

DIGITAL DELAY LINE
DDL3 / D1030

SERVICE ADDITIONAL MANUAL

THE DDL3 MODEL NAME CHANGE

The model name DDL3 has been changed to D1030.

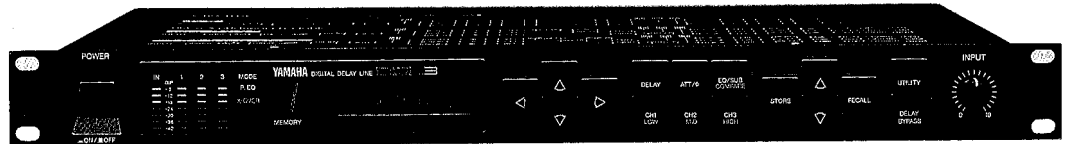
Another company has a similar product with the same name,
constituting the name change.

DIGITAL DELAY LINE

DDL3

SERVICE MANUAL

DDL3



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IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

IMPORTANT: Turn the unit **OFF** during disassembly and parts replacement. Recheck all work before you apply power to the unit.

This product uses a lithium battery for memory back-up.

WARNING: Lithium batteries are dangerous because they can be exploded by improper handling. Observe the following precautions when handling or replacing lithium batteries.

- Leave lithium battery replacement to qualified service personnel.
- Always replace with batteries of the same type.
- When installing on the PC board, solder using the connection terminals provided on the battery cells. Never solder directly to the cells. Perform the soldering as quickly as possible.
- Never reverse the battery polarities when installing.
- Do not short the batteries.
- Do not attempt to recharge these batteries.
- Do not disassemble the batteries.
- Never heat batteries or throw them into fire.

ADVARSEL!

Lithiumbatteri. Eksplosionsfare.

Udskiftning må kun foretages af en sagkyndig, og som beskrevet i servicemanualen.

SPECIFICATIONS (総合仕様)

- **ELECTRICAL CHARACTERISTICS**
 - FREQUENCY RESPONSE:** 20Hz-20kHz
 - DYNAMIC RANGE:** Greater than 100dB
 - DISTORTION:** Less than 0.03% (@1kHz, level max.)
- **INPUT**
 - NUMBER OF CHANNEL:** ELECTRONICALLY BALANCED × 1
 - NOMINAL LEVEL:** +4dBm
 - IMPEDANCE:** 10kΩ
- **OUTPUT**
 - CONVERSION TYPE:** DELTA-SIGMA
 - NUMBER OF CHANNEL:** ELECTRONICALLY BALANCED × 3
 - NOMINAL LEVEL:** +4dBm
 - IMPEDANCE:** 150Ω
- **A/D, D/A CONVERSION**
 - QUANTIZATION:** 18 bits
 - SAMPLING RATE:** 50 kHz
- **DELAY TIME:** 0-1300msec.(20μsec. step)
- **MEMORY**
 - NUMBER OF LOCATIONS:** 15:1-9 & A-F
 - No.1-9:** DIGITAL DELAY & 3-BAND PARAMETRIC EQUALIZER
 - No.A-F:** DIGITAL DELAY & CROSSOVER
- **MIDI CONTROL:** PROGRAM CHANGE for memory select, CONTROL CHANGE for parameter adjust, BULK DUMP for up/down load, LINK
- **REMOTE CONTROL:** 9-PIN D-SUB (contact-conclosure memory select) PROGRAM CHANGE (ANALOG CONTROL)
- **FRONT PANEL CONTROLS:**
 - KEYS:** INPUT LEVEL
PARAMETER (↑, ↓), CURSOR (→, ←),
DELAY, ATT/φ, EQ/SUB-COMPARE,
CH1·LOW, CH2·MID, CH3·HIGH,
STORE, COPY, MEMORY (↑, ↓), UTILITY,
DELAY·BYPASS
- **DISPLAYS**
 - INPUT LEVEL:** 8-SEGMENT LED
 - OUTPUT LEVEL (1, 2, 3):** 3 CHANNELS 8-SEGMENT LED
 - MEMORY No.:** 7-SEGMENT LED
 - LCD:** 16-CHARACTER × 2 LINE, BACKLIT
- **REAR PANEL CONNECTORS:** OUTPUT (CH1, CH2, CH3), INPUT, MIDI (IN, OUT), REMOTE
- SWITCH MODE:** P.EQ/X-OVER
- PROTECT:** OFF, MEM, KEY
- **GENERAL**
 - POWER SUPPLY:** U.S. & CANADIAN MODELS: 120V, 22W
GENERAL MODEL: 220-240V, 22W
 - DIMENSIONS (W × H × D):** 480 × 45.2 × 324mm
(18-7/8" × 1-3/4" × 12-3/4")
 - WEIGHT:** 3.8kg (8 lbs 6 oz)
- **電気特性**
 - 周波数特性** : 20Hz~20kHz
 - S/N比** : 100dB
 - 全高調波歪率(T.H.D.)** : 0.03%以下(@1kHz, Max level)
- **インプット (INPUT)**
 - チャンネル数** : 1ch (電子バランス方式)
 - 規定出力レベル** : +4dBm
 - 入力インピーダンス** : 10kΩ
- **アウトプット (OUTPUT CH1, CH2, CH3)**
 - チャンネル数** : 3ch (電子バランス方式)
 - 規定出力レベル** : +4dBm
 - 入力インピーダンス** : 150Ω
- **AD/DAコンバーター**
 - 量子化ビット数** : 18bits
 - サンプリング周波数** : 50kHz
- **ディレイタイム** : 0~1300msec
- **メモリー(15プログラム)**
 - No. 1~9** : デジタルディレイ&3バンドパラメトリックイコライザー
 - No. A~F** : デジタルディレイ&クロスオーバー
- **MIDIコントロール** : プログラムチェンジ、コントロールチェンジ、バルクダンプ、リンク機能
- **REMOTEコントロール** : プログラムチェンジ:アナログ方式
- **フロントパネル**
 - コントロール** : インプットレベル
 - スイッチ** : パラメータ(↑, ↓)、カーソル(→, ←)、ディレイ、アッテネーター/φ、イコライザー/サブソニックフィルター・コンペア、CH1·LOW、CH2·MID、CH3·HIGH、ストア、コピー、メモリー(↑, ↓)、ユーティリティ、ディレイ・バイパス
- **ディスプレイ**
 - インプットレベル** : 8素子LED
 - アウトプットレベル** : 8素子LED × 3
 - メモリーナンバー** : 7セグメントLED
 - LCD** : 16文字2ライン
- **リアパネル**
 - 端子** : アウトプット(CH1, CH2, CH3)、インプット、MIDI(IN, OUT)、リモート
 - スイッチ** : モード(P.EQ/X-OVER)、プロテクト(OFF/MEM/KEY)
- **電源** : AC100V、50/60Hz
- **消費電力** : 18W
- **寸法(W × H × D)** : 480 × 45.2 × 324mm
- **重量** : 3.8kg

