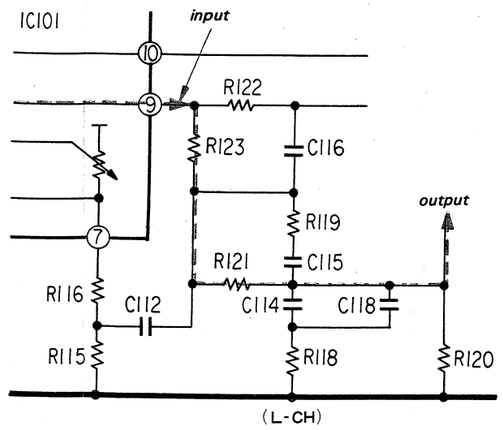


Fig. 2 Noise improvement

RECORDING IN DOLBY NR C-TYPE SYSTEM (Refer to Fig. 3)

In the C-type system, one processor (CX174) is used in the high-level stage and one in the low-level stage. 10 dB is encoded in each stage level, thus 20 dB is finally encoded.
The operation is the same for both L-CH and R-CH, and L-CH is explained below. During recording, input signals pass through the LPF101, then are applied to terminal (11) of IC101 in the high-level stage. The signal which passes through the variable filter and is encoded 10 dB is applied to terminal (11) of IC102 in the low-level stage. Then it is encoded 10 dB again and is fed to the output amp.



1) High-Level Stage (Refer to Fig. 4)

a) Variable Filter
The variable filter in the high-level stage consists of one-path the same as the B-type system. The cut-off frequency is about 180 Hz (fT_1) and about 568 Hz (fT_2) under the lowest level signal conditions in the C-type system.
In the B-type, it is about 458 Hz (fT_1) and about 1.64 kHz (fT_2).

b) Spectral Skewing
The L–C–R series-connected resonance circuit is used to improve the noise modulation and to skew the frequency response in the high-level.
The resonance frequency is 20 kHz.

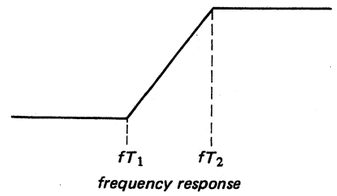


Fig. 4 High-Level Stage Variable Filter

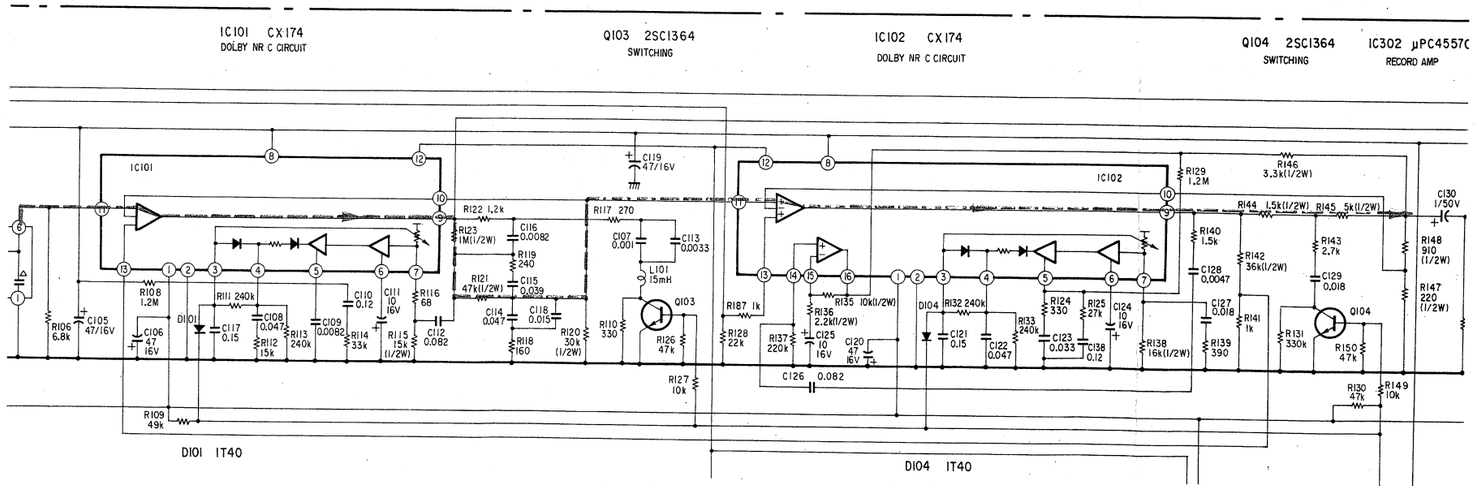


Fig. 3 REC Signal Path

2) Low-Level Stage

a) Variable filter (Refer to Fig. 5)

The variable filter in the low-level stage consists of two-paths (the main and the sub) the same as a standard circuit.

The cut-off frequency is identical to that of the high level stage.

b) Anti-saturation network (Refer to Fig. 6)

The anti-saturation network reduces high-level high-frequency signals when input signals are high to correct the tendency of the tape to saturate in high-level.

The cut-off frequency is 1.4 kHz (fT_1) and 3 kHz (fT_2).

PLAYBACK IN DOLBY NR C-TYPE

(Refer to Fig. 7)

The output signal of the playback EQ amp first is applied to terminal (13) of IC102 and IC202 in the low-level stage. This is the opposite of recording. Then the signal passes through the variable filter consisting of two-paths and is decoded 10 dB. Then, the signal is applied to terminal (13) of IC101 and IC201 in the high-level stage and is decoded 10 dB again. Thus it is finally decoded 20 dB and is fed to the LINE output.

Frequency response transformed by the antisaturation network and spectral skewing during recording are restored to the original input level in playback by means of a circuit with opposite characteristics. The NF circuit provides these functions.

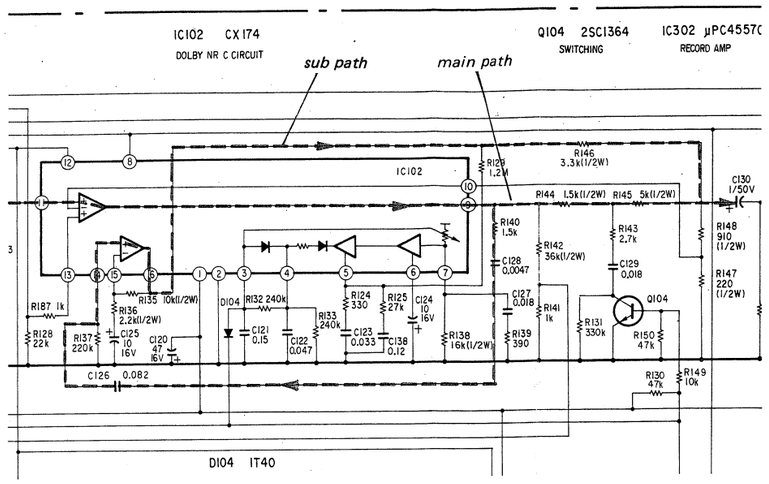


Fig. 5 Low-Level Stage Variable Filter (L-CH)

Fig. 6 Anti-saturation Network

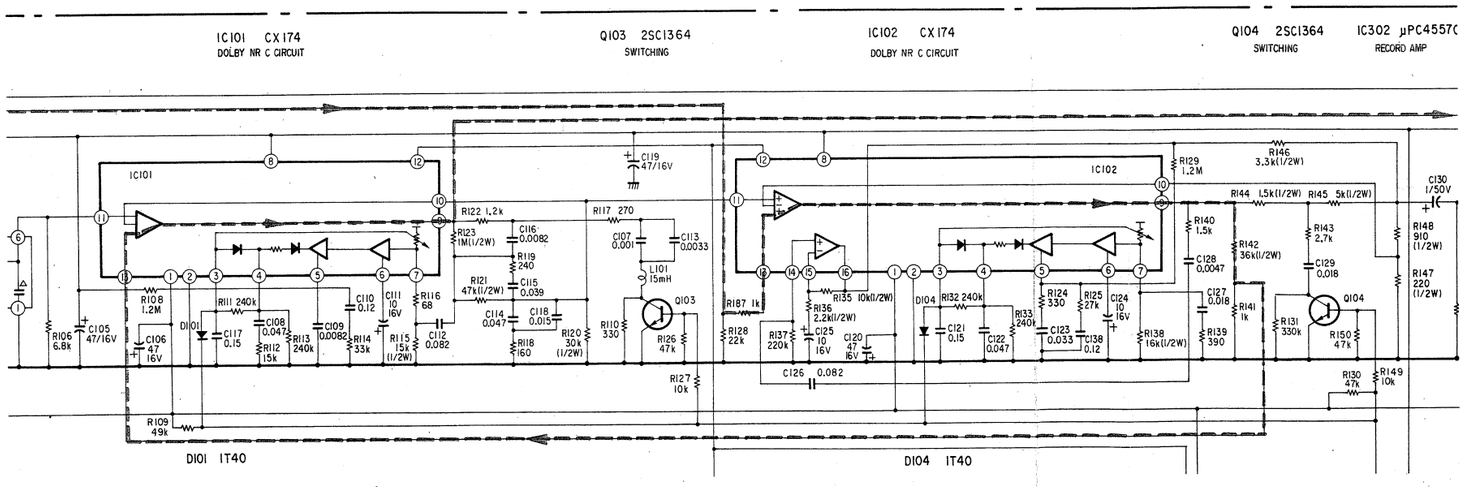


Fig. 7 PB Signal Path

Control Circuit

The control circuit is composed of the overshoot suppression amp, the sensing amp and the variable resistance control circuit.

