



SECTION 2

SERVICE MANUAL

MODEL GX-F31

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For basic adjustments, measuring methods, and operating principles, refer to GENERAL TECHNICAL MANUAL.

I. SPECIFICATIONS

TRACK SYSTEM	4 Track 2 Channel Stereo System
TAPE	Philips Type Cassette
TAPE SPEED	4.76 cm/s \pm 1.0% (1-7/8 ips. \pm 1.0%)
HEADS	Twin Field Super GX head for recording/playback \times 1 Erase head \times 1
MOTORS	FG servo D.C. motor for direct capstan drive \times 1 D.C. motor for reel drive \times 1
WOW & FLUTTER	0.10% WTD (DIN) 0.035% WRMS
TAPE WINDING TIME	90 sec. using a C-60 cassette tape
FREQUENCY RESPONSE	Normal: 20 to 17,000 Hz \pm 3 dB CrO ₂ : 20 to 18,000 Hz \pm 3 dB Metal: 20 to 19,000 Hz \pm 3 dB
FREQUENCY RANGE	Normal: 15 to 18,000 Hz CoO ₂ : 15 to 20,000 Hz Metal: 15 to 21,000 Hz
SIGNAL TO NOISE RATIO	Metal: 60 dB (measured via tape with peak recording level) Dolby B-type NR switch ON: Improves up to 5 dB at 1 kHz, 10 dB above 5 kHz Dolby C-type NR switch ON: Improves up to 15 dB at 500 Hz, 20 dB at 1 kHz to 10 kHz
HARMONIC DISTORTION	1 kHz, 3rd harmonic distortion Metal: 0.8%
INPUT	MIC: 0.25 mV (600 ohms) Line: 70 mV (47 kohms)
OUTPUT	Line: 410 mV (less than 2 kohms) Phone: 1.3 mW (8 ohms)
DIN	Input: 2.0 mV (10 kohms) Output: 410 mV
POWER REQUIREMENTS	100V, 50/60 Hz for Japan 120V, 60 Hz for USA and Canada 220V, 50 Hz for Europe except UK 240V, 50 Hz for UK and Australia 110V/120V/220V/240V, 50/60 Hz switchable for other countries.
POWER CONSUMPTION	U, C, A Models 22W J Model 20W
DIMENSIONS	440(W) \times 100(H) \times 345(D) mm (17.3 \times 3.9 \times 13.6")
WEIGHT	5.8 kg (12.8 lbs)

* For improvement purposes, specifications and design are subject to change without notice.

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(Manufactured under license from Dolby Laboratories).

II. CONTROLS

GX-F31

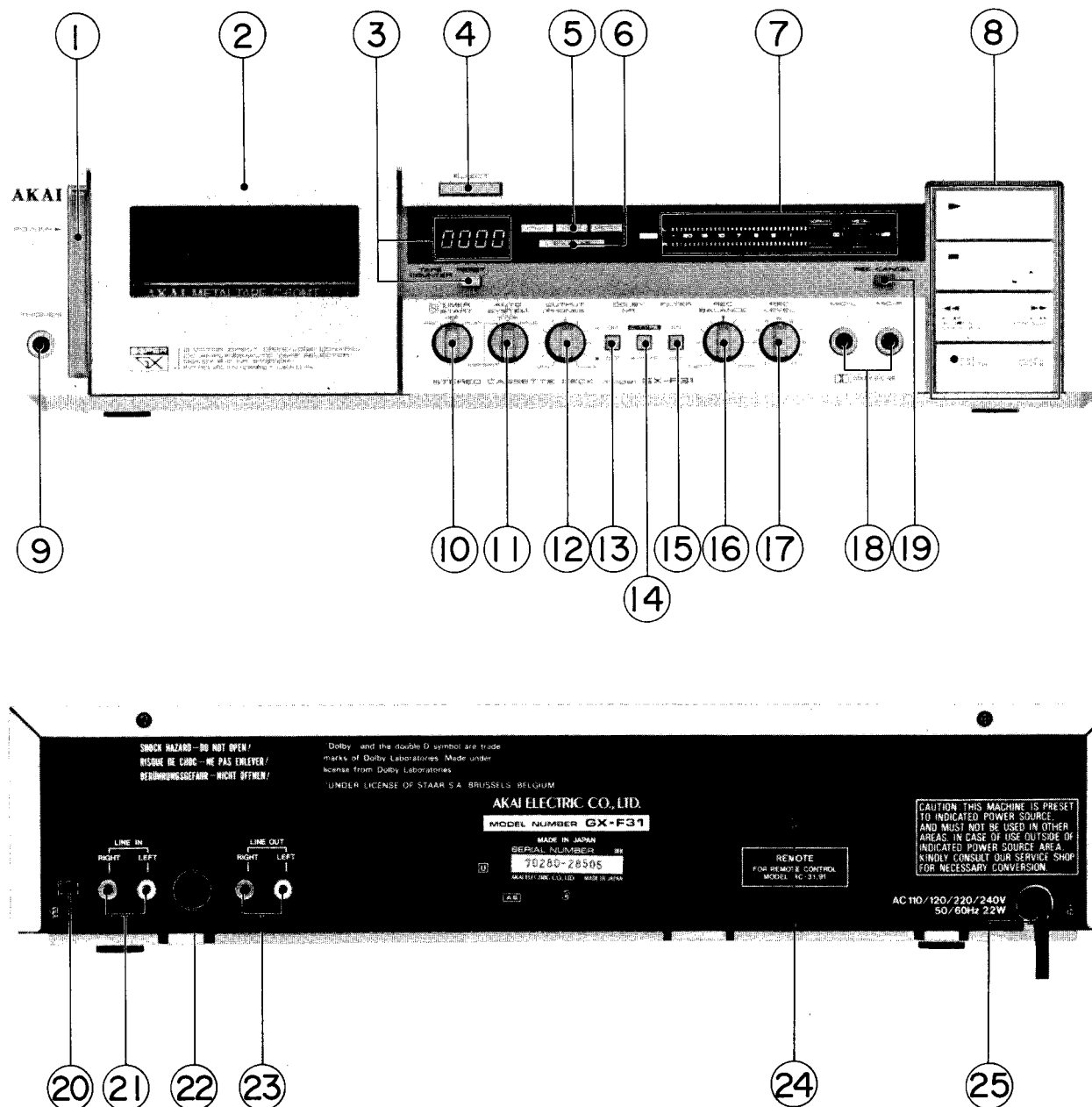


Fig. 1 Controls

- | | |
|--|--|
| 1. POWER SWITCH | 12. OUTPUT/HEADPHONE (PHONES) CONTROL |
| 2. CASSETTE RECEPTACLE | 13. DOLBY NR SWITCH |
| 3. FLD TAPE COUNTER and RESET BUTTON | 14. DOLBY NR SELECTOR |
| 4. EJECT BUTTON | 15. MPX FILTER SWITCH |
| 5. TAPE POSITION INDICATOR | 16. RECORDING (REC) BALANCE CONTROL
(LEFT and RIGHT) |
| 6. DOLBY NR INDICATOR | 17. RECORDING (REC) LEVEL CONTROL |
| 7. FLD BAR METER with MAXIMUM INPUT LEVEL
INDICATORS | 18. MICROPHONE JACKS (MIC-L: left, MIC-R: right) |
| 8. OPERATING BUTTONS
PLAY (▶) BUTTON with INDICATOR
STOP (■) BUTTON
REWIND (◀◀) BUTTON
FAST FORWARD (▶▶) BUTTON
RECORDING (REC)/PAUSE BUTTON with INDICATOR
AUTO MUTE BUTTON | 19. RECORDING (REC) CANCEL BUTTON |
| 9. HEADPHONE (PHONES) JACK | 20. LINE/DIN SELECTOR
(Some models do not have this facility.) |
| 10. TIMER START SELECTOR | 21. LINE IN JACKS |
| 11. AUTO SYSTEM SELECTOR | 22. DIN JACK
(Some models are not equipped with this facility.) |
| | 23. LINE OUT JACKS |
| | 24. REMOTE JACK |
| | 25. POWER CORD |