* 0dB=0.775Vr.m.s.

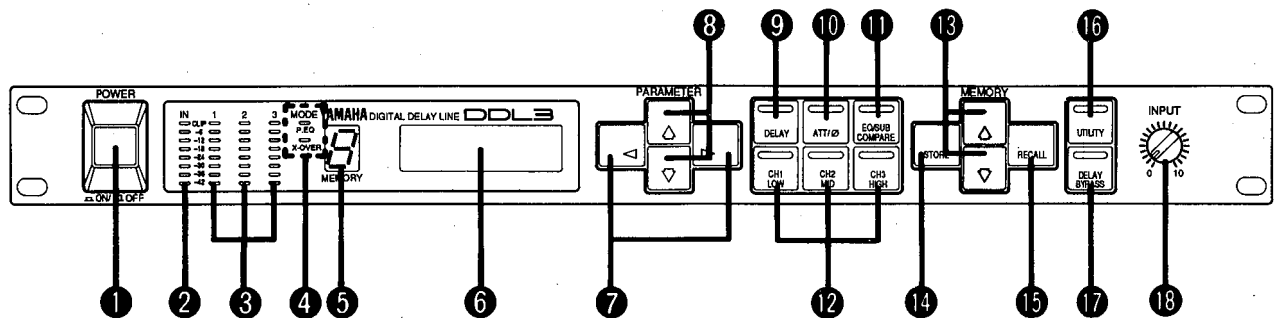
* Internal circuit delays result in an overall delay of approximately 0.85 msec even when DELAY TIME and DELAY OFFSET are both set to "0", or DELAY BYPASS is engaged.

* 0dB=0.775Vr.m.s.

* DELAY TIME=0、DELAY BYPASSの状態でも、DDL3内部を信号が通過するのに要する時間分(約0.85msec)遅延時間が生じます。

■ PANEL LAYOUT (パネルレイアウト)

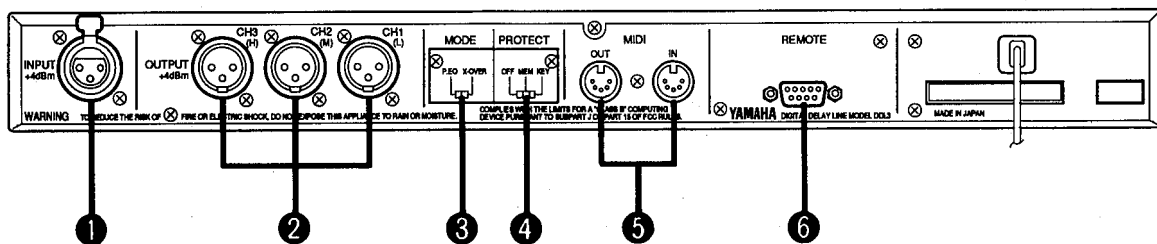
● Front Panel (フロントパネル)



