AIWA®

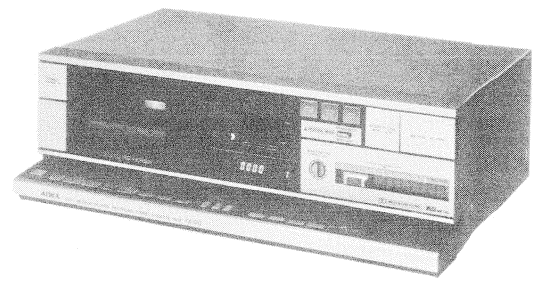
S/M Code No. 84-004
DATE OF ISSUE 2/1984

SERVICE MANUAL

STEREO CASSETTE DECK

MODEL NO.

FX-90

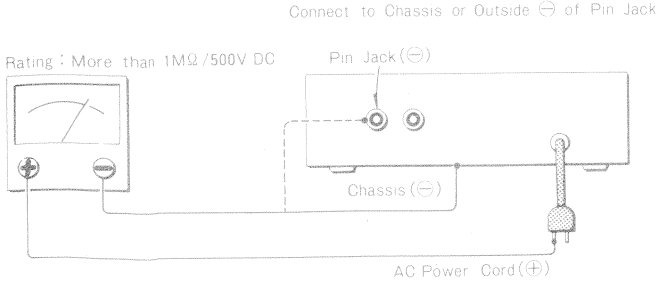


TYPE. H,HB,UB,E,EB,K,KB,G

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

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 ± 5V D.C and shall be not less than 1MΩ.**

Measuring Point



6. **General instructions for mechanism repair**
   1) 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.
   2) 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
   3) idlers and pinch roller, especially.
      E-rings and poly slider washers shall be replaced with new ones, if once those have been removed. – No re-utilization due to unreliability.
   4) Regular spare-parts shall always be used for repair, because using irregular parts and tampering with the products shall cause deterioration, mulfunction and damage.

SPECIFICATIONS

Power supply:	H, HB models AC 120V/220V/240V switchable, 50/60 Hz K, KB, G models AC 240V, 50/60 Hz
Power consumption:	15W
Dimensions:	330(W)×107(H)×230(D) mm (13"×4 1/4"×9")
Weight:	3.7kg
Track type:	4 tracks 2 channels
Tape speed:	4.8 cm/s (1 7/8 ips)
Wow and flutter:	According to DIN45500 0.10% 0.038% (WRMS)
Automatic stop system:	Full automatic stop
Automatic shut-off action time:	4^{+1}_{-0}s.
Pinch roller pressure:	225±25g (2.21±0.25N)
Take-up torque:	35 $^{+15}_{-7}$ g-cm(3.43 $^{+1.47}_{-0.69}$mN・m)
FF & rewind torque:	160±40g-cm (15.68±3.92mN・m)
FF & rewind time:	65±10s.(C-60)
Play back output: (TTA-161)	390±20mV(DIN)
Play back noise:	Less than 1.2 mV (CrO2, DOLBY NR ON) Less than 2.0 mV (METAL DOLBY NR OFF) Less than 2.7 mV (NORMAL DOLBY NR OFF)
Rec./PB output: (TTA-119G)	0 VU±1.0 dB (LINE)
Rec./PB distortions:	Less than 1.5% (METAL) Less than 2.0% (CrO2) Less than 1.5% (NORMAL)
Rec./PB S/N ratio: Unweighted	More than 50/53 dB (METAL, DOLBY-C NR OFF/B) More than 49/52 dB (CrO2, DOLBY -C NR OFF/B More than 48/51 dB (NORMAL DOLBY NR OFF/B)
WTD-A	More than 61/68 dB (METAL DOLBY NR B/C) More than 60/67 dB (CrO2DOLBY NR B/C) More than 58/66 dB (NORMAL DOLBY NR B/C)

Channel separation: (1 kHz, 0 VU)	More than 35 dB
Cross talk: (1 kHz, 0 VU)	More than 60 dB
Erasing ratio: (METAL 125 Hz)	More than 60 dB
Level drift:	±0.5 dB (at 10 kHz,0 VU)
Bias frequency:	100 kHz
Recording system:	AC bias
Erase system:	AC erase
Frequency response:	METAL 20~18,000 Hz CrO2 20~17,000 Hz NORMAL 20~16,000 Hz
Motor:	DC servo motor, DC motor
Head:	DX head
Inputs:	LINE IN maximum input sensitivity (50 mV/over 50 kΩ)
Outputs:	LINE OUT Standard output level 280 mV (0 VU); Suitable load impedance: over 50 KΩ
TEST TAPE:	METAL TTA-119MX CrO2 TTA-119G NORMAL TTA-119J

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

WA®

ELECTRICAL MAIN PARTS LIST

"★★★" shows unavailable Repair Part.

Symbol No.	Part No.	Description	Remark
		<MAIN CIRCUIT BOARD SECTION>	
PCB-A	82-197-601-11	Main circuit board	
IC101	87-020-157-01	IC. M5210L	
IC201	87-027-925-01	IC. M5220	
IC202	87-020-096-01	IC. M4066BP	
IC251. 371	87-027-895-01	IC. M5218L	
IC252	87-020-151-01	IC. TD62505P	
IC301	87-020-079-01	IC. TD62555S	
IC351	87-027-538-01	IC. μPD4069	
⏚IC501	82-197-641-01	IC. LC6502B	
IC551	87-020-146-01	IC. M4030BP	
IC552	87-027-909-01	IC. M54523P	
IC601	87-020-160-01	IC.TC4015BP	
Q101	89-414-064-51	Transistor. 2SD1406Y (GR)	
Q102. 105	89-210-154-51	Transistor. 2SB1015Y (GR)	
Q103. 106. 371. 372. 503. 504. 601. 602. 603	89-318-155-01	Transistor. 2SC1815 (GR)	
Q104	89-412-753-01	Transistor. 2SD1275 (Q)	
Q107. 251. 252	89-413-023-01	Transistor. 2SD1302S	
Q108. 351 391. 501. 505. 506. 551. 552	89-110-155-01	Transistor. 2SA1015 (GR)	
Q301. 302	89-320-011-01	Transistor. 2SC2001K	
Q303. 403. 404. 501 553. 554	89-109-521-01	Transistor. 2SA952K	
Q401. 402. 604	89-309-457-01	Transistor. 2SC945L (K)	
D101	87-027-376-01	Diode. 1B4B41	
D102	87-027-365-01	Diode. S5277B	
D103. 104. 105. 301. 302. 352. 371. 501. 502. 503. 504. 505. 551. 552. 601	87-020-123-01	Diode. DS446	
D106	87-027-674-01	Zener diode. HZ7A2	
D107	87-027-369-01	Zener diode. 05Z6.2L	
D351. 553. 605	87-027-097-01	Diode. 1S1555	
D602. 603	87-027-606-01	Zener diode. HZ7C2L	
L251. 252	82-196-603-01	Trap coil. 100K	
L253. 254	82-194-634-01	Coil. 10mH	
L301	82-197-637-01	OSC coil EH	
L302	82-003-051-01	Choke coil. 470 μH	
L501	87-196-649-01	OSC coil. LC6502C	
RY301	87-045-218-01	Relay. FBR244D012-A59	
J601	87-032-892-01	Jack. 2.5 φ (CD SYNC)	
J602	82-197-635-01	Jack board ass'y. 8P-3 (CONTROL. REC/PLAY)	
⚠F101	87-035-222-01	Fuse. "T"1A (H. HB. E. EB. K. KB. G models only)	
⚠F101	87-035-297-01	Fuse. 1A (UB model only)	
⚠	87-033-147-01	Fuse clamp	★★★
SFR201. 202	87-021-734-01	Semi-fixed resistor. 100Ω-B	
SFR203. 204 251. 252	87-021-743-01	Semi-fixed resistor. 22kΩ-B	
PIN101	87-049-275-01	Pin. 5P	★★★
PIN102	87-049-396-01	Pin. 2P	★★★
PIN103	87-049-273-01	Pin. 3P	★★★
PIN201	87-049-279-01	Pin. 9P	★★★
PIN502	87-049-281-01	Pin. 11P	★★★
PIN503	87-049-283-01	Pin. 13P	★★★
PIN551	87-049-282-01	Pin. 12P	★★★
PIN601. 602	82-197-647-01	Pin. 15P	★★★
		<Resistor>	
⚠FR101	87-029-089-01	4.7 Ω 1/4W Fuse resistor	
		<Capacitors>	
C101	82-194-657-01	2200μF 25V Electrolytic	
C102	88-336-131-91	1000μF 25V Electrolytic	
C207. 208. 602	87-010-132-01	1 μF 50V Electrolytic BP	
C301	87-014-073-01	4700pF PP	
C306	87-010-137-01	22μF 16V Electrolytic BP	
C108. 109. 356. 407. 408. 501	87-018-044-01	1000pF Ceramic	
C201. 202	87-018-039-01	390pF Ceramic	
C354	87-018-034-01	150pF Ceramic	
C401. 402	87-018-036-01	220pF Ceramic	
C403. 404. 405. 406	87-018-047-01	0.01μF 16V Ceramic	
		<DISPLAY CIRCUIT BOARD SECTION>	
PCB-B	*	DISPLAY Circuit board	
IC801. 802	87-027-879-01	IC. AN6882	
⏚IC803	82-197-642-01	IC. HD38702A33	
D801. 802. 803. 804. 805. 806. 807. 808 809. 810. 811. 812. 813. 814	87-020-175-01	LED. GL-103 (LEVEL)	
D807. 808	87-020-174-01	LED. GL-104N5 (LEVEL)	
D815. 817. 818. 819. 821. 824. 827	87-027-984-01	LED. GL-9PR23 (C. REVERSE MODE. EDIT. MT. LH)	
D816. 820 822	87-020-163-01	LED. GL-9NG23 (B. SKIP. LH)	
D823	87-020-173-01	LED. GL-9HY23 (Co)	
D825. 826	87-027-773-01	LED. GL-9NG4 (PLAY. R. PLAY)	
D828. 829. 830. 831. 832. 833. 834	87-027-097-01	Diode. 1S1555	
D835	87-027-225-01	Zener diode. 05Z5.1	
D836	87-027-301-01	Zener diode. HZ3A1	
FL801	82-197-631-01	FL. 9-ST-10-AK	
VR801	82-197-634-01	Volume. 10k Ω-A (RECORD)	
VR802	82-197-632-01	Volume. 50k Ω-B (BIAS FINE)	
S801. 802. 803	87-031-760-01	Push-swict (REVERSE MODE)	
S804	82-197-633-01	Push-switch (ↄ ↄ)	
S805. 806	87-031-692-01	Push-switch (DOLBY ON/OFF. DOLBY C/B)	
CON601. 602	82-197-646-01	Connector ass'y. 15P	★★★
		<Capacitor>	
C801. 802. 805	87-015-697-01	3.3 μF 50V Electrolytic	
C803. 804	87-018-047-01	0.01μF 16V Ceramic	
C806	87-014-033-01	100pF P.P	

Symbol No.	Part No.	Description	Remark
		<KEY CIRCUIT BORD SECTION>	
PCB-C	*	KEY circuit board	
IC861. 862	87-027-723-01	IC. TC4049BP	
Q861	89-318-155-01	Transistor. 2SC1815 (GR)	
D861. 862. 863. 864. 865. 866. 867. 868. 869. 870 871. 872. 873. 874. 875. 876. 886. 887	87-027-097-01	Diode. 1S1555	
D878. 879	83-203-731-01	LED. TLUG 163 (PLAY. RVS- PLAY)	
D880	87-020-170-01	LED. SLP477B (PAUSE)	
D881. 882. 883. 884. 885	87-020-168-01	LED. SLP177B (RM. REC. TUN. CD. AUX)	
S861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875	87-031-771-01	Tact switch (RMT. PUS. STOP. FF. PLAY. R.PLAY. RWD. EDIT. RESET. Z.STOP. MS. AUX. CD. TUN. PHONO)	
S877	87-031-817-01	Slide switch (TIMER)	
CON503	82-197-652-01	Connector ass'y. 13P	★★★
		<DOLBY CIRCUIT BOARD SECTION>	
PCB-D	82-198-666-01	DOLBY circuit board	
	87-020-132-01	DOLBY unit 12058J	★★★
IC1. 2	87-020-241-01	IC. HA12058NT	
L1. 2	82-198-608-01	Filter. SQ20K	
PIN1	87-049-118-01	Pin. 8P	★★★
PIN2	87-049-120-01	Pin. 10P	★★★
		<Capacitor>	
C3. 4. 25. 26	87-015-953-01	4.7 μF 50V Electrolytic LL	
		<HX CIRCUIT BOARD SECTION>	
PCB-E	82-198-619-01	HX circuit board	
IC1. 2. 3	87-027-986-01	IC. NJM4560S	
Q1. 2	89-321-204-01	Transistor. 2SC2120Y	
D1. 2	87-020-156-01	Diode. MC931	
L1. 2	82-198-606-01	OSC Coil. HX	
SFR1. 2	87-021-869-01	Semi-fixed resistor. 220kΩ-B	
	82-197-636-01	Pin. 9P	★★★
		<Resistor>	
⚠R5. 6	87-029-102-01	47Ω 1/4W Fuse resistor	
		<Capacitors>	
C1. 2	87-014-041-01	220pF PP	
C3. 4	87-014-173-01	1000pF PP	
		<AUTO CIRCUIT BOARD SECTION>	
PCB-F	*	AUTO circuit board	
CP901	87-027-644-01	Photo sensor. NJL514EA	
		<CONECT CIRCUIT BOARD SECTION>	
PCB-G	*	CONECT circuit board	

Symbol No.	Part No.	
		<SENSOR C BOAR
PCB-H	*	
CP902	87-027-644-01	
		<POWER CI SE
PCB-I	*	
S881	87-031-817-01	
		<MISCELLA
⚠PT951	82-197-615-01	
⚠PT951	82-197-612-01	
⚠PT951	82-197-613-01	
⚠PT951	82-197-614-01	
RPH /EH	81-506-601-01	
D951	87-020-109-01	
M901	09-047-198-01	
M902	87-045-135-01	
⚠S46	87-031-586-01	
⚠	87-033-140-01	
⚠	87-034-962-01	
⚠	87-034-992-01	
⚠	87-034-578-01	
⚠	87-787-674-01	
⚠	87-034-708-01	
⚠	87-085-184-01	
⚠	87-085-185-01	
SOL901. 902. 903. 904	81-505-603-01	
S901. 902 907	81-505-601-01	
S903. 906. 908	81-505-607-01	
S904. 905	81-505-602-01	
CON201	81-506-631-01	
CON501	81-506-631-01	
CON502	81-505-635-01	
CON551	81-506-632-01	

⚠ Safety component symbol
This symbol is given to important
the safety of the product, and whic
safety specifications. Therefore, wh
this symbol, make absolutely sure t

The ICs on the electrical parts wh
IC symbol mark (⏚).

Note; Combination Circuit Boa

The parts on the electrical parts
asterisk (*) are supplied as one s
Therefore, they will not be suppli
necessary, please order the entire cir

Combination circuit board A 82
PCB-B 82-197-606-11
PCB-C 82-197-607-11
PCB-I 82-197-607-11
Combination circuit board B 87
PCB-F 81-506-102-01
PCB-G 81-506-613-01
PCB-H 81-506-614-01

★★★" shows unavailable Repair Part.

ption	Remark
BOARD N>	
R)	
R)	
R)	
Q)	
R)	
K)	
(CONTROL, REC/PLAY)	
S models only)	
Ω-B	
Ω-B	

Symbol No.	Part No.	Description			Remark
PIN201	87-049-279-01	Pin, 9P			★★★
PIN502	87-049-281-01	Pin, 11P			★★★
PIN503	87-049-283-01	Pin, 13P			★★★
PIN551	87-049-282-01	Pin, 12P			★★★
PIN601, 602	82-197-647-01	Pin, 15P			★★★
		<Resistor>			
⚠FR101	87-029-089-01	4.7 Ω	1/4W	Fuse resistor	
		<Capacitors>			
C101	82-194-657-01	2200μF	25V	Electrolytic	
C102	88-336-131-91	1000μF	25V	Electrolytic	
C207, 208, 602	87-010-132-01	1 μF	50V	Electrolytic BP	
C301	87-014-073-01	4700pF		PP	
C306	87-010-137-01	22μF	16V	Electrolytic BP	
C108, 109, 356, 407, 408, 501	87-018-044-01	1000pF		Ceramic	
C201, 202	87-018-039-01	390pF		Ceramic	
C354	87-018-034-01	150pF		Ceramic	
C401, 402	87-018-036-01	220pF		Ceramic	
C403, 404, 405, 406	87-018-047-01	0.01μF	16V	Ceramic	
		<DISPLAY CIRCUIT BOARD SECTION>			
PCB-B	*	DISPLAY Circuit board			
IC801, 802	87-027-879-01	IC, AN6882			
⚡IC803	82-197-642-01	IC, HD38702A33			
D801, 802, 803, 804, 805, 806	87-020-175-01	LED, GL-103 (LEVEL)			
D807, 808, 809, 810, 811, 812, 813, 814	87-020-174-01	LED, GL-104N5 (LEVEL)			
D815, 817, 818, 819, 821, 824, 827	87-027-984-01	LED, GL-9PR23 (C, REVERSE MODE, EDIT, MT, LH)			
D816, 820, 822	87-020-163-01	LED, GL-9NG23 (B, SKIP, LH)			
D823	87-020-173-01	LED, GL-9HY23 (Co)			
D825, 826	87-027-773-01	LED, GL-9NG4 (PLAY, R, PLAY)			
D828, 829, 830, 831, 832, 833, 834	87-027-097-01	Diode, 1S1555			
D835	87-027-225-01	Zener diode, 05Z5.1			
D836	87-027-301-01	Zener diode, HZ3A1			
FL801	82-197-631-01	FL, 9-ST-10-AK			
VR801	82-197-634-01	Volume, 10k Ω-A (RECORD)			
VR802	82-197-632-01	Volume, 50k Ω-B (BIAS FINE)			
S801, 802, 803	87-031-760-01	Push-swict (REVERSE MODE)			
S804	82-197-633-01	Push-switch (↻ ↻)			
S805, 806	87-031-692-01	Push-switch (DOLBY ON/OFF, DOLBY C/B)			
CON601, 602	82-197-646-01	Connector ass'y, 15P			★★★
		<Capacitor>			
C801, 802, 805	87-015-697-01	3.3 μF	50V	Electrolytic	★★★
C803, 804	87-018-047-01	0.01μF	16V	Ceramic	★★★
C806	87-014-033-01	100pF		P.P	★★★

