

# 3-BAND STEREO RADIO CASSETTE RECORDER

## MODEL NO. CS-880E, K

# AIWA® [SERVICE MANUAL]

Code No. 29-880-000-18



DATE OF ISSUE 7/1981

### SPECIFICATIONS

#### GENERAL

Semiconductors: 17 ICs, 1 FET, 95 transistors,

68 diodes, 7 LED's, 1 LCD

Power source: E model

Batteries DC 13.5V (UM-1 x 9)

Back-up power supply (for tuner memory)

DC 3V (UM-3, "AA" x 2)

AC 110 ~ 120V/220 ~ 240V

switchable 50/60 Hz

K model

Batteries, DC 13.5V (UM-1 or HP-2 x 9)

Back-up power supply (for tuner memory)

DC 3V (UM-3 or HP-7 x 2)

K model

AC 120V/240V

switchable, 50/60 Hz

Car battery (thru car adaptor)

E model

42W

K model

39W

Speakers:

140mmφ x 2 (Woofer)

50mmφ x 2 (Tweeter)

170mmφ x 1 (Passive Radiator)

588(W) x 325(H) x 163(D) mm

Dimension:

Weight:

8.6 kg

#### RADIO SECTION

Frequency range:

FM 87.5 ~ 108 MHz

MW 522 ~ 1,611 kHz

LW 146 ~ 353 kHz

Intermediate frequency:

FM 10.7 MHz

MW, LW 450 kHz

Sensitivity:

(IHF, THD 3%)

FM 14 ± 6 dB (at 88.0 MHz)

12 ± 6 dB (at 98.0 MHz)

12 ± 6 dB (at 108.0 MHz)

(S/N 10 dB)

MW 47 ± 5 dB (at 594 kHz)

45 ± 5 dB (at 1008 kHz)

42 ± 5 dB (at 1404 kHz)

(S/N 10 dB)

LW

55 ± 5 dB (at 155 kHz)

54 ± 5 dB (at 245 kHz)

55 ± 5 dB (at 344 kHz)

Image rejection:

FM 45 ± 6 dB (at 108.0 MHz)

MW 41 ± 5 dB (at 1,404 kHz)

LW 45 ± 10 dB (at 344 kHz)

IF rejection:

FM 80 ± 20 dB (at 88.0 MHz)

MW 27 ± 5 dB (at 594 kHz)

Total harmonic distortion: FM Less than 1.5% (at 98 MHz)

MW 1.7 ± 1.0% (at 1,008 kHz)

#### TAPE RECORDER SECTION

Tape speed:

22 ± 3 dB (at 1 kHz)

Auto stop level:

FM 22 ± 10 dB (at 98 MHz)

FF & rewind time:

MW 60 ± 10 dB (at 1,008 kHz)

Automatic stop system:

LW 65 ± 10 dB (at 245 kHz)

Pinch roller pressure:

Distortion:

Less than 1.5% (PB)

Frequency response:

Less than 1.5% (REC/PB)

Signal to noise ratio:

METAL tape 35 ~ 16,000 Hz

(Un-weighted)

CrO<sub>2</sub> tape 35 ~ 13,000 Hz

LH tape 35 ~ 12,500 Hz

More than 49/46 dB

[DC/AC] (PB)

Signal to noise ratio:

More than 44/42 dB

[DC/AC] (REC/PB)

Erasing ratio:

More than 60 dB

Separation:

More than 38 dB (REC/PB)

Output power:

More than 28W (14W + 14W)

FF & rewind time:

90 ± 5 s. (at C-60)

Automatic stop system:

Mechanical auto stop

Pinch roller pressure:

125 ± 15 g (1.23 ± 0.15N)

Wow and flutter:

Less than 0.038% (WRMS)

Take-up torque:

35 ± 15 g-cm (343 ± 147 mN·m)

FF & rewind torque:

35 ± 5 g-cm (343 ± 49 mN·m)

Input terminal:

110 ± 20 g-cm (1078 ± 196 mN·m)

DIN 3.5φ jack x 2

PHONO pin jack x 2

DIN 5P

Input sensitivity/impedance:

DIN 5P

MIC 0.3mV/3kΩ

DIN 5P

PHONO 500mV/47kΩ

Output terminal:

4mV/47kΩ

DIN 5P

EXT. SP 3.5φ jack x 2

PHONES 6.3φ jack

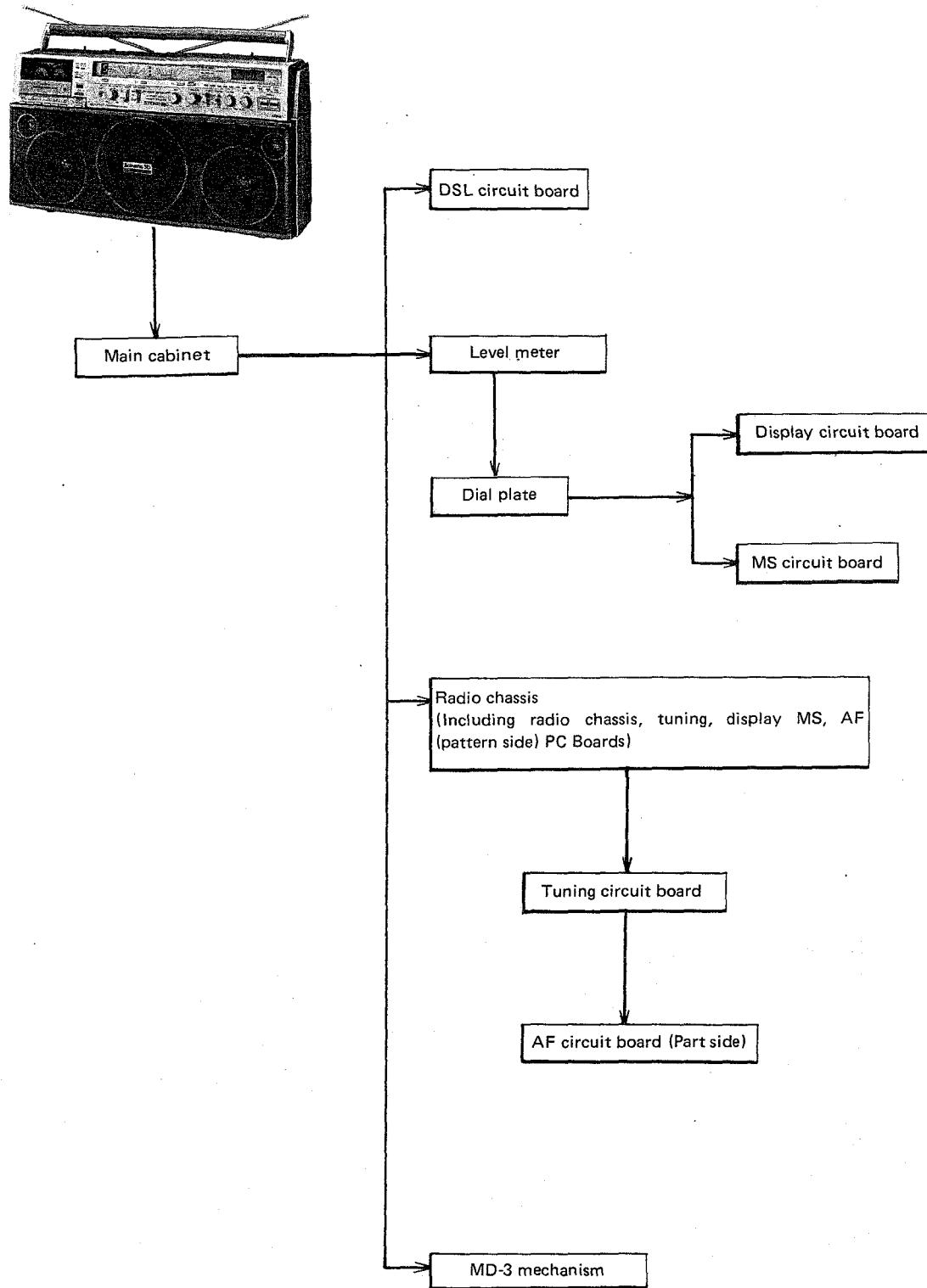
- Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.
- Dolby and the  symbol are trademarks of Dolby Laboratories Licensing Corporation.
- Specifications and external appearance are subject to change without notice due to product improvement.

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## DISASSEMBLING CHART OF MAIN PARTS

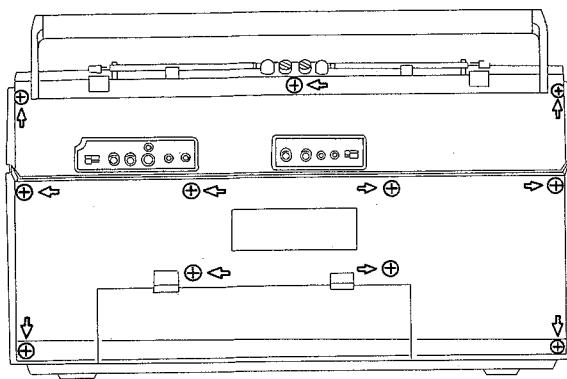
- To avoid troubles when disassembling or replacing the main parts, follow the chart diagram as below.



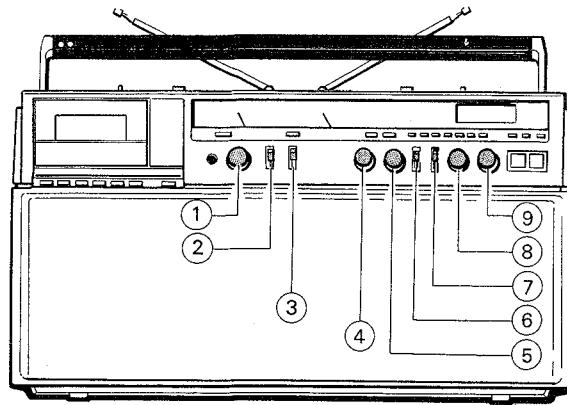
## DISASSEMBLY INSTRUCTIONS

## Removing the Main Case

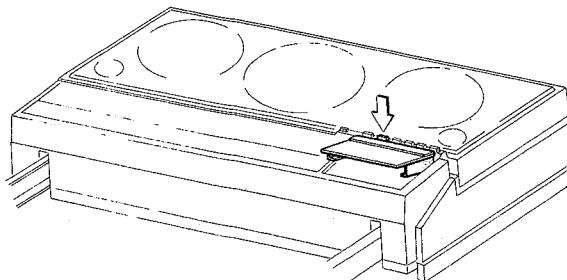
- 1) Remove 11 screws on the rear lid shown by arrows ←.



- 2) Remove 9 knobs.



**Note 3)** Open the cassette lid.  
(It is not required to remove the cassette lid)

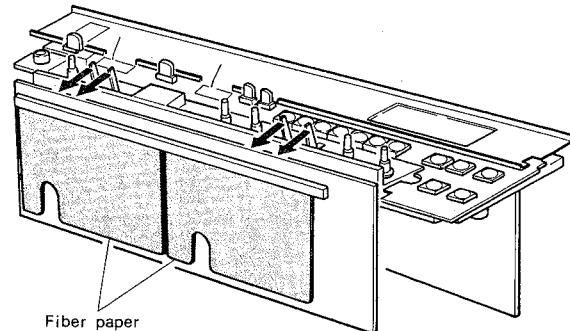


## Installing the Main Case

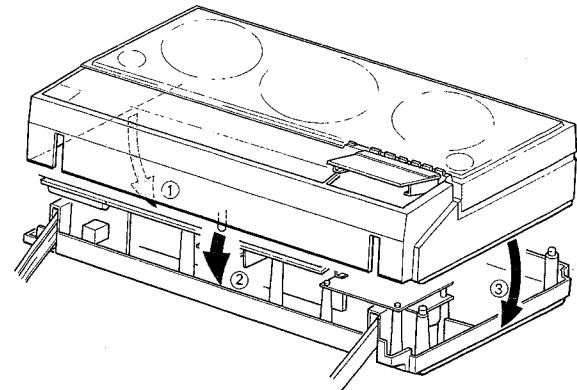
- 1) Check that the fibre paper of the REC/PB PC Board (pattern die) is fixed properly.

**Note:** Firmly fix the fibre paper using two-sided tape, etc. because it is likely to lift up when it is peeled off once.

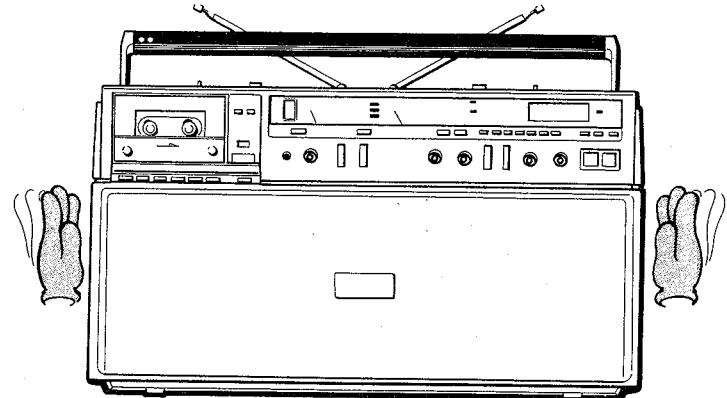
- 2) Lower all the lever switches in the direction of the arrow.



**Note 3)** Be sure to install in the order (1) – (3). Be careful: when it is mounted incorrectly, it may damage the dial plate and the display PC Boards, etc.



- 4) Match the knobs while performing item 3) and tapping the side.

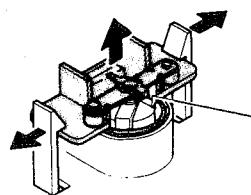


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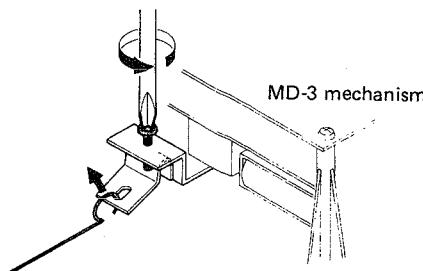
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**Note:** Removing the radio chassis

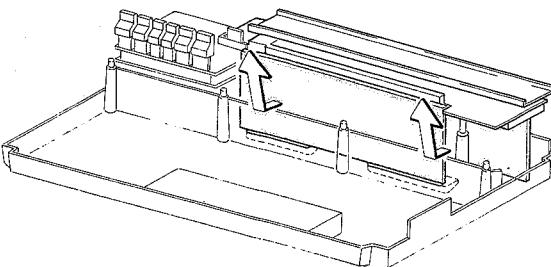
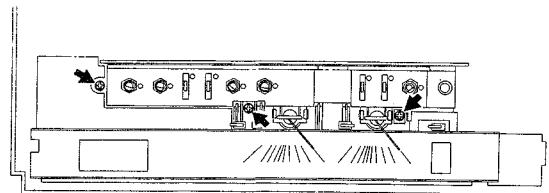
- 1) Be sure to remove the level meter before starting work to prevent the pointer of the level meter from being damaged.



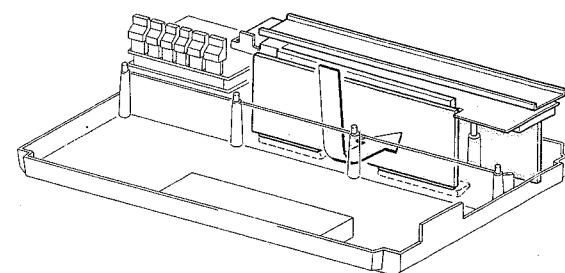
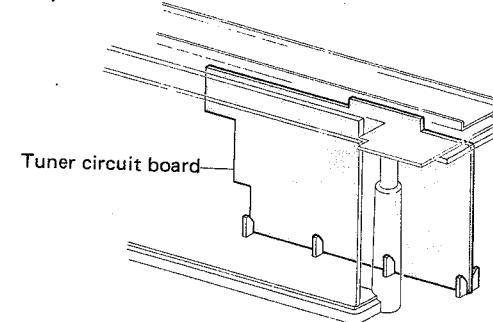
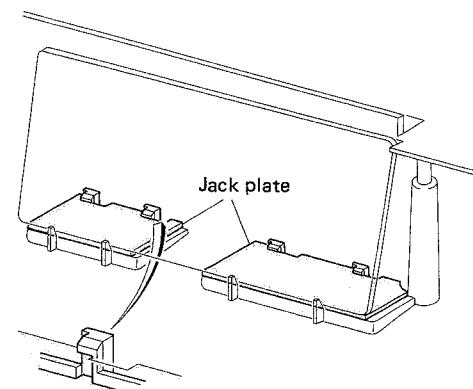
- 2) Loosen the screw and lift up the hook.



- 3) Remove 3 screws and lift up the radio chassis in the direction of the arrow. The radio chassis, REC/PB, tuner, MS and display PC Boards are removed at that time.

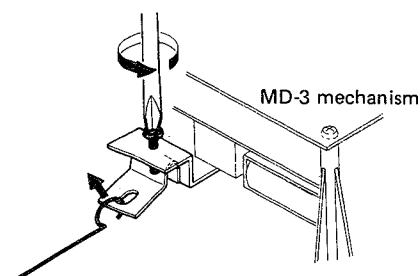
**Note:** Installing the radio chassis

- 1) Hook the jack plate to the tab of the rear lid while paying attention not to pinch the wire. Compress the radio chassis against the direction of the arrow after checking that the tuner PC Board is inserted into the rib.

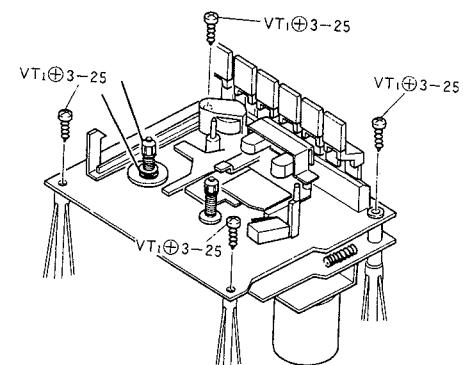


**Removing Mechanism**

1) Loosen the screw and remove the hook of the rod.

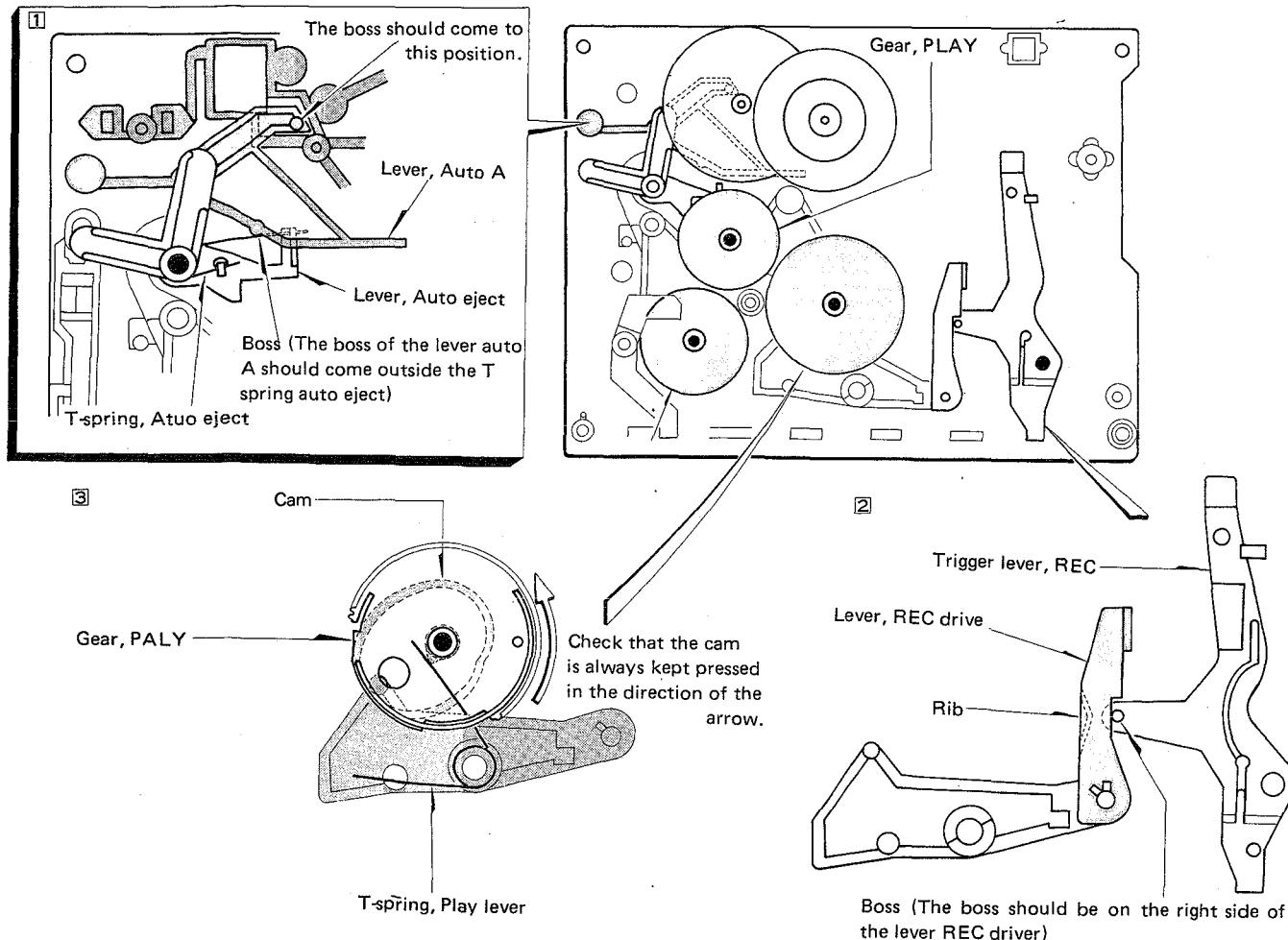


2) Remove 4 screws.