- ① POWER ON/OFF switch
- ② INPUT level meter
- ③ OUTPUT level meters
- ④ MODE indicators
- ⑤ MEMORY no. display
- ⑥ LCD
- ⑦ Cursor → and ← keys
- ⑧ PARAMETER ↑ and ↓ keys
- ⑨ DELAY key
- ⑩ ATT/φ key
- ⑪ EQ/SUB COMPARE key
- ⑫ CH1•LOW, CH2•MID and CH3•HIGH keys
- ⑬ MEMORY select ↑ and ↓ keys
- ⑭ STORE key
- ⑮ RECALL key
- ⑯ UTILITY key
- ⑰ DELAY•BYPASS key
- ⑱ INPUT level control

- ① POWER スイッチ
- ② INPUT レベルメーター (IN)
- ③ OUTPUT レベルメーター (1, 2, 3)
- ④ モードインジケータ (P.EQ/X-OVER)
- ⑤ メモリーナンバーディスプレイ (MEMORY)
- ⑥ LCD
- ⑦ カーソルキー (→, ←)
- ⑧ パラメーター設定キー (↑, ↓)
- ⑨ デイレイキー
- ⑩ ATT/φ キー
- ⑪ EQ/SUB•COMPARE キー
- ⑫ CH1 (LOW), CH2 (MID), CH3 (HIGH) キー
- ⑬ メモリー選択キー (↑, ↓)
- ⑭ メモリー STORE キー
- ⑮ メモリー RECALL キー
- ⑯ UTILITY キー
- ⑰ DELAY BYPASS キー
- ⑱ INPUT レベルコントロール

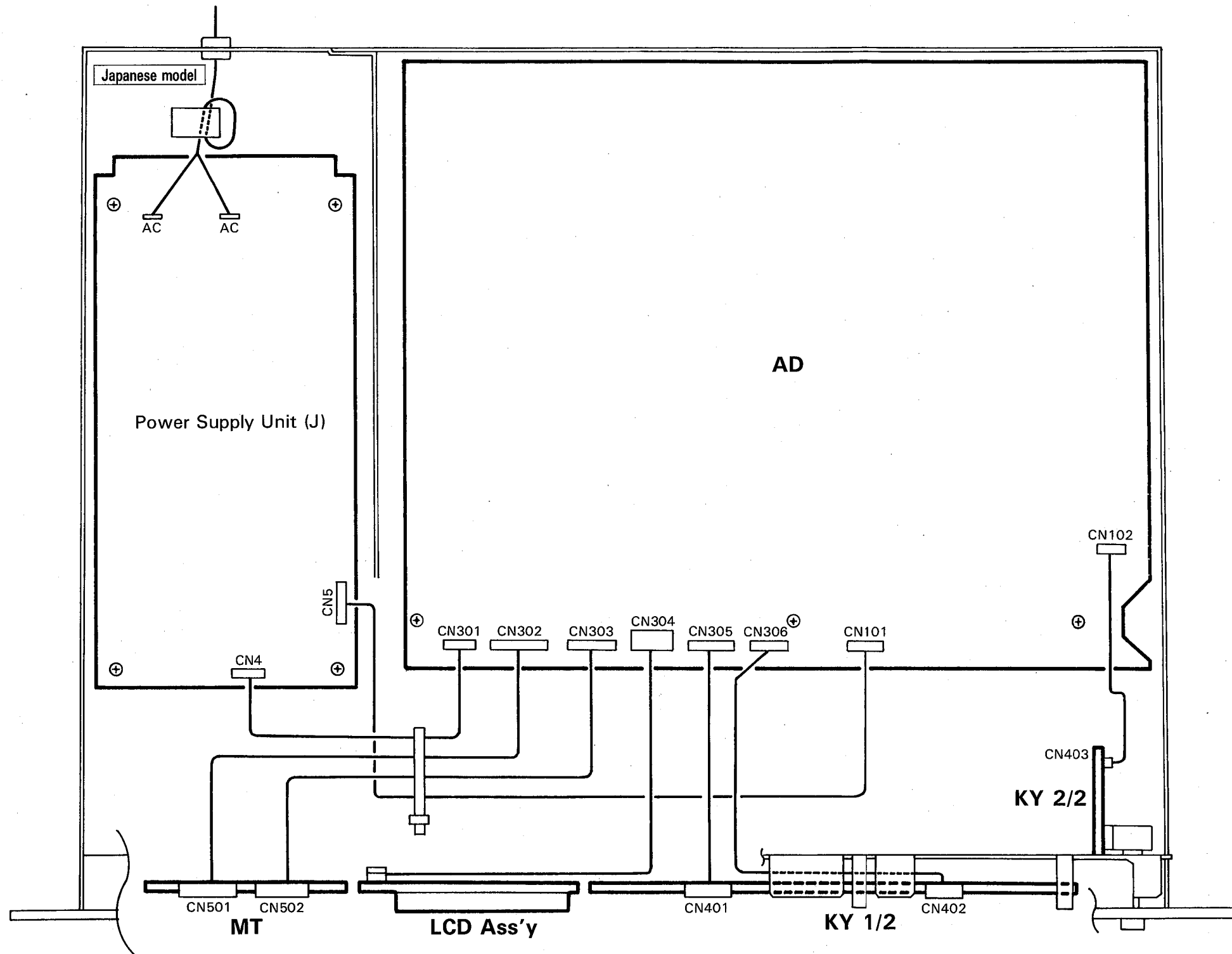
● Rear Panel (リアパネル)



