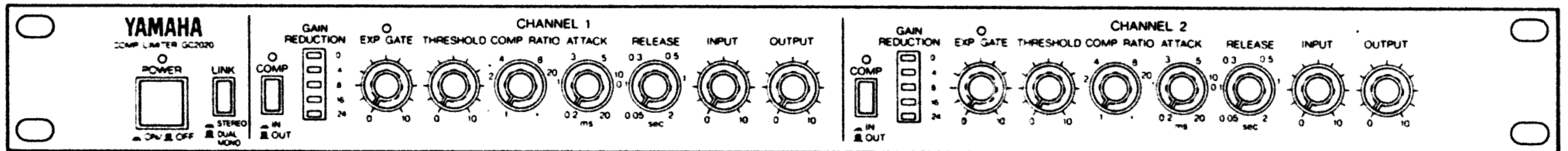


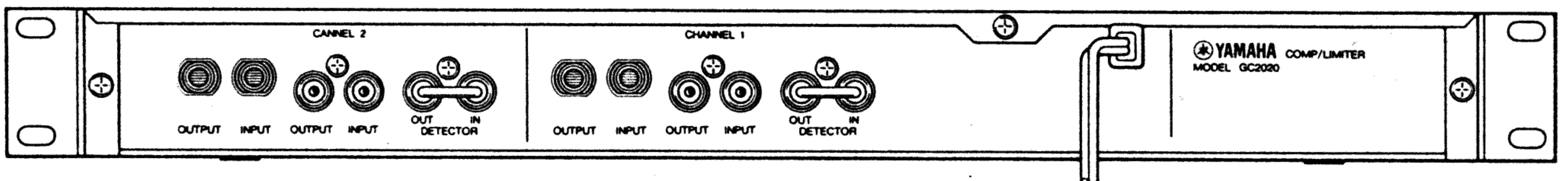
# 2-Channels Compressor/Limiter GC2020

## SERVICE MANUAL

### FRONT PANEL



### REAR PANEL



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**YAMAHA**

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN  
2.25K-702 Printed in Japan '85.3

GC2020

## ■ SPECIFICATIONS (仕様)

CHANNEL	2-channels
MODE	STEREO Mode/DUAL MONO Mode
FREQUENCY RESPONSE	+2dB, -2dB, 20Hz ~ 20kHz
TOTAL HARMONIC DISTORTION	Less than 0.03%
NOISE LEVEL	Less than -87dB (IHF-A)
INPUT	Unbalanced (RCA pin jack, 1/4" mono phone jack)
INPUT IMPEDANCE	30k ohms
NOMINAL INPUT LEVEL	-10dB
MAXIMUM INPUT LEVEL	+32dB (INPUT Level Control at minimum)
OUTPUT	Unbalanced (RCA pin jack, 1/4" mono phone jack)
OUTPUT IMPEDANCE	600 ohms
NOMINAL OUTPUT LEVEL	-10dB
MAXIMUM OUTPUT LEVEL	+20dB
DETECTOR INPUT	Unbalanced RCA pin jack
INPUT IMPEDANCE	30k ohms
MAXIMUM INPUT LEVEL	+20dB
DETECTOR OUTPUT	Unbalanced RCA pin jack
OUTPUT IMPEDANCE	600 ohms
MAXIMUM OUTPUT LEVEL	+20dB
RATIO CONTROL	1:1 ~ ∞:1
MAXIMUM LIMITING	32dB

GAIN REDUCTION INDICATOR	5-segments LED
<b>COMPRESSOR/LIMITER THRESHOLD LEVEL CONTROL</b>	
INPUT CONTROL at 0 position	+32dB ~ +5dB
INPUT CONTROL at Center position	+20dB ~ -20dB
INPUT CONTROL at 10 position	+5dB ~ -35dB
<b>EXPAND NOISE GATE THRESHOLD LEVEL CONTROL</b>	
INPUT CONTROL at 0 position	0dB ~ -40dB
INPUT CONTROL at Center position	-25dB ~ -65dB
INPUT CONTROL at 10 position	-40dB ~ -80dB
ATTACK TIME CONTROL	0.2msec ~ 20msec
RELEASE TIME CONTROL	50msec ~ 2sec
<b>POWER REQUIREMENTS</b>	
Japanese model	AC100V, 50/60Hz
U.S. & Canadian models	120V, 60Hz
General model	110-120/220-240, 50/60Hz
<b>POWER CONSUMPTIONS</b>	
Japanese model	11W
U.S. & Canadian models	18W
General model	13W
DIMENSIONS (W x H x D)	480mm x 44mm x 235mm (18-7/8" x 1-3/4" x 9-1/4")
WEIGHT	3kg (6.6 lbs.)

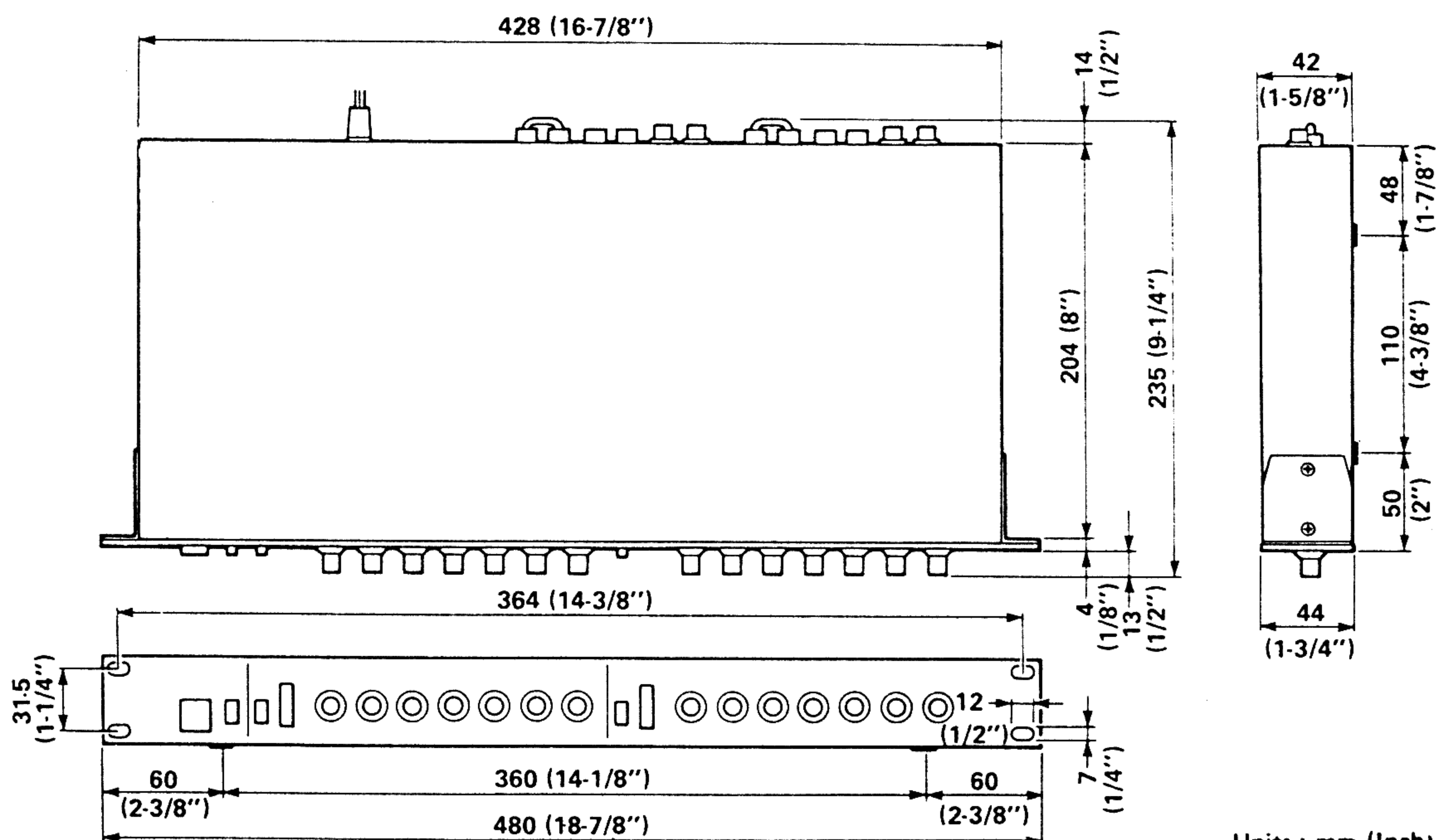
\* 0dB is referenced to 0.775V RMS.

\* Specifications subject to change without notice.

\* 0 dB = 0.775Vr.m.s.

\*仕様および外観は、改良のため予告なく変更することがあります。

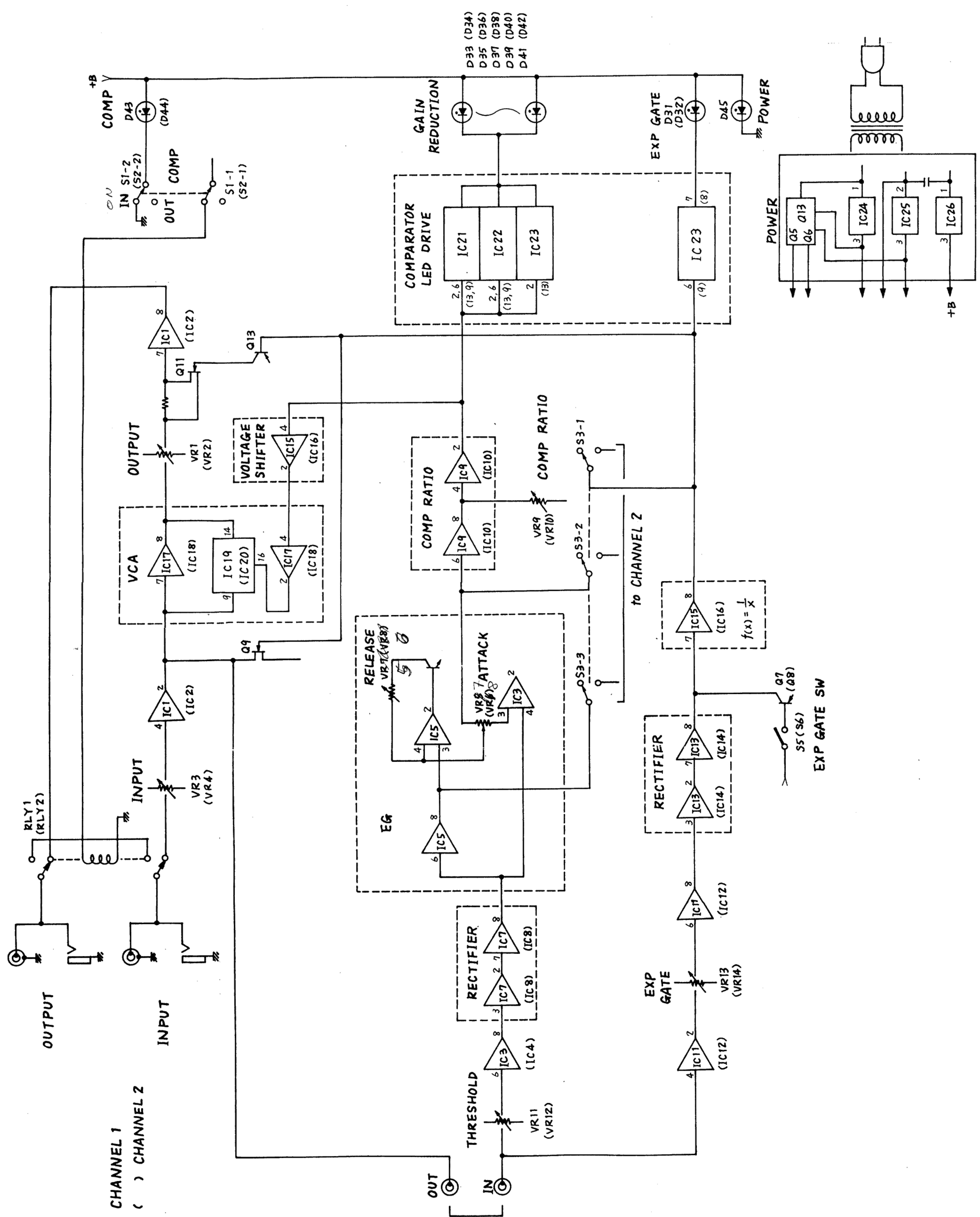
## ■ DIMENSIONS (寸法図)



Units : mm (Inch)  
単位 : mm (インチ)



■ BLOCK DIAGRAM (ブロックダイアグラム)



CHANNEL 1  
( ) CHANNEL 2

OUTPUT

INPUT

OUT

IN

THRESHOLD

EXP GATE

RECTIFIER

EG

RELEASE

ATTACK

COMP RATIO

COMP RATIO

COMPARATOR LED DRIVE

GAIN REDUCTION

EXP GATE

POWER

POWER

EXP GATE SW

+B

+B



## ■ CIRCUITRY OUTLINE

### 1. MAIN SIGNAL SYSTEM

The input signal can be varied by 40 dB using the INPUT VOL. The amplification following VOL has increased gain so that the input signal to DETECTOR OUT at INPUT VOL center will be at the same level.

Concerning the VCA circuit, the VCA IC is used in the NF circuit of the OP amplifier and a maximum 35 dB of gain reduction can be obtained.

OUTPUT VOL has a variable range of 40 dB and the level is set so that the gain will be "0" at the center position.

That is, at the INPUT and OUTPUT VOLUME center point in time, the input and output will be at the same level (when COMP is "OUT"). The gain can be increased to the maximum position for each of INPUT and OUTPUT, but since the maximum output of the amplifier following each is 5 Vrms, it is necessary that the VOL setting correspond to the input signal.