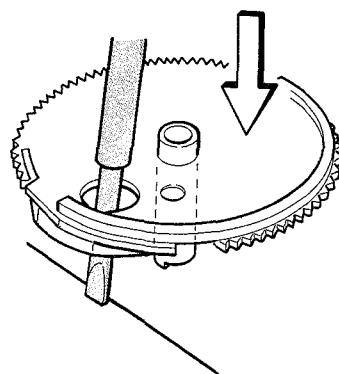
**Cautions on Disassembling MD-3 Mechanism**

Disassemble or repair the MD-3 mechanism while paying attention to the springs and levers, etc. shown in the figure below.



Be sure to hook the T-spring (PLAY lever) to the cam of the gear when installing the gear PLAY.

Hook it from the inside of the gear using a clock screwdriver as shown in the figure. Perform the same for the gear FR and cam gear PAUSE.



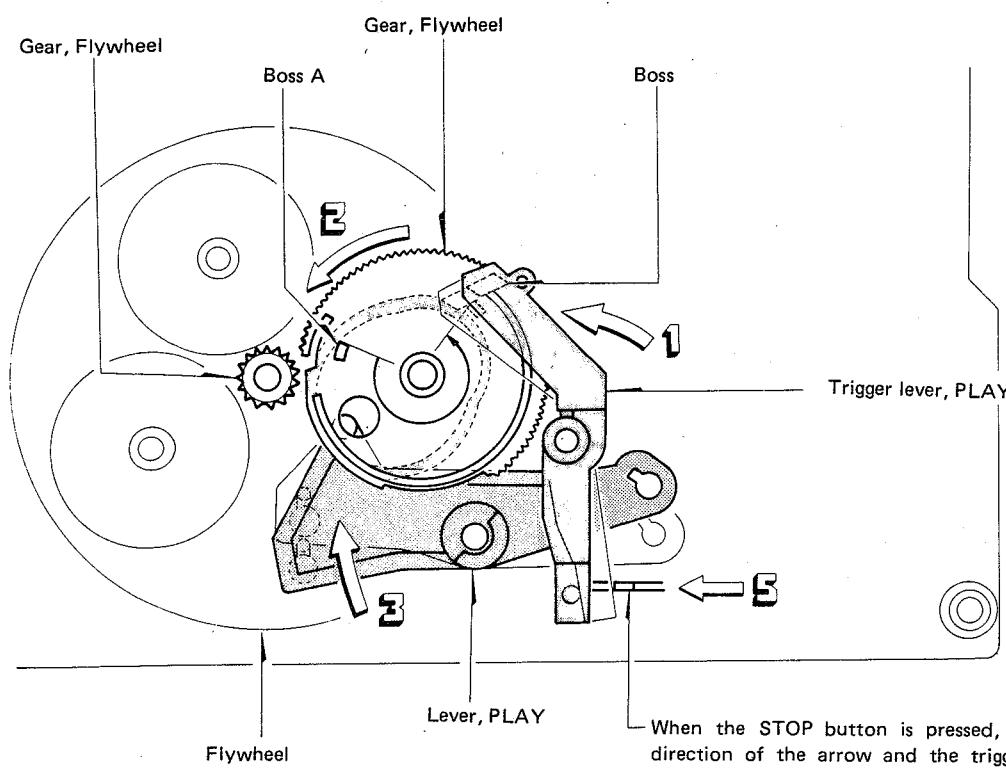
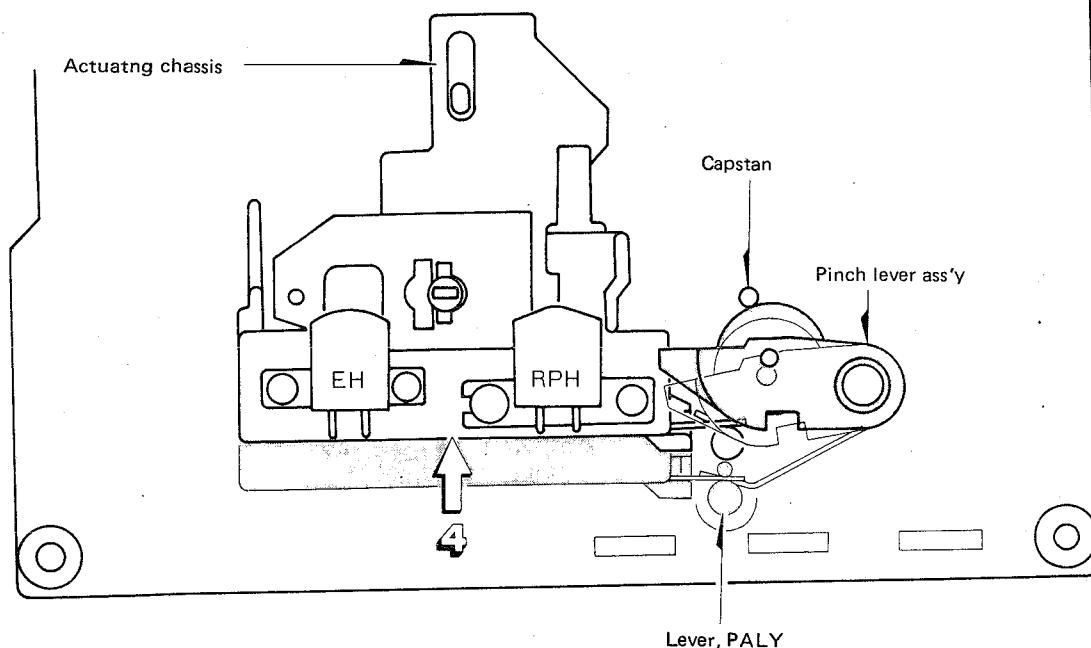
## DESCRIPTION OF THE MD-3 MECHANISM

### Description of the PLAY Operation

With the plate button pressed, the trigger lever (PLAY) moves in the direction of the arrow  $\leftarrow$  (1), the gear (PLAY) is released from the boss of the trigger lever (PLAY) engages with the gear flywheel and rotates in the direction of the arrow  $\leftarrow$  (2), the boss (A) of the gear (PLAY) touches the trigger lever (PLAY) and the gear stops rotating.

When the gear (PLAY) rotates, the lever (PLAY) moves in the direction of the arrow  $\leftarrow$  (3) along the cam groove on the rear of the gear to push up the operation chassis in the direction of the arrow  $\leftarrow$  (4).

The PLAY button which has been locked is released by pressing the STOP button, the trigger lever (PLAY) moves in the direction of the arrow  $\leftarrow$  (5), the boss (A) of the gear (PLAY) is released and the PLAY operation stops.

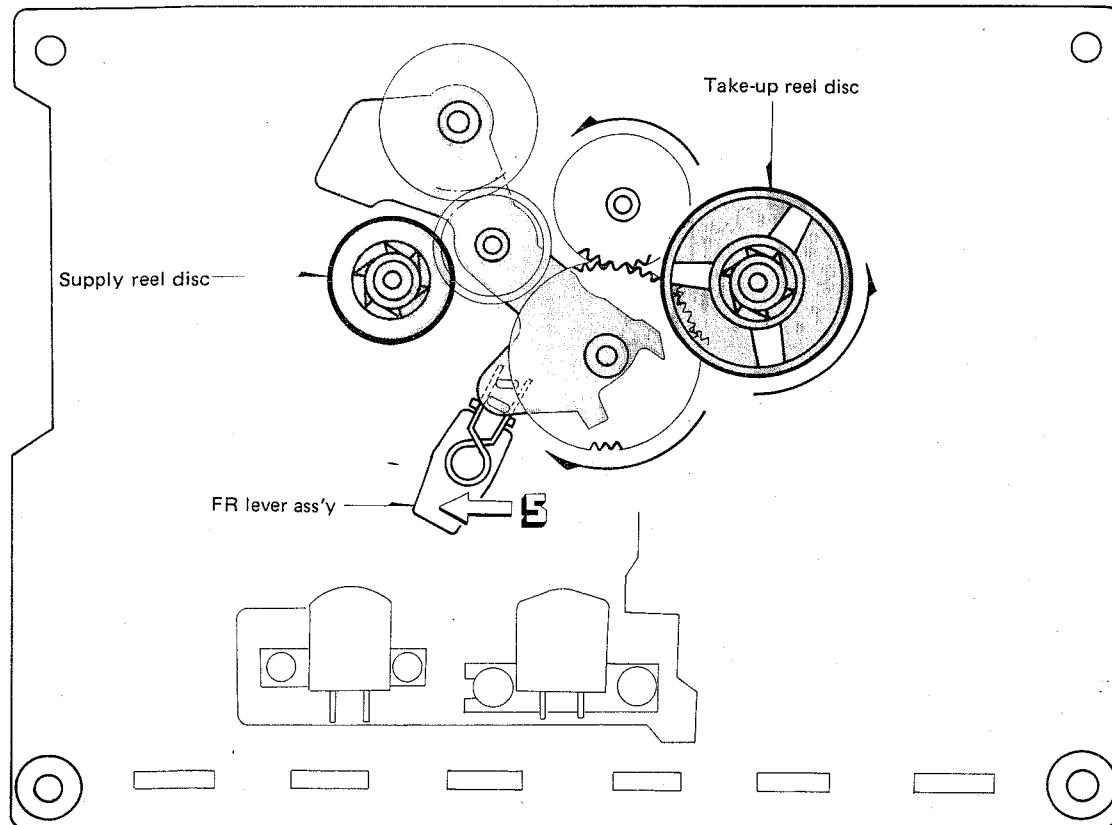
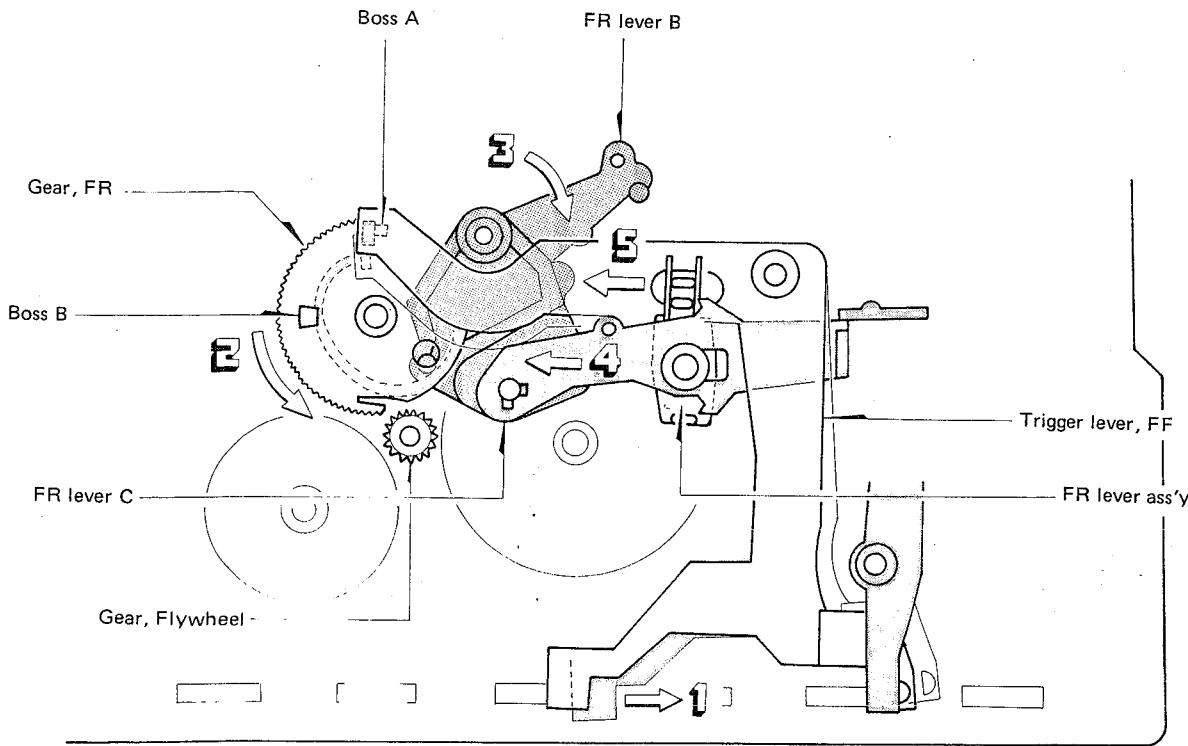


When the STOP button is pressed, the lever moves in the direction of the arrow and the trigger lever PLAY releases the boss (A) of the gear (PLAY).

### Description of the FF Operation

When the FF button is pressed, the trigger lever FF moves in the direction of the arrow ← (1), the boss of the gear FR cam is released and engages with the gear wheel to rotate in the direction of the arrow ← (2), the boss (A) touches the boss of the trigger lever FF

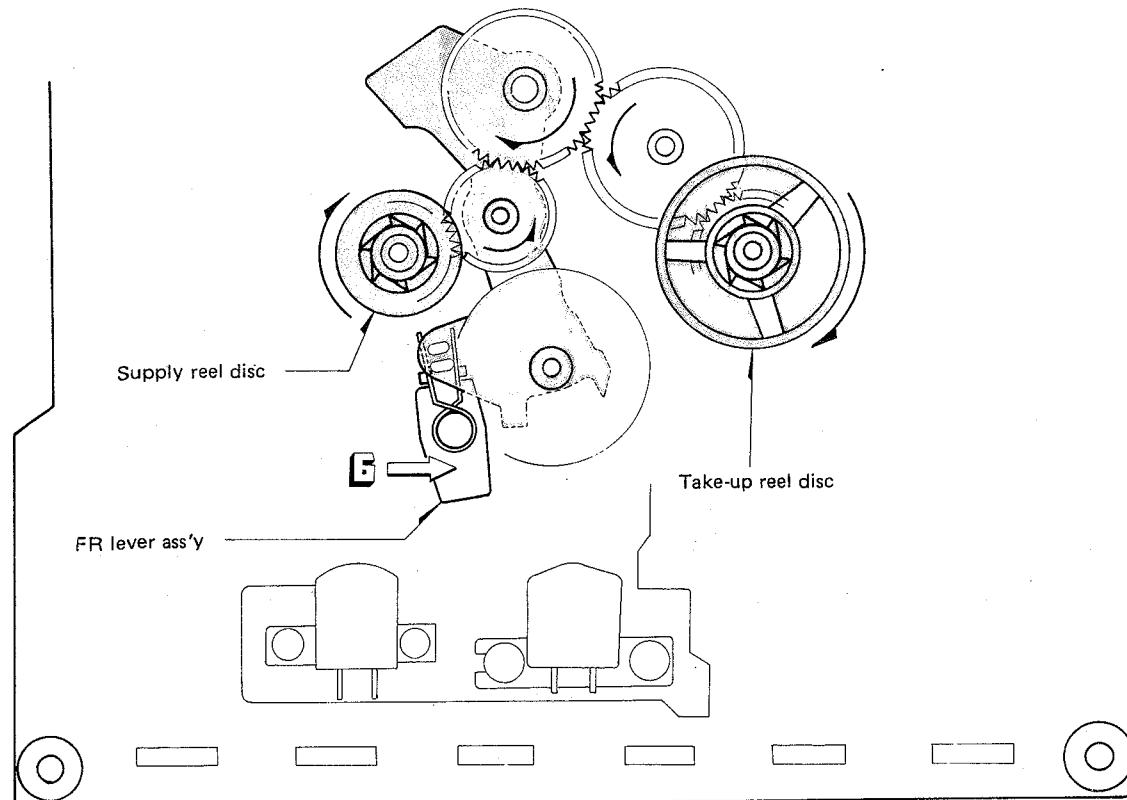
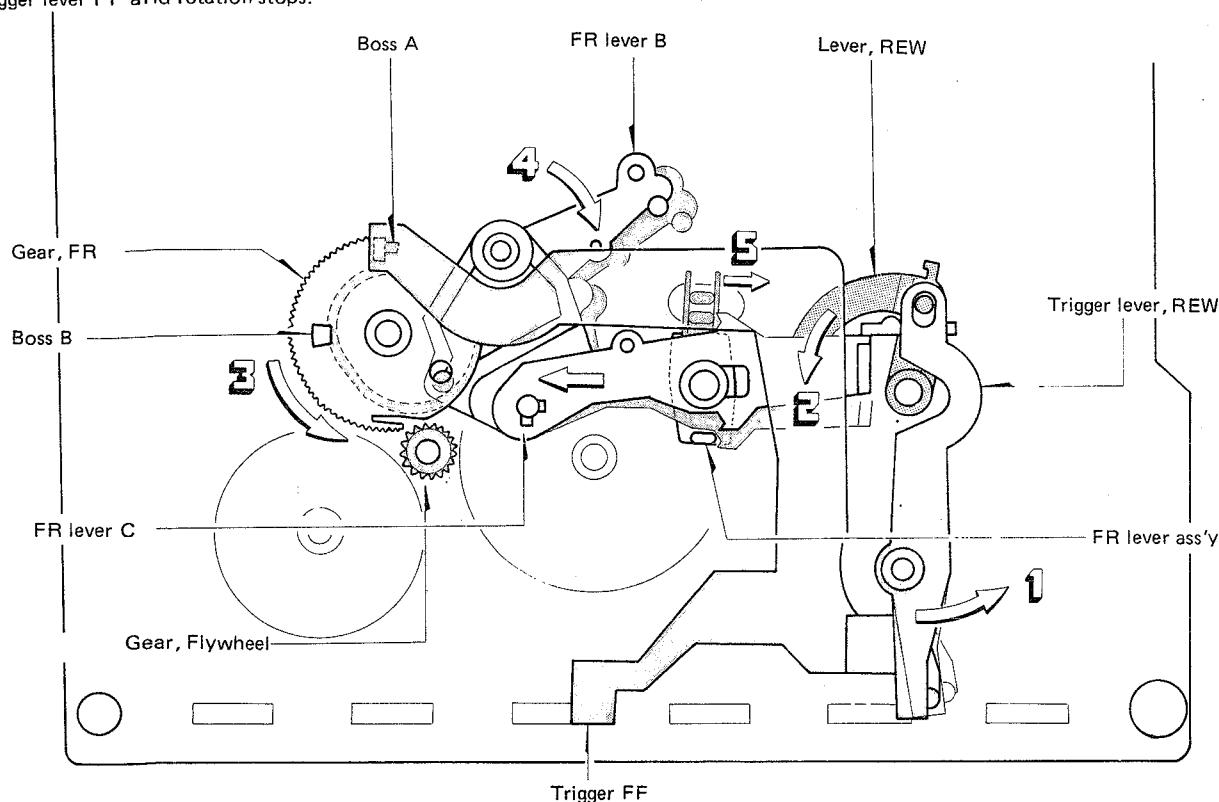
and the gear FR cam stops. The FR lever B moves in the direction of the arrow ← (3) along the groove of the gear FR cam, the FR lever B moves in the direction of the arrow ← (3), the FR lever C compresses the gear of the FR lever Ass'y against the Take-up reel disc ass'y to perform the FF operation.



### REW Operation

When the REW button is pressed, the trigger lever REW moves in the direction of the arrow  $\leftarrow$  (1) and pushes the lever REW in the direction of the arrow  $\leftarrow$  (2). The trigger lever FF releases the boss A of the gear at that time, the gear FR engages with the gear flywheel, rotates in the direction of the arrow  $\leftarrow$  (3), boss B touches the trigger lever FF and rotation stops.

The FR gear B is moved in the direction the arrow  $\leftarrow$  (4) by means of the cam of the gear FR following the rotation of the gear FR, pulls the FR lever C in the direction of the arrow  $\leftarrow$  (5) and moves the FR lever ass'y in the direction of the arrow  $\leftarrow$  (6) to rotate the Take-up reel disc reel disc ass'y to perform the REW operation.