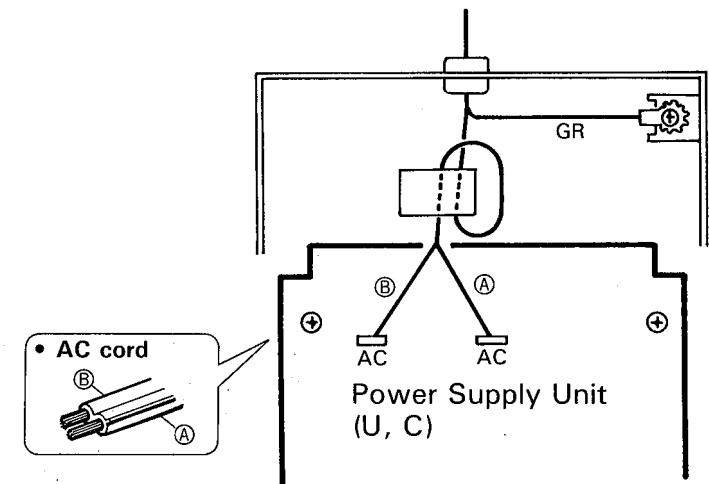
- ① INPUT 端子 (XLB-3-31)
- ② OUTPUT 端子 (CH1, CH2, CH3) (XLB-3-32)
- ③ MODE スイッチ (P.EQ/X-OVER)
- ④ PROTECT スイッチ
- ⑤ MIDI IN and OUT 端子
- ⑥ REMOTE 端子

- ① INPUT 端子
- ② OUTPUT 端子 (CH1, CH2, CH3)
- ③ MODE スイッチ (P.EQ/X-OVER)
- ④ PROTECT スイッチ (OFF/MEM/KEY)
- ⑤ MIDI 端子 (IN, OUT)
- ⑥ REMOTE 端子

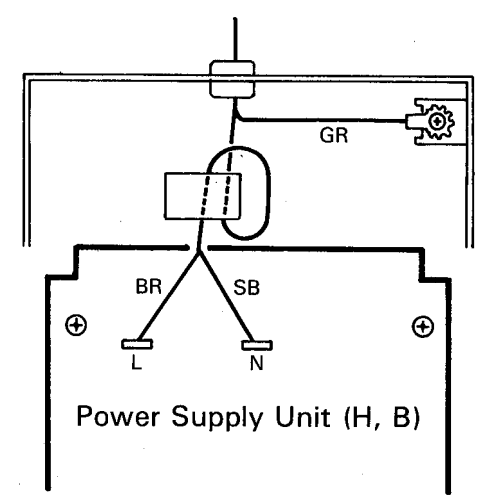
■ CIRCUIT BOARD LAYOUT & WIRING (ユニットレイアウト & 配線図)



