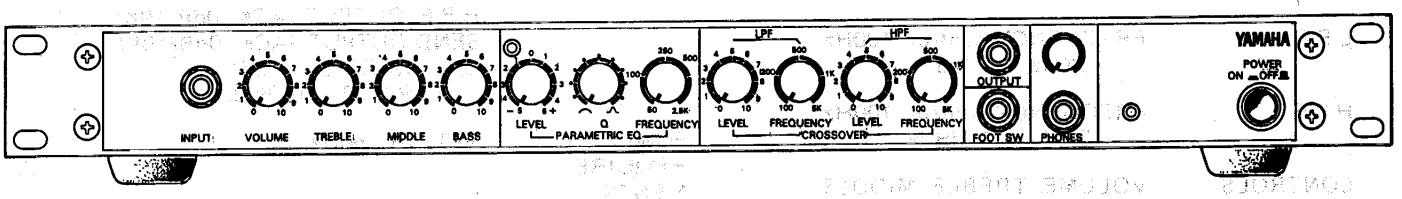
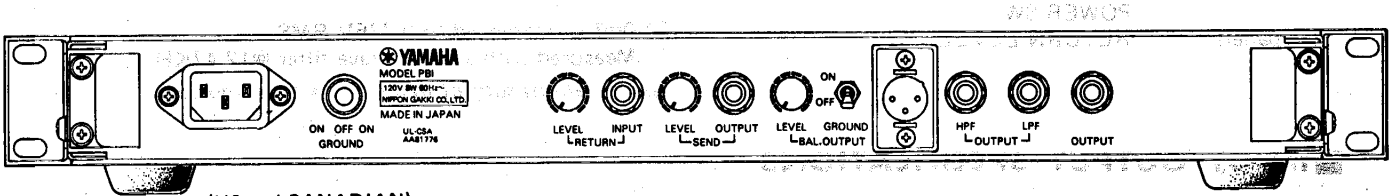
PB1

SERVICE MANUAL

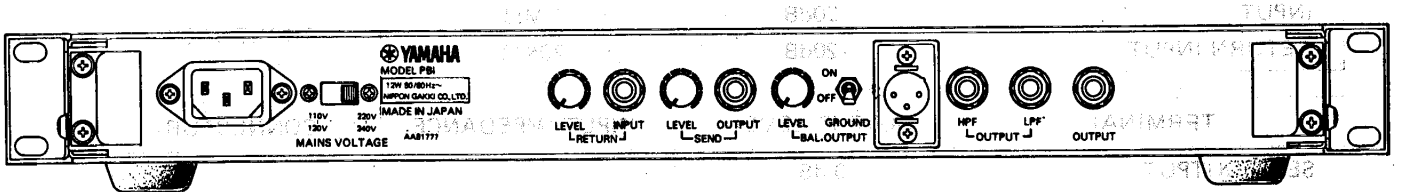
■ FRONT PANEL



■ REAR PANEL



(US and CANADIAN)



(GENERAL)

■CONTENTS

006477

SINCE 1887 YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

■ SPECIFICATIONS

GAIN	47dB (input to output at 1KHz) 64dB (input to send output at 1KHz) 68dB (input to balanced output at 1KHz) 15dB (return input to output)
NOISE	Less than – 86dB (all volume controls at Min.) Less than – 60dB (VOLUME, TREBLE, MIDDLE, BASS at Max.)
PARAMETRIC EQ.	LEVEL control: ±15dB Q control: 0.35 ~ 3.0 FREQUENCY control: 50 Hz ~ 2.5KHz
L.P.F.	FREQUENCY control: 100Hz ~ 5KHz, – 12dB/oct
H.P.F.	FREQUENCY control: 100Hz ~ 5KHz, – 12dB/oct
CONTROLS (front panel) (rear panel)	VOLUME, TREBLE, MIDDLE, BASS, P.E Q., LEVEL, P.EQ.Q, P.E Q. FREQUENCY, L.P.F. LEVEL, L.P.F. FREQUENCY, H.P.F. LEVEL, H.P.F. FREQUENCY, PHONES LEVEL, POWER SW. RETURN LEVEL, SEND LEVEL, BALANCED LEVEL, GROUND (lift) SW., GROUND (polarity) SW.
FOOT SW. JACK	P.EQ. ON/OFF
INPUT	INPUT JACK: – 20dB RETURN INPUT JACK: – 20dB
OUTPUT	OUTPUT JACK (front panel): 0dB/10KΩ OUTPUT JACK (rear panel): 0dB/10KΩ PHONES OUTPUT JACK: –1dB/8Ω L.P.F. OUTPUT JACK: 0dB/10KΩ H.P.F. OUTPUT JACK: 0dB/10KΩ SEND OUTPUT JACK: 0dB/10KΩ BALANCED OUTPUT XLR-3-32: 0dB/600Ω
POWER REQUIRE-MENTS	120V AC, 60Hz
DIMENSIONS (W x H x D)	18.9 x 2.1 x 10" (480 x 54 x 255 mm)
WEIGHT	10.6 lbs (4.8 kg)

* 0dB is referenced to 0.775V RMS.
* Measured with a 6dB/octave filter @12.47KHz.