III. PRINCIPAL PARTS LOCATION

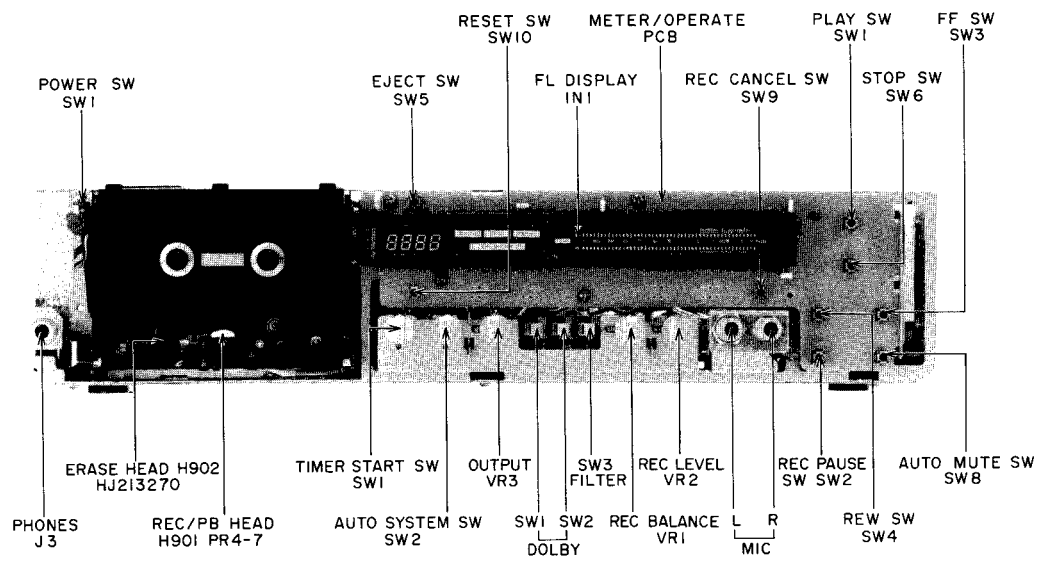


Fig. 2 Front View

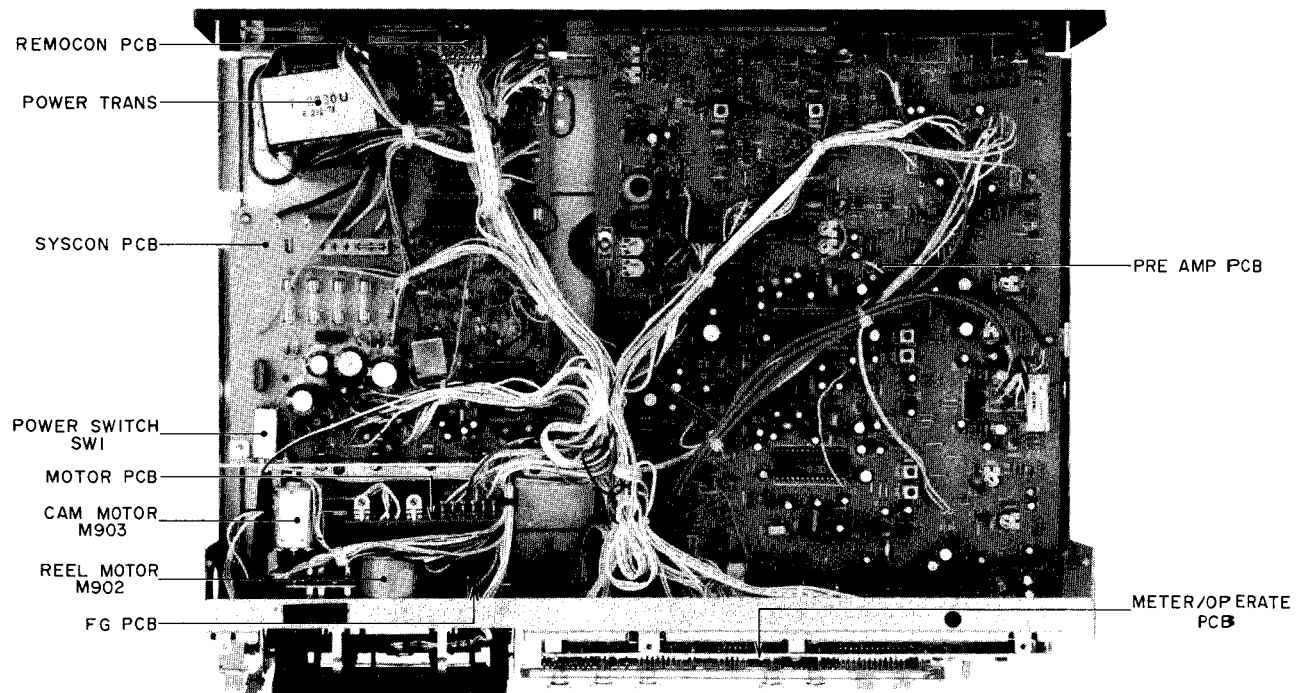


Fig. 3 Top View

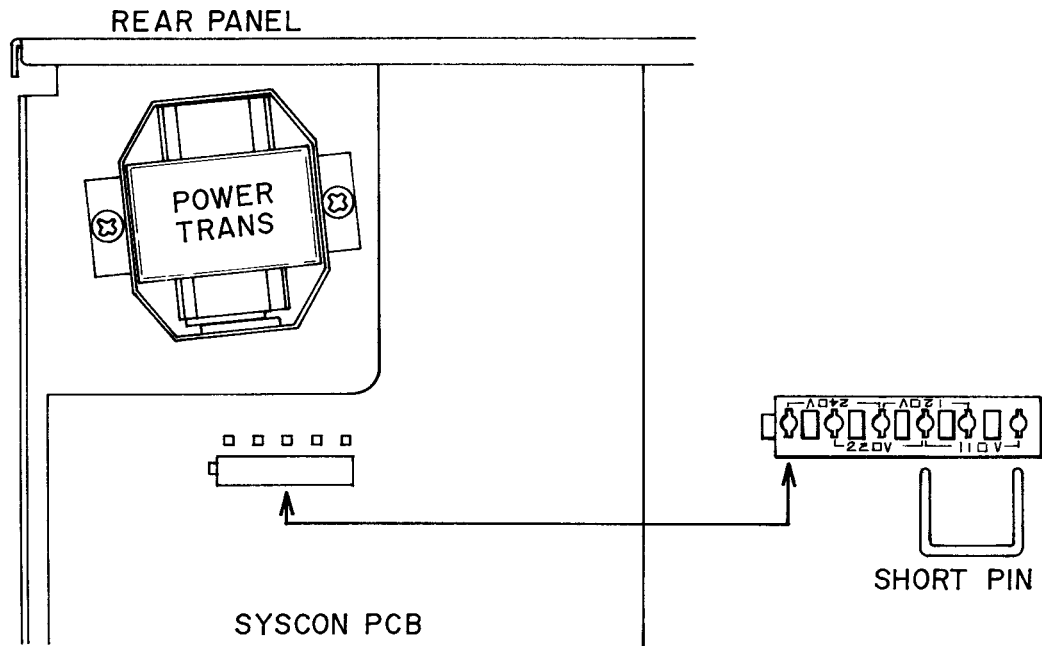


Fig. 4 Voltage Conversion (U Model only)

1. VOLTAGE CONVERSION

Models for Canada, Europe, USA, UK and Australia are not equipped with this facility.

Each machine is preset at the factory according to destination, but some machines can be set to 110V, 120V, 220V or 240V as required.

If voltage change is necessary, this can be accomplished as follows:

- 1) Disconnect power cord.
- 2) Loosen holding screws and remove upper cover.
- 3) Remove short pin plug from present holes and replace in correct holes. Follow the markings explicitly.

2. CYCLE CONVERSION

With DC motor, cycle conversion is not necessary.

V. MECHANICAL ADJUSTMENT

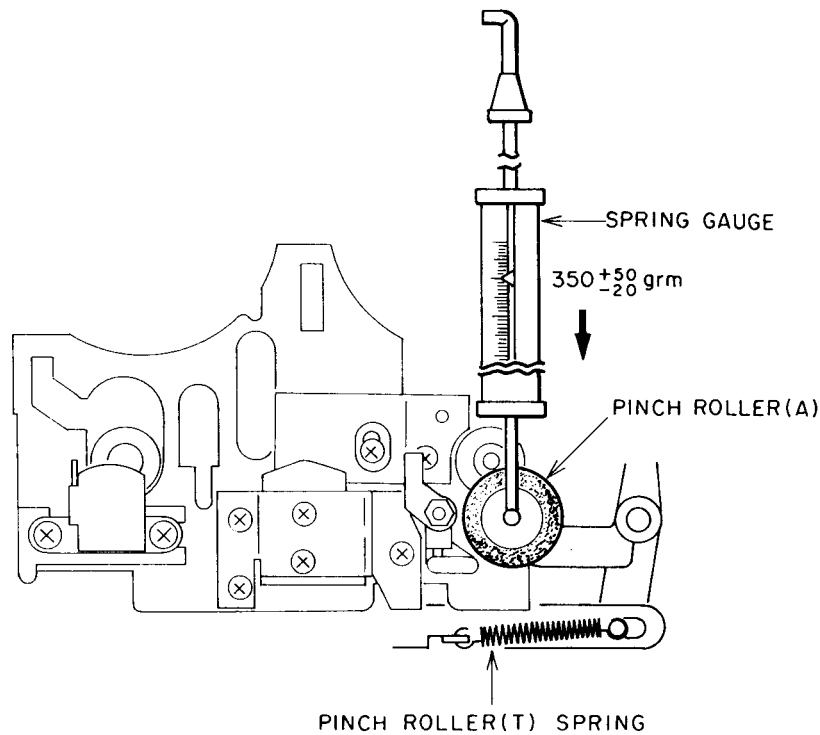


Fig. 5

1. PINCH ROLLER PRESSURE MEASUREMENT (Refer to Fig. 5)

Put in PLAY mode. Push pinch roller arm down with the spring gauge push the pinch roller 1 ~ 2 mm from the capstan and release slowly. Read the spring gauge at the moment the pinch roller touches the capstan and begins to rotate.

Specified pressure: $350 +50 -20$ gm. If there is no measurement obtained, replace the pinch roller spring.

2. TAPE SPEED ADJUSTMENT

Play Back a 1,000 Hz (TF-102CS) Pre-Recorded test tape, and Adjust tape Speed Adjustment Volume (VR1 50K) to obtain a tape speed of 1,000 Hz \pm 1.0%.