The output of the variable filter is amplified by the overshoot suppression amp and the sensing amp, then rectified by the variable resistance control circuit and changes the value of variable resistance.

Therefore, during recording, it shows the encoding characteristics in Fig. 1. During playback, the opposite characteristics of the encode are shown, causing the control signal to be fed back to terminal (10) of IC101 and IC102.

1) High-Level Stage (Refer to Fig. 8)

The control circuit is shown in Fig. 8. The values of C108 and C117 are half of that of Dolby B-type. Also, both attack time and recovery time take half that of Dolby B-type.

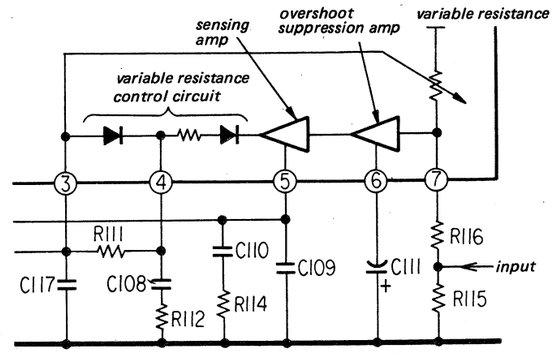


Fig. 8 High-Level Stage Control Circuit

2) Low-Level Stage (Refer to Fig. 9)

The control circuit is basically the same as that for high-level stage. Also, the sub signal circuit is formed by the amplifiers which are connected with terminals (14)–(16) of IC 102 and IC202.

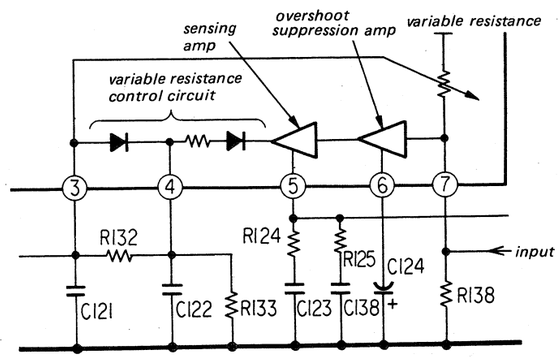
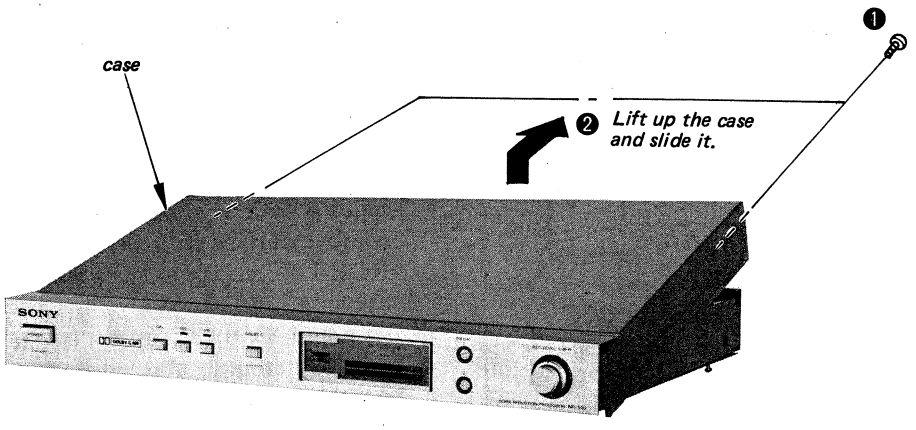


Fig. 9 Low-Level Stage Control Circuit

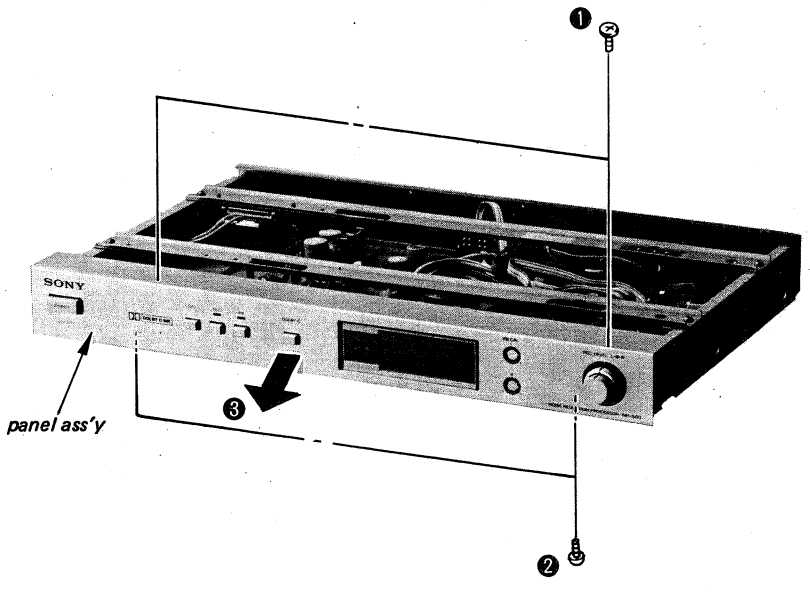
SECTION 2
DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.

• CASE



• PANEL ASS'Y

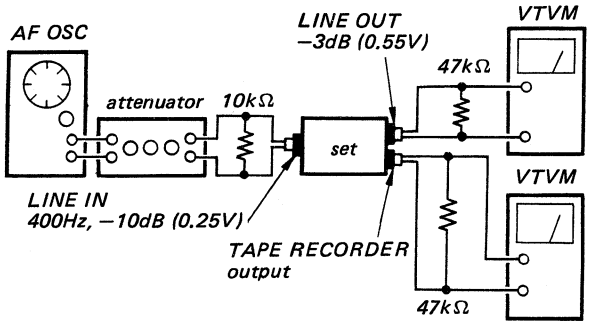


SECTION 3
ADJUSTMENTS

[CAL Oscillation Level Adjustment]

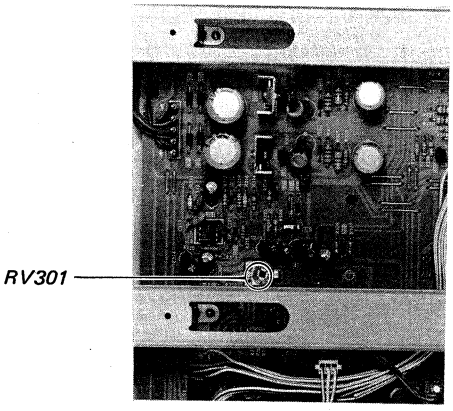
DOLBY C switch: ON

Procedure:



1) Place the set in REC mode, and adjust the REC level knob so that line output level (L-CH) becomes −3dB (0.55V).
2) Measure tape recorder output level (L-CH).
3) Place the set into CAL mode, and adjust RV301 so that tape recorder output level (L-CH) is the same as that obtained in step 2).
4) Switch to REC mode, and confirm that there is less than 0.2dB (0.76V) output difference between the tape recorder output level in step 2) and the tape recorder output level in step 3).

