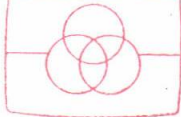


SERVICE MANUAL

MODEL NO.

AD-WX110

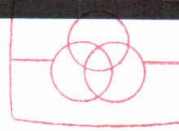
STEREO CASSETTE DECK



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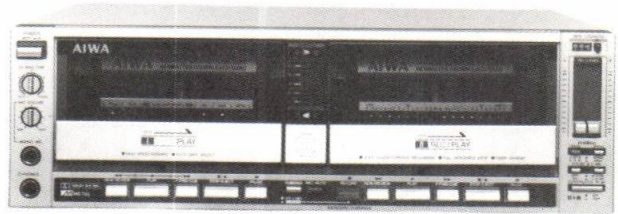
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Code No. 04-110-000-58

TYPE. H, HU, E, K, G


DATE OF ISSUE 9/1982

SPECIFICATION

GENERAL

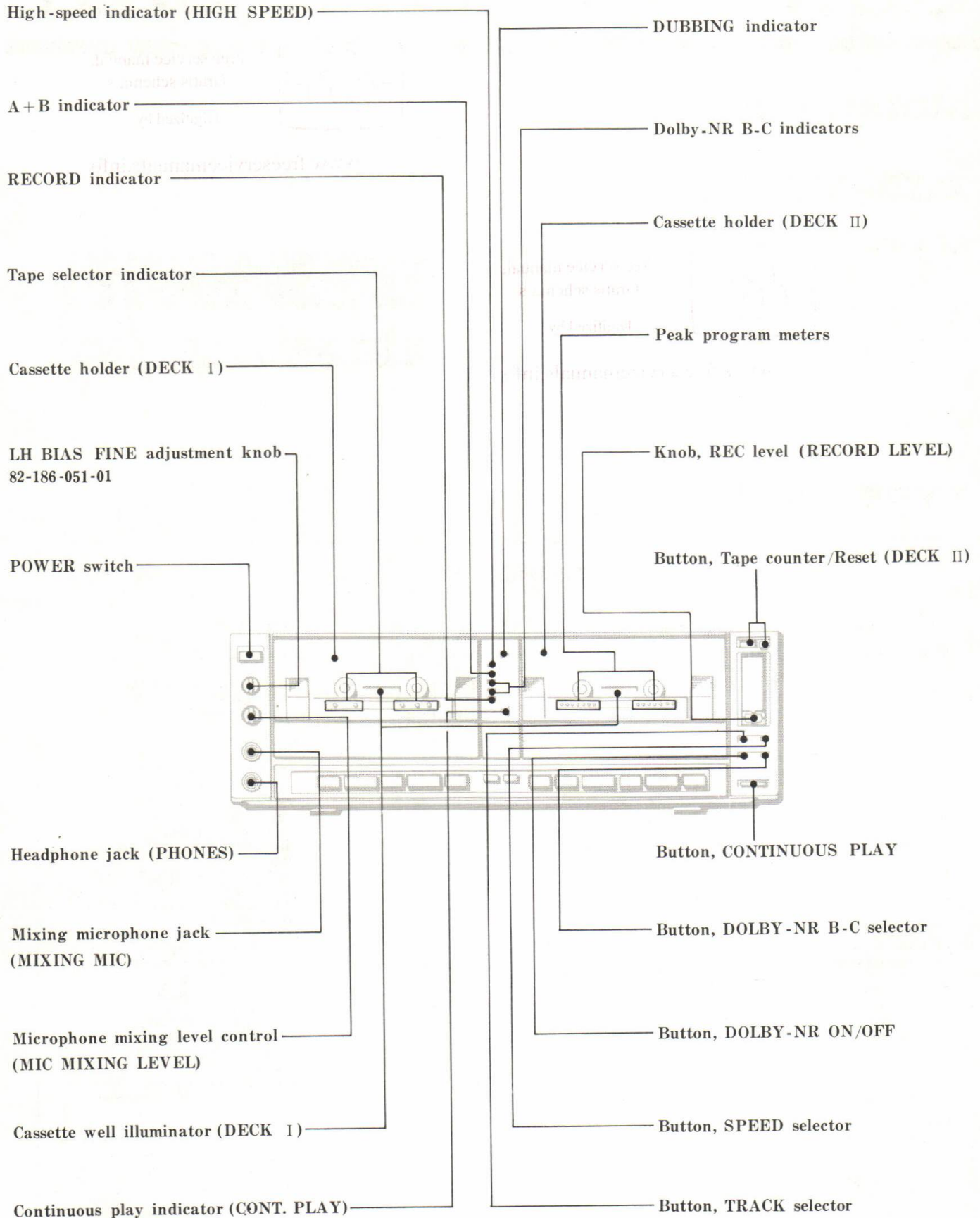
Semiconductors:	91Cs, 135 transistors, 29 diodes, 26 LED
Power source:	H, HU models AC120V/220V/240V Switchable 50/60 Hz E model AC220V, 50/60 Hz K, G models AC240V, 50/60 Hz
Power consumption:	25W
Dimensions:	330 (W) x 107 (H) x 306 (D) mm
Weight:	5.2kg
Track type:	4 track 4 channel
Tape speed:	4.8cm/s. $\pm 1.5\%$ 9.5cm/s. (at dubbing)
Wow and flutter:	Less than 0.045% (WRMS)
Automatic stop system:	Full auto stop
Automatic shut-off action time:	Less than 5s.
Pinch roller pressure:	$125 \pm 15\text{g}$ ($1.23 \pm 0.15\text{N}$)
Take-up torque:	35 ± 15 g-cm (0.34 ± 0.15 mN·m)
FF & rewind torque:	$110 \pm 20\text{g-cm}$ ($1.078 \pm 0.2\text{mN}\cdot\text{m}$)
FF & rewind time:	$90 \pm 5\text{s}$. (C-60)
Back tension:	$2.5 \pm 1\text{g-cm}$ ($0.025 \pm 0.0098\text{mN}\cdot\text{m}$)
Counter indication error:	0 ± 2.5
Playback output:	$540 \pm 50\text{mV}$ (LINE)
Playback noise:	Less than 1mV (CrO ₂ , DOLBY B NR ON) Less than 2.6mV (LH, DOLBY B NR OFF)
REC/PB output:	OVU $+1.5$ -0.5 dB
REC/PB distortion:	Less than 1.5% (LINE IN, REC/PB, METAL, CrO ₂ , LH) Less than 2.5% (Back side dubbing, METAL, CrO ₂ , LH)
REC/PB SN ratio:	More than 45/52 dB (METAL, CrO ₂ , DOLBY C NR OFF/ON) More than 43/50 dB (LH, DOLBY NR C OFF/ON)
(WTD-A)	More than 47/62 dB (METAL, CrO ₂ , DOLBY C NR OFF/ON) More than 45/60 dB (LH, DOLBY C NR OFF/ON)

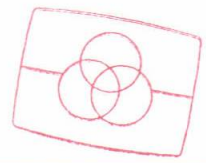
Channel separation:	More than 35 dB (1 kHz, 0VU)
Cross talk:	More than 45 dB (1 kHz, 0VU)
Erasing ratio:	More than 60 dB (Front side) More than 55 dB (Rear side)
Level drift:	Less than ± 1 dB (10 kHz, 0VU)
Bias frequency:	100 kHz
Dubbing frequency/Sensitivity:	REC/PB input (LINE), Normal-speed dubbing (Front side) 0 ± 2.5 dB (12.5 kHz/1 kHz, DOLBY NR OFF) 0 ± 1.5 dB (at 1 kHz) Duble-speed dubbing (Front side) $+0.5 \pm 3.0$ dB (12.5 kHz/1 kHz, DOLBY NR OFF) 0 ± 2.0 dB (at 1 kHz) Duble-speed dubbing (Rear side) $+0.5 \pm 3.0$ dB (12.5 kHz/1 kHz, DOLBY NR OFF) 0 ± 2.0 dB (at 1 kHz)
Frequency response:	METAL : 20 ~ 18,000 Hz CrO ₂ : 20 ~ 17,000 Hz LH : 20 ~ 16,000 Hz
Motor:	DC servomotor
Heads:	Playback head: SH head Record/playback head: SH head Erase head: Double-gap ferrite head x 2
Inputs:	MIC maximum input sensitivity: 0.3 mV (200 Ω —10k Ω matched) LINE IN maximum input Sensitivity: 50mV (OVER 50k Ω)
Outputs:	LINE OUT standard output level: 360mV (OVU); suitable load impedance: OVER 50k Ω ; Headphones: 8 Ω

- Specifications and external appearance are subject to change without due to product improvement.
- Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.
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DETECTION





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Button, DUBBING

Button, REC MUTE

Button, PAUSE (DECK I)
82-186-009-01

Button, RECORD

Button, STOP/EJECT (DECK I)
82-186-010-01

Button, REW/REVIEW (DECK II)
82-186-009-01

Button, F. FWD/CUE (DECK I)
82-186-009-01

Button, PLAY (DECK II)
82-186-010-01

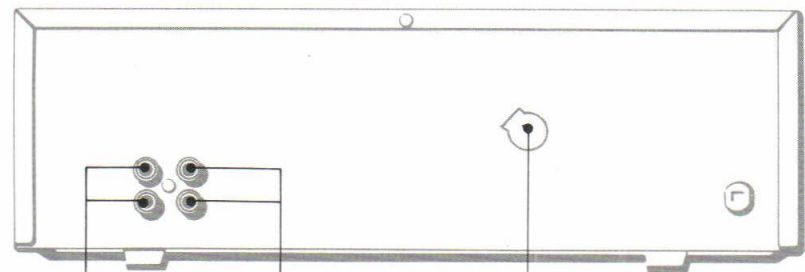
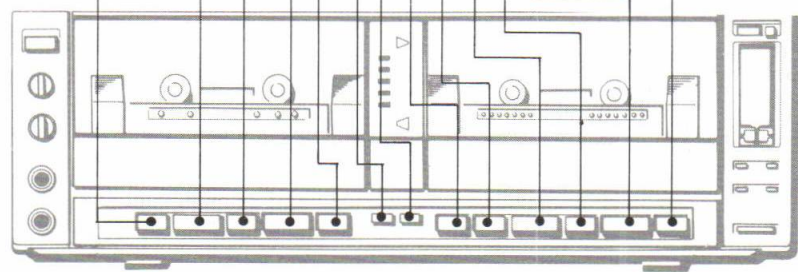
Button, PLAY (DECK I)
82-186-010-01

Button, F. FWD/CUE (DECK II)
82-186-009-01

Button, REW/REVIEW (DECK I)
82-186-009-01

Button, STOP/EJECT (DECK II)
82-186-010-01

Button, PAUSE (DECK II)
82-186-009-01



LINE IN/REC jacks

AC VOLTAGE SELECTOR switch

LINE OUT/PLAY jacks

Follow the instructions carefully, which will allow the user to optimise the products' performance and give many years of service.