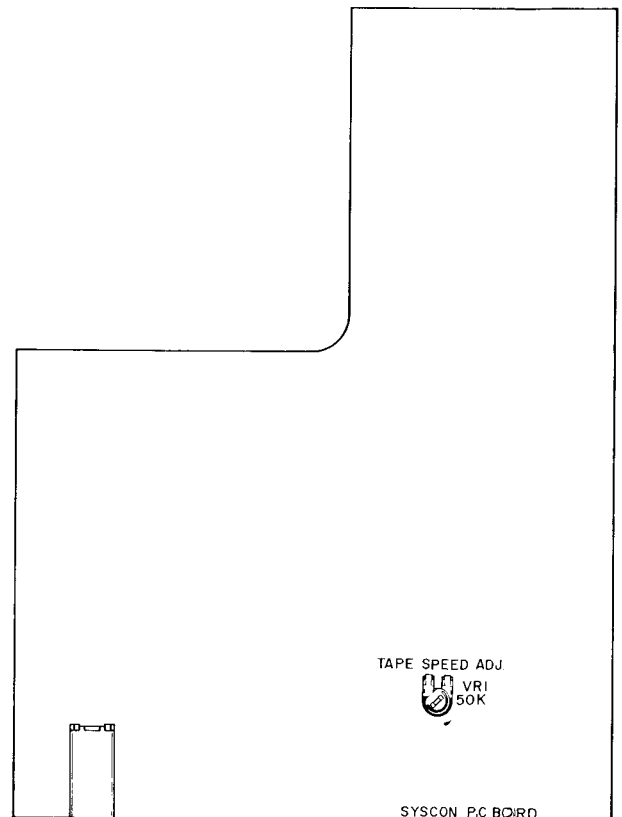


Fig. 6 Syscon P.C Board Adjustment Point

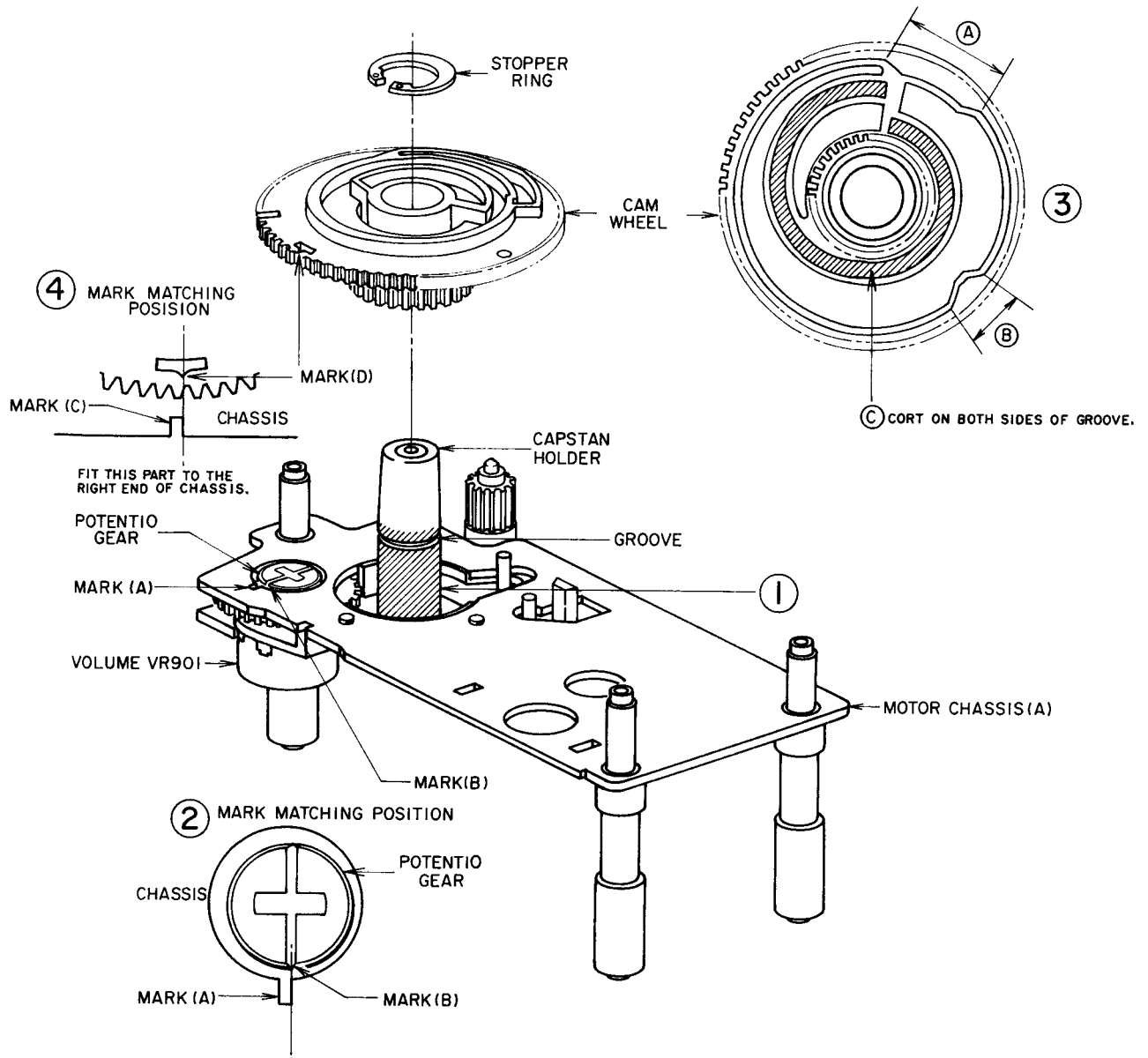


Fig. 7

3. HOW TO INSTALL VOLUME (VR901) AND CAM WHEEL

- 1) Apply Molybdenum coat on the capstan holder
Apply Molybdenum coat on the area of 360° from the bottom to the upside 2 mm of groove as shown in the figure. (Fig. 7-①)
- 2) Fitting position volume (potentio gear)
Fit the right end of Mark (A) to the center of Mark (B) as shown in the figure. (Fig. 7-②)
- 3) Apply Molybdenum coat on (A), (B) and (C) shown in Fig. 7-③.
- 4) Set the cam wheel on the capstan wheel
(Ensure that the cam wheel and potentiometer gear are

meshed properly). When the cam wheel is set properly, fit the center of Mark (D) to the right end of Mark (C). (Fig. 7-④)

- 5) Fit the stopper ring in the groove of the capstan holder.

CAUTIONS:

1. Make sure that the teeth on the periphery of cam wheel and the cam are absolutely free from any scratch, flaw, cut, etc.
2. Make sure that Molybdenum coat is applied on the specified area only.

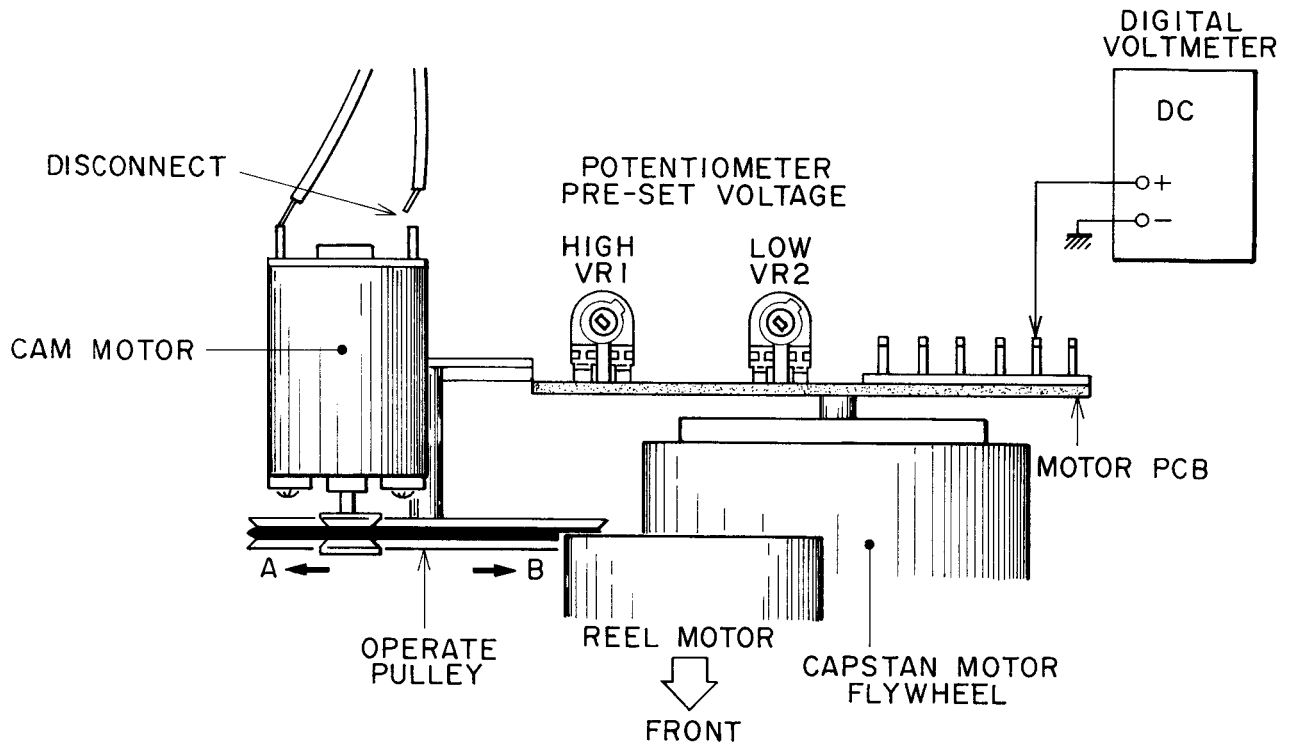


Fig. 8-1

4. POTENTIOMETER PRESET VOLTAGE ADJUSTMENT

1) LOW VOLTAGE ADJUSTMENT

- a. With power OFF, remove the connecting cord of the cam motor and turn the operate pulley fully with your fingers in A direction.
- b. Connect the digital voltmeter as shown in Fig. 8-1.
- c. With power ON, adjust VR2 so that the voltage reading will be 0.78V (DC).

2) HIGH VOLTAGE ADJUSTMENT

- a. With power OFF, turn the operate pulley fully with your fingers in B direction.
- b. With power ON, adjust VR1 so that the voltage reading will be 6.73V (DC).