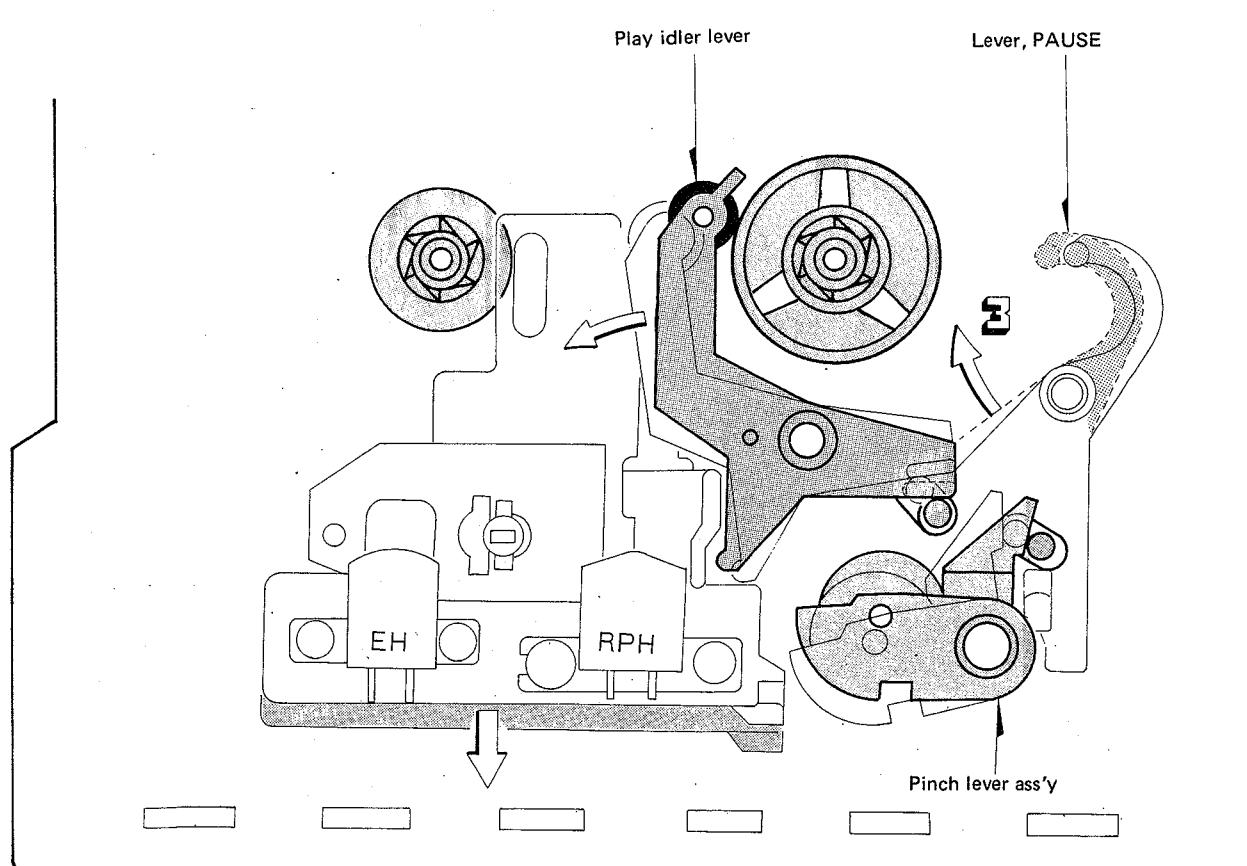
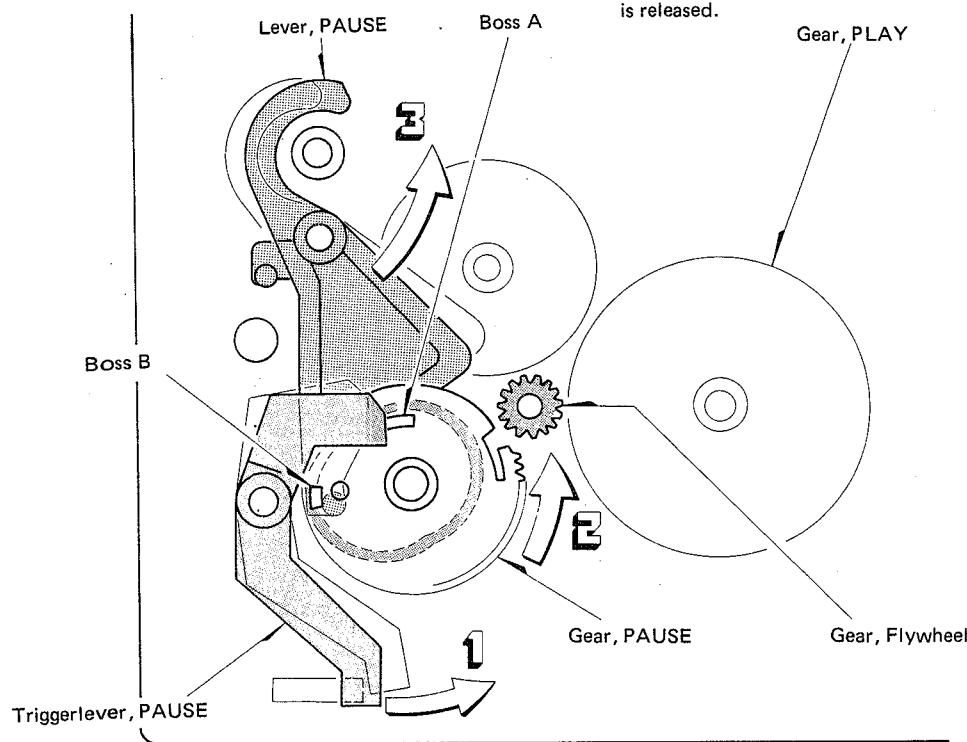


### Description of the PAUSE Operation

When the PAUSE button is pressed, the trigger lever PAUSE moves in the direction of the arrow ← (1), the boss A of the gear PAUSE is released, engages with the gear flywheel and rotates in the direction of the arrow ← (2), the boss B touches the trigger PAUSE and rotation stops.

The PAUSE lever moves in the direction of the arrow ← (3) along the cam groove of the PAUSE gear at that time. The PLAY idler lever and the pinch lever ass'y is moved to perform the PAUSE operation at that time.

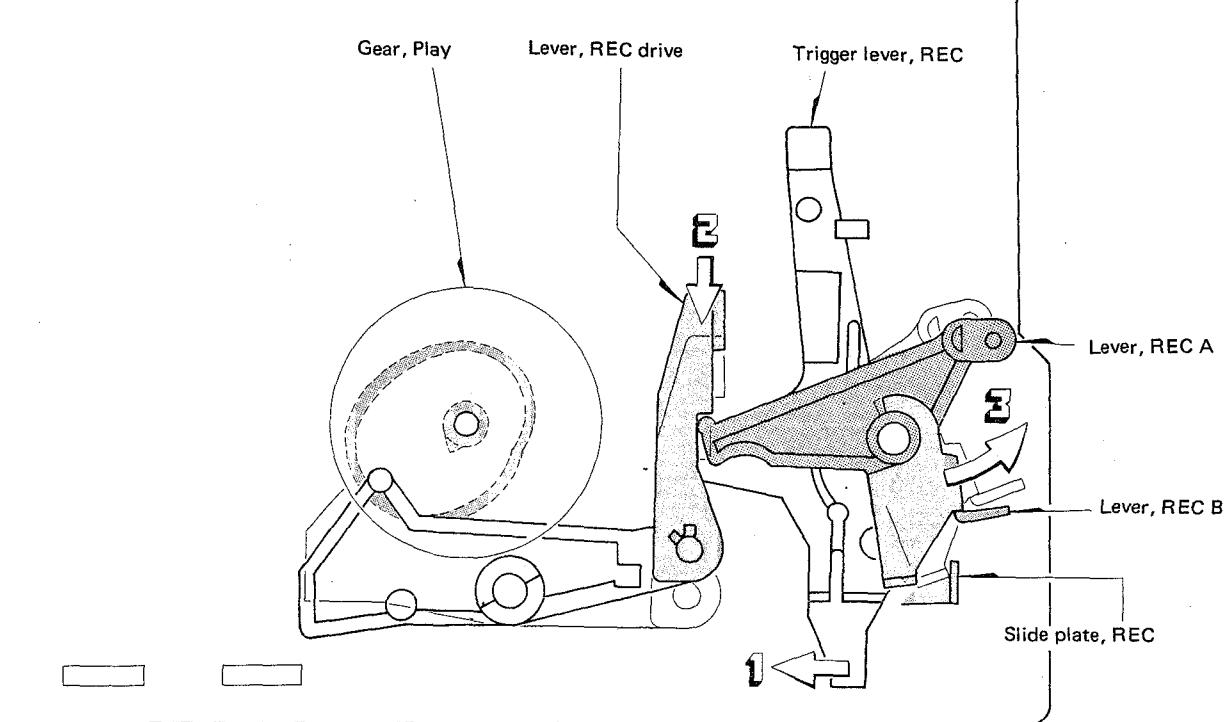
When the PAUSE button is pressed again, the button is released from locking and simultaneously the boss B of the gear PAUSE is released from the trigger lever PAUSE and the PAUSE operation is released.



### REC Operation

When the REC and PLAY buttons are pressed simultaneously, the trigger lever REC moves in the direction of the arrow ← (1). The PLAY operation is performed simultaneously at that time, so the REC lever driver moves in the direction of the arrow ← (2), pushes the lever REC A, B in the direction of the arrow ← (3), the interlocked slide REC plate pulls the rod, the slide switch is operated and the unit enters the REC mode.

When one of the STOP, FF and REW buttons is pressed, the REC trigger lever is released from the REC lever driver and only the REC operation is released.



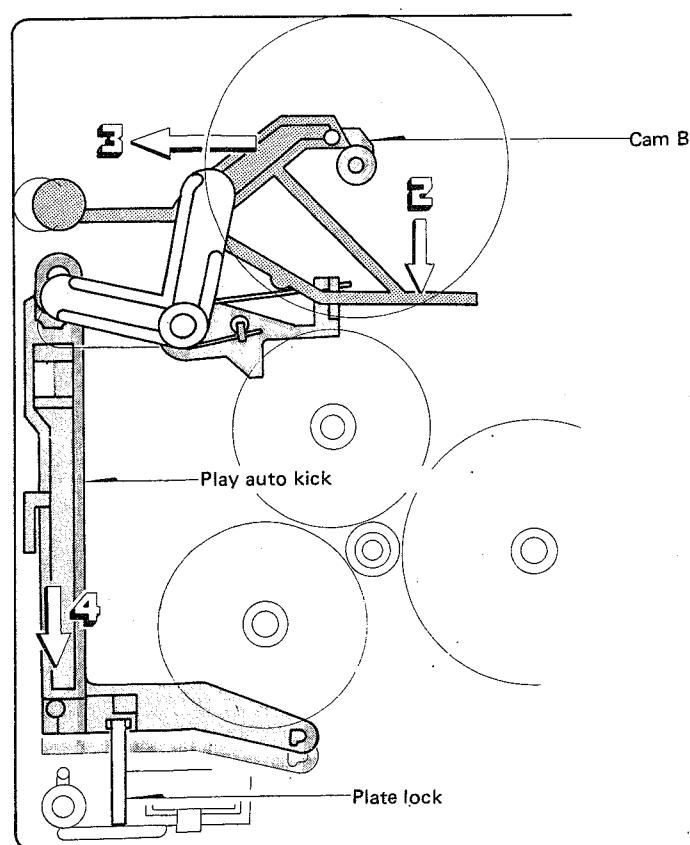
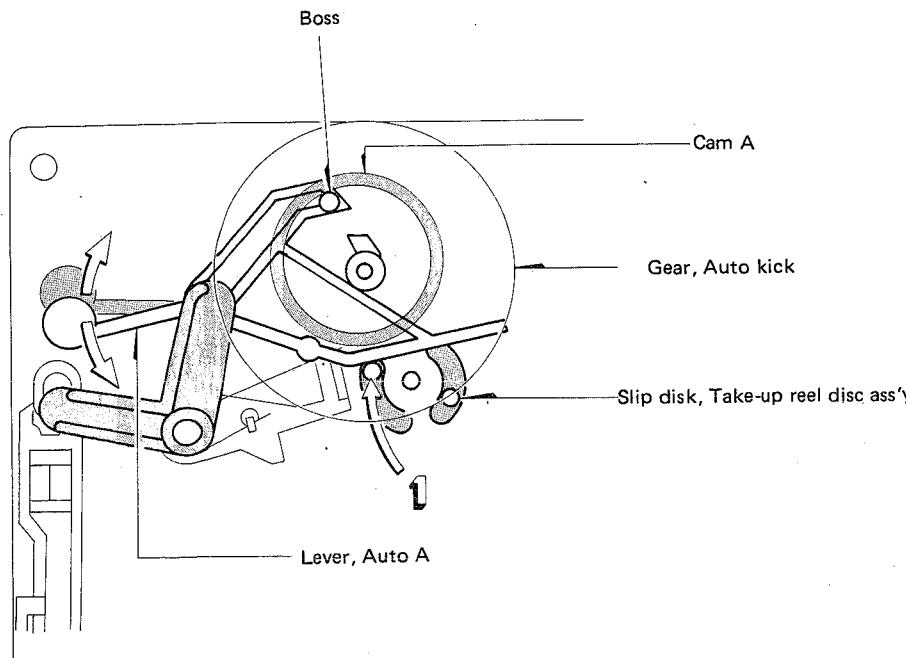
### Description of the Auto-stop Operation

The motor rotation is transmitted to the gear auto-kick of the MD-3 mechanism via the slip pulley FR ass'y.

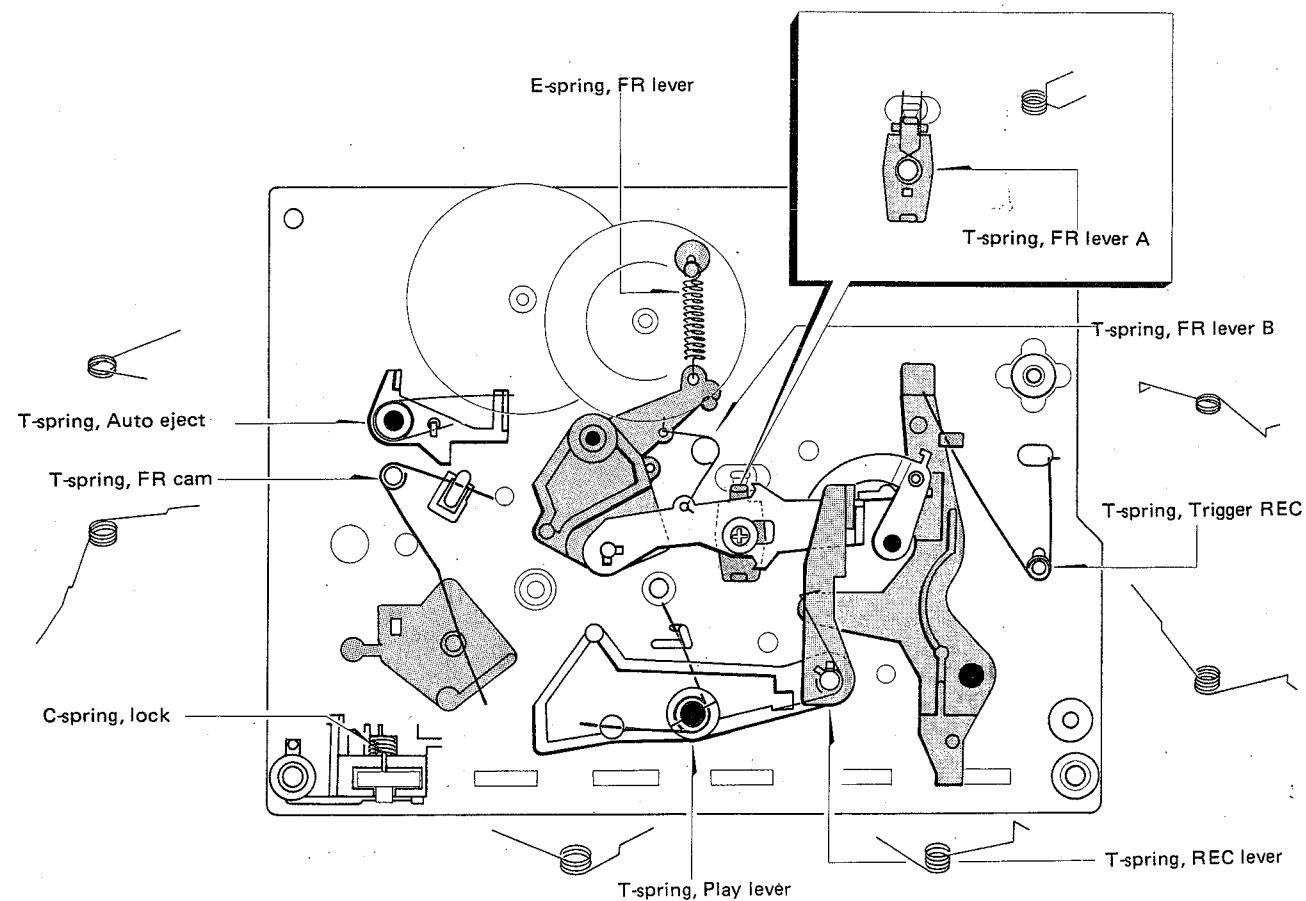
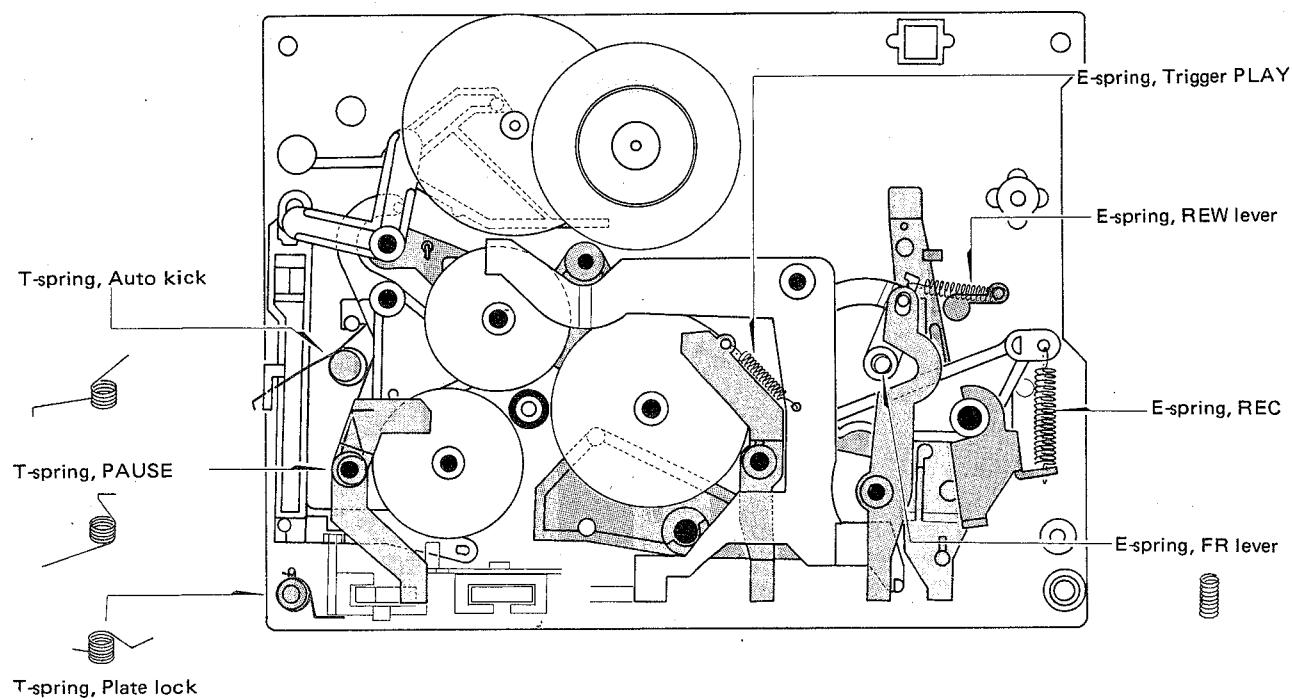
The slip disk presses the lever auto A in the direction of the arrow ← (1) when the Take-up reel disc ass'y is rotating, so the boss of the lever auto A moves along the cam (A) groove of the gear auto-kick.

When the reel discs (S, T sides) stop, the lever auto A stops in the condition being moves in the direction of the arrow ← (2).

The cam (B) of the gear auto-kick moves the lever auto A in the direction of the arrow ← (3), operates the plate auto-kick in the direction of the arrow ← (4) to release the plate lock and performs the AUTO STOP operation.



## SPRING APPLICATION POSITION



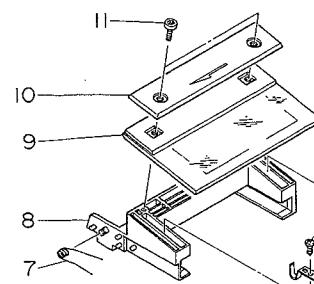
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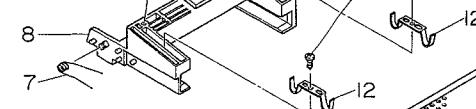
## EXPLODED VIEW-1

1 2 3 4 5 6 7

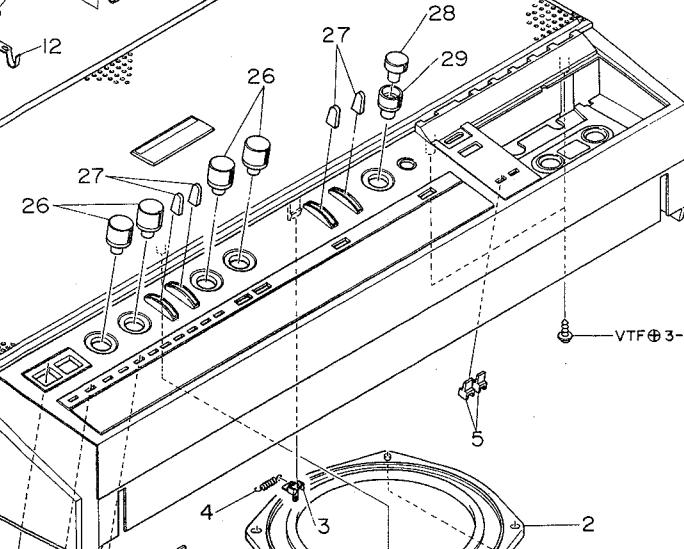
A



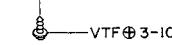
B



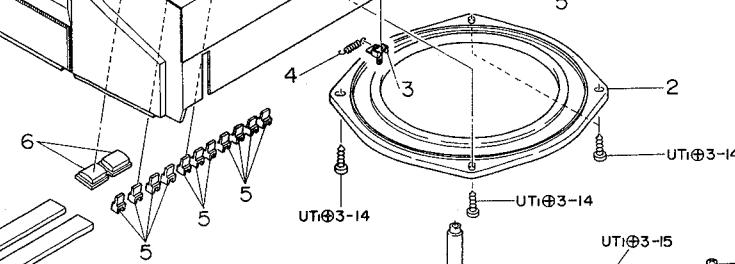
C



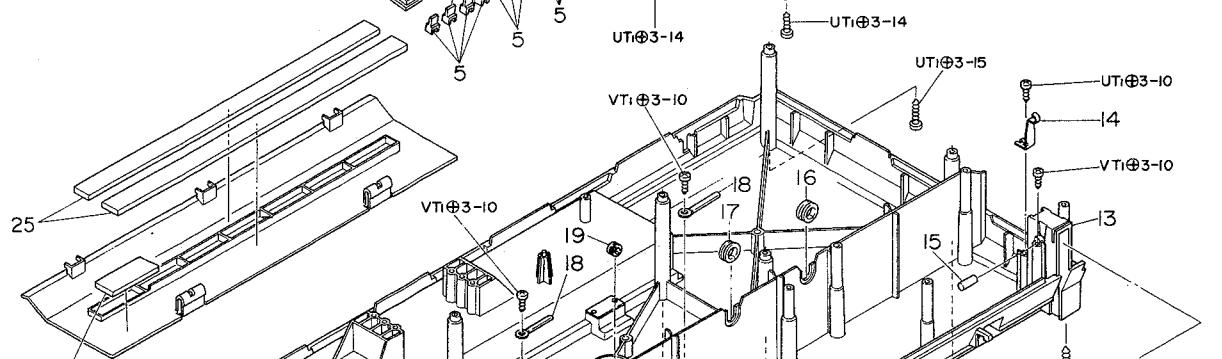
D



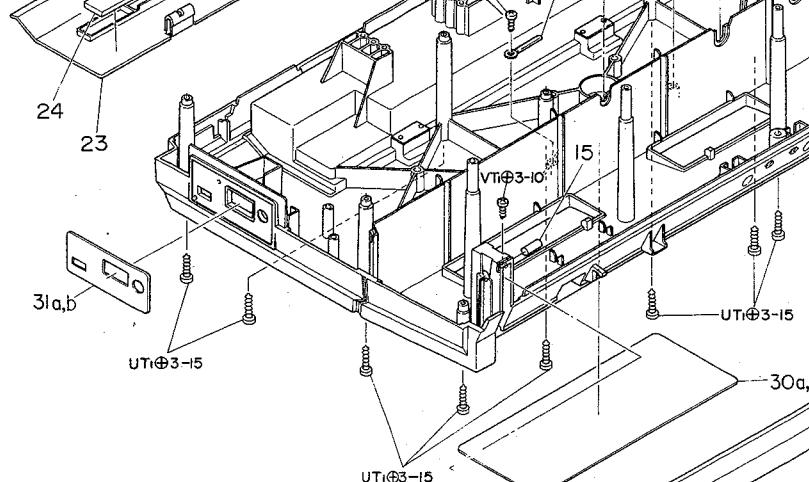
E



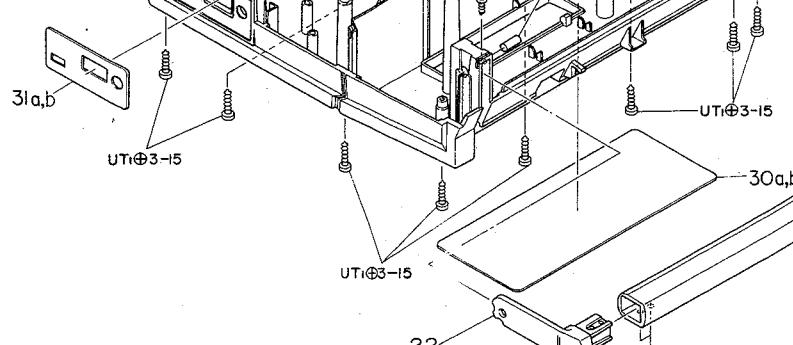
F



G



H



I



J



## MECHANICAL PARTS

## PARTS LIST

■ \* mark in this part list shows exclusive part.