Symbol No.	Part No.	Description	Remark
		<KEY CIRCUIT BORD SECTION>	
PCB-C	*	KEY circuit board	
IC861, 862	87-027-723-01	IC, TC4049BP	
Q861	89-318-155-01	Transistor, 2SC1815 (GR)	
D861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 886, 887	87-027-097-01	Diode, 1S1555	
D878, 879	83-203-731-01	LED, TLUG 163 (PLAY, RVS- PLAY)	
D880	87-020-170-01	LED, SLP477B (PAUSE)	
D881, 882, 883, 884, 885	87-020-168-01	LED, SLP177B (RM, REC, TUN, CD, AUX)	
S861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875	87-031-771-01	Tact switch (RMT, PUS, STOP, FF, PLAY, R.PLAY, RWD, EDIT, RESET, Z.STOP, MS, AUX, CD, TUN, PHONO)	
S877	87-031-817-01	Slide switch (TIMER)	
CON503	82-197-652-01	Connector ass'y, 13P	★★★
		<DOLBY CIRCUIT BOARD SECTION>	
PCB-D	82-198-666-01	DOLBY circuit board	
	87-020-132-01	DOLBY unit 12058J	★★★
IC1, 2	87-020-241-01	IC, HA12058NT	
L1, 2	82-198-608-01	Filter, SQ20K	
PIN1	87-049-118-01	Pin, 8P	★★★
PIN2	87-049-120-01	Pin, 10P	★★★
		<Capacitor>	
C3, 4, 25, 26	87-015-953-01	4.7 μF 50V Electrolytic LL	
		<HX CIRCUIT BOARD SECTION>	
PCB-E	82-198-619-01	HX circuit board	
IC1, 2, 3	87-027-986-01	IC, NJM4560S	
Q1, 2	89-321-204-01	Transistor, 2SC2120Y	
D1, 2	87-020-156-01	Diode, MC931	
L1, 2	82-198-606-01	OSC Coil, HX	
SFR1, 2	87-021-869-01	Semi-fixed resistor, 220kΩ-B	
	82-197-636-01	Pin, 9P	★★★
		<Resistor>	
⚠R5, 6	87-029-102-01	47Ω 1/4W Fuse resistor	
		<Capacitors>	
C1, 2	87-014-041-01	220pF PP	
C3, 4	87-014-173-01	1000pF PP	
		<AUTO CIRCUIT BOARD SECTION>	
PCB-F	*	AUTO circuit board	
CP901	87-027-644-01	Photo sensor, NJL514EA	
		<CONECT CIRCUIT BOARD SECTION>	
PCB-G	*	CONECT circuit board	

Symbol No.	Part No.	Description	Remark
		<SENSOR CIRCUIT BOARD SECTION>	
PCB-H	*	SENSOR circuit board	
CP902	87-027-644-01	Photo sensor, NJL5141EA	
		<POWER CIRCUIT BOARD SECTION>	
PCB-I	*	POWER circuit board	
S881	87-031-817-01	Slide switch (TIMER)	
		<MISCELLANEOUS>	
⚠PT951	82-197-615-01	Power transformer (H, HB models only)	
⚠PT951	82-197-612-01	Power transformer (UB model only)	
⚠PT951	82-197-613-01	Power transformer (E, EB models only)	
⚠PT951	82-197-614-01	Power transformer (K, KB, G models only)	
RPH /EH	81-506-601-01	REC /PLAY erase heard	
D951	87-020-109-01	LED, SLF-301C Ass'y	
M901	09-047-198-01	Reel motor	
M902	87-045-135-01	DG, EG motor	
⚠S46	87-031-586-01	Rotary switch (VOLTAG SELECTOR) (H, HB, models only)	
⚠	87-033-140-01	Splice connector	★★★
⚠	87-034-962-01	AC power cord (H model only)	
⚠	87-034-992-01	AC power cord (HB model only)	
⚠	87-034-578-01	AC power cord (UB model only)	
⚠	87-787-674-01	AC power cord (E, EB models only)	
⚠	87-034-708-01	AC power cord (K, KB, G models only)	
⚠	87-085-184-01	Cord bushing (H, HB, UB models only)	
⚠	87-085-185-01	Cord bushing (E, EB, K, KB, G models only)	
SOL901, 902, 903, 904	81-505-603-01	Solenoid 9ME-A (PAUSE, FWD PLAY, RVS, EDIT)	
S901, 902, 907	81-505-601-01	Leaf switch (PLAY, PAUSE, DRCT)	
S903, 906, 908	81-505-607-01	Leaf switch (CST, RWD, REC, REV, REC)	
S904, 905	81-505-602-01	Leaf switch (METAL, Co)	
CON201	81-506-631-01	Connector ass'y, 9P	★★★
CON501	81-506-631-01	Connector ass'y, 7P	★★★
CON502	81-505-635-01	Connector ass'y, 11P	★★★
CON551	81-506-632-01	Connector ass'y, 12P	★★★

⚠ 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.

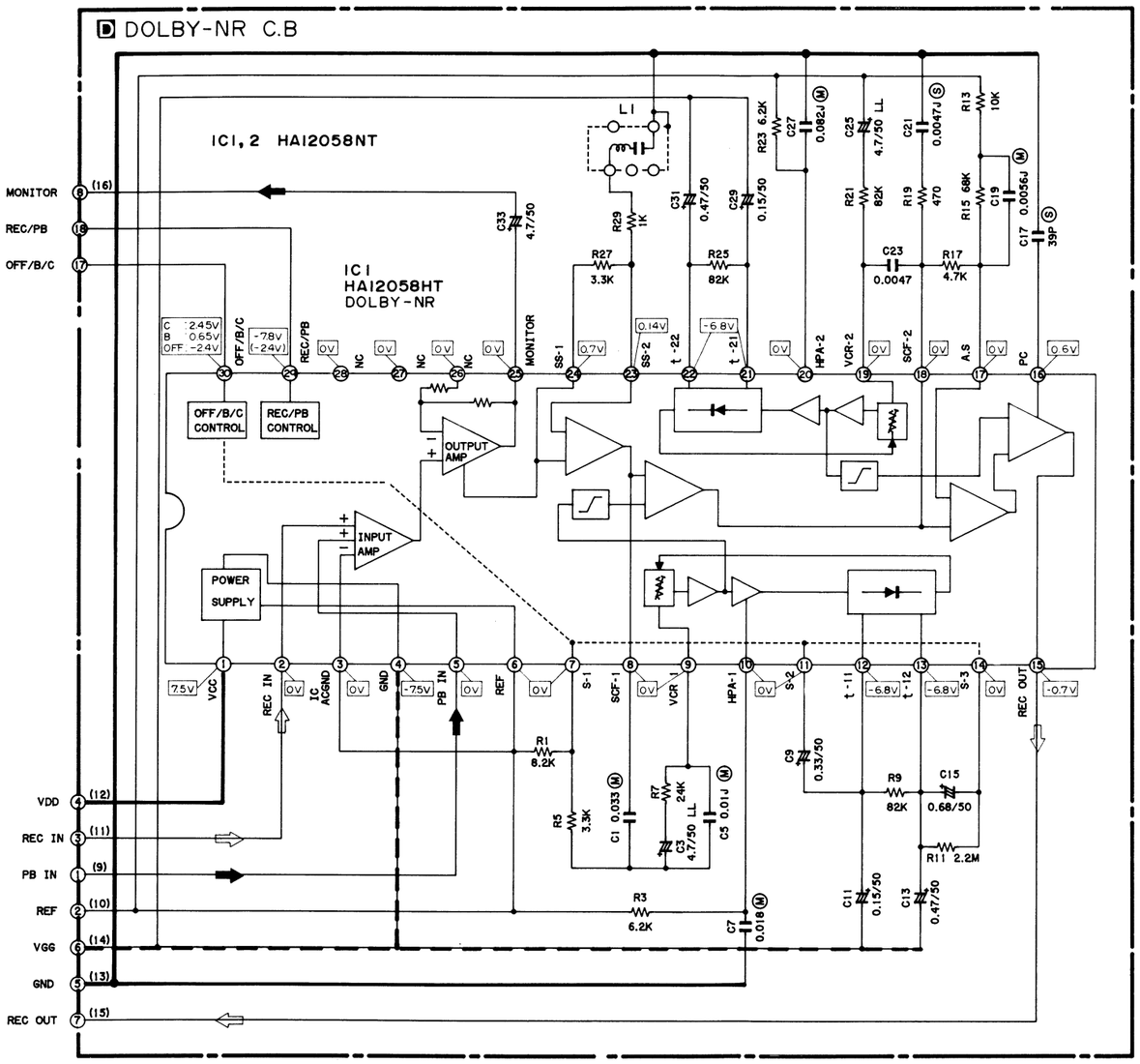
The ICs on the electrical parts which are indicated by an C-MOS IC symbol mark (⚡).

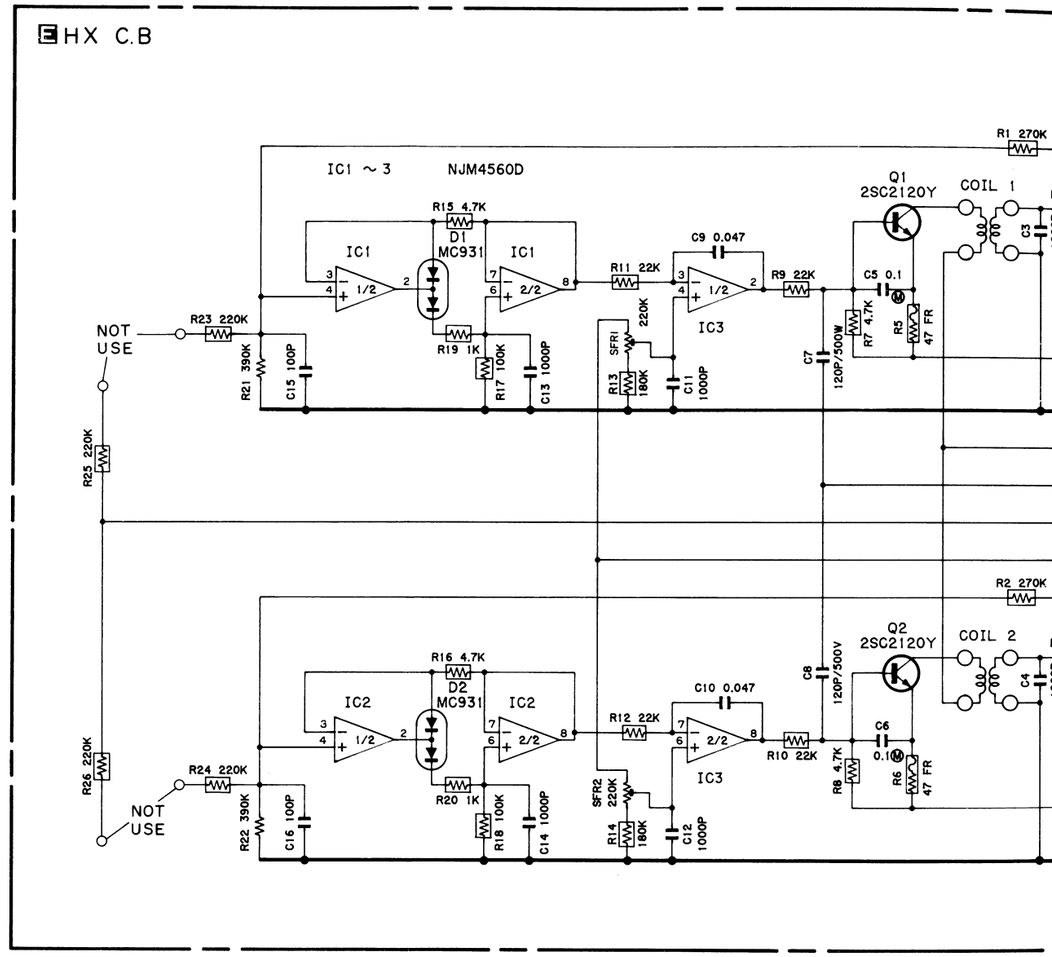
Note; Combination Circuit Board

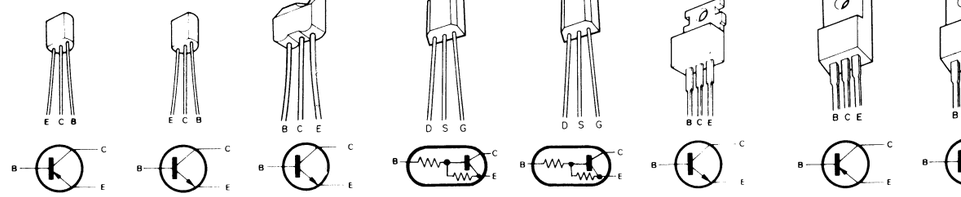
The parts on the electrical parts list which are indicated by an asterisk (*) are supplied as one single combined circuit board. Therefore, they will not be supplied separately. If this becomes necessary, please order the entire circuit board.

Combination circuit board A 82-197-605-11
PCB-B 82-197-606-11
PCB-C 82-197-607-11
PCB-I 82-197-607-11
Combination circuit board B 81-506-614-01
PCB-F 81-506-102-01
PCB-G 81-506-613-01
PCB-H 81-506-614-01