### 2. COMP CIRCUIT SYSTEM

The threshold level VOLUME can vary the signal input to DETECTOR IN by 40 dB. The input signal goes through the first level amplifier, then is full-wave rectified. The signal is then converted by the timing circuit to a DC level which is time-set for attack and release. After this, the signal enters a circuit that determines the compression ratio. A DC level is output which corresponds to the input signal so that the COMP RATIO VOLUME will bring about the determined compression ratio. Concerning the voltage shift, the DC level is shifted so that there will be the necessary voltage to control the VCA IC.

Furthermore, the determined DC level of the compression ratio is a signal that lights the GAIN REDUCTION LED.

The attack time is 0.2 – 20 msec and the release time has a variable range of 50 msec – 2 sec.

### 3. EXP GATE (EXPANDER GATE) CIRCUIT SYSTEM

Since the EXP GATE works when there are weak signals or no signals, a two-step OP amplifier is used to provide gain.

VOL which determines the threshold level of the EXP GATE is positioned midway and there is a variable range of 40 dB.

To control the VCA when there are weak signals, the full-wave rectified signal goes through the reversing circuit, the shift voltage is applied, and the necessary level of control signal is produced. When the EXP GATE switch is turned "OFF" this signal will be changed to a level which does not have an effect on the VCA circuit. In order for this switch to reduce the EXP GATE ON/OFF shock sound, on/off switching of the DC level is stopped and voltage is applied to the input of the reversing circuit. The condition of the input of a large signal is produced and the GATE is made inoperative. The EXP GATE LED will light up when the EXP GATE switch is "ON" and when the EXP is working.

### 4. LINK SWITCH

Pressing the LINK switch permits simultaneous control of CH1 and CH2.

Concerning priority order, there is a fast level setting for the attack and recovery times, the compression ratio is large, and there is a high EXP GATE level setting.

With regard to the EXP GATE, even if one channel is switched OFF at linking time, the GATE level of the other channel will work. The GATE LED of the channel that is switched OFF will not light up.

### 5. FUNCTION OF THE THRESHOLD LEVEL (REFER TO THE GRAPHS)

The 45° slope line shows the expander, compression ratio, threshold, and MIN time input/output characteristics (at INPUT VOL/OUTPUT VOL center time).

The horizontal line in Diagram 1 shows the function of the compression when the compression ratio is maximum.

For example, at INPUT center time with the COMP RATIO at MAX if the threshold is at center, output will be obtained at the third horizontal line from the top (an output level of -10 dBm). When the input level goes to -10 dBm, the output will increase by the same level as the input, but when the input becomes higher than -10 dBm, the output will be fixed at -10 dBm and the compressor will act on the output. At this time, (1) in the diagram will be the variable level of the threshold and the compressor will function so that at MAX time the output will be fixed at -25 dBm; and at MIN time the output will be fixed at +15 dBm.

Furthermore, since the input level volume and threshold level are connected in series, if the INPUT VOL is put to MAX at the above condition, variation of the COMP threshold level will be possible over the -40 dBm to 0 dBm range with the -25 dBm input at the center. (To make the function of the compressor easier to understand in the graph of Diagram 1, the output volume is varied and the output is matched at the 45° slope portion. Diagram 2 shows the input/output curve at OUTPUT VOL center time.)

### 6. FUNCTION OF THE EXP GATE THRESHOLD LEVEL

When the input level is small as in Diagrams 1 and 2, the output will be reduced to a 1:2 curve. The GATE curve in Diagram 1 is a graph at INPUT VOL center time, and since the same COMP threshold VOL is in series, the position of the INPUT VOL as in Diagram 2 will change the input level on the GATE.



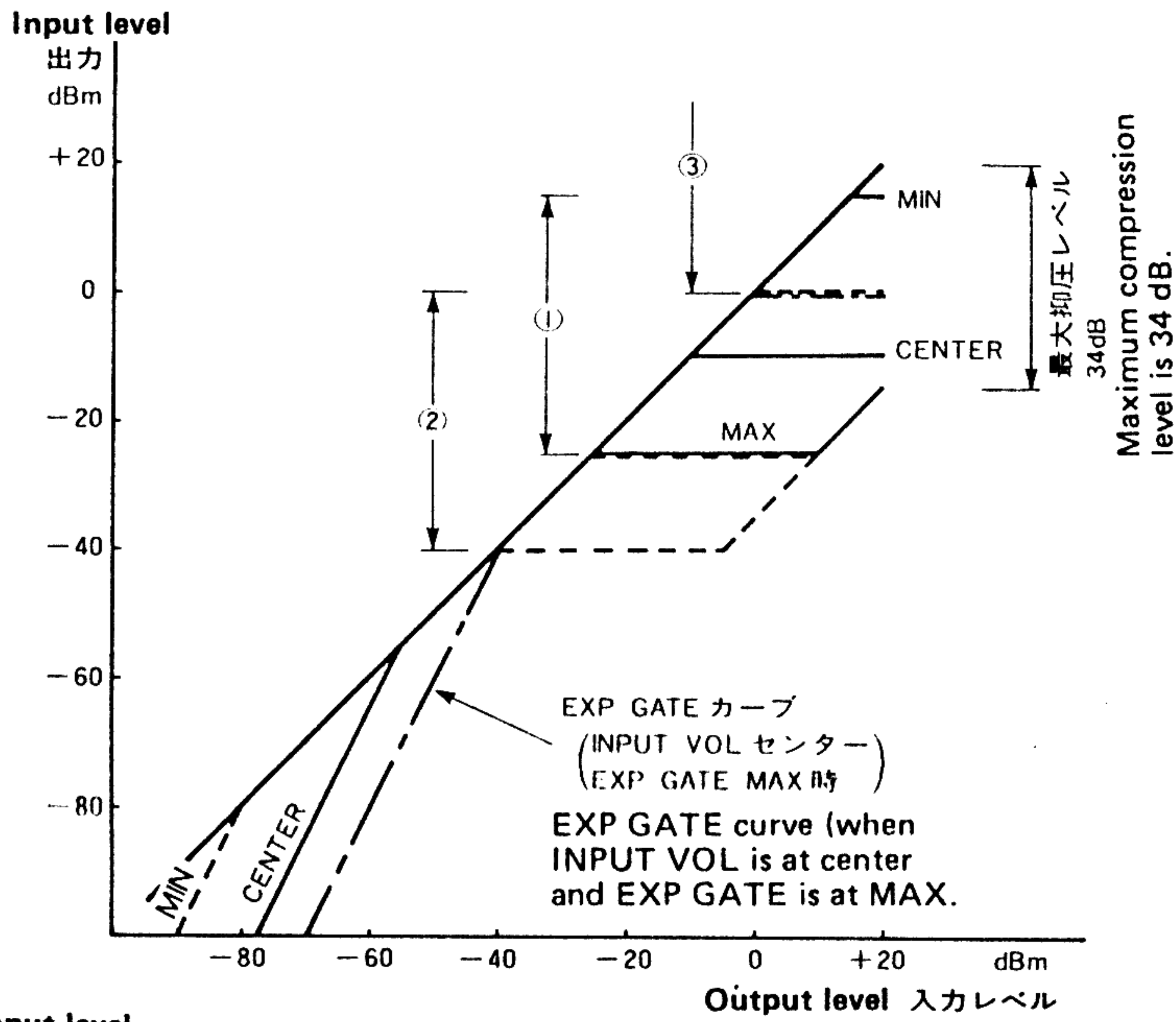


Fig. 1 図1

- ① Threshold level variable range (40 dB) at INPUT VOL center time.
- ② Threshold level variable range (40 dB) at INPUT VOL MAX time.
- ③ Threshold level variable range (40 dB) at INPUT VOL MIN time.

In order to know the level of compression for INPUT VOLUME variations, this input/output curve varies with output VOL so that the input/output gain is 0 dB at a condition in which the compressor is not operating.

- ①INPUT VOL センター時のスレッショールドレベル可変範囲(40dB)
- ②INPUT VOL MAX時のスレッショールドレベル可変範囲(40dB)
- ③INPUT VOL MIN時のスレッショールドレベル可変範囲(40dB)

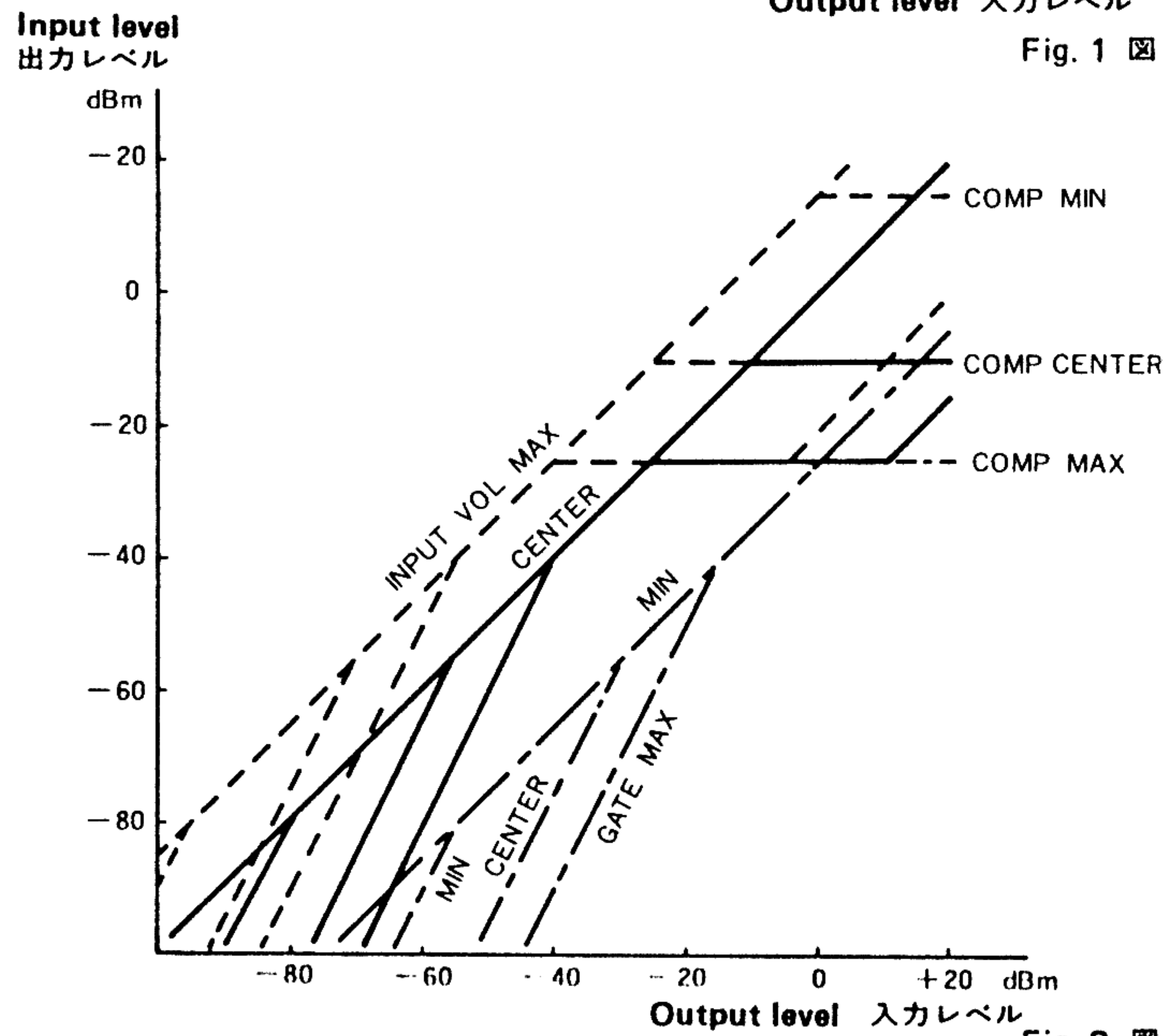


Fig. 2 図2

入力 VOLUME 可変におけるCOMP のかかり具合を知るため、COMPがかからない状態で入出力 GAIN 0dBになるよう出力VOLにて操作した入出力カーブ。

\* This diagram is at a time when the OUTPUT VOL is fixed at center.  
\*この図は、OUTPUT VOL センター一定の時。