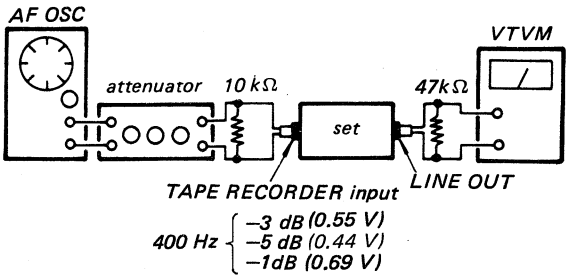
Adjustment Location:



[CAL Indicator Adjustment]

DOLBY C switch: ON

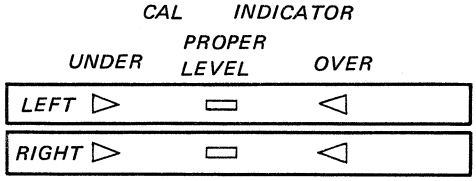
Procedure:



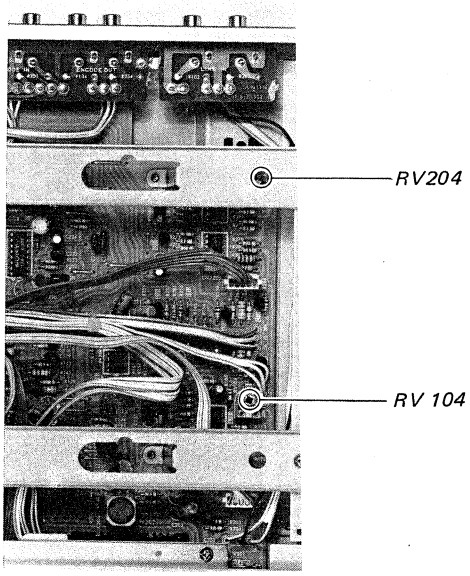
1) Input a 400Hz, −3dB (0.55V) signal to tape recorder input and set in PB mode. Adjust L-CH and R-CH PB CAL controls so that line output level becomes −3dB (0.55V).
2) Adjust RV104 (204) so that the voltage of IC103 (203) terminal ① becomes 0V.

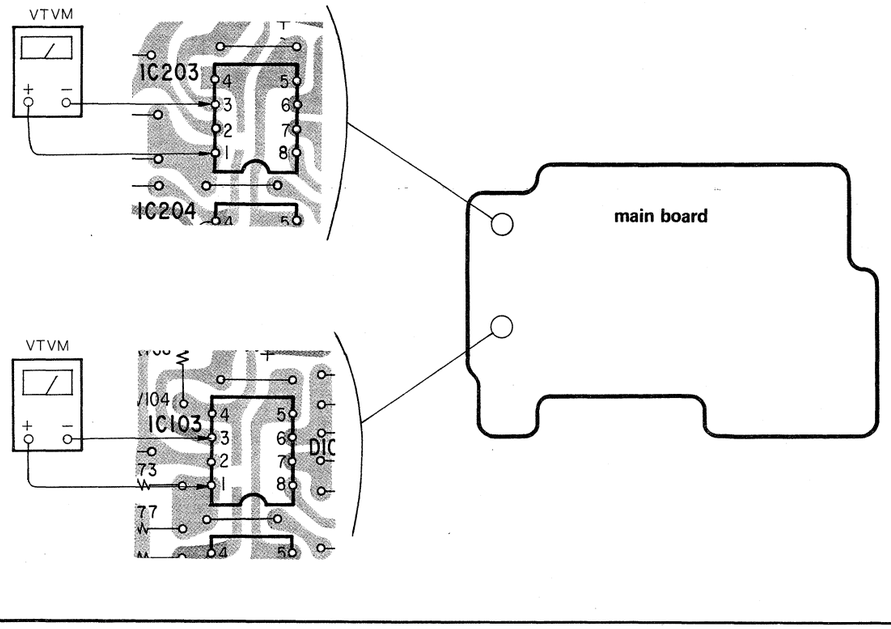
At this time, only the PROPER LEVEL CAL INDICATOR should be lit up.

3) Confirm that when the tape recorder input level is −5dB (0.44V), only UNDER LEVEL indicator is lit up.
4) Confirm that when the tape recorder input level is −1dB (0.69V), only OVER LEVEL indicator is lit up.



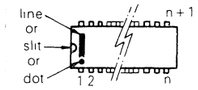
Adjustment Location:



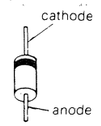


SEMICONDUCTOR LEAD LAYOUTS

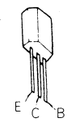
CX-174
CX-174A
μPC4557C
μPC4558C



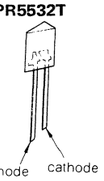
10E2
1S1555
HZ6B1L
HZ9A2L



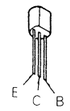
2SA1027R



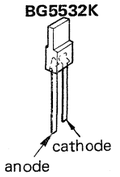
BG5532T
PR5532T



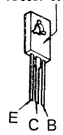
2SA733
2SC945
2SA844
2SC1345
2SC1364



PR5532K
BG5532K

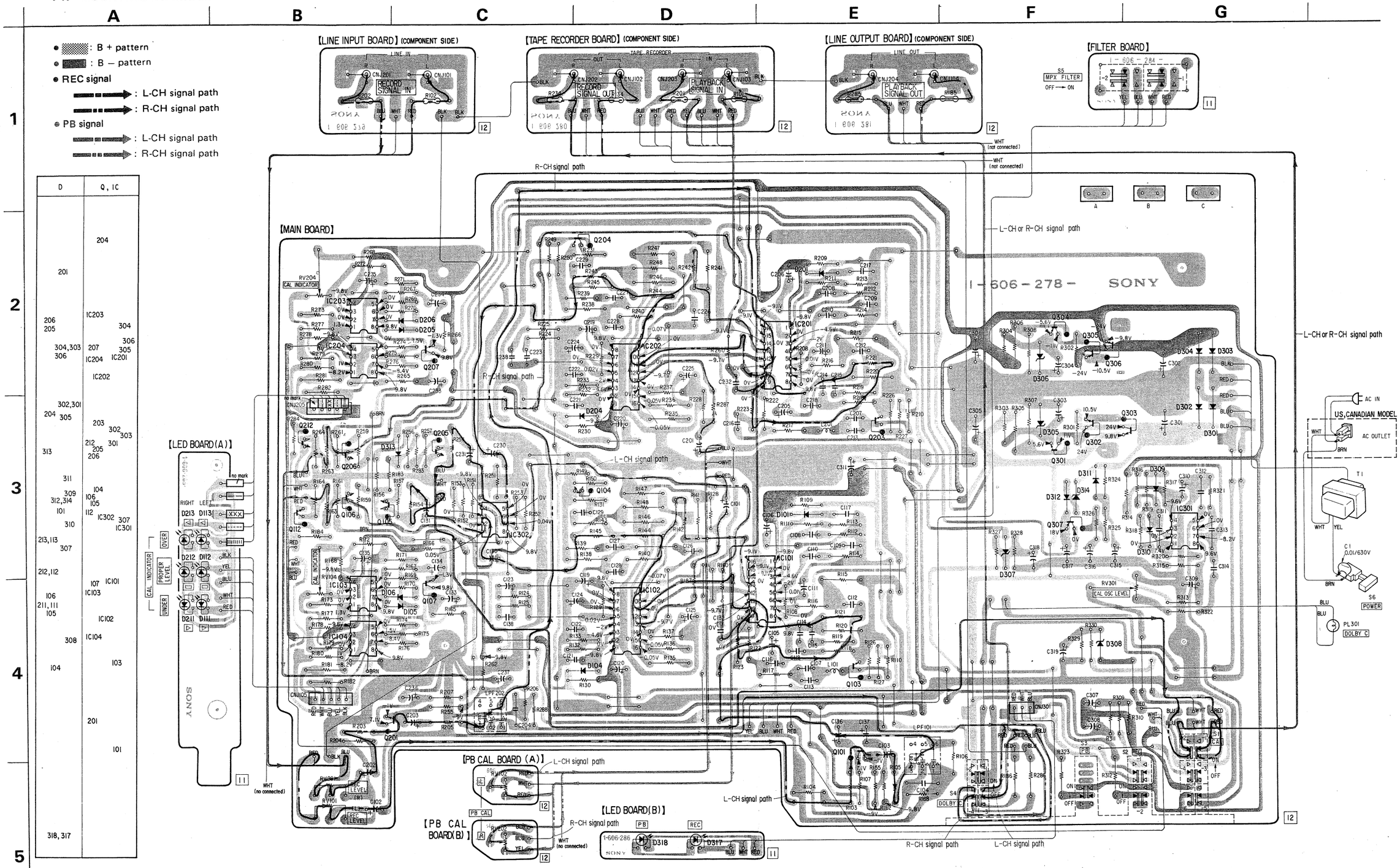


2SD809
2SB731
letter side



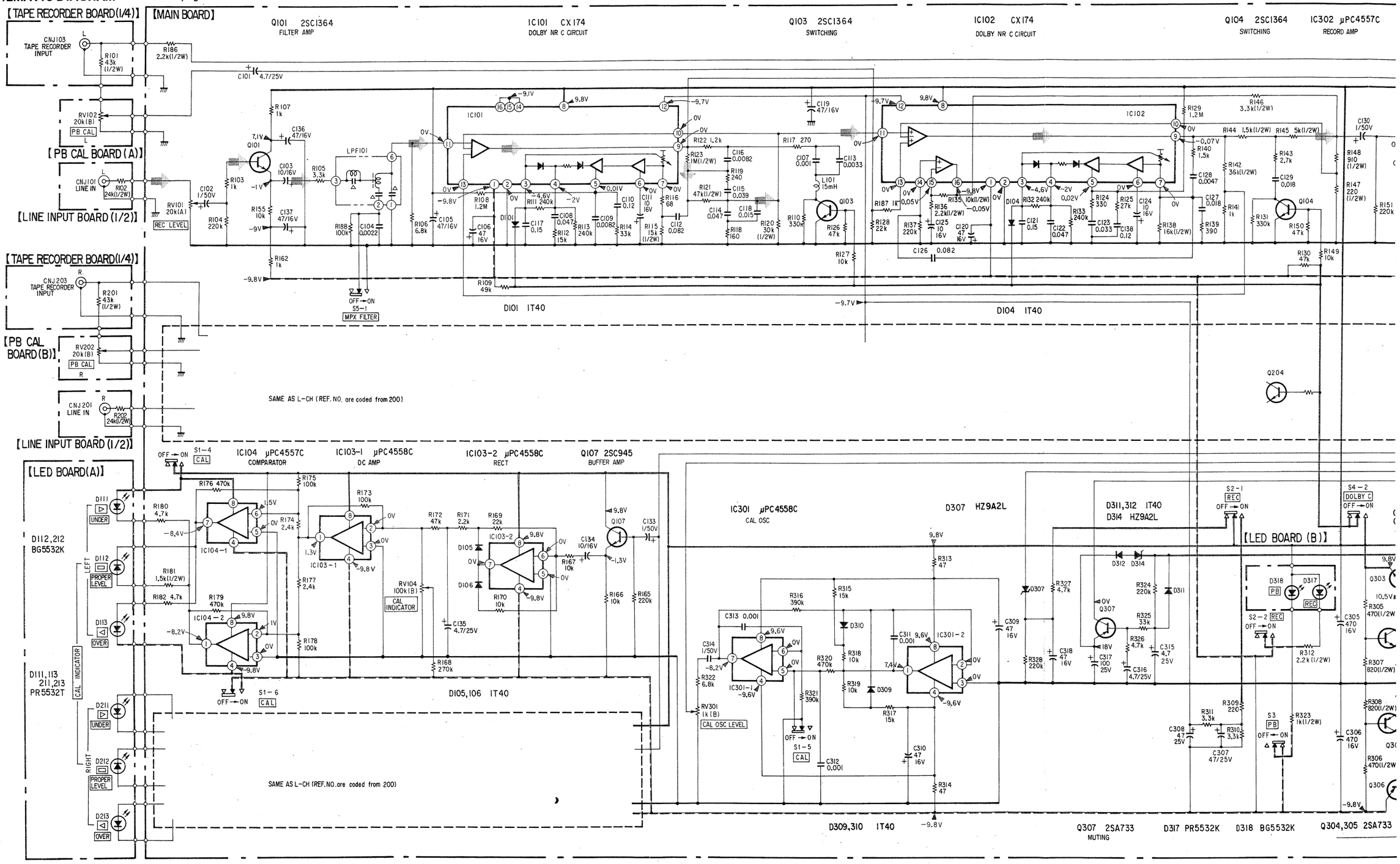
SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM

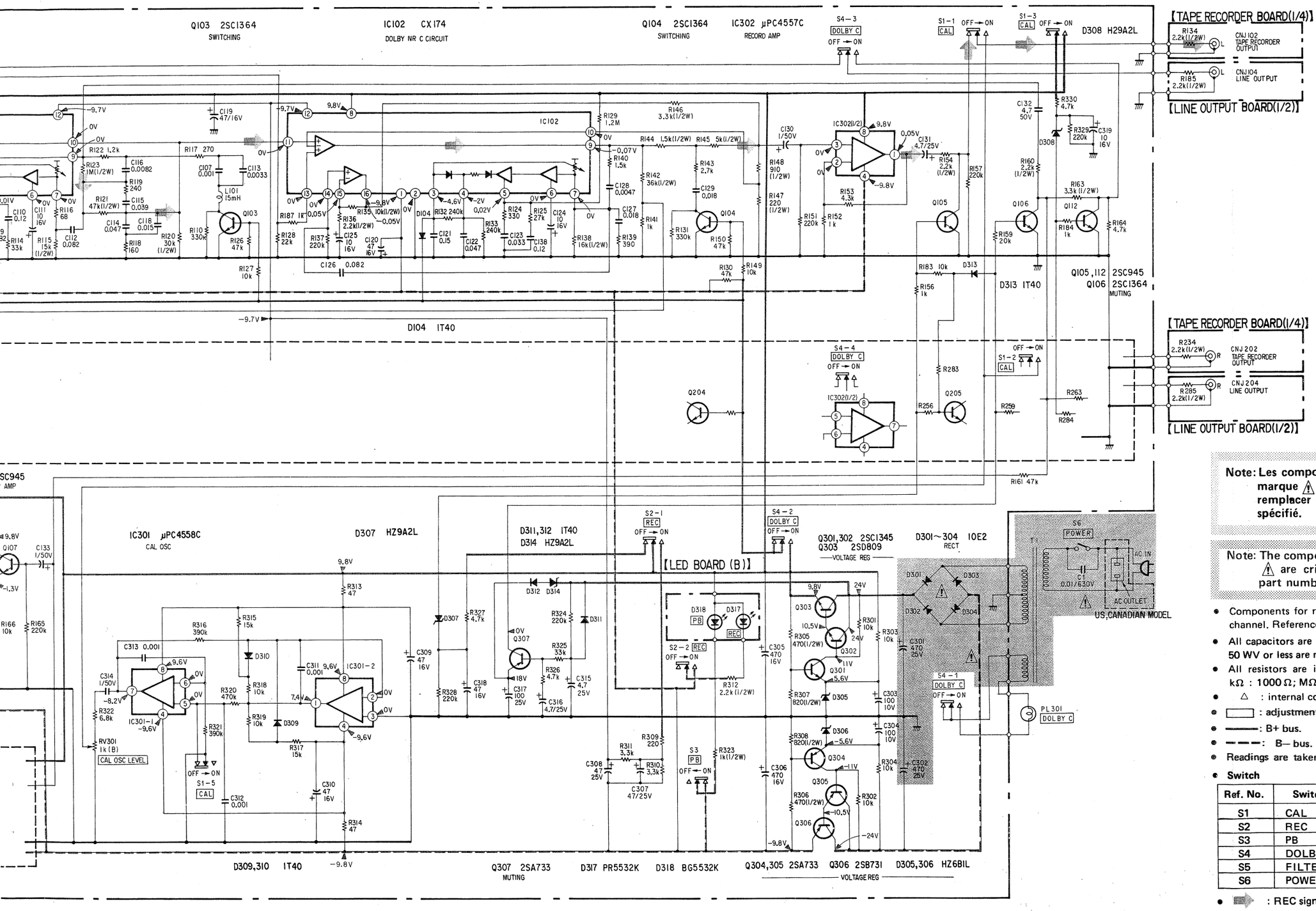


4-2. SCHEMATIC DIAGRAM

● See page 12 for semiconductor lead layouts.