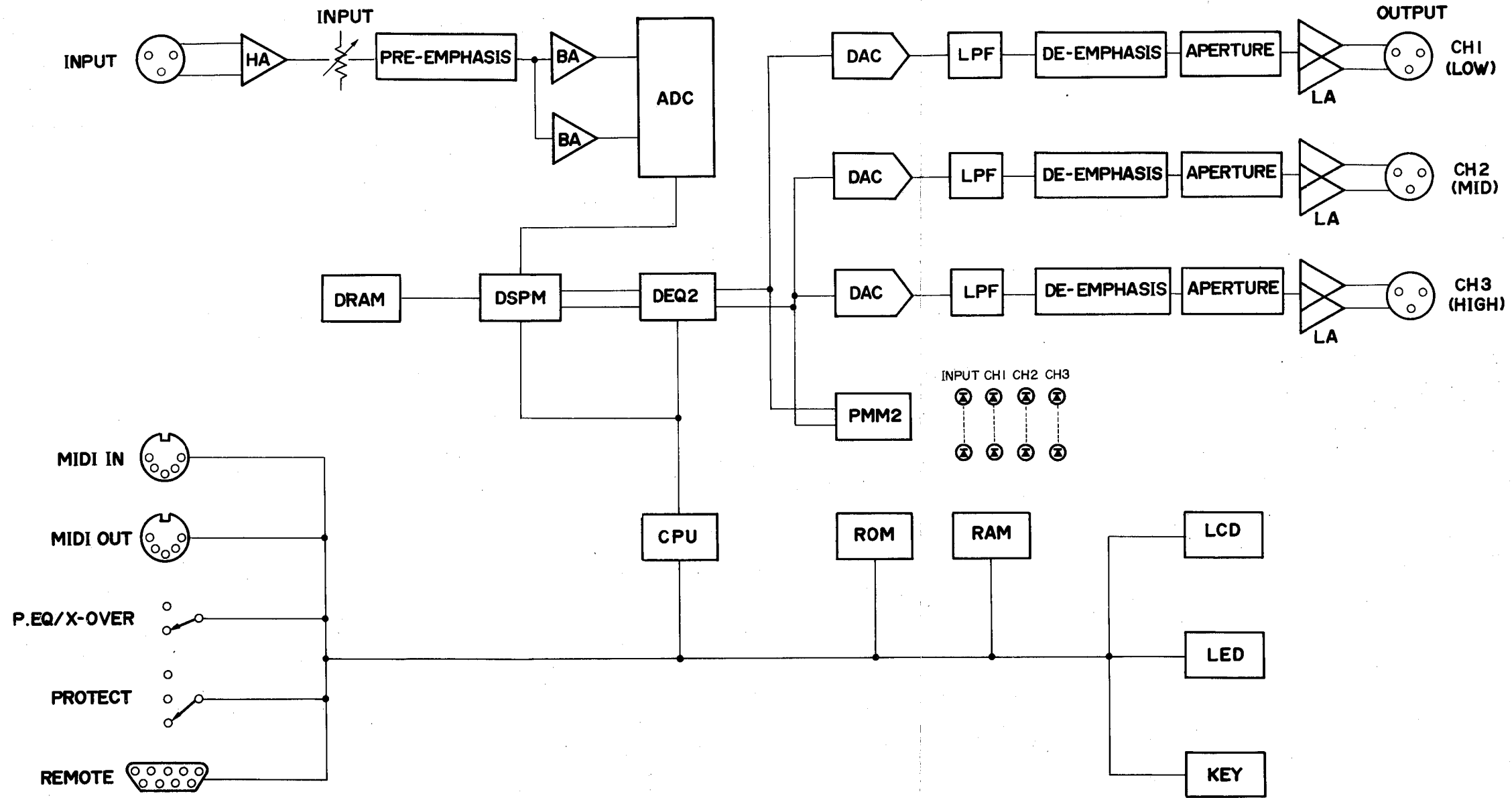
U.S. & Canadian models



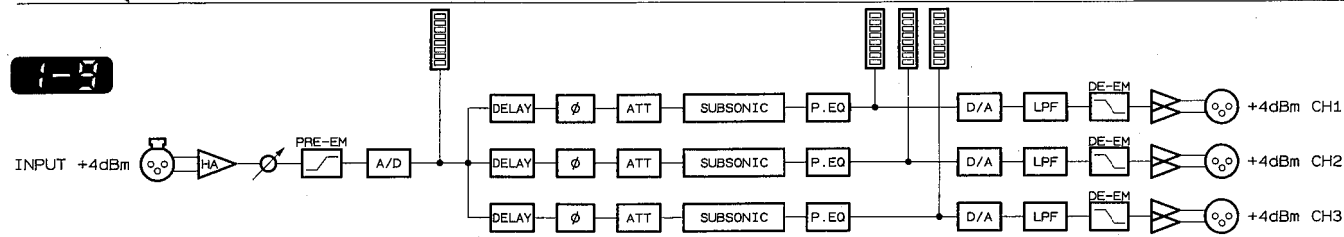
North European & British models



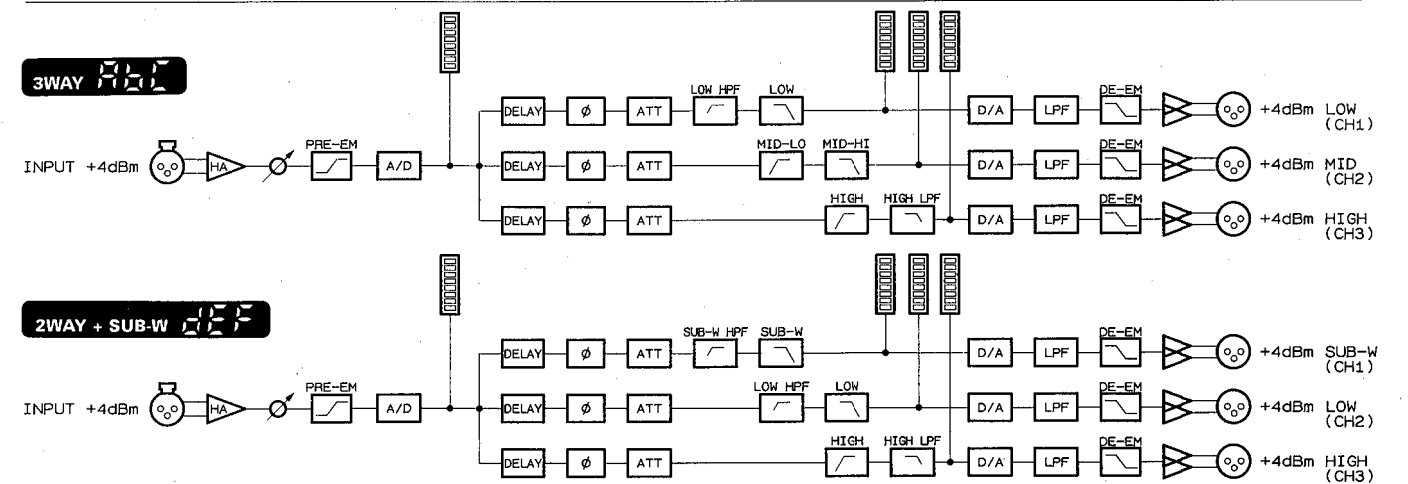
■ BLOCK DIAGRAM (ブロックダイアグラム)



DELAY & PARAMETRIC EQUALIZER MODE

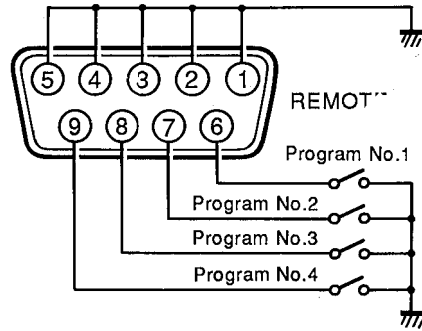