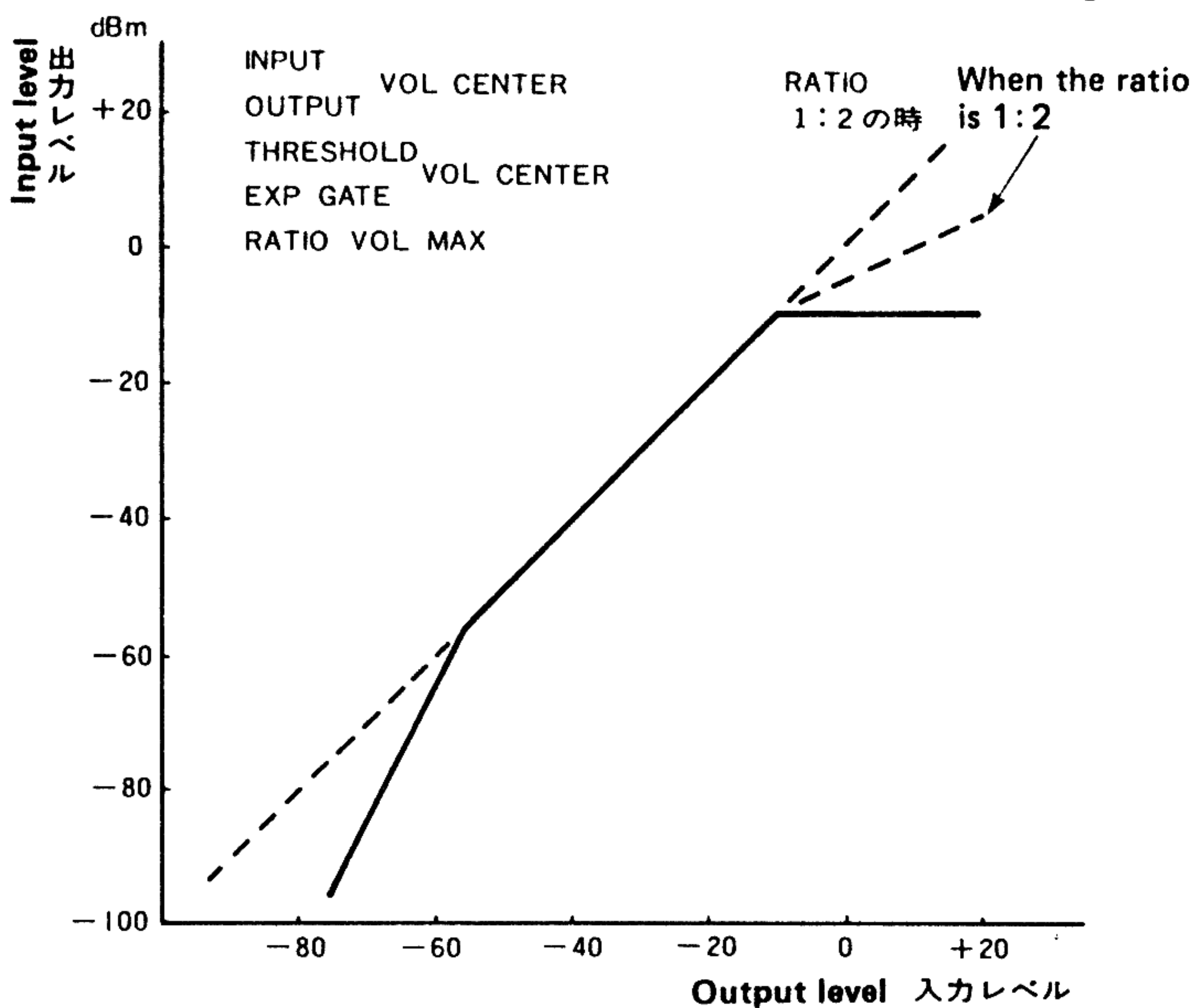


Fig. 3 図3

## ■ ADJUSTMENTS (調整仕様)

### 1. Before adjustment

Set the switch and controls as follows.

COMP switch	IN (—)
EXP GATE	min
THRESHOLD	max
COMP RATIO	max
ATTACK	min
RELEASE	min
INPUT	max
OUTPUT	max

### 2. Adjustment of ratio curve

Adjust VR15 and/or VR16 so that  $-2.5\text{ dB} \pm 0.5\text{ dB}$  ( $580\text{ mV} \pm 30\text{ mV}$ ) is obtained at the OUTPUT Jacks when a  $1\text{ kHz}$ ,  $-30\text{ dB}$  ( $24.5\text{ mV}$ ) signal is applied to the INPUT Jacks.

\* Insert the short plugs between the DETECTOR OUT and IN.

### 3. Adjustment of VCA DC balance.

Adjust VR17 and/or VR18 so that  $+50\text{ mV}$  is obtained between the both Jacks of R45 and those of R46 respectively when a  $1\text{ kHz}$ ,  $+5\text{ dB}$  ( $1380\text{ mV}$ ) signal is applied to the DETECTOR IN Jack.

\* Use a DC milli-volt meter (YHP4304B or its equivalent) for measurement.

### 1. 調整の前に

スイッチおよびツマミは次のようにセットする。

COMP switch	IN (—)
EXP GATE	min
THRESHOLD	max
COMP RATIO	max
ATTACK	min
RELEASE	min
INPUT	max
OUTPUT	max

### 2. レシオカーブの調整

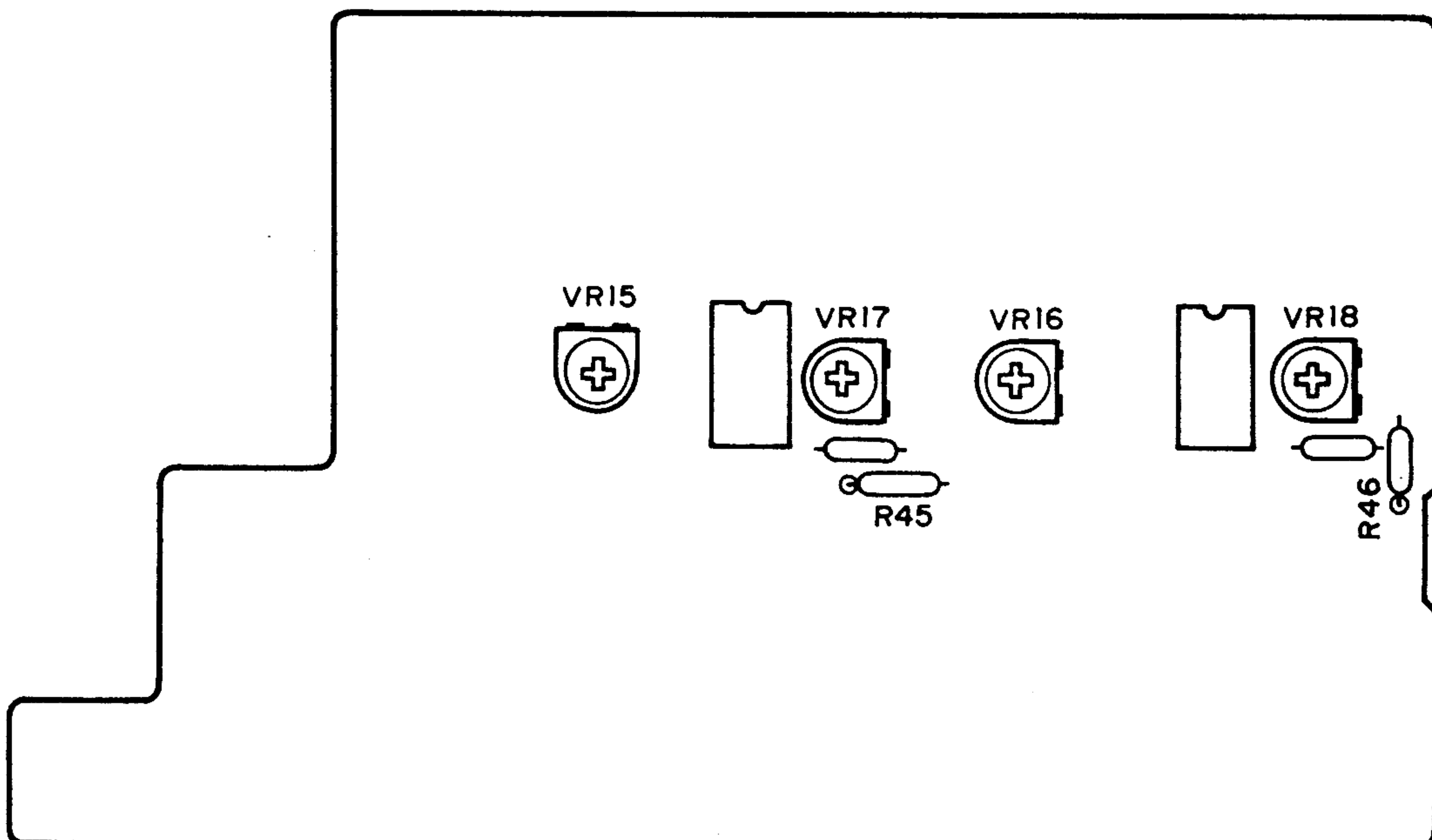
INPUT端子に  $1\text{ kHz}$ 、 $-30\text{ dB}$  ( $24.5\text{ mV}$ ) の信号を印加したとき、OUTPUT端子に  $-2.5\text{ dB} \pm 0.5\text{ dB}$  ( $580\text{ mV} \pm 30\text{ mV}$ ) が得られるようにVR15、VR16を調整する。

\* DETECTOR OUT、IN 間にショートプラグを差しておくこと。

### 3. VCA DCバランス調整

DETECTOR IN端子に  $1\text{ kHz}$ 、 $+5\text{ dB}$  ( $1380\text{ mV}$ ) の信号を印加したとき、R45の両端子間およびR46の両端子間にそれぞれ  $+50\text{ mV}$  が得られるようにVR17、VR18を調整する。

