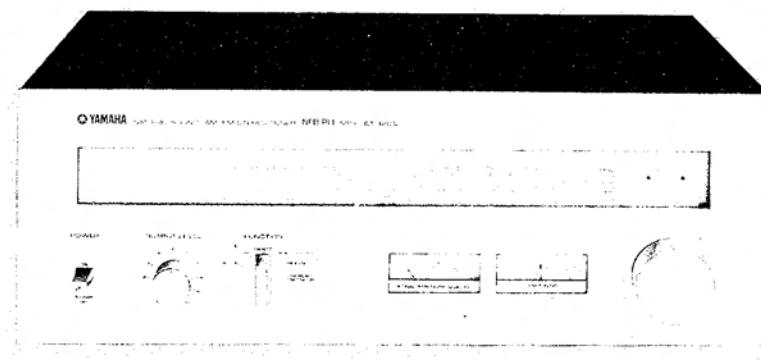


SERVICE MANUAL

CT-610 II

AM/FM STEREO TUNER



SINCE 1887



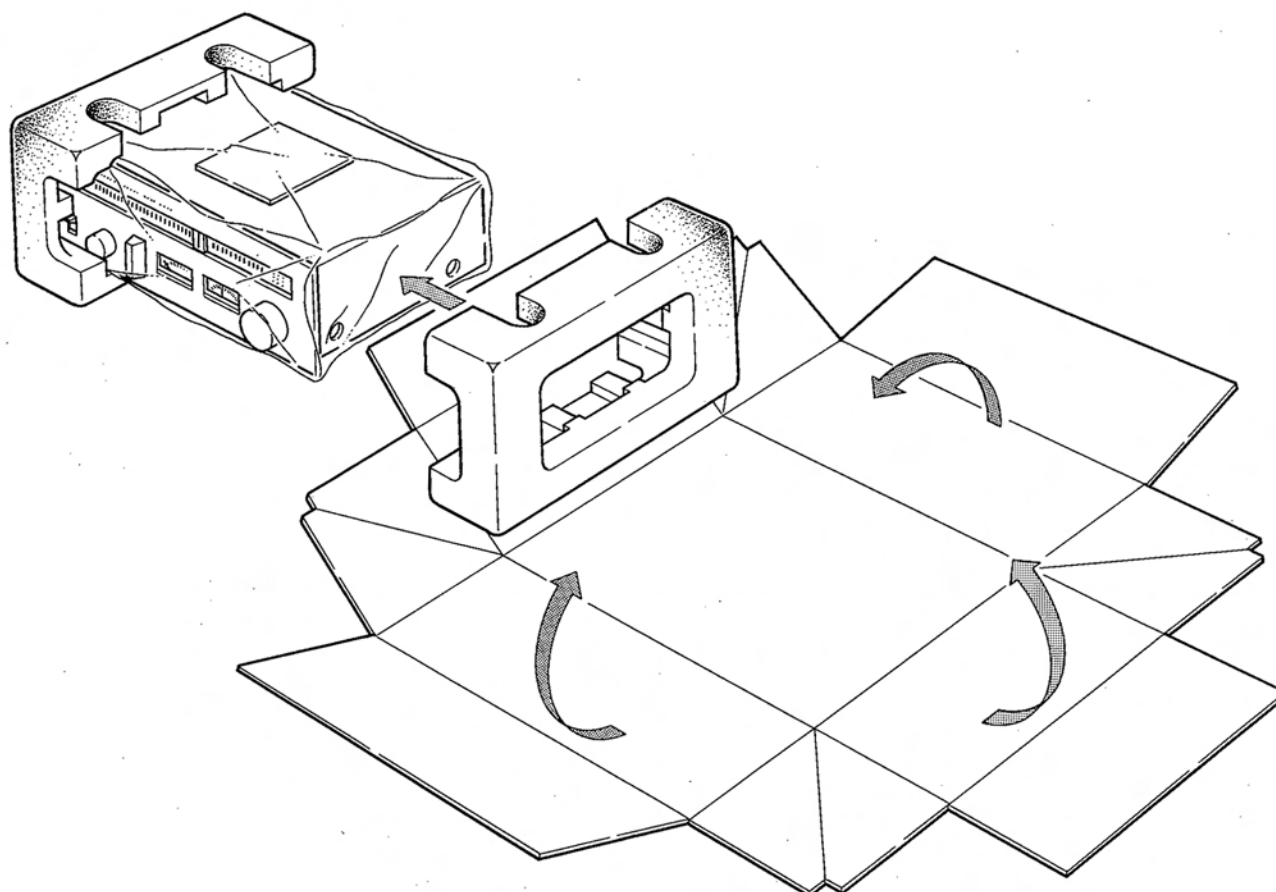
YAMAHA

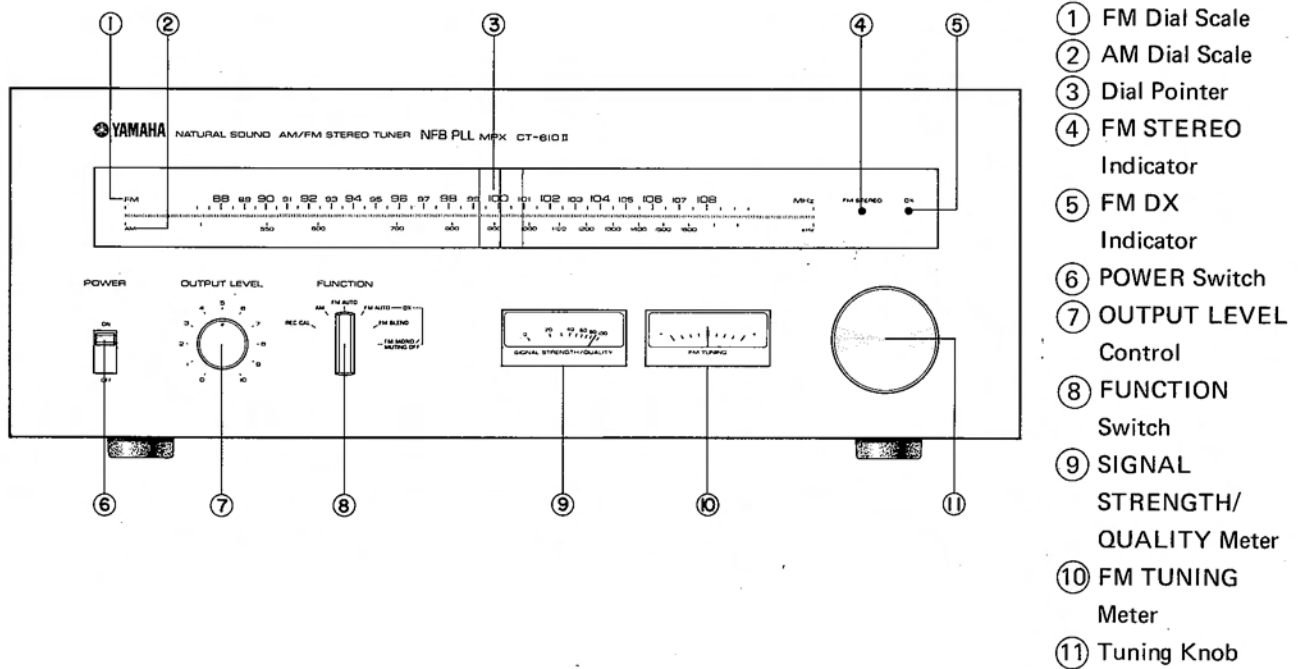
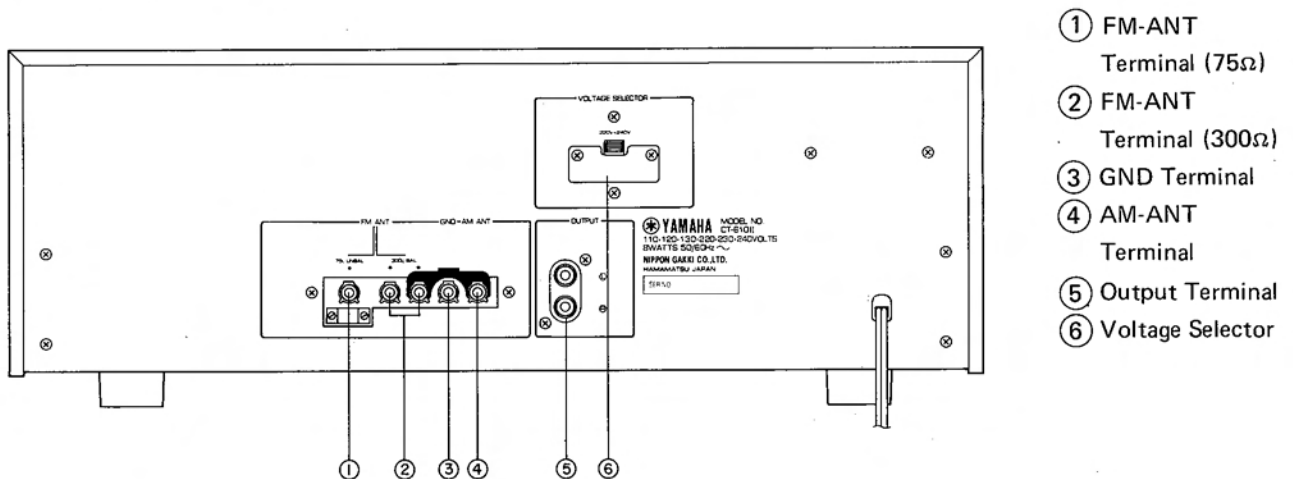
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