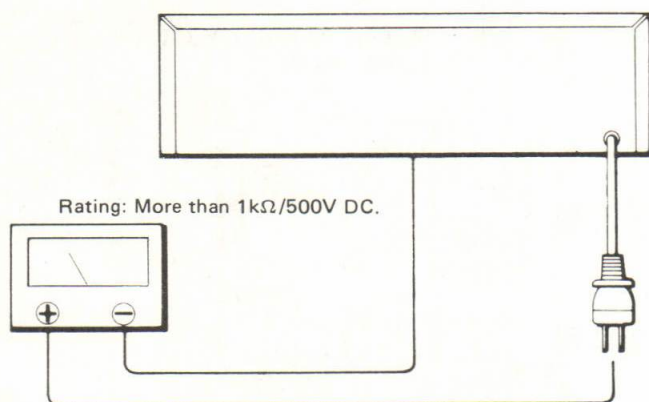
1. No scratch and melting shall be made to covered lead-wires of an a.c. primary circuit including mains leads.
2. No illegibility shall be given to the specification plate, the caution labels, the fuse labels and others.
3. When, on pattern sides of circuit boards, additional repair-parts have been made up, the parts shall be firmly glued to circuit boards or other components, unless the parts can be attached firmly.

4. The following matters shall be maintained as they are, when repairing.

- 1) Soldering of lead-wire ends
* Care should be taken of the space distance in an a.c. primary circuit as well as soldering.
- 2) Wiring and holding of lead-wires with wire-clips and binders
- 3) Materials of lead-wires
* e.g.; For UL models, lead-wires to be used shall be approved or accepted by the UL.
- 4) Location of all kinds of insulators
- 5) Setting of voltage selector switch
* Set the Voltage Selector Switch to 240V, 220V, or 120V, According to your Local Voltage.

5. After repaired, the insulation resistance or leakage current shall be measured with $500 \pm 5V$ D.C and shall be not less than $1M\Omega$.

Measuring points:



6. General instructions for mechanism repair

- 1) The heads, capstan and pinch roller shall be cleaned of good quality alcohol after repaired, because dirty heads shall cause distorted sounds while dirty capstan and pinch roller shall occur wow/flutter and take-up fault.
- 2) Lubricants been stained the surfaces of transmitting portion of the belts, idlers, capstan and pinch roller shall be removed, because slippery and faulty tape travel shall be caused.
- 3) When oiling, only one or two drops shall be applied so as not to run over and be dispersed. Note should be taken of the metal fitting for the capstan and rotating portions of the idlers and pinch roller, especially.
- 4) E-rings and poly slider washers shall be replaced with new ones, if once those have been removed. — No re-utilization due to unreliability.
- 5) Regular spare-parts shall always be used for repair, because using irregular parts and tampering with the products shall cause deterioration, malfunction and damage.

DISASSEMBLY INSTRUCTION

1. Removing the front cabinet

- 1) Remove 12 screws. (See figure 1)

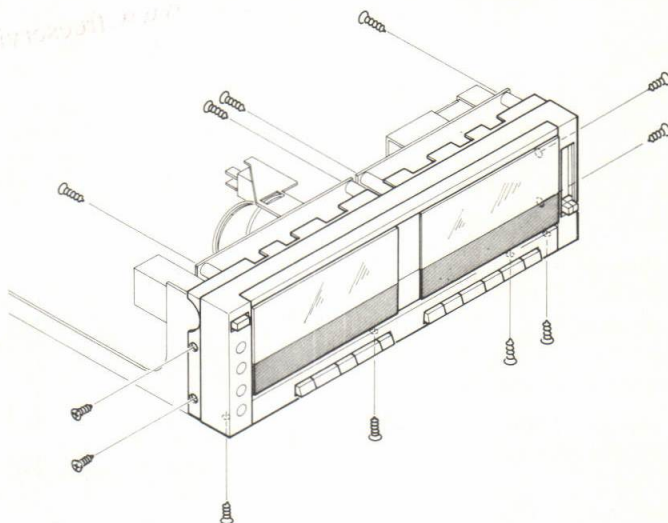


Fig. 1

- 2) Open the cassette lid and raise the front panel in the direction of the arrow. (See figure 2)

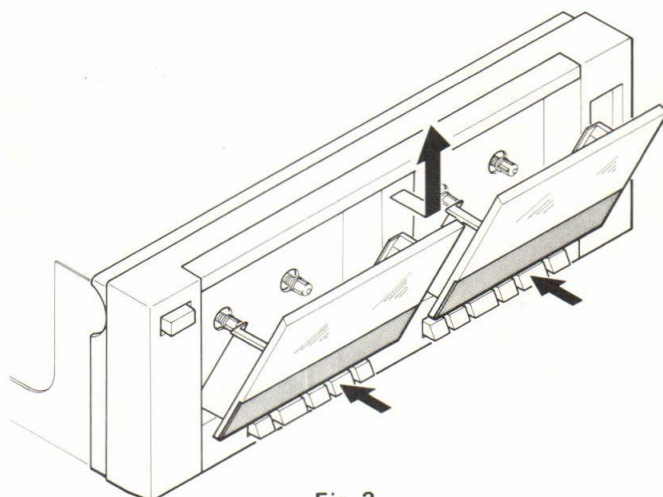


Fig. 2

2. Removing the mechanism

Removing the DECK-1

- 1) Remove 2 screws. (See figure 3)

Removing the DECK-2

- 2) Remove 3 screws. (See figure 3)

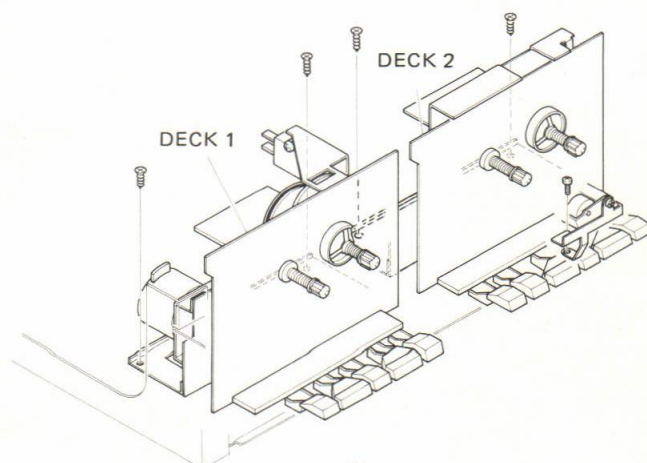


Fig. 3

MOUNTING OF MECHANISM

When assembling both mechanism of Deck (1) and Deck (2), take note of the following cautions.

1. When mounting Deck(1) and Deck(2), make certain that the rec/pb lever and dubbing lever are in position as illustrated.

(See figure 1)

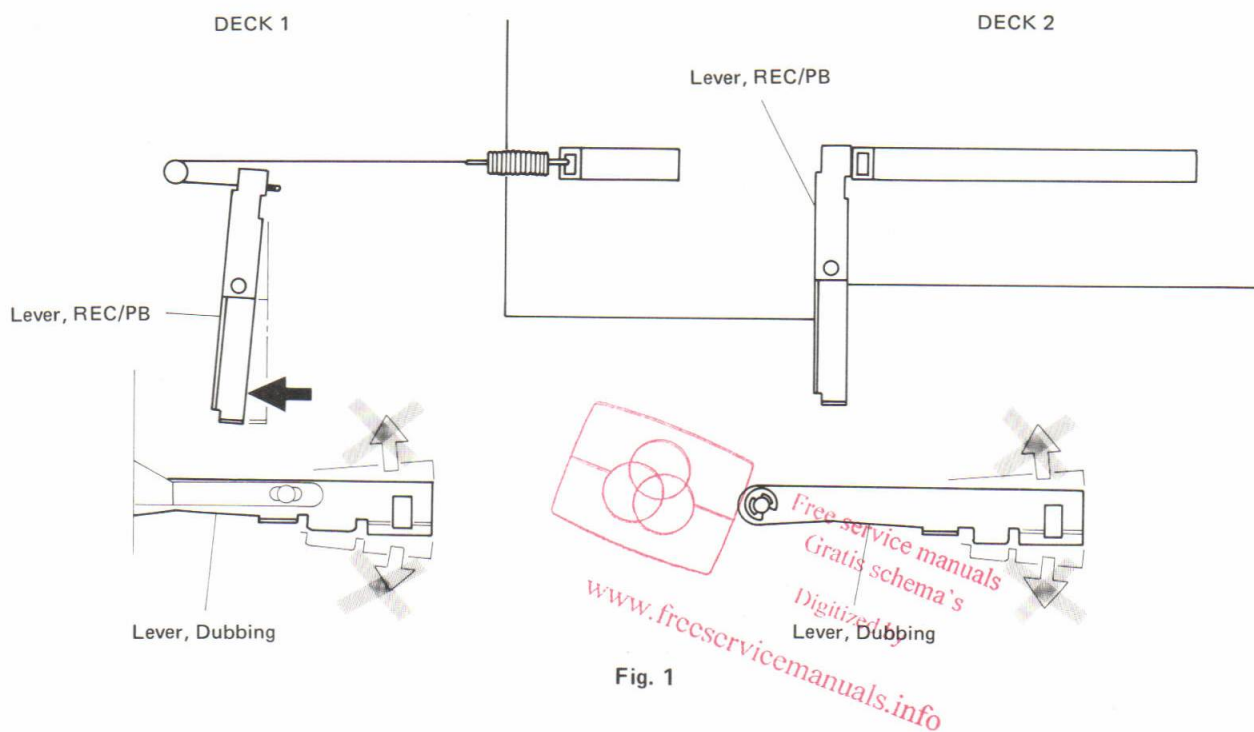


Fig. 1

2. Caution when assembling

- 1) Mount the rec/pb lever to both Deck (1) and Deck (2) in position as illustrated. (See figure 2)

- 2) The pins of play button and REC button must be located to the dubbing lever as illustrated. (See figure 3)