E F G H I J K



Note: Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

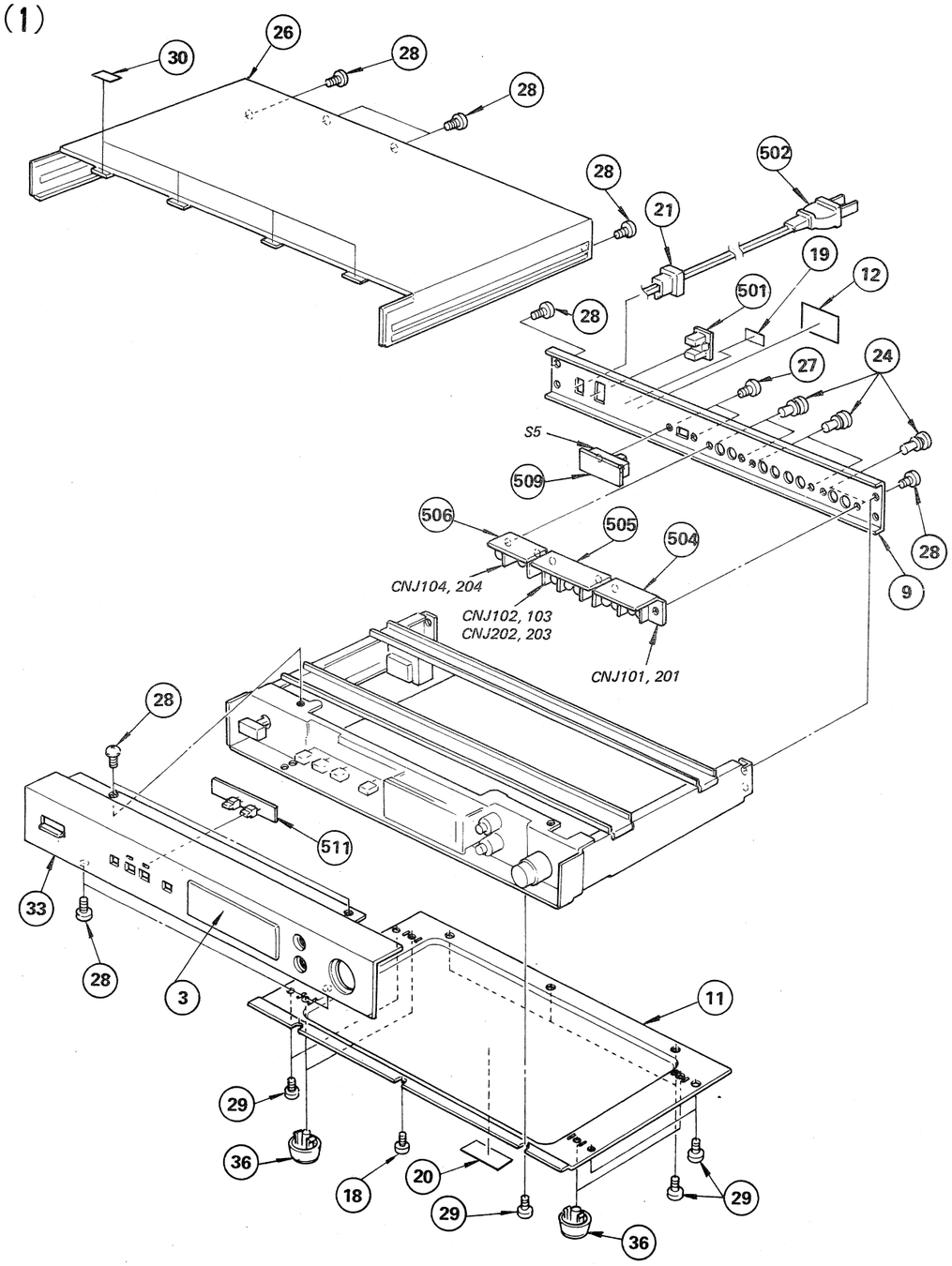
- Components for right channel have same values as for left channel. Reference numbers are coded from 200.
- All capacitors are in μF unless otherwise noted. pF : μμF
  50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms; ¼W unless .otherwise noted.
  kΩ : 1000Ω; MΩ : 1000kΩ
- △ : internal component.
- ▭ : adjustment for repair.
- ——: B+ bus.
- — — —: B— bus.
- Readings are taken under no-signal conditions.
- **Switch**

Ref. No.	Switch	Position
S1	CAL	OFF
S2	REC	OFF
S3	PB	ON
S4	DOLBY C	OFF
S5	FILTER	OFF
S6	POWER	OFF