■CONTENTS

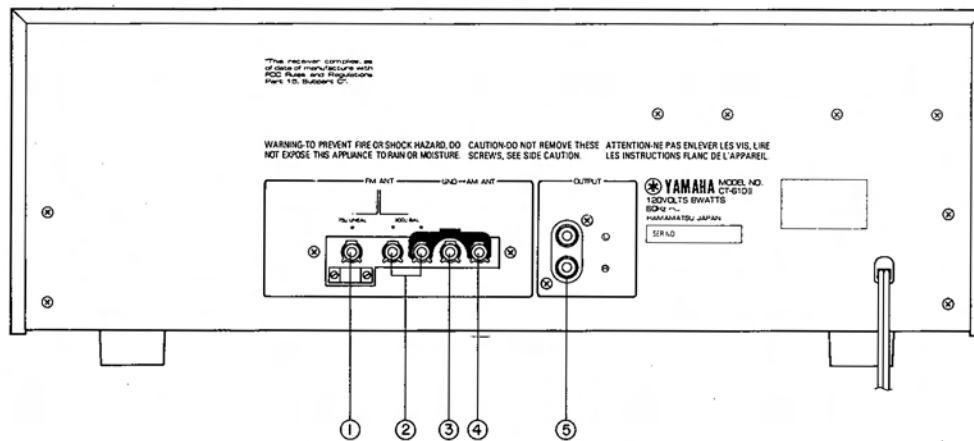
■ PACKAGE INSTRUCTION	1
■ PANEL OPERATION	
FRONT PANEL	2
REAR PANEL	2
■ DISASSEMBLY PROCEDURES	4
■ DIAL CORD STRINGING	5
■ BLOCK DIAGRAM	5
■ SPECIFICATIONS	6
■ ADJUSTING POINTS	6
■ PATTERN DIAGRAM	7
■ SCHEMATIC DIAGRAM	8
■ ADJUSTMENTS	
ADJUSTMENT OF FM SECTION	9
ADJUSTMENT OF AM & REC. CAL SECTION	10
■ PARTS LIST	11

■PACKAGE INSTRUCTION



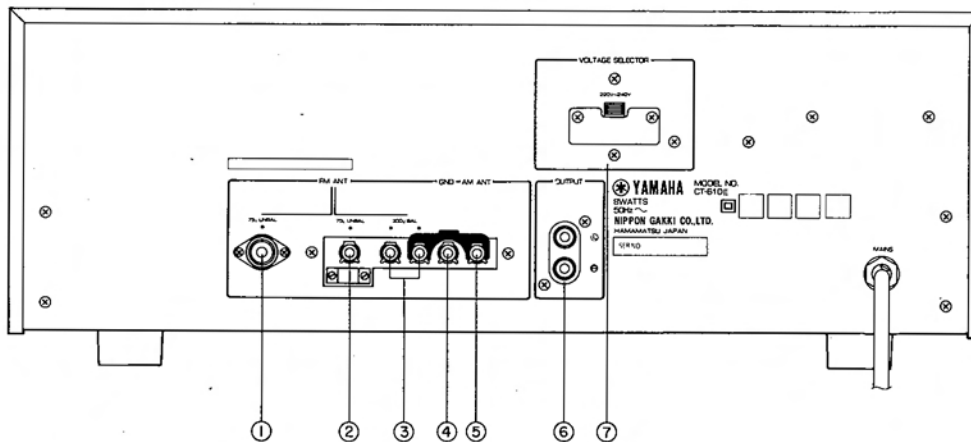
PANEL OPERATION**FRONT PANEL****REAR PANEL****General Export Model**

U.S.A. & Canadian Model



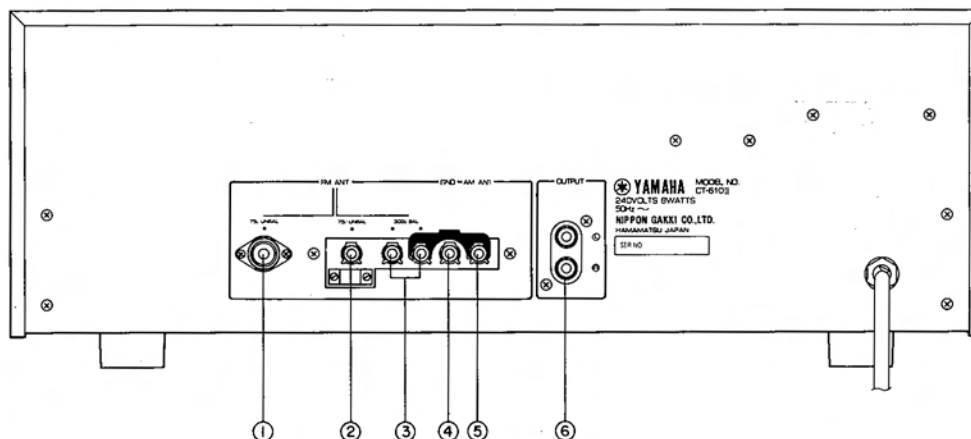
- ① FM-ANT Terminal (75Ω)
- ② FM-ANT Terminal (300Ω)
- ③ GND Terminal
- ④ AM-ANT Terminal
- ⑤ Output Terminal

British & European Model



- ① FM-ANT Connector (75Ω)
- ② FM-ANT Terminal (75Ω)
- ③ FM-ANT Terminal (300Ω)
- ④ GND Terminal
- ⑤ AM-ANT Terminal
- ⑥ Output Terminal
- ⑦ Voltage Selector