3) Repeat Items 1) and 2).

- 4) a. With Power OFF, connect the connecting cord of the motor.
- b. Remove the digital voltmeter.

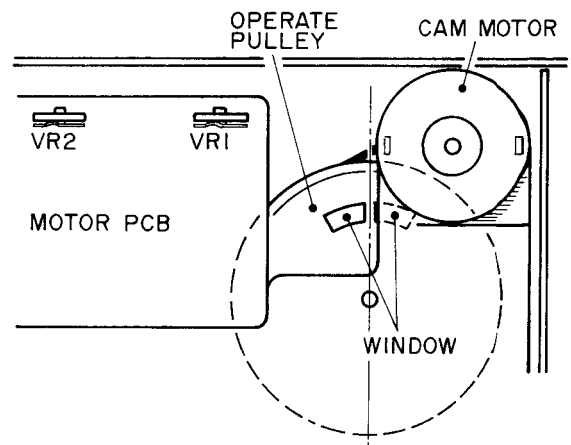


Fig. 8-2 Position of Operate Pulley in STOP Mode

- 5) a. Set power to ON.
- b. Adjust VR1 slightly so that a center line between windows of the operate pulley will face directly above during STOP Mode. (Fig. 8-2)
- c. Remove the cassette lid and set the AUTO SYSTEM switch to IPLS Mode.
- d. Confirm that the head and pinch roller do not move up and down when the FF and REW switches are alternately depressed.
- e. Turn the reel with fingers in STOP Mode to check that the brake works sufficiently. When the brake acts normally, the take-up reel does not turn clockwise while the supply reel does not rotate counterclockwise.

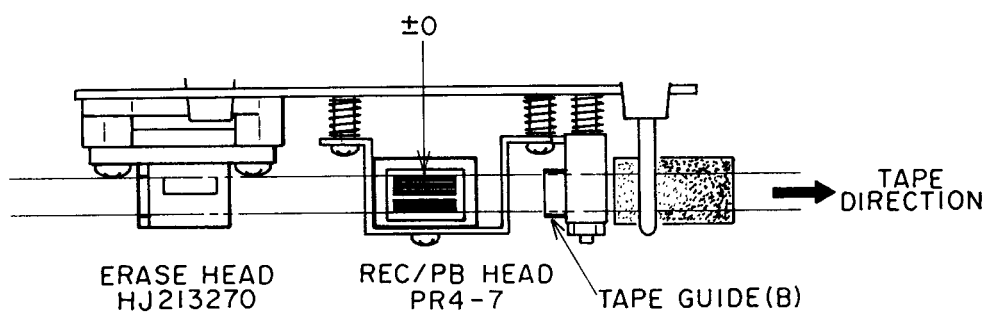
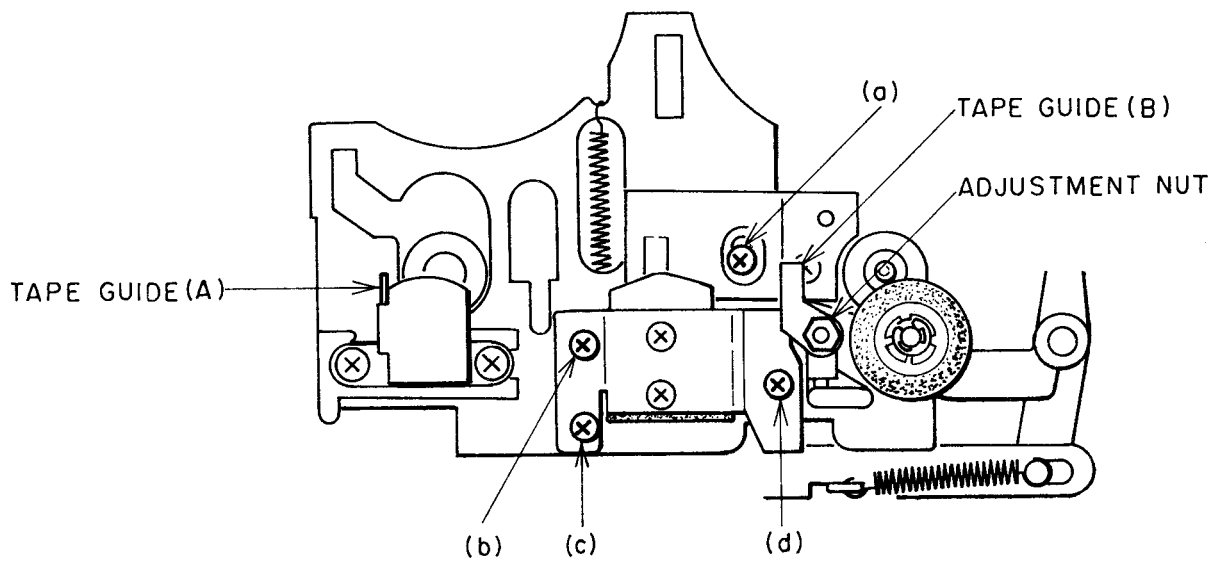


Fig. 9

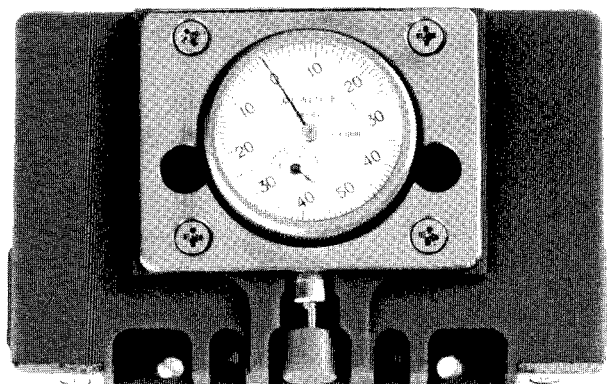


Fig. 10 Cassette Head Projection Gauge (TF-111CJ)



Fig. 11 Mirror Cassette Tape (TF-109CM)

1. REC/PB HEAD PROJECTION

ADJUSTMENT

Set the cassette head projection gauge (TF-111CJ) and set to PLAY mode. Loosen the screw (a) and adjust so that the gauge indication at that time will be 3.2 ± 0.05 mm. After adjustment, apply paintlock on the screw (a).

2. TAPE GUIDE HEIGHT ADJUSTMENT

- 1) Set the mirror cassette tape (TF-109CM) and set to PLAY mode.
- 2) Using the tape guide (A) as reference height, adjust the tape guide (B) so that the tape runs smoothly and is not hitched by the tape guide. For the adjustment, use the adjustment nut. After adjustment, apply paintlock on the adjustment nut.

3. REC/PB HEAD HEIGHT ADJUSTMENT

- 1) Set the mirror cassette tape and set to PLAY mode.
- 2) Adjust screws (b), (c) and (d) so that the upper edge of the REC/PB head L-ch core is in alignment with the upper side of the tape.
- 3) Playback the head height adjustment tape (4Tr 1,000 Hz) (TF-103CF) and fine-adjust the screws (b), (c) and (d) so that the largest output is obtained for both channels.

4. REC/PB HEAD AZIMUTH

ALIGNMENT ADJUSTMENT

- 1) Playback a 10 kHz head azimuth alignment tape (TF-106CH) and adjust the screw (d) until the output level of both channels is maximum.
- 2) After adjustment, better to check again head height and azimuth alignment.
- 3) After adjustment, paintlock the screws (b), (c) and (d).

NOTES:

1. Be sure to clean the heads prior to head adjustment.
2. Be careful not to use a magnetized driver or other magnetized tools in the vicinity of the heads.
3. Be sure to demagnetize the heads with a Head Demagnetized before and after head adjustment.

VII. AMPLIFIER ADJUSTMENT

* ↻ direction increases the level (bias will be shallower)