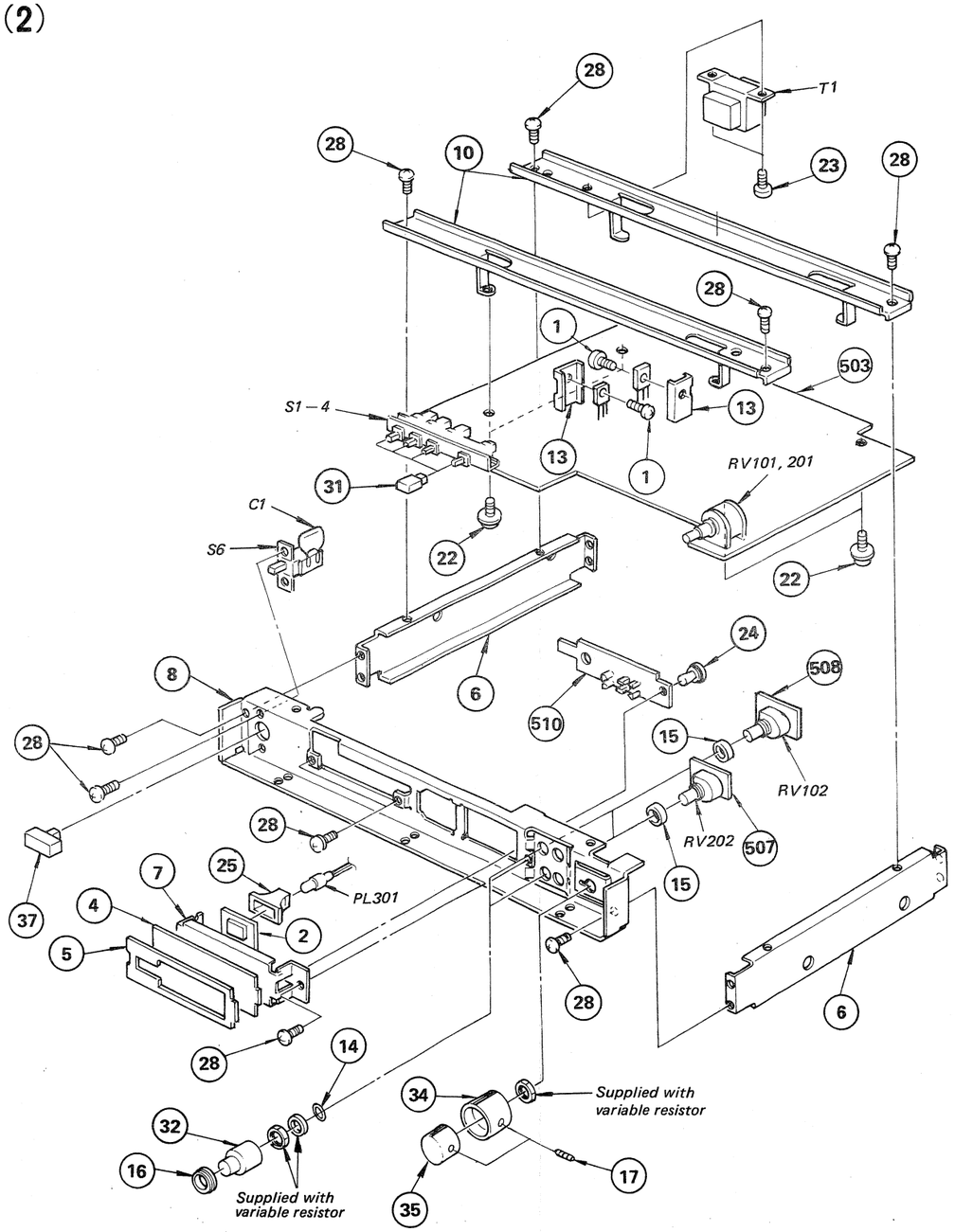
- ➡ : REC signal path

SECTION 5
EXPLODED VIEWS AND PARTS LIST

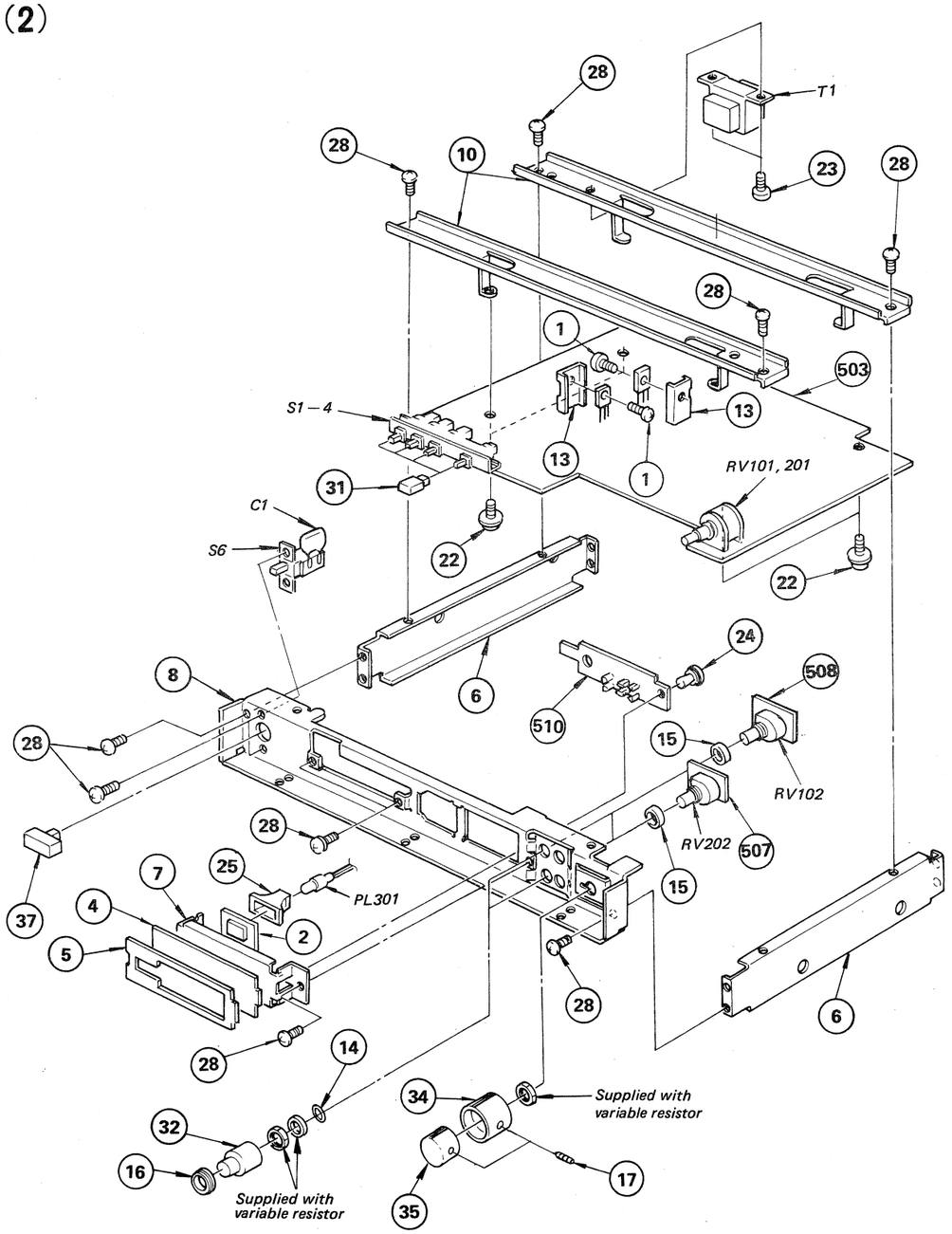
(1)



(2)



(2)



GENERAL SECTION

No.	Part No.	Description
1	2-259-121-00	SCREW, TR
2	2-295-201-00	PLATE, INDICATION, DOLBY
3	2-295-203-00	WINDOW, INDICATION BLOCK
4	2-295-204-00	PANEL, INDICATION BLOCK
5	2-295-205-00	SPACER, INDICATION WINDOW
6 ♦	2-295-207-00	PLATE, SIDE
7 ♦	2-295-208-00	CHASSIS, INDICATION UNIT
8 ♦	2-295-210-00	PANEL, SUB
9 ♦	2-295-211-21	PLATE, JACK
10 ♦	2-295-213-00	BRACKET, TRANSFORMER
11 ♦	2-295-215-00	PLATE, BOTTOM
12	2-295-221-00	LABEL, MODEL NUMBER (USA/CND)
13 ♦	3-567-242-00	HEAT SINK
14	3-575-392-00	RING, PISTON
15 ♦	3-577-675-00	SPACER, CONTROL, REC CAL
16	3-577-676-00	SPACER, REC KNOB
17	3-701-505-00	SET SCREW, DOUBLE POINT 3X3
18	7-685-870-01	+BVTT 3X5, (S)
19	3-703-079-21	LABEL, CAUTION (BACK)(US ONLY)
20	3-703-114-01	LABEL, MAIN CAUTION
21	3-703-244-00	BUSHING, CORD
22	3-703-249-01	SCREW, S TIGHT, +PTTWH 3X6
23	3-703-486-00	+PTTWH 3X5
24	4-812-134-11	RIVET, NYLON, 3.5
25	4-827-018-00	COVER (B), LAMP
26	4-875-434-21	CASE
27	7-621-775-10	SCREW +B 2.6X4
28	7-685-871-01	SCREW +BVTT 3X6 (S)
29	7-685-872-01	SCREW +BVTT 3X8 (S)
30	9-911-856-XX	SPACER
31	X-2290-101-0	KNOB ASSY, PUSH
32	X-2295-203-0	KNOB ASSY, CAL
33	X-2295-204-1	PANEL ASSY
34	X-3577-602-0	KNOB (L) ASSY, REC
35	X-3577-605-0	KNOB (R) ASSY, REC
36	X-3701-069-0	FOOT ASSY, M.F
37	X-4875-108-0	KNOB ASSY, POWER

ACCESSORY & PACKING MATERIAL

No.	Part No.	Description
61	1-551-734-11	CORD, CONNECTION (RK- 74A)
62	2-295-218-00	CUSHION
63	2-295-222-00	INDIVIDUAL CARTON
64	3-701-619-00	BAG, POLYETHYLENE
65	3-701-630-00	BAG, POLYETHYLENE
66	3-783-717-21	MANUAL, INSTRUCTION
67	4-858-407-00	ADJUSTOR, DP
68	4-866-723-00	SHEET, POLYETHYLENE
69	A-2510-108-A	TAPE ASSY, DOLBY

ELECTRICAL PARTS

Ref.No.	Part No.	Description
501 ⚠	1-526-609-00	(US, Canadian)·····CONNECTOR, AC OUTLET
502 ⚠	1-534-986-XX	(US, Canadian)·····CORD, POWER
502 ⚠	1-534-817-XX	(AEP)·····CORD, POWER
503	A-2010-203-A	MOUNTED PCB, MAIN
504	1-606-279-00	PC BOARD, LINE IN
505 ♦	1-606-280-00	PC BOARD, TAPE IN
506 ♦	1-606-281-00	PC BOARD, LINE OUT
507 ♦	1-606-282-00	PC BOARD, PB CAL (R)
508 ♦	1-606-283-00	PC BOARD, PC CAL (L)
509 ♦	1-607-284-00	PC BOARD, FILTER
510 ♦	1-606-285-00	PC BOARD, LED (A)
511 ♦	1-606-286-00	PC BOARD, LED (B)

C1	⚠ 1-161-749-00	CAP, CERAMIC	0.01MF		630V
C301	⚠ 1-123-336-00	ELECT	470MF	A%	25V
C302	⚠ 1-123-336-00	ELECT	470MF	A%	25V

NOTE:
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- Items marked " ♦ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- Due to standardization, parts with part numbers (Δ-ΔΔΔ-ΔΔΔ-XX or Δ-ΔΔΔΔ-ΔΔΔ-X) may be different from those used in the set.

CAPACITORS:
- All capacitors are in μF. Common capacitors are omitted. Refer to the following lists for their part numbers. MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms. Common 1/4W, 1/8W and 1/16W carbon resistors are omitted. Refer to the following lists for their part numbers.
- F : nonflammable

COILS
- MMH : mH, UH : μH

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Les composants identifiés par une trame et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