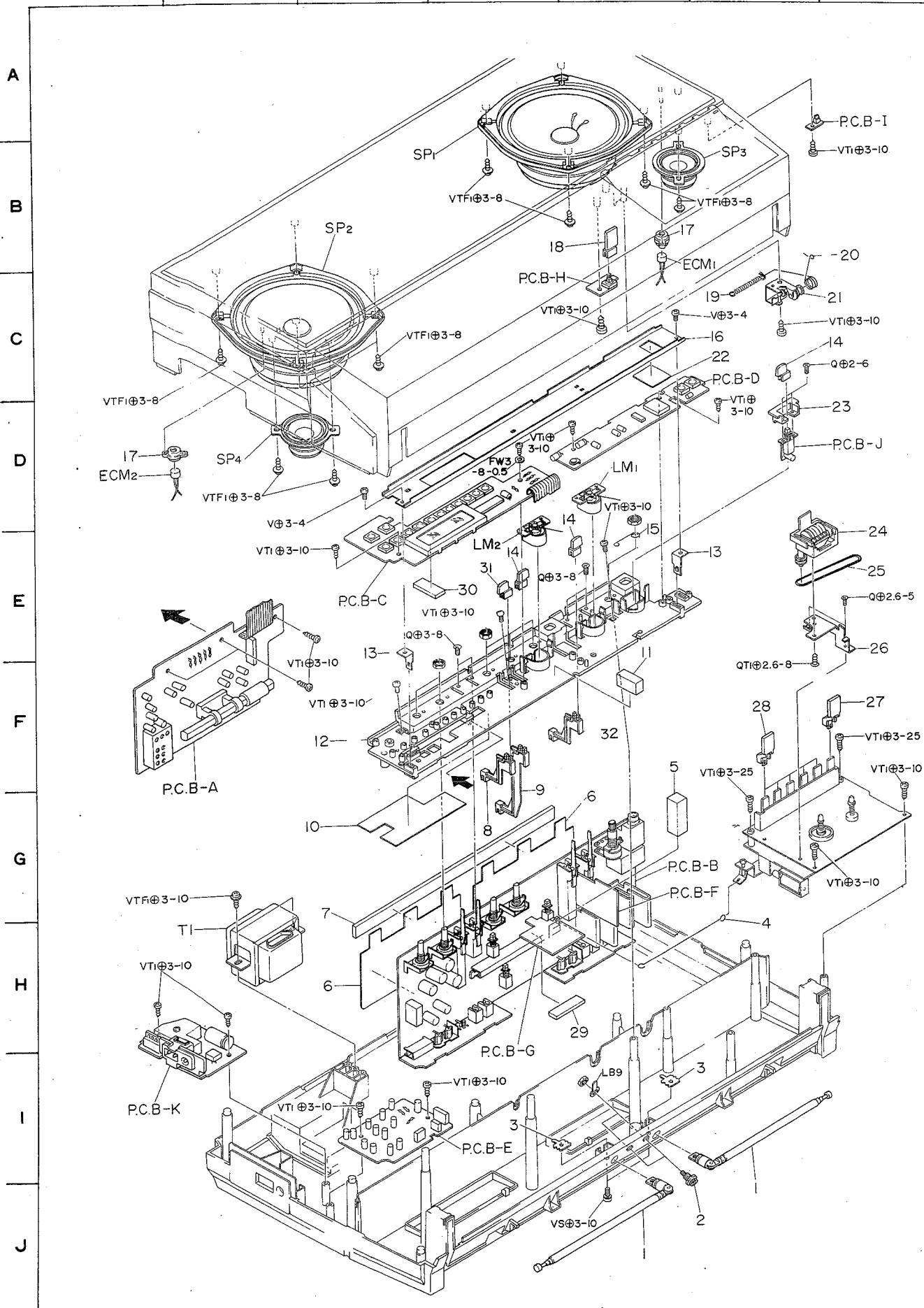
Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
1-1	09-017-850-01		Main case ass'y	*	1
	82-587-001-01		Cabinet, Main	*	1
	82-587-234-01		Damper A, Rubber	*	18
	82-587-007-01		Panching	*	1
	82-587-036-01		Badge	*	1
	82-587-009-01		Side panel R	*	1
	82-587-010-01		Side panel L	*	1
	82-587-028-01		Panel, Front	*	1
	82-563-032-01		Cassette plate	CS-990	1
	82-587-003-01		Window, Dial	*	1
	82-587-221-01		E-spring (tact)	*	1
	82-587-239-01		P-spring, Tact A	*	1
	87-321-097-21		QT <sub>1</sub> + 3 - 12	*	6
1-2	82-587-635-01		Drone cone ass'y	*	1
1-3	82-587-227-01		P-spring, Earth	*	1
1-4	82-576-241-01		E-spring, Earth	CS-350	1
1-5	82-587-020-01		Tact push-key	*	13
1-6	82-587-021-01		Push-button	*	2
1-7	82-587-218-01		T-spring, Cassette lid	*	1
1-8	82-587-202-01		Cassette box	*	1
1-9	82-587-004-01		Window, Cassette	*	1
1-10	82-587-011-01		Decorative panel, Cassette	*	1
1-11	87-081-979-01		Decorative screw 3-12		2
1-12	82-587-219-01		P-spring, Cassette holder	*	2
1-13	09-017-851-01		Back cover ass'y	*	1
	82-587-038-01		Back cover ass'y	*	1
	82-587-213-01		C-spring, Terminal A	*	1
	82-587-214-01		C-spring, Terminal B	*	1
	82-587-216-01		C-spring, Terminal C	*	1
	82-587-215-01		Terminal plate U <sub>1</sub>	*	1
	82-587-217-01		Terminal plate U <sub>3</sub>	*	1
	82-587-226-01		Sheet, Faiber	*	2
	82-277-382-01		Spring, Terminal		1
	81-235-211-01		Terminal plate D		1
	87-349-095-21		UT <sub>1</sub> + 3 - 8		1
1-14	82-534-203-01		Click plate spring R		1
1-15	82-587-212-01		Shaft, Handle	*	2
1-16	82-587-231-01		Rubber bushing 6 x 10	*	1
1-17	82-587-233-01		Rubber bushing 7 x 10	*	1
1-18	87-038-039-01		Wire binder		2
1-19	82-587-208-01		Rubber bushing 3 x 5	*	1
1-20	82-587-013-01		Handle 'L	*	1
1-21	82-587-014-01		Handle grip	*	1
1-22	82-587-012-01		Handle R	*	1
1-23	82-587-005-01		Battery room lid	*	1
1-24	82-587-237-01		M cushion 14 x 35 x 5	*	1
1-25	82-587-247-01		M cushion 7 x 281 x 7	*	2
1-26	82-587-017-01		Knob	*	4
1-27	82-563-014-01		Knob, TOGGLE	CS-990	4
1-28	82-587-023-01		Knob, VOLUME (UP)	*	1
1-29	82-587-024-01		Knob, VOLUME (DOWN)	*	1
1-30a	82-587-030-01		Name plate, Spec. (E model only)	*	1
1-30b	82-587-031-01		Name plate, Spec. (K model only)	*	1
1-31a	82-587-025-01		AC jack plate (E model only)	*	1
1-31b	82-587-041-01		AC jack plate (K model only)	*	1

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## EXPLODED VIEW-2

1 2 3 4 5 6 7

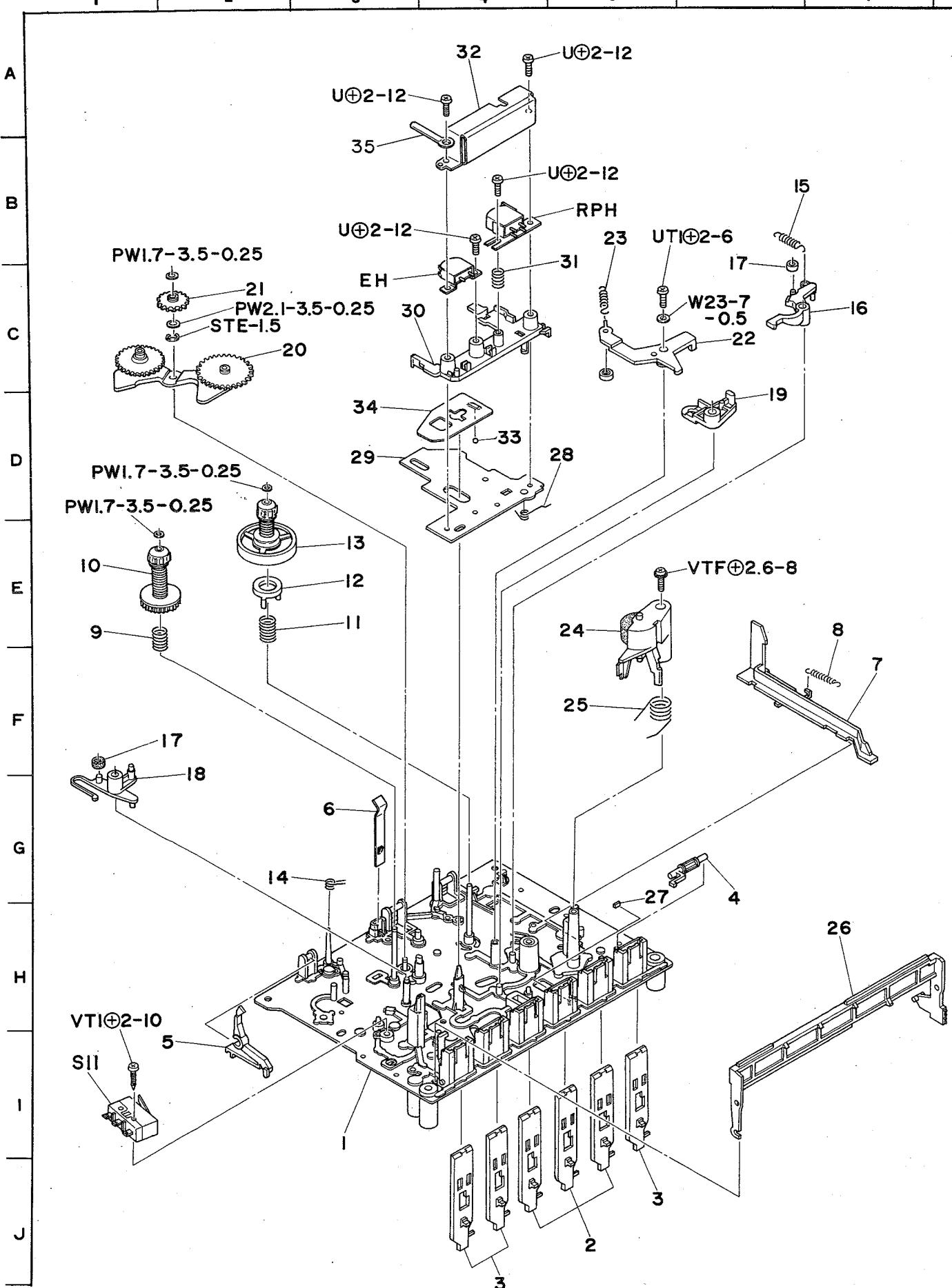


Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	
2-1	87-043-058-01		Whip antenna		2	
2-2	87-033-166-01		Antenna terminal		2	
2-3	82-587-220-01		Terminal plate, Antenna	*	2	
2-4	82-587-205-01		Rod, REC	*	1	
2-5	82-588-209-01		Cushion 15 x 15 x 41	CS-770	1	
2-6	82-587-242-01		Sheet, Fiber A	*	2	
2-7	82-587-211-01		Cushion, Battery	*	1	
2-8	82-587-225-01		Rod 37.8	*	1	
2-9	82-587-206-01		Rod 87.8		1	
2-10	82-587-608-01		Shield, Front		1	
2-11	82-587-238-01		Rubber cushion 10 x 25 x 14		1	
2-12	82-587-201-01		Chassis		1	
2-13	82-587-207-01		Holder, Dial plate		2	
2-14	82-162-037-01		Push-button B <sub>2</sub>	AD-R500	3	
2-15	82-588-634-01		Earth, REC	CS-770	1	
2-16	82-587-008-01		Dial plate (Silver)	*	1	
2-17	87-064-084-01		Holder, ECM 30		2	
2-18	82-587-019-01		Push-key, REC mute	*	1	
2-19	82-563-247-01		E-spring, Air-damp	CS-990	1	
2-20	87-096-045-01		String, Dial		1	
2-21	87-078-003-01		Air-damp unit ass'y		1	
2-22	82-587-240-01		LED reflector	*	1	
2-23	82-587-224-01		Holder, Switch	*	1	
2-24	87-040-143-01		Counter		1	
2-25	82-587-209-01		Rubber belt	*	1	
2-26	82-587-203-01		Holder, Counter	*	1	
2-27	82-587-037-01		Push-key, REC	*	1	
2-28	82-587-018-01		Push-key, Tape recorder	*	5	
2-29	82-588-208-01		Rubber cushion 33-6-3	CS-770	1	
2-30	87-063-113-01		Cushion WA		2	
2-31	82-587-049-01		Push-button, DSL	*	1	
2-32	82-587-254-01		Rod 38.3	*	1	

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**EXPLODED VIEW-3**



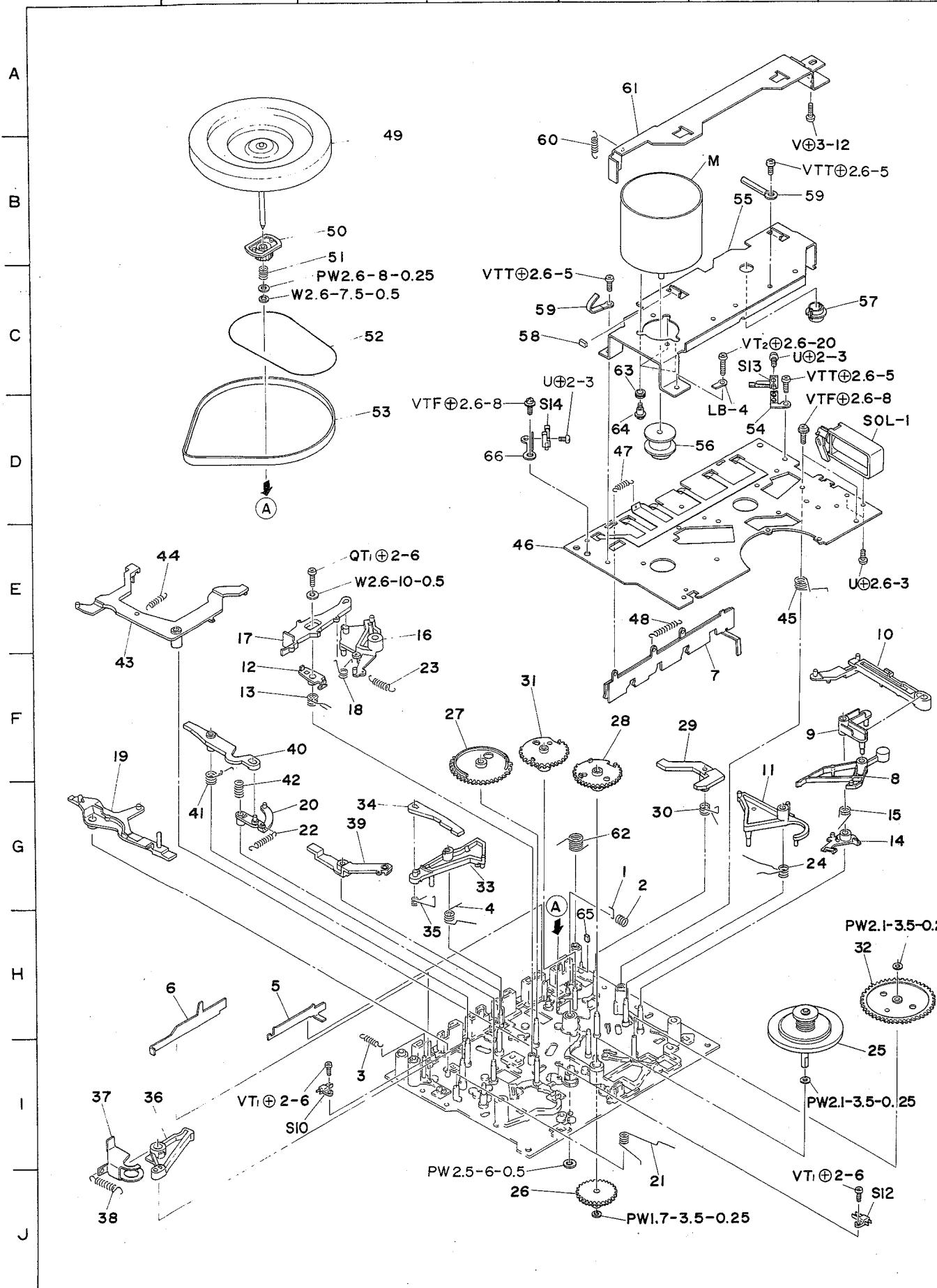
Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
3-1	82-585-325-01		Outsert chassis		1
3-2	82-585-277-01		Plate button, FR		3
3-3	82-585-337-01		Plate button, REC		3
3-4	82-585-279-01		Lever A, Eject		1
3-5	82-585-255-01		REC blocking lever		1
3-6	82-585-319-01		P-spring, Cassette pressure		1
3-7	82-585-254-01		Slide plate, Eject		1
3-8	82-585-311-01		E-spring, Lid lock		1
3-9	82-585-290-01		C-spring, Back tension		1
3-10	82-585-215-01		Supply reel platform ass'y		1
3-11	82-585-292-01		C-spring, Slip disk		1
3-12	82-585-272-01		Slip disk T		1
3-13	82-585-210-01		Take-up reel platform ass'y		1
3-14	82-585-294-01		T-spring, Center shift		1
3-15	82-585-312-01		E-spring, Brake R		1
3-16	82-585-253-01		Lever, Brake R		1
3-17	82-585-286-01		Rubber cushion, Brake		2
3-18	82-585-252-01		Lever, Brake L		1
3-19	82-585-265-01		REV lever		1
3-20	82-585-231-01		FR lever ass'y		1
3-21	82-585-235-01		Gear A, REW		1
3-22	82-585-223-01		Play idler lever ass'y		1
3-23	82-585-313-01		F-spring, Play idler		1
3-24	82-585-364-01		Pinch lever B ass'y		1
3-25	82-585-296-01		T-spring, Pinch lever		1
3-26	82-585-340-01		Plate lock ass'y		1
3-27	82-585-338-01		Rubber cushion, Play lever		1
3-28	82-585-295-01		T-spring, Actuating		1
3-29	82-585-208-01		Actuating chassis		1
3-30	82-585-209-01		Head base		1
3-31	82-585-291-01		C-spring, RPH		1
3-32	82-588-628-01		Shield plate	CS-770	1
3-33	87-073-005-01		Steel ball 2φ		1
3-34	82-585-284-01		P-spring, Actuating		1
3-35	87-038-056-01		Wire binder		1