\* 測定には、DCミリバル(YHP4304B程度)等を使用する。



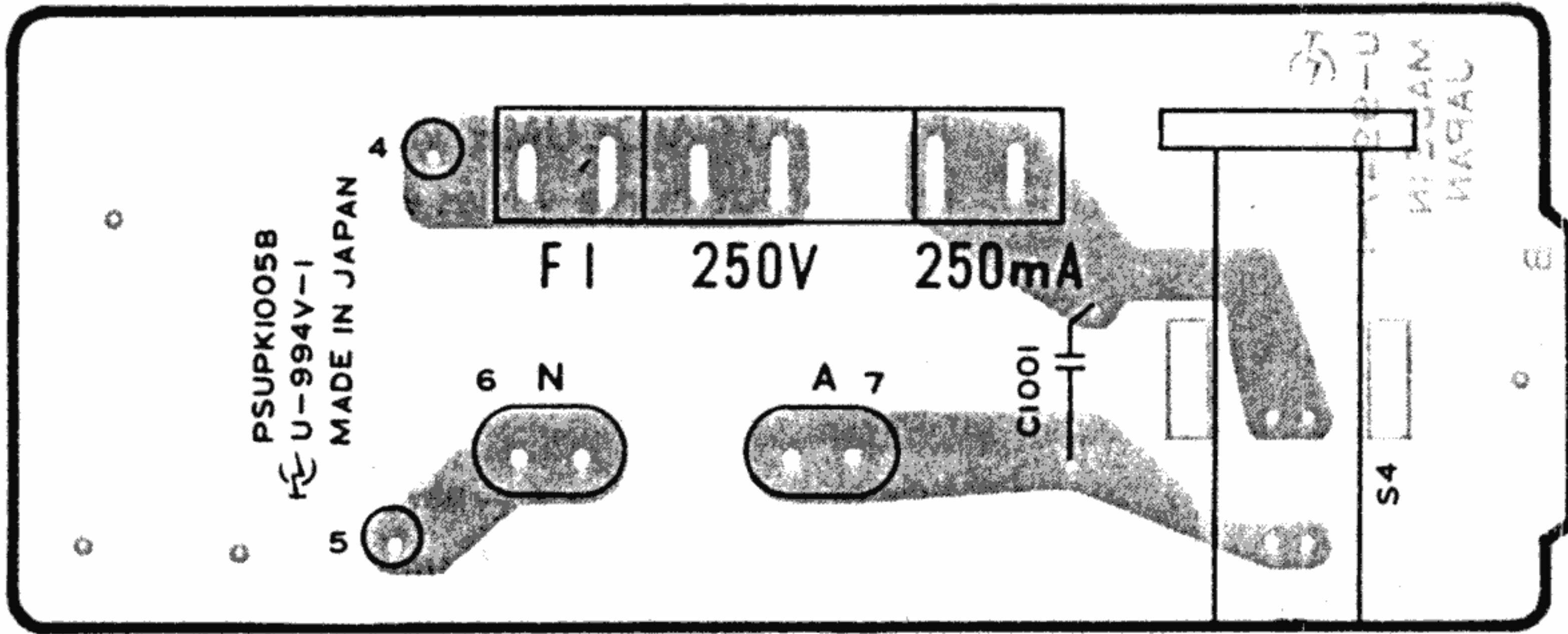
MAIN Circuit Board



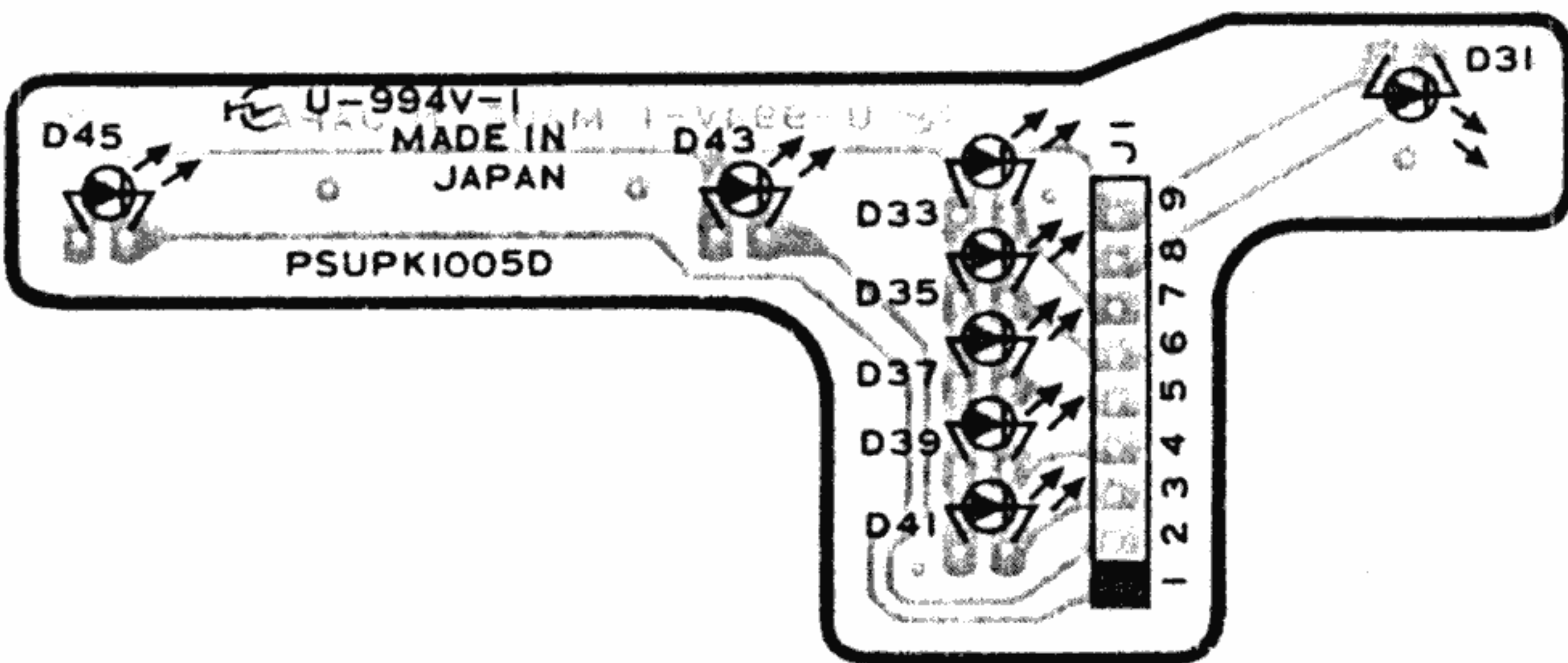
GC2020

**CIRCUIT BOARDS (Parts side)**  
 シート図(部品側)

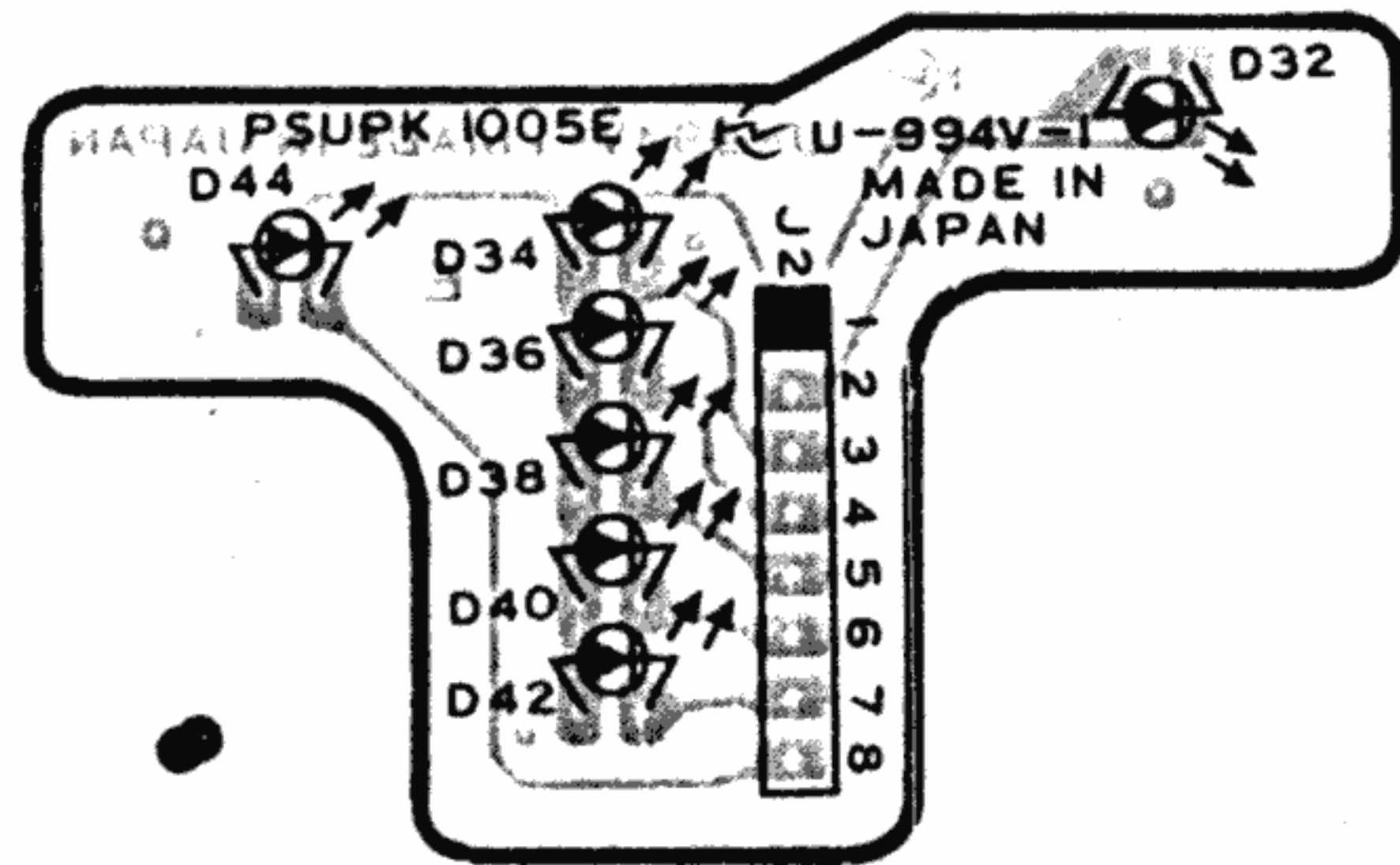
- AC CIRCUIT BOARD (Japanese ; XX806180  
 U.S. & Canadian ; XX806480  
 General ; XX806450)



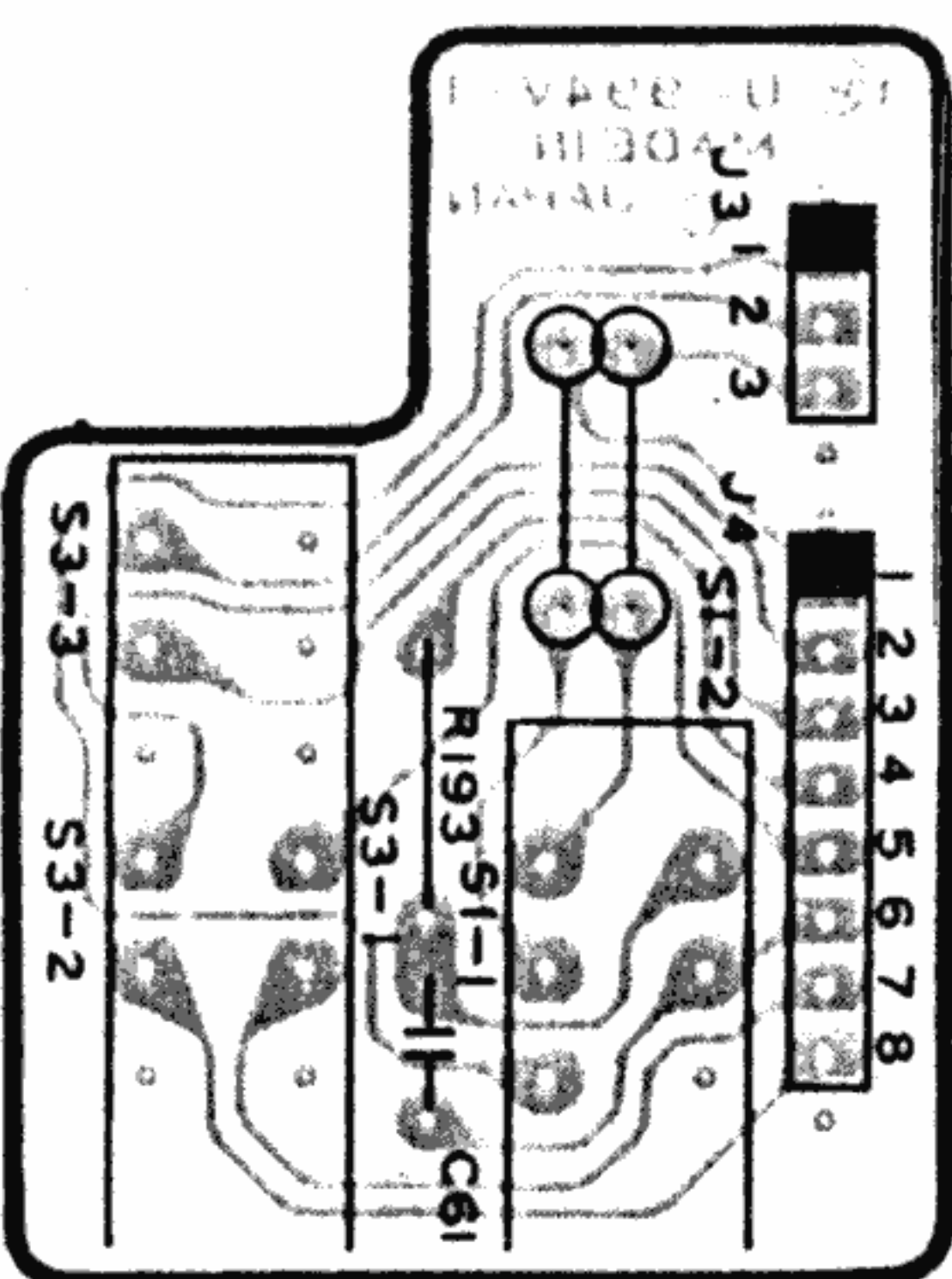
- LED1 CIRCUIT BOARD (XX806160)



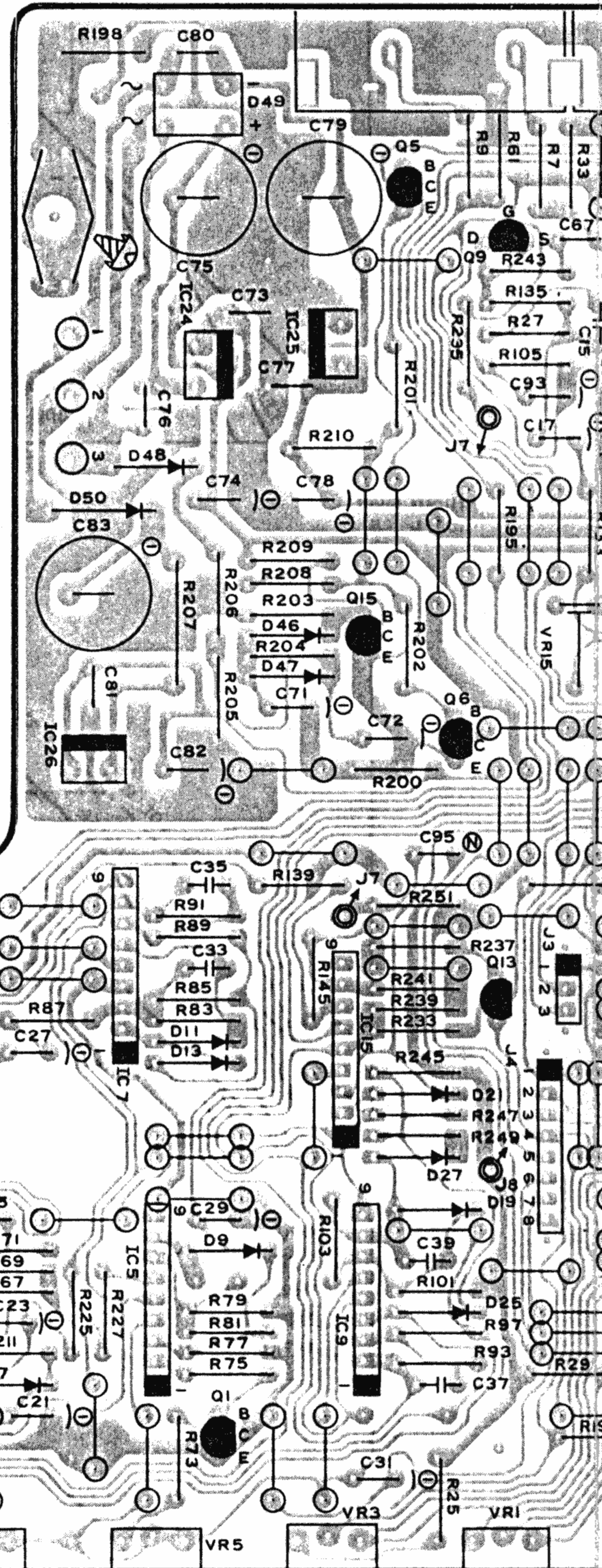
- LED2 CIRCUIT BOARD (XX806170)



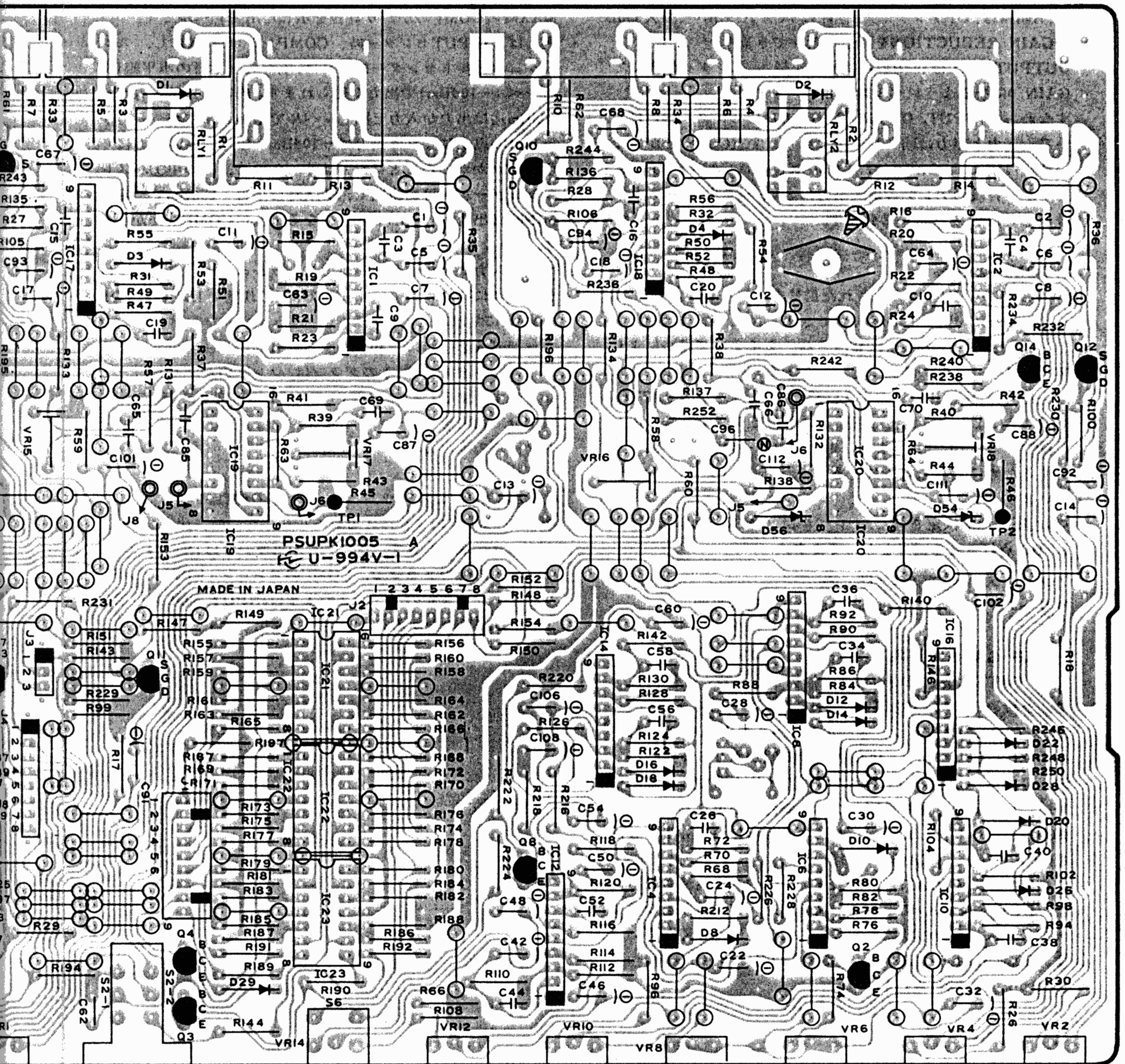
- SW CIRCUIT BOARD (XX806150)