Australian Model



- ① FM-ANT Connector (75Ω)
- ② FM-ANT Terminal (75Ω)
- ③ FM-ANT Terminal (300Ω)
- ④ GND Terminal
- ⑤ AM-ANT Terminal
- ⑥ Output Terminal

■ DISASSEMBLY PROCEDURES

1. Cabinet Removal

Remove four screws (① and ②) on both sides of the cabinet and remove the cabinet. (See Photo 1)

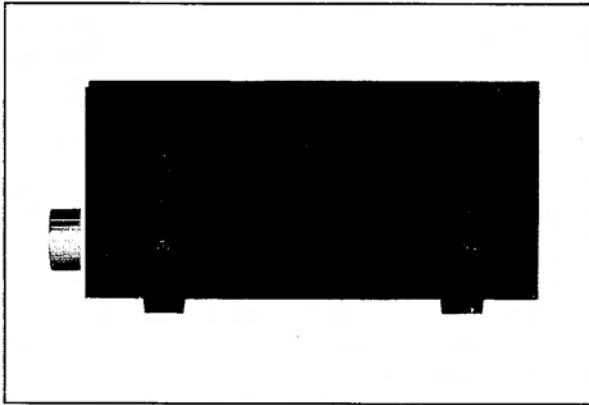


Photo. 1

2. Bottom Cover Removal

Remove tapping screws (① to ⑤) and remove the bottom cover. (See Photo 2)

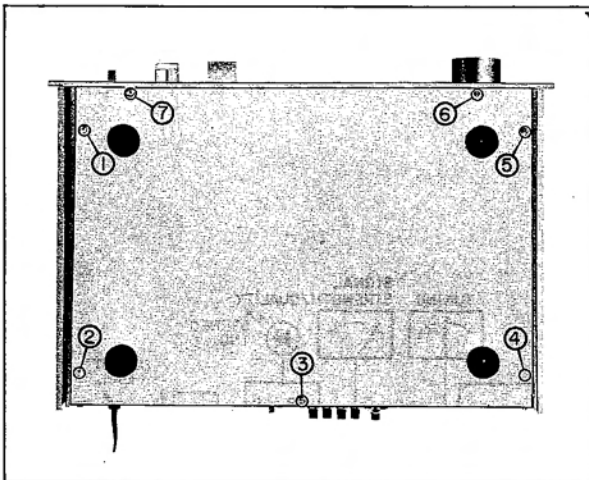


Photo. 2

3. Front Panel Removal

3.1 Remove the cabinet (see Item 1).

3.2 Remove the knobs on the front panel.

Pullout the OUTPUT LEVEL knob and tuning knob.

Pullout the FUNCTION knob after loosening screws with a hexagonal wrench.

3.3 Remove screws ⑥ and ⑦ shown in Photo 2 and screws ① and ② in Photo 3.

Photo 4 shows the unit disassembled according to the above instructions.

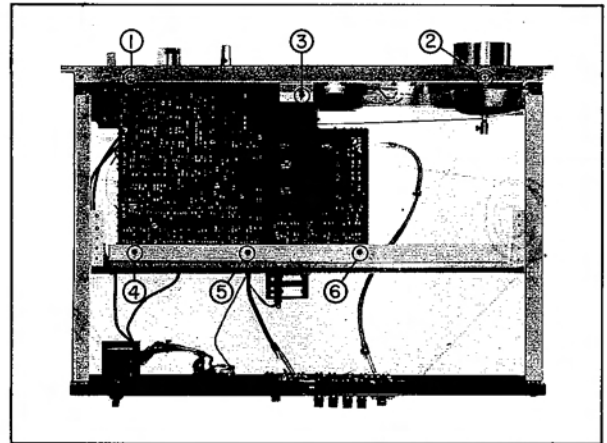


Photo. 3

4. Tuner C. Board Removal

4.1 Remove the cabinet and bottom cover (see Items 1 and 2).

4.2 Remove the front panel (see Item 3).

4.3 Loosen two set screw of the variable capacitor pulley and remove the pulley from of the variable capacitor shaft. For easier handling, taking the pulley and the dial thred away binding them with wire etc. as illustrated in Fig. 1.

4.4 Remove plastic rivets ③ to ⑥ shown in Photo 3. In this case, as illustrated in Fig. 2, push out the core (①) from the opposite side, then remove the outer part (②).