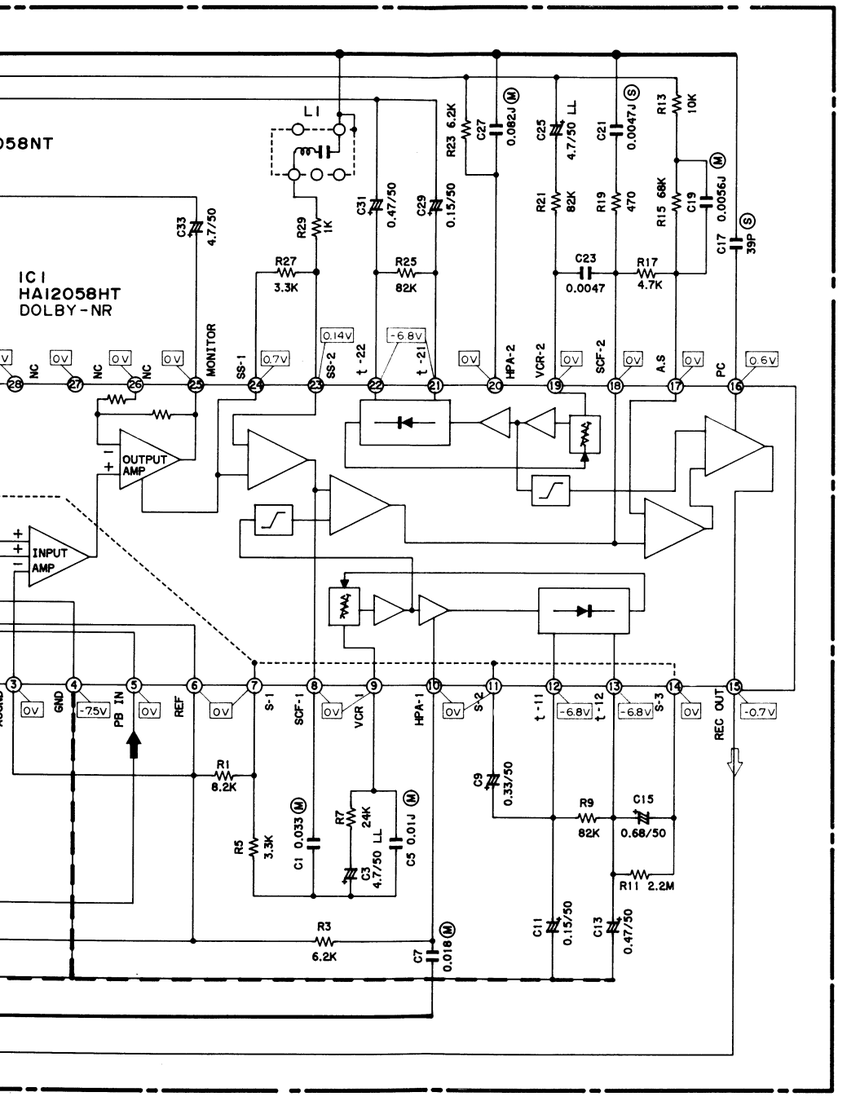
SCHEMATIC DIAGRAM-1



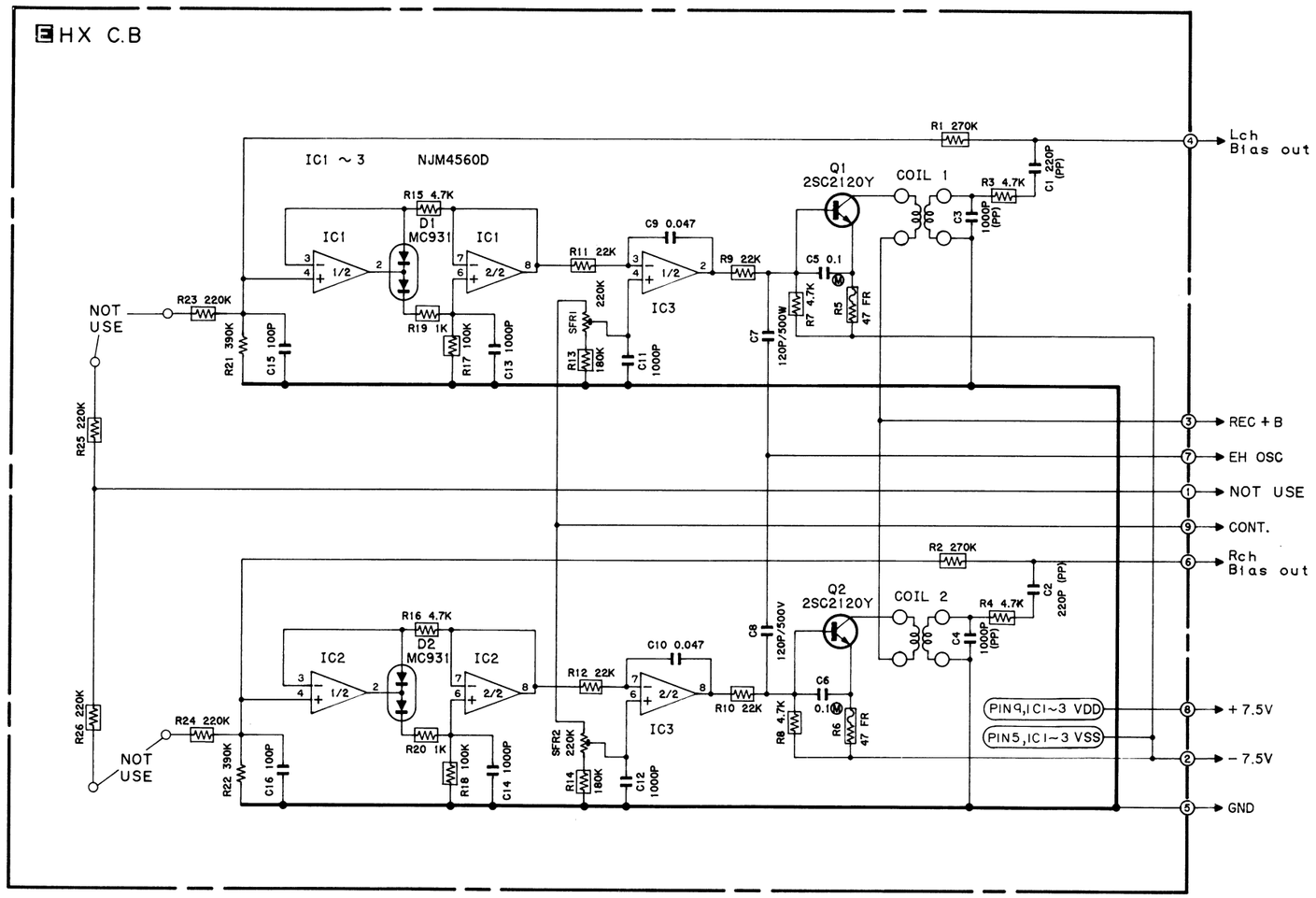


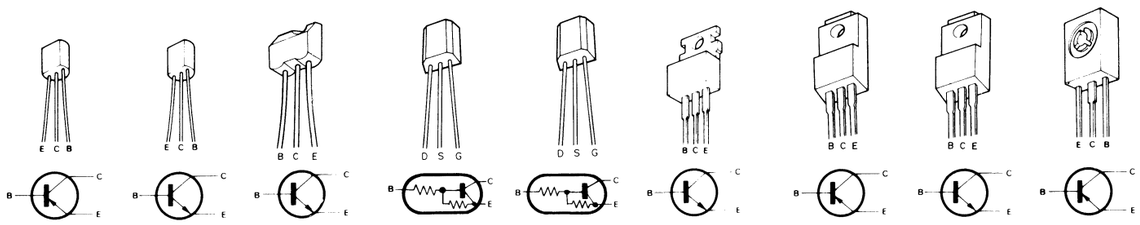


4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19



EHX C.B





2SA952
2SA1015

2SC1815
2SC2120
2SD1302

2SD636

2SA1346

2SC3399
2SC3400

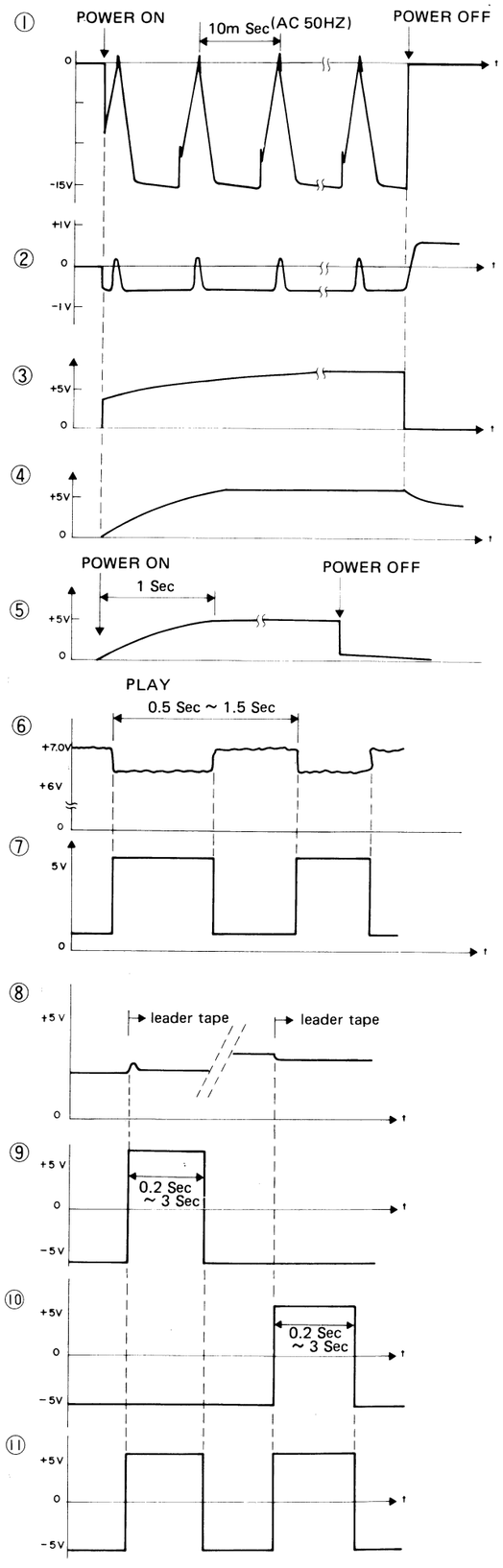
2SD880

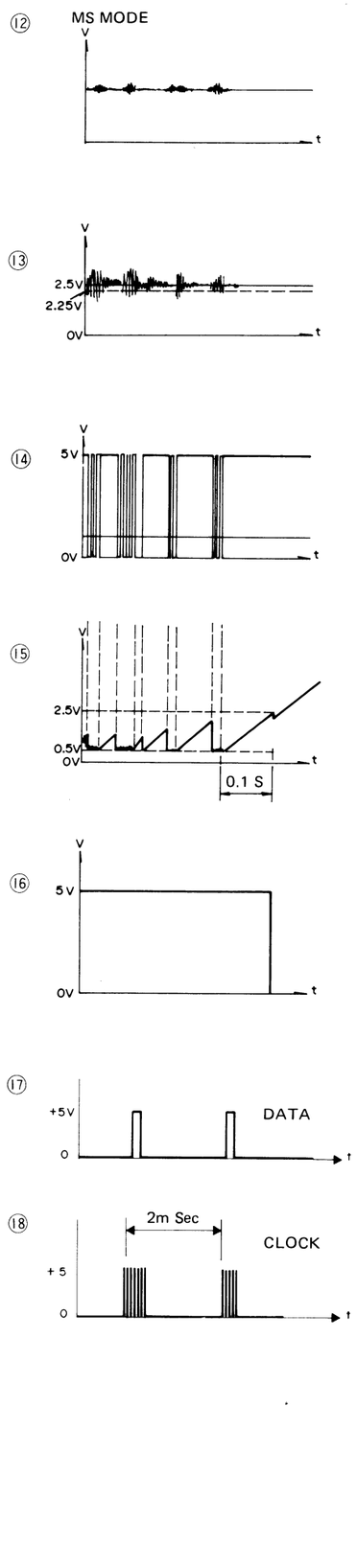
2SB1015

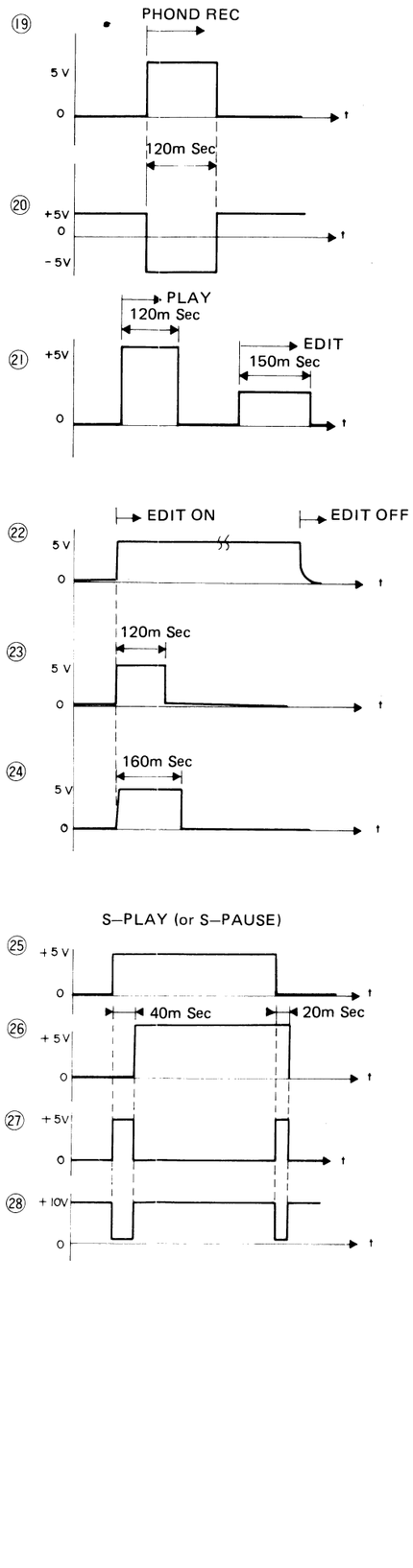
2SD1275
2SD1406

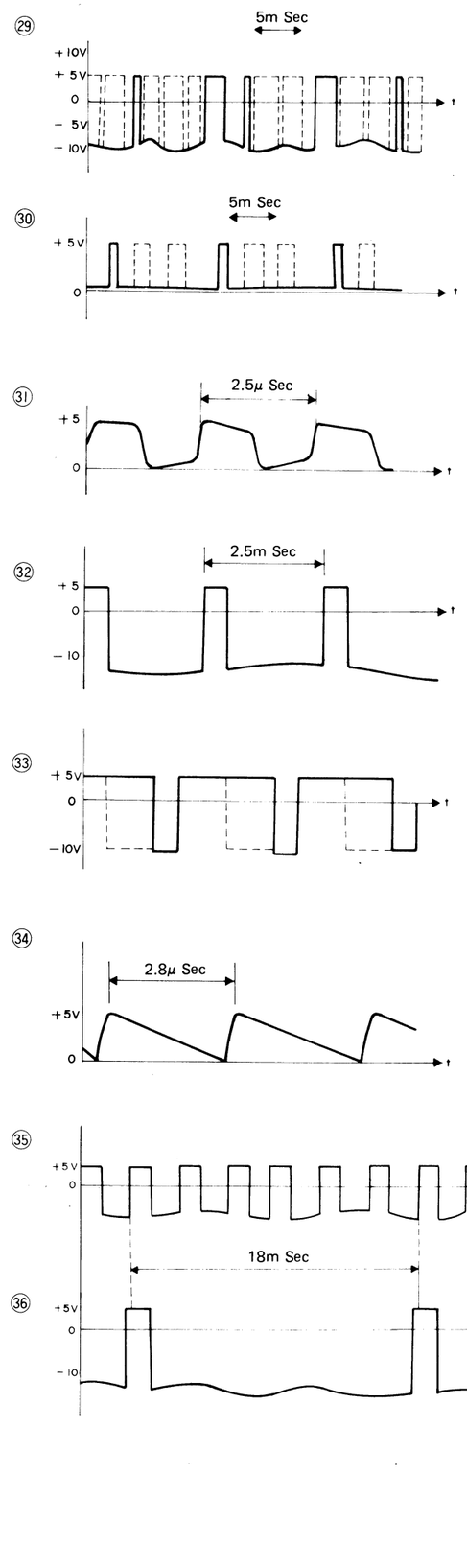
2SA885

WAVEFORM

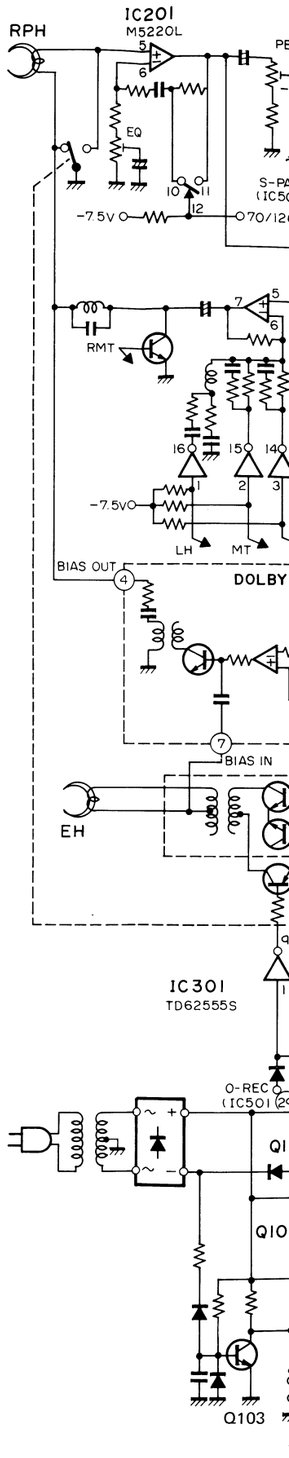




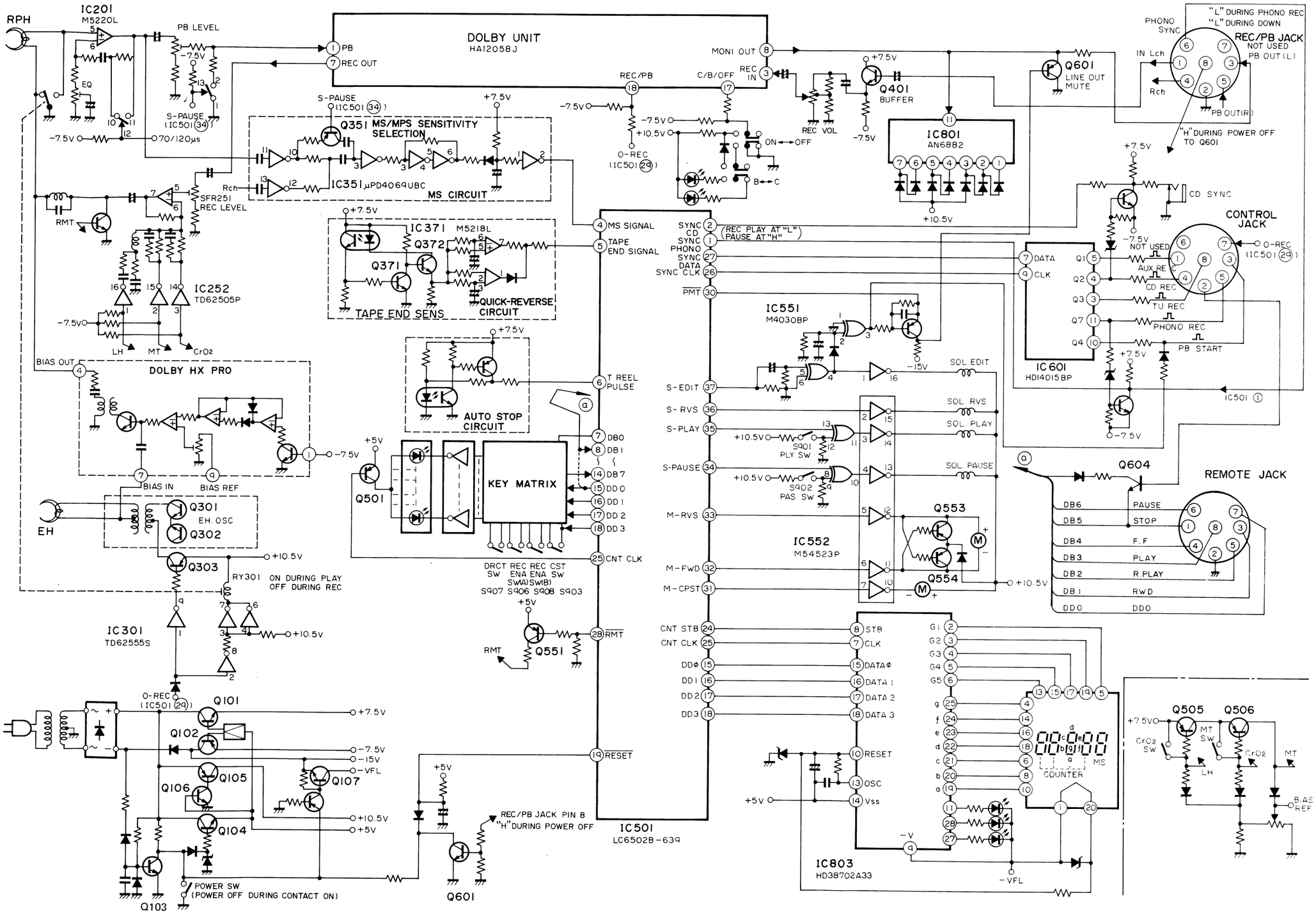




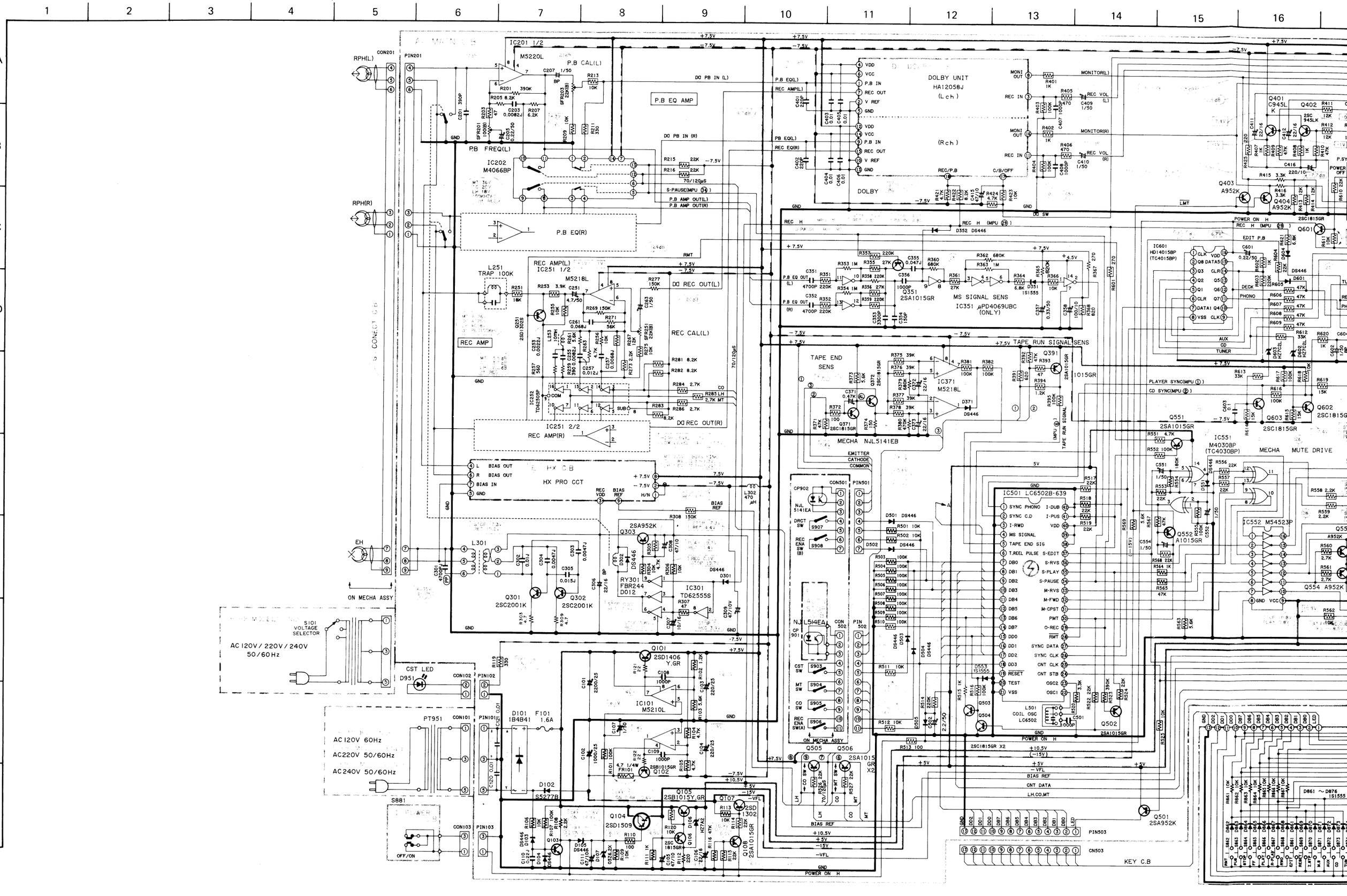
BLOCK DIAGRAM

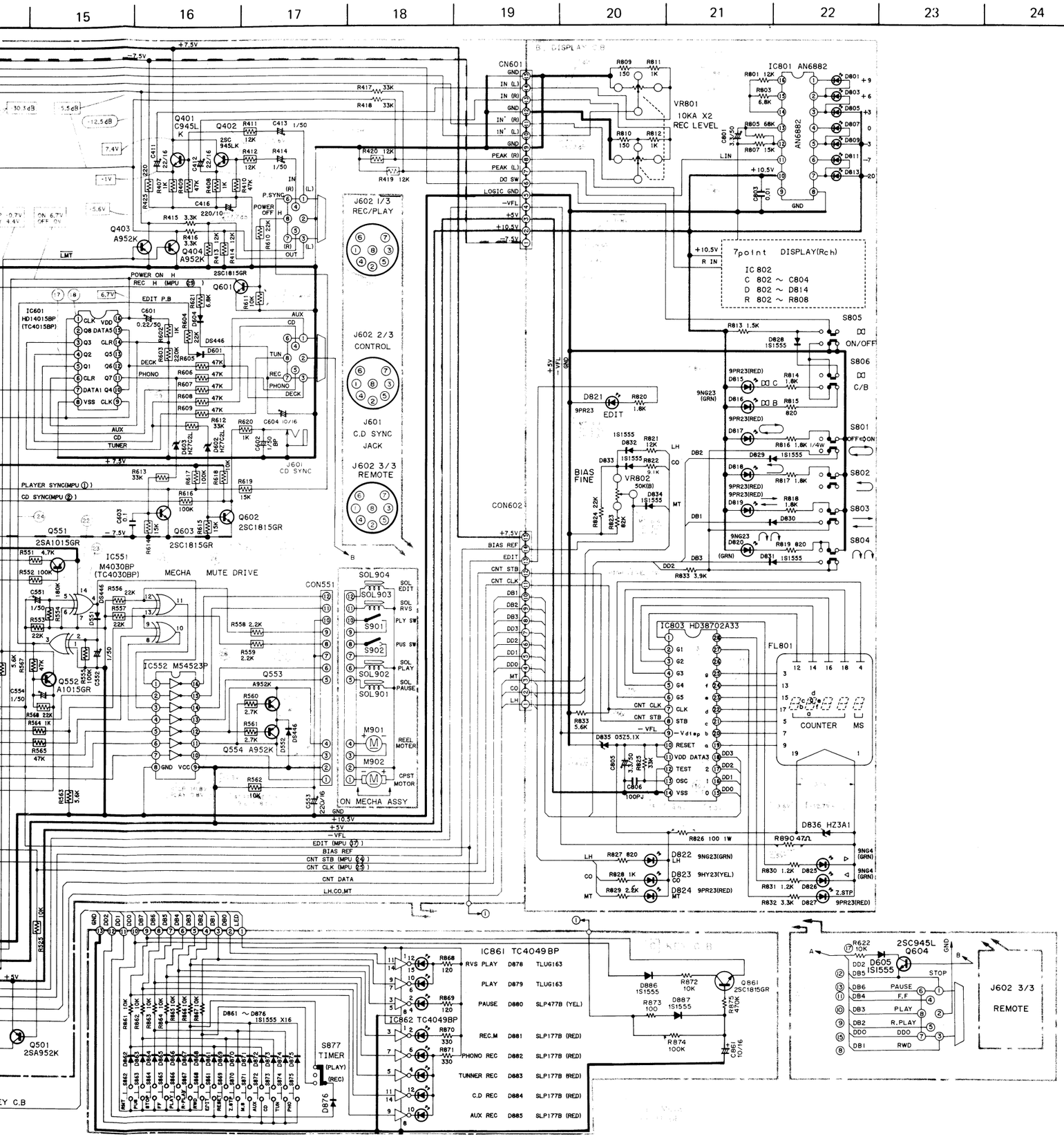


BLOCK DIAGRAM



SCHEMATIC DIAGRAM-2





Microcomputer (MPU) Terminal and Mechanical Operation

		DECK												
		REW ◄◄	REVIEW ◄◄	STOP	REC	REC PAUSE	PLAY	PLAY PAUSE	FF ►►	CUE ►►	EDIT (BUTTON PRESSED)	REVERSE	NORM DUB	HIGH DUB
MPU II (TC501)	㉞ SOL PAUSE	L	H	L	L	H	L	H	L	H	L	L	L	L
	㉟ SOL PLAY	L	H	L	H	H	H	H	L	H	H	H	H	H
	㉜ REEL MOTOR REVERSE	H	H	L	L	L	L	L	L	L	L	L	L	L
	㉝ REEL MOTOR FORWARD	L	L	L	L	L	L	L	H	H	L	L	L	L
	㉙ 0-REC	L	L	L	H	H	L	L	L	L	L		H	H
	㊲ SOL EDIT	—	—	—	—	—	—	—	—	—	H	L	—	—
	㊱ SOL REVERSE	—	—	—	—	—	—	—	—	—	⎍	⎍	—	—
	㉚ $\overline{\text{PMT}}$	L	H	L	H	H	H	L	L	H	H	—	H	H
	㉘ $\overline{\text{RMT}}$	L	L	L	H	L	L	L	L	L	L	—	H	H

H : HIGH LEVEL, L : LOW LEVEL

NOTES:

1) ■ B (+) power supply ▮▮▮ B (–) power supply
2) The voltage is the reference value measured with a tester (20 k-ohms/V DC) when there are no signals. But ( ) is with AM reception or recording. An asterisk (*) indicates that the value was measured with a vacuum-tube voltmeter during recording.
3) Resistors with no designation have a rated power of 1/4W and a tolerance of ±5%.
4) Capacitors with no designation have a dielectric strength of less than 50WV.