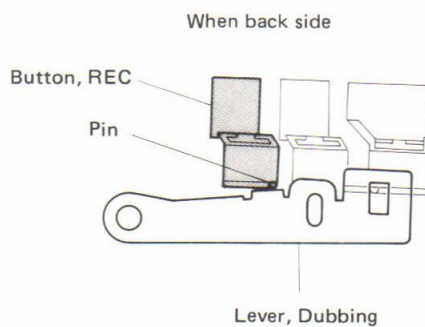
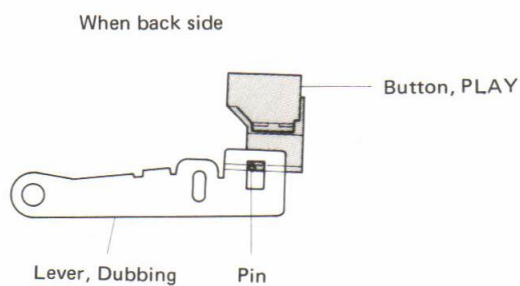
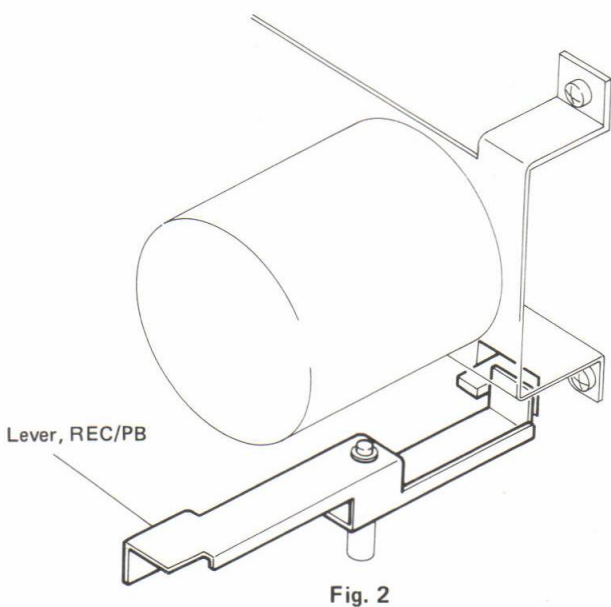
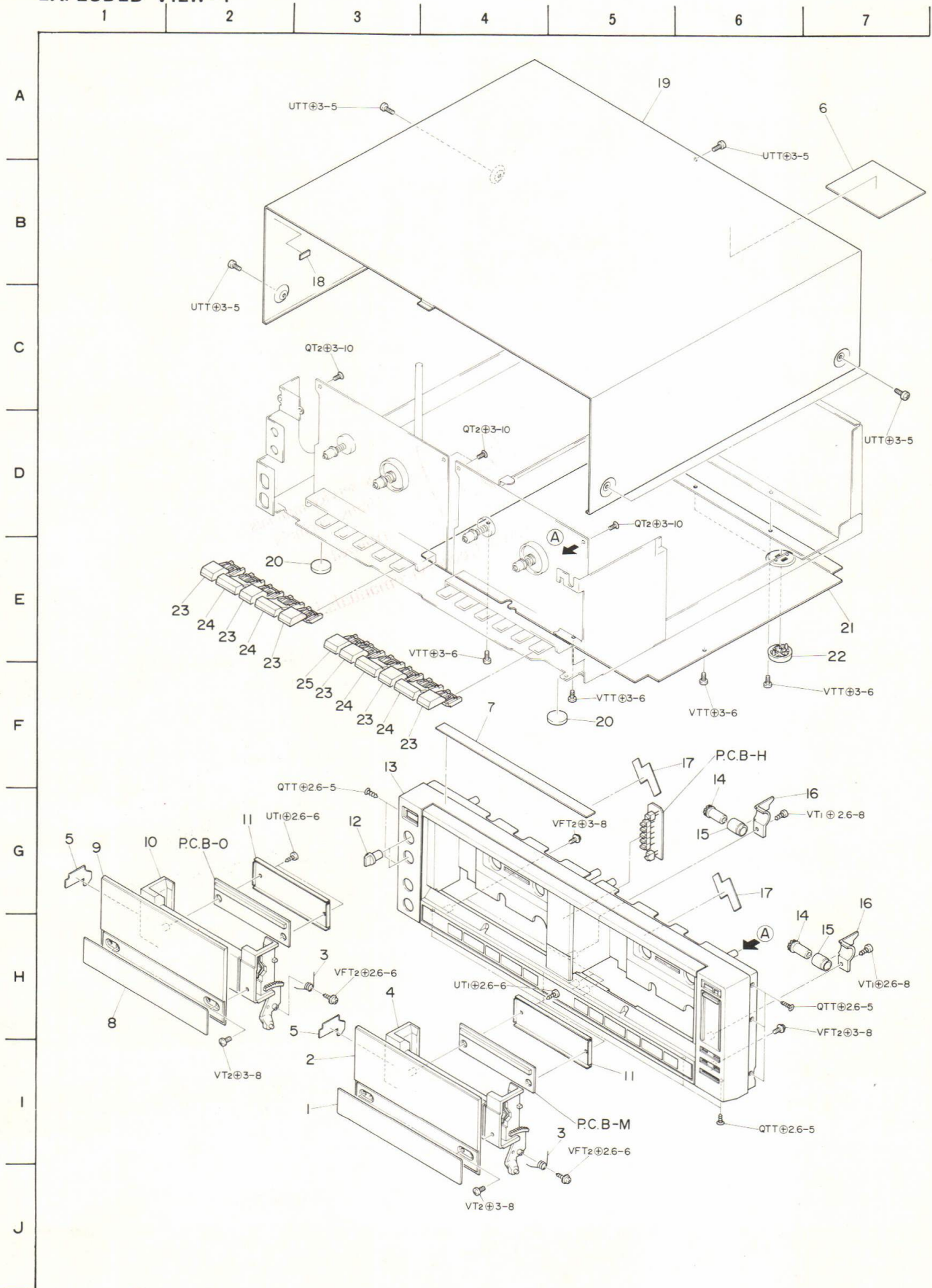


Fig. 3

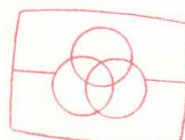
EXPLODED VIEW-1



PARTS LIST

MECHANICAL PARTS

Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
1-1	82-186-042-11		Name plate, Cassette window R	*	1
1-2	82-186-054-01		Window, Cassette RH	*	1
1-3	82-186-241-21		T-spring, Cassette box	*	2
1-4	82-186-048-31		Cassett box R ass'y F	*	1
1-5	82-186-256-01		Wire cover	*	2
1-6	82-186-287-01		Insulation sheet (E, K, G models only)	*	1
1-7	82-186-036-01		Sheet, Bias Insulation	*	1
1-8	82-186-045-11		Name plate, Cassette window L	*	1
1-9	82-186-050-11		Window, Cassette LH	*	1
1-10	82-186-047-31		Cassette box L ass'y F	*	1
1-11	82-186-272-01		Cover C, Cassette box	*	2
1-12	82-186-051-01		Knob	*	2
1-13	82-186-046-61		Front cabinet ass'y F	*	1
1-14	82-534-264-01		Gear, Oil-dump		2
1-15	82-186-274-01		Oil-dump bearing	*	2
1-16	82-175-210-11		Holder, Oil-dump	AD-3500	2
1-17	82-186-266-01		Adhesive sheet	*	2
1-18	82-175-233-01		Spacer 5-3.5-0,3	AD-3500	1
1-19	82-186-002-01		Cabinet, Steel	*	1
1-20	82-172-011-01		Rubber foot	SD-L35	2
1-21	82-186-003-01		Cabinet, Bottom	*	1
1-22	82-745-019-11		Foot		2
1-23	82-186-009-01		Push-key, FF	*	6
1-24	82-186-010-21		Push-key, PLAY	*	4
1-25	82-186-011-11		Push-key, REC	*	1



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CIRCUIT DESCRIPTION

1. Tape selector circuit

Tape selection is automatic by detection of the chrome hole and metal hole in the cassette-half. The play equalizer amplifier is not independent for mechanism I and mechanism II each but one play equalizer amplifier is used in common for both. When different types of tape are inserted into mechanism I and mechanism II (for example, LH tape in mechanism I and chrome tape in mechanism II), the correct time constant of the play equalizer cannot be determined. Which of the two tapes being in play is detected (S_{7-8}), and whether it is at normal speed or high speed determines the time constant.

Speed	Tape	Time constant
NORMAL	LH	120 μ s
	CrO ₂ , MT	70 μ s
HIGH	LH	70 μ s
	CrO ₂ , MT	35 μ s

MT: METAL

The AND circuit is composed of Q510–Q519. The input is set to the collector and base, and the output, to the emitter. Q520 works as an inverter.

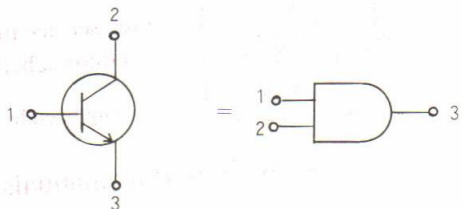


Fig. 1

Fig. 2 shows the composition of the tape selector and Table 2 shows the relation between the input and output.

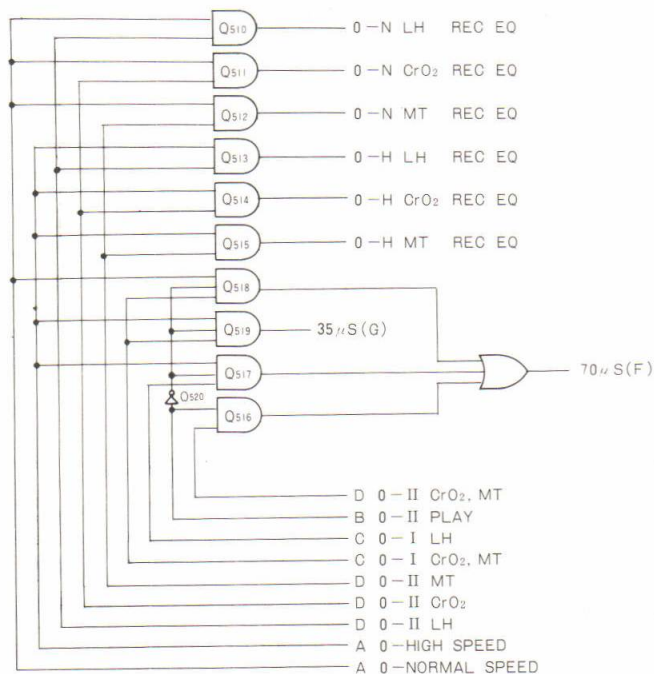


Fig. 2

When both 35 μ s and 70 μ s are set to "0", the time constant is 120 μ s.