Specifications subject to change without notice.

■ INPUT/OUTPUT SPECIFICATIONS

TERMINAL	INPUT LEVEL	INPUT IMPEDANCE	CONNECTOR
INPUT	–20dB	1 MΩ	PHONE JACK
RETURN INPUT	–20dB	20KΩ	

TERMINAL	OUTPUT LEVEL	INPUT IMPEDANCE	CONNECTOR
SEND OUTPUT	0 dB	10 KΩ	PHONE JACK
H.P.F. OUTPUT	0 dB		
L.P.F. OUTPUT	0 dB		
OUTPUT (front)	0 dB		
OUTPUT (rear)	0 dB		
BALANCED OUTPUT	0 dB	600Ω	XLR 3–32
PHONES OUTPUT	–1 dB	8Ω	PHONE JACK

■ TEST SPECIFICATIONS

- Use an oscillator with an output impedance of less than 1 KΩ, and an oscilloscope, level meter, voltmeter etc., each with input impedances of more than 100 KΩ.
- The settings for the control knobs should be as follows, unless otherwise specified.

VOLUME, TREBLE, MIDDLE, BASS ..... MAXIMUM
P.EQ. LEVEL 0
P.EQ.Q and FREQUENCY ..... MINIMUM
L.P.F. LEVEL and FREQUENCY, H.P.F. LEVEL ..... MAXIMUM
H.P.F. FREQUENCY ..... MINIMUM
PHONES LEVEL, RETURN LEVEL, SEND LEVEL, BAL. LEVEL ..... MAXIMUM

- Short the FS terminal to ground.
- Terminate the loads appearing in the following chart across the output terminals and the E terminal.

OUTPUT TERMINAL		LOAD IMPEDANCE
OUTPUT (FRONT)	OF	10 KΩ
OUTPUT (REAR)	OR	
SEND OUT	SO	
L.P.E. OUT	LO	
H.P.F. OUT	HO	
BAL. OUT	BN, BV	600Ω
PHONES OUT	PR	8Ω

Table 1

*0 dB=0.775V r.m.s

	Test Item	Measuring Conditions	Standards	Remarks
1	Power Supply		The voltage across +15, E should be +15V ± 2V. The voltage across −15, E should be −15V ± 2V.	
2	Preamplifier Characteristics Amplifier Gain	A −60dB, 1KHz sine wave signal should be applied to the Input terminal.	The output should be as follows. OUTPUT (FRONT) −13dB ± 3dB OUTPUT (REAR) −13dB ± 3dB	• When a shorting plug is inserted into the Return jack, the output should cut out.
	Frequency characteristics	A −60dB input signal should be applied to the input terminal and the input frequency should be varied.	The output should be within the limits ±3dB appearing in Fig. 1. −3dB ± 3dB @ 70Hz −9dB ± 3dB @ 400Hz +4dB ± 3dB @ 7KHz	• With an input of 1KHz, the nominal output level is 0dB.
	Tone Control	A −60dB input signal should be applied to the input terminal and the input frequency should be varied.	The amount of the variations in output should be within the following limits. TREBLE 18dB ± 3dB @ 7KHz MIDDLE 4dB ± 3dB @ 400Hz BASS 11dB ± 3dB @ 70Hz	• Set the Treble, Middle and Bass control knobs to intermediate.
3	Send Amplifier Gain	Apply a −60dB, 1KHz sine wave signal to the input terminal.	The output level of the send out terminal should be 4dB ± 3dB.	
4	Return Amplifier Gain	Apply a −15dB, 1KHz signal to the Return terminal.	The output level of the Output (Front) should be 0dB ± 3dB.	• When a shorting plug is inserted into the Return jack, the Output (Front) should cut out.
5	Parametric EQ Characteristics Frequency characteristics	Apply a −15dB signal to the Return terminal and vary the input frequency.	The amount of the variations in the output should be within the following limits.	• Set the P. EQ level to either Maximum or Minimum.
	FOOT SW.	Set FOOT SW. to ON/OFF.	The effect of the P.EQ can be switched ON/OFF.	
6	L.P.F. Frequency characteristics	Apply a −15dB signal to the Return terminal and vary the input frequency.	The output from the L.P.F. output should be as follows. −19dB ± 3dB @ 10KHz 0dB ± 3dB @ 1KHz −8dB ± 3dB @ 5KHz −21dB ± 3dB @ 325Hz −5dB ± 3dB @ 90Hz	• L.P.F. Frequency: 5 kHz L.P.F. Frequency: 5 kHz L.P.F. Frequency: 5 kHz L.P.F. Frequency: 100 Hz L.P.F. Frequency: 100 Hz