5) The only capacitor tolerance indicated are ±5% (J) and ±10% (K).
6) Ceramic capacitor symbols:
   - —||— For temperature compensation (SL)
   - —||— High dielectric constant system (YY)
   - —||— High dielectric constant system (YW, YP, YZ)
   - —•||— Semiconductor ceramic
   - —⑧||— For temperature compensation (SH)
7) Explanation of symbols
   - (M) Mylar capacitor
   - (A) Aluminum solid capacitor
   - (PP) Polypropylene film capacitor
   - (BP) Bi-polarized capacitor
   - (LL) Low-leakage capacitor
   - (T) Tantalum capacitor
   - (S) Styrol capacitor
   - Printed resistor
   - Fuse resistor
   - Nonflammable resistor
   - (LN) 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.

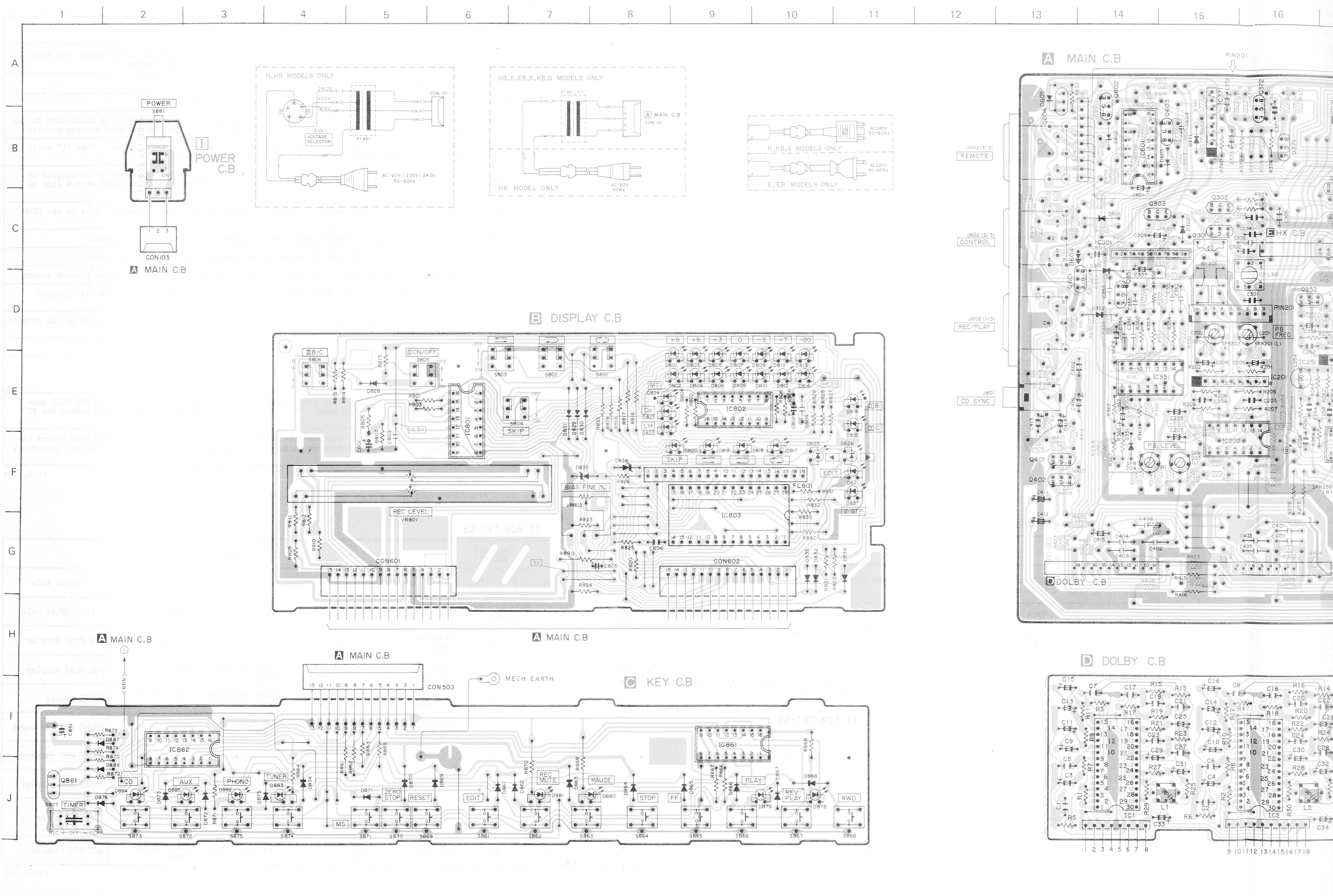
- This schematic diagram is subject to change without notice in the interests of improved performance.

WA

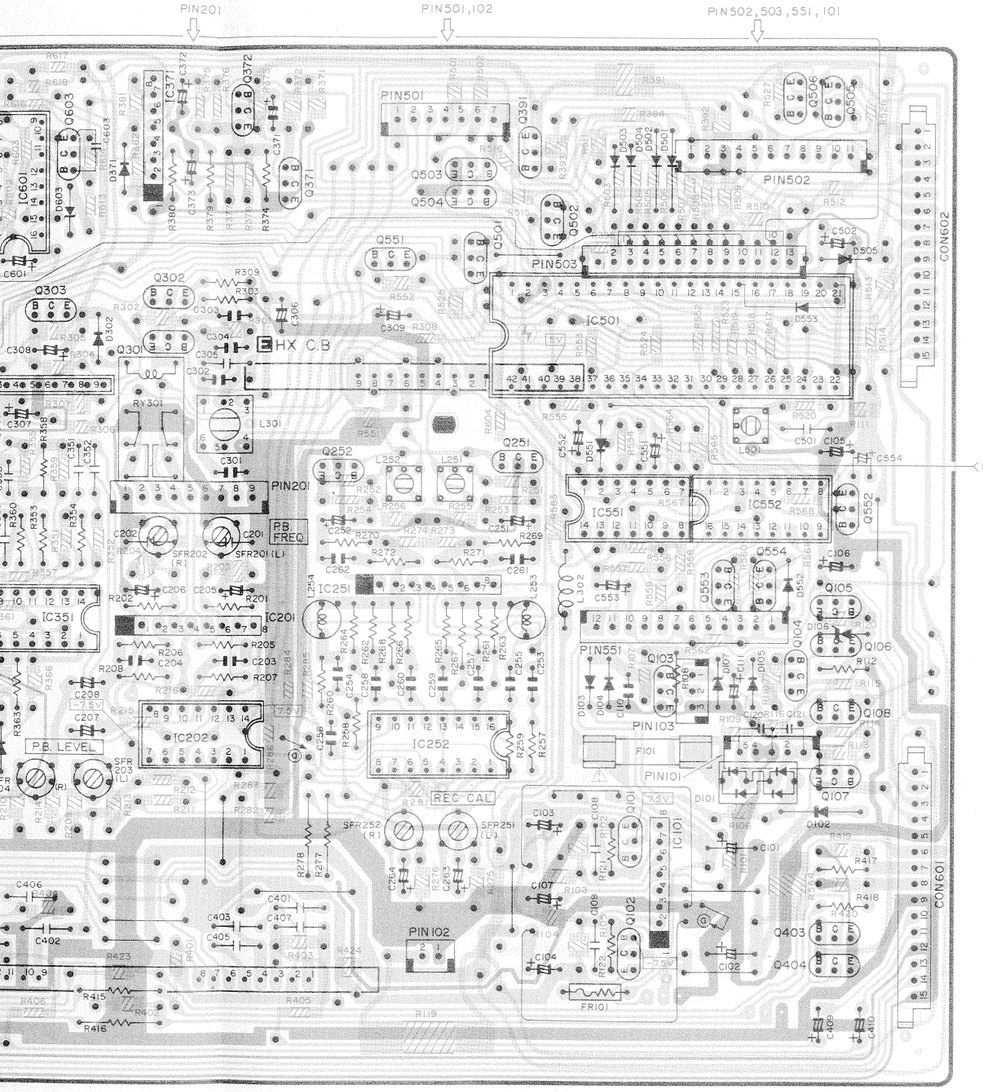
NOTES (1) Earth pattern Printed resistor pattern Others pattern

(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-1



POWER S881
STANDBY
POWER C.B
CON103
A MAIN C.B
H, HB MODELS ONLY
S101 VOLTAGE SELECTOR
PT951
CON.101
AC120V / 220V / 240V 50/60Hz
UB, E, EB, K, KB, G MODELS ONLY
UB MODEL ONLY
AC120V 60Hz
K, KB, G MODELS ONLY
AC240V 50/60Hz
E, EB MODELS ONLY
AC220V 50/60Hz
B DISPLAY C.B
REC LEVEL VR801
BIAS FINE (%)
IC801
IC802
IC803
FL801
CON601
CON602
SKIP
EDIT
Z STP
A MAIN C.B
A MAIN C.B
J602(3/3) REMOTE
J602(2/3) CONTROL
J602(1/3) REC/PLAY
J601 CD SYNC
E HX C.B
P.B LEVEL
P.B FREQ
PIN201
D DOLBY C.B
A MAIN C.B
CON503
MECH EARTH
C KEY C.B
IC862
IC861
CD
AUX
PHONO
TUNER
TIMER
ZERO STOP
RESET
EDIT
REC MUTE
PAUSE
STOP
FF
PLAY
REV PLAY
RWD
MS
D DOLBY C.B
IC1
IC2

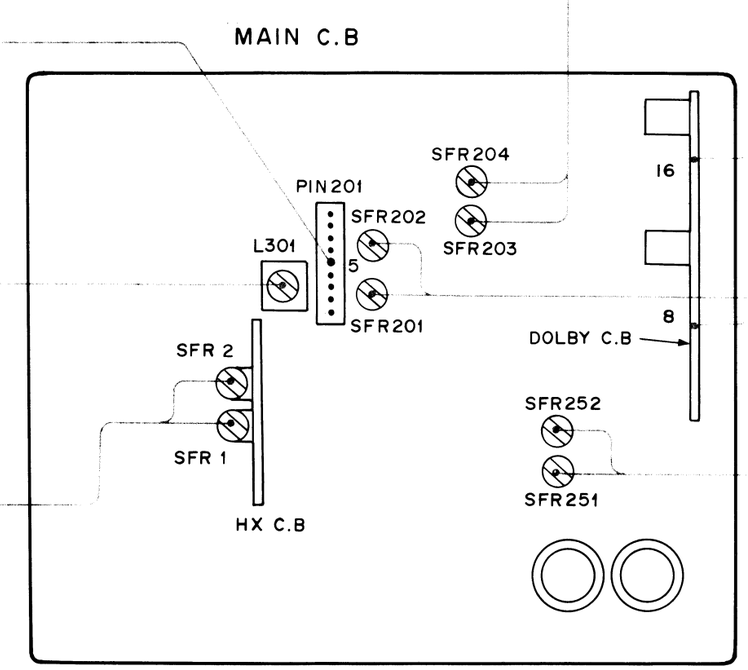


2. Azimuth adjustment
Setting : Alignment tape : TTA-317E
Adjusting point : RPH head azimuth adjustm
Method : Make adjustment in each of the PLAY and REV PLAY mades.