4.5 Remove hexagon nuts ① to ③ and the power switch lever ④ in Photo 4, then remove screws.

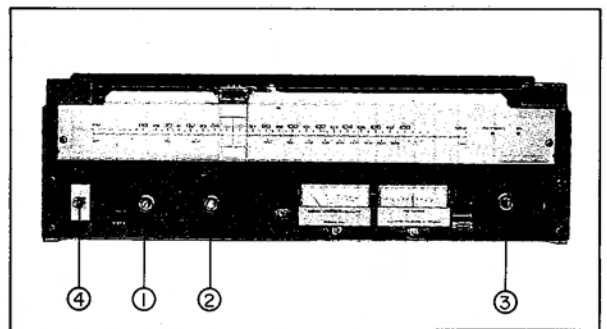


Photo. 4

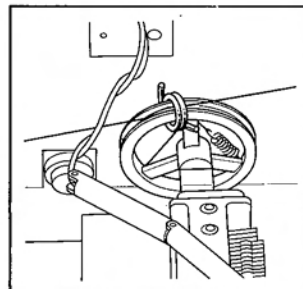


Fig. 1

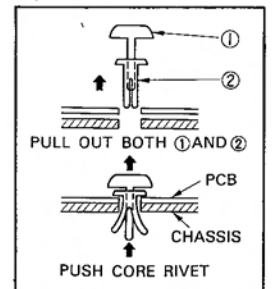
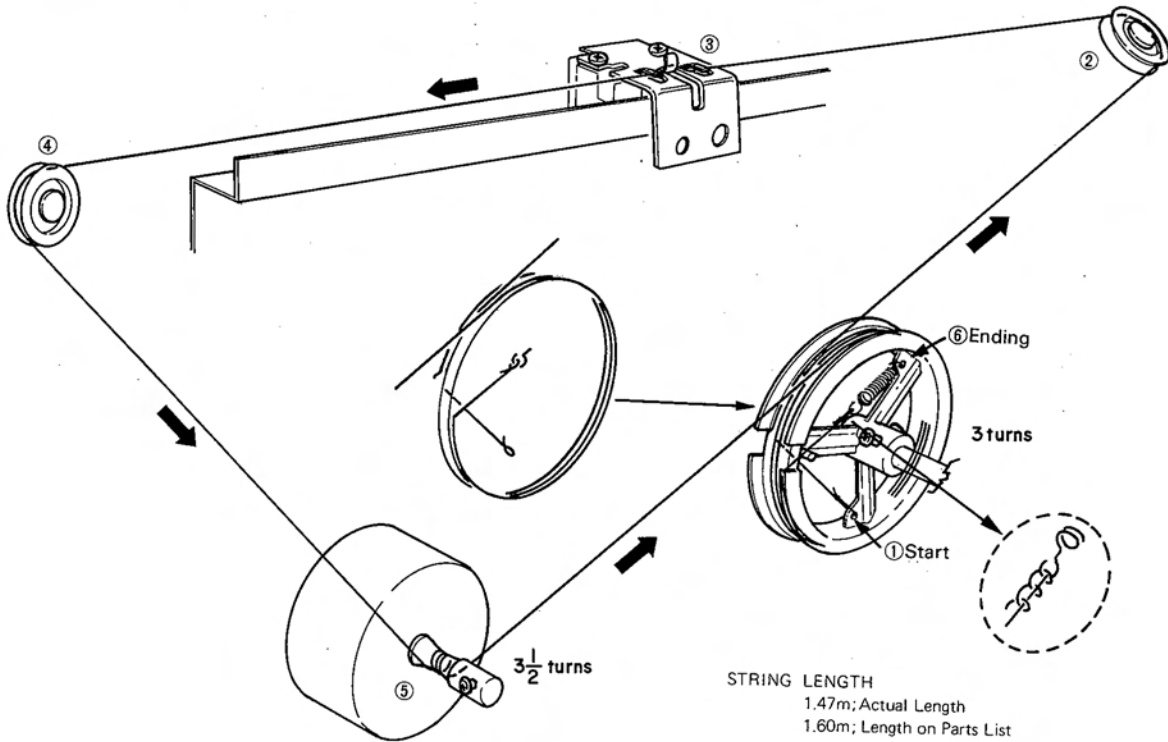
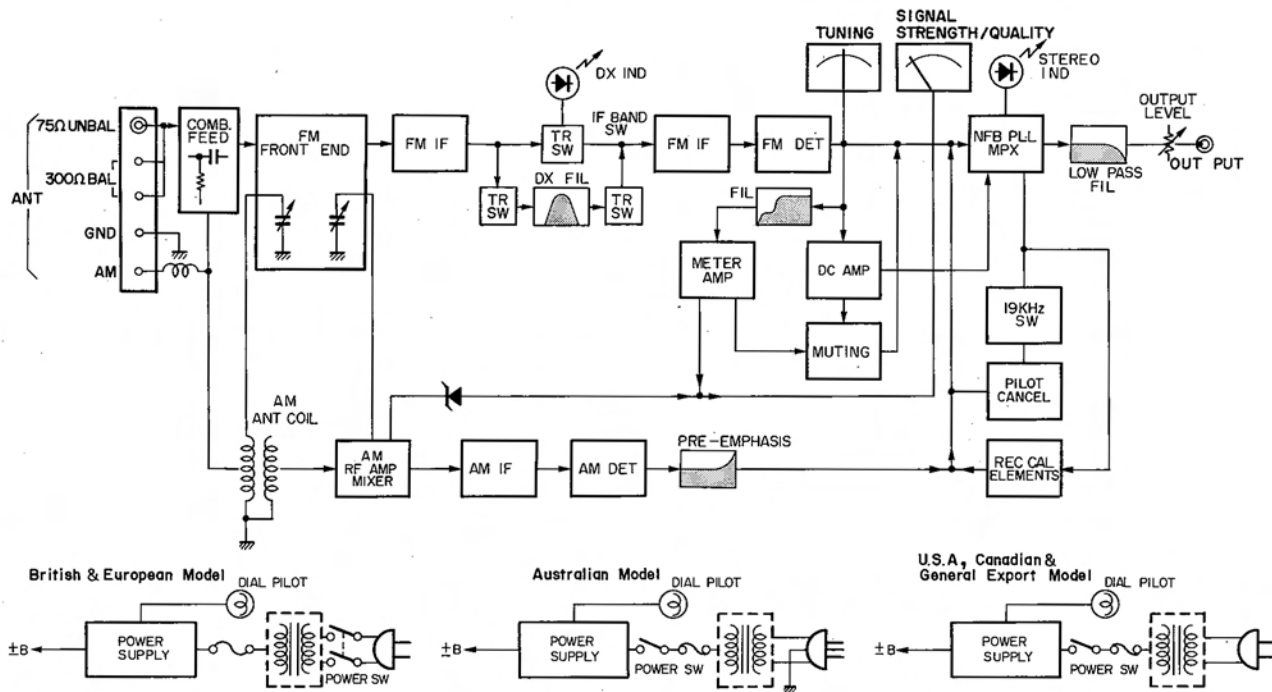


Fig. 2

DIAL CORD STRINGING



BLOCK DIAGRAM



SPECIFICATIONS

FM SECTION

Tuning Range 87.6MHz to 108MHz
Usable Sensitivity
IHF MONO(98MHz) .. 1.6 μ V(300 Ω)9.3dBf
0.8 μ V(75)9.3dBf
DIN MONO(Dev;40kHz,S/N;26dB) .. 1.2 μ V
STEREO(-do.-) 40 μ V

50dB Quieting Sensitivity

MONO 3 μ V(14.8dBf)
STEREO 40 μ V(37.2dBf)
Image Response Ratio(98MHz) 55dB
IF Response Ratio(98MHz) 80dB
Spurious Response Ratio(98MHz) 75dB
AM Suppression Ratio(IHF) 65dB
Capture Ratio 1dB

Alternate Channel Selectivity

DX 85dB, DIN(Dev; $\pm$ 300kHz 40kHz);
60dB
NORMAL 55dB, DIN(Dev; $\pm$ 300kHz
40kHz); 30dB

Signal-to-Noise Ratio

MONO 80dB, DIN(Dev;40kHz);74dB
STEREO..... 75dB, DIN(Dev;40kHz);69dB

Distortion

MONO 100Hz 0.07%
1kHz 0.1%
6kHz 0.2%
STEREO 100Hz 0.1%
1kHz 0.1%
6kHz 0.2%

Intermodulation Distortion

IHF MONO 0.1%
STEREO 0.2%

Stereo Separation

1kHz 45dB
50Hz 40dB
10kHz 40dB

Frequency Response

50 to 10,000Hz $\pm$ 0.5dB
30 to 15,000Hz $\pm$ 0.5 dB
10 to 18,000Hz $\pm$ 0.5 dB
Sub-carrier Suppression Ratio 45dB
Muting Signal Level 5 μ V 18.2dBf

AM SECTION

Tuning Range 525 to 1605kHz
Usable Sensitivity(IHF) 18 μ V
Selectivity(1000kHz) 25dB
Signal-to-Noise Ratio 50dB
Image Response Ratio(1000kHz) 40dB
Spurious Response Ratio(1000kHz) ... 50dB
Total Harmonic Distortion 0.4%

AUDIO SECTION

Output Level/Impedance(1kHz)
FM(100%Modulation) 0.1 to 1V/5k Ω
(VR min to max)
500mV/5k Ω (VR center)
AM(30%Modulation) .. 25 to 250mV/5k Ω
(VR min to max)
125mV/5k Ω (VR center)

REC.CAL Signal 50 to 500mV/5k Ω
(VR min to max)
250mV/5k Ω (VR center)

ATTACHED SYSTEM

FMDX Position. FM Blend. Mode(Auto/
Mono)Interlock Style FM Muting
REC.CAL(Recording Calibrator)