- MAIN CIRCUIT BOARD (XX806140)

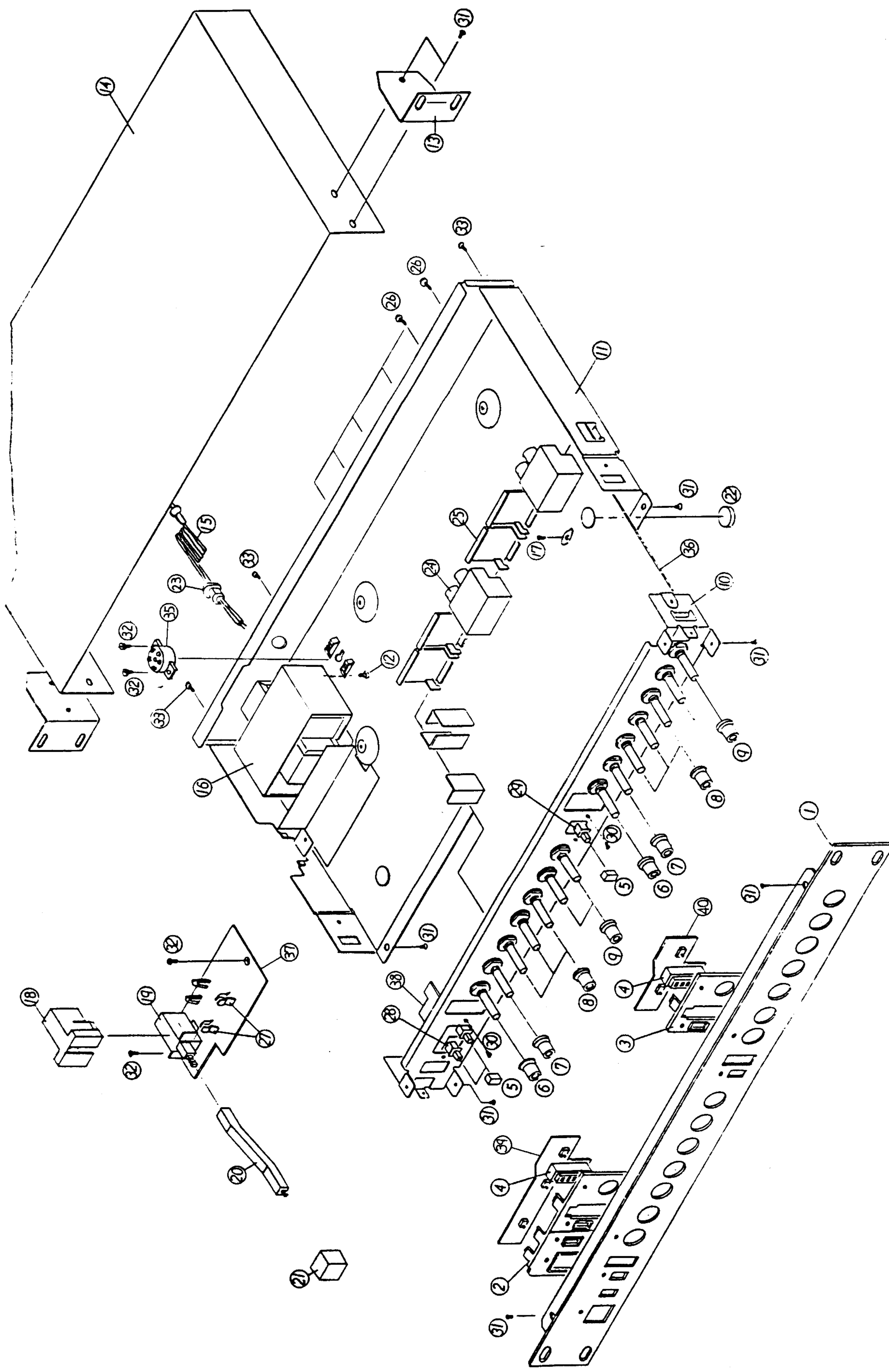








EXPLODED VIEW (分解図)





## MECHANISM PARTS (メカ部品)

Ref. No.	Part No.	Description	部品名		Remarks	Common Model	Markets	ランク
* 1	XX 80 60 10	Front Panel		フロントパネル	PSGWK300A			150
* 2	XX 80 60 20	Sheet A, Knob		ツマミ座(A)	PSG XK97			030
* 3	XX 80 61 10	Sheet B, Knob		ツマミ座(B)	PSG XK97B			020
* 4	XX 80 60 30	Holder, LED		LEDホルダー	PSGLK15			030
* 5	CX 80 01 10	Push Button		プッシュボタン	PSBCK46			020
* 6	CB 83 52 10	Knob	Red	ツマミ	PSBNK41-3			010
* 7	CB 83 49 40	"	Green	"	"			010
* 8	CX 80 01 20	"	Gray	"	"			020
* 9	CB 83 52 00	"	Blue	"	"			010
* 10	XX 80 60 40	Sub Panel		前板	PSU FK20			070
* 11	XX 80 61 30	Chassis		シャーシ	PSGPK290A		J	
* "	XX 80 61 90	"		"			U,C	
* "	XX 80 62 00	"		"			G	
* 12	ED 33 00 86	Bind Head Screw	3×8	BI	バインド小ネジ	XTW3+8LFZ		010
* 13	XX 80 60 50	Bracket			パネル補強金具	PSKXK3		060
* 14	XX 80 60 60	Top Cover			トップカバー	PSKCK140		110
* 15	MX 80 01 80	Power Supply Cord			電源コード	PSJAK3	J	
* "	MX 80 01 90	"			"	PSJAK4	U,C	
* "	MX 80 02 00	"			"	PSJAK5	G	
* 16	GX 80 00 70	Power Transformer			電源トランス	PSLTK9M1-W	J	160
* "	GX 80 00 80	"			"	PSLTK9M2-W	U,C	
* "	GX 80 00 90	"			"	PSLTK9M3-W	G	
* 17	ED 33 00 86	Bind Head Screw	3×8	BI	バインド小ネジ	XTBS3+8FFZ1		010
* 18	XX 80 60 80	Cover, Power Switch			電源スイッチカバー	SMNK17		020
* 19	KX 80 02 10	Power Switch			電源スイッチ	SSH1071		
* 20	XX 80 60 90	Shaft, Power Switch			電源スイッチ連結棒	SUB69		020
* 21	CB 81 23 80	Push Button			プッシュボタン	PSBCK45		010
* 22	XX 80 61 00	Leg			脚	PSK LK2		020
* 23	XX 80 64 60	Cord Stopper			コードストッパー	SHR127	U,C,G	
* 24	LX 80 04 20	Phone Jacks			入出力ジャック	PSJJK30		060
* 25	LX 80 04 30	Pin Jacks			入出力ピンジャック	SJF3057-7N		040
* 26	Ei 33 01 06	Bind Head Tapping Screw	3×10	BI	バインドタッピングネジ	XTB3+10GFZ		010
* 27	LX 80 04 50	Fuse Holder			ヒューズホルダー	SJT345	J,U,C	010
* "	LX 80 04 80	"			"	SJT347	G	
* 28	KX 80 01 70	Push Switch			プッシュスイッチ	PSSHK50		
* 29	KX 80 01 80	"			"	PSSHK51		
* 30	EB 33 00 86	Flat Head Screw	3×8	BI	皿小ネジ	XSS3+8S		010
* 31	EO 33 00 86	Flat Head Tapping Screw	3×8	BI	皿タッピングネジ	XTS3+8BFZ		010
* 32	ED 33 00 86	Bind Head Screw	3×8	BI	バインド小ネジ	XTB3+8FFZ		010
* 33	Ei 33 00 86	Bind Head Tapping Screw	3×8	BI	バインドタッピングネジ	XTB3+8BFZ		010
* 34	Ei 33 01 06	"	3×10	BI	"	XTB3+10GFZ		010
* 35	KX 80 02 00	Voltage Selector			電圧切替器	ESE3787	G	
* 36	XX 80 61 40	Circuit Board, MAIN			MAINシート			360
* 37	XX 80 61 80	Circuit Board, AC			ACシート		J	110
* "	XX 80 64 80	"			"		U,C	
* "	XX 80 64 50	"			"		G	
* 38	XX 80 61 50	Circuit Board, SW			SWシート			110
* 39	XX 80 61 60	Circuit Board, LED1			LED1シート			120
* 40	XX 80 61 70	Circuit Board, LED2			LED2シート			110

\*New Parts (新規部品)

ランク : Japan only



**■ CIRCUIT BOARDS & ELECTRICAL PARTS**  
(シート及び電気部品)

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Model	Markets	ランク
*	XX 80 61 40	Circuit Board, MAM	M A I N シ ー ト				360
*	VR1,2 7,8	HX 80 04 80 Potentiometer	A10kΩ	可 変 抵 抗 器	EVJ-KAA033A14		
*	VR9,10	HX 80 04 90 "	C10kΩ	"	EVJ-KAA033C14		
*	VR3,4	HX 80 05 00 "	A50kΩ	"	EVJ-KAA033A54		
*	VR11,12	HX 80 05 10 "	A100kΩ	"	EVJ-KAA033A15		
*	VR5,6	HX 80 05 20 "	A1MΩ	"	EVJ-KAA033A16		
*	VR13,14	HX 80 05 30 Potentiometer with Switch	C10kΩ	"	EVJ-LLB026C14		
*	VR15,16	HX 80 05 40 Trimmer Potentiometer	B20kΩ	ソ リ ッ ド V R	MQNK4AA00B24		
	Q1,2	iC 28 78 00 Transistor	2SC2878(A,B)	ト ラ ン ジ ス タ	2SC2878B-T		031
	Q3~8	iA 10 15 30 "	2SA1015(Y,GR)	"	2SA1015GR-T		031
	Q13	iC 18 15 50 "	2SC1815A(Y,GR)	"	2SC1815L-BL-T		031
	Q9~12	iE 10 26 00 FET	2SK246	F E T	2SK246GR-T		031
*	D46	iX 80 11 60 Diode		ダ イ オ ー ド	MA27W-A(T)		
*	D3, etc.	iX 80 11 50 "		"	MA150TA		
*	D1,2	iX 80 11 40 "		"	MA1120MTA		
	D54,56	iF 00 70 00 "	MA1130M	"	MA1130MTA		010
*	D46	iX 80 11 70 "		"	SVD1B4B42		
*	D50	iX 80 11 80 "		"	SVD1SR35-200LF		
	IC3~16	iX 80 07 80 IC	TA75559S	I C	SVITA75559S-1		030
	IC1, etc.	iG 08 02 00 "	NJM2043S	"	SVINJM2043SE		030
*	IC19,20	iX 80 12 20 "		"	NJM13600		050
*	IC21~23	iX 80 12 30 "		"	LA6324		030
*	IC24	iX 80 13 30 "		"	AN78M15		
*	IC25	iX 80 12 50 "		"	AN79M15		
*	IC26	iX 80 12 40 "		"	AN78N12		
*	RLY1,2	KX 80 02 30 Relay	12V DC	リ レ -	SFDYG5A237P		
*	XX 80 61 80	Circuit Board, AC	A C シ ー ト			J	110
*	XX 80 64 80	"	"			U,C	
*	XX 80 64 50	"	"			G	
*	KB 00 09 90	Fuse	ヒ ュ - ズ	XBA2F02NU100		J,U,C	012
	KB 00 07 00	"	"	XBA2C02TRO		G	
*	XX 80 61 50	Circuit Board, SW	S W シ ー ト				110
*	XX 80 61 60	Circuit Board, LED1	L E D 1 シ ー ト				120
	D31, etc.	iF 00 37 40 LED	LN222RP	L E D			020
	D33, etc.	iF 99 05 50 "	LN229RP	"			020
*	XX 80 61 70	Circuit Board, LED2	L E D 2 シ ー ト				110
	D32, etc.	iF 00 37 40 LED	LN222RP	L E D			020
	D34, etc.	iF 99 05 50 "	LN229RP	"			020