1. Tape speed adjustment
Setting : Alignment point : SFR of motor.

PIN201 pin 5 : Test point for bias frequency adjustment

Pins 8 and 16 : Test points for Dolby level adjustment



5. Bias frequency adjustment

Settings:
- Alignment tape: TTA-119J
- Test point: PIN201 pin 5
- Adjusting point: L301

Method: Set the unit to REC mode and adjust so that the frequency is 100.3 kHz ± 0.1 kHz.

3. Dolby level adjustment

Settings:
- Alignment tape: TTA-161
- DOLBY-NR switch: OFF
- Test points: DOLBY C.B pin 8 (L) and pin 16 (R), or line OUT
- Adjusting points: SFR203 (L-ch) and SFR204 (R-ch)

Method: Play back an alignment tape and adjust so that the output at test point is 580 mV. The line output should be 490 mV.

4. Playback frequency response adjustment

Settings:
- Alignment tape: TTA-317E
- Test points: DOLBY C.B pin 8 (L) and pin 16 (R), or line OUT
- Adjusting points: SFR201 (L-ch) and SFR202 (R-ch)

Method: Play back an alignment tape and adjust so that an output of 10 kHz is $0^{+0.5}_{-0}$ dB with an output of 1 kHz as reference.

6. Bias current adjustment

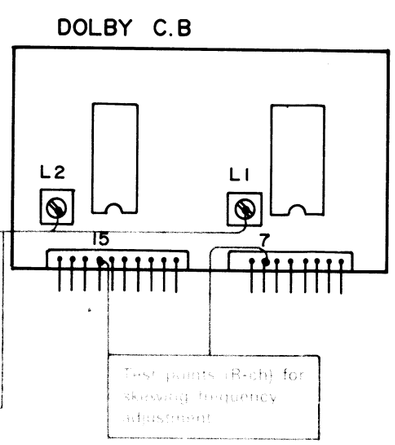
Settings:
- Alignment tape: TTA-119J
- Test points: DOLBY C.B pin 8 (L) and pin 16 (R), or line OUT
- Adjusting points: SFR1 (L-ch) and SFR2 (R-ch)

Method: Load an alignment tape and set the unit to REC mode, and then record at 1 kHz − 33 dB and 10 kHz − 33 dB. Play back the recorded tape and adjust so that an output of 10 kHz is $0^{+0.5}_{-0}$ dB with respect to that of 1 kHz. Set REC VL to the center position.

7. NORMAL tape recording sensitivity adjustment

Settings:
- Alignment tape: TTA-119J
- Test points: DOLBY C.B pin 8 (L) and pin 16 (R), or line OUT
- Adjusting points: SFR251 (L-ch) and SFR252 (R-ch)

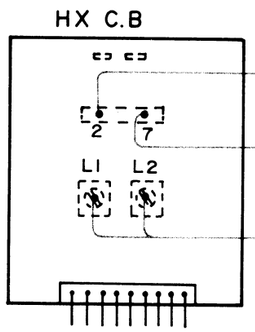
Method: Load an alignment tape and set the unit to REC mode, and then record at approx. 1 kHz − 33 dB. Play back the recorded tape and adjust so that the output is $0^{+0.5}_{-0}$ dB compared with the REC mode. Set REC VL to the center position.



9. Skewing frequency adjustment

Settings:
- Test points: TP7 (L-ch) and TP8 (R-ch)
- Adjusting points: L1 (L-ch) and L2 (R-ch)
- DOLBY-NR switch: "C" (Closed)

Method: Input a signal of 20 kHz from the line OUT and adjust so that the voltage at test point is minimized.



8. Dolby HX adjustment

Settings:
- Test points: TP5 (L-ch) and TP6 (R-ch)
- Adjusting points: L1 (L-ch) and L2 (R-ch)

Method: Adjust so that the voltage at test point is minimized in the REC mode.

CIRCUIT DESCRIPTION

1. DESCRIPTION OF IC LC6502B-639

1-1 Terminal name

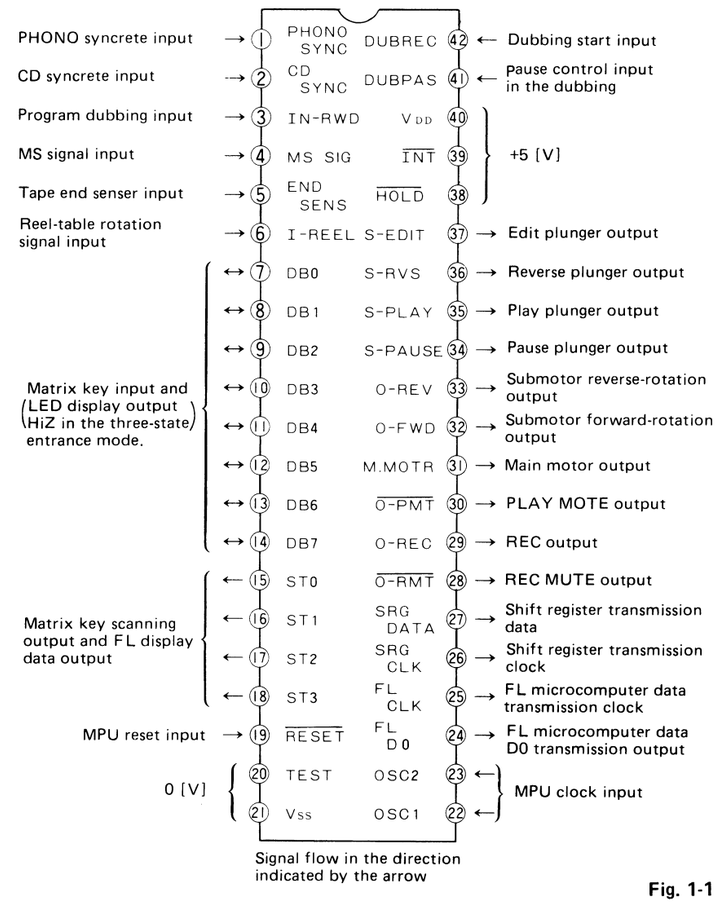


Fig. 1-1

1-2 Terminal description

Pin No.	Terminal Symbol	Function
1	PHONO SYNC	During REC, enters the REC PLAY mode at "L" level and the REC PLAY PAUSE mode at "H" level, by each sync REC input.
2	DC SYNC	
3	IN-RWD	Used to determine the normal dubbing or program dubbing mode. When the IN-RWD mode is set to the "H" level immediately after the DUB REC mode is set to the "H" level, enters the REC PLAY PAUSE mode under judgment of the program dubbing mode.
4	MS SIG	Used for MS cueing-in input. { Cued at "H" level. Not cued at "L" level.
5	END SENS	Using the tape end sensor input, starts detecting in 8 seconds after the unit enters the PLAY and REC PLAY modes. 1 CTL pulse is input at tape end.
6	1-REEL	Using the rotation pulse input of a take-up reel, used for the auto stop detection, tape counter and so on.
15 16 17 18	ST0 ST1 ST2 ST3	Matrix key scanning strobe signal output and FL display data output
19	$\overline{\text{RESET}}$	The MPU is set at "H" level with a delay of CD time constant from the power supply (V_{DD}).
20, 21	TEST, V_{SS}	Connected to GND [0(V)].
22, 23	OSC1, 2	MPU clock input
24	FL D_O	Goes "H" only when the data D_{00} through D_{03} are output to ST0 through ST3 at the time of data transmission to the FL microcomputer.

Pin No.	Terminal Symbol	Function
25	FL CLK	Data clock transmitted to the FL microcomputer. When the clock is "L" in level, the modes DB0 through DB7 are set to the output mode with the valid LED display.
26	SRG CLK	Data clock transmitted to the shift register
27	SRG DATA	8-bit serial data output transmitted to the shift register
28	$\overline{\text{O-RMT}}$	Goes "H" for canceling of muting by the REC mute output if the mechanism is stabilized in the REC PLAY mode. Muted until the mechanism is stabilized at the time of head reverse-rotation.
29	O-REC	Goes "H" only in the REC PLAY (PAUSE) mode by the REC/PB selection output. Goes "L" until the mechanism is stabiliged at the time of head reverse-rotation.
30	$\overline{\text{O-PMT}}$	Goes "H" for canceling of muting by the play mute output if the mechanism is stabilized in the (REC) PLAY, CUE and REV modes. Muted until the mechanism is stabilized at the time of head reverse-rotation.
31	M.MOTR	Used to control the main motor. The motor rotates at "H" level. Goes "L" only in the STOP mode.
32	O-FWD	Goes "H" only in the FF and CUE modes by the submotor forword-rotation output.
33	O-REV	Goes "H" only in the RWD and REV modes by the submotor reverse-rotation output.
34	S-PAUSE	Goes "H" only in the PAUSE, CUE, REV and (REC) PLAY PAUSE modes by the pause plunger output.
35	S-PLAY	Goes "H" only in the (REC) PLAY, (REC) PLAY PAUSE, CUE and REV modes by the play plunger output.
36	S-RVS	Goes "H" for 64m sec at the time of head reverse-rotation and editing start/end by the reverse plunger output.
37	S-EDIT	GOES "H" in the edit mode by the edit plunger output.
38 39 40	$\overline{\text{HOLD}}$ $\overline{\text{INT}}$ V_{DD}	Connected to +5 [V]
41	DUB PAS	Used for pause control in the program dubbing mode. When "L" goes "H", the REC PLAY mode enters the REC PLAY PAUSE mode. When "H" goes "L", the REC PLAY PAUSE mode enters the REC PLAY mode.
42	DUB REC	Used to start, stop and interrupt the dubbing. When "L" goes "H", the STOP mode enters the REC PLAY (PAUSE) mode. During dubbing, enters the STOP mode when dubbing stops and interrupls at H" level.

Table. 1-1

Pin No.	Terminal Symbol	Function				
	Modes DB0 through DB7	Input mode				Output mode
	Outputs ST0 through ST 3	When ST0 is "H"	When ST1 is "H"	When ST2 is "H"	When ST3 is "H"	FL DISPLAY DATA
7	DB0	Cassette-in input	Not used.	Not used.	REC key input	RVS PLAY display
8	DB1	Front REC proof key input	Reverse mode front→rear	Timer REC key input	RWD key input	FWD PLAY display
9	DB2	Rear REC proof key input	Reverse mode rear→front	Timer PLAY key input	RVS PLAY key input	PAUSE disply
10	DB3	Head direction -in key input	Blank skip key input	FWD PLAY key input	REC MUTE dsplay	PHONO REC key input
11	BD4	NC	PHONO REC key input	MS set key input	FF key input	PHONO REC display
12	DB5	NC	TUNER REC key input	Memory stop key input	STOP key input	TUNER REC display
13	DB6	2 times normal speed dubbing -in input	CD REC key input	Counter reset key input	PAUSE key input	CD REC display
14	DB7	Not used.	AUX REC key input	EDIT key input	REC MUTE key input	AUX REC kisplay

Table. 1-2

3. IC TC4015BP

3-1. Terminal name

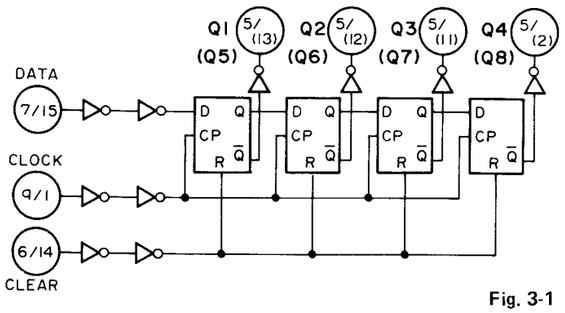


Fig. 3-1

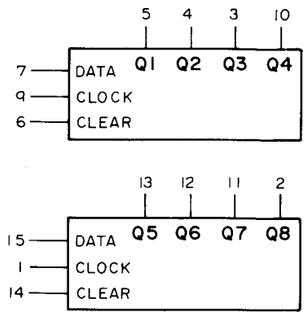


Fig. 3-2

3-2. Terminal description

Pin No.	Terminal Symbol	Function
10	O-TAPE	Output an "H" level signal for 125m sec in the PLAY mode.
3	O-TUNER	Outputs an "H" level signal for 125 m sec by the function selction output of an amplifier in the sync REC mode. The output is supplied again by pressing the sync REC key in the REC mode.
11	O-PHONO	
4	O-CD	
5	O-AUX	
12	O-DUB EN	Output an "H" level signal if recording is possible in the STOP mode. Goes "L" for 250 m sec in the dubbing STOP mode.
2. 13	—	Blank terminal. Not used
1. 9	CLOCK	CLOCK input terminal
6. 14	CLEAR	CLEAR input terminal
7. 15	SI IN (DATA)	DATA input terminal
8	V_{SS}	Power terminal
16	V_{DD}	Power terminal

Table. 3

4. EDITING OPERATION

4-1. Outline

When a commercial following the end of music has been recorded during air checking, the commercial can be easily cut using this mechanism.

4-1-1 When the EDIT button is being pressed in the REC mode, the tape is played back in the reverse direction.

4-1-2 When the EDIT button is released in the REC mode, the tape runs without recording for 4 seconds in forword direction and stops momentarily. (When the EDIT button is pressed in the PB mode, the tape is played back in the reverse direction.)

4-2. Circuit operation

4-2-1 When the EDIT button is presed in the REC mode.
- (a) The O-EDIT therminal of a microcomputer goes high and the EDIT solenoid is draun. (The solenoid remains draun while the EDIT button is pressed.)
- (b) The PMT termined of a microcomputer goes low and the PLAY MUTE is established.
- (c) A pulse appears at the PB START terminal of DIN JACK with TAPE as function of an amplifier.
- (d) The O-REC terminal of a microcomputer goes low and the recording is changed over to the PB mode.

4-2-2 A pulse apears at the SOL REVERSE terminal of a microcomputer and the REVERSE solenoid is draun one time, and then running is inverted.

4-2-3 When the PMT terminal goes high, the tape is played back in the reverse direction.

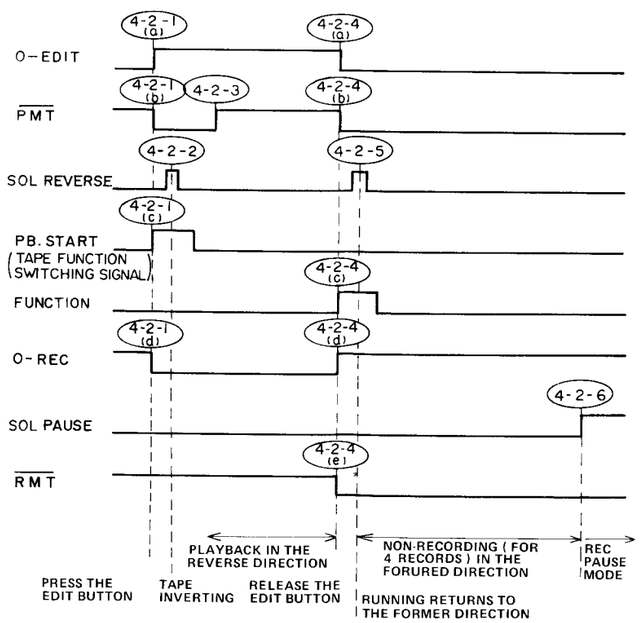


Fig. 4-1

4-2-4 When the EDIT button is released.
- (a) SOL EDIT is canceled.
- (b) PLAY MUTE is established.
- (c) Prior to pressing the EDIT button, a function suitchig pules is supplied from the DIN JACK terminal to suitch over the function.
- (d) The recording/playback is changed over to the REC mode.
- (e) The PMT terminal of a microcomputer goes low and the REC MUTE is established.