DELAY & CROSSOVER MODE

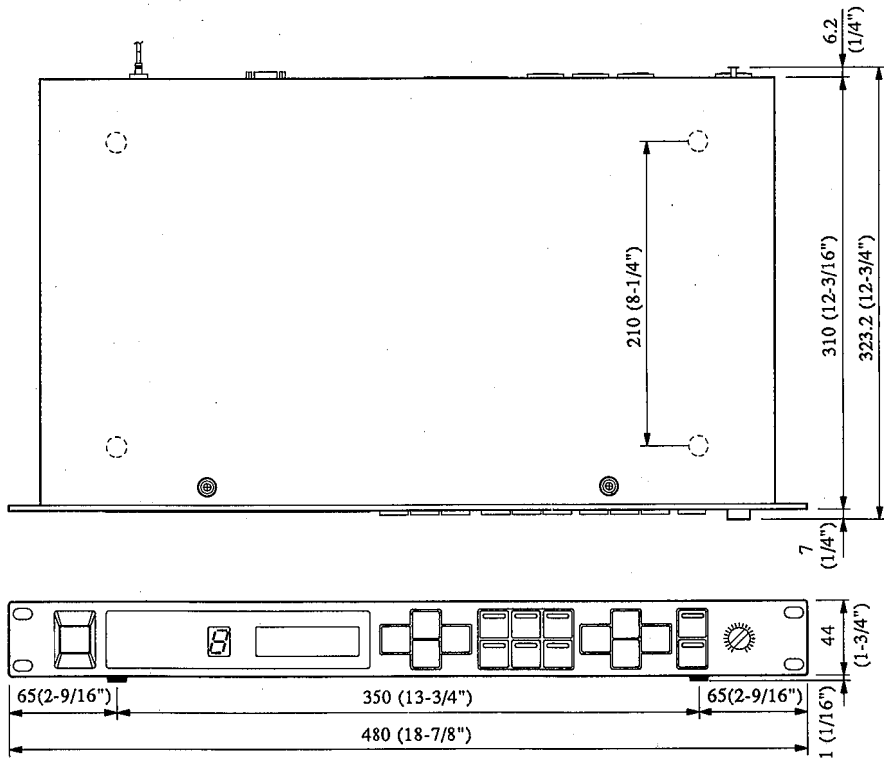


■ REMOTE CONNECTOR PIN ASSIGNMENT (リモート端子ピン配列)

Pin no.	Function
1	Ground
2	Ground
3	Ground
4	Ground
5	Ground
6	Program number 1
7	Program number 2
8	Program number 3
9	Program number 4



■ DIMENSIONS (寸法図)



Unit: mm (inch)