\*New Parts (新規部品)

ランク : Japan only

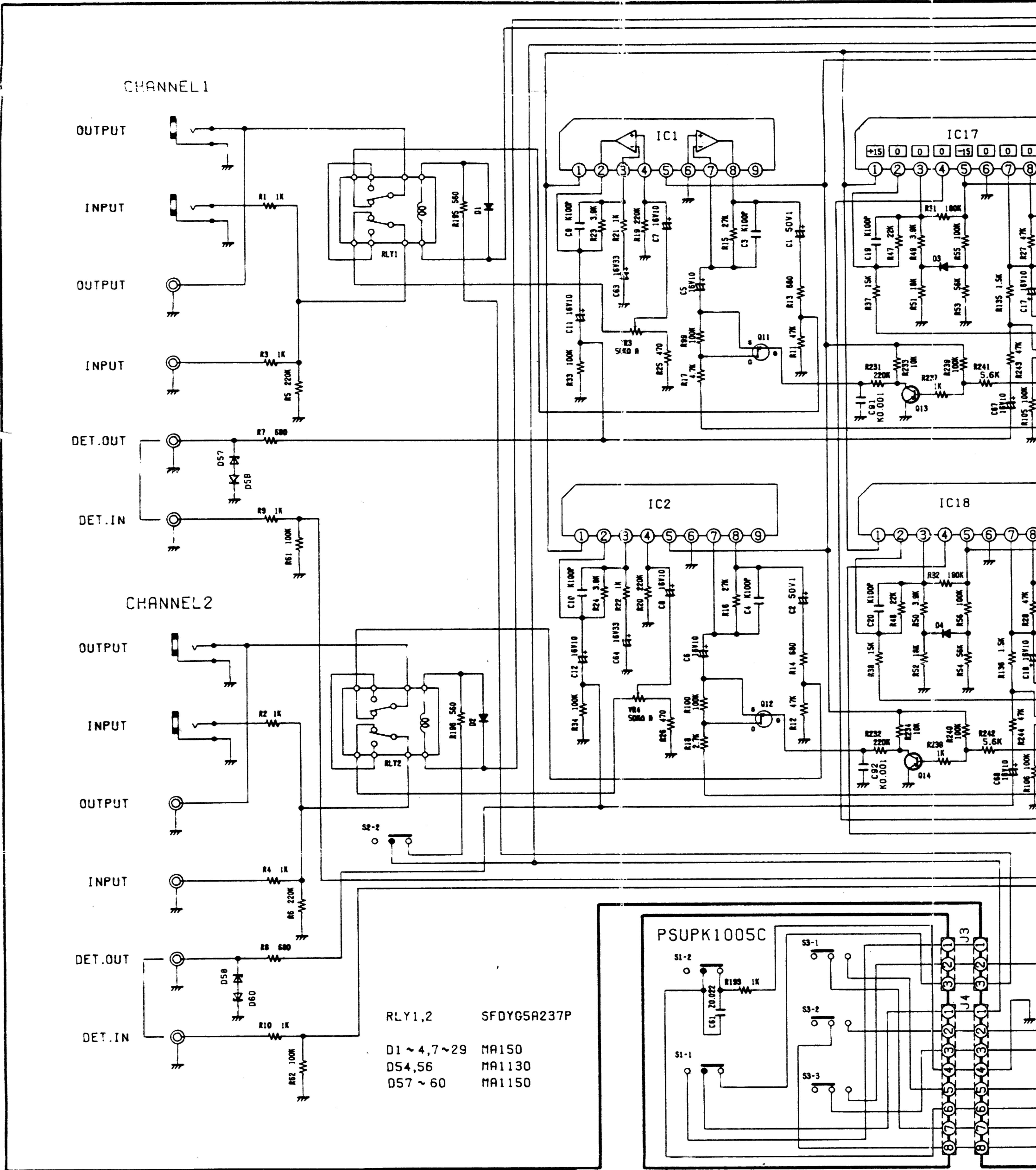
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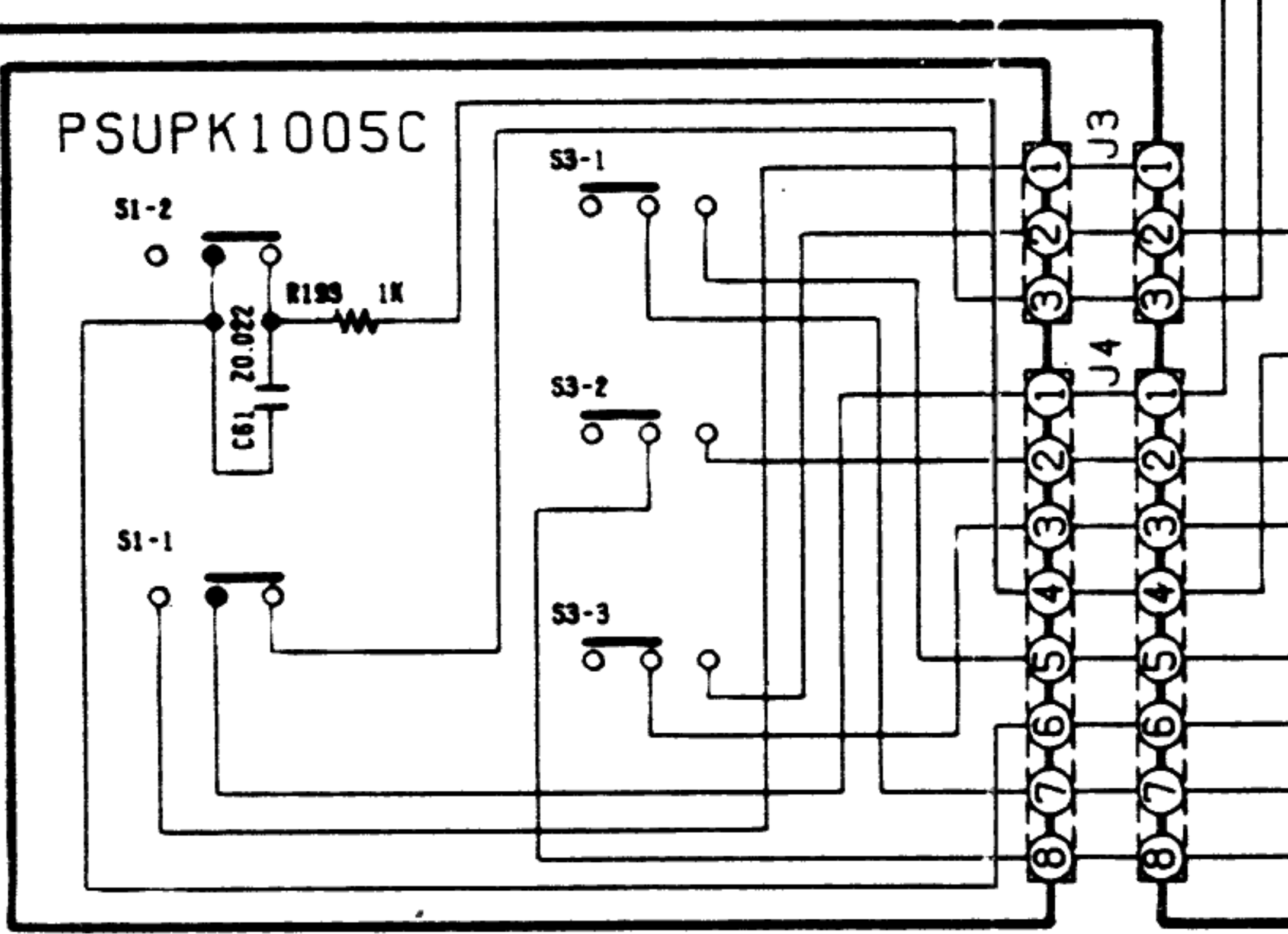
# SCHEMATIC DIAGRAM (総回路図)