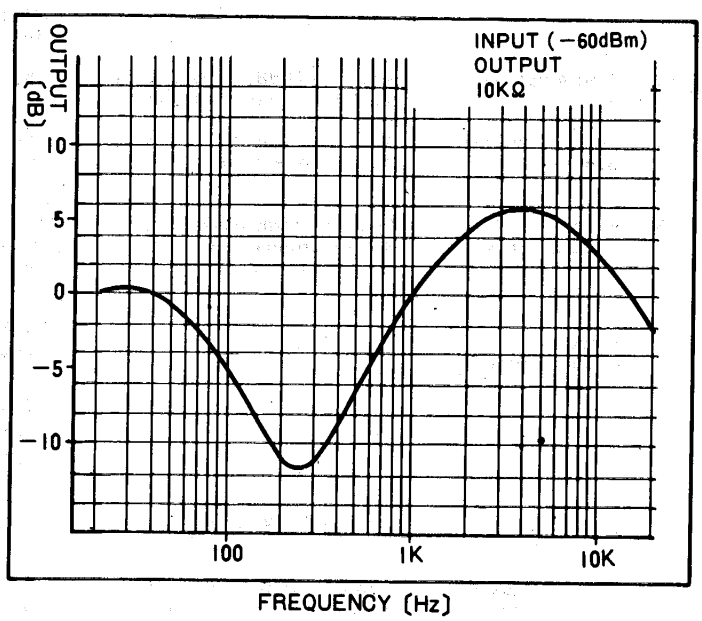
Condition	Input (Hz)	Variation (dB)
Q Minimum, F 100 Hz	325	±7 ± 2
Q Minimum, F 5 kHz	325	±7 ± 2
Q Maximum, F 5 kHz	325	±1 more less
Q Maximum, F 100 Hz	325	±1 more less
Q Maximum, F 100 Hz	45	±15 ± 2
Q Maximum, F 5 kHz	2.5K	±15 ± 2

	Test Item	Measuring Conditions	Standards	Remarks
7	H.P.F. Frequency Characteristics	Apply a −15dB signal to the Return terminal and vary the input frequency.	The output from the H.P.F. output should be as follows. 1 KHz 0 ± 3 dB 90 Hz −7 ± 3 dB 45 Hz −15 ± 3 dB 5 KHz −7 ± 3 dB 1 KHz −27 ± 3 dB	• H.P.F. Frequency 100 Hz H.P.F. Frequency 100 Hz H.P.F. Frequency 100 Hz H.P.F. Frequency 5 kHz H.P.F. Frequency 5 kHz
8	Balanced Amplifier Gain	Apply a −30dB, 1KHz sine wave signal to the Return terminal.	The output from the BAL. OUT terminal should be 6 ± 3dB.	• When there is a short across pins 1 and 3 with the Ground Lift Switch ON, the output should 0 ± 3dB.
9	Phones Amplifier Gain	Apply a −15dB, 1KHz sine wave signal to the Return terminal.	The output from the Phones Out should be −1 ± 3dB.	
10	Noise Level		The level at each output terminal should be within the following limits. OUTPUT (FRONT) Less than −60dB OUTPUT (REAR) Less than −60dB SEND Less than −38dB L.P.F. Less than −60dB H.R.F. Less than −60dB BAL. OUT Less than −42dB PHONES Less than −60dB	@ Use a −6dB/oct. L.P.F. at 12.47KHz.

●Stability

1. The unit should operate properly even with a ±10% variation of the AC line voltage.
2. No oscillation should occur with 0.001μF connected to each of the output terminals.
3. All variable resistors and switches should operate smoothly and there should be no noise or extreme level changes.

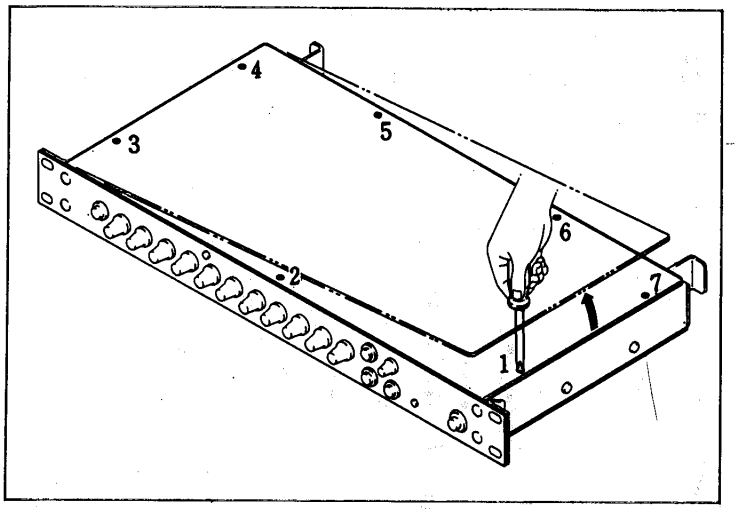
Fig. 1 Frequency Characteristics.