ELECTRICAL PARTS

Ref.No.	Part No.	Description
CNJ101	1-507-725-21	JACK, PIN 2P
CNJ102	1-507-560-00	PLATE, PIN JACK
CNJ103	1-507-560-00	PLATE, PIN JACK
CNJ104	1-507-725-21	JACK, PIN 2P
CNJ105 ♦	1-560-063-00	PIN, CONNECTOR 5P
CNJ201	1-507-725-21	JACK, PIN 2P
CNJ202	1-507-560-00	PLATE, PIN JACK
CNJ203	1-507-560-00	PLATE, PIN JACK
CNJ204	1-507-725-21	JACK, PIN 2P
CNJ205 ♦	1-560-063-00	PIN, CONNECTOR 5P
D101	8-719-815-55	DIODE 1S1555
D104	8-719-815-55	DIODE 1S1555
D105	8-719-815-55	DIODE 1S1555
D106	8-719-815-55	DIODE 1S1555
D111	8-719-907-72	DIODE PR5532T
D112	8-719-907-69	DIODE BG5532K
D113	8-719-907-72	DIODE PR5532T
D201	8-719-815-55	DIODE 1S1555
D204	8-719-815-55	DIODE 1S1555
D205	8-719-815-55	DIODE 1S1555
D206	8-719-815-55	DIODE 1S1555
D211	8-719-907-72	DIODE PR5532T
D212	8-719-907-69	DIODE BG5532K
D213	8-719-907-72	DIODE PR5532T
D301 ⚠	8-719-200-02	DIODE 10E-2
D302 ⚠	8-719-200-02	DIODE 10E-2
D303 ⚠	8-719-200-02	DIODE 10E-2
D304 ⚠	8-719-200-02	DIODE 10E-2
D305	8-719-910-64	DIODE HZ6B1L
D306	8-719-910-64	DIODE HZ6B1L
D307	8-719-990-92	DIODE HZ9A2L
D308	8-719-990-92	DIODE HZ9A2L
D309	8-719-815-55	DIODE 1S1555
D310	8-719-815-55	DIODE 1S1555
D311	8-719-815-55	DIODE 1S1555
D312	8-719-815-55	DIODE 1S1555
D313	8-719-815-55	DIODE 1S1555
D314	8-719-990-92	DIODE HZ9A21
D317	8-719-907-71	DIODE PR5532K
D318	8-719-907-69	DIODE BG5532K
IC101	8-759-300-74	IC CX-174A
IC102	8-759-300-74	IC CX-174A
IC103	8-759-145-58	IC UPC4558C
IC104	8-759-145-57	IC UPC4557C
IC201	8-759-300-74	IC CX-174A
IC202	8-759-300-74	IC CX-174A

ELECTRICAL PARTS

Ref.No.	Part No.	Description
IC203	8-759-145-58	IC UPC4558C
IC204	8-759-145-57	IC UPC4557C
IC301	8-759-145-58	IC UPC4558C
IC302	8-759-145-57	IC UPC4557C
L101	1-408-259-00	MICRO INDUCTOR 15MMH
L201	1-408-259-00	MICRO INDUCTOR 15MMH
LPF101	1-231-388-00	FILTER, LOWPASS
LPF201	1-231-388-00	FILTER, LOWPASS
PL301	1-518-340-71	LAMP, PILOT
Q101	8-729-334-58	TRANSISTOR 2SC1345
Q103	8-729-104-57	TRANSISTOR 2SC945
Q104	8-729-104-57	TRANSISTOR 2SC945
Q105	8-729-104-57	TRANSISTOR 2SC945
Q106	8-729-104-57	TRANSISTOR 2SC945
Q107	8-729-104-57	TRANSISTOR 2SC945
Q112	8-729-104-57	TRANSISTOR 2SC945
Q201	8-729-334-58	TRANSISTOR 2SC1345
Q203	8-729-104-57	TRANSISTOR 2SC945
Q204	8-729-104-57	TRANSISTOR 2SC945
Q205	8-729-104-57	TRANSISTOR 2SC945
Q206	8-729-104-57	TRANSISTOR 2SC945
Q207	8-729-104-57	TRANSISTOR 2SC945
Q212	8-729-104-57	TRANSISTOR 2SC945
Q301	8-729-334-58	TRANSISTOR 2SC1345
Q302	8-729-334-58	TRANSISTOR 2SC1345
Q303	8-729-180-93	TRANSISTOR 2SD809
Q304	8-729-384-48	TRANSISTOR 2SA844
Q305	8-729-384-48	TRANSISTOR 2SA844
Q306	8-729-173-13	TRANSISTOR 2SB731
Q307	8-729-193-37	TRANSISTOR 2SA733
RV101	1-226-740-00	RES, VAR, CARBON 20K/20K
RV102	1-228-412-00	RES, VAR, CARBON 20K
RV104	1-224-648-XX	RES, ADJ, CARBON 100K
RV201	1-226-740-00	RES, VAR, CARBON 20K/20K
RV202	1-228-412-00	RES, VAR, CARBON 20K
RV204	1-224-648-XX	RES, ADJ, CARBON 100K
RV301	1-224-642-XX	RES, ADJ, CARBON 1K
S1	1-553-878-00	PUSHBUTTON, CAL
S2	1-553-878-00	PUSHBUTTON, REC
S3	1-553-878-00	PUSHBUTTON, PB
S4	1-553-878-00	PUSHBUTTON, DOLBY C
S5	1-553-638-00	SWITCH, SLIDE
S6 ⚠	1-553-319-00	PUSHBUTTON, POWER
T1 ⚠	1-447-247-00	(US Canadian) -----TRANSFORMER, POWER
T1 ⚠	1-447-269-00	(AEP) -----TRANSFORMER, POWER

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ELECTROLYTIC CAPACITORS

CAP. (μF)	RATING → : Use the high voltage rated one.					
	6.3 VOLT.	10 VOLT.	16 VOLT.	25 VOLT.	35 VOLT.	50 VOLT.
	PART No.	PART No.	PART No.	PART No.	PART No.	PART No.
0.47					→	1-121-726-00
1.0					→	1-121-391-00
2.2					→	1-121-450-00
3.3	→	→	→	1-121-392-00	→	1-121-393-00
4.7	→	→	→	1-121-395-00	→	1-121-396-00
10	→	→	1-121-651-00	1-121-398-00	→	1-121-738-00
22	→	→	1-121-479-00	1-121-480-00	1-121-662-00	1-121-152-00
33	→	→	1-121-403-00	1-121-404-00	1-121-652-00	1-121-405-00
47	→	1-121-352-00	1-121-409-00	1-121-410-00	1-121-653-00	1-121-411-00
100	→	1-121-414-00	1-121-415-00	1-121-416-00	1-121-357-00	1-121-417-00
220	1-121-419-00	1-121-420-00	1-121-421-00	1-121-422-00	1-121-261-00	1-121-423-00
330	1-121-751-00	1-121-805-00	1-121-521-00	1-121-654-00	1-121-655-00	1-121-656-00
470	1-121-424-00	1-121-425-00	1-121-426-00	1-121-733-00	1-121-361-00	1-121-810-00
1000	–	1-121-736-00	1-121-245-00	1-121-657-00	1-121-388-00	1-123-061-00
2200	1-121-658-00	1-121-659-00	1-121-660-00	1-123-067-00	1-121-984-00	–
3300	1-121-661-00	1-123-075-00	1-123-071-00	–	–	–

CAP. (μF)	100 VOLT.	160 VOLT.	250 VOLT.	350 VOLT.
	PART No.	PART No.	PART No.	PART No.
0.47	–	–	–	–
1.0	1-123-249-00	1-123-252-00	1-123-003-00	1-121-168-00
2.2	1-123-250-00	1-123-026-00	–	1-123-028-00
3.3	1-121-995-00	–	1-123-004-00	1-123-006-00
4.7	1-123-255-00	1-121-246-00	1-121-759-00	1-123-007-00
10	1-121-126-00	1-121-999-00	1-123-254-00	1-123-008-00
22	1-121-996-00	1-123-253-00	1-123-005-00	1-123-022-00
33	1-121-997-00	1-121-757-00	–	–
47	1-123-251-00	1-121-919-00	–	–
100	1-123-084-00	–	–	–

CERAMIC CAPACITORS

CAP. (pF)	RATING 50 VOLT. PART No.	CAP. (pF)	50 VOLT. PART No.	CAP. (pF)	50 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.
0.5	1-101-837-00	22	1-102-959-00	150	1-101-361-00	0.001	1-102-074-00
0.75	1-101-586-00	24	1-102-960-00	160	1-101-367-00	0.0012	1-102-118-00
1.0	1-102-934-00	27	1-102-961-00	180	1-102-976-00	0.0015	1-102-119-00
1.5	1-101-576-00	30	1-102-962-00	200	1-102-977-00	0.0018	1-102-120-00
2.0	1-102-935-00	33	1-102-963-00	220	1-102-978-00	0.0022	1-102-121-00
3	1-102-936-00	36	1-102-964-00	240	1-102-979-00	0.0027	1-102-122-00
4	1-102-937-00	39	1-102-965-00	270	1-102-980-00	0.0033	1-102-123-00
5	1-102-942-00	43	1-102-966-00	300	1-102-981-00	0.0039	1-102-124-00
6	1-102-943-00	47	1-101-880-00	330	1-102-820-00	0.0047	1-102-125-00
7	1-102-944-00	51	1-101-882-00	360	1-102-821-00	0.0056	1-102-126-00
8	1-102-945-00	56	1-101-884-00	390	1-102-822-00	0.0068	1-102-127-00
9	1-102-946-00	62	1-101-886-00	430	1-102-823-00	0.0082	1-102-128-00
10	1-102-947-00	68	1-101-888-00	470	1-102-824-00	0.01	1-102-129-00
11	1-102-948-00	75	1-101-890-00	510	1-101-059-00	0.022	1-101-005-00
12	1-102-949-00	82	1-102-971-00	560	1-102-115-00	0.047	1-101-006-00
13	1-102-950-00	91	1-102-972-00	680	1-102-116-00		
15	1-102-951-00	100	1-102-973-00	820	1-102-117-00		
16	1-102-952-00	110	1-102-815-00				
18	1-102-953-00	120	1-102-816-00				
20	1-102-958-00	130	1-101-081-00				