Settings				Results			Contents
A	B	C	D	E	F	G	
HIGH SPEED	I MECH PLAY	I MECH CrO ₂ HALL	II MECH CrO ₂ HALL	120 μ s	70 μ s	35 μ s	
1	1	1	1	0	0	1	Double speed dubbing with mechanism I, CrO ₂ tape or MT.
1	1	1	0	0	0	1	
1	1	0	1	0	1	0	Double speed dubbing with mechanism I, LH tape
1	1	0	0	0	1	0	Double speed play of mechanism II is not possible
1	0	1	1	X	X	X	
1	0	1	0	X	X	X	
1	0	0	1	X	X	X	
1	0	0	0	X	X	X	
0	1	1	1	0	1	0	
0	1	1	0	0	1	0	
0	1	0	1	1	0	0	Standard speed dubbing with mechanism I, LH tape
0	1	0	0	1	0	0	Standard speed play with mechanism II, CrO ₂ tape or MT tape
0	0	1	1	0	1	0	
0	0	0	1	0	1	0	
0	0	1	0	1	0	0	
0	0	0	1	0	1	0	Standard speed play with mechanism II, LH tape
0	0	0	0	1	0	0	

Note: How to read the table (Example of the case marked*)

- The play equalizer is set to 35 μ s when A is double speed play, mechanism I CrO₂ hole provided, mechanism II CrO₂ hole provided.
 - Double speed dubbing
- Mark X shows that a condition never happens.
 - Double speed play with mechanism II

2. Muting circuit

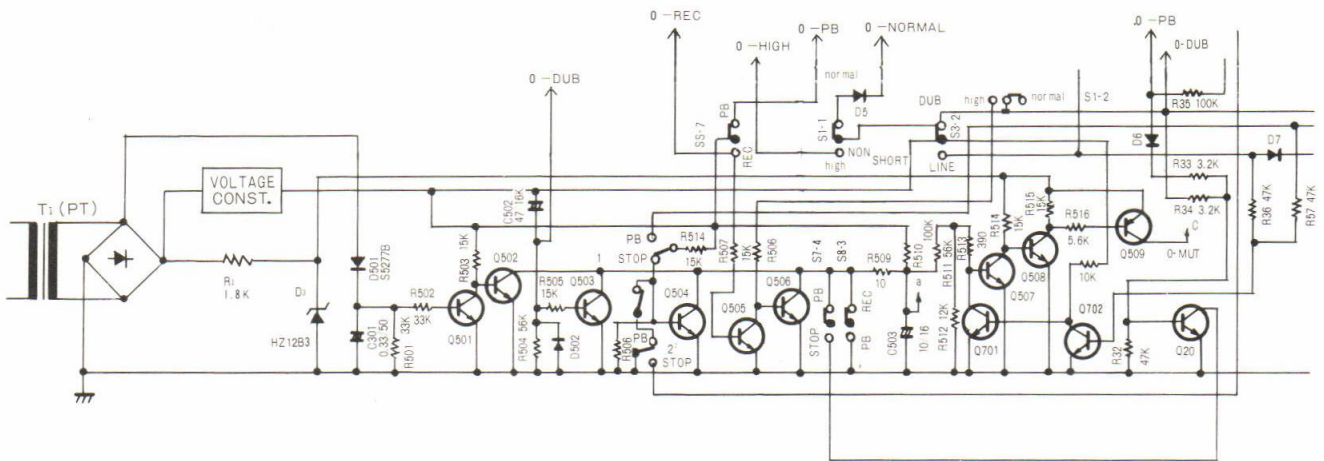
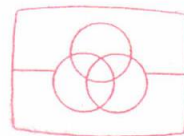


Fig. 3

- 1 Q501 is set to ON when the power is set to ON, to keep Q502 at OFF.
- 2 Next, Q508 is set to ON, and Q509, to ON; 0-MUT is output and muting is applied.
- 3 When mechanism I and mechanism II are set to PLAY, Q504 is set to OFF, Q503 is charged via R510, and Q507 is set to ON, Q508, OFF and Q509, OFF, and muting is released. The time required for this is approx. 230ms.
- 4 When the power is set to ON with the mechanism button kept pressed, Q503 is set to ON via the charge in C502 at first and muting is applied, but Q503 is set to OFF approx. 3 sec later, so muting is released.
- 5 When the power is set to ON, Q501 is set to OFF and Vcc remains at the same level, so Q502 is set to ON to discharge the charge in C503 and muting is applied.
- 6 When it is set to the HIGH SPEED position, Q506 is set to ON and muting is applied, so playback at HIGH speed is not possible.
 When mechanism II is set to the record mode in this state, Q505 is set to ON, Q506, OFF, so the monitor sound can be heard.
- 7 S7-4 and S8-3 are alide switches; they keep contact earlier and release later than other switches. Muting is applied while these switches are operating. S8-3 is the REC/PB selector switch which prevents click noise when changing from PB → REC and REC → PB.
 - Q504 is set to OFF when mechanism II is in the play mode, so S7-4 applies muting when mechanism I changes from STOP to PLAY and from PLAY to STOP.
 - So that muting is not applied to the source monitor via the PLAY - STOP and STOP - PLAY operations of mechanism I when mechanism II is set to the LINE IN REC mode, one terminal of S7-4 is grounded via Q20 when mechanism II is set to modes other than the LINE IN REC mode; it is open when mechanism II is set to the LINE IN REC mode, and muting is not applied to the S7-4 operation. Q20 works as a NOR gate of the collector output of BASE 2 input.
- 8 Q702 is the NOR gate of the BASE 2 input and the collector output: the input is set to 0-LINE and 0-DUB, and is connected to S3-2. The S3-2 switch timing is set to non-short, so S3-2 is set to low level at the mid point of the switch in both 0-LINE and 0-DUB, and Q702 is set to OFF, Q701, to ON and muting is applied.
- 9 Muting is applied when switching (S3-4, S1-4) LINE/DUB, NORMAL/HIGH by dropping the potential of C503 (+).

ACCESSORIES/PACKAGE

Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
1	82-186-854-01		Printed indiv., Packing	*	1
2	82-186-852-01		Cushion L, Printed indiv.	*	1
3	82-186-853-01		Cushion R, Printed indiv.	*	1
4	82-184-858-01		Sheet, Foamed mat		1
5	87-051-131-11		Poly-vinyl sack (H, HU models only)		1
6	87-051-135-11		Poly-vinyl sack (E, K, G models only)		1
7	87-056-627-01		Poly-vinyl sack		1
8	82-186-904-01		Instructions booklet	*	1
9	87-051-171-11		Poly-vinyl sack		1
10	87-056-008-11		Label, AC power cord (K model only)		1
11	87-056-009-51		Distributors list (H, E, K, G models only)		1
12	87-056-045-01		Guarantee card (HU models only)		1
13	87-056-057-01		Service station list (HU model only)		1
14	86-944-012-01		Connection cord CW-129BSK		2
15	87-032-845-01		Siemens plug (H, HU models only)		1
16	87-056-059-01		Guarantee card (G model only)		1



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ELECTRICAL MAIN PARTS LIST

Symbol No.	Part No.	Description
« MAIN CIRCUIT BOARD SECTION »		
PCB-A	*	Main circuit board
IC101	87-027-865-01	IC, LA-6458SS
Q1	89-412-653-41	Transistor, 2SD1265 OP
Q2, 18, 103, 104, 113, 114, 115, 116, 117, 118, 119, 120, 129, 130, 133, 134, 135, 136, 137, 138, 147, 148, 149, 150, 151, 152, 167, 168, 171, 172	89-309-455-61	Transistor, 2SC945L (P, Q)
Q3, 12, 13, 16, 17, 20, 105, 106, 107, 108, 109, 110, 111, 112, 121, 122, 123, 124, 153, 154, 155, 156, 173, 174	89-318-155-01	Transistor, 2SC1815 (GR)
Q4	89-408-805-01	Transistor, 2SD880 (GR)
Q6, 7, 8, 9, 10, 19, 25, 126, 127, 128	89-320-011-21	Transistor, 2SC2001 (K)
Q11	89-107-335-61	Transistor, 2SA733K, P
Q14	89-110-155-01	Transistor, 2SA1015 (GR)
Q101, 102, 169, 170	89-322-406-01	Transistor, 2SC2240 (BL)
D1	87-027-376-01	Diode, 1B4B41 (H, HU, models only)
D1	87-027-163-01	Diode, 1B4B1 (E, K, G models only)
D2, 19, 20	87-027-365-01	Diode, S5277B
D3	87-027-509-01	Zener diode, HZ-12B-3
D4	87-027-449-01	Zener diode, HZ-15L-3
D5, 7, 8, 9, 10, 11, 12, 13, 15, 16, 21	87-027-097-01	Diode, IS1555
D14	87-027-332-01	Zener diode, HZ6B1L
L101	82-186-614-01	OSC coil B
L102	82-186-613-01	OSC coil A
L103, 104	87-003-051-01	Choke coil, 470μH
L105, 106	87-003-073-01	Coil, 6.8mH
L107, 108, 109, 110	87-007-118-01	Coil, 25mH
L201, 202	82-371-622-01	Coil, 23mH
MPX, F1, MPX, F2	87-008-252-01	Low-pass filter, 100K
J1, 2, 3, 4	87-049-055-01	Pin, 4P (LINE IN/OUT)
S1, 3	82-186-624-01	Push-switch (SPEED, DUBBING/LINE)
S2	82-186-622-01	Push-switch (TRACK, I/II)
S4, 5	82-186-623-01	Push-switch (DOLBY ON/OFF, DOLBY B/C)
S7	82-186-631-01	Slide switch (STOP/PB)
S8	82-186-630-01	Slide switch (REC/PB)
SFR101, 102, 103, 104	87-021-624-01	Semi-fixed resistor, 50kΩ-B
SFR105, 106, 107, 108, 117, 118	87-021-730-01	Semi-fixed resistor, 2.2kΩ-B