GENERAL

Semiconductors

Transistor 24
IC 4
FET 1
Diode 10
Zener Diode 3
LED 2
Ceramic Filter FM;8, AM;1

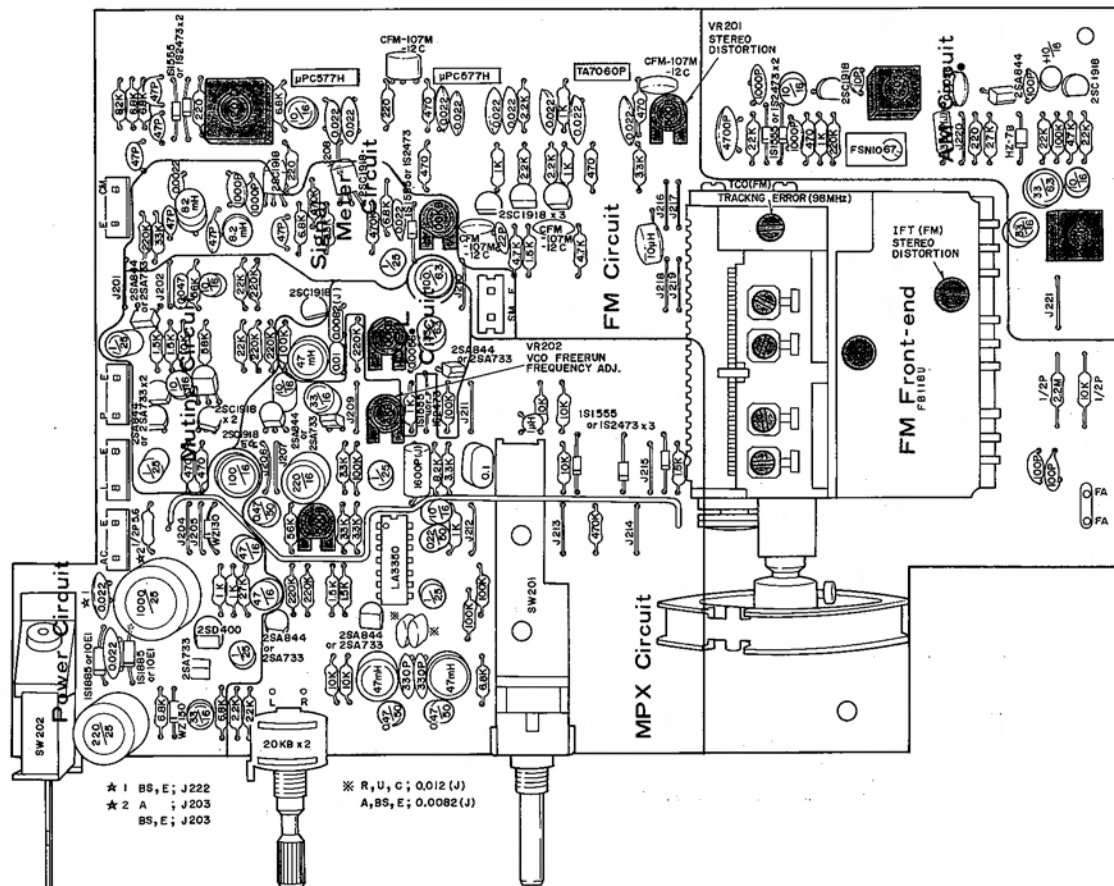
Power Supplies

U.S.A. & Canadian Model; 120V, 60Hz
European & General Model; 110 to 130V/
220 to 240V, 50/60Hz
Australian Model; 240V, 50Hz
British Model; 220 to 240V, 50Hz
Dimensions(WxHxD) 435x160x334mm
(17-1/8"x6-3/10"x13-7/47")
Weight 6.2kg (13.78 lbs)

Design and Specifications are subject to
change without notice for improvement.

ADJUSTING POINTS

Note: Component side view



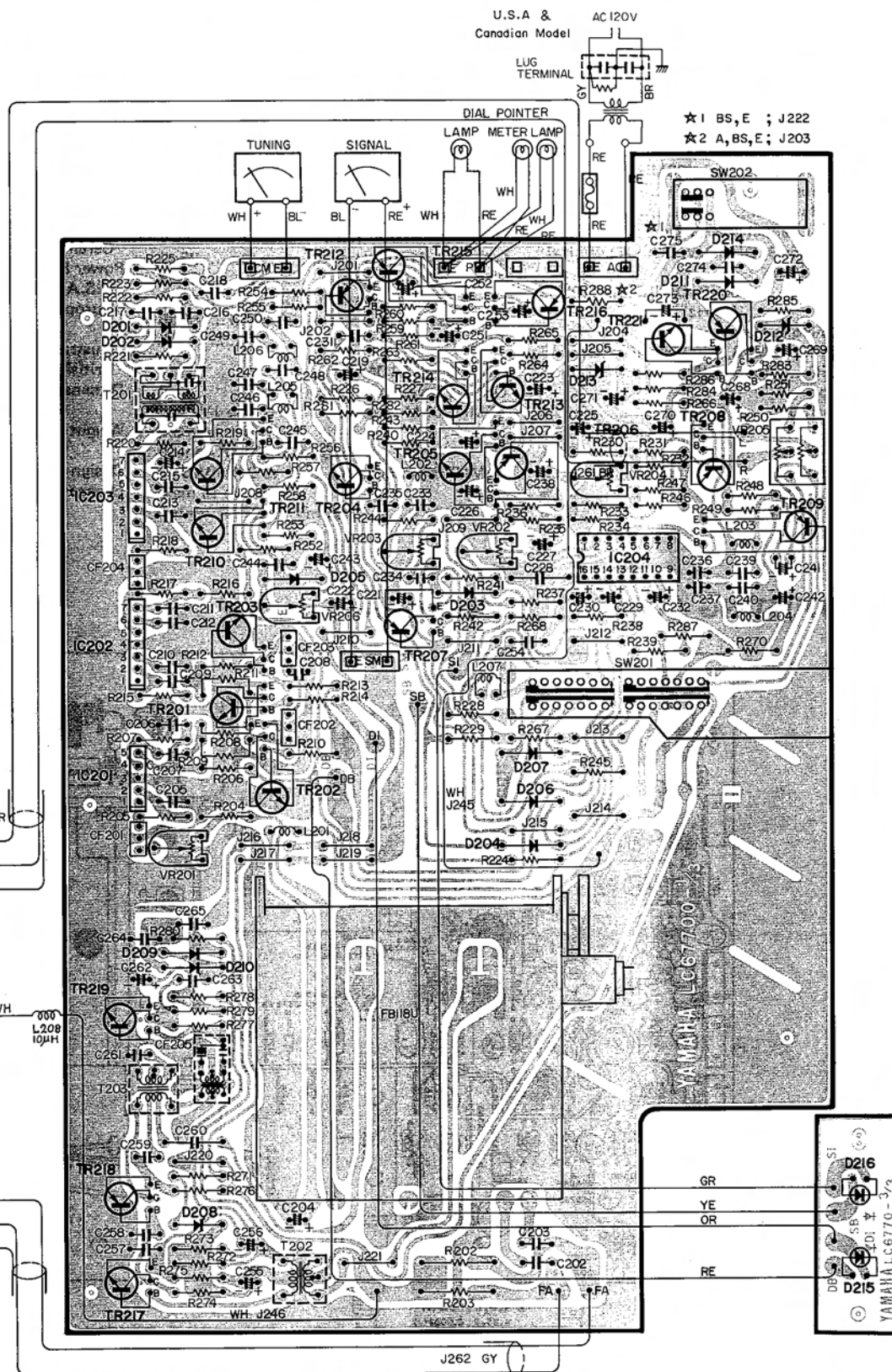
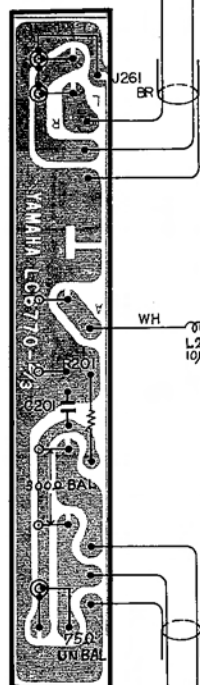
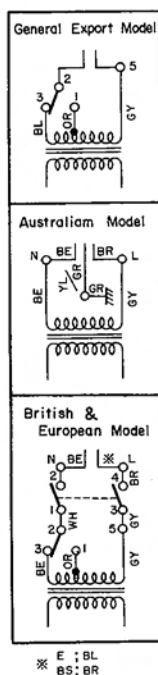
PATTERN DIAGRAM