0.001μF = 1,000pF

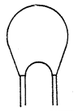
CERAMIC (SEMICONDUCTOR) CAPACITORS

CAP. (μF)	RATING → : Use the high voltage rated one. 25 VOLT. PART No.	50 VOLT. PART No.	CAP. (μF)	25 VOLT. PART No.	50 VOLT. PART No.
0.001	→	1-161-039-00	0.018	1-161-016-00	1-161-054-00
0.0012	→	1-161-040-00	0.022	1-161-017-00	1-161-055-00
0.0015		1-161-041-00	0.027	1-161-018-00	1-161-056-00
0.0018		1-161-042-00	0.033	1-161-019-00	1-161-057-00
0.0022		1-161-043-00	0.039	1-161-010-00	1-161-058-00
0.0027	→	1-161-044-00	0.047	1-161-021-00	1-161-059-00
0.0033	→	1-161-045-00	0.056	→	1-161-060-00
0.0039	→	1-161-046-00	0.068	→	1-161-061-00
0.0047	→	1-161-047-00	0.082	1-161-024-00	1-161-062-00
0.0056	→	1-161-048-00	0.1	1-161-025-00	1-161-063-00
0.0068	→	1-161-049-00			
0.0082	1-161-012-00	1-161-050-00			
0.01	1-161-013-00	1-161-051-00			
0.012	→	1-161-052-00			
0.015	1-161-015-00	1-161-053-00			

MYLAR CAPACITORS

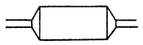
CAP. (μF)	RATING 50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.	CAP. (μF)	50 VOLT. PART No.	100 VOLT. PART No.	200 VOLT. PART No.
0.001	1-108-227-00	1-108-365-00	1-108-409-00	0.01	1-108-239-00	1-108-377-00	1-108-421-00	0.1	1-108-251-00	1-108-389-00	1-108-433-00
0.0012	1-108-351-00	1-108-366-00	1-108-410-00	0.012	1-108-357-00	1-108-378-00	1-108-422-00	0.12	1-108-363-00	1-108-390-00	1-108-434-00
0.0015	1-108-228-00	1-108-367-00	1-108-411-00	0.015	1-108-240-00	1-108-379-00	1-108-423-00	0.15	1-108-252-00	1-108-391-00	1-108-435-00
0.0018	1-108-352-00	1-108-368-00	1-108-412-00	0.018	1-108-358-00	1-108-380-00	1-108-424-00	0.18	1-108-364-00	1-108-392-00	1-108-436-00
0.0022	1-108-230-00	1-108-369-00	1-108-413-00	0.022	1-108-242-00	1-108-381-00	1-108-425-00	0.22	1-108-254-00	1-108-393-00	1-108-437-00
0.0027	1-108-353-00	1-108-370-00	1-108-414-00	0.027	1-108-359-00	1-108-382-00	1-108-426-00	0.27	1-108-854-00	–	–
0.0033	1-108-232-00	1-108-371-00	1-108-415-00	0.033	1-108-244-00	1-108-383-00	1-108-427-00	0.33	1-108-855-00	–	–
0.0039	1-108-354-00	1-108-372-00	1-108-416-00	0.039	1-108-360-00	1-108-384-00	1-108-428-00	0.39	1-108-856-00	–	–
0.0047	1-108-234-00	1-108-373-00	1-108-417-00	0.047	1-108-246-00	1-108-385-00	1-108-429-00	0.47	1-108-857-00	–	–
0.0056	1-108-355-00	1-108-374-00	1-108-418-00	0.056	1-108-361-00	1-108-386-00	1-108-430-00				
0.0068	1-108-237-00	1-108-375-00	1-108-419-00	0.068	1-108-249-00	1-108-387-00	1-108-431-00				
0.0082	1-108-356-00	1-108-376-00	1-108-420-00	0.082	1-108-362-00	1-108-388-00	1-108-432-00				

TANTALUM CAPACITORS



CAP. (μF)	RATING 3.15 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	25 VOLT. PART No.	35 VOLT. PART No.
0.01					→	→	1-131-396-00
0.015						→	1-131-397-00
0.022						→	1-131-398-00
0.033						→	1-131-399-00
0.047						→	1-131-400-00
0.068					→	→	1-131-401-00
0.1					→	→	1-131-402-00
0.15					→	→	1-131-403-00
0.22					→	→	1-131-404-00
0.33					→	1-131-409-00	1-131-405-00
0.47	–	–	–	–	1-131-412-00	→	1-131-406-00
0.68	–	–	–	1-131-415-00	→	1-131-410-00	1-131-407-00
1.0	–	–	1-131-418-00	–	1-131-413-00	→	1-131-408-00
1.5	–	1-131-421-00	–	1-131-416-00	→	1-131-411-00	1-131-348-00
2.2	1-131-424-00	–	1-131-419-00	–	1-131-414-00	1-131-355-00	1-131-349-00
3.3	–	1-131-422-00	–	1-131-417-00	1-131-362-00	1-131-356-00	1-131-350-00
4.7	1-131-425-00	–	1-131-420-00	1-131-369-00	1-131-363-00	1-131-357-00	1-131-351-00
6.8	–	1-131-423-00	1-131-376-00	1-131-370-00	1-131-364-00	1-131-358-00	1-131-352-00
10	1-131-426-00	1-131-383-00	1-131-377-00	1-131-371-00	1-131-365-00	1-131-359-00	1-131-353-00
15	1-131-390-00	1-131-384-00	1-131-378-00	1-131-372-00	1-131-366-00	1-131-360-00	–
22	1-131-391-00	1-131-385-00	1-131-379-00	1-131-373-00	1-131-367-00		
33	1-131-392-00	1-131-386-00	1-131-380-00	1-131-374-00			
47	1-131-393-00	1-131-387-00	1-131-381-00	–			
68	1-131-394-00	1-131-388-00	–	–			
100	1-131-395-00	–	–	–			

TANTALUM CAPACITORS



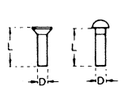
CAP. (μF)	RATING 3 VOLT. PART No.	6.3 VOLT. PART No.	10 VOLT. PART No.	16 VOLT. PART No.	20 VOLT. PART No.	35 VOLT. PART No.
0.033						1-131-273-00
0.047						1-131-274-00
0.068						1-131-275-00
0.1						1-131-276-00
0.15						1-131-277-00
0.22			–	–	1-131-262-00	1-131-278-00
0.33			–	–	1-131-263-00	1-131-279-00
0.47			1-131-169-00	–	1-131-264-00	1-131-280-00
0.68			–	1-131-258-00	1-131-265-00	1-131-281-00
1.0			1-131-254-00	–	1-131-266-00	1-131-282-00
1.5		1-131-250-00	–	–	1-131-267-00	1-131-283-00
2.2		–	–	1-131-259-00	1-131-268-00	1-131-284-00
3.3		–	1-131-255-00	–	1-131-269-00	–
4.7		1-131-251-00	1-131-171-00	–	1-131-270-00	–
6.8		–	–	1-131-260-00	1-131-271-00	–
10	–	–	1-131-256-00	–	1-131-272-00	–
15	–	1-131-252-00	–	1-131-261-00		
22	–	–	1-131-257-00	–		
33	1-131-176-00	1-131-253-00	1-131-173-00	–		
47	1-131-288-00	1-131-174-00	–			
100	1-131-177-00					

1/4 WATT CARBON RESISTORS

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-476-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-477-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-478-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-479-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-480-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-481-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-482-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-483-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-484-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-485-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-486-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-487-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

HARDWARE NOMENCLATURE

Screw: – P 3 x 10
- *L: Length in mm*
- *D: Diameter in mm*
- *Type of head*
- *Indicated slotted-head only.*
- *Unless otherwise indicated, it means cross-recessed head (Phillips type).*



Nut, Washer, Retaining ring:
- N 3
- *Diameter of usable screw or shaft*
- *Reference designation*

Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		braizer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	

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Audio Group

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