IC1,2,17,18 SVINJM2043S  
 IC3~16 SVITA75559S  
 IC19,20 NJM13600  
 IC21~23 LA6324

Q1,2,17,18 2SC2878  
 Q3~8,13,14 2SA1015  
 Q9,10 2SK246  
 Q11,12 2SK301  
 Q15 2SC1815



RLY1,2 SFDYG5A237P  
 D1~4,7~29 MA150  
 DS4,56 MA1130  
 DS7~60 MA1150

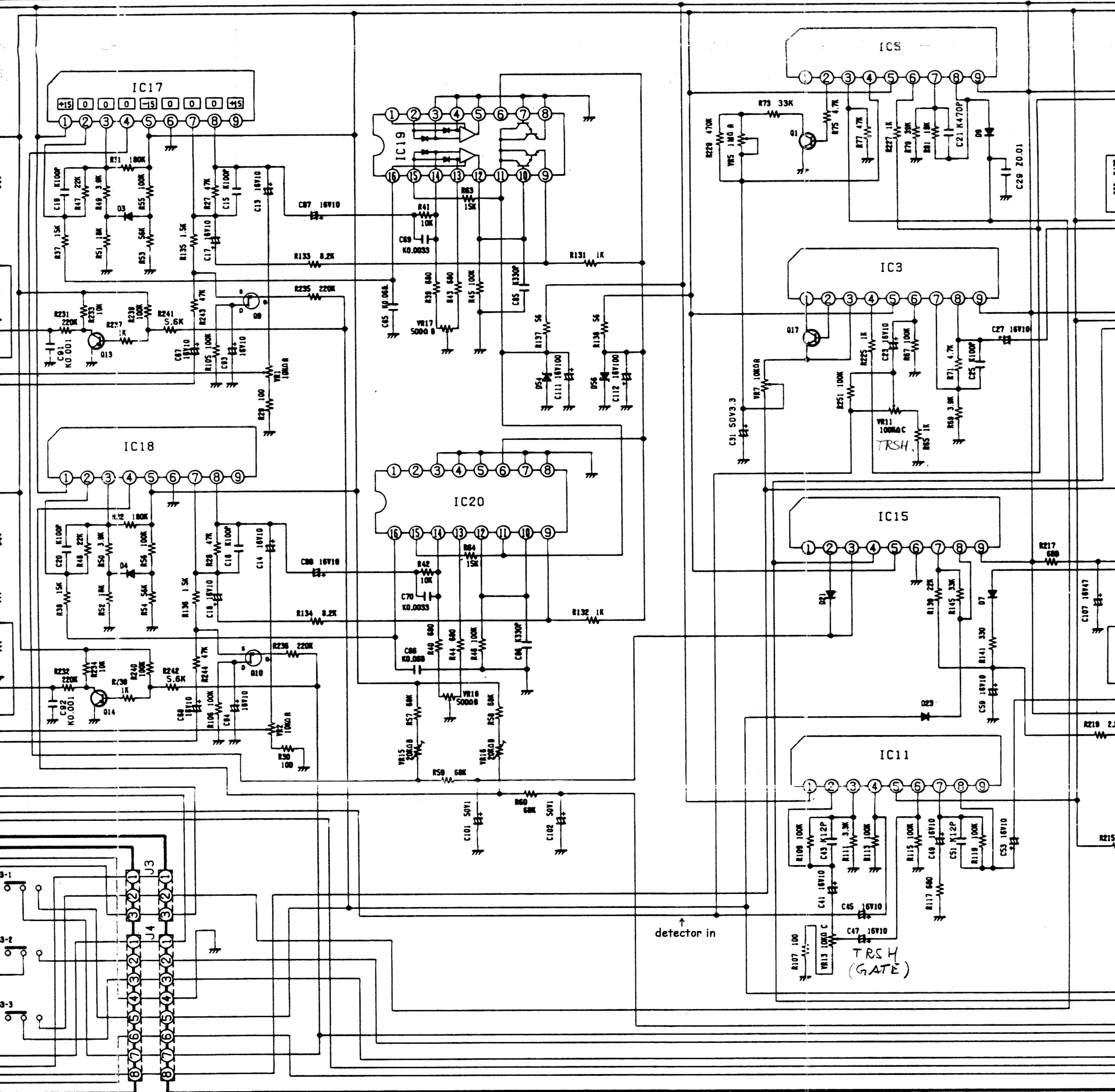


compressor  
on/off

Channel  
link

1  
2  
3  
4  
5  
6

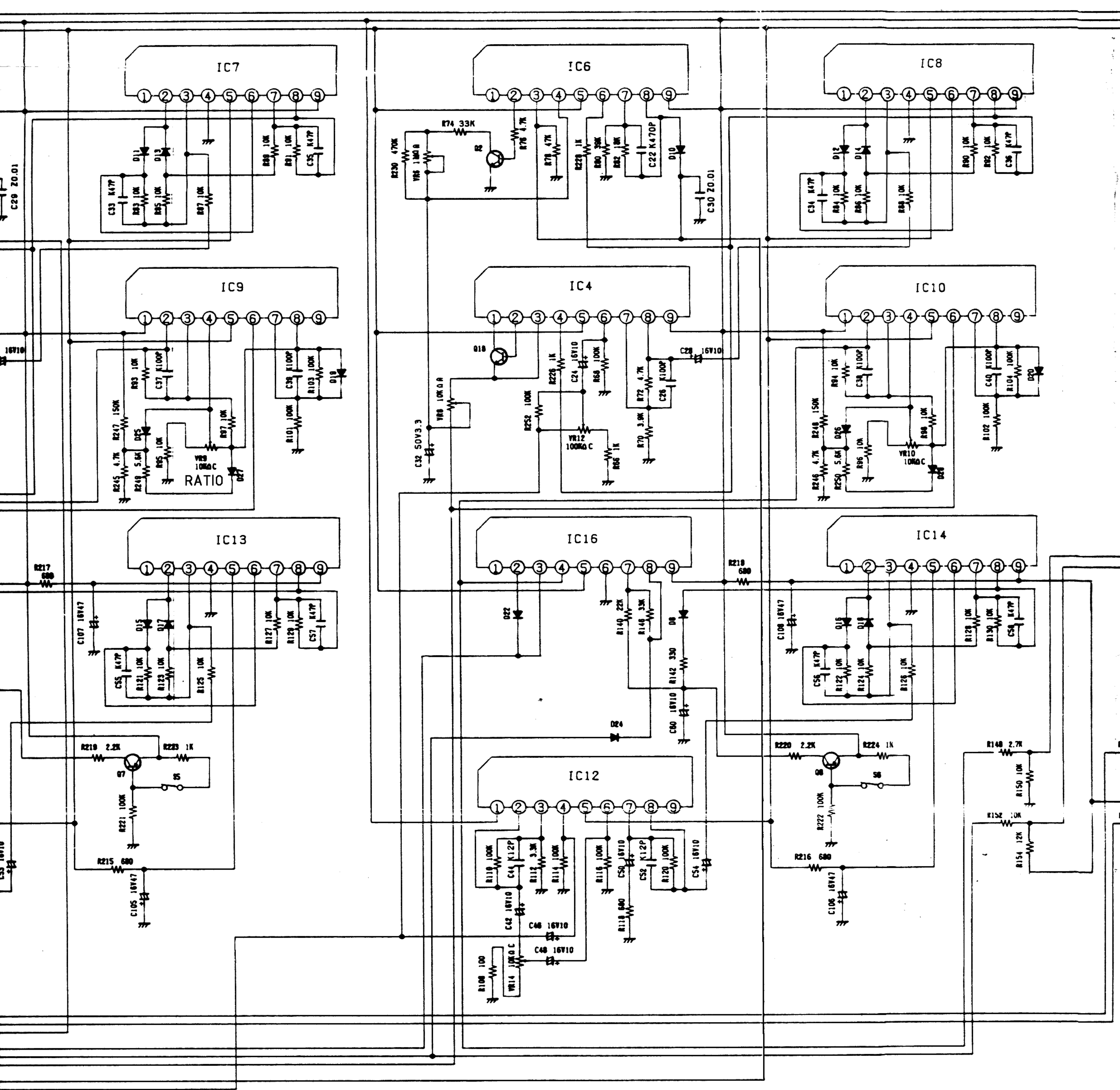




Channel link

mod Gate Decay: C50 / IC15

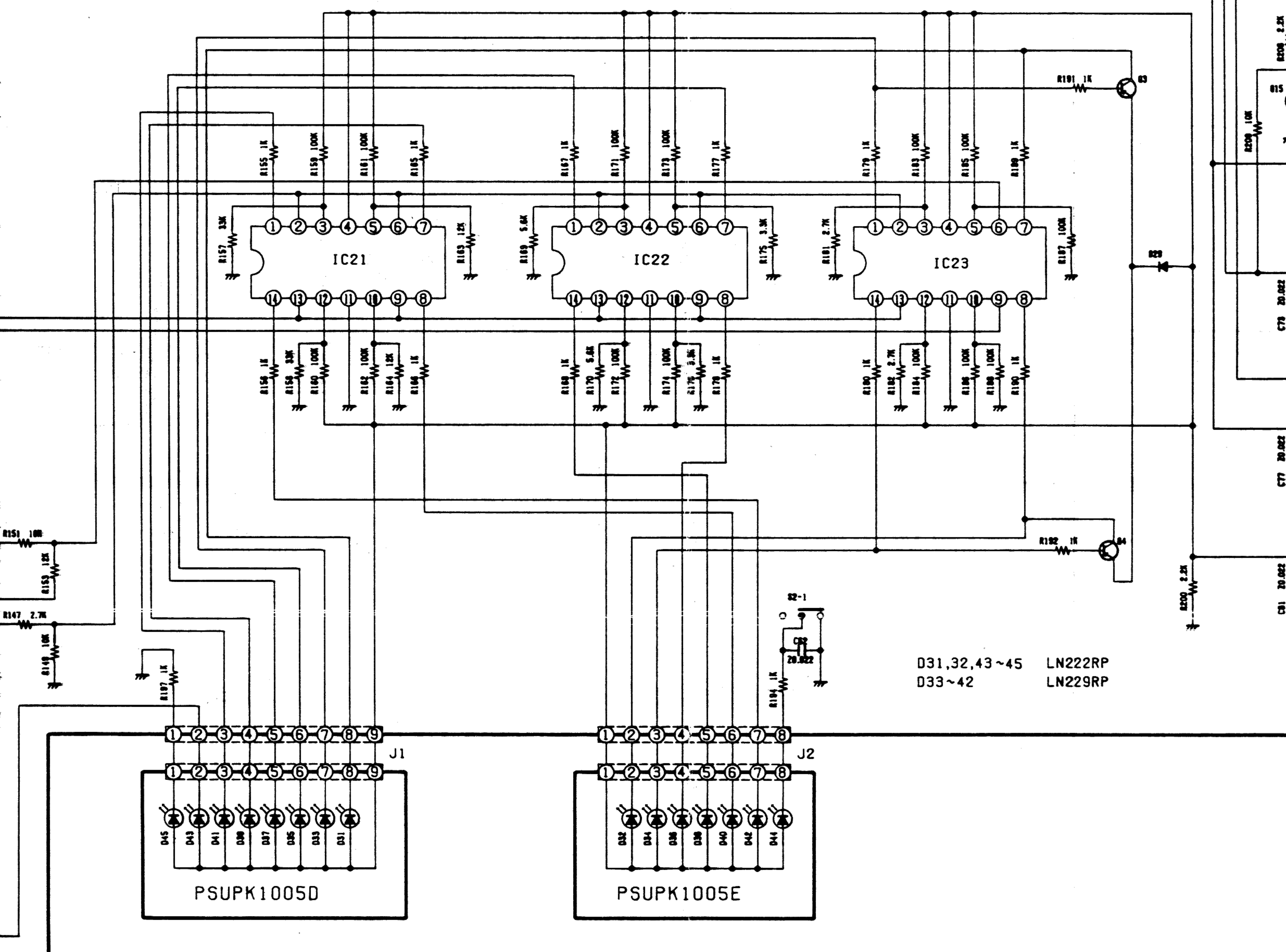




Gate Decay: C50,C60 @IC15,IC16

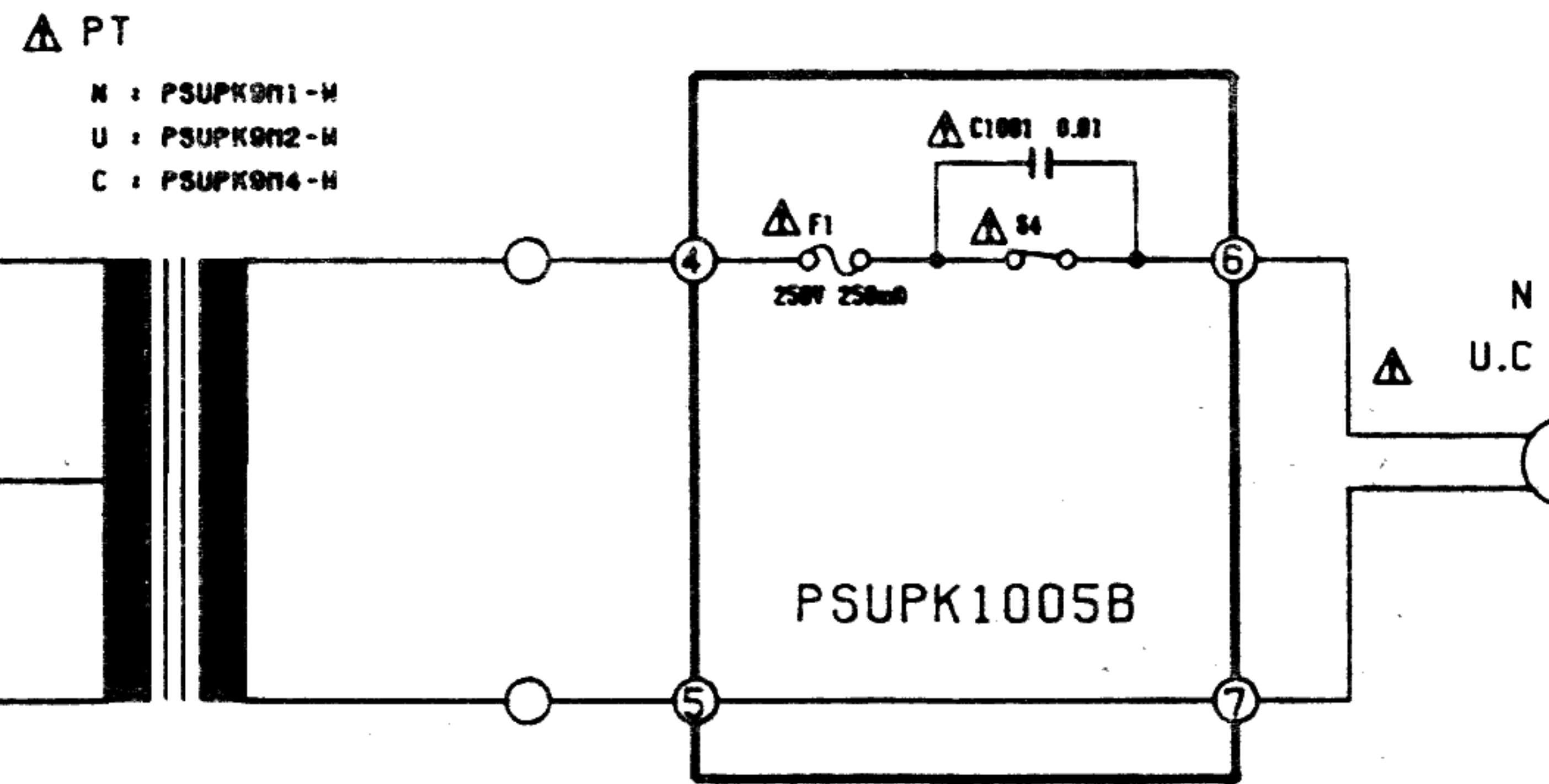
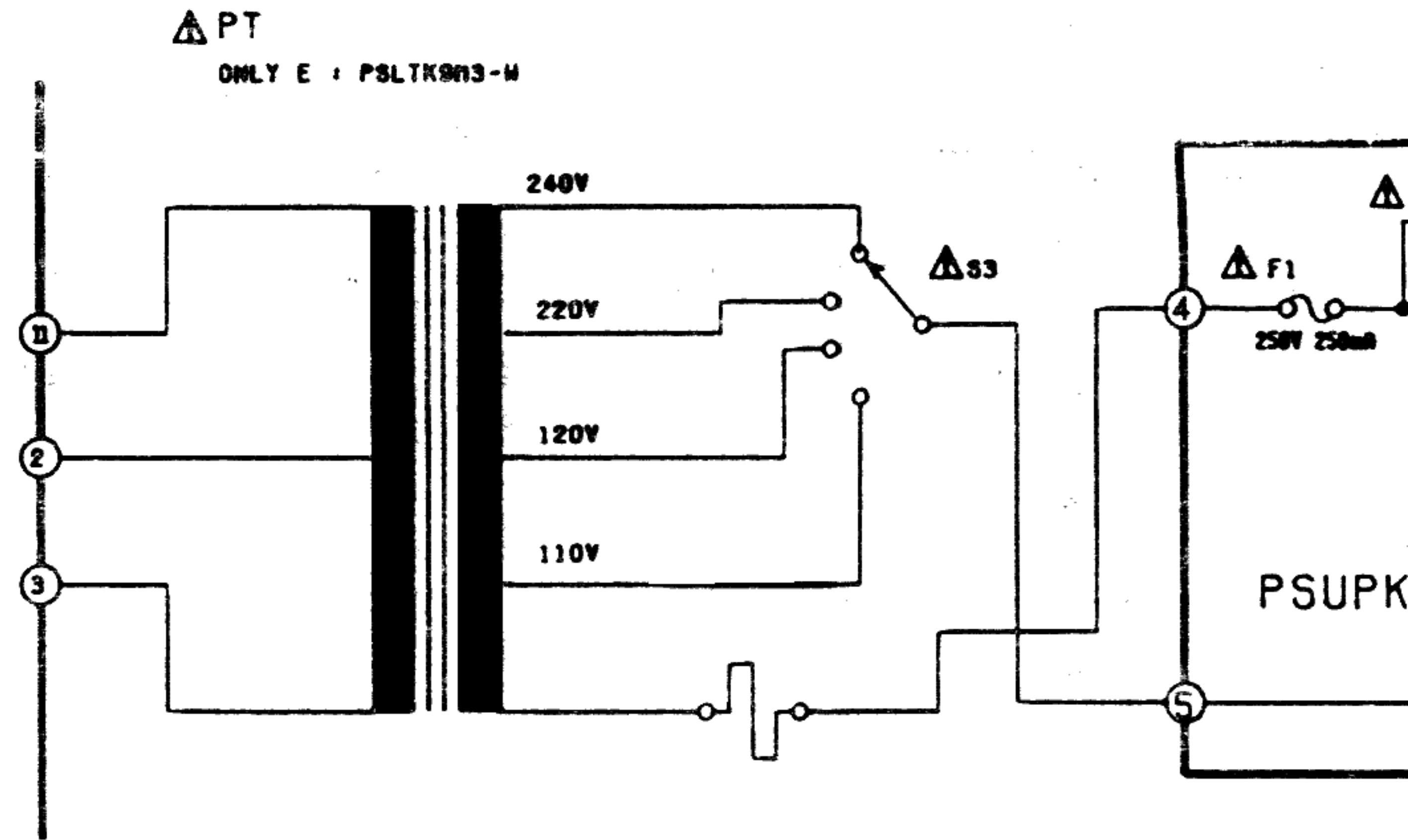
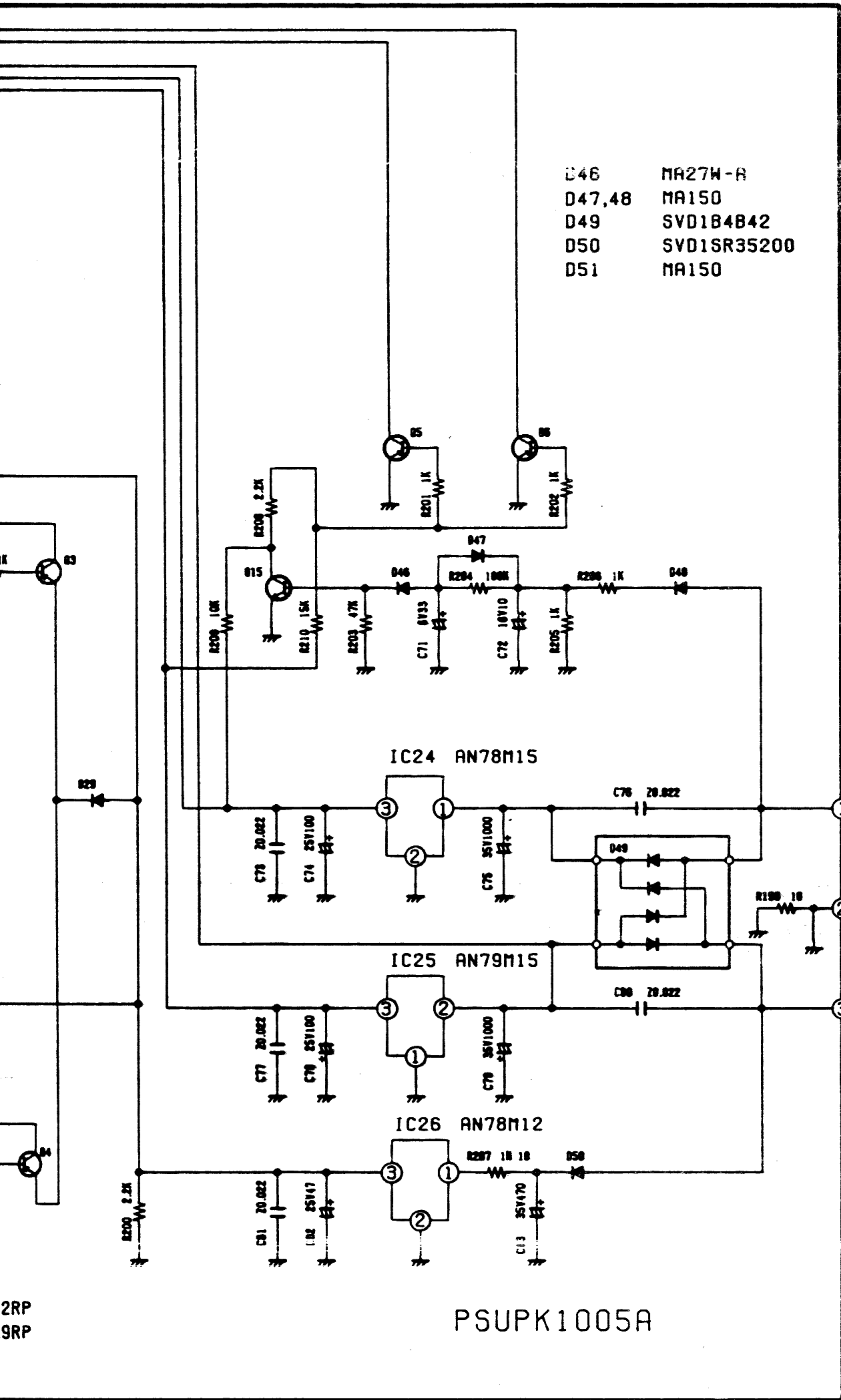