■DISASSEMBLY

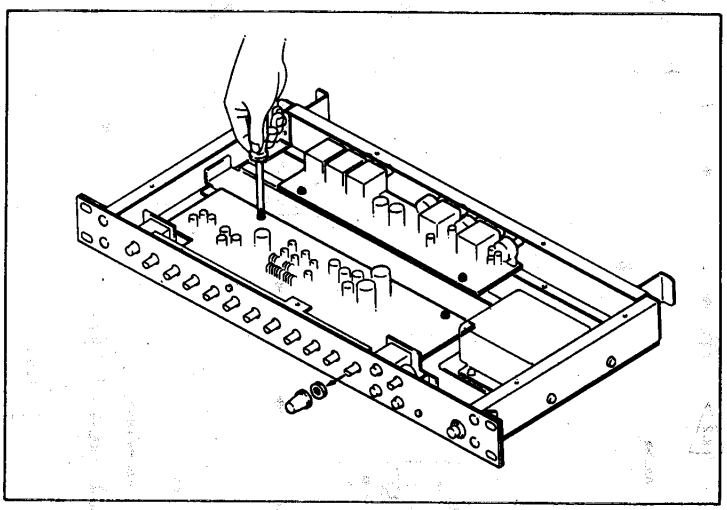
1. REMOVAL OF THE UPPER COVER PLATE.

Lift off the cover plate after removing all seven screws as illustrated in the diagram.

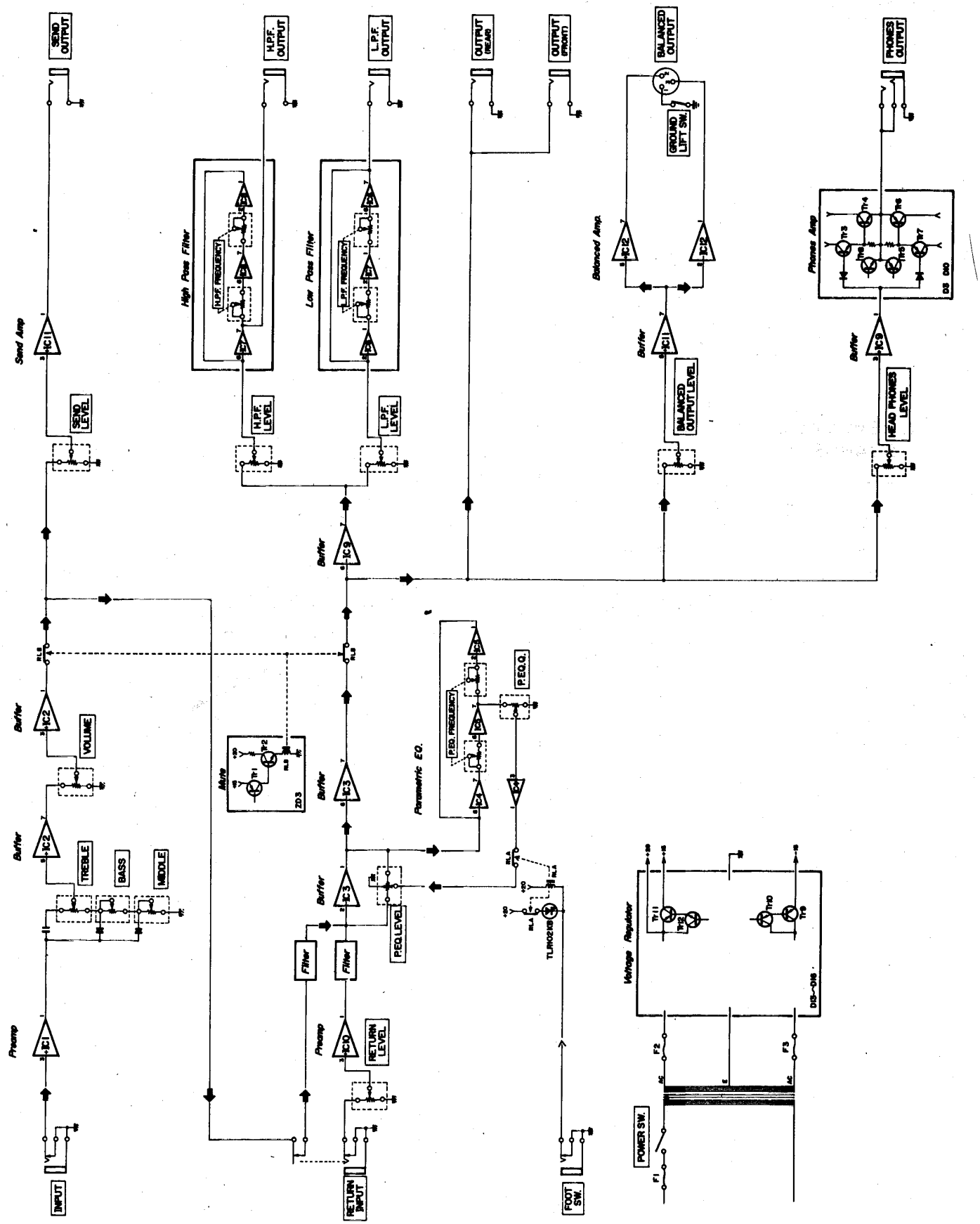


2. REMOVAL OF THE CIRCUIT BOARDS.

After removing the four screws as illustrated in the diagram, remove the twelve knobs, hexagonal nuts etc, which are on the front panel. Then the circuit boards can be removed.