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## EXPLODED VIEW-4

1 2 3 4 5 6 7



Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty
4-1	82-585-289-01		Shaft lock		1
4-2	82-585-285-01		C-spring lock		1
4-3	82-585-317-01		E-spring, Button lock		1
4-4	82-585-306-01		T-spring, Play lever		1
4-5	82-585-283-01		Slide plate, FR auto		1
4-6	82-585-282-01		Slide plate, Motor switch		1
4-7	82-585-327-01		Slide plate key ass'y		1
4-8	82-585-268-01		Auto A lever		1
4-9	82-585-269-01		Auto B lever		1
4-10	82-585-270-01		Plate auto kick		1
4-11	82-585-248-01		Lever, PAUSE		1
4-12	82-585-264-01		FR lever D		1
4-13	82-585-297-01		T-spring, FR lever A		1
4-14	82-585-271-01		Auto eject lever		1
4-15	82-585-299-01		T-spring, Auto eject		1
4-16	82-585-262-01		FR lever B		1
4-17	82-585-263-01		FR lever C		1
4-18	82-585-298-01		T-spring, FR lever B		1
4-19	82-585-261-01		Trigger lever, REC		1
4-20	82-585-260-01		Lever, REW		1
4-21	82-585-303-01		T-spring, Trigger (REC)		1
4-22	82-585-308-01		E-spring, REW lever		1
4-23	82-585-341-01		E-spring, FR lever		1
4-24	82-585-300-01		T-spring, FR cam		1
4-25	82-585-217-01		Slip pulley FR ass'y		1
4-26	82-585-216-01		Drive gear		1
4-27	82-585-244-01		Play cam gear		1
4-28	82-585-245-01		FR cam gear		1
4-29	82-585-256-01		Trigger lever, PAUSE		1
4-30	82-585-304-01		T-spring, Trigger (PAUSE)		1
4-31	82-585-246-01		Gear, PAUSE		1
4-32	82-585-247-01		Gear, Auto kick		1
4-33	82-585-249-01		PLAY lever		1
4-34	82-585-250-01		Lever, REC drive		1
4-35	82-585-307-01		T-spring, REC lever		1
4-36	82-585-266-01		REC A lever		1
4-37	82-585-267-01		REC B lever		1
4-38	82-585-314-01		E-spring, REC		1
4-39	82-585-258-01		Trigger lever, PLAY		1
4-40	82-585-259-01		Trigger lever, REW		1
4-41	82-585-308-01		T-spring, REW lever		1
4-42	82-585-331-01		C-spring, REW lever		1
4-43	82-585-257-01		FF trigger lever		1
4-44	82-585-301-01		E-spring, Trigger PLAY		1
4-45	82-585-321-01		T-spring, Auto kick		1
4-46	82-585-203-01		Mechanism chassis B ass'y		1
4-47	82-585-315-01		E-spring, Slide plate		1
4-48	82-585-332-01		E-spring, REC lock		1
4-49	82-585-229-01		Flywheel ass'y		1
4-50	82-585-243-01		Gear, Flywheel		1
4-51	82-585-324-01		C-spring, Flywheel		1
4-52	82-585-336-01		Rubber belt FR B		1
4-53	82-585-287-01		Rubber belt, Flywheel		1
4-54	82-585-323-01		Holder, Pause switch		1
4-55	82-585-281-01		Holder, Motor		1
4-56	82-585-242-01		Motor pulley		1
4-57	82-585-326-01		Thrust bearing B		1
4-58	82-588-206-01		Rubber cushion, REC lever	CS-770	1
4-59	87-038-039-01		Wire binder		1
4-60	82-587-241-01		E-spring, Slide plate	*	1
4-61	82-587-228-01		Slide plate REC ass'y	*	1
4-62	82-585-335-01		T-spring, Plate lock		1
4-63	87-087-029-01		Rubber cushion		3
4-64	87-081-483-01		Motor screw, M2.6		3
4-65	82-585-342-01		Rubber cushion, PAUSE lock		1
4-66	82-587-232-01		Holder, REC switch	*	1



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### 2-2. Operation During AM Reception

When  $f_s = 594$  kHz is received:

$$f_s = 594 \text{ kHz and } f_{IF} = 450 \text{ kHz}$$

$$\text{Therefore: } f_{osc} = 594 + 450 = 1044 \text{ kHz}$$

$$\text{Since } f_{ref} = 9 \text{ kHz (or } 10 \text{ kHz}), (\text{at LW } f_{ref} = 1 \text{ kHz})$$

$$4.5 \text{ MHz} \div 9 \text{ kHz} = 500$$

$$f_{osc} (1044 \text{ kHz}) \div 9 \text{ kHz} = 116$$

Therefore, the crystal oscillator frequency division is locked at 500 and that of the programmable counter at 116.

### 3. Description of ICs Used

Fig. 3 is a block diagram of the ICs in the PLL frequency synthesizer section and LCD indicator section.

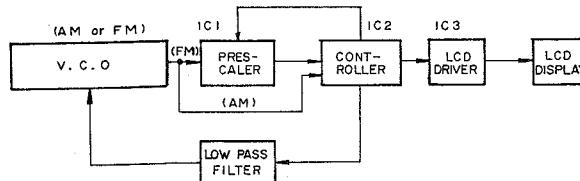


Fig. 3

#### 3-1. Prescaler $\mu$ PB553AC

This IC is energized during FM reception, it selects either the 1/16 or 1/17 frequency division ratio in accordance with the command from the swallow counter inside the controller, and it sends the signal to the controller's programmable divider.

##### 3-1-1. Pin Configuration

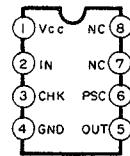


Fig. 4

Pin no.	Name	Function
1	$V_{cc}$	Power supply
2	IN	VCO input pin
3	CHK	Check pin, connected to GND at all times
4	GND	Ground
5	OUT	Output pin
6	PSC	Frequency division ratio setting pin (frequency division setting input from controller)
7	NC	Not used
8	NC	Not used

#### 3-2. Controller $\mu$ PD1703C-515

Contained in this IC are the conventional programmable divider section and control section.

##### 3-2-1. Pin Configuration

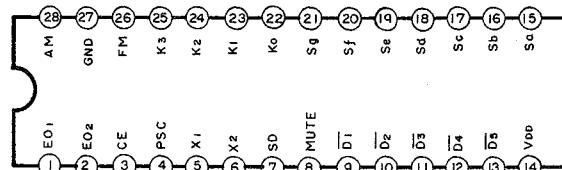


Fig. 5

Pin no.	Name	Function
1, 2	EO1, EO2	Charge pump output pins of phase detector; since signals are fed out during AM/FM reception, one or other is connected to LPF.
3	CE	High: Normal operation Low: Memory held, operation stops
4	PSC	Feeds out frequency division ratio switching signal to prescaler.
5, 6	X1, X2	Crystal oscillator pins
7	SD	High: Auto tuning stop mode Low: Auto tuning enable mode
8	MUTE	Feeds out high level signal during key operation. (Used for muting of signal system)
9~13	$\overline{D}1 \sim \overline{D}5$	Display digit signal output pins Only D1 and D2 are used with this unit and are connected to LCD driver.
14	$V_{DD}$	Power supply pin
15~21	$S_a \sim S_g$	Key matrix key return signal source pins
22~25	$K_0 \sim K_3$	Key matrix key return signal input pins
26	FM	Input pin for FM prescaler output
27	GND	Ground
28	AM	AM $f_{osc}$ input pin

##### 3-2-2. Key Matrix Functions

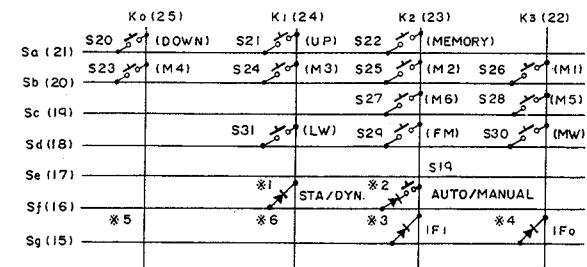


Fig. 6

- The function in parentheses is displayed by key operation based on a momentary switch (marked  $\frac{1}{\text{so}}$ ).
- **Manual/auto selection (\*1)**  
Manual/auto selection is performed by a fixed switch but in this unit the key operations are carried out with momentary switches which, thanks to the flip-flop circuit, have the same functions as fixed switches.
- When connected: Auto tuning  
When disconnected: Manual tuning
- **LCD static/dynamic selection (\*2)**  
This determines whether the LCD display system should be static or dynamic. In this unit, static specifications apply and so the diode is shorted.
- **IF frequency selection (\*3, \*4)**  
Alignment is made with the FM IF frequency by  $IF_1$  and  $IF_2$  shorting and open combinations. The IF frequencies used by this unit are 10.675 MHz, 10.700 MHz and 10.725 MHz and so the combinations appear as follows:

IF offset frequency	IF <sub>1</sub>	IF <sub>0</sub>
10.675 MHz (blue)	Open	Shorted
10.700 MHz (red)	Open	Open
10.725 MHz (orange)	Shorted	Shorted

Color of ceramic filter indicated in parentheses.

### Japan/US use selection (\*5)

When connected: US specifications

When disconnected: Japan specifications

### • AM frequency interval selection (\*6)

The AM channel frequency intervals are selected to 10 kHz or 0.1 kHz.

When connected: 10 kHz

When connected: 10 kHz

### 3-3 LCD driver (MSM5829GS)

Indication is provided on the LCD by connecting the three serial output data from the controller ( $\mu$ PD1703C-515)

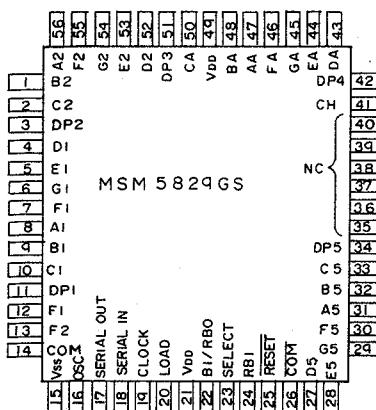


Fig. 7

Pin no.	Name	Function
8, 9, 10, 4 5, 7, 6, 56, 1, 2, 52 53, 55, 54 31, 32, 33, 27 28, 30, 29 47, 48, 50, 43 44, 46, 45 12, 13 11, 3, 51, 42, 34, 41	SEGMENT OUT A1, B1, C1, D1 E1, F1, G1 A2, B2, C2, D2 E2, F2, G2 A5, B5, C5, D5 E5, F5, G5 AA, BA, CA, DA EA, FA, GA F1, F2 DP1, DP2, DP3, DP4, DP5 CH	LCD segment output pins (see Fig. 8*)
15	V <sub>SS</sub>	Ground Pin
16	OSC	LCD AC drive frequency pin; with this unit, the circuit is con- figured as below.
17	SERIAL OUT	Not used
18	SERIAL IN	Data indicated with shift regis- ter data input pins are fed into this pin in synchronization with clock pulses. (Connected to pin 19 of controller IC)
19	CLOCK	Sync. input pin when data is fed into, or fed out of shift register. (Connected to pin 9 of control- ler IC)
20	LOAD	Input pin for latching shift register contents. High: Shift register contents are transmitted to decoder. Low: Final contents at high level are held (Connect- ed to pin 10 of controller IC)
21, 49	V <sub>DD</sub>	Power supply pin
22	BI/RBO	Not used
23	SELECT	This function is not used and so pin is always at high level or, in other words, it is connected to V <sub>DD</sub> .
24	RBI	Pin for determining whether or not leftmost display digit is to indicate a numeral or not. In this unit, it displays only signifi- cant figures and so it is used at the low level, or in other words, it is connected to V <sub>SS</sub> (ground).
25	RESET	Pin for switching display to segment or dot; since segment is used in this unit, it is set to high level or, in other words, it is connected to V <sub>DD</sub> .
26	COM	This pin feeds out an output with the reverse phase to that of COM. In this unit, it is not used for direct display but for AM and FM +B selection as men- tioned later.
14	COM	This pin feeds out a signal with the reverse phase to that of out- put and 7 segments for AC drive of the LCD; it drives the LCD common pin.
35, 36, 37 38, 39, 40		Not used

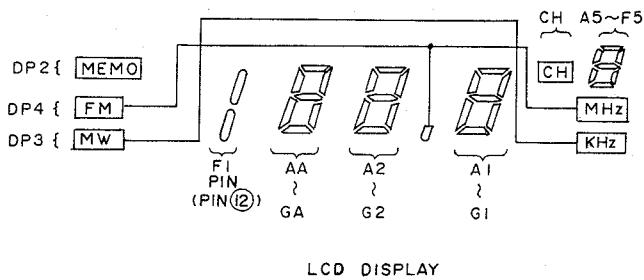


Fig. 8

#### 4. Other Circuits

#### 4-1. FM/AM +B Power Selector Circuit

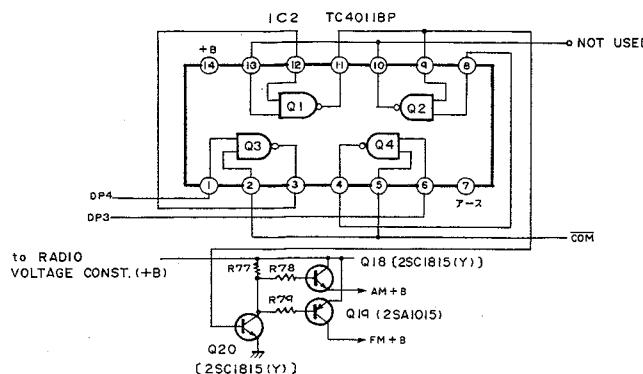
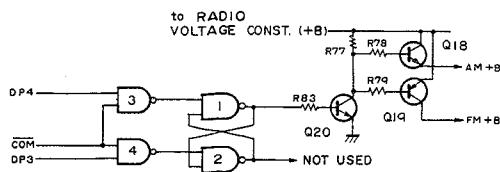


Fig. 9



Switching is performed with a 4-NAND gate IC (IC2)

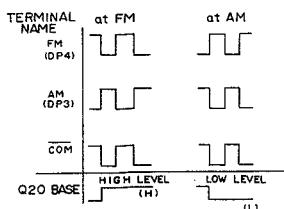


Fig. 10

When the FM band selector key is depressed, pulses with the same phase are fed out to IC3 (MSG5829G) DP4 and COM. As this output passes through the NAND gate IC (TC4011BP), a high level output is produced at NAND gate 1 output and this causes Q20 to turn ON. As a result, Q19 turns ON and the FM +B is obtained. With AM reception, no output appears at DP4, the NAND gate 1 output is set to the low level and with Q20 OFF, Q18 turns ON and the AM +B is obtained.

#### 4-2. Scan Auto Stop Circuit

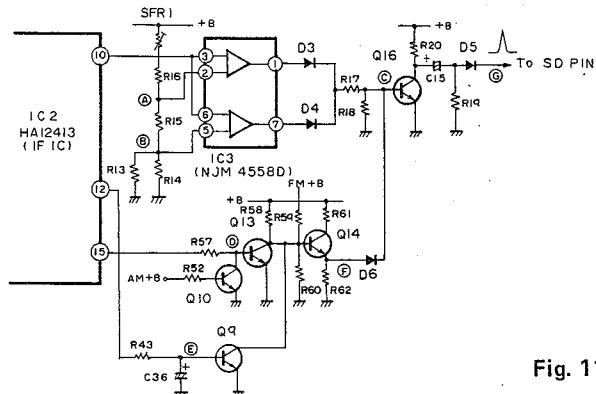


Fig. 11

#### 4-2-1. Operation During FM Reception

The S-curve output pin 10 and meter output pin 15 of IF IC (IC2, HA12413) are used. If pin 10 has a voltage where  $V(B) < V(10) < V(A)$  with respect to the preset point A and point B voltages (about  $\pm 0.5$  V with respect to pin 10 voltage during tuning), no output appears at point (C) and when there is an output at pin 15, point (F) is set to a low level and no signal is fed out to point (C). A trigger pulse is produced at point (G) by the above two AND circuits, this is applied to the SD pin of the controller IC and the scanning is stopped.

#### 4-2-2. Operation During AM Reception

The IF output from pin 12 is smoothed and point (F) is reduced to the low level by the output. As with FM reception, a trigger pulse is produced at point (G) and the scanning stops. [IC3 (NJM4558D) does not work during AM reception.]

## 5. Dynamic Super Loudness (DSL) Circuit

If the DSL circuit is compared with the loudness circuit, it is seen that both function to boost the low-range (bass) and high-range (treble) frequencies with respect to the midrange frequencies but there are the following major differences.

## 5-1. Characteristics

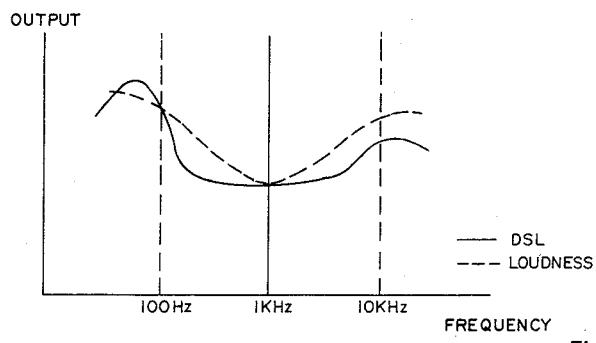


Fig. 12

The loudness system functions to boost the midrange frequencies too. However, the DSL system keeps this increase down to the bare minimum.

With the loudness system, the characteristics do not change with the strength of the signal entering the volume control for providing a tape in the control [normally scale unit 5 (center position)], and the volume control's tap position is mechanical,

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meaning that the characteristics change. At a scale position lower than the volume control's tap position, the loudness characteristics are provided regardless of the strength of the sound level and, in contrast, even when the sound level is low, the effect is impaired by the control's scale position.

However, the DSL system judges the strength of the sound level by electrical means and features a configuration which produces dynamic super loudness characteristics.

### 5-2. DSL Circuit Configuration

The DSL circuit comprises the equalizer circuit which produces the DSL characteristics, the detector circuit which judges the strength of the sound level and the control circuit which suppresses the DSL characteristics when the sound is high.

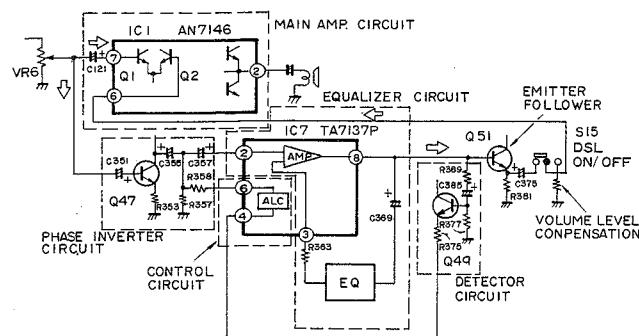


Fig. 13

#### 5-2-1. Equalizer Circuit

An ordinary direct-coupled amplifier feedback circuit (T-type bridge circuit) is provided with time constants, and its characteristics generated.

Two T-type bridge circuits are connected in series and the time constants are divided into the left side for bass [R361, 359, C359, 361] and right side for treble.

The characteristics of each of the twin filters connected to pins 3 and 8 of IC351 (TA7137P) are attenuated by frequency  $f_1$  determined by constants R1, R2 and C1.

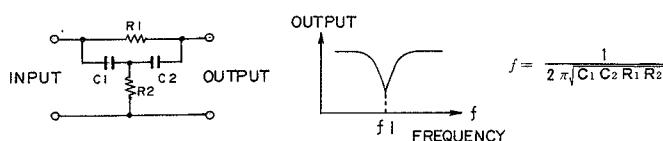


Fig. 14

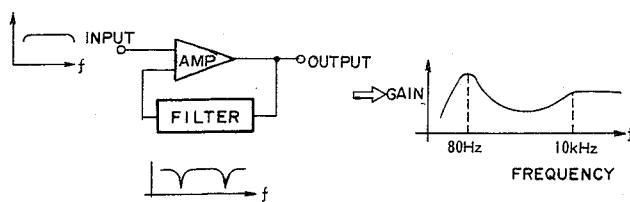


Fig. 15

#### 5-2-2. Detector Circuit

The level of this circuit is set by the frequency division ratio of two resistors.

#### 5-2-3. Control Circuit

This circuit is the same as an ALC circuit used for normal recording although it differs in that its attack time and recovery time are extremely short.

Because of the boosted level, the output must be not distorted. When a signal exceeding a certain fixed level is fed out, it is taken out by the Q49 emitter, the IC7 ALC circuit functions and the input of pin 2 is controlled.

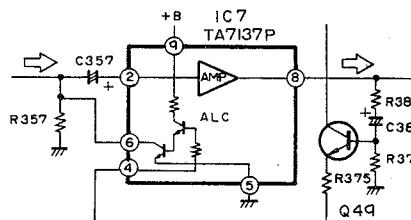


Fig. 16

The DSL circuit with the above-mentioned configuration is mixed with a main amplifier. The IC1 (AN7146) input has a differential amplifier configuration, and when a flat signal enters transistor Q1 at one side of the differential amplifier from the volume control, a flat signal also enters the DSL circuit simultaneously. Q2 is basically a negative feedback pin but when the output (signal with DSL characteristics) of the DSL circuit is fed into the Q2 input, differential operation is provided by Q1 and Q2.

The DSL block input transistor Q47 is used to invert the phase. As a result, the phase is inverted at the DSL block input and output sides and so the differential operation of Q1 and Q2 becomes a mixing operation. Meanwhile, the feedback from the output inside IC7 does not change and negative feedback operation results.