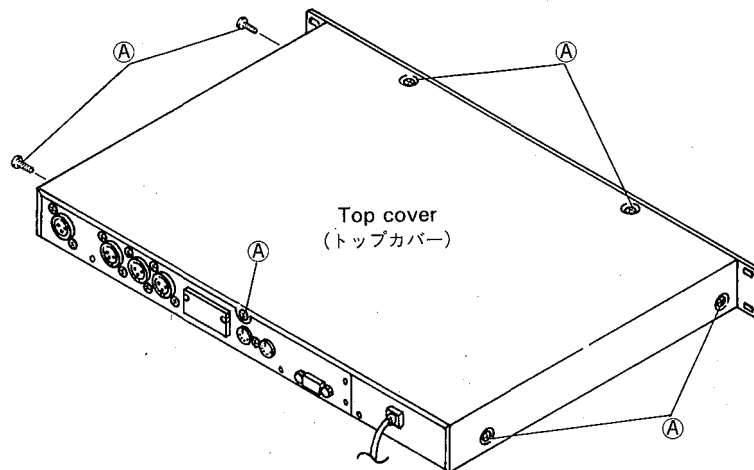
DISASSEMBLY PROCEDURE (分解手順)

1. Top Cover (Fig. 1)

- 1-1. Remove the seven (7) screws **A** (3.0×8 bind head screw), then the Top cover can be removed.

1. トップカバーの外し方 (図1参照)

- 1-1. **A**のネジ7本(3×8バインド小ネジ)を外して、外します。



(Fig. 1)

2. AD Circuit Board (Fig. 2 and Fig. 3)

- 2-1. Remove the Top cover. (see procedure 1.)
 2-2. To remove the AD circuit board, remove the nine (9) screws **B** (3.0×8 bind head screw), two (2) screws **C** and three (3) screws **D** (3.0×6 bind head screw), and then disconnect the wire harness.

2. ADシートの外し方 (図2、3参照)

- 2-1. トップカバーを外します。(1項参照)
 2-2. **B**のネジ9本(3×8バインド小ネジ)とコネクタのネジ**C**2本と**D**のネジ3本(3×6バインド小ネジ)を外し、シートのコネクタを外してADシートを外します。

3. Power Supply Unit (Fig. 3)

- 3-1. Remove the Top cover. (see procedure 1.)
 3-2. Remove the push rod.
 3-3. Remove the four (4) screws **E** (3.0×8 bind head screw).
 3-4. After the wire harness has been disconnected, the Power supply unit can be removed.

3. 電源ユニットの外し方 (図3参照)

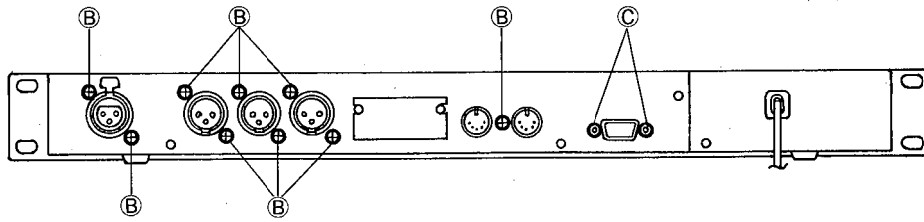
- 3-1. トップカバーを外します。(1項参照)
 3-2. プッシュロッドを外します。
 3-3. ネジ**E**4本(3×8バインド小ネジ)とコネクタを外して、電源ユニットを外します。

4. Front Panel (Fig. 3)

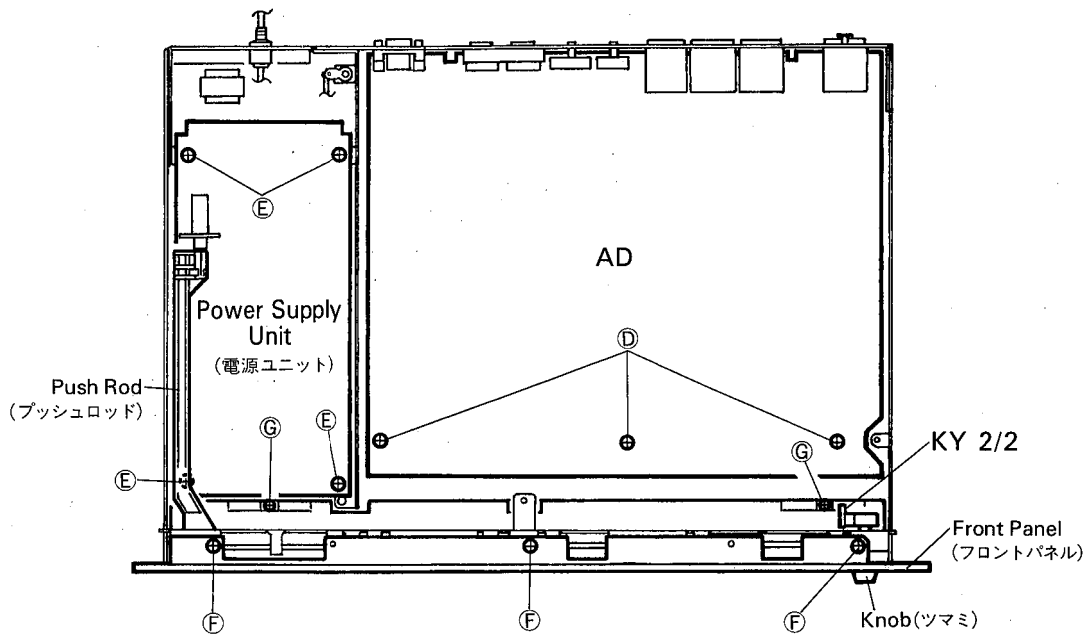
- 4-1. Remove the Top cover. (see procedure 1.)
 4-2. Remove the three (3) screws **F** (3.0×6 flat head screw) and two (2) screws **G** (3.0×8 bind head screw), and then pull out the front panel toward you while lifting the unit slightly.