■BLOCK DIAGRAM



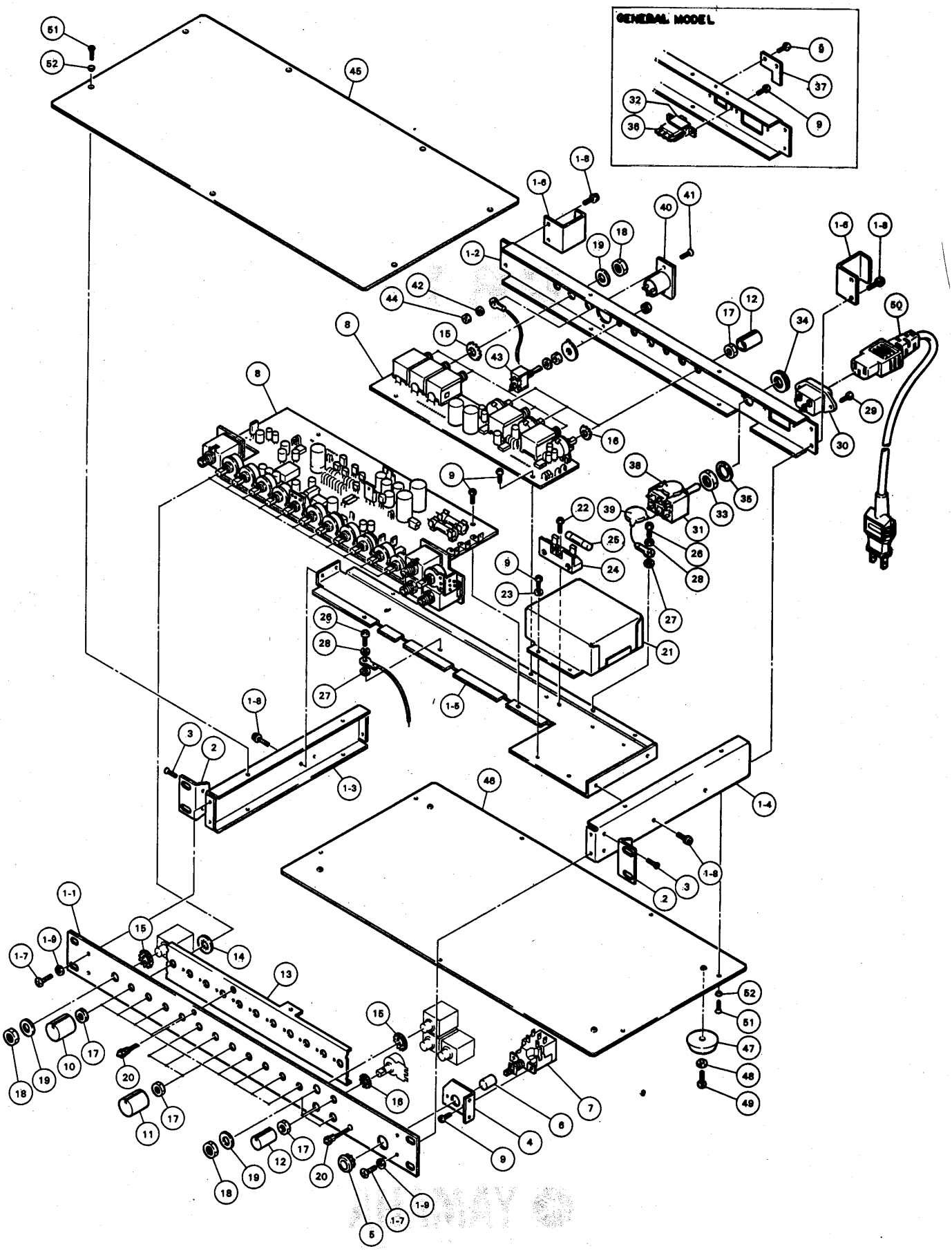
PARTS LIST

PB1

■ CONTENTS

SINCE 1887 YAMAHA
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

■EXPLODED VIEW



■PARTS LIST

J: Japanese Model C: Canadian Model
U: U.S. Model G: General Model

	Ref. No.	Part No.	Description	部品名	Remarks	Common Model
*	1-1	AA 81 77 40	Front Panel		フロントパネル	
*	1-2	AA 81 77 50	Rear Panel		リアパネル	J
*	1-2	AA 81 77 60	〃		〃	U,C
*	1-2	AA 81 77 70	〃		〃	G
*	1-3	AA 81 77 80	Side Panel	Left	サイドパネル	
*	1-4	AA 81 77 90	〃	Right	〃	
*	1-5	AA 81 77 10	Center Stay		センターステー	
*	1-6	AA 81 78 00	Rear Stabilizer		リアスタビライザー	
	1-7	EC 34 00 80	Truss Screw	M4 x 8 BL	トラス小ネジ	
	1-8	ED 34 00 80	Bind Screw	M4 x 8 BL	バインド小ネジ	
	1-9	EV 41 30 40	Toothed Lock Washer	A4S BL	歯付座金	
*	2	AA 81 78 10	Panel Angle		ラックマウント補強金具	
	3	EB 33 00 80	Flat Head Screw	M3 x 8 BL	皿小ネジ	
*	4	AA 81 78 20	Power Switch Angle		パワーSW取付金具	
*	5	CB 81 92 00	Switch Escutcheon		スイッチエスカッション	
*	6	CB 06 65 10	Push Button		プッシュボタン	PG1
	7	KA 80 02 20	Push Siwtch	SDG5P	プッシュスイッチ	J PG1
	7	KA 80 02 00	〃	SDG5P001	〃	U,C
	7	KA 80 06 90	〃	SDG5P-E	〃	G
*	8	NA 80 84 00	Circuit Board	PB #8735	シート	J
*	8	NA 80 84 10	〃	— Do —	〃	U,C
*	8	NA 80 84 20	〃	— Do —	〃	G