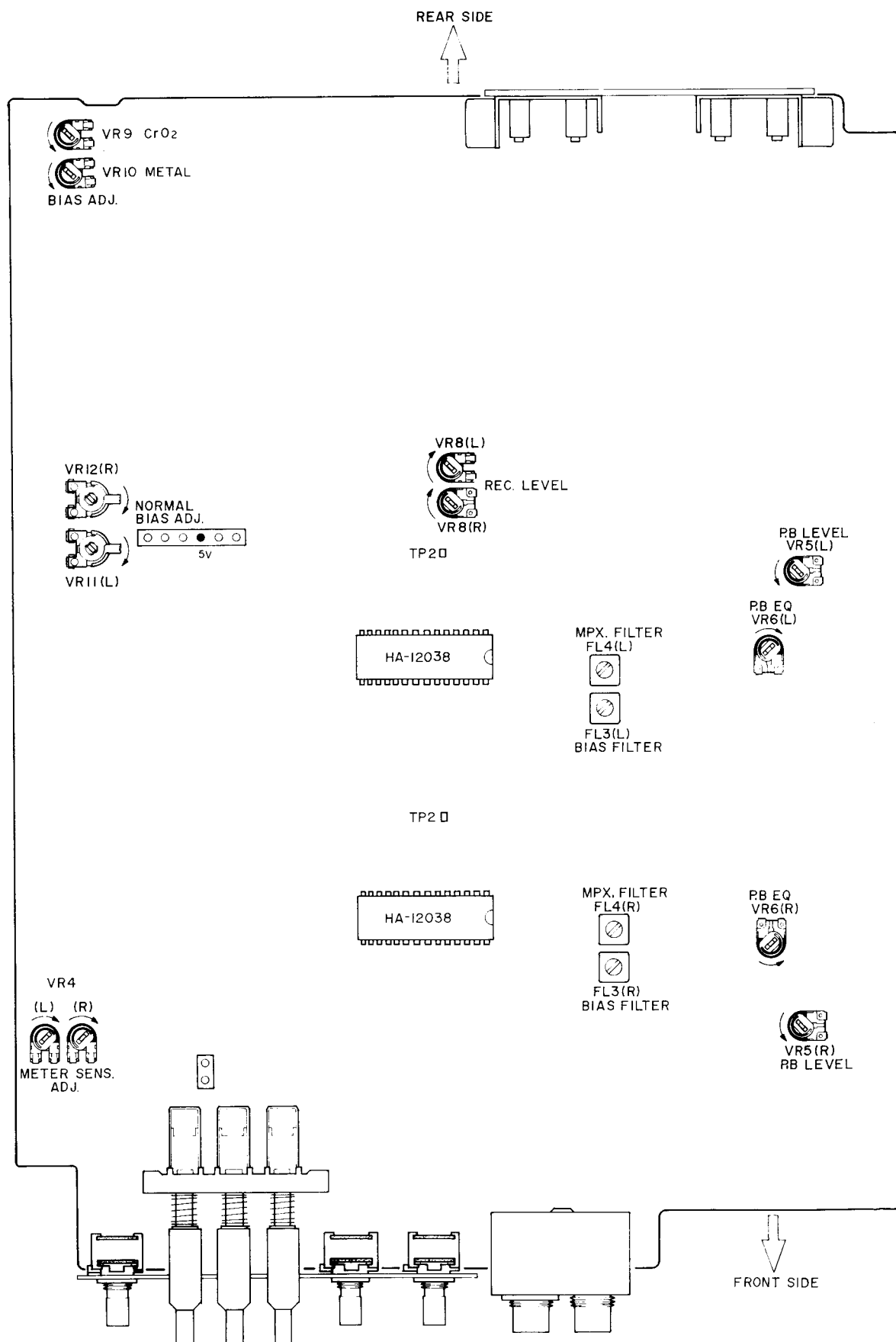


Fig. 12 Pre-Amp P.C Board Adjustment Point

Step	Adjustment Item	Test Tape Supply Signal	Mode	Adjustment Parts	Result	Remarks
1	PB Level	333 Hz (TF-101CL)	PB	VR5	-5.5 ± 0.2 dBm (410 mV)	
2	PB EQ	10 kHz (TF-106CH)	PB	VR6	-22.5 ± 1.5 dBm	
3	Normal Position Frequency Response	Normal Blank Tape 1 kHz, 10 kHz -22.5 dBm	REC/PB	VR11	1 kHz to 10 kHz flat response	
4	CrO ₂ Position Frequency Response	CrO ₂ Blank Tape 1 kHz, 10 kHz -25.5 dBm	REC/PB	VR9	1 kHz to 10 kHz flat response	
5	Metal Position Frequency Response	Metal Blank Tape 1 kHz, 10 kHz -25.5 dBm	REC/PB	VR10	1 kHz to 10 kHz flat response	
6	REC Level	Normal Blank Tape 1 kHz, -5.5 dBm	REC/PB	VR8	-5.5 ± 0.3 dBm (410 mV)	
7	MPX Filter	19 kHz from oscillator	REC	FL4	Minimum Output	MPX Filter ON
8	Bias Filter	No Signal Input	REC	FL3	Minimum Output	Set REC Volume to maximum
9	Meter Sensitivity	1 kHz, -5.5 dBm from oscillator	REC	VR4	0 dB Indication	+1VU puts out the light in Line out -5.2 dBm

NOTES: 1. Except for Step 7 set MPX Filter Switch to OFF Position.

2. Use the following cassette measuring tapes:

Normal Tape : Maxell UD C-60

CrO₂ Tape : TDK SA C-60

Metal Tape : TDK MA-C C-60

For your reference:

Confirmation of Dolby level

1) Set to REC/PAUSE.

2) Input a signal of 400 Hz and adjust the input level so that the level of pin ② of Dolby I.C (HA-12038) will be 580 mV when Dolby NR is OFF.

3) Check that the level of TP-2 is 580 mV.

VIII. DC RESISTANCE OF HEADS

GX-F31

Description	Name	DC Resistance
REC/PB Head	PR4-7	650 ohms \pm 10%
Erase Head	HJ213270	3.5 ohms

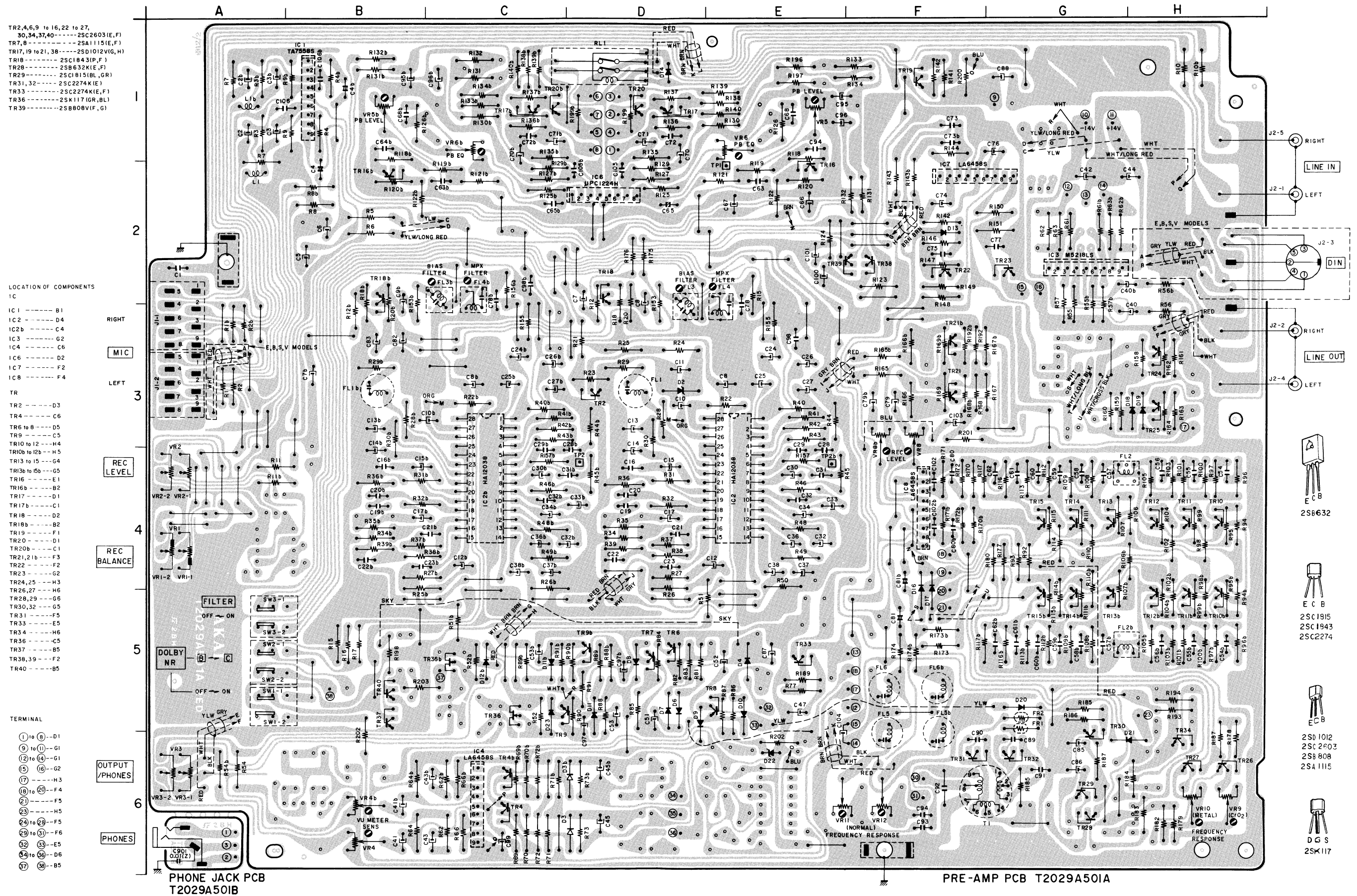
IX. CLASSIFICATION OF VARIOUS P.C BOARDS