NAO6946 (R,U,C)

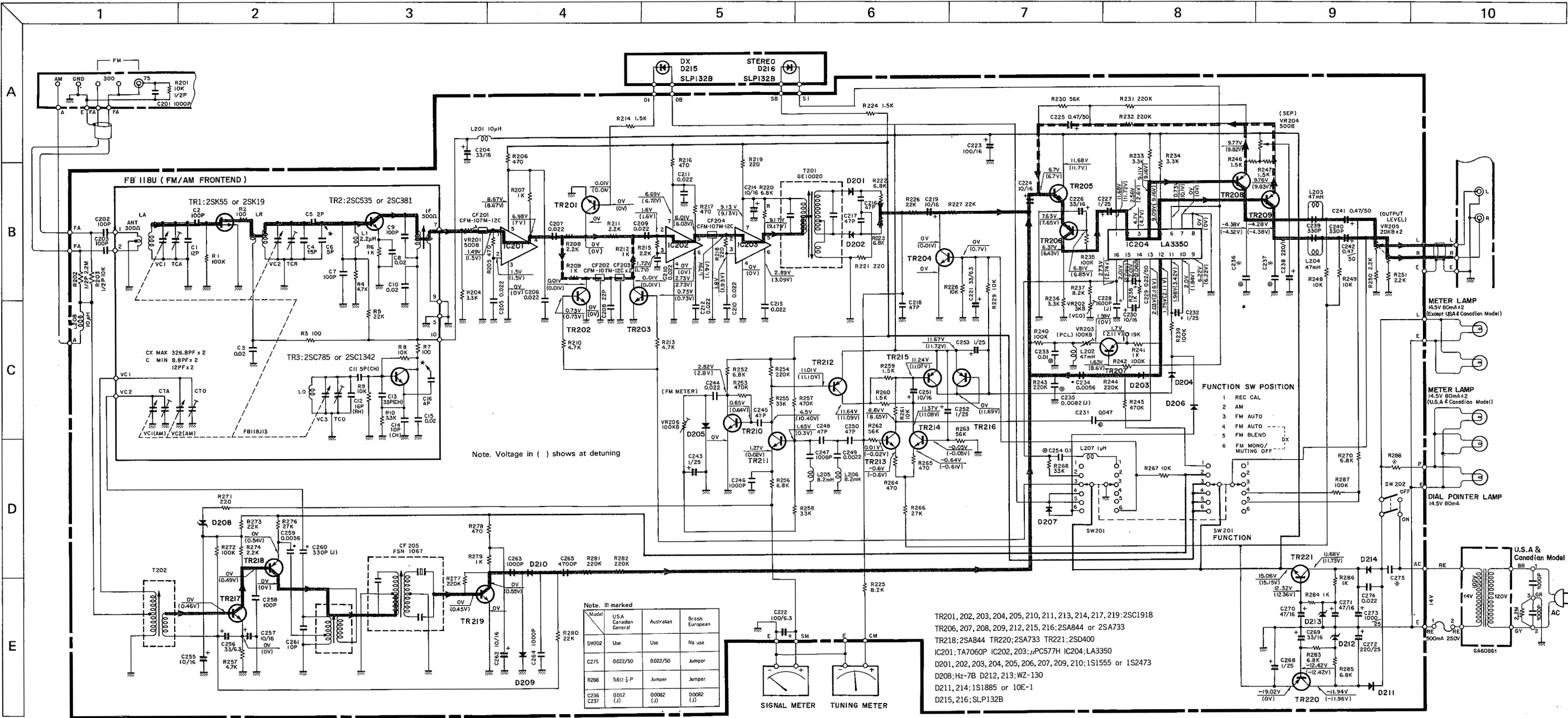
NAO6947 (E,B)

NAO7001 (A)

Note: Pattern side view



SCHEMATIC DIAGRAM



ADJUSTMENTS

ADJUSTMENT OF FM SECTION

Step	ITEMS	ADJUSTING POINTS	SETTING		RATED VALUE	METHOD (REMARKS)
			EQUIPMENT	TUNER		
1	DISCRI. BALANCE	T201 (Upper side core)		Near by 98MHz detuned Tuning Meter		Before adjusting, confirm that the Tuning Meter reads zero when the power sw. is off. (mechanical zero) Turn the core of T201 so that the Tuning Meter reads zero. (Fig. 1, 2)
2	TUNING POINT SETTING	Tuning Knob	FM SG: 98MHz 60dBμ	98MHz tuned Tuning Meter	0±1mm	Connect FM SG to FM antenna terminal (300Ω BALANCE)
3	MONO. DISTORTION	T201 (Bottom side core)	FM SG: -do.- mod; mono. 1kHz 100% Distortion Meter Volt Meter Oscilloscope	-do.- L output	-56dB or less	Connect Distortion Meter, Volt Meter and Oscilloscope to Left output terminal.
4	VCO FREE RUN FREQUENCY	VR202 (VCO adj)	FM SG -do.- mono. mod; 0% Frequency Counter		19kHz ±20Hz	FM SG must not be modulated. Connect Frequency Counter to 19k Test Point of C. Board. (See P.6)
5	STEREO DISTORTION	IF (FM Front-end pack) VR201	FM SG: -do.- mod; stereo 1kHz 100% DM/VM/OSC.	-do.- L output	-54dB or less	FM SG to stereo mode (pilot: 10%) Same as step 3.
6	PILOT SIGNAL CANCEL AND CARRIER LEAK	VR203 (PCL VR)	FM SG: -do.- mod; pilot 9% VM/OSC	L, R output	43dB or more	Pilot signal only. Connect VM and OSC to L and R output.
7	SEPARATION	VR204 (SEP VR)	FM SG: -do.- mod; stereo 1kHz 100% VM/OSC	-do.- L and R output		Modulate L and R alternately Adjust VR204 so that the leakage to alter channels become minimum and equal
8	SIGNAL METER FULL SCALE	VR206 (FM METER ADJ VR)	FM SG: 98MHz 80dBμ mod; 0%	Signal Meter		Adjust VR206 so that the Signal Meter reads 90.
9	DIAL POINTER CLARIFICATION	Pointer	FM SG: 98MHz	98MHz	0±1mm	Tune to SG frequency, then loosen the pointer from dial string and set the pointer onto 98MHz of dial scale.
10	HIGH END TRACKING CONFIRMATION		FM SG: 108MHz 60dBμ	108MHz	0±2mm	Read error between the pointer and dial scale. (Fig. 3)
11	TRACKING ERROR ADJUSTING I (Only when proper trimming cannot be made by Step 10)	Pointer	FM SG: 88MHz to 108MHz	88MHz to 108MHz	0±2mm 92MHz to 104MHz	Reset the pointer so that error in all range should be within allowance.
12	TRACKING ERROR ADJUSTING II (Only when proper trimming cannot be made by Step 11)	Pointer TCO (Front-end pack)	FM SG: 88MHz to 108MHz	98MHz to 108MHz	0±2mm	Adjust error by the pointer and TCO alternately 98MHz ... Pointer 108MHz ... TCO

Note; DM: Distortion Meter, VM: Volt Meter, OSC: Oscilloscope.

ADJUSTMENT OF AM & REC. CAL SECTION

Adjust AM section after adjustment of FM section made correctly.