	9	ED 33 00 60	Bind Screw	M3 x 6 BL	バインド小ネジ	
*	10	BA 80 55 40	Knob	(L) Yellow	ツマミ	PG1
*	11	BA 80 55 50	〃	(L) Red	〃	PG1
*	12	BA 80 55 60	〃	(S) Yellow	〃	PG1
*	13	AA 81 78 30	VR Sub — Panel		VDサブパネル	
	14	EV 41 00 70	Toothed Lock Washer	A7S Ye	歯付座金	
	15	AA 80 58 20	Spacer	9S	スペーサー	
	16	AA 80 49 50	〃	7S	〃	
	17	EZ 30 70 10	Hexagonal Nut	7S Ye	六角ナット	
	18	LX 20 00 60	〃	9S Cr	〃	
	19	LX 20 00 10	Flat Washer	9S	特殊平座金	
*	20	iF 00 13 10	LED	TLR-102KB	LED	PG1
*	21	GA 82 69 00	Power Transformer		電源トランス	J PG1
*	21	GA 82 70 00	〃		〃	U,C PG1
*	21	GA 82 71 00	〃		〃	G PG1
	22	ED 03 00 80	Bind Screw	M3 x 8	バインド小ネジ	
	23	EV 30 00 30	Spring Lock Washer	3S	バネ座金	
	24	LB 20 12 10	Fuse Holder		ヒューズホルダー	J,U,C
	24	LB 20 14 70	〃		〃	G
	25	KB 00 03 10	Fuse	250V 0.5A	ヒューズ	J
	25	KB 00 10 10	〃	250V 0.5A	〃	U,C
	25	KB 00 07 10	〃	250V 1500 MA	〃	G
	26	ED 34 00 60	Bind Screw	M4 x 6 BL	バインド小ネジ	
	27	EV 41 30 40	Toothed Lock Washer	A4S BL	歯付座金	
	28	EV 30 30 40	Spring Lock Washer	4S BL	バネ座金	
	29	Ei 33 00 80	Bind Head Tapping Screw	M3 x 8	バインドタッピングネジ	
	30	LB 30 05 60	AC Inlet		3P インレット	J,U,C
	30	LB 20 18 60	〃		2P インレット	G
	31	KA 30 02 10	Toggle Switch		トグルスイッチ	J
	31	KA 30 03 50	〃		〃	U
	31	KA 30 04 40	〃		〃	C

* New Parts (新規部品)