1. P.C BOARD TITLES AND IDENTIFICATION NUMBERS

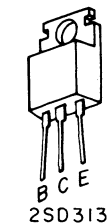
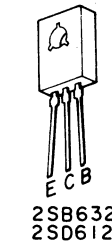
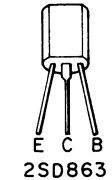
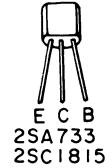
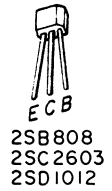
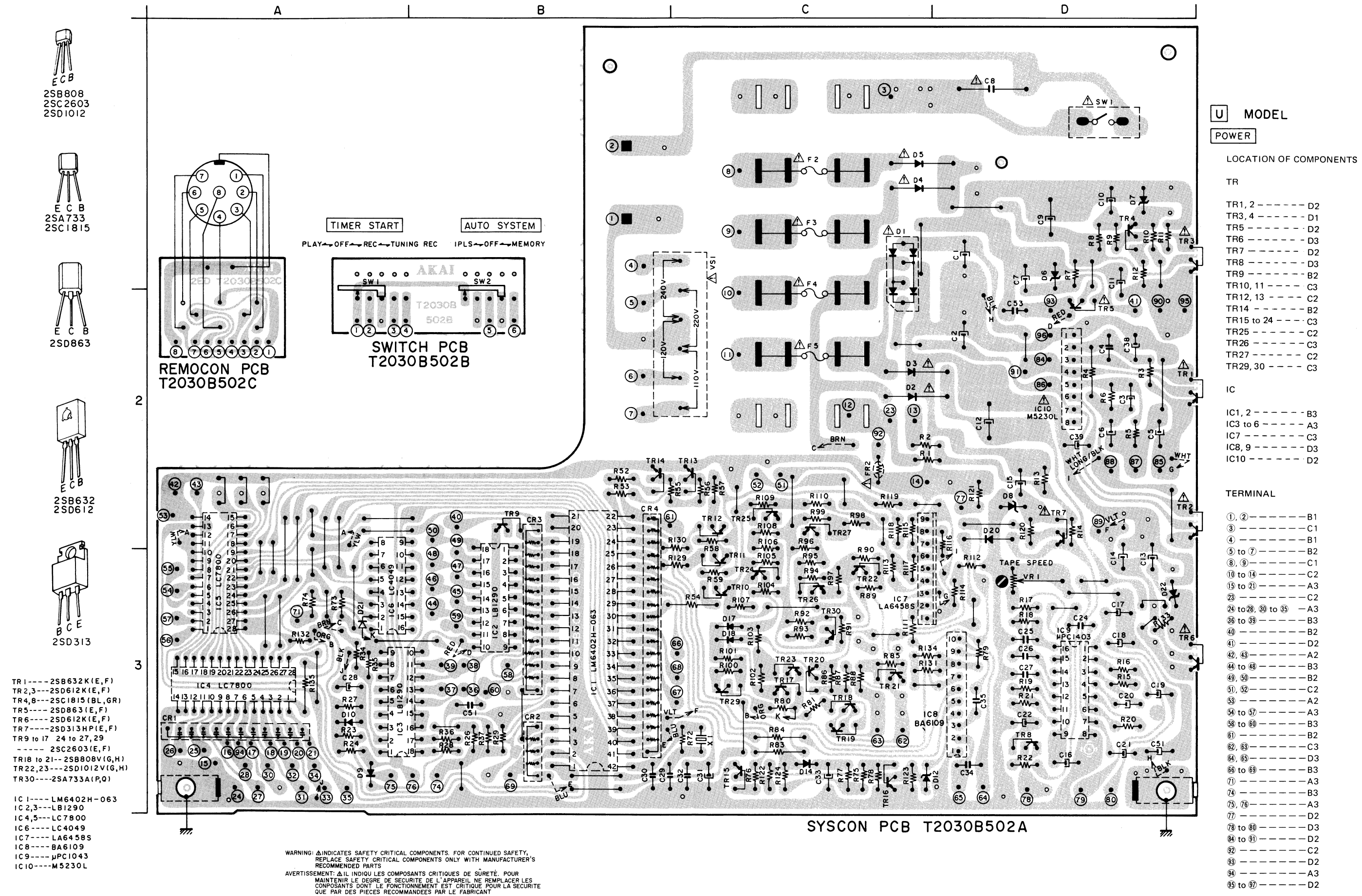
P.C Board Title	P.C Board Number
Pre Amp P.C Board	T2029A501A
Phone Jack P.C Board	T2029A501B
Syscon P.C Board	T2030B 502A
Switch P.C Board	T2030B502B
Remocon P.C Board	T2030B502C
Meter/Operate P.C Board	T2030B5030
Motor P.C Board	M3103C726A
Potention P.C Board	M3103C726B
FG P.C Board	M3103C7130
Filter P.C Board	T2029D5040
Detector P.C Board	T2029D5030
Micro SW P.C Board	T2029D5020

2. COMPOSITION OF VARIOUS P.C BOARDS

1) PRE AMP P.C BOARD T2029A501A (2ED) and PHONE JACK P.C BOARD T2029A501B



2) SYSCON P C BOARD T2030B502A (3ED), SWITCH P.C BOARD T2030B502B and REMOCON P.C BOARD T2030B502C (2ED)



- TR1----25B632K(E,F)
- TR2,3---25D612K(E,F)
- TR4,8---25C1815(BL,GR)
- TR5----25D863(E,F)
- TR6----25D612K(E,F)
- TR7----25D313HP(E,F)
- TR9 to 17 24 to 27,29
-----25C2603(E,F)
- TR18 to 21---25B808V(G,H)
- TR22,23---25D1012V(G,H)
- TR30---25A733A(P,Q)

- IC 1----LM6402H-063
- IC 2,3---LB1290
- IC 4,5---LC7800
- IC 6----LC4049
- IC 7----LA6458S
- IC 8----BA6109
- IC 9----μPC1043
- IC 10---M5230L

WARNING: Δ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.
 AVERTISSEMENT: Δ IL INDIQUÉ LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SÛRETÉ DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÛRETÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT.

U MODEL
POWER

LOCATION OF COMPONENTS

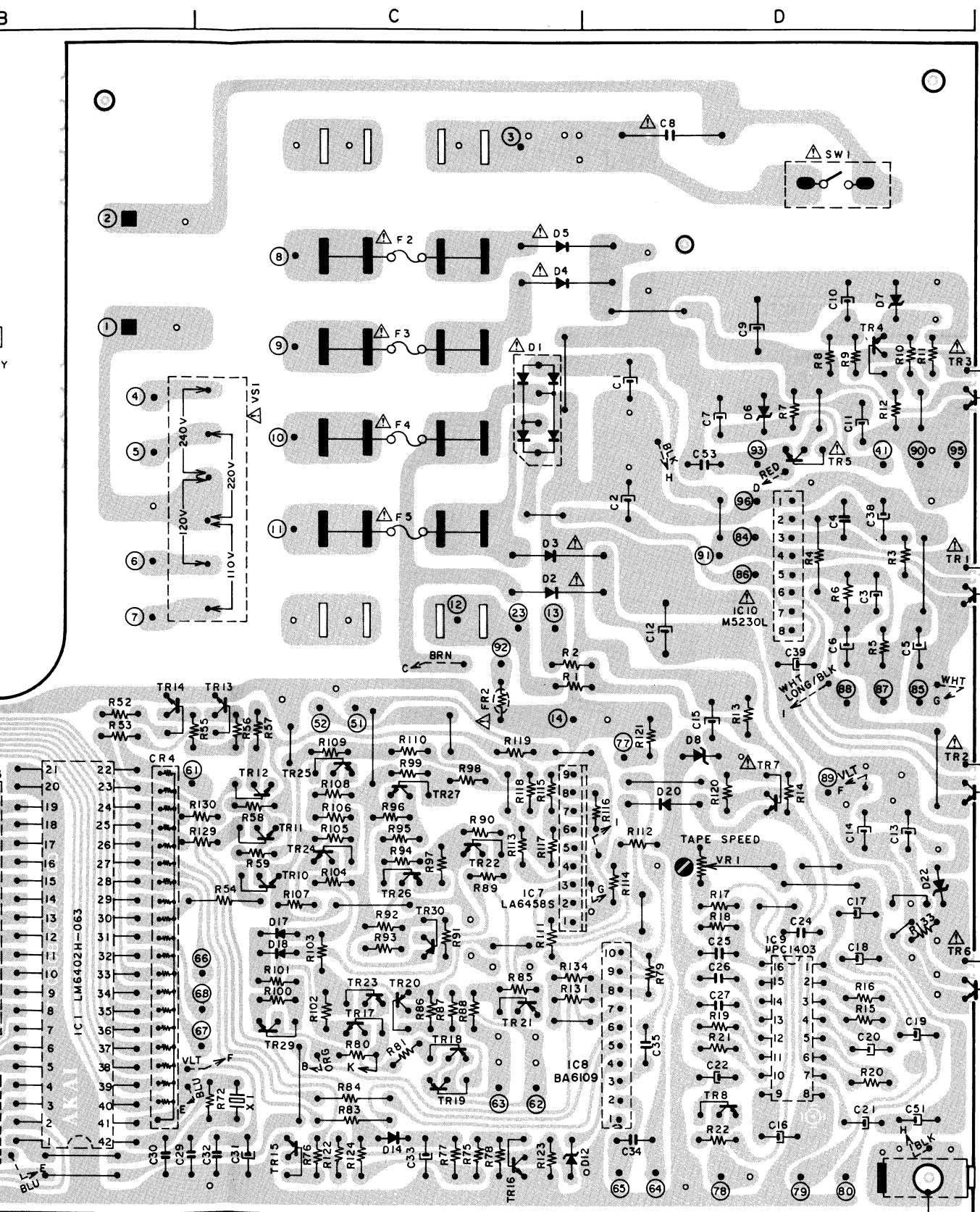
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- TR1, 2 ----- D2
 - TR3, 4 ----- D1
 - TR5 ----- D2
 - TR6 ----- D3
 - TR7 ----- D2
 - TR8 ----- D3
 - TR9 ----- B2
 - TR10, 11 ----- C3
 - TR12, 13 ----- C2
 - TR14 ----- B2
 - TR15 to 24 ----- C3
 - TR25 ----- C2
 - TR26 ----- C3
 - TR27 ----- C2
 - TR29, 30 ----- C3

- IC
- IC1, 2 ----- B3
 - IC3 to 6 ----- A3
 - IC7 ----- C3
 - IC8, 9 ----- D3
 - IC10 ----- D2

TERMINAL

- ① ② ----- B1
- ③ ----- C1
- ④ ----- B1
- ⑤ to ⑦ ----- B2
- ⑧, ⑨ ----- C1
- ⑩ to ⑭ ----- C2
- ⑮ to ⑳ ----- A3
- ㉑ ----- C2
- ㉒ to ㉓, ㉔ to ㉕ ----- A3
- ㉖ to ㉗ ----- B3
- ㉘ ----- B2
- ㉙, ㉚ ----- A2
- ㉛ to ㉜ ----- B3
- ㉝, ㉞ ----- B2
- ㉟ ----- C2
- ㊱ to ㊲ ----- A2
- ㊳ to ㊴ ----- A3
- ㊵ to ㊶ ----- B3
- ㊷ ----- B3
- ㊸, ㊹ ----- A3
- ㊺ to ㊻ ----- D3
- ㊼ to ㊽ ----- D2
- ㊾ ----- D2
- ㊿ ----- A3
- ① to ② ----- D2