• AM SECTIONS

Step	ITEMS	ADJUSTING POINTS	SETTING		RATED VALUE	METHOD (REMARKS)
			EQUIPMENT	TUNER		
1	LOW END TRACKING	T203 TUNING Knob	AM SG: 600kHz 60dBμ	AM Ant. terminal 600kHz (pointer)		Connect AM SG to AM antenna terminal.
2	LOW END SENSITIVITY	T202	AM SG: -do.- 60dBμ	-do.-		Decrease AM SG output to 60dBμ.
3	HIGH END TRACKING	CTO	AM SG: 1350kHz 60dBμ	1350kHz (pointer)		CTO: Front-end pack, paralleled to AM OSC. V.C.
4	HIGH END SENSITIVITY	CTA	AM SG: -do.-	-do.-		CTA: Front-end pack, paralleled to AM ANT. V.C.
5	REPEAT ADJUSTMENT	T203 T202 CTO CTA	AM SG: 600kHz 1350kHz 60dBμ	600kHz 1350kHz	0±1.5mm	The above adjustment are necessary to repeat 2 to 3 times until tracking error and differential of sensitivity between low and high end become minimum.
6	MID RANGE CONFIRMATION		AM SG: 950kHz	950kHz	0±2mm	Confirm the tracking error.

Step	ITEMS	ADJUSTING POINTS	SETTING		METHOD (REMARKS)
			EQUIPMENT	TUNER	
1	CONFIRMATION OF REC. CAL OUTPUT		VTVM (Vacuum Tube Voltage Meter)		OUTPUT VR. must be maximum. Confirm output voltage and frequency of REC. CAL signal. Output (Voltage): -4.5±2.5dBm (0.45±0.1V) frequency: 333±66Hz