Ref. No.	Part No.	Description	部品名	Remarks	Common Model
32	FZ 00 22 70	Spark Suppression Cap	250V	スパークキラーコンデンサ	
33	EZ 31 20 10	Hexagonal Nut	12S	特殊六角ナット	J,U,C
34	BB 80 04 80	Round Nut	12S	丸ナット	J,U,C
35	EV 41 01 20	Toothed Lock Washer	A12S	歯付座金	J,U,C
36	KA 40 07 40	Slide Switch		スライドスイッチ	G
37	CB 81 42 50	Stopper		ストッパー	G
38	FZ 00 20 30	Ceramic Cap.	0.01μF 125V	セラコン	J,U,C
39	FZ 00 21 60	〃	0.0033μF 125V	〃	J,U,C
40	LB 30 01 60	Cannon Socket	XLR3-32 JAE	キャノンソケット	
41	EM 23 00 80	Oval Head Tapping Screw	M3 x 8	丸皿タッピングネジ	
42	EV 41 00 30	Toothed Lock Washer	A3S	歯付座金	
43	KA 30 04 20	Toggle Switch		ドグルスイッチ	
44	EV 10 00 30	Hexagonal Nut	3S	六角ナット	
* 45	AA 81 77 20	Top Cover		トップカバー	
* 46	AA 81 77 30	Bottom Cover		ボトムカバー	
47	CB 80 12 70	Leg		ゴム脚	
48	EV 20 30 40	Flat Washer	4S BL	平座金	
49	ED 34 01 00	Bind Head Screw	M4 x 10 BL	バインド小ネジ	
50	MG 00 05 60	AC Cord		電源コード	J
50	MG 00 05 80	〃		〃	U,C
50	MG 00 10 50	〃		〃	G
51	EB 33 00 80	Plate Screw	M3 x 8 BL	皿小ネジ	
52	EV 98 05 00	Plate Toothed Lock Washer	3S BL	皿歯付座金	

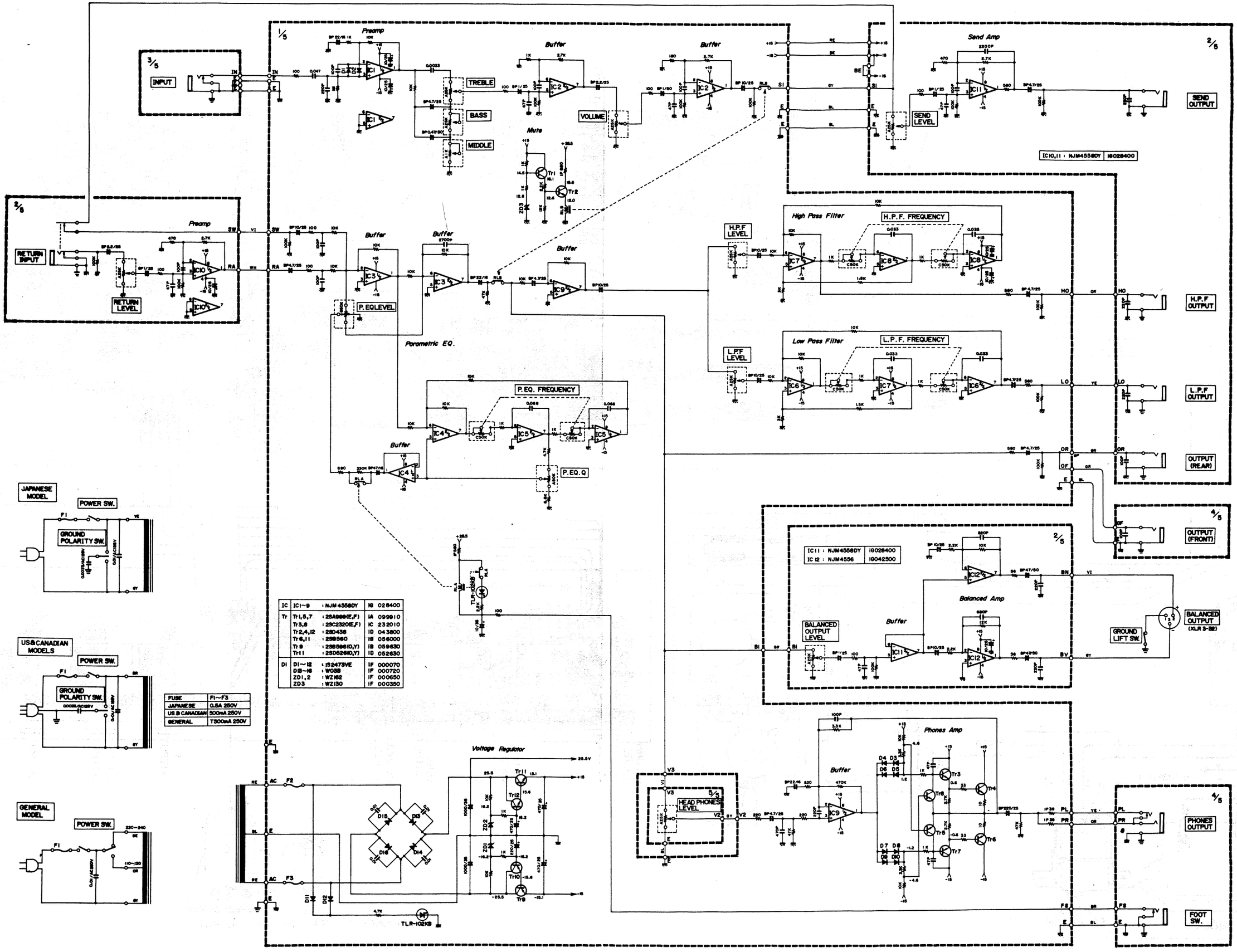
* New Parts (新規部品)