4-2-5 SOL REVERSE is draun one time and running returns to the former direction.

4-2-6 After 4 seconds, SOL PAUSE is draun to enter the PAUSE mode.

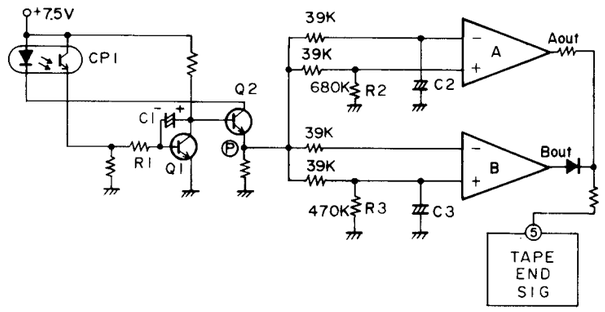


Fig. 4-2

5. QUICK-REVERSE CICUIT (END SENSER CIRCUIT)

5-1. RUNNING OF MAGNETIC BLOCK

5-1-1 The light from an LED is reflected on the surface of a tape, supplied to a phototransistor and converted into a current.

5-1-2 Iransistors Q1 and Q2 are an automatic illuminance control circuit.
The voltage at Q2 emitter (point P) remains constant based on the time constant which is determined using C1R1.

5-1-3 A and B are a comparator. Using R2 and R3, the voltage at ⊖ terminal is lower than that at ⊕ teminal. As a result, the output level of Aout and Bout goes low.

5-2. JUNCTION BLOCK OF LEADER TAPE

5-2-1 When the tape runs from a magnetic block into a leader tape block, the reflected amount of light changes. The speed in change is lower than the time constant of C1R1, so the voltage at point P also changes.
- (a) For increase in the reflected amount:
  An increase in voltage at Q1 base causes a decrease in that at point P. The voltage at ⊕ terminal of the comparator B also decreases, but the voltage at ⊕ terminal decreases slowly due to descharging of C3. As a result, the voltage at ⊕ terminal becomes ligher than that at ⊖ terminal and the output level of Bout goes high.
- (b) For decrease in the reflected amount:
  A decrease in voltage at Q1 base causes an increase in that at point P . The voltage at ⊕ terminal of the comparator A also increases, but the voltage at ⊖ terminal increases slowly due to discharging of C2. As a result, the voltage at ⊕ terminal becomes higher than that at ⊖ terminal and the output level of Aout goes high.

5-2-2 Each "H" level signal is supplied to the microcomputer as a reverse signal.

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆MEMO☆

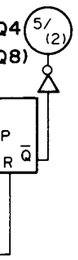
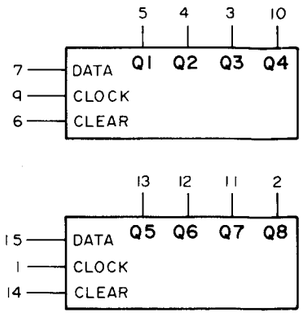


Fig. 3-1



VDD : 16 , Vss : 8

Fig. 3-2

Function
gnal for 125m sec in the PLAY mode.
ignal for 125 m sec by the function selction output of an REC mode. again by pressing the sync REC key in the REC mode.
gnal if recording is possible in the STOP mode. Goes "L" for 250 TOP mode.
sed

Table. 3

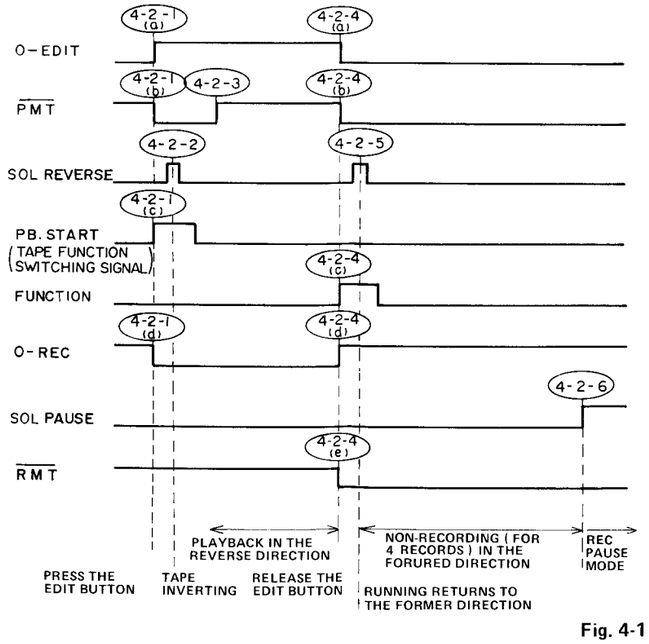


Fig. 4-1

4-2-4 When the EDIT button is released.
(a) SOL EDIT is canceled.
(b) PLAY MUTE is established.
(c) Prior to pressing the EDIT button, a function suitchig pules is supplied from the DIN JACK terminal to suitch over the function.
(d) The recording/playback is changed over to the REC mode.
(e) The PMI terminal of a microcomputer goes low and the REC MUTE is established.

4-2-5 SOL REVERSE is draun one time and running returns to the former direction.

4-2-6 After 4 seconds, SOL PAUSE is draun to enter the PAUSE mode.

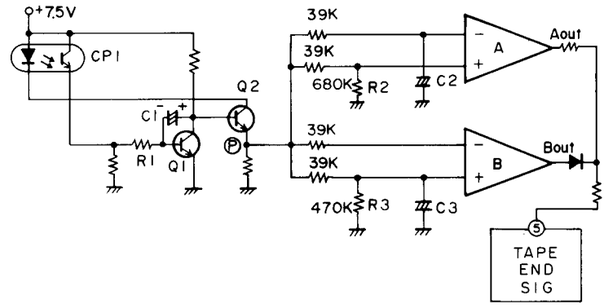


Fig. 4-2

5. QUICK-REVERSE CICUIT (END SENSER CIRCUIT)

5-1. RUNNING OF MAGNETIC BLOCK

5-1-1 The light from an LED is reflected on the surface of a tape, supplied to a phototransistor and converted into a current.

5-1-2 Iransistors Q1 and Q2 are an automatic illuminance control circuit.
The voltage at Q2 emitter (point P) remains constant based on the time constant which is determined using C1R1.

5-1-3 A and B are a comparator. Using R2 and R3, the voltage at ⊖ terminal is lower than that at ⊕ teminal. As a result, the output level of Aout and Bout goes low.

5-2. JUNCTION BLOCK OF LEADER TAPE

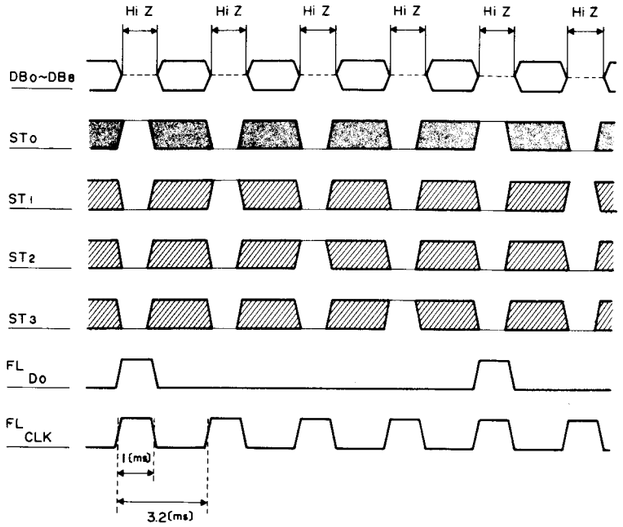
5-2-1 When the tape runs from a magnetic block into a leader tape block, the reflected amount of light changes. The speed in change is lower than the time constant of C1R1, so the voltage at point P also changes.

(a) For increase in the reflected amount:
An increase in voltage at Q1 base causes a decrease in that at point P. The voltage at ⊕ terminal of the comparator B also decreases, but the voltage at ⊕ terminal decreases slowly due to descharging of C3. As a result, the voltage at ⊕ terminal becomes ligher than that at ⊖ terminal and the output level of Bout goes high.

(b) For decrease in the reflected amount:
A decrease in voltage at Q1 base causes an increase in that at point P . The voltage at ⊕ terminal of the comparator A also increases, but the voltage at ⊖ terminal increases slowly due to discharging of C2. As a result, the voltage at ⊕ terminal becomes higher than that at ⊖ terminal and the output level of Aout goes high.

5-2-2 Each "H" level signal is supplied to the microcomputer as a reverse signal.

MEMO



DB0 ~ DB8 { HiZ : High impedanc
: Input mode
LED DISPLAY DATA is output in the output mode.

ST0 ~ ST3 { The key scanning strobe signal is outpu when DB0 through DB8 are in the input mode. In case except the above. FL DISPLAY DATA (marked by "▨" on the left) is output by synchronizing with FL DO and FL CLK.

Fig. 1-2

2. IC HD38702A33

2-1. Terminal name

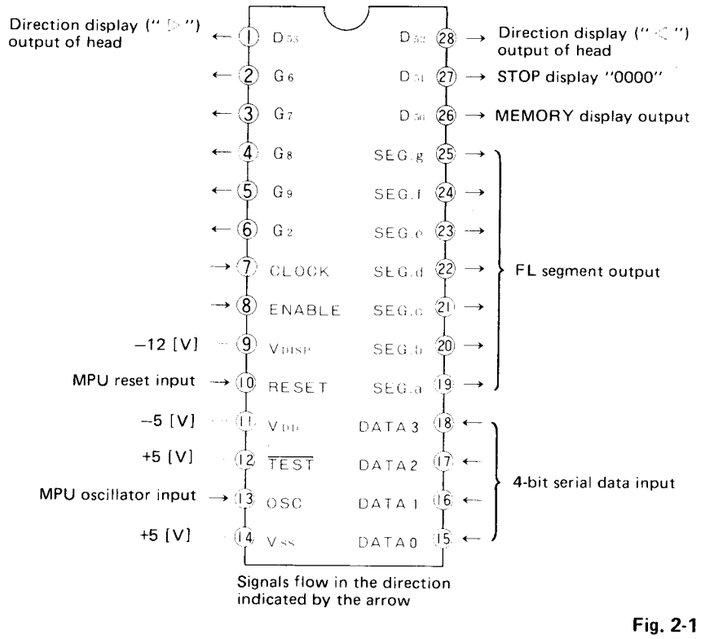
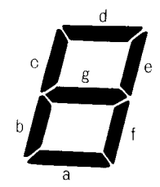


Fig. 2-1

2-2. Terminal discription

Pin No.	Terminal Symbol	Function
15	DATA0	4-bit serial data input. Refer to Tables 2-2 and 2-3.
16	DATA1	
17	DATA2	
18	DATA3	
7	CLOCK	6 serial data input clocks. Data is input when "H" is set to the "L" level.
8	ENABLE	Input to determine the 1st data of 6 serial data. Determined as a 1st data when "L" is set to the "H" level.
19	SEG. a	FL segment output  (For FX-90 used in reverse.)
20	SEG. b	
21	SEG. c	
22	SEG. d	
23	SEG. e	
24	SEG. f	
25	SEG. g	
6	G_0	Digit scanning signal output. (FL grid)
5	G_1	
4	G_2	
3	G_3	
2	G_4	
26	D_{50}	Not used
27	D_{51}	Counter "0000" STOP display output.
28	D_{52}	Head direction display ("◁") output
1	G_{53}	Head direction display ("▷") output

Lights up at "H" level.

Table. 2-1

$D_{00} \sim D_{03}$
$D_{10} \sim D_{13}$
$D_{20} \sim D_{23}$
$D_{30} \sim D_{33}$
$D_{40} \sim D_{43}$
} D_{50} through D_{53} are static outputs corresponding to a couple of bits.

DATA					SEGMENT						
HEX	=3	=2	=1	=0	a	b	c	d	e	f	g
0	0	0	0	0	I	I	I	I	I	I	
1	0	0	0	I		I	I				
2	0	0	I	0	I	I		I	I		I
3	0	0	I	I	I	I	I	I			I
4	0	I	0	0		I	I			I	I
5	0	I	0	I	I		I	I		I	I
6	0	I	I	0	I		I	I		I	I
7	0	I	I	I	I	I	I		I		
8	I	0	0	0	I	I	I	I	I	I	I
9	I	0	0	I	I	I	I	I		I	I

Table. 2-2

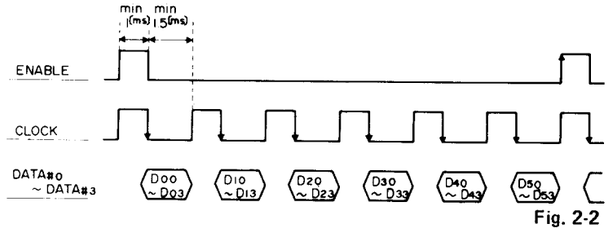
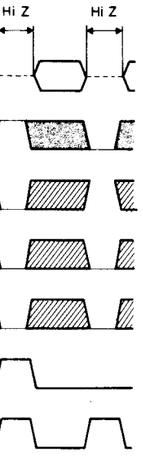


Fig. 2-2

$D_{00} \sim D_{03}$	NS counter display data	BCD code
$D_{10} \sim D_{13}$	Tape counter 10^3 (thousands digit)	BCD code
$D_{20} \sim D_{23}$	Tape counter 10^2 (hundreds digit)	BCD code
$D_{30} \sim D_{33}$	Tape counter 10^1 (tens digit)	BCD code
$D_{40} \sim D_{43}$	Tape counter 10^0 (units digit)	BCD code
$D_{50} \sim D_{53}$	Static output	Corresponding to a couple of bits

Table. 2-3

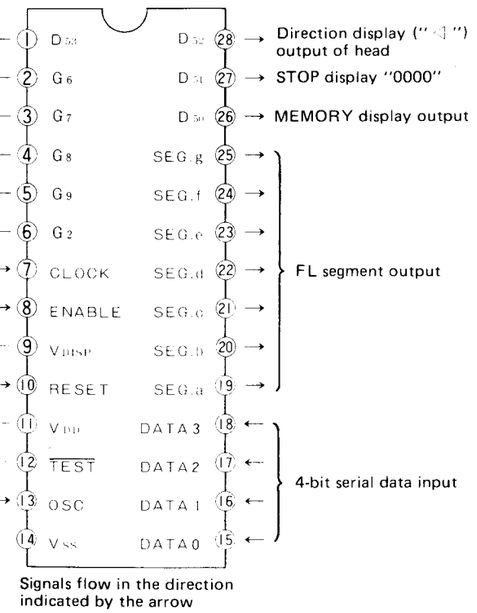
Fig. 2-3



DB0 ～ DB8 { HiZ : High impedanc
: Input mode
LED DISPLAY DATA is output in the output mode.

ST0 ～ ST3 { The key scanning strobe signal is outpu when DB0 through DB8 are in the input mode. In case except the above. FL DISPLAY DATA (marked by "▨" on the left) is output by synchronizing with FL DO and FL CLK.

Fig. 1-2



Signals flow in the direction indicated by the arrow

Fig. 2-1

2-2. Terminal discription

Pin No.	Terminal Symbol	Function	
15	DATA0	4-bit serial data input. Refer to Tables 2-2 and 2-3.	
16	DATA1		
17	DATA2		
18	DATA3		
7	CLOCK	6 serial data input clocks. Data is input when "H" is set to the "L" level.	
8	ENABLE	Input to determine the 1st data of 6 serial data. Determined as a 1st data when "L" is set to the "H" level.	
19	SEG. a	FL segment output (For FX-90 used in reverse.)	
20	SEG. b		
21	SEG. c		
22	SEG. d		
23	SEG. e		
24	SEG. f		
25	SEG. g		
6	G_0	Digit scanning signal output. (FL grid)	
5	G_1		
4	G_2		
3	G_3		
2	G_4		
26	D_{50}	Not used	Lights up at "H" level.
27	D_{51}	Counter "0000" STOP display output.	
28	D_{52}	Head direction display ("◁") output	
1	G_{53}	Head direction display ("▷") output	

Table. 2-1

$D_{00} \sim D_{03}$
$D_{10} \sim D_{13}$
$D_{20} \sim D_{23}$
$D_{30} \sim D_{33}$
$D_{40} \sim D_{43}$
} D_{50} through D_{53} are static outputs corresponding to a couple of bits.