When the signal level is low in Fig. 13, there is a high degree of mixing by Q1 and Q2 inside IC1 so that the DSL feeds out a strong signal, and the bass and treble are greatly boosted. However, when the signal level is high, the DSL block output is suppressed, the amount of mixing by Q1 and Q2 inside IC1 is reduced, and since the Q2 input is reduced to a fraction, almost all of it becomes the signal fed in from Q1.

The resistor inserted across the ground and OFF side pin of the DSL ON/OFF switch functions to compensate for the difference in the volume when the switch is selected.

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## ACCESSORIES/PACKAGE

Ref. No.	Part No.	Part No. Changed to	Description	Common Model	Q'ty	
1	82-587-855-01		Printed indiv., Packing	*	1	
2	82-587-852-21		Cushion L, Printed indiv.	*	1	
3	82-587-853-21		Cushion R, Printed indiv.	*	1	
4	87-051-137-11		Poly-vinyl sack		1	
5	87-056-626-01		Poly-vinyl sack		1	
6a	82-587-908-01		Instructions booklet (E model only)	*	1	
6b	82-587-909-01		Instructions booklet (K model only)	*	1	
7	82-587-907-01		Sticker, POP	*	1	
8	87-051-171-11		Poly-vinyl sack (for instruction)		1	
9	87-056-009-41		Distributors list		1	
10	87-056-008-11		Label, AC power cord (K model only)		1	
11	87-056-016-01		Tag, Main voltage (K model only)		1	
12	82-916-740-01		Tape cassette, DMC-164		1	
13a	87-034-883-01		AC power cord (E model only)		1	
13b	87-034-871-01		AC power cord (K model only)		1	

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## ELECTRICAL MAIN PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description	Symbol No.	Part No.	Description	Symbol No.	Part No.	Description	Symbol No.
<b>&lt; TUNER CIRCUIT BOARD SECTION &gt;</b>												
PCB-A	82-587-611-21	Tuner circuit board	O39,40	89-318-155-01	Transistor, 2SC1815 (GR)	C77,78	87-015-313-01	0.33μF 10V Aluminum solid	PIN-3	87-049-034-01	Pin, 4P	S12
CP1	82-587-626-11	FM front end	Q41	89-318-464-01	Transistor, 2SC1846 (R)	PCB-C	82-587-604-11	Control circuit board	C361,362	87-015-311-01	< Capacitors >	S13
④IC1	87-027-752-01	IC, 553AC	Q43	89-322-364-01	Transistor, 2SC2236 (Y)	④IC1	87-027-750-01	IC, μPD1703C514	C359,360	87-015-313-01	0.1μF 10V Aluminum solid	CON-4
IC2	87-027-734-01	IC, HA12413	Q45,46	89-320-011-21	Transistor, 2SC2001 (K,L)	④IC2,4	87-027-564-01	IC, TC4011BP	④IC3	87-027-751-01	0.33μF 10V Aluminum solid	CON-3
IC3	87-027-235-01	IC, NJM4558D	D1,2,7,8,	87-027-097-01	Diode, 1S1555	Q1,2,3,4	89-318-154-01	Transistor, 2SC1815 (Y)	④IC3	87-027-751-01	IC, MSM5829GS	CON-2
IC4	87-027-430-11	IC, LA3361	9,10,11,12,			Q5	89-500-303-01	FET, 2SK30 (O)	Q1,2,3,4	89-318-154-01	Transistor, 2SC1815 (Y)	CON-1
Q1	89-319-233-01	Transistor, 2SC1923 (O)	13,17,18,19,			D1,2,3,4,	87-027-097-01	Diode, 1S1555	Q5	89-500-303-01	FET, 2SK30 (O)	
Q2	89-303-803-01	Transistor, 2SC380 (O)	352			5,6,7,11,			D1,2,3,4,	87-027-097-01	Diode, 1S1555	
Q3,4,5,7,	89-318-154-01	Transistor, 2SC1815 (Y)	8,9,10,11,			12,13,14,15,			5,6,7,11,	87-027-097-01	Diode, 1S1555	
13,14,15,16,			13,14,15,16,			16,17,18,19,			12,13,14,15,	87-027-097-01	Diode, 1S1555	
18,20,21,22,			25,26,27			20,21,22,23,			16,17,18,19,	87-027-097-01	Diode, 1S1555	
25,26,27						24,25,26			20,21,22,23,	87-027-097-01	Diode, 1S1555	
Q6,23,24	89-318-156-01	Transistor, 2SC1815 (BL)	L7,9,13,14,17			D27,29	87-027-716-01	LED, GL-PPR22 (AUTO OPERATE/FM STEREO)	Q1,2,3,4	89-318-154-01	Transistor, 2SC1815 (Y)	
Q12,19	89-110-154-01	Transistor, 2SA1015 (Y)	L8	82-491-661-01	Choke coil, 600μH	D28	87-027-758-01	LED, GL-9PG22 (DOLBY-NR)	D30	82-587-603-01	LCD (FREQUENCY INDICATOR)	C1,2
Q17	89-403-135-01	Transistor, 2SD313 (E)	L11,12	87-003-051-01	Choke coil, 470μH	X1	87-030-083-01	Crystal resonator	S19,20,21,	87-031-498-01	Push-switch (TUNING, DOWN, UP, MEMORY, 1,2,3,4,5,6, FM, MW, LW)	
D1,2	87-027-753-01	Diode, KV1236Z	L15,16	87-005-088-01	Coil, 5.6mH	PL1,2	82-587-605-01	Pilot lamp	PL1,2	82-587-606-01	Electric conduction rubber	
D3,4,5,6,	87-027-097-01	Diode, 1S1555	CP1	82-587-641-11	Bias OSC unit							
7,8,9,11			LPF1	87-030-070-01	Low-pass filter							
D10	87-027-431-01	Zener diode, RD6.2EB2	J1,2,3,4,6	82-587-633-01	Jack plate ass'y (PHONO, MIC-L,R, PLAYER SYNC)							
L1,10,11,13	87-003-051-01	Choke coil, 470μH	J5, S34	87-049-059-01	DIN jack w/switch (DIN)							
L2	87-005-121-01	FM coil	J7,8	82-587-632-01	Jack plate ass'y (EXT SP-L,R)							
L3,4	82-587-680-01	MW/LW bar antenna coil	J9	87-049-043-01	Jack, 6.3φ (PHONES)							
L5	82-755-607-01	MW OSC coil	VR1	87-021-671-01	Volume, 50kΩ-A (REC VOLUME)							
L6	82-587-681-01	LW OSC coil	VR2,3	87-021-668-01	Volume, 50kΩ-A (BASS, TREBLE)							
L7,8	87-005-126-01	Coil, 1mH	VR4	87-021-669-01	Volume, 100kΩ-W (BALANCE)							
L9	87-008-227-01	FM coil	VR5	87-021-667-01	Volume, 20kΩ-A (VOLUME)							
L12	87-003-045-01	Choke coil, 22μH	S1	87-031-655-01	Lever switch (FUNCTION)							
TC1	87-011-108-01	Trimmer, 8pF	S2	82-588-622-21	Slide switch (REC/PB)							
TC2	87-011-109-01	Trimmer, 15pF	S3	87-031-631-01	Lever switch (TAPE SELECTOR)							
CF1,2	87-008-245-01	Ceramic filter kid	S4	87-031-620-01	Lever switch (RECORD)							
CF3	87-008-225-01	AM ceramic filter	S5	82-563-609-01	Slide switch (PHONO/AUX)							
IFT1	87-008-226-01	AM IFT	S6	87-031-622-01	Lever switch (MODE)							
IFT2	87-008-223-01	AM IFT	S7,8,15	87-031-619-01	Push-switch (DOLBY-NR, POWER, DSL)							
SFR1	87-021-566-01	Semi-fixed resistor, 5kΩ-B	S32	82-431-604-01	Slide switch (OSC)							
SFR2	87-021-567-01	Semi-fixed resistor, 10kΩ-B	SFR1,2	87-021-564-01	Semi-fixed resistor, 1kΩ-B							
PIN-1	87-049-045-01	Pin, 12P	SFR3,7,8	87-021-624-01	Semi-fixed resistor, 50kΩ-B							
<b>&lt; Resistor &gt;</b>												
R50	87-025-317-01	47Ω ½w Nonflammable resistor	SFR4	87-021-514-01	Semi-fixed resistor, 200kΩ-B							
<b>&lt; Capacitors &gt;</b>												
C108	87-014-040-41	200pF PP	SFR5,6	82-587-634-01	Semi-fixed resistor, 100Ω-B							
C19	87-014-048-41	430pF PP	R83,84	87-025-209-01	< Resistors >							
C48	87-014-057-41	1000pF PP	R245	87-025-313-01	3.3kΩ Metal film resistor							
C105	87-014-065-01	2200pF PP	R164	87-025-320-01	4.7Ω Nonflammable resistor							
<b>&lt; REC/PB CIRCUIT BOARD SECTION &gt;</b>												
PCB-B	82-587-658-01	REC/PB circuit board	R164	87-025-320-01	100Ω 2w Nonflammable resistor	D416	87-027-228-01	Zener diode, 05Z-7.5U	R501	87-025-194-01	220Ω 2w Metal film resistor	
IC1,2	87-027-540-01	IC, AN7146	R202	87-029-108-01	1Ω ½w Fuse resistor	S17,18	87-031-496-01	Tact switch (PROGRAM, RESET)				
IC3,4	87-027-754-01	IC, LM1111C	R153,154,	87-029-089-01	4.7Ω ½w Fuse resistor	SFR401,402	87-021-624-01	Semi-fixed resistor, 50kΩ-B				
IC5,9	87-027-539-01	IC, LA3161	R162,163	87-029-090-01	22Ω ¼w Fuse resistor	C412	87-015-318-01	< Capacitors >				
IC10	87-027-656-01	IC, TC4066BP	R172	87-029-365-01	22Ω ¼w Fuse resistor	C407	87-015-425-01	0.1μF 10V Aluminum solid				
Q1,2	89-322-405-01	Transistor, 2SC2240 GR)	C49,50,89,	87-014-053-01	< Capacitors >	D351	87-027-097-01	1μF 25V Aluminum solid				
Q3,4,5,6,	89-318-154-01	Transistor, 2SC1815 (Y)	90	680pF PP								
7,8,17,			C17,18	87-014-055-01	820pF PP							
18,19,20,			C13,14,75,	87-015-311-01	0.1μF 10V Aluminum solid							
21,22,27,			76	C115,116	0.15μF 10V Aluminum solid							
28,29,30,			C107,108,	87-015-367-01	0.22μF 10V Aluminum solid							
31,32,33,			117,118	87-015-312-01	0.22μF 10V Aluminum solid							
34,35,36,				</td								

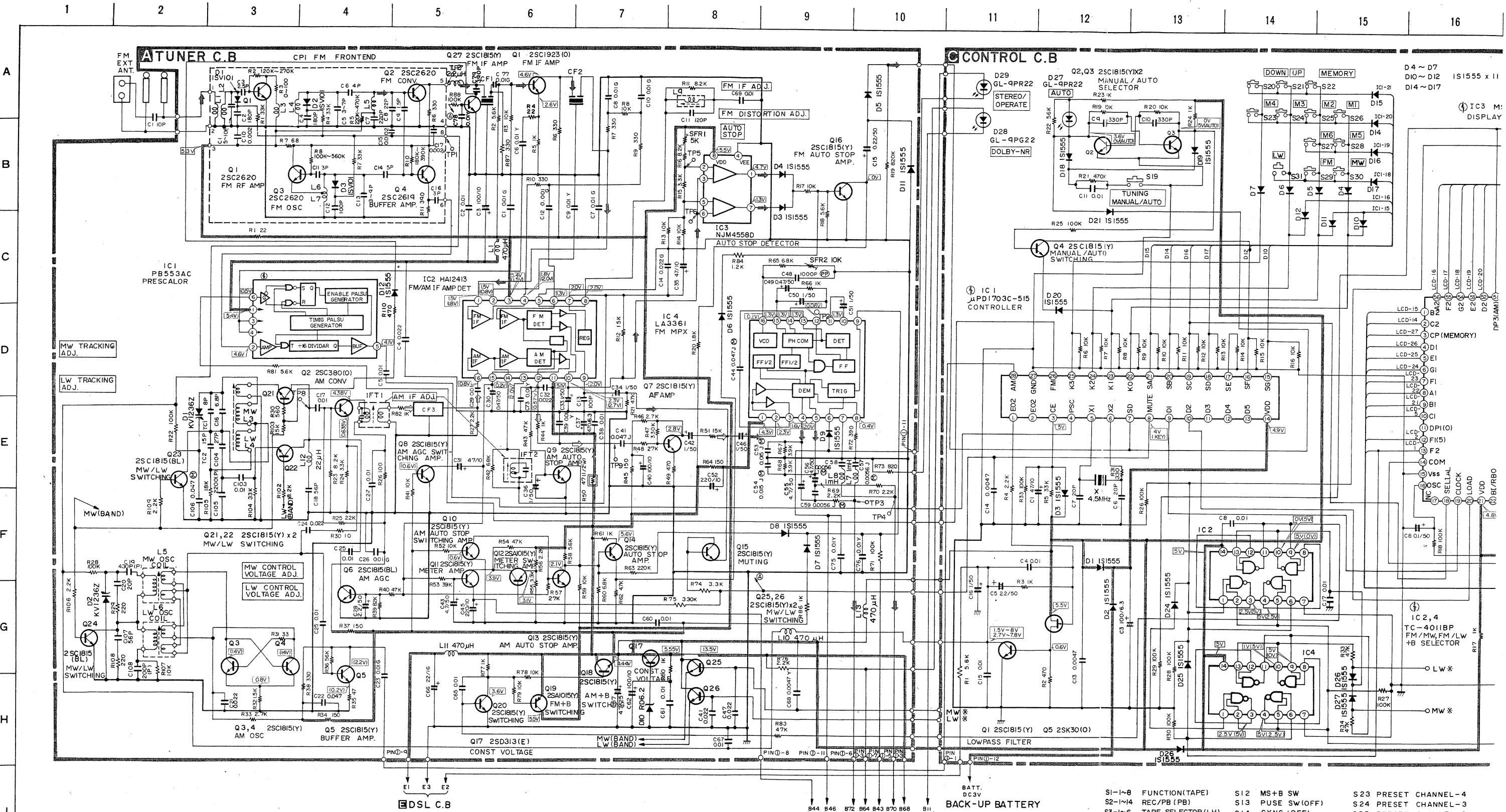
Symbol No.	Part No.	Description
Q39,40	89-318-155-01	Transistor, 2SC1815 (GR)
Q41	89-318-464-01	Transistor, 2SC1846 (R)
Q43	89-322-364-01	Transistor, 2SC2236 (Y)
Q45,46	89-320-011-21	Transistor, 2SC2001 (K,L)
D1,2,7,8, 9,10,11,12, 13,17,18,19, 352	87-027-097-01	Diode, 1S1555
D3,4,5,6	88-052-188-11	Diode, 1S188 (FM)
D14	87-027-346-01	Zener diode, HZ11A2L
D16	87-027-199-01	Zener diode, 05Z-15U
L1,2	87-008-173-01	Trap coil, 10mH
L3,4	82-487-654-01	Coil, 10mH
L7,9,13,14,17	87-003-039-01	Choke coil, 36μH
L8	82-491-661-01	Choke coil, 600μH
L11,12	87-003-051-01	Choke coil, 470μH
L15,16	87-005-088-01	Coil, 5.6mH
CP1	82-587-641-11	Bias OSC unit
LPF1	87-030-070-01	Low-pass filter
J1,2,3,4,6	82-587-633-01	Jack plate ass'y (PHONO, MIC-L,R, PLAYER SYNC)
J5, S34	87-049-059-01	DIN jack w/switch (DIN)
J7,8	82-587-632-01	Jack plate ass'y (EXT SP-L,R)
J9	87-049-043-01	Jack, 6.3φ (PHONES)
VR1	87-021-671-01	Volume, 50kΩ-A (REC VOLUME)
VR2,3	87-021-668-01	Volume, 50kΩ-A (BASS, TREBLE)
VR4	87-021-669-01	Volume, 100kΩ-W (BALANCE)
VR5	87-021-667-01	Volume, 20kΩ-A (VOLUME)
S1	87-031-655-01	Lever switch (FUNCTION)
S2	82-588-622-21	Slide switch (REC/PB)
S3	87-031-631-01	Lever switch (TAPE SELECTOR)
S4	87-031-620-01	Lever switch (RECORD)
S5	82-563-609-01	Slide switch (PHONO/AUX)
S6	87-031-622-01	Lever switch (MODE)
S7,8,15	87-031-619-01	Push-switch (DOLBY-NR, POWER, DSL)
S32	82-431-604-01	Slide switch (OSC)
SFR1,2	87-021-564-01	Semi-fixed resistor, 1kΩ-B
SFR3,7,8	87-021-624-01	Semi-fixed resistor, 50kΩ-B
SFR4	87-021-514-01	Semi-fixed resistor, 200kΩ-B
SFR5,6	82-587-634-01	Semi-fixed resistor, 100Ω-B
	82-588-634-01	Earth terminal
< Resistors >		
R83,84	87-025-209-01	3.3kΩ Metal film resistor
R245	87-025-313-01	4.7Ω Nonflammable resistor
R164	87-025-320-01	100Ω 2w Nonflammable resistor
▲ R202	87-029-108-01	1Ω ½w Fuse resistor
▲ R153,154, 220,246	87-029-089-01	4.7Ω ½w Fuse resistor
▲ R162,163	87-029-090-01	22Ω ¼w Fuse resistor
▲ R172	87-029-365-01	22Ω ¼w Fuse resistor
< Capacitors >		
C49,50,89, 90	87-014-053-01	680pF PP
C17,18	87-014-055-01	820pF PP
C13,14,75, 76	87-015-311-01	0.1μF 10V Aluminum solid
C115,116	87-015-367-01	0.15μF 10V Aluminum solid
C107,108, 117,118	87-015-312-01	0.22μF 10V Aluminum solid

Symbol No.	Part No.	Description
C77,78	87-015-313-01	0.33μF 10V Aluminum solid
<< CONTROL CIRCUIT BOARD SECTION >>		
PCB-C	82-587-604-11	Control circuit board
④ IC1	87-027-750-01	IC, μPD1703C514
④ IC2,4	87-027-564-01	IC, TC4011BP
④ IC3	87-027-751-01	IC, MSM5829GS
Q1,2,3,4	89-318-154-01	Transistor, 2SC1815 (Y)
Q5	89-500-303-01	FET, 2SK30 (O)
D1,2,3,4, 5,6,7,11, 12,13,14,15, 16,17,18,19, 20,21,22,23, 24,25,26	87-027-097-01	Diode, 1S1555
D27,29	87-027-716-01	LED, GL-PPR22 (AUTO OPERATE/FM STEREO)
D28	87-027-758-01	LED, GL-9PG22 (DOLBY-NR)
D30	82-587-603-01	LCD (FREQUENCY INDICATOR)
X1	87-030-083-01	Crystal resonator
S19,20,21, 22,23,24, 25,26,27, 28,29,30, 31	87-031-498-01	Push-switch (TUNING, DOWN, UP, MEMORY, 1,2,3,4,5,6, FM, MW, LW)
PL1,2	82-587-605-01	Pilot lamp
	82-587-606-01	Electric conduction rubber
<< MS CIRCUIT BOARD SECTION >>		
PCB-D	82-587-615-21	MS circuit board
④ IC6	87-027-713-01	IC, TC9138P
Q401,402,403, 404,405,411, 412,413,414, 415,416	89-327-854-01	Transistor, 2SC2785 (E)
Q406	89-111-154-51	Transistor, 2SA1115 (E,F)
Q407,409	89-313-834-01	Transistor, 2SC1383 (S)
Q408	89-106-834-51	Transistor, 2SA683 (RS)
D401	87-027-756-01	LED, SL-1160L (MS PROGRAM)
D402	87-027-365-01	Diode, S5277B
D403	87-027-332-01	Zener diode, HZ6B1L
D404,405, 406,407, 408,409, 410,411, 415	87-027-097-01	Diode, 1S1555
D412,413, 414	87-027-716-01	LED, GL-9PR22 (PEAK 0, +3, +7)
D416	87-027-228-01	Zener diode, 05Z-7.5U
S17,18	87-031-496-01	Tact switch (PROGRAM, RESET)
SFR401,402	87-021-624-01	Semi-fixed resistor, 50kΩ-B
< Capacitors >		
C412	87-015-318-01	0.1μF 10V Aluminum solid
C407	87-015-425-01	1μF 25V Aluminum solid
<< DSL CIRCUIT BOARD SECTION >>		
PCB-E	82-587-617-21	DSL circuit board
IC7,8	87-027-176-01	IC, TA-7137P Stereo type
Q47,48,49, 50,51,52, 73,74	89-318-154-01	Transistor, 2SC1815 (Y)
D351	87-027-097-01	Diode, 1S1555
L10	82-587-610-01	Coil, DC-DC
PIN-4	87-049-038-01	Pin, 3P
PIN-2	82-481-647-01	Pin, 4P