CON P.C BOARD T2030B502C (2ED)



SYSCON PCB T2030B502A

U MODEL
POWER

LOCATION OF COMPONENTS

TR

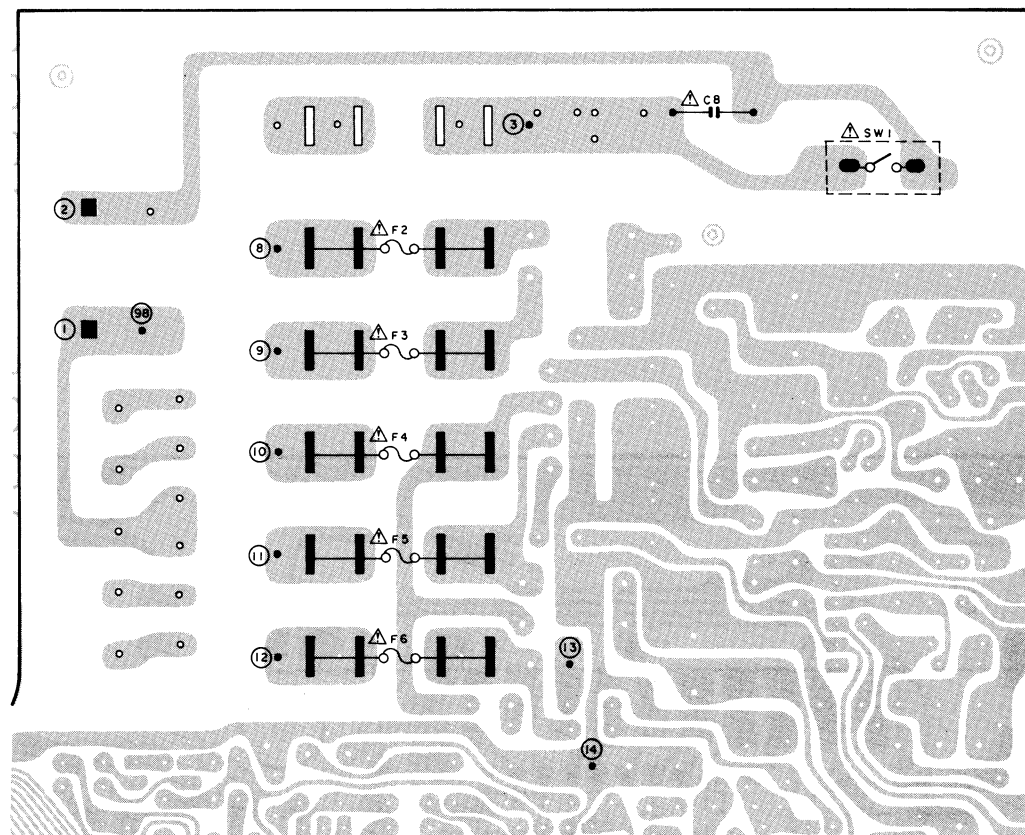
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- TR5 ----- D2
- TR6 ----- D3
- TR7 ----- D2
- TR8 ----- D3
- TR9 ----- B2
- TR10, 11 ----- C3
- TR12, 13 ----- C2
- TR14 ----- B2
- TR15 to 24 ----- C3
- TR25 ----- C2
- TR26 ----- C3
- TR27 ----- C2
- TR29, 30 ----- C3

IC

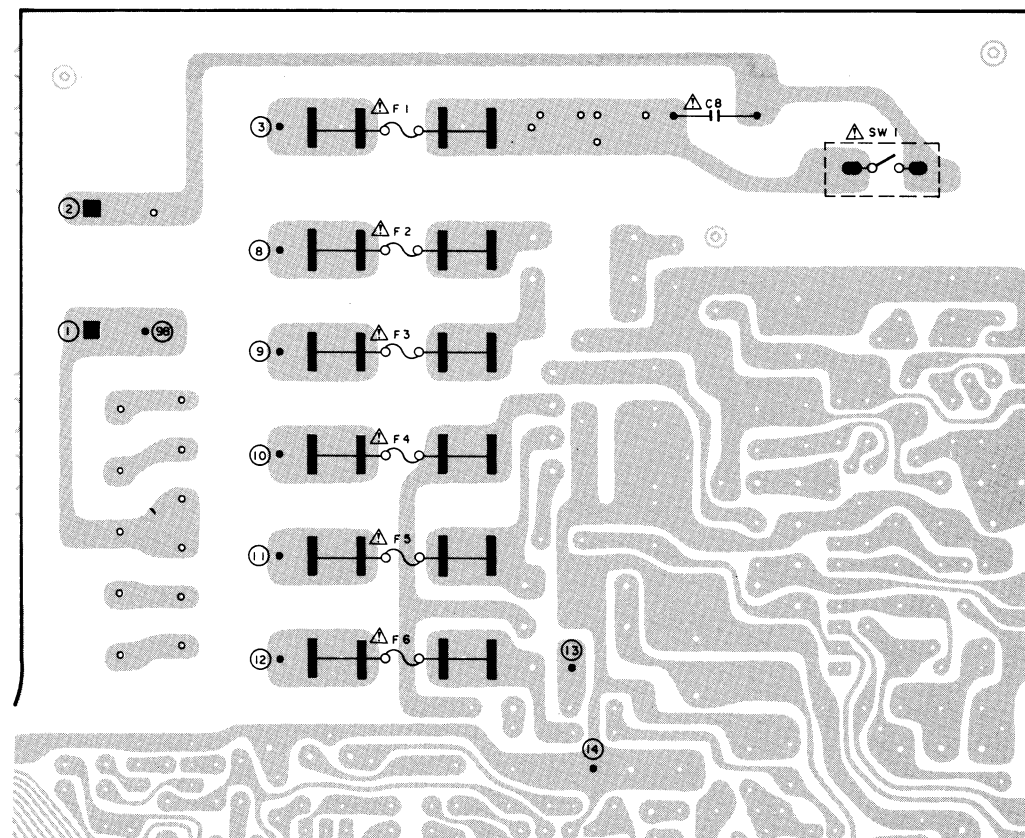
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- IC8, 9 ----- D3
- IC10 ----- D2

TERMINAL

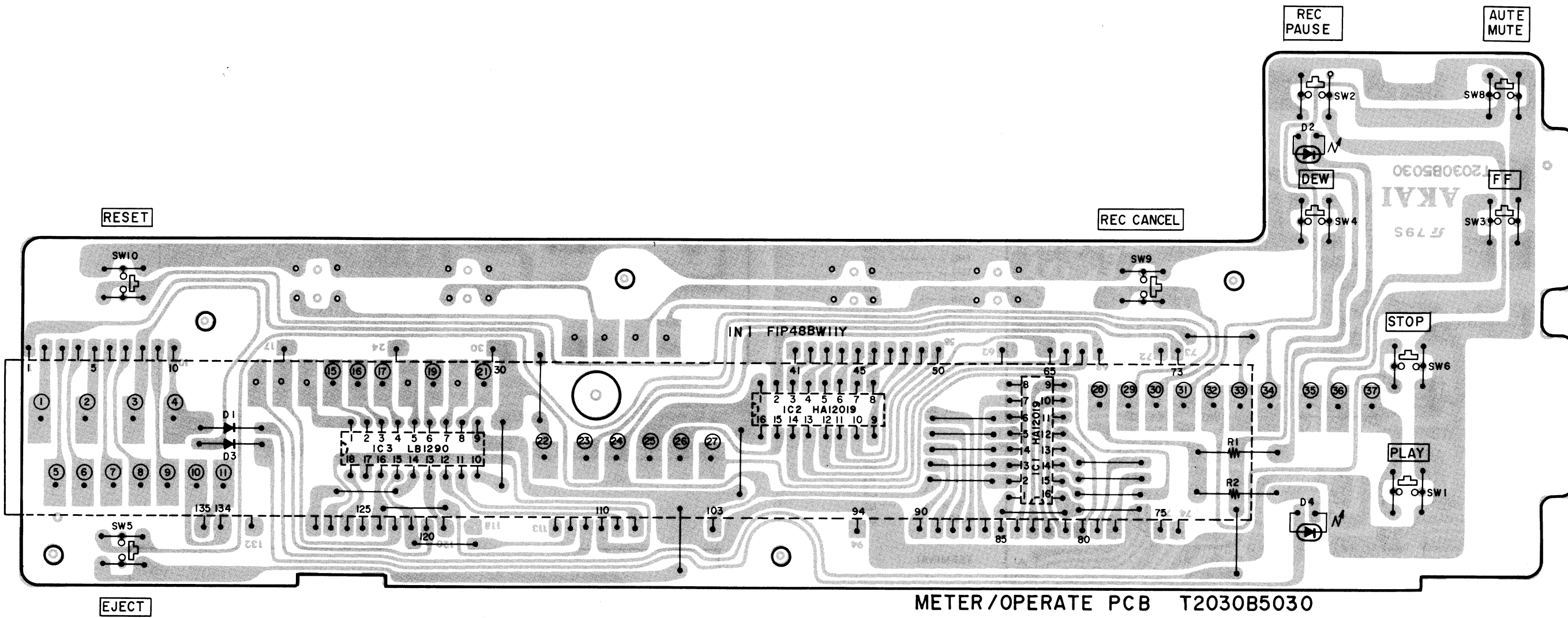
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- ③ ----- C1
- ④ ----- B1
- ⑤ to ⑦ ----- B2
- ⑧, ⑨ ----- C1
- ⑩ to ⑭ ----- C2
- ⑮ to ⑰ ----- A3
- ⑱ ----- C2
- ⑳ to ㉓, ㉔ to ㉗ ----- A2
- ㉘ ----- B2
- ㉙, ㉚ ----- C2
- ㉛ ----- A2
- ㉜ to ㉞ ----- A3
- ㉟ to ㊱ ----- B3
- ㊲ ----- B2
- ㊳, ㊴ ----- C3
- ㊵, ㊶ ----- D3
- ㊷ ----- A3
- ㊸ ----- B3
- ㊹, ㊺ ----- A3
- ㊻ ----- D2
- ㊼ to ㊾ ----- D3
- ㊿ to ① ----- D2
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- ③ ----- D2
- ④ ----- A3
- ⑤ to ⑦ ----- D2