IC1,2,17,18	SVINJM2043S	Q1,2,17,18	2SC2878
IC3~16	SVITA75559S	Q3~8,13,14	2SA1015
IC19,20	NJM13600	Q9,10	2SK246
IC21~23	LA6324	Q11,12	2SK301
		Q15	2SC1815



D31,32,43~45 LN222RP  
D33~42 LN229RP



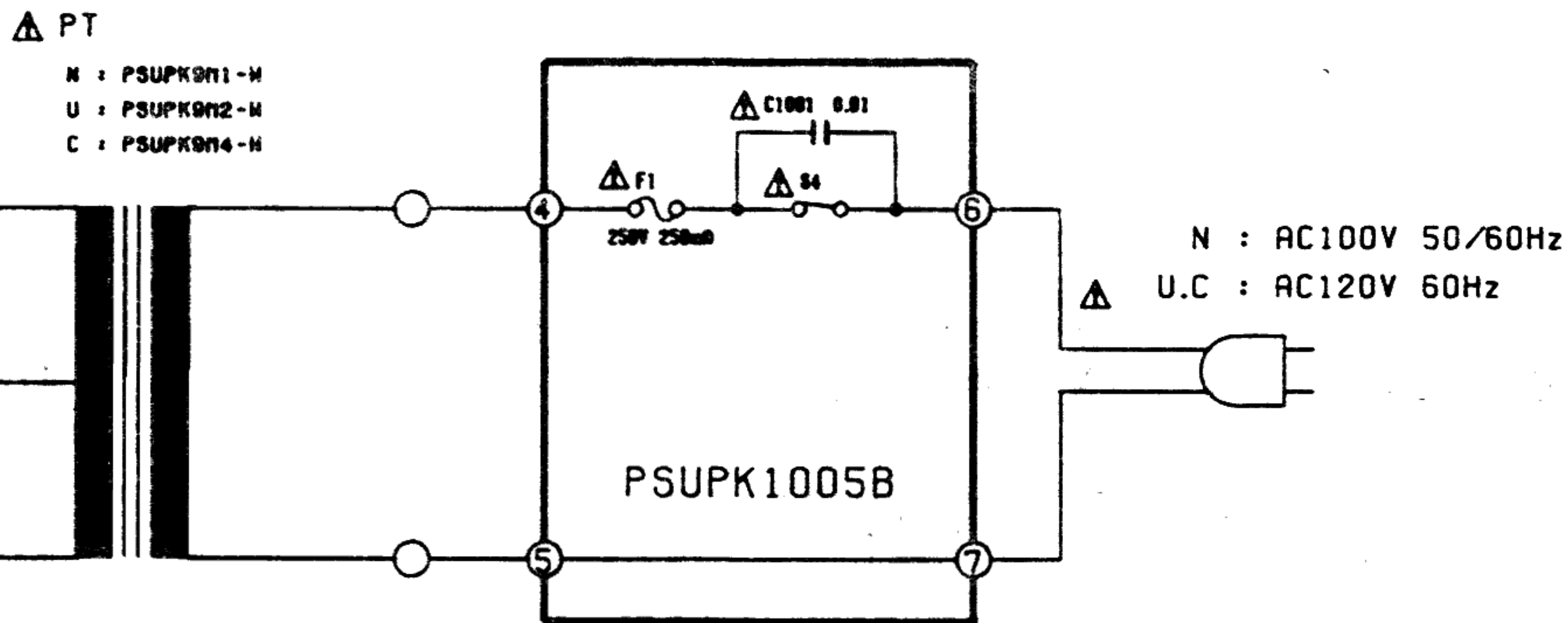
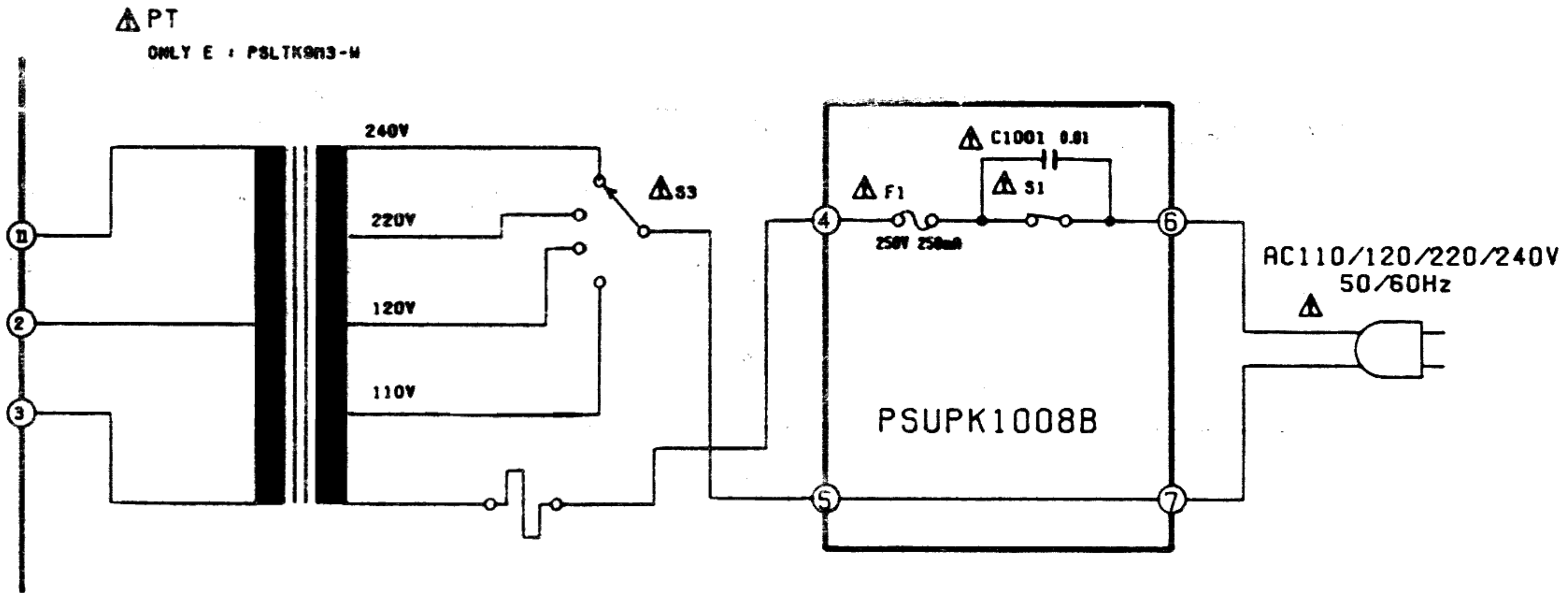


Notes

1. S1-1~2, S2-1~2  
COMP. switch in "on" position.  
on-off
2. S3-1~3  
LINK switch in "off" position.  
on-off
3. S4  
Power source switch in "on" position.  
on-off
4. S5, S6  
EXP.GATE switch in "on" position.  
on-off
5. Indicated voltage values are standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chasis taken as standard.
6.  $\Delta$  indicates that only parts specified by the manufacture be used for safety.
7. All the resistor otherwise are 1/4W  $\pm$  5% carbon film resistor.



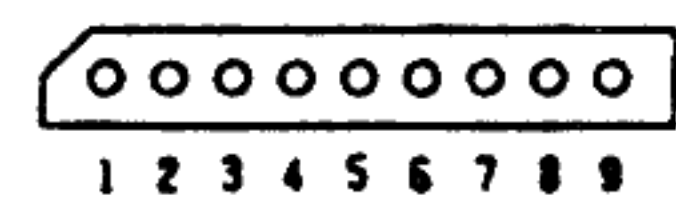
R27W-R  
R150  
VD1B4B42  
VD1SR35200  
R150



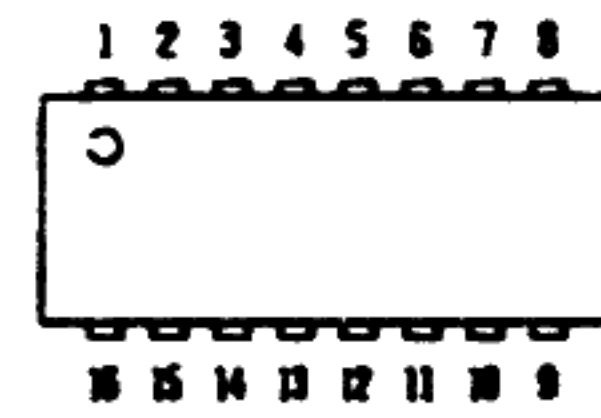
Notes

1. S1-1~2, S2-1~2  
COMP. switch in "on" position.  
on-off
2. S3-1~3  
LINK switch in "off" position.  
on-off
3. S4  
Power source switch in "on" position.  
on-off
4. S5, S6  
EXP.GATE switch in "on" position.  
on-off
5. Indicated voltage values are standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard.
6.  $\Delta$  indicates that only parts specified by the manufacture be used for safety.
7. All the resistor otherwise are 1/4W  $\pm$  5% carbon film resistor.

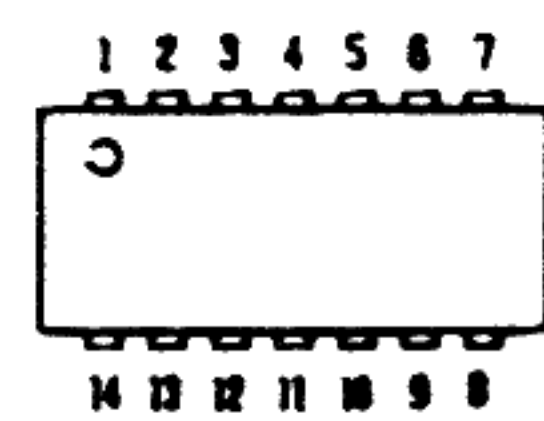
Bottom of view



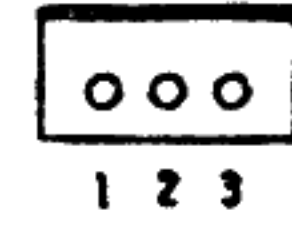
SVI TA75559S



NJM13600



LA6324



AN78M12  
AN78M15  
AN79M15



2SA1015  
2SC2878  
2SC1815



2SK246  
2SK301