Symbol No.	Part No.	Description
PIN-3	87-049-034-01	Pin, 4P
< Capacitors >		
C361,362	87-015-311-01	0.1μF 10V Aluminum solid
C359,360	87-015-313-01	0.33μF 10V Aluminum solid
<< REC AMP CIRCUIT BOARD SECTION >>		
PCB-F	82-588-617-11	REC amp circuit board
Q23,24,25, 26	89-318-154-01	Transistor, 2SC1815 (Y)
L5,6	87-005-088-01	Micro inductor, 5.6mH
SFR9,10	87-021-672-01	Semi-fixed resistor, 50kΩ-B
< Capacitor >		
C81,82	87-015-311-01	0.1μF 10V Aluminum solid
<< MONITOR CIRCUIT BOARD SECTION >>		
PCB-G	82-588-633-21	Monitor circuit board
Q9,10	89-322-405-01	Transistor, 2SC2240 (GR)
Q11,12,13, 14,15,16	89-318-154-01	Transistor, 2SC1815 (Y)
PIN	87-032-634-01	Pin, 4P
<< REC MUTE CIRCUIT BOARD SECTION >>		
PCB-H	82-587-618-21	REC mute circuit board
O72	89-110-154-01	Transistor, 2SA1015 (Y)
D1	87-027-097-01	Diode, 1S1555
S9	82-587-642-01	Push-switch (REC MUTE)
<< LED CIRCUIT BOARD SECTION >>		
PCB-I	82-587-619-21	LED circuit board
D1	87-027-731-01	LED, SR-535D (RECORD)
<< LIGHT SWITCH CIRCUIT BOARD SECTION >>		
PCB-J	82-587-648-21	Light switch circuit board
S33	86-992-604-01	Push-switch (LIGHT)
<< POWER CIRCUIT BOARD SECTION >>		
△PCB-K	82-551-672-21	Power circuit board
D501	87-027-609-01	Encapsulated diode
J10,11	87-032-958-01	AC-DC jack
△S16	87-031-466-01	Slide switch (VOLTAGE SELECTOR)
△F1	87-035-192-01	Fuse, "T" 4A
△F2	87-035-219-01	Fuse label, "T" 4A
	87-098-022-01	Fuse, "T" 500mA
	87-098-013-01	Fuse label, "T" 500mA
	87-033-147-01	Fuse clamp
< Resistor >		
R501	87-025-194-01	220Ω 2w Metal film resistor
<< MISCELLANEOUS >>		
△T1	82-587-651-01	Power transformer (E model only)
△T1	82-587-652-01	Power transformer (K model only)
RPH	87-046-159-01	REC/PB head
EH	87-046-189-01	Erase head
SOL1	82-585-601-21	Solenoid
SP1,2	82-587-644-11	Speaker (Woofer)
SP3,4	82-563-602-01	Speaker (Tweeter)
SP5	82-587-635-11	Passive radiator ass'y
LM1,2	82-588-642-01	Level meter
ECM1,2	87-041-015-01	ECM, ESM-10PB
M1	87-045-135-01	Motor DC EG
S10,14	87-031-548-01	Leaf switch (MOTOR, SYNCRATE)
S11	87-031-537-01	Micro switch (PLAY)

Symbol No.	Part No.	Description
</tbl

## SCHEMATIC DIAGRAM-1



## NOTES:

- 1) B (+) power supply
- 2) Signal path
- 3) Rec path, AM signal path.
- 4) 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.
- 5) An asterisk (\*) indicates that the value was measured with a vacuum-tube voltmeter during recording.
- 6) Resistors with no designation have a rated power of 1%W and a tolerance of ±5%.
- 7) Capacitors with no designation have a dielectric strength of less than 50VW.
- 8) The only capacitor tolerances indicated are ±5% (J) and ±10% (K).
- 9) Ceramic capacitor symbols:
  - (C) For temperature compensation (SL)
  - (YY) High dielectric constant system (YY)
  - (YW, YP, YZ) High dielectric constant system (YW, YP, YZ)
- 10) 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

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

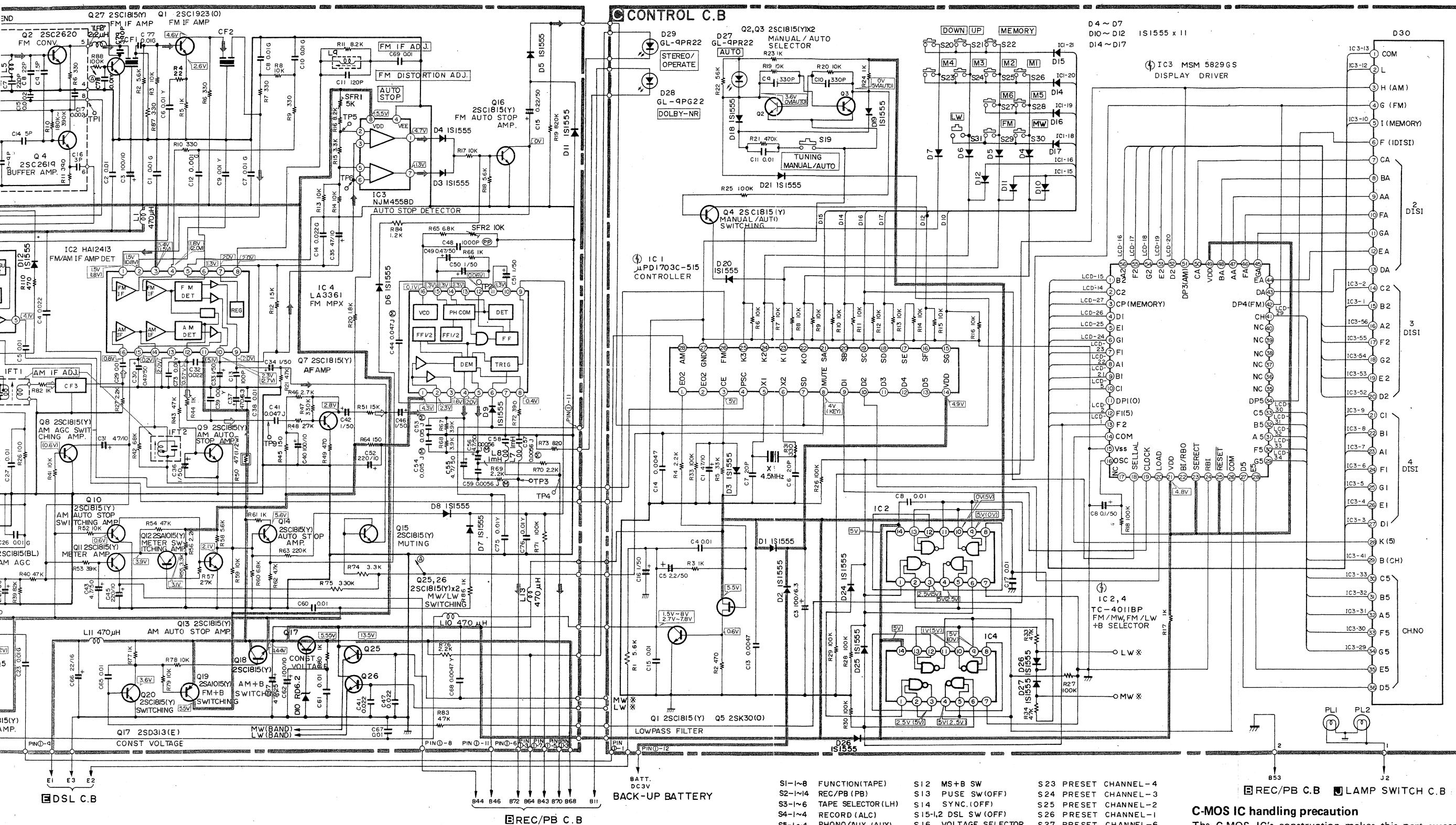
S1-1~8	FUNCTION(TAPE)	S12	MS+B SW
S2-1~4	REC/PB (PB)	S13	PUSE SW(OFF)
S3-1~6	TAPE SELECTOR (LH)	S14	SYNC.(OFF)
S4-1~4	RECORD (ALC)	S15-1,2	DSL SW (OFF)
S5-1~4	PHONO/AUX (AUX)	S16	VOLTAGE SELECTOR
S6-1,2	MODE (STEREO)	S17	PROGRAM SW(OFF)
S7	DOLBY-NR	S18	SLEEP(OFF)
S8	REC MUT (OFF)	S19	TUNING
S9	MOTOR SW(OFF)	S20	DOWN
S10	PLAY SW (OFF)	S21	UP
S11		S22	MEMORY

D 4 ~ D7  
 D10 ~ D12  
 D14 ~ D17

IS1555 x 11

IC3 M: DISPLAY

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



The only capacitor tolerances indicated are  $\pm 5\%$  (J) and  $\pm 10\%$  (K).

Ceramic capacitor symbols:  
 For temperature compensation (SL)  
 High dielectric constant system (YY)

High dielectric constant system (YW, YP, YZ)

Explanation of symbols

(M) Mylar capacitor  
 (A) Aluminum solid capacitor  
 (PP) Polypropylene film capacitor  
 (BP) Bi-polarized capacitor  
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 (T) Tantalum capacitor

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.

S1-1~8	FUNCTION(TAPE)	S12	MS+B SW
S2-1~14	REC/PB (PB)	S13	PUSE SW(OFF)
S3-1~6	TAPE SELECTOR(LH)	S14	SYNC.(OFF)
S4-1~4	RECORD (ALC)	S15-1,2	DSL SW(OFF)
S5-1~4	PHONO/AUX (AUX)	S16	VOLTAGE SELECTOR
S6-1,2	MODE (STEREO)	S17	PROGRAM SW(OFF)
S7	DOLBY-NR	S18	RESET SW(OFF)
S8	SLEEP(OFF)	S19	TUNING
S9	REC MUT (OFF)	S20	DOWN
S10	MOTOR SW(OFF)	S21	UP
S11	PLAY SW (OFF)	S22	MEMORY
		S23	PRESET CHANNEL-4
		S24	PRESET CHANNEL-3
		S25	PRESET CHANNEL-2
		S26	PRESET CHANNEL-1
		S27	PRESET CHANNEL-6
		S28	PRESET CHANNEL-5
		S29	FM
		S30	MW
		S31	LW
		S32	OSC
		S33	LIGHT
		S34	DIN

REC/PB C.B. LAMP SWITCH C.B.

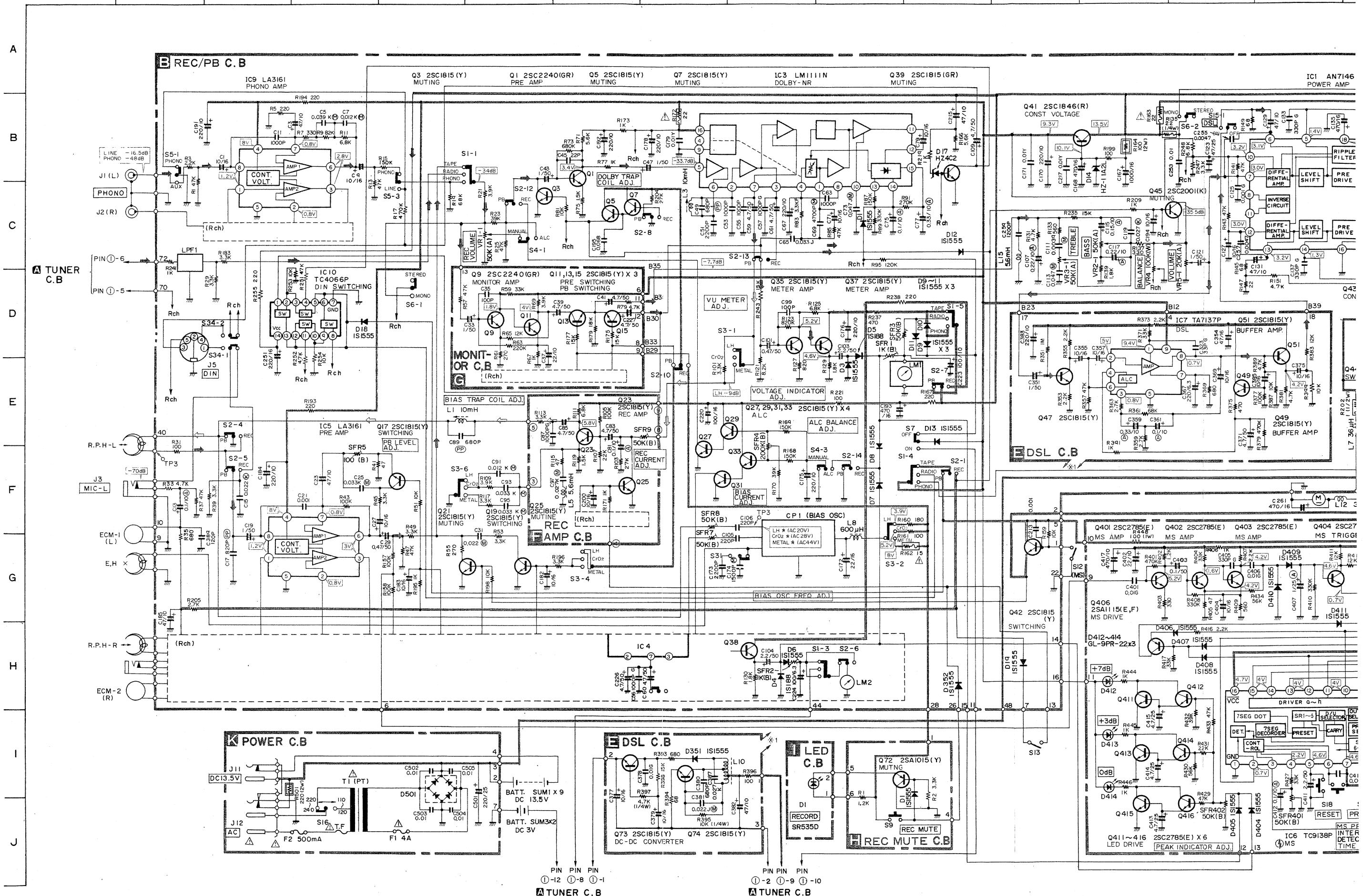
#### C-MOS IC handling precaution

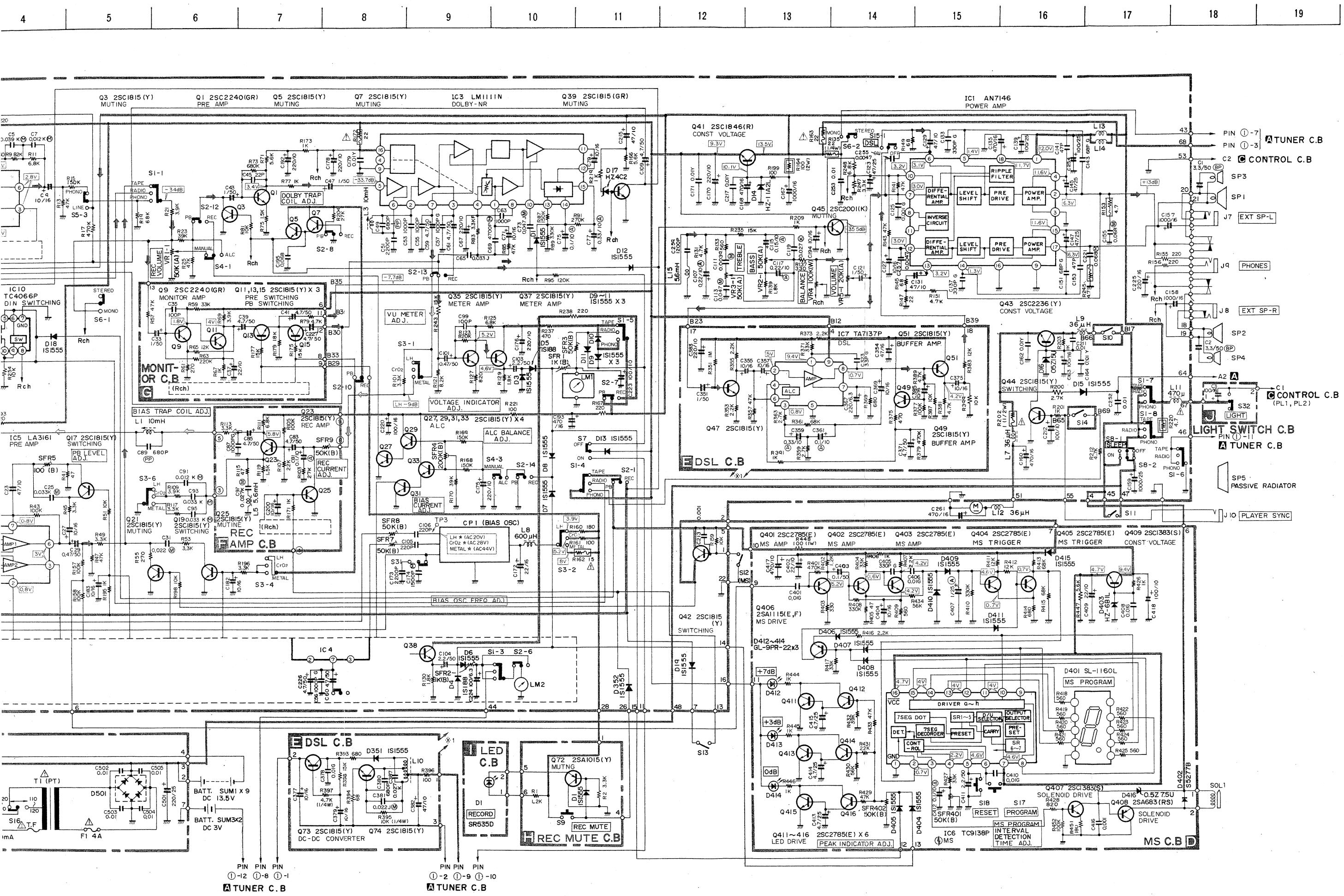
The C-MOS IC's construction makes this part susceptible to damage by static electricity and so take sufficient care in regard to following articles.

1. Need to be put on conductive sheet, to be put in a metallic box and to be wrapped by aluminium foil for transportation and deposit.
2. To use solder iron less than 40W (less than 260°C) of power consumption for soldering. But do not overheat more than 10 second.
3. Do not perform a conductivity test with a tester, etc. Refer to the circuit voltages of each part.
4. The ICs on the electrical parts which are indicated by an C-MOS IC symbol mark ( ).