■ PARTS LIST (ELECTRONIC)

	Ref. No.	Part No.				Description	部品名		Remarks	Common Model
*		NA	80	84	00	PBC. Board	#80840	P B シート		
		UK	33	72	20	Bipolar Electrolytic	22μF 16V	バイポーラケミコン		
		UK	33	74	70	〃	47μF 16V	〃		
		FM	22	62	20	〃	2.2μF 25V	〃		
		UK	34	64	70	〃	4.7μF 25V	〃		
		UK	34	71	00	〃	10μF 25V	〃		
		UK	34	82	20	〃	220μF 25V	〃		
		UK	36	54	70	〃	0.47μF 50V	〃		
		UK	34	61	00	〃	1μF 25V	〃		
		UK	36	74	70	〃	47μF 50V	〃		
		HL	51	43	90	Metal Oxide Film Resistor	1P 39Ω	酸化金属被膜抵抗		
		HL	51	55	60	〃	1P 560Ω	〃		
		HL	51	56	80	〃	1P 680Ω	〃		
*		HS	31	14	30	Variable Resistor	A1KΩ	可変抵抗器		
*		HS	31	14	40	〃	A25KΩ	〃		
*		HS	31	14	50	〃	A25KΩ	〃		
*		HS	31	14	70	〃	A50KΩ	〃		
*		HS	31	15	00	〃	C50KΩ x 2	〃		
*		HS	31	15	10	〃	G50KΩ C,C,C,T	〃		
		iA	09	99	10	Transistor	2SA999 (E, F)	トランジスタ		
		iB	05	60	00	〃	2SB560	〃		
		iB	05	96	30	〃	2SB596 (O, Y)	〃		
		iC	23	20	10	〃	2SC2320 (E, F)	〃		
		iD	04	38	00	〃	2SD438	〃		
		iD	05	26	30	〃	2SD526 (O, Y)	〃		
		iF	00	00	70	Diode	1S2473VE	ダイオード		
		iF	00	03	50	Zener Diode	WZ130	ツェナーダイオード		
		iF	00	06	50	Do	WZ162	〃		
		iH	00	07	20	Diode	W03B	ダイオード		
		iG	02	84	00	IC	NJM4558DY	オペアンプ		
		iG	04	25	00	〃	NJM4556	〃		
		KC	00	06	20	Relay	FRL644D12/DAS	リレー		
		LB	20	12	30	Jack	LJ259-1-53	ジャック		
		LB	20	15	40	〃	X-G7652 #01	〃		
		LB	30	10	80	〃	HLJ0259-01-010	〃		
		KA	80	02	20	Push Switch	SDG5P	フッシュスイッチ	J	
		KA	80	02	00	〃	SDG5P001	〃	U, C	
		KA	80	06	90	〃	SDG5P-E	〃	G	
		KA	30	02	10	Toggle Switch		トグルスイッチ	J	
		KA	30	03	50	〃		〃	U	
		KA	30	04	40	〃		〃	C	
		KA	30	04	20	〃		〃	G	
		KA	40	07	40	Slide Switch		スライドスイッチ	G	
		KB	00	03	10	Fuse	250V 0.5A	ヒューズ	J	
		KB	00	07	10	〃	250V 1500MA	〃	G	
		KB	00	10	10	〃	250V 0.5A	〃	U, C	
		iF	00	13	10	LED	TLR-102KB	LED		
		MG	00	05	60	AC Cord		電源コード	J	
		MG	00	05	80	Do		〃	U, C	
		MG	00	10	50	Do		〃	G	
		FZ	00	22	70	Spark Suppression Cap	250V	スパークキラーコンデンサ		
		FZ	00	20	30	Ceramil Cap.	0.01μF 125V	セラコン	J, U, C	
		FZ	00	21	60	〃	0.0033μF 125V	〃	J, U, C	

*New Parts (新規部品)

■ SCHEMATIC DIAGRAM



IC	IC1~9	: NJM4558DY	IG 028400
Tr	Tr1,5,7	: 2SA968(E,F)	IA 099810
	Tr3,8	: 2SC2320(E,F)	IC 232010
	Tr2,4,12	: 2SD438	ID 043800
	Tr6,11	: 2SB560	IB 056000
	Tr9	: 2SB596(O,Y)	IB 059630
	Tr11	: 2SD526(O,Y)	ID 052630
DI	DI~12	: IS2473VE	IF 000070
	DI3~16	: W03B	IF 000720
	ZD1,2	: WZ162	IF 000650
	ZD3	: WZ130	IF 000350

FUSE	F1~F3
JAPANESE	0.5A 250V
US & CANADIAN	500mA 250V
GENERAL	T500mA 250V

■ PRINTED CIRCUIT BOARDS