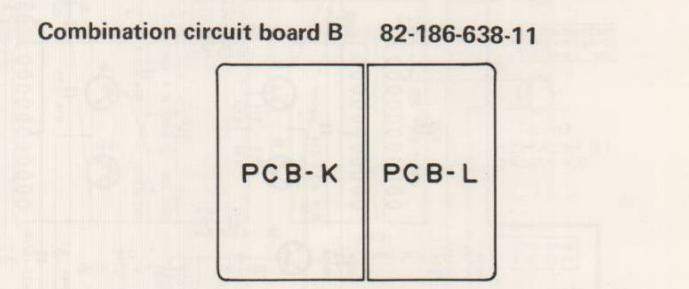
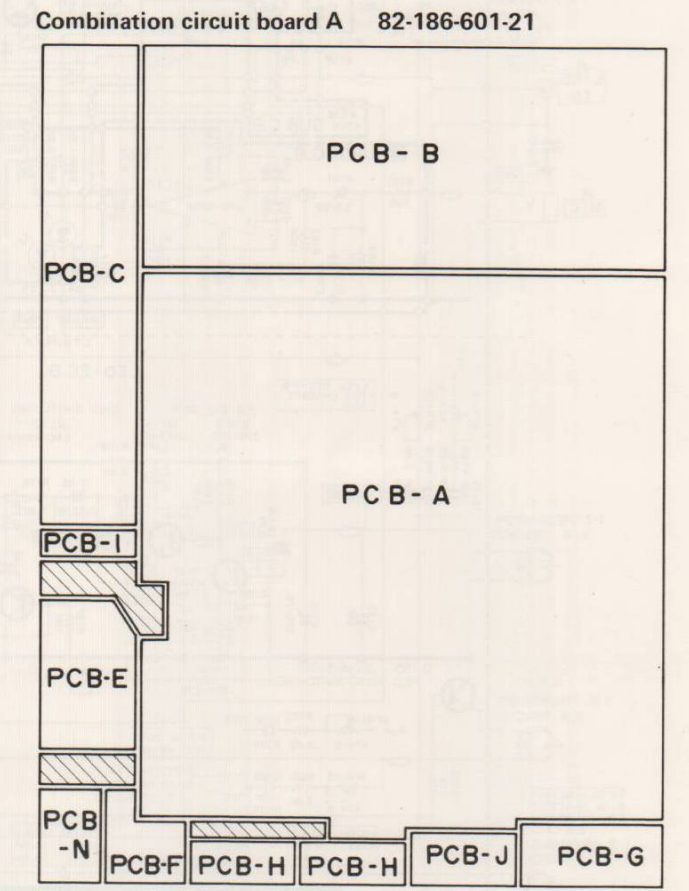
Symbol No.	Part No.	Description
SFR109, 110, SFR111, 112	87-021-729-01 87-021-687-01	Semi-fixed resistor, 1kΩ-B Semi-fixed resistor, 30kΩ-B
SFR113, 114, 115, 116	87-021-615-01	Semi-fixed resistor, 47kΩ-B
PIN1	87-049-080-01	Pin, 2P
PIN2	87-049-038-01	Pin, 3P
PIN3	87-049-034-01	Pin, 4P
< Resistors >		
R10	87-029-088-01	1.5Ω ½W Fuse resistor
R9	87-029-009-01	22Ω 1W Fuse resistor
R7	87-029-369-01	47Ω 1W Fuse resistor
R13	87-029-109-01	220Ω ¼W Fuse resistor
< Capacitors >		
C107, 108, 137, 138	87-015-617-01	10μF 16V Electrolytic LL
C4, 10	82-186-685-01	3300μF 35V Electrolytic
C167, 168, 419, 420	87-014-037-01	150pF PP
C19	87-014-128-01	1500pF 630V PP
C21	82-304-706-01	2200pF 630V PP
« SUB CIRCUIT BOARD SECTION »		
PCB-B	*	Sub circuit board
IC401	87-027-865-01	IC, LA6458SS
Q401, 402, 403, 404, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519	89-309-455-61	Transistor, 2SC945 L (P, Q)
Q501, 502	89-318-155-01	Transistor, 2SC1815 (GR)
Q509	89-107-336-01	Transistor, 2SA733 (P)
Q521	89-318-464-51	Transistor, 2SC1846 (R, S)
Q523	89-110-155-01	Transistor, 2SA1015 (GR)
D501	87-027-365-01	Diode, S5277B
D502, 503, 504, 505, 506, 507, 508, 522, 524	87-027-097-01	Diode, IS1555
D801	87-027-772-01	LED, GL-9PR4 (DUBBING)
D802, 803, 805, 806	87-027-354-01	LED, GL-9PR2 (HIGH SPEED, A+B, DOLBY C, RECORD)
D804	87-027-352-01	LED, GL-9NG2 (DOLBY B)
D807	87-027-773-01	LED, GL-9NG4 (CONT. PLAY)
« SWITCH CIRCUIT BOARD SECTION »		
= "H, HU" models only		
PCB-I	*	Switch circuit board
S25	87-031-730-01	Push-switch (POWER)
C1	87-019-110-01	0.01μF Spark killer
« MS CIRCUIT BOARD SECTION »		
PCB-C	*	MS circuit board
IC601	87-027-762-01	IS, MS51143L
IC702	87-027-739-01	IC, NJM4556D
Q601, 602, 603, 604, 606, 607, 608, 609, 610, 613, 614, 615, 616, 617, 618	89-318-155-01	Transistor, 2SC1815 (GR)

Symbol No.	Part No.	Description
Q605	89-405-712-01	Transistor, 2SD571L
Q611	89-309-455-61	Transistor, 2SC945L (P, Q)
Q612	89-318-464-51	Transistor, 2SC1846R, S
D601, 603, 604, 605, 606, 612, 613, 615, 616	87-027-097-01	Diode, IS1555
D602, 607	87-027-365-01	Diode, S5277B
PIN7	87-049-080-01	Pin, 2P
« DOLBY-NR CIRCUIT BOARD SECTION »		
PCB-D	82-184-620-11	Dolby-NR circuit board
IC301, 302	87-027-862-01	IC, HA12038
L301, 302	87-005-155-01	Coil, 36mH
PIN	87-049-117-01	Pin, 7P
PIN	87-049-119-01	Pin, 9P
< Resistors >		
R309, 310	87-025-271-01	5.1kΩ ¼W ±1% Metal film
R311, 312	87-025-295-01	15kΩ ¼W ±1% Metal film
R335, 336	87-025-296-01	56kΩ ¼W ±1% Metal film
< Capacitors >		
C315, 316, 351, 352	87-015-617-01	10μF 16V Electrolytic LL
C321, 322, 323, 324, 345, 346	87-015-366-01	0.15μF 10V Aluminum solid
« JACK CIRCUIT BOARD SECTION »		
PCB-E	*	Jack circuit board
IC101	87-027-182-01	IC, μPC1023H
J5, 6	82-186-632-01	Jack, 6.3φ (MIXING MIC, PHONES)
« VOLUME-1 CIRCUIT BOARD SECTION »		
PCB-F	*	Volume-1 circuit board
VR101	82-186-628-01	Volume, 20kΩ-A (MIC)
VR102	82-186-629-01	Volume, 10kΩ-B (LH BIAS FINE)
« VOLUME-2 CIRCUIT BOARD SECTION »		
PCB-G	*	Volume-2 circuit board
VR103	82-186-627-01	Slide volume, 30kΩ-A (REC LEVEL)
« LED-1 CIRCUIT BOARD SECTION »		
PCB-H	*	LED-1 circuit board
D801	87-027-772-01	LED, GL-9PR4 (DUBBING)
D802, 803, 805, 806	87-027-354-01	LED, GL-9PR2 (HIGH SPEED, A+B, DOLBY C, RECORD)
D804	87-027-352-01	LED, GL-9NG2 (DOLBY B)
D807	87-027-773-01	LED, GL-9NG4 (CONT. PLAY)
« SWITCH CIRCUIT BOARD SECTION »		
= "H, HU" models only		
PCB-I	*	Switch circuit board
S25	87-031-730-01	Push-switch (POWER)
C1	87-019-110-01	0.01μF Spark killer
« DECK SELECTOR CIRCUIT BOARD SECTION »		
PCB-J	*	Deck selector circuit board
S17	82-186-623-01	Push-switch (CONTINUOUS)
« RELAY-1 CIRCUIT BOARD SECTION »		
PCB-K	*	Relay-1 circuit board
PIN10	87-049-138-01	Pin, 5P
PIN9	87-049-139-01	Pin, 7P
« RELAY-2 CIRCUIT BOARD SECTION »		
PCB-L	*	Relay-2 circuit board
Q701, 702	89-318-155-01	Transistor, 2SC1815 (GR)
PIN8	87-049-140-01	Pin, 11P

Symbol No.	Part No.	Description
« LEVEL INDICATOR CIRCUIT BOARD SECTION »		
D1 ~ 14	82-186-621-01	LED, LT3320 (With/PCB-M)
« REC MUTE CIRCUIT BOARD SECTION »		
PCB-N	*	REC MUTE circuit board
« LED-2 CIRCUIT BOARD SECTION »		
D1 ~ 5	82-186-635-01	LED, LT1076 (LH, CrO ₂ , METAL, 70μs, 120μs, (W/PCB-O))
« FUSE CIRCUIT BOARD SECTION »		
= "E, K, G" models only		
PCB-P	82-186-686-01	Fuse circuit board
F1	87-035-190-01	Fuse, "T" 2A
	87-033-147-01	Fuse clamp
	82-304-743-01	IP terminal
C1	87-019-112-01	0.01μF Spark killer
« MISCELLANEOUS »		
T1	82-186-618-01	Power transformer (H, HU models only)
T1	82-186-619-02	Power transformer (E model only)
T1	82-186-620-01	Power transformer (K, G models only)
RPH1	87-046-219-11	REC/PB head, 4 ch
PH1	87-046-218-11	PB head, 4 ch
EH1	82-186-254-01	EH dummy head
EH2	87-046-220-01	Erase head
M1, 2	87-045-187-01	Motor, DC-EG
SOL1	82-186-683-01	Solenoid ass'y
SOL2	82-186-637-01	Solenoid, MS
PL1	82-186-681-01	Lamp ass'y, 8V, 50mA
PL2	82-186-682-01	Lamp ass'y, 8V, 50mA
	87-033-140-01	Splice connector (H, HU models only)
	87-085-165-01	Cord bushing (H, HU models only)
	87-450-414-01	Lug terminal LB4
	87-034-826-01	AC power cord (H, HU models only)
	87-034-877-01	AC power cord (E model only)
	87-034-872-01	AC power cord (K model only)
	87-034-892-01	AC power cord (G model only)
	87-085-166-01	Holder, AC power cord (E, K, G models only)
S10, 11	87-031-537-01	Micro switch (I, II PLAY DETECTION)
S12, (S15)	82-186-636-01	Leaf switch (II MECHANISM DETECTION)
S13	87-031-693-01	Micro switch (II MECHANISM METAL DETECTION)
S15	87-031-707-01	Micro switch (I MECHANISM CrO ₂ DETECTION)
S16	82-283-631-01	Leaf switch (MISS ERASE BLOCKING)
S18, 19	87-031-548-01	Leaf switch (I, II MOTOR, ON/OFF)
S20	87-031-491-01	Micro switch (REC, ON/OFF)
S21, 22	87-031-615-01	Leaf switch (I, II FF/REW)
S25	87-031-735-01	Push-switch (POWER) (E, K, G models only)
S26	87-031-586-01	Rotary switch (VOLTAGE SELECTOR) (H, HU models only)
CON1	82-186-656-01	2P connector ass'y
CON7	82-186-652-01	2P connector ass'y
CON5	82-186-655-01	3P connector ass'y
CON2	82-186-662-01	3P connector ass'y
CON3	82-186-650-01	4P connector ass'y
CON10	82-186-674-01	5P connector ass'y
CON4	82-186-651-01	6P connector ass'y
CON6	82-186-654-01	6P connector ass'y
CON9	82-186-672-01	7P connector ass'y
CON8	82-186-660-01	11P connector ass'y

▲ Safety component symbol
This symbol is given to important parts which serve to maintain the safety of the product, and which are made to conform to special safety specifications. Therefore, when replacing a component with this symbol, make absolutely sure that you use a designated part.