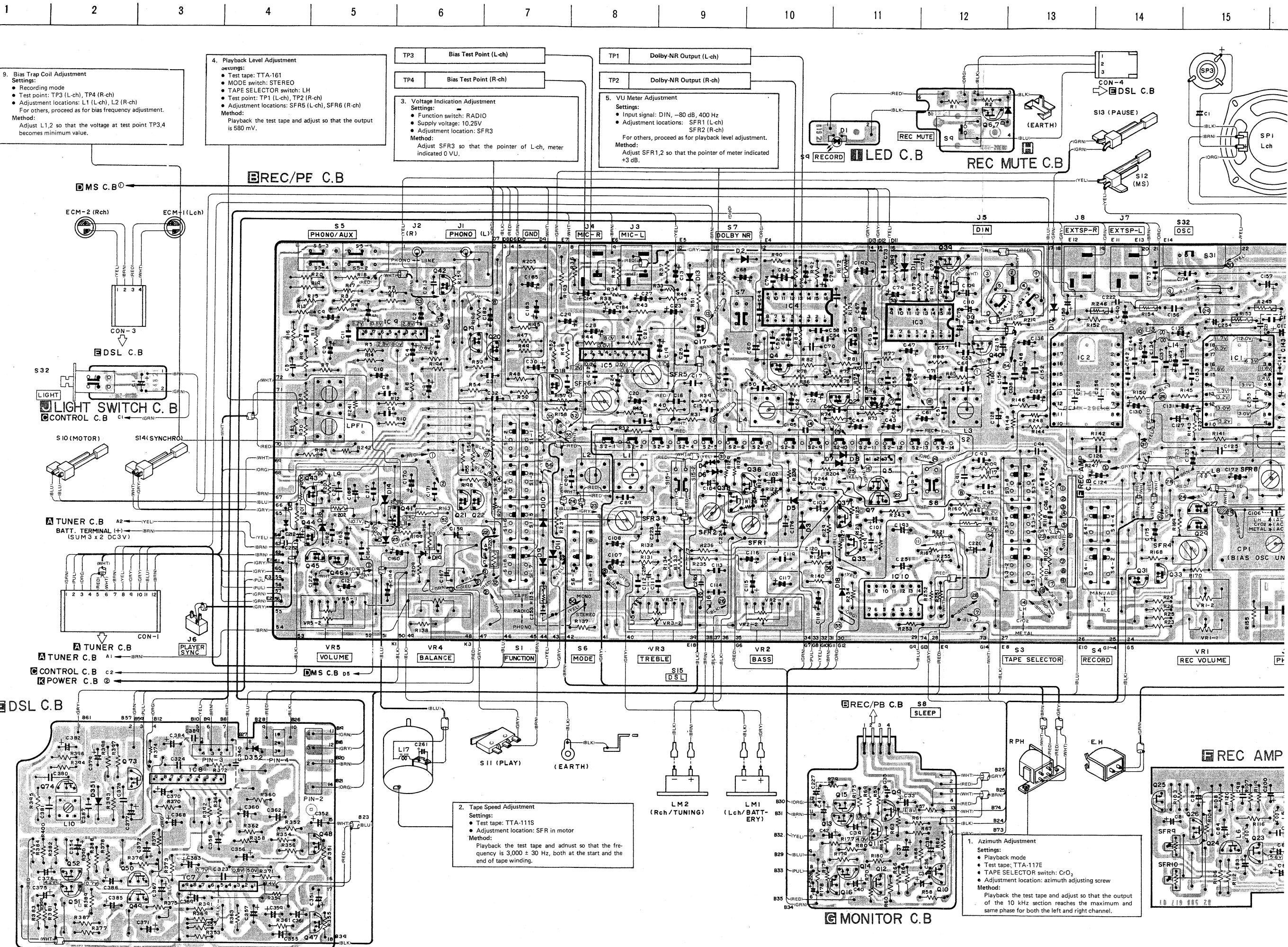
## SCHEMATIC DIAGRAM -2

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15



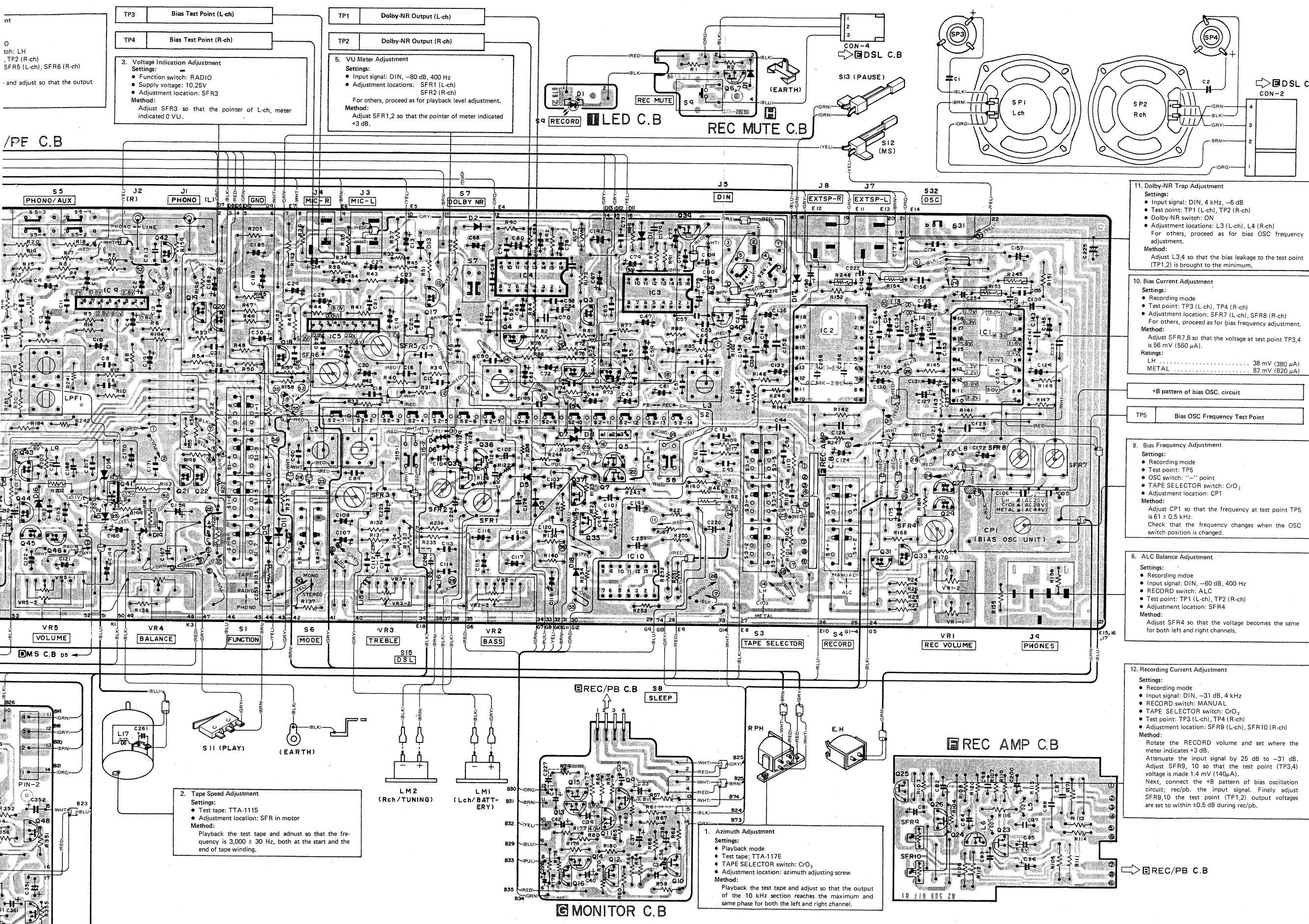


## WIRING-1



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.

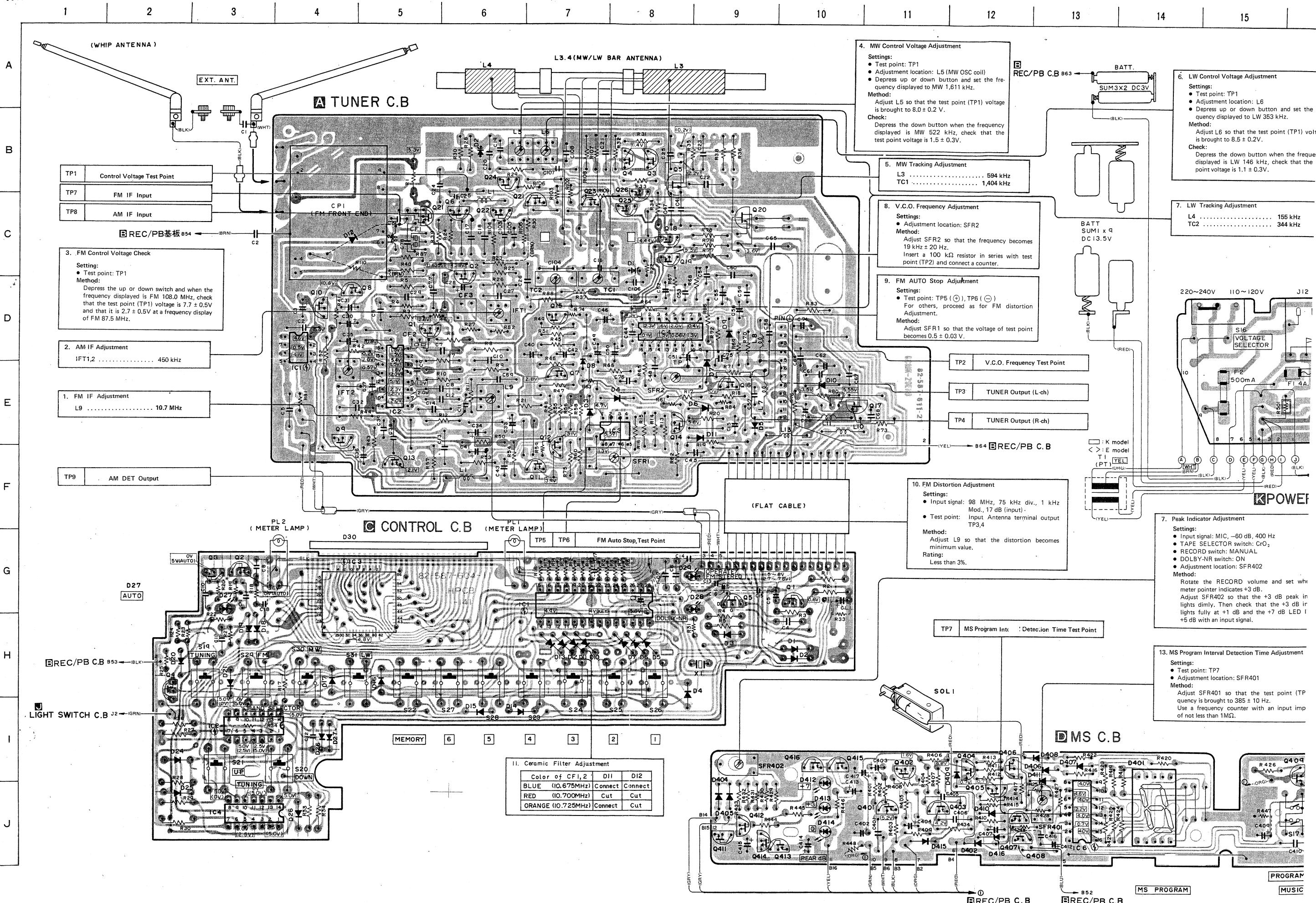
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19



## WIRING-2

NOTES (1) B(+) Pattern Component side pattern Others pattern

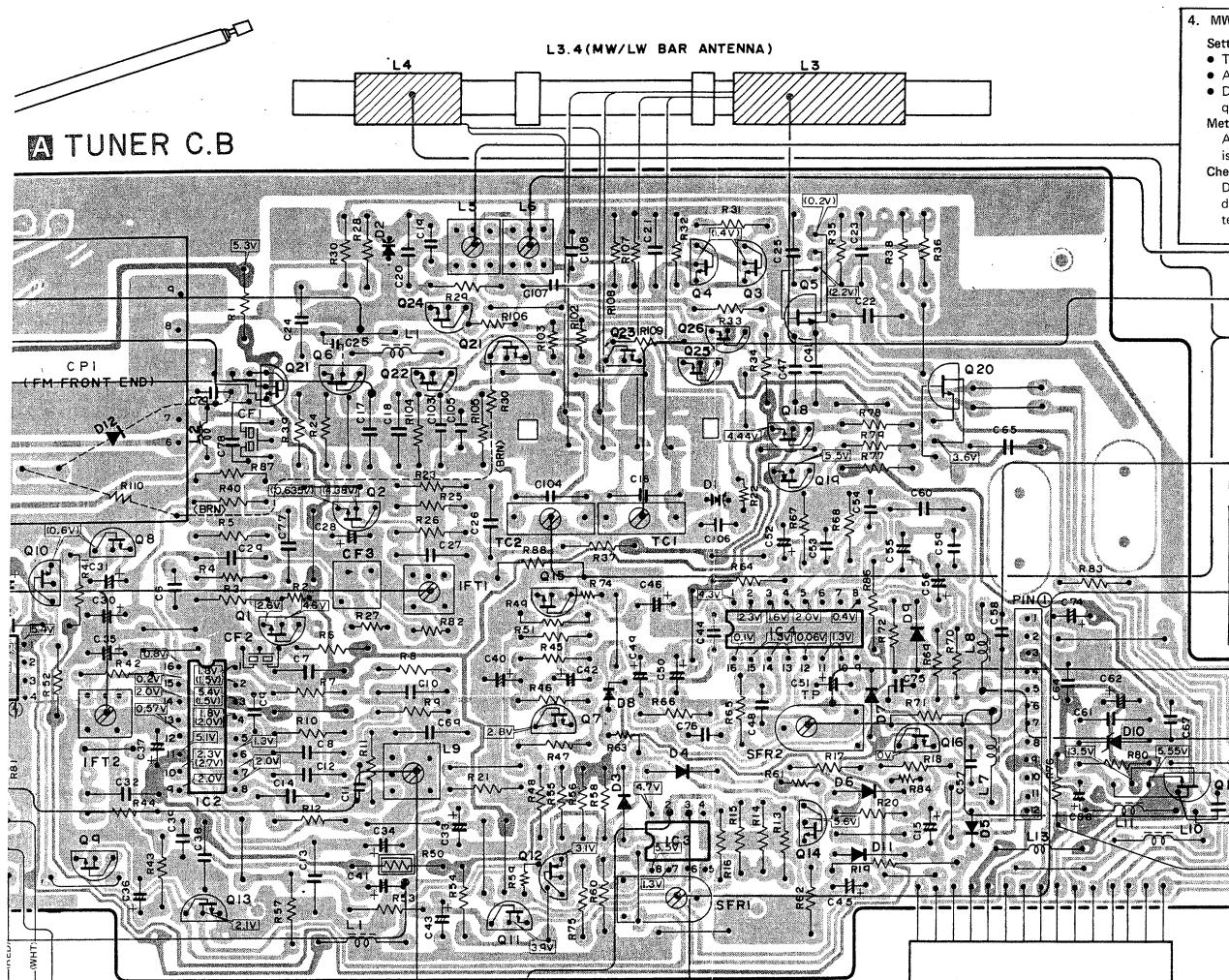
(2) The voltage is the reference value measured with a tester (20 K ohms/V DC) when there are no signals. But ( ) is with AM reception.



NOTES (1) B(+) Pattern Component side pattern Others pattern

(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.

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



## 4. MW Control Voltage Adjustment

Settings:  
 • Test point: TP1  
 • Adjustment location: L5 (MW OSC coil)  
 • Depress up or down button and set the frequency displayed to MW 1,611 kHz.  
 Method:  
 Adjust L5 so that the test point (TP1) voltage is brought to  $8.0 \pm 0.2$  V.

Check:  
 Depress the down button when the frequency displayed is MW 522 kHz, check that the test point voltage is  $1.5 \pm 0.3$  V.

## 5. MW Tracking Adjustment

L3 ..... 594 kHz  
TC1 ..... 1,404 kHz

## 8. V.C.O. Frequency Adjustment

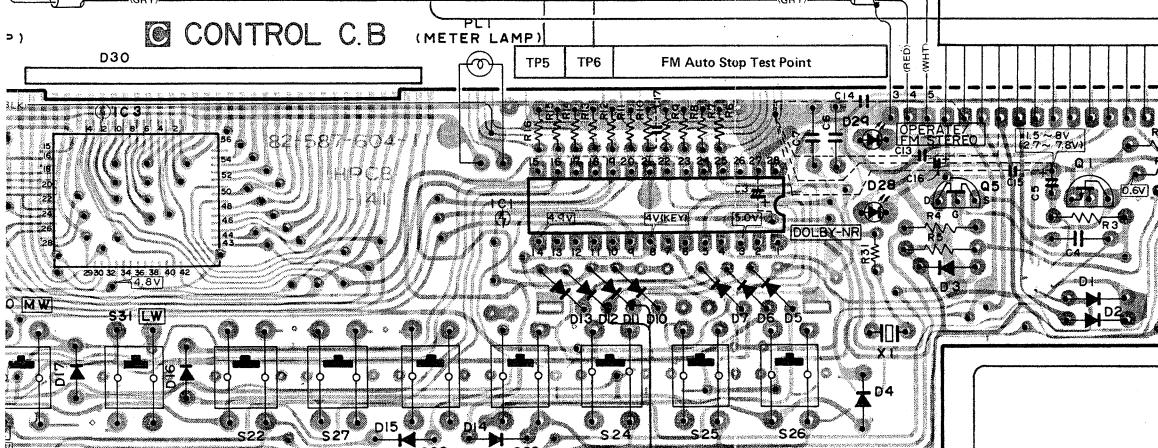
Settings:  
 • Adjustment location: SFR2  
 Method:  
 Adjust SFR2 so that the frequency becomes  $19 \text{ kHz} \pm 20 \text{ Hz}$ . Insert a  $100 \text{ k}\Omega$  resistor in series with test point (TP2) and connect a counter.

## 9. FM AUTO Stop Adjustment

Settings:  
 • Test point: TP5 (+), TP6 (-)  
 For others, proceed as for FM distortion Adjustment.  
 Method:  
 Adjust SFR1 so that the voltage of test point becomes  $0.5 \pm 0.03$  V.

## 10. FM Distortion Adjustment

Settings:  
 • Input signal: 98 MHz, 75 kHz div., 1 kHz Mod., 17 dB (input).  
 • Test point: Input Antenna terminal output TP3,4  
 Method:  
 Adjust L9 so that the distortion becomes minimum value.  
 Rating:  
 Less than 3%.



## 11. Ceramic Filter Adjustment

Color of CF1,2	D11	D12
BLUE (10.675MHz)	Connect	Connect
RED (10.700MHz)	Cut	Cut
ORANGE (10.725MHz)	Connect	Cut

## 6. LW Control Voltage Adjustment

Settings:  
 • Test point: TP1  
 • Adjustment location: L6  
 • Depress up or down button and set the frequency displayed to LW 353 kHz.  
 Method:  
 Adjust L6 so that the test point (TP1) voltage is brought to  $8.5 \pm 0.2$  V.

Check:  
 Depress the down button when the frequency displayed is LW 146 kHz, check that the test point voltage is  $1.1 \pm 0.3$  V.

## 7. LW Tracking Adjustment

L4 ..... 155 kHz  
TC2 ..... 344 kHz

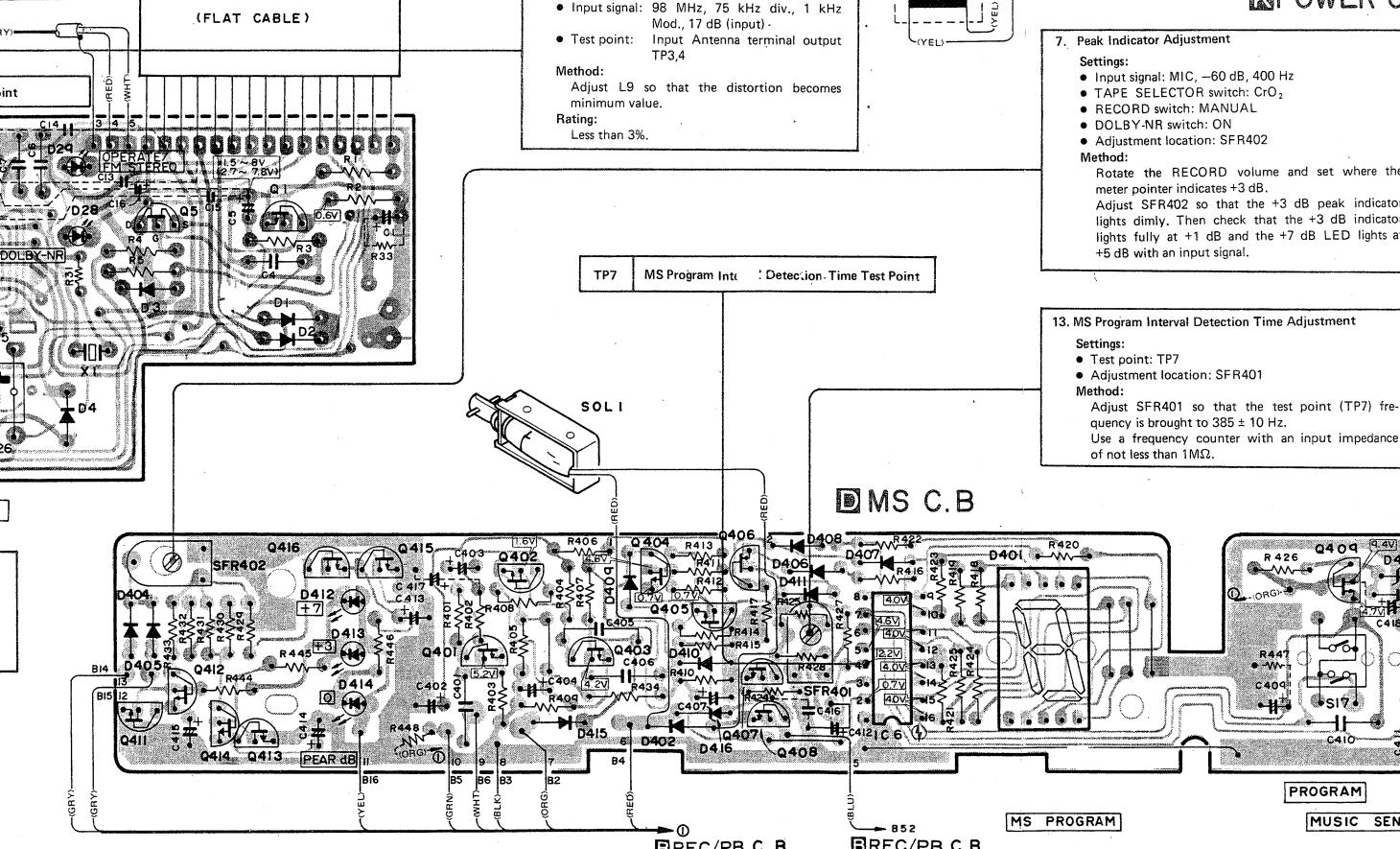
## 12. AC Power Adjustment

Settings:  
 • Adjustment location: SFR1  
 Method:  
 Adjust SFR1 so that the voltage of test point becomes  $0.5 \pm 0.03$  V.

## 13. MS Program Interval Detection Time Adjustment

Settings:  
 • Test point: TP7  
 • Adjustment location: SFR401  
 Method:  
 Adjust SFR401 so that the test point (TP7) frequency is brought to  $385 \pm 10$  Hz.

Use a frequency counter with an input impedance of not less than  $1\text{M}\Omega$ .



## 6. LW Control Voltage Adjustment

Settings:  
 • Test point: TP1  
 • Adjustment location: L6  
 • Depress up or down button and set the frequency displayed to LW 353 kHz.  
 Method:  
 Adjust L6 so that the test point (TP1) voltage is brought to  $8.5 \pm 0.2$  V.

Check:  
 Depress the down button when the frequency displayed is LW 146 kHz, check that the test point voltage is  $1.1 \pm 0.3$  V.

## 7. LW Tracking Adjustment

L4 ..... 155 kHz  
TC2 ..... 344 kHz

## 7. Peak Indicator Adjustment

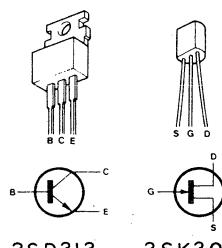
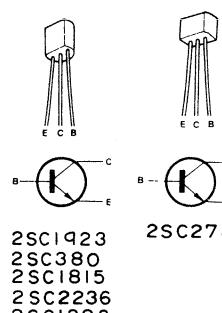
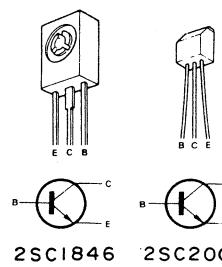
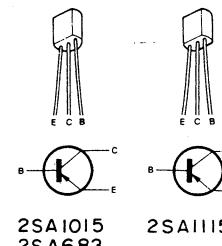
Settings:  
 • Input signal: MIC,  $-60$  dB, 400 Hz  
 • TAPE SELECTOR switch:  $\text{CrO}_2$   
 • RECORD switch: MANUAL  
 • DOLBY-NR switch: ON  
 • Adjustment location: SFR402  
 Method:  
 Rotate the RECORD volume and set where the meter pointer indicates  $+3$  dB.

Adjust SFR402 so that the  $+3$  dB peak indicator lights dimly. Then check that the  $+3$  dB indicator lights fully at  $+1$  dB and the  $+7$  dB LED lights at  $+5$  dB with an input signal.

## 13. MS Program Interval Detection Time Adjustment

Settings:  
 • Test point: TP7  
 • Adjustment location: SFR401  
 Method:  
 Adjust SFR401 so that the test point (TP7) frequency is brought to  $385 \pm 10$  Hz.

Use a frequency counter with an input impedance of not less than  $1\text{M}\Omega$ .



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