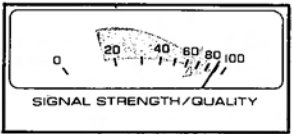


Fig. 1

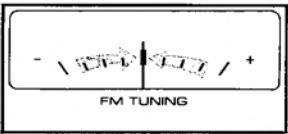


Fig. 2

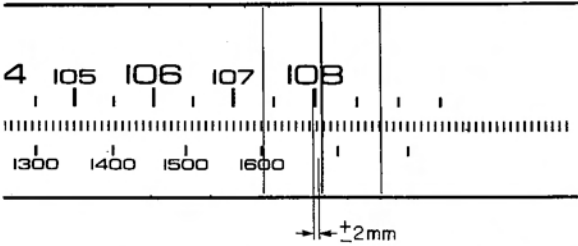


Fig. 3

PARTS LIST

CT-610 II

AM/FM STEREO TUNER

SINCE 1887

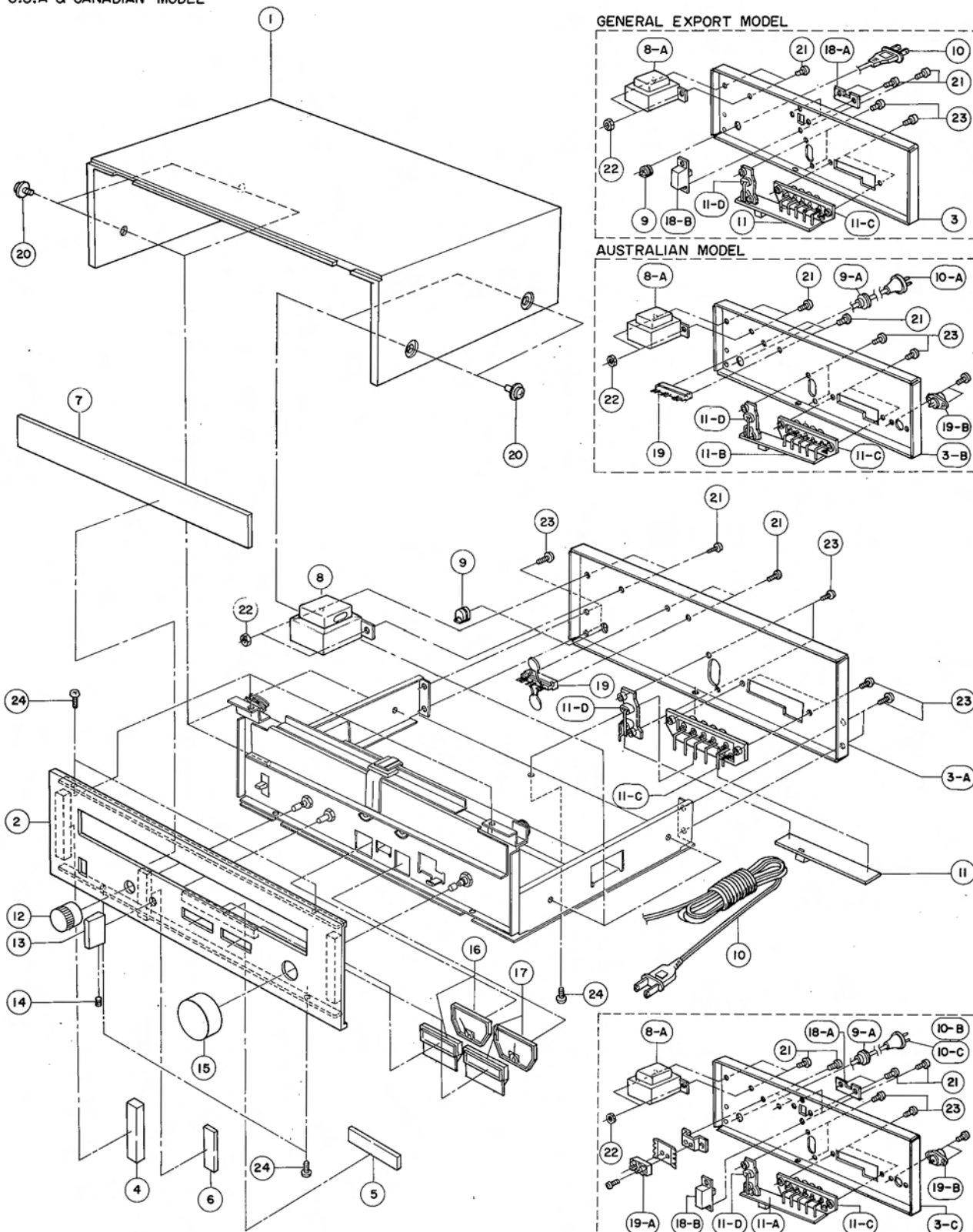


YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

EXPLODED VIEW

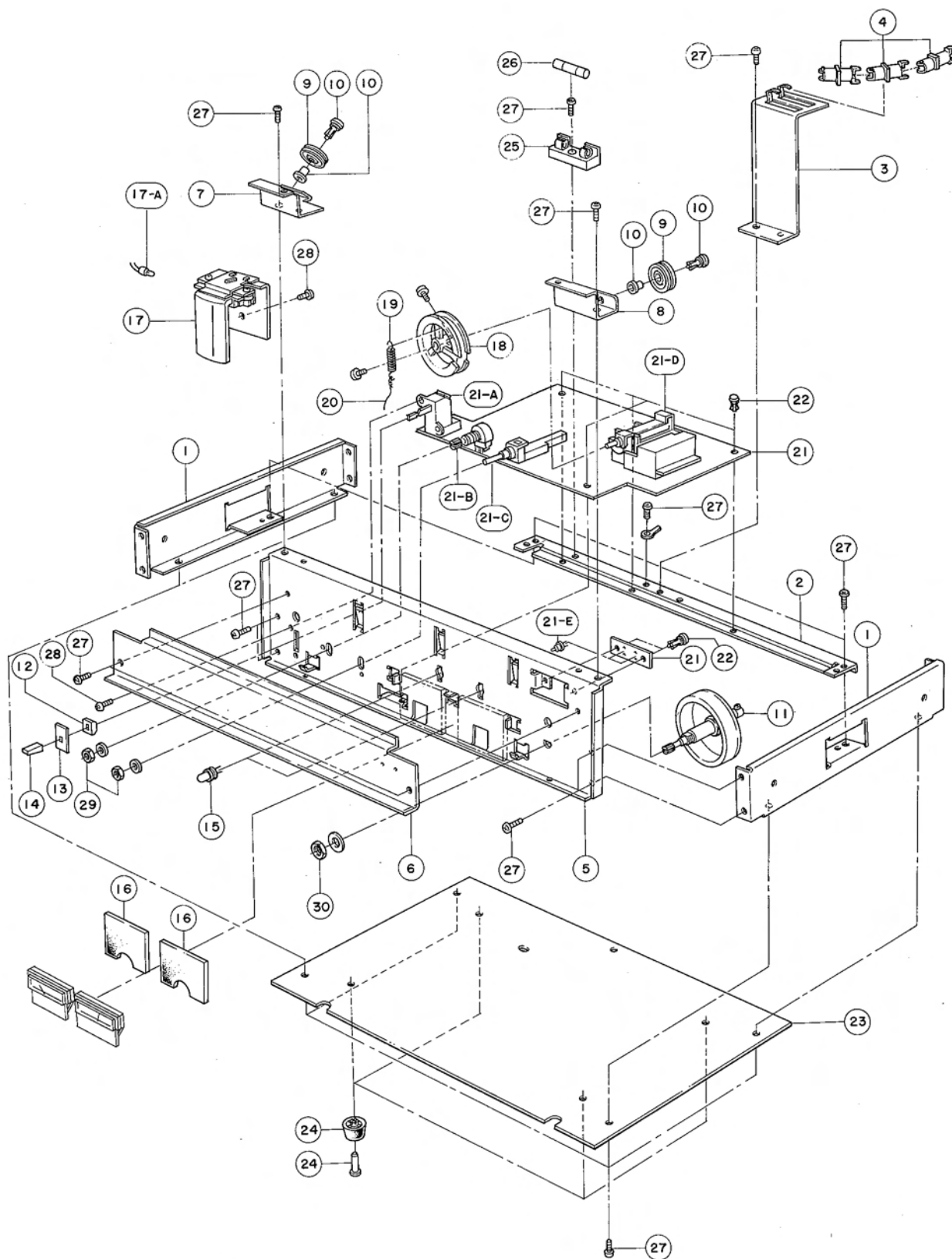
U.S.A & CANADIAN MODEL



■ PARTS LIST

[illegible]

EXPLODED VIEW



PARTS LIST

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Models	卸価	小売価
1	32:00:00:AA:08:74:90	Side Frame	サイドフレーム				
2	32:00:00:AA:08:89:20	Center Frame	センターフレーム				
3	32:00:00:AA:08:79:30	Pipe Holder	パイプホルダー				
4	32:00:00:CB:07:92:80	Lead Pipe	リードパイプ		CR-2020		
5	32:00:00:AA:08:75:80	Sub Chassis	サブシャーシ	R, U, C, A			
	32:00:00:AA:08:88:80	—do.—	//	E, B			
6	32:00:00:NB:08:23:80	Dial Scale Assembly	目盛板ユニット				
7	32:00:00:AA:08:75:90	Panel Holder (Left)	パネルホルダー(左)				
8	32:00:00:AA:08:76:00	—do.— (Right)	// (右)				
9	32:00:00:CB:07:58:40	Wheel	滑 車		CT-1000 1010		
10	32:00:00:CB:07:78:90	Pulley-Crip MECO No.513	プーリークリップ		—do.—		
11	32:00:00:NB:08:02:00	Tuning Unit	チューニング ユニット				
12	32:00:00:CB:07:97:70	Bush, Switch	SWブッシュ		CT- 810		
13	42:00:00:CB:07:95:10	Switch Apron	SWエプロン		—do.—		
14	32:00:00:CB:07:97:80	Lever Knob	レバーツマミ		CR-2020		
15	42:00:00:JB:00:05:50	Pilot Lamp (Lead Type) 14.5V 80mA	パイロットランプ (リード式)				
16	42:00:00:CB:08:14:10	Meter Dumper	メーターダンパー				
	32:00:00:NB:08:01:90	Dial Pointer Unit	ダイヤル指針 ユニット	R, A, E, B			
17	32:00:00:NB:08:23:70	—do.—	//	U, C			
	42:00:00:JB:00:05:60	Pilot Lamp (Lead Type) 14.5V 80mA	パイロットランプ (リード式)指針用	R, A, E, B			
A	42:00:00:JB:00:05:70	—do.—	//	U, C			
18	32:00:00:CB:08:19:70	Pulley, Variable Capacitor	バリコンプーリー				
19	32:00:00:AA:08:05:30	Dial Spring	ダイヤルスプリング		CT Com.		
20	42:00:00:CB:07:70:70	Dial String $\phi 0.39 \times 1.6m$	ダイヤル糸		—do.—		
21	32:00:00:NA:06:94:60	Tuner C.Board	チューナーシート	R, U, C			
	32:00:00:NA:06:94:70	—do.—	//	E, B			
	32:00:00:NA:07:00:10	—do.—	//	A			
A	42:00:00:KA:20:06:00	Lever Switch 2X2S	レバースイッチ	R, U, C, A	CA- 810		
	42:00:00:KA:20:07:30	—do.— SDE-3L	//	E, B			
B	42:00:00:HS:41:04:30	Variable Resistor $\phi 16$ GM70E609 B20K Ω	ボリューム				
C	42:00:00:KA:50:09:80	Rotary Switch MS25L SRZ-V046	ロータリースイッチ				
D	42:00:00:PA:00:03:30	RF Pack FB118	バック				
E	42:00:00:IF:00:06:80	LED SLP-132B	発光ダイオード				
22	42:00:00:CB:06:88:80	Plastic Rivet MECO $\phi 3.5$	プラスチック リベット		AU Com.		
23	32:00:00:AA:08:75:60	Bottom Cover	ボトムカバー				
24	32:00:00:CB:08:13:90	Leg MECO #8139	脚				
25	42:00:00:LB:20:12:10	Fuse Holder 1P	ヒューズホルダー	R, U, A, C			
	42:00:00:LB:20:09:40	—do.— 1PFHM FRPET	//	E, B			
26	42:00:00:KB:00:03:10	Fuse 0.5AT 250V	ヒューズ タイラッシュ	R, A			
	42:00:00:KB:00:11:50	—do.— ST-4 0.5A 250V	ヒューズUL	U, C			
	42:00:00:KB:00:06:60	Miniature Fuse 400mAT 250V	ヒューズ [®] タイムラグ	E, B			
27	42:00:00:EI:03:00:80	Bind Head Tapping Screw 3X8S ZMC2-Y	バインド タッピングネジ				
28	42:00:00:ED:03:00:60	Bind Head Screw 3X6S ZMC2-Y	バインド小ネジ				
29	42:00:00:EV:10:00:70	Hexagonal Nut M7 ZMC2-Y	M7用ナット				
30	42:00:00:EV:10:00:90	—do.— M9 —do.—	M9用ナット				

[illegible]