Note: Combination Circuit Board
The parts on the electrical parts list which are indicated by an asterisk (*) are supplied as one single combined circuit board. Therefore, they will not be supplied separately. If this becomes necessary, please order the entire circuit board.

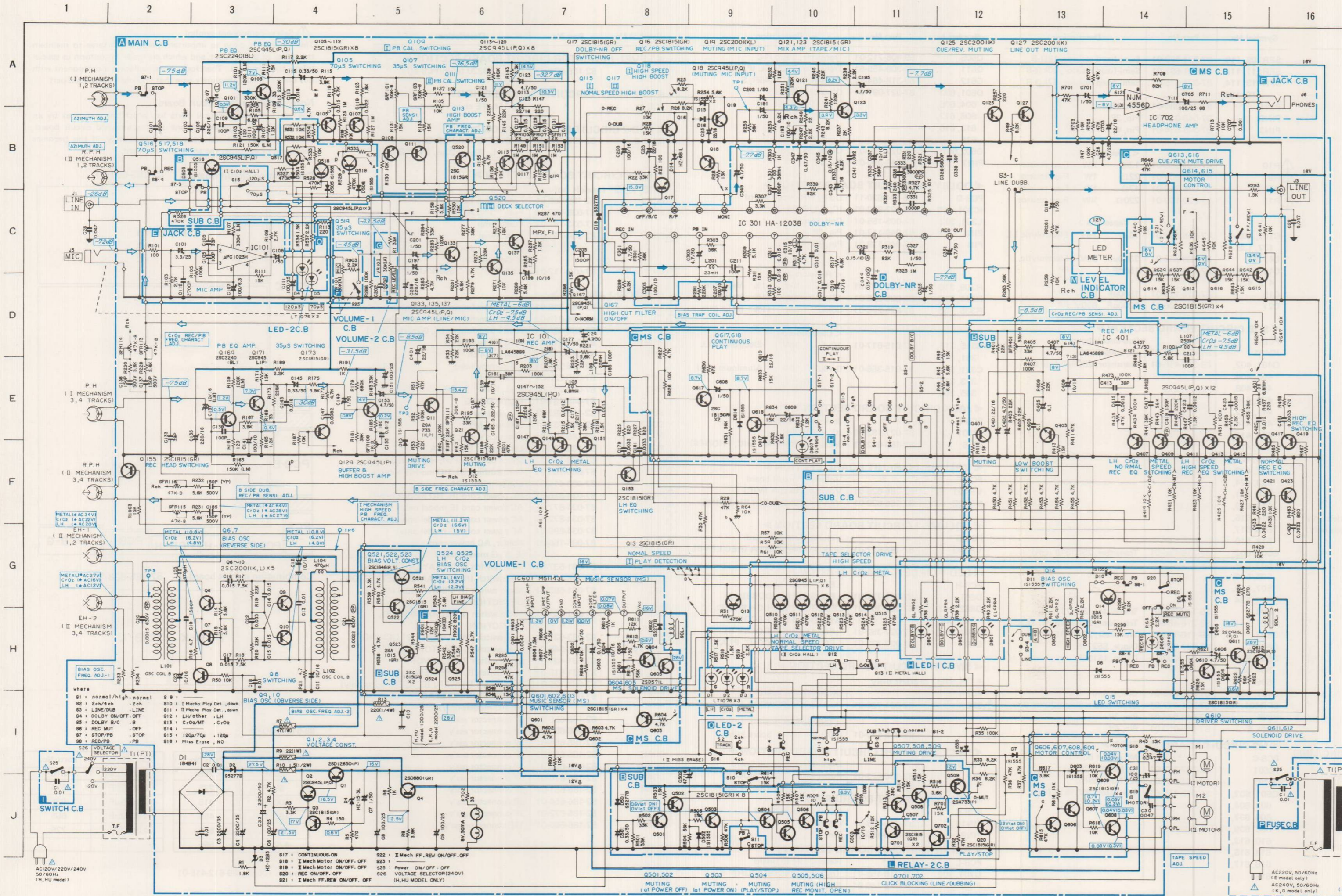


● Semiconductor ceramic capacitor

Capacitors	Parts No.	Capacitors	Parts No.
33pF	255	0.001 μF	615
39pF	275	0.0012μF	625
100pF	415	0.0015μF	635
150pF	455	0.0022μF	665
390pF	545	0.0047μF	725
470pF	555		

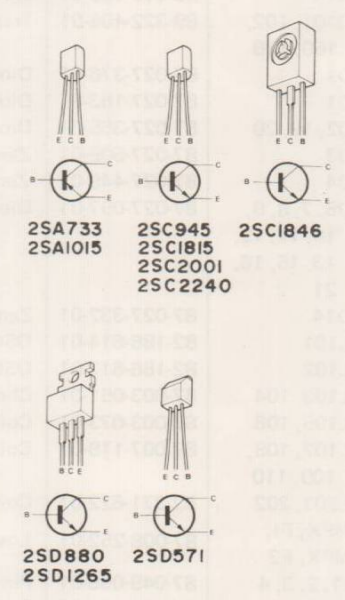
Example: 100pF 89-612-415-01

SCHEMATIC DIAGRAM



- NOTES:**
- 1) B (+) power supply
 - 2) Signal path
 - 3) Rec path.
 - 3) The voltage is the reference value measured with a tester (20 k-ohms/V DC) when there are no signals. But () is with recording. An asterisk (*) indicates that the value was measured with a vacuum-tube voltmeter during recording.
 - 4) Resistors with no designation have a rated power of 1/4W and a tolerance of ±5%.
 - 5) Capacitors with no designation have a dielectric strength of less than 50WV.
 - 6) The only capacitor tolerances indicated are ±2% (G), ±5% (J) and ±10% (K).
 - 7) Ceramic capacitor symbols:
 - High dielectric constant system (YY)
 - High dielectric constant system (YW, YP, YZ)
 - 8) Explanation of symbols
 - Mylar capacitor
 - Polypropylene film capacitor
 - Bi-polarized capacitor
 - Low-leakage capacitor
 - Fuse resistor
 - Nonflammable resistor
 - Low noise resistor
- ⚠ Safety component symbol
This symbol is given to important parts which serve to maintain the safety of the product, and which are made to conform to special safety specifications. Therefore, when replacing a component with this symbol, make absolutely sure that you use a designated part.
- Free service manuals
Circuit schema s
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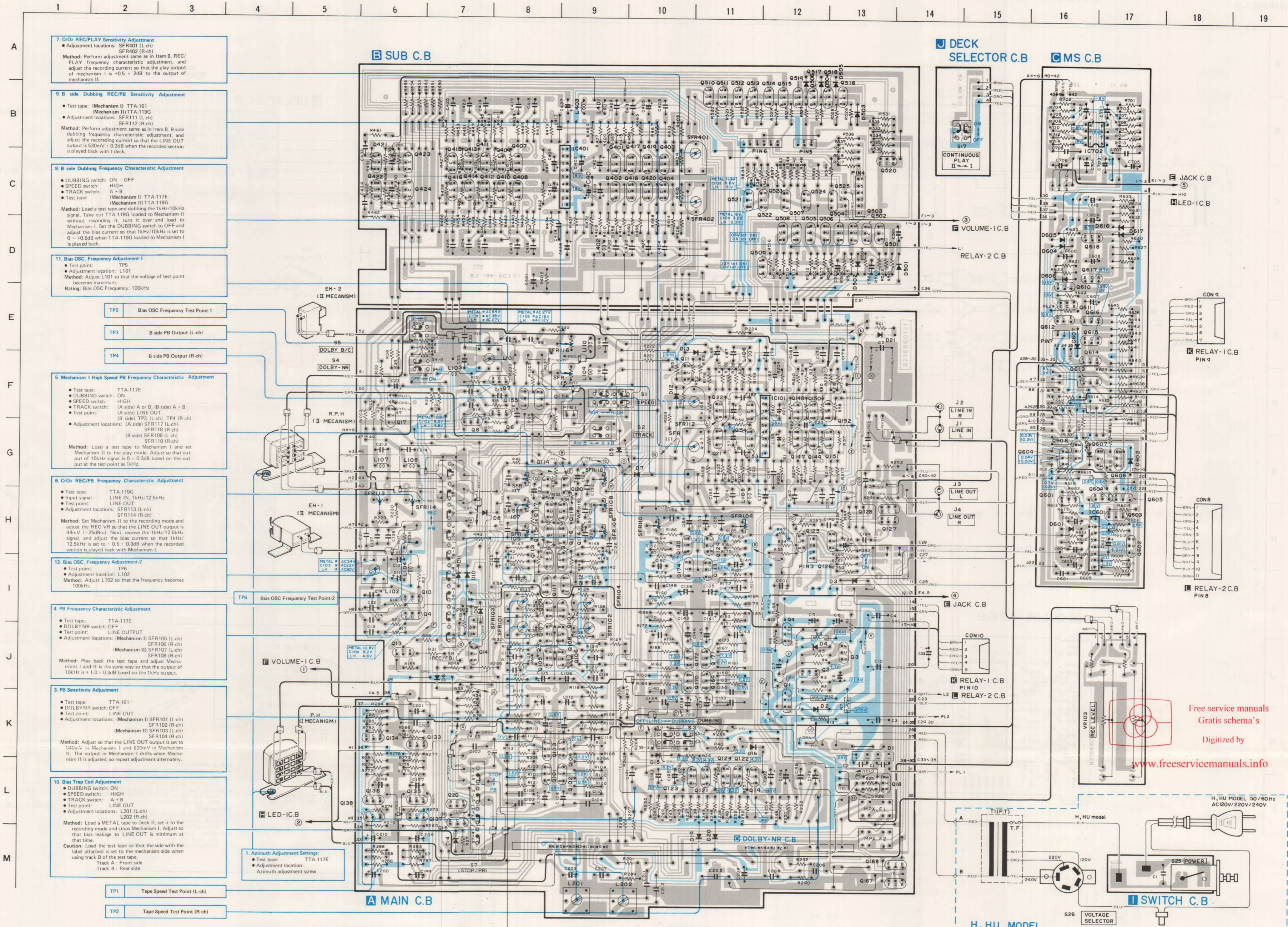