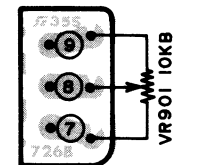
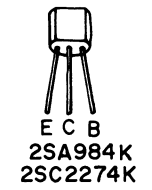
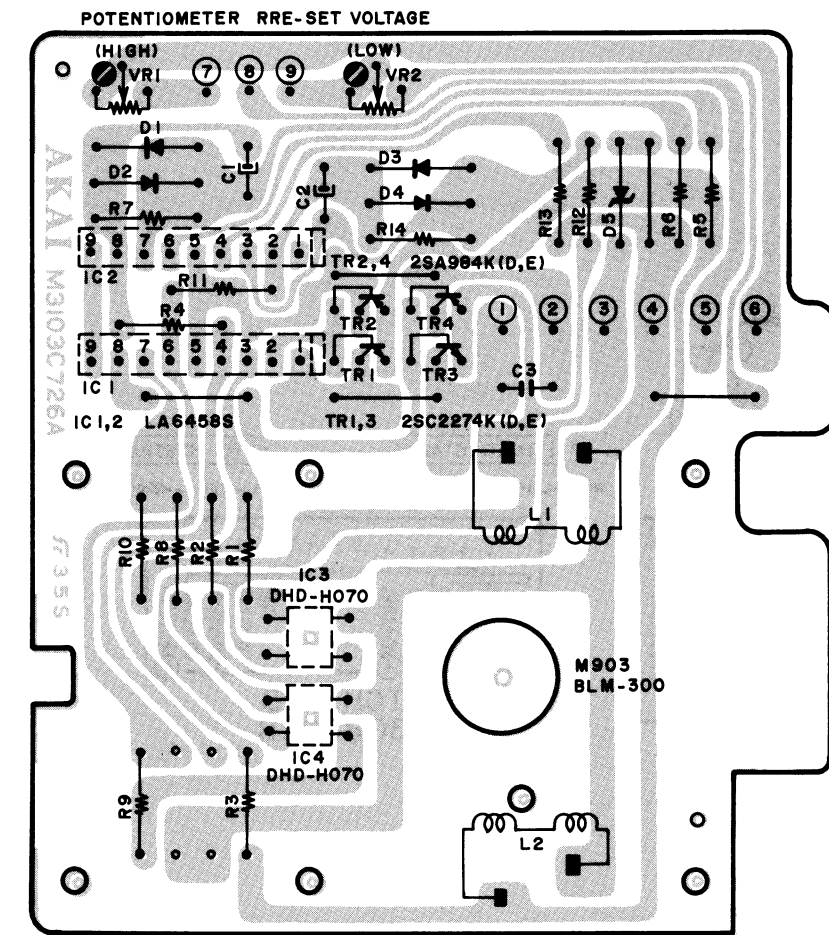
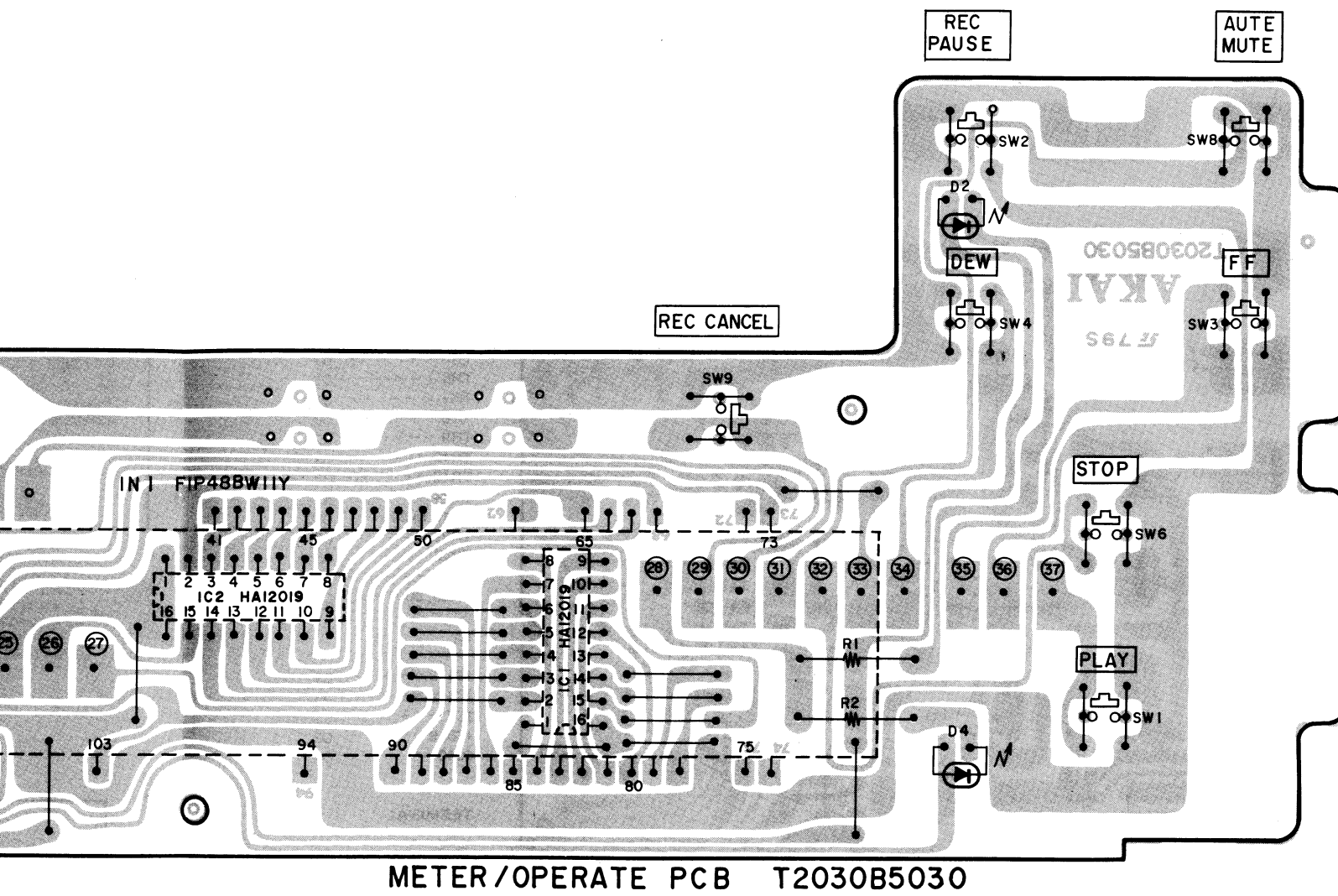
J,C,A,E,V,S MODEL
POWER



B MODEL
POWER

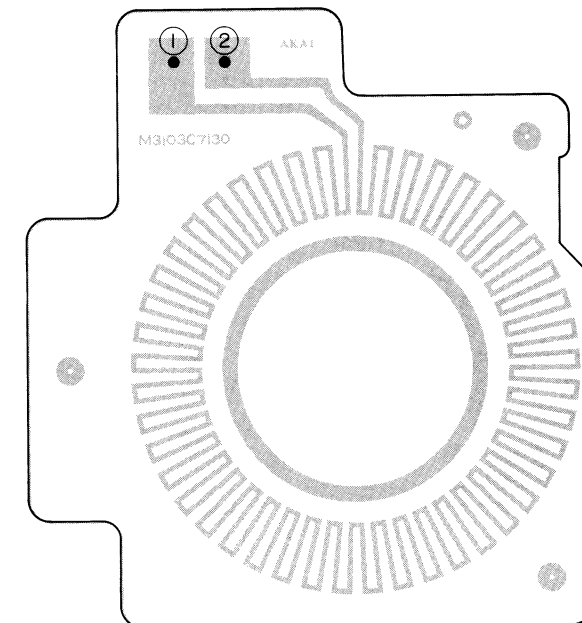


4) MOTOR P.C BOARD M3103C726A and POTENTION P.C BOARD M3103C726B

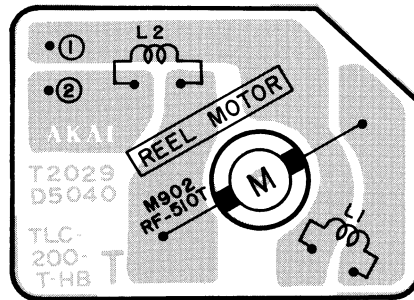


POTENTION PCB M3103C726B

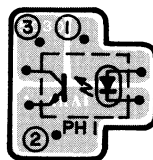
5) FG P.C BOARD M3103C7130



6) FILTER P.C BOARD T2029D5040



7) DETECTOR P.C BOARD T2029D5030



8) MICRO SW P.C BOARD T2029D5020