DATA					SEGMENT						
HEX	=3	=2	=1	=0	a	b	c	d	e	f	g
0	0	0	0	0	I	I	I	I	I	I	
1	0	0	0	I		I	I				
2	0	0	I	0	I	I		I	I		I
3	0	0	I	I	I	I	I	I			I
4	0	I	0	0		I	I			I	I
5	0	I	0	I	I		I	I		I	I
6	0	I	I	0	I		I	I		I	I
7	0	I	I	I	I	I	I		I		
8	I	0	0	0	I	I	I	I	I	I	I
9	I	0	0	I	I	I	I	I		I	I

Table. 2-2

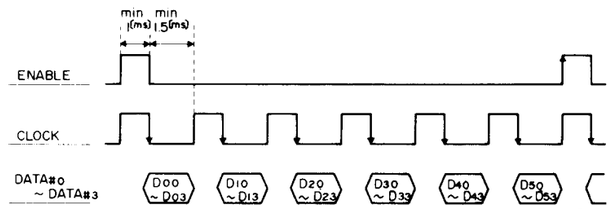


Fig. 2-2

$D_{00} \sim D_{03}$	NS counter display data	BCD code
$D_{10} \sim D_{13}$	Tape counter 10^3 (thousands digit)	BCD code
$D_{20} \sim D_{23}$	Tape counter 10^2 (hundreds digit)	BCD code
$D_{30} \sim D_{33}$	Tape counter 10^1 (tens digit)	BCD code
$D_{40} \sim D_{43}$	Tape counter 10^0 (units digit)	BCD code
$D_{50} \sim D_{53}$	Static output	Corresponding to a couple of bits

Table. 2-3

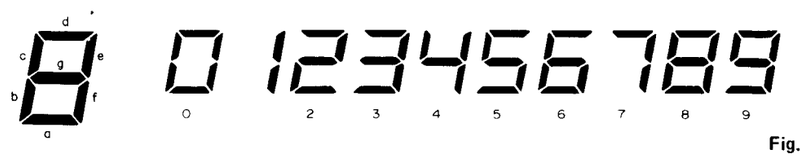


Fig. 2-3

DISASSEMBLY INSTRUCTIONS

1. Removing Front Cabinet

1) Remove the 5 screws. (See Figure-1)

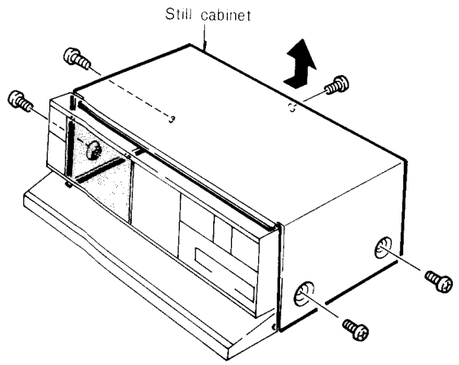


Fig. 1

2. Removing Main Circuit Board

1) Remove the 6 screws. (See Figure-2)

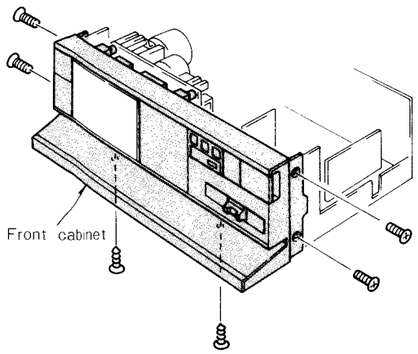


Fig. 2

2) Remove the 3 screws and 2 nylon rivets to dismount the front cabinet with the mechanism and the main circuit board. (See Figure-3, 4)

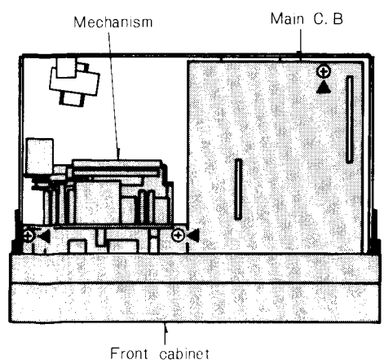


Fig. 3

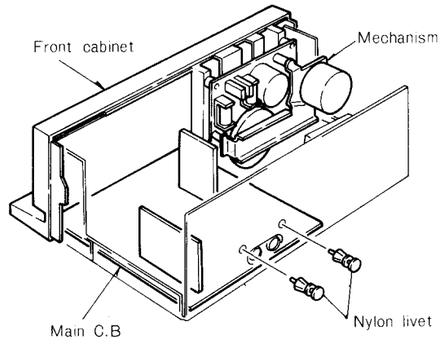


Fig. 4

3. Removing Mechanism

1) Open the cassette lid to remove the 2 screws. (See Figure-5, 6)

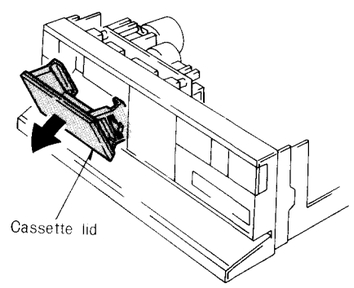


Fig. 5

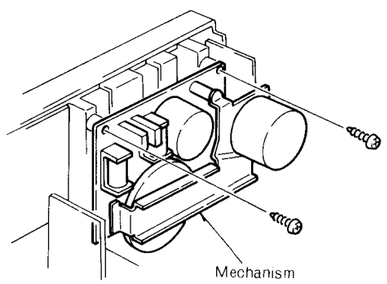
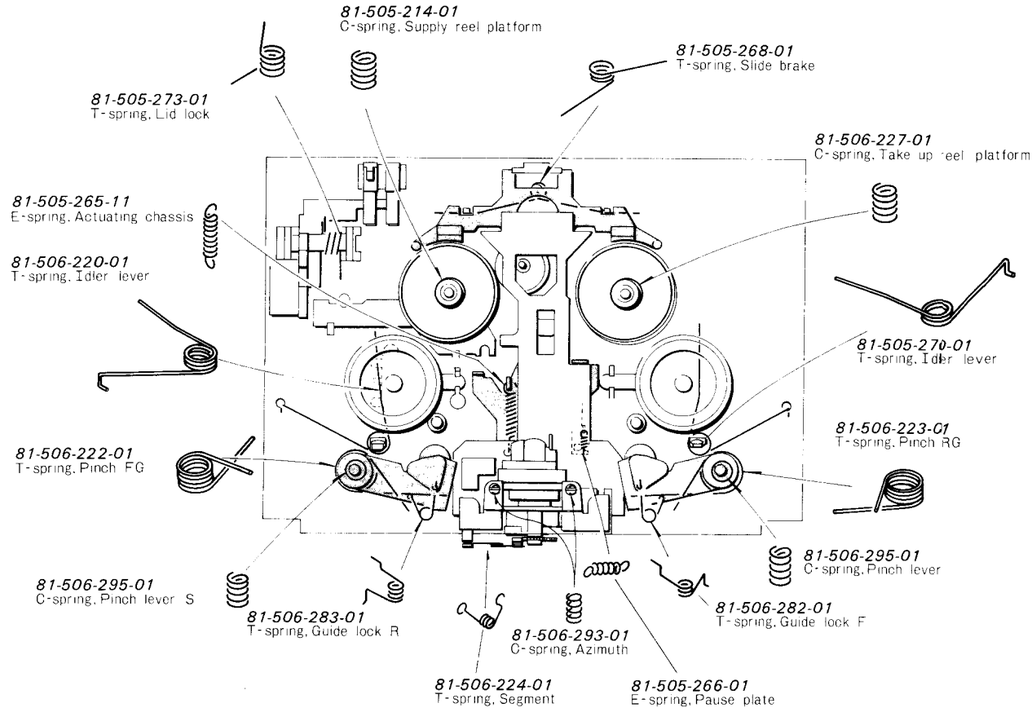
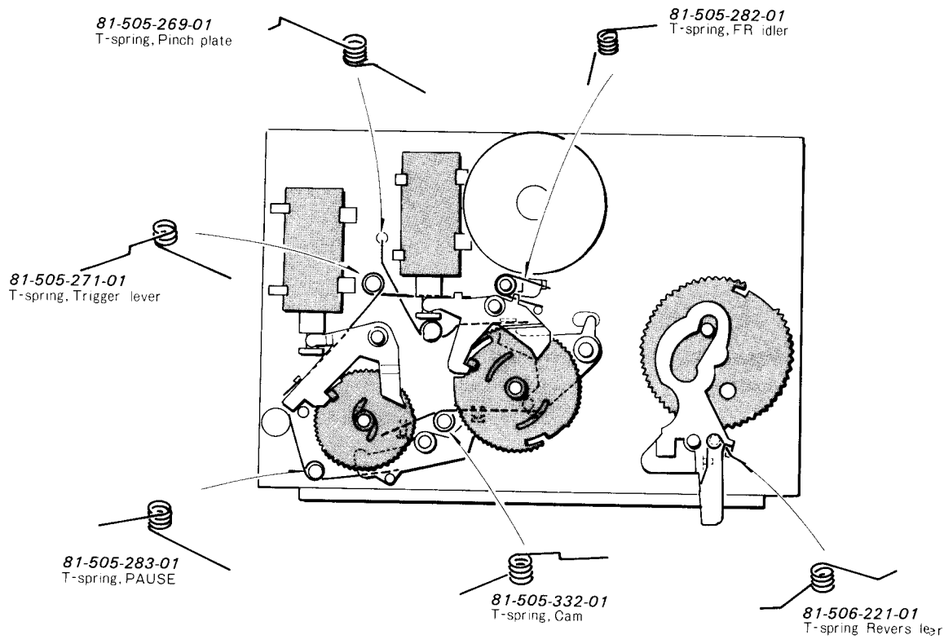


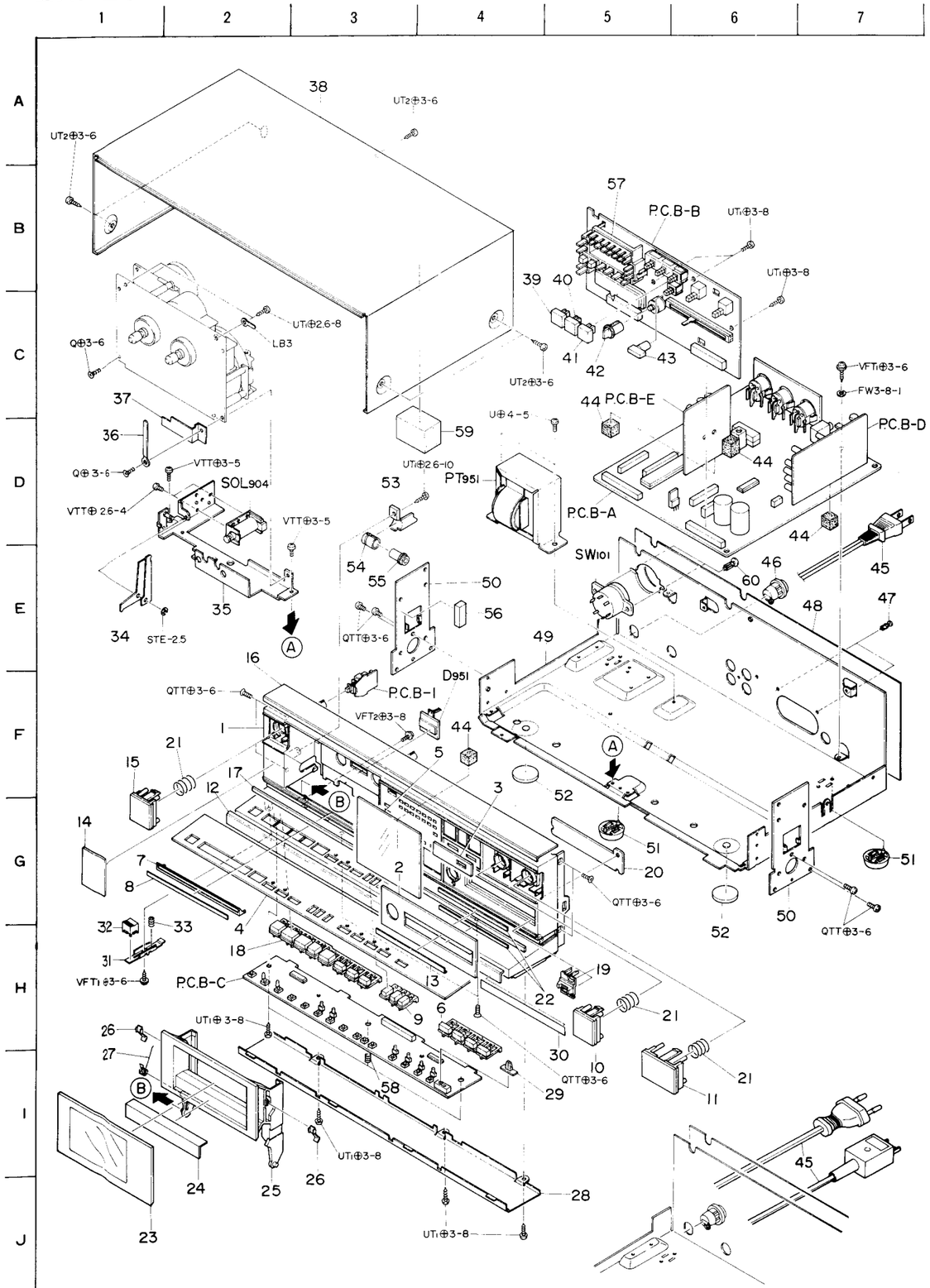
Fig. 6

SPRING APPLICATION POSITION





EXPLODED VIEW-1



PARTS LIST

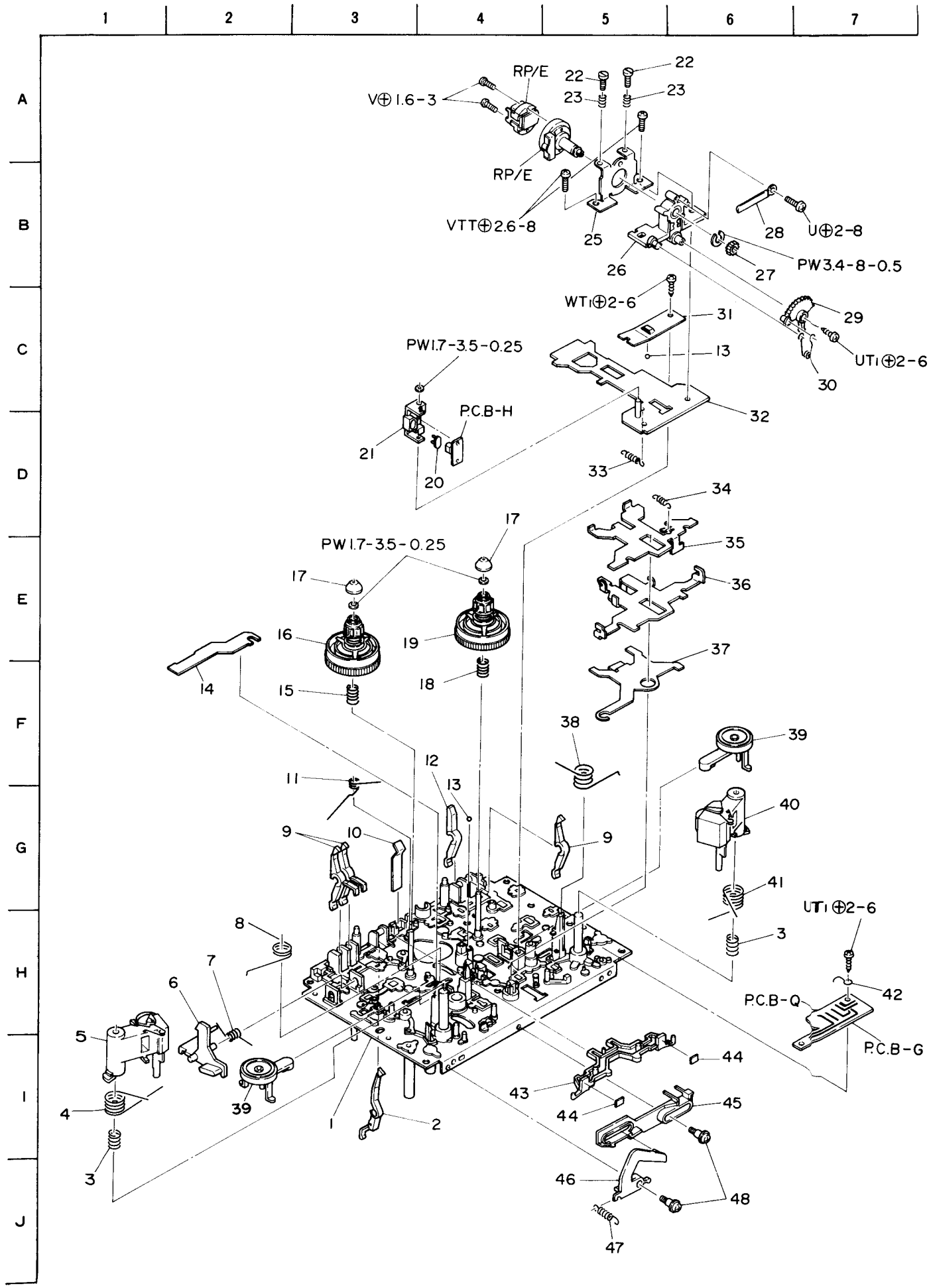
MECHANICAL PARTS

■※ mark in the part list shows exclusive part.
■ "★★★" shows unavailable Repair Part.

Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	Remark
1- 1 ~22	82-197-032-01		Front cabinet ass'y (H, E, K, G models only)	※	1	
1- 1 ~22	82-197-043-01		Front cabinet ass'y (HB, UB, EB, KB models only)	※	1	
1- 1	82-197-002-01		Cabinet, Front (H, E, K, G models only)	※	1	★★★
	82-197-044-01		Cabinet, Front (HB, UB, EB, KB models only)	※	1	★★★
1- 2	82-197-003-01		Panel, NR (H, E, K, G models only)	※	1	★★★
	82-197-045-01		Panel, VR (HB, UB, EB, KB models only)	※	1	★★★
1- 3	82-197-004-01		Panel, BS (H, E, K, G models only)	※	1	★★★
	82-197-046-01		Panel, BS (HB, UB, EB, KB models only)	※	1	★★★
1- 4	82-197-041-01		Panel, Control	※	1	★★★
1- 5	82-197-006-01		Window, Meter	※	1	
1- 6	82-197-013-01		Touch-key, Synchro	※	1	
1- 7	82-197-022-01		Attachment	※	1	★★★
1- 8	82-197-023-11		Plate, Attachment	※	1	★★★
1- 9	82-197-024-01		Touch-key, Counter L	※	1	
1-10	82-197-028-01		DOLBY button ass'y (H, E, K, G models only)	※	1	
	82-197-047-01		DOLBY button ass'y (HB, UB, EB, KB models only)	※	1	
1-11	82-197-029-01		BC button ass'y (H, E, K, G models only)	※	1	
	82-197-049-01		BC button ass'y (HB, UB, EB, KB models only)	※	1	★★★
1-12	82-197-033-01		Panel, Front (H, E, K, G models only)	※		★★★
	82-197-051-01		Panel, Front (HB, UB, EB, KB models only)	※	1	★★★
1-13	82-197-036-01		Plate, Volume (H, E, K, G models only)	※	1	★★★
	82-197-052-01		Plate, Volume (HB, UB, EB, KB models only)	※	1	★★★
1-14	82-197-037-01		Panel L (H, E, K, G models only)	※	1	★★★
	82-197-053-01		Panel L (HB, UB, EB, KB models only)	※	1	★★★
1-15	82-798-036-01		POWER button ass'y (H, E, K, G models only)	MX 90	1	
	82-798-062-01		POWER button ass'y (HB, UB, EB, KB models only)	MX-90	1	
1-16	82-198-003-01		Panel, Top (H, E, K, G models only)		1	★★★
	82-197-054-01		Panel, Top (HB, UB, EB, KB models only)	※	1	★★★
1-17	82-198-009-01		Decorative bar		1	★★★
1-18	82-198-010-01		Touch-key R ass'y		1	
1-19	82-798-015-01		Knob, Volume	MX 90	1	
1-20	82-798 017-01		Plate B (H, E, K, G models only)	MX-90	1	★★★
	82-798-064-01		Plate B (HB, UB, EB, KB models only)	MX-90	1	★★★
1-21	82-798-209-01		C-spring, POWER	MX 90	3	
1-22	82-199-221-01		Sheet, Volume (H, E, K, G models only)	AD-R550	2	★★★
	82-197-230-01		Sheet, Volume (HB, UB, EB, KB models only)	※	2	★★★
1-23 ~26	82-197-007-01		Cassette box ass'y	※	1	
1-23	82-197-009-01		Window, Cassette	※	1	★★★
1-24	82-197-019-01		Plate, Cassette	※	1	★★★
1-25	82-197-008-01		Box, Cassette	※	1	★★★
1-26	82-192-218-01		P-spring, Cassette holder	FX 30	2	★★★
1-27	82-197-207-01		T-spring, Eject	※	1	
1-28	82-198-028-01		Cabinet, Bottom		1	★★★
1-29	82-197-021-11		Slide knob, TIMER	※	1	
1-30	82-197-026-01		Sheet, Vias	※	1	★★★
1-31	82-198-203-01		Lever A, Eject		1	★★★
1-32	82-198-016-01		Eject knob		1	
1-33	82-197-211-01		C-spring, Eject	※	1	
1-34	82-198-204-01		Lever B, Eject		1	★★★
1-35	82-197-223-11		Mechanism holder ass'y	※	1	★★★
1-36	87-038-039-01		Wire binder		1	★★★

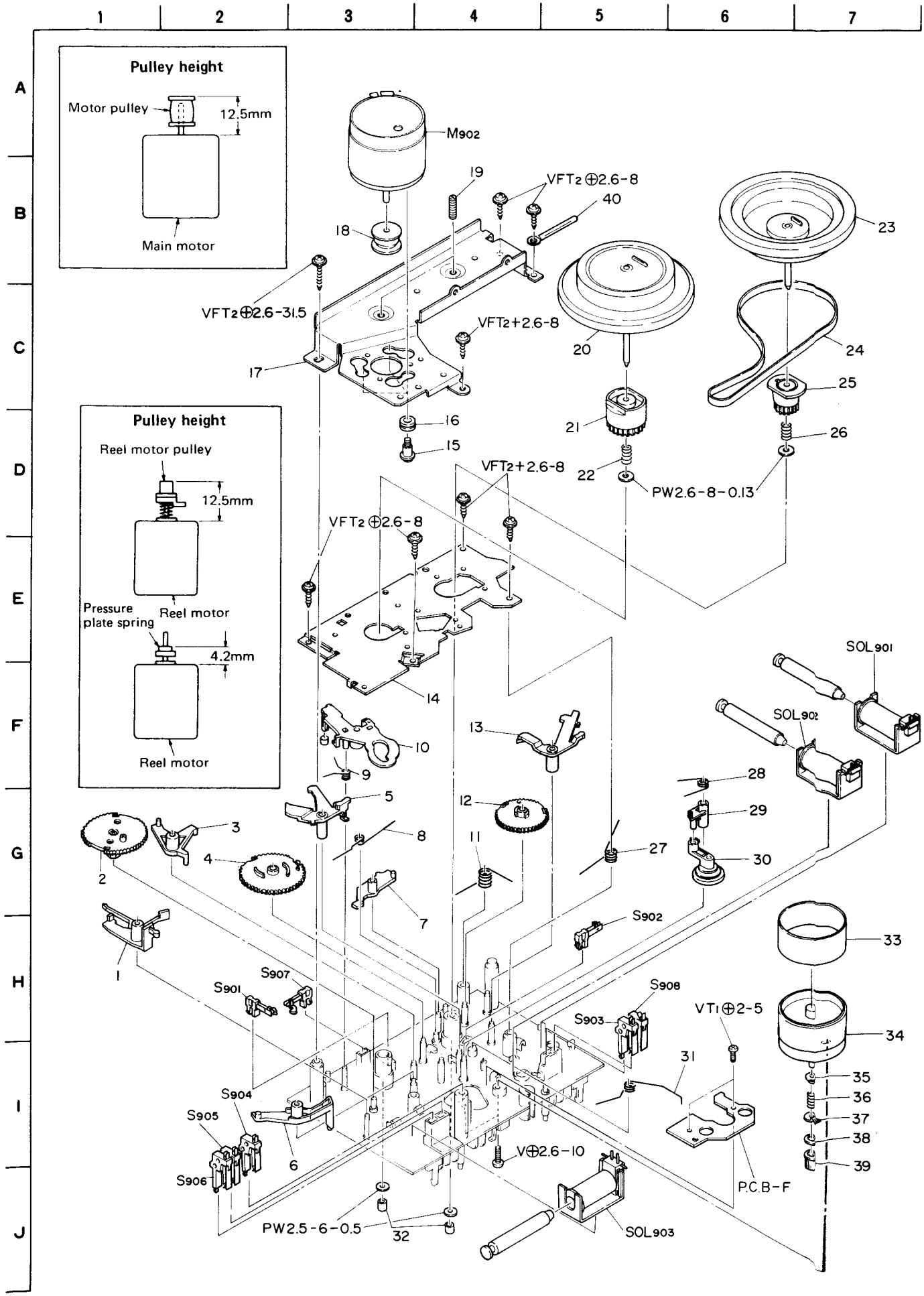
Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	Remark
1-37	82-198-214-01		Shield plate, Relay		1	★★★
1-38	82-197-020-01		Cabinet, Steel (H, E, K, G models only)	※	1	
	82-197-055-01		Cabinet, Steel (HB, UB, EB, KB models only)	※	1	
1-39	82-197-010-01		MODE button, CONT	※	1	
1-40	82-197-011-01		MODE button, RIV	※	1	
1-41	82-197-012-01		MODE button, NORM	※	1	
1-42	82-197-018-11		Knob, Vias (H, E, K, G models only)	※	1	
	82-197-056-11		Knob, Vias (HB, UB, EB, KB models only)	※	1	
1-43	82-799-025-11		Push-button, HI	TX-110	1	
1-44	82-197-219-01		G cushion, Circuit board	※	3	★★★
1-45	87-034-962-01		AC power cord (H model only)		1	
	87-034-992-01		AC power cord (HB model only)		1	
	87-034-578-01		AC power cord (UB model only)		1	
	82-787-674-01		AC power cord (E, EB models only)		1	
	87-034-708-01		AC power cord (K, KB, G models only)		1	
1-46	87-085-184-01		Cord bushing (H, HB, UB models only)		1	
	87-085-185-01		Cord bushing (E, EB, K, KB, G models only)		1	
1-47	87-085-102-01		Nylon rivet 3.5-5.5		2	
1-48	82-197-034-01		Plate, Jack (H model only)	※	1	★★★
	82-197-057-01		Plate, Jack (HB model only)	※	1	★★★
	82-197-058-01		Plate, Jack (UB model only)	※	1	★★★
	82-197-038-01		Plate, Jack (E model only)	※	1	★★★
	82-197-059-01		Plate, Jack (EB model only)	※	1	★★★
	82-197-040-01		Plate, Jack (K model only)	※	1	★★★
	82-197-060-01		Plate, Jack (KB model only)	※	1	★★★
	82-197-042-01		Plate, Jack (G model only)	※	1	★★★
1-49	82-197-216-01		Chassis, Amp. (H, HB models only)	※	1	★★★
	82-197-209-01		Chassis, Amp. (UB, E, EB, K, KB, G models only)	※	1	★★★
1-50	82-198-208-01		Holder L, Side	※	2	★★★
1-51	87-085-186-01		Foot		2	
1-52	82-198-042-01		Rubber foot		2	
1-53	82-175-210-11		Holder, Oil-damp	AD-3500	1	
1-54	82-197-221-01		Shaft bearing, Oil-damp	※	1	
1-55	82-534-264-01		Gear, Oil-damp		1	
1-56	82-197-208-01		FL cushion	※	1	★★★
1-57	82-197-205-01		Guide, LED	※	1	★★★
1-58	82-197-218-01		C-spring, Front earth	※	1	
1-59	82-199-230-01		Cushion, Steel cabinet	AD-R550	1	★★★
1-60	87-084-063-01		Nylon ribet 3-5.5 (H, HB, models only)		2	

EXPLODED VIEW-2



Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	Remark
2- 1	81-506-201-01		Outsert chassis ass'y		1	★★★
2- 2	81-505-242-11		Lever, Metal		1	
2- 3	81-506-295-01		C-spring, Pinch lever		2	
2- 4	81-506-222-01		T-spring, Pinch FG		1	
2- 5	81-506-275-11		Pinch lever FG ass'y		1	
2- 6	81-505-239-01		Eject lever		1	
2- 7	81-505-273-01		T-spring, Lid lock		1	
2- 8	81-506-220-01		T-spring, Idler lever		1	
2- 9	81-505-241-21		REC blocking lever		3	
2-10	81-505-260-01		P-spring, Cassette holder		1	
2-11	81-505-268-01		T-spring, slide brake		1	
2-12	81-505-240-21		Lever, Cassette sensor		1	
2-13	81-073-005-01		Steel ball 2ϕ		2	
2-14	81-505-238-01		Blocking plate, Eject		1	
2-15	81-505-214-01		C-spring, Supply reel platform		1	
2-16	81-506-239-11		Supply reel platform RP ass'y		1	
2-17	82-303-398-01		Cap, Take-up reel platform		2	
2-18	81-506-227-01		C-spring, Take-up reel platform		1	
2-19	81-506-240-21		Take-up reel platform F.P ass'y		1	
2-20	81-506-274-01		Guide, Light		1	
2-21	81-506-236-01		Tape sensor		1	
2-22	81-506-230-01		Ajust screw, Azimuth		2	
2-23	81-506-293-01		C-spring, Azimuth		2	
2-24	81-506-208-01		Head housing ass'y		1	
2-25	81-506-204-01		Holder, Azimuth screw		1	
2-26	81-506-207-01		Head base ass'y		1	
2-27	81-506-237-01		Gear, Head housing		1	
2-28	87-038-056-01		Wire binder 2.3		1	★★★
2-29	81-506-219-01		Gear, Segment		1	
2-30	81-506-224-01		T-spring, Segment		1	
2-31	81-507-224-01		P-spring, Actuating chassis		1	
2-32	81-506-238-01		Actuating chassis ass'y		1	★★★
2-33	81-505-265-11		E-spring, Actuating chassis		1	
2-34	81-505-266-01		E-spring, PAUSE plate		1	
2-35	81-506-301-01		PAUSE plate R		1	★★★
2-36	81-506-281-01		Plate, Pinch lever R		1	★★★
2-37	81-506-203-01		Select lever, Pinch lever		1	
2-38	81-505-270-01		T-spring, Idler lever		1	
2-39	81-505-216-31		Idler lever ass'y		2	
2-40	81-506-276-11		Pinch lever RG ass'y		1	
2-41	81-506-223-01		T-spring, Pinch RG		1	
2-42	81-506-305-01		T-spring, Earth		1	
2-43	81-505-236-11		Lever, Slide Brake		1	
2-44	81-505-237-01		Felt, Slide Brake		2	★★★
2-45	81-506-244-01		Select lever E, Head		1	
2-46	81-506-245-01		Lever, EDIT		1	
2-47	82-197-217-01		E-spring, EDIT	※	1	
2-48	87-081-483-01		Motor screw, M2.6		2	

EXPLODED VIEW-3



Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	Remark
3- 1	81-506-242-01		Trigger lever, Reverse Q		1	
3- 2	81-506-241-01		Gear, Reverse Q		1	
3- 3	81-505-230-01		Lever, PLAY		1	
3- 4	81-505-234-11		Gear, PLAY cam		1	
3- 5	81-505-231-01		Trigger lever, PLAY		1	
3- 6	81-506-216-01		Lever		1	
3- 7	81-505-232-01		Lever, PAUSE		1	
3- 8	81-505-332-01		T-spring, Cam A		1	
3- 9	81-506-221-01		T-spring, Reverse lever		1	
3-10	81-506-214-01		Lever, Reverse		1	
3-11	81-505-283-01		T-spring, PAUSE lever		1	
3-12	81-505-235-01		Gear, PAUSE cam		1	
3-13	81-505-233-01		Trigger lever, PAUSE		1	
3-14	81-505-204-11		Chassis B, Mechanism		1	★★★
3-15	87-085-483-01		Motor screw, M2.6		3	
3-16	87-087-029-01		Rubber cushion		3	★★★
3-17	81-506-202-01		Holder, Motor		1	★★★
3-18	81-506-284-01		Pulley 2-7.6, Motor		1	
3-19	82-565-373-01		Screw, Thrust		2	
3-20	81-506-287-01		Flywheel RB ass'y		1	
3-21	81-506-243-01		Gear Q, Flywheel		1	
3-22	81-506-228-01		C-spring, Flywheel R		1	
3-23	81-506-205-11		Flywheel F ass'y		1	
3-24	81-506-289-01		Rubber belt B		1	
3-25	81-505-225-01		Gear, Flywheel		1	
3-26	81-505-261-01		C-spring, Flywheel F		1	
3-27	81-505-271-01		T-spring, Trigger lever		1	
3-28	81-505-282-01		T-spring, FR idler		1	
3-29	81-505-254-11		Lever A, FR idler		1	
3-30	81-505-301-11		FR idler P ass'y		1	
3-31	81-505-269-01		T-spring, Pinch plate		1	
3-32	81-505-246-01		Rubber, Drive		2	
3-33 ~39	09-047-198-01		Reel motor ass'y		1	
3-33	81-505-606-01		Shield plate		1	★★★
3-34	81-505-604-11		Reel motor		1	★★★
3-35	81-505-289-01		Presure plate spring		1	★★★
3-36	81-505-290-01		C-spring, FR idler C		1	★★★
3-37	81-505-207-11		Lever C, FR idler		1	
3-38	81-505-328-01		Felt 4.5-7.2-1.0		1	★★★
3-39	81-505-257-01		Pulley, Reel motor		1	
3-40	87-038-039-01		Wire binder		1	★★★

■ACCESSORIES/PACKAGE LIST

Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	Remark
1	82-197-855-01		Printed indiv., Packing	※	1	★★★
2	82-197-852-01		Cushion L, Printed indiv.	※	1	★★★
3	82-197-853-01		Cushion R, Prented indiv.	※	1	★★★
4	82-197-856-01		Carton, Outer (H, HB, E, EB, K, KB, G models only)	※	1/4	★★★
5	82-197-857-01		Carton, Outer (UB model only)	※	1/2	★★★
6	87-056-644-01		Poly-vinyl sack (for case)		1	★★★
7	87-056-651-01		Color label, Black (HB, UB, EB, KB models only)		1	★★★
8	82-197-904-01		Instructions booklet	※	1	
9	87-051-171-11		Poly-vinyl sack (for instruction)		1	★★★
10	87-056-009-51		Distributors list (H, HB, E, EB, K, KB, G models only)		1	★★★
11	87-056-050-01		Safety instruction (UB model only)		1	★★★
12	87-056-084-01		Limited, Warranty (UB model only)		1	★★★
13	87-056-059-01		Guarantee card (G model only)		1	★★★
14	87-056-045-01		Guarantee card (UB model only)		1	★★★
15	87-056-008-11		Label, AC power cord (K, KB models only)		1	★★★
16	82-197-905-01		Label, POP	※	1	★★★

Part No.	Description
87-251-036-21	U+2-8
87-251-037-21	U+2-10
87-251-168-21	U+4-5
87-081-954-01	V+1.6-3
87-261-075-11	V+2.6-10
87-251-094-21	V+3-6
87-231-094-21	Q+3-6
87-341-035-21	UT$_1$+2-6
87-341-075-21	UT$_1$+2.6-6
87-351-034-21	VT+2-5
87-346-095-11	UT$_1$+3-8
87-340-094-21	UT$_2$+3-6
87-340-095-01	UT$_2$+3-8
87-353-074-21	VT$_2$+2.6-8
87-353-095-21	VT$_2$+3-8
87-323-074-21	QT$_2$+2.6-8
87-323-095-21	QT$_2$+3-8
87-081-501-01	VTT+2.6-4
87-081-502-01	VTT+2.6-6
87-081-503-01	VTT+2.6-8

Part No.	Description
87-081-919-01	VTT+3-5
87-081-511-01	VTT+3-6
87-081-531-01	QTT+3-6
81-505-341-01	VFT$_1$+2.6-31.5
87-511-094-21	VFT$_1$+3-6
87-512-074-01	VFT$_2$+2.6-8
87-513-094-21	VFT$_2$+3-6
87-513-095-21	VFT$_2$+3-8
87-410-305-21	W2-6-0.4
87-081-808-01	PW1.7-3.5-0.25
82-416-358-01	PW2.5-6-0.5
87-067-052-01	PW2.6-8-0.13
87-067-105-01	PW3.4-8-0.5
87-081-143-01	FW3.3-8-1
87-067-065-01	FW3.2-8-0.25
87-441-008-01	STE2.5