- where
- B1 : normal/high-normal
 - B2 : 2en/4en
 - B3 : LINE/DUB
 - B4 : DOLBY ON/OFF, OFF
 - B5 : DOLBY B/C
 - B6 : REC MUT
 - B7 : STOP/PB
 - B8 : REC/PB
 - B9 : CONTINUOUS ON
 - B10 : Mech Play Det., down
 - B11 : Mech Play Det., down
 - B12 : LH/Other
 - B13 : C-02/MT
 - B14 : REC MUT
 - B15 : 120p/70p
 - B16 : Miss Erase
 - B17 : CONTINUOUS ON
 - B18 : Mech Motor ON/OFF
 - B19 : Mech Motor ON/OFF
 - B20 : REC ON/OFF
 - B21 : Mech FF.REW ON/OFF
 - B22 : Mech FF.REW ON/OFF
 - B23 : Motor ON/OFF
 - B24 : Motor ON/OFF
 - B25 : VOLTAGE SELECTOR(240V)
 - B26 : VOLTAGE SELECTOR(240V)
- Q501,502 Q503 Q504 Q505,506 Q701,702
MUTING (at POWER OFF) MUTING (at POWER ON) (PLAY/STOP) MUTING (H) (H) REC MONIT. (OPEN)
- Q606,607,608,609 MOTOR CONTROL (0.03V) (0.03V) (0.03V) (0.03V)
- Q610,611,612 MOTOR CONTROL (0.03V) (0.03V) (0.03V)
- Q613,614,615 MOTOR CONTROL (0.03V) (0.03V) (0.03V)
- Q616,617,618 MOTOR CONTROL (0.03V) (0.03V) (0.03V)
- Q619,620 MOTOR CONTROL (0.03V) (0.03V)
- Q621,622 MOTOR CONTROL (0.03V) (0.03V)
- Q623,624 MOTOR CONTROL (0.03V) (0.03V)
- Q625,626 MOTOR CONTROL (0.03V) (0.03V)
- Q627,628 MOTOR CONTROL (0.03V) (0.03V)
- Q629,630 MOTOR CONTROL (0.03V) (0.03V)
- Q631,632 MOTOR CONTROL (0.03V) (0.03V)
- Q633,634 MOTOR CONTROL (0.03V) (0.03V)
- Q635,636 MOTOR CONTROL (0.03V) (0.03V)
- Q637,638 MOTOR CONTROL (0.03V) (0.03V)
- Q639,640 MOTOR CONTROL (0.03V) (0.03V)
- Q641,642 MOTOR CONTROL (0.03V) (0.03V)
- Q643,644 MOTOR CONTROL (0.03V) (0.03V)
- Q645,646 MOTOR CONTROL (0.03V) (0.03V)
- Q647,648 MOTOR CONTROL (0.03V) (0.03V)
- Q649,650 MOTOR CONTROL (0.03V) (0.03V)
- Q651,652 MOTOR CONTROL (0.03V) (0.03V)
- Q653,654 MOTOR CONTROL (0.03V) (0.03V)
- Q655,656 MOTOR CONTROL (0.03V) (0.03V)
- Q657,658 MOTOR CONTROL (0.03V) (0.03V)
- Q659,660 MOTOR CONTROL (0.03V) (0.03V)
- Q661,662 MOTOR CONTROL (0.03V) (0.03V)
- Q663,664 MOTOR CONTROL (0.03V) (0.03V)
- Q665,666 MOTOR CONTROL (0.03V) (0.03V)
- Q667,668 MOTOR CONTROL (0.03V) (0.03V)
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- Q671,672 MOTOR CONTROL (0.03V) (0.03V)
- Q673,674 MOTOR CONTROL (0.03V) (0.03V)
- Q675,676 MOTOR CONTROL (0.03V) (0.03V)
- Q677,678 MOTOR CONTROL (0.03V) (0.03V)
- Q679,680 MOTOR CONTROL (0.03V) (0.03V)
- Q681,682 MOTOR CONTROL (0.03V) (0.03V)
- Q683,684 MOTOR CONTROL (0.03V) (0.03V)
- Q685,686 MOTOR CONTROL (0.03V) (0.03V)
- Q687,688 MOTOR CONTROL (0.03V) (0.03V)
- Q689,690 MOTOR CONTROL (0.03V) (0.03V)
- Q691,692 MOTOR CONTROL (0.03V) (0.03V)
- Q693,694 MOTOR CONTROL (0.03V) (0.03V)
- Q695,696 MOTOR CONTROL (0.03V) (0.03V)
- Q697,698 MOTOR CONTROL (0.03V) (0.03V)
- Q699,700 MOTOR CONTROL (0.03V) (0.03V)
- Q701,702 MOTOR CONTROL (0.03V) (0.03V)
- Q703,704 MOTOR CONTROL (0.03V) (0.03V)
- Q705,706 MOTOR CONTROL (0.03V) (0.03V)
- Q707,708 MOTOR CONTROL (0.03V) (0.03V)
- Q709,710 MOTOR CONTROL (0.03V) (0.03V)
- Q711,712 MOTOR CONTROL (0.03V) (0.03V)
- Q713,714 MOTOR CONTROL (0.03V) (0.03V)
- Q715,716 MOTOR CONTROL (0.03V) (0.03V)
- Q717,718 MOTOR CONTROL (0.03V) (0.03V)
- Q719,720 MOTOR CONTROL (0.03V) (0.03V)
- Q721,722 MOTOR CONTROL (0.03V) (0.03V)
- Q723,724 MOTOR CONTROL (0.03V) (0.03V)
- Q725,726 MOTOR CONTROL (0.03V) (0.03V)
- Q727,728 MOTOR CONTROL (0.03V) (0.03V)
- Q729,730 MOTOR CONTROL (0.03V) (0.03V)
- Q731,732 MOTOR CONTROL (0.03V) (0.03V)
- Q733,734 MOTOR CONTROL (0.03V) (0.03V)
- Q735,736 MOTOR CONTROL (0.03V) (0.03V)
- Q737,738 MOTOR CONTROL (0.03V) (0.03V)
- Q739,740 MOTOR CONTROL (0.03V) (0.03V)
- Q741,742 MOTOR CONTROL (0.03V) (0.03V)
- Q743,744 MOTOR CONTROL (0.03V) (0.03V)
- Q745,746 MOTOR CONTROL (0.03V) (0.03V)
- Q747,748 MOTOR CONTROL (0.03V) (0.03V)
- Q749,750 MOTOR CONTROL (0.03V) (0.03V)
- Q751,752 MOTOR CONTROL (0.03V) (0.03V)
- Q753,754 MOTOR CONTROL (0.03V) (0.03V)
- Q755,756 MOTOR CONTROL (0.03V) (0.03V)
- Q757,758 MOTOR CONTROL (0.03V) (0.03V)
- Q759,760 MOTOR CONTROL (0.03V) (0.03V)
- Q761,762 MOTOR CONTROL (0.03V) (0.03V)
- Q763,764 MOTOR CONTROL (0.03V) (0.03V)
- Q765,766 MOTOR CONTROL (0.03V) (0.03V)
- Q767,768 MOTOR CONTROL (0.03V) (0.03V)
- Q769,770 MOTOR CONTROL (0.03V) (0.03V)
- Q771,772 MOTOR CONTROL (0.03V) (0.03V)
- Q773,774 MOTOR CONTROL (0.03V) (0.03V)
- Q775,776 MOTOR CONTROL (0.03V) (0.03V)
- Q777,778 MOTOR CONTROL (0.03V) (0.03V)
- Q779,780 MOTOR CONTROL (0.03V) (0.03V)
- Q781,782 MOTOR CONTROL (0.03V) (0.03V)
- Q783,784 MOTOR CONTROL (0.03V) (0.03V)
- Q785,786 MOTOR CONTROL (0.03V) (0.03V)
- Q787,788 MOTOR CONTROL (0.03V) (0.03V)
- Q789,790 MOTOR CONTROL (0.03V) (0.03V)
- Q791,792 MOTOR CONTROL (0.03V) (0.03V)
- Q793,794 MOTOR CONTROL (0.03V) (0.03V)
- Q795,796 MOTOR CONTROL (0.03V) (0.03V)
- Q797,798 MOTOR CONTROL (0.03V) (0.03V)
- Q799,800 MOTOR CONTROL (0.03V) (0.03V)

AC220V, 50/60Hz (E model only)
AC240V, 50/60Hz (K, G model only)

WIRING-1

NOTES (1) B(+) Pattern Others pattern
(2) The voltage is the reference value measured with a tester (20 K ohms/V DC) when there are no signals.
An asterisk (*) indicates that the value was measured with a vacuum-tube voltmeter during recording.



7. CrO₂ REC/PLAY Sensitivity Adjustment
• Adjustment locations: SFR401 (L ch)
SFR402 (R ch)
Method: Perform adjustment same as in Item 6. REC/PLAY frequency characteristic adjustment, and adjust the recording current so that the play output of mechanism I is +0.5 ± 0.3dB to the output of mechanism II.

9. B side Dubbing REC/PB Sensitivity Adjustment
• Test tape: (Mechanism I) TTA-161
(Mechanism II) TTA-119G
• Adjustment locations: SFR111 (L ch)
SFR112 (R ch)
Method: Perform adjustment same as in Item 8. B side dubbing frequency characteristic adjustment, and adjust the recording current so that the LINE OUT output is 530mV ± 0.3dB when the recorded section is played back with I deck.

8. B side Dubbing Frequency Characteristic Adjustment
• DUBBING switch: ON - OFF
• SPEED switch: HIGH
• TRACK switch: A + B
• Test tape: (Mechanism I) TTA-117E
(Mechanism II) TTA-119G
Method: Load a test tape and dubbing the 1kHz/10kHz signal. Take out TTA-119G loaded to Mechanism II without rewinding it, turn it over and load to Mechanism I. Set the DUBBING switch to OFF and adjust the bias current so that 1kHz/10kHz is set to 0 - +0.5dB when TTA-119G loaded to Mechanism I is played back.

11. Bias OSC. Frequency Adjustment-1
• Test point: TP5
• Adjustment location: L101
Method: Adjust L101 so that the voltage of test point becomes maximum.
Rating: Bias OSC Frequency: 100kHz

- TP5 Bias OSC Frequency Test Point-1
- TP3 B side PB Output (L-ch)
- TP4 B side PB Output (R-ch)

5. Mechanism I High Speed PB Frequency Characteristic Adjustment
• Test tape: TTA-117E
• DUBBING switch: ON
• SPEED switch: HIGH
• TRACK switch: (A side) A or B, (B side) A + B
• Test point: (B side) TP3 (L-ch), TP4 (R-ch)
• Adjustment locations: (A side) SFR117 (L ch)
SFR118 (R ch)
(B side) SFR109 (L ch)
SFR110 (R ch)
Method: Load a test tape to Mechanism I and set Mechanism II to the play mode. Adjust so that output of 10kHz signal is 0 - 0.3dB based on the output at the test point as 1kHz.

6. CrO₂ REC/PB Frequency Characteristic Adjustment
• Test tape: TTA-119G
• Input signal: LINE IN, 1kHz/12.5kHz
• Test point: (B side) TP3 (L-ch), TP4 (R-ch)
• Adjustment locations: SFR113 (L ch)
SFR114 (R ch)
Method: Set Mechanism II to the recording mode and adjust the REC VR so that the LINE OUT output is 44mV (-25dBm). Next, receive the 1kHz/12.5kHz signal, and adjust the bias current so that 1kHz/12.5kHz is set to 0.5 ± 0.3dB when the recorded section is played back with Mechanism I.

12. Bias OSC. Frequency Adjustment-2
• Test point: TP6
• Adjustment location: L102
Method: Adjust L102 so that the frequency becomes 100kHz.

- TP6 Bias OSC Frequency Test Point-2

4. PB Frequency Characteristic Adjustment
• Test tape: TTA-117E
• DOLBYNR switch: OFF
• Test point: LINE OUTPUT
• Adjustment locations: (Mechanism I) SFR105 (L ch)
SFR106 (R ch)
(Mechanism II) SFR107 (L ch)
SFR108 (R ch)
Method: Play back the test tape and adjust Mechanisms I and II in the same way so that the output of 10kHz is +1.0 ± 0.3dB based on the 1kHz output.

VOLUME-I C.B.

3. PB Sensitivity Adjustment
• Test tape: TTA-161
• DOLBYNR switch: OFF
• Test point: LINE OUT
• Adjustment locations: (Mechanism I) SFR101 (L ch)
SFR102 (R ch)
(Mechanism II) SFR103 (L ch)
SFR104 (R ch)
Method: Adjust so that the LINE OUT output is 540mV in Mechanism I and 520mV in Mechanism II. The output in Mechanism I drifts when Mechanism II is adjusted, so repeat adjustment alternately.

P.H (I MECHANISM)

10. Bias Trap Coil Adjustment
• DUBBING switch: ON
• SPEED switch: HIGH
• TRACK switch: A + B
• Test point: LINE OUT
• Adjustment locations: L201 (L ch)
L202 (R ch)
Method: Load a METAL tape to Deck II, set it to the recording mode and stops Mechanism I. Adjust so that bias leakage to LINE OUT is minimum at that time.
Caution: Load the test tape so that the side with the label attached is set to the mechanism side when using track B of the test tape.
Track A: Front side
Track B: Rear side

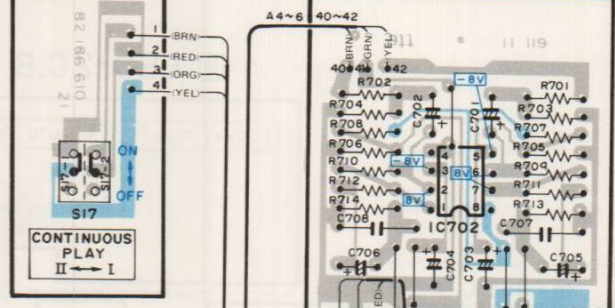
LED-I C.B.

1. Azimuth Adjustment Settings:
• Test tape: TTA-117E
• Adjustment location: Azimuth adjustment screw

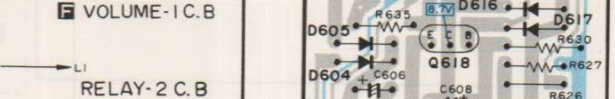
- TP1 Tape Speed Test Point (L-ch)
- TP2 Tape Speed Test Point (R-ch)

MAIN C.B.

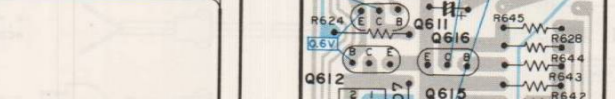
DECK SELECTOR C.B.



VOLUME-I C.B.



RELAY-2 C.B.



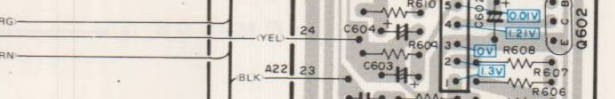
JACK C.B.



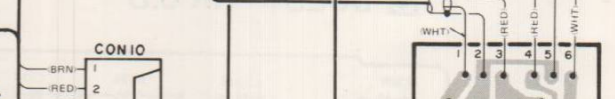
RELAY-1 C.B.



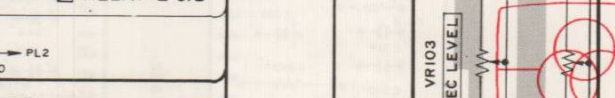
RELAY-2 C.B.



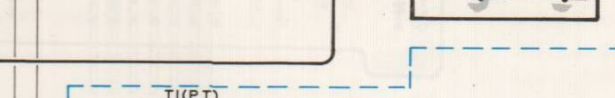
JACK C.B.



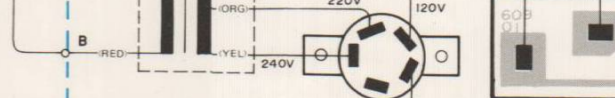
RELAY-1 C.B.



RELAY-2 C.B.



JACK C.B.



SWITCH C.B.

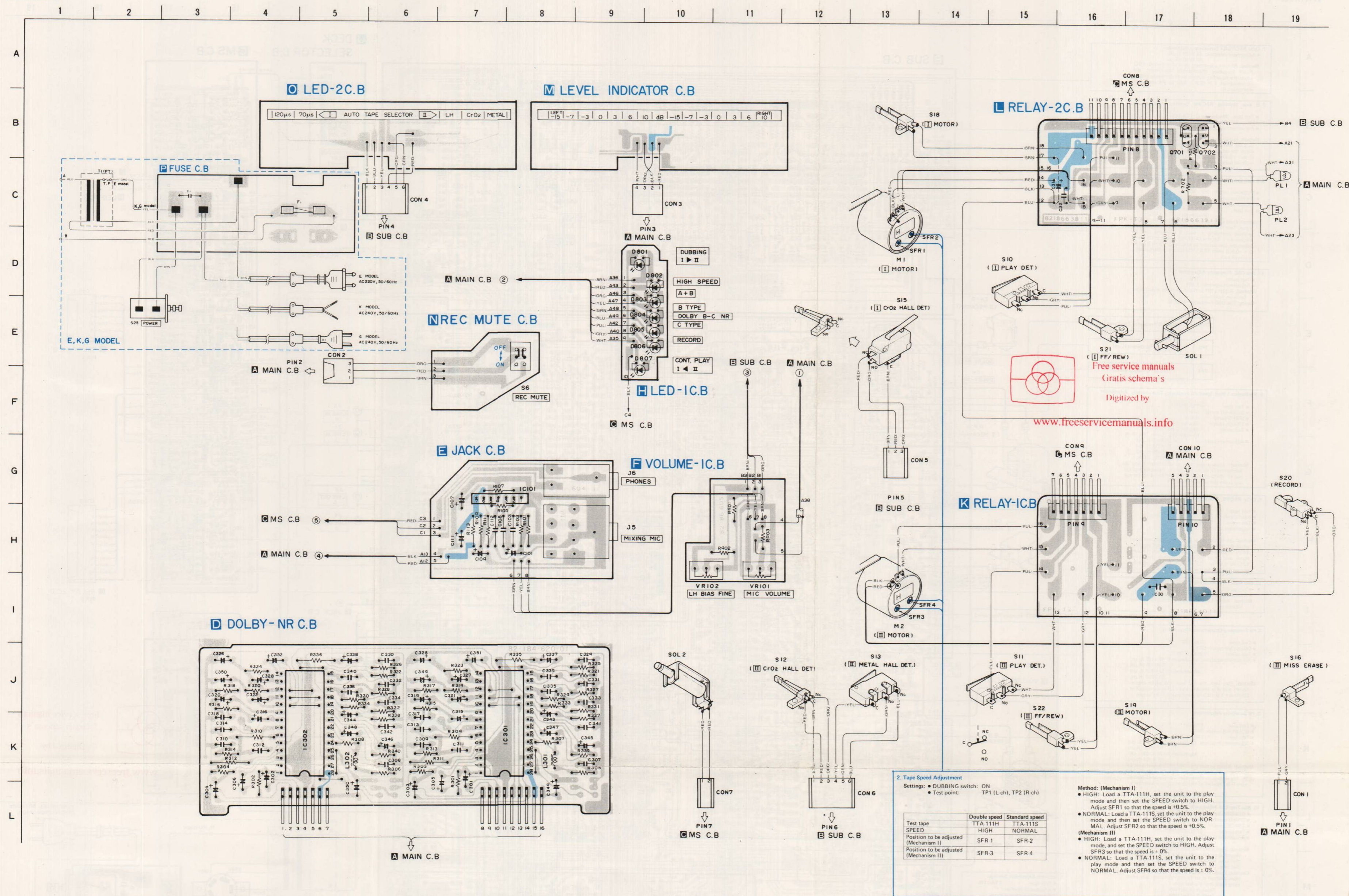


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NOTES (1) B(+) Pattern Others pattern
(2) The voltage is the reference value measured with a tester (20 K ohms/V DC) when there are no signals.
An asterisk (*) indicates that the value was measured with a vacuum-tube voltmeter during recording.

WIRING-2



2. Tape Speed Adjustment

Settings: • DUBBING switch: ON
• Test point: TP1 (L-ch), TP2 (R-ch)

Test tape	Double speed	Standard speed
TTA-111H	TA-111H	TA-111S
Position to be adjusted (Mechanism I)	SFR-1	SFR-2
Position to be adjusted (Mechanism II)	SFR-3	SFR-4

Method: (Mechanism I)

- HIGH: Load a TTA-111H, set the unit to the play mode and then set the SPEED switch to HIGH. Adjust SFR1 so that the speed is +0.5%.
- NORMAL: Load a TTA-111S, set the unit to the play mode and then set the SPEED switch to NORMAL. Adjust SFR2 so that the speed is +0.5%.

(Mechanism II)

- HIGH: Load a TTA-111H, set the unit to the play mode, and set the SPEED switch to HIGH. Adjust SFR3 so that the speed is +0.5%.
- NORMAL: Load a TTA-111S, set the unit to the play mode and then set the SPEED switch to NORMAL. Adjust SFR4 so that the speed is +0.5%.

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