4. フロントパネルの外し方 (図3参照)

- 4-1. トップカバーを外します。(1項参照)
 4-2. ネジ**F**3本(3×6皿小ネジ)とネジ**G**2本(3×8バインド小ネジ)を外して、本体を少し持ち上げながらフロントパネルを手前に引き抜きます。



(Fig. 2)



(Fig. 3)

5. KY1/2 and KY2/2 Circuit Boards (Fig.4)

- 5-1. Remove the Top cover. (see procedure 1.)
- 5-2. Remove the Front Panel. (see procedure 4.)
- 5-3. KY1/2 circuit board removal
 - 5-3-1. Disconnect the wire harness on the circuit board.
 - 5-3-2. Take the KY1/2 circuit board out of the sub panel while pressing the three (3) hooks ㊸ upward.
- 5-4. KY2/2 circuit board removal
 - 5-4-1. Pull out the INPUT level control knob.
 - 5-4-2. To remove the KY2/2 circuit board, remove the hexagonal nut ① ($\phi 7.0$) and disconnect the wire harness.

5. KY1/2 シートとKY2/2シートの外し方 (図4 参照)

- 5-1. トップカバーを外します。(1項参照)
- 5-2. フロントパネルを外します。(4項参照)
- 5-3. KY1/2シートの外し方
 - 5-3-1. シートのコネクタを外します。
 - 5-3-2. サブパネルのフック㊸3箇所を押上げながら、KY1/2シートを手前に引き抜きます。
- 5-4. KY2/2シートの外し方
 - 5-4-1. ボリュームツマミを外します。
 - 5-4-2. 六角ナット①1個($\phi 7$)とコネクタを外して、KY2/2シートを外します。

6. MT Circuit Board (Fig. 4)

- 6-1. Remove the Top cover. (see procedure 1.)
- 6-2. Remove the Front panel. (see procedure 4.)
- 6-3. Disconnect the wire harness on the circuit board.
- 6-4. Take the MT circuit board out of the sub panel while pressing the two (2) hooks ① upward.

7. LCD Assembly (Fig. 4)

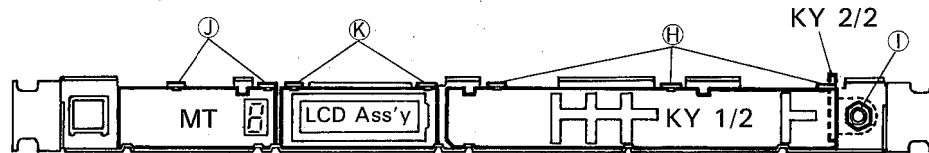
- 7-1. Remove the Top cover. (see procedure 1.)
- 7-2. Remove the Front Panel. (see procedure 4.)
- 7-3. Remove the LCD assembly while pressing the two (2) hooks ② upward.

6. MTシートの外し方 (図4参照)

- 6-1. トップカバーを外します。(1項参照)
- 6-2. フロントパネルを外します。(4項参照)
- 6-3. シートのコネクタを外します。
- 6-4. サブパネルのフック①2箇所を押上げながら、MTシートを手前に引き抜きます。

7. LCD Ass'yの外し方(図4参照)

- 7-1. トップカバーを外します。(1項参照)
- 7-2. フロントパネルを外します。(4項参照)
- 7-3. サブパネルのフック②2箇所を押上げながら、LCD Ass'yを手前に引き抜きます。



(Fig. 4)

LSI PIN DESCRIPTION (LSI 端子機能表)

• HD63B03YP-N (XD245001) CPU

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	Vss		Ground	33	Vcc		DC Supply (+5V)
2	XTAL		Clock	34	A15	0	Address bus
3	EXTAL			35	A14	0	
4	MP0		Mode program	36	A13	0	
5	MP1			37	A12	0	
6	RES		Reset	38	A11	0	
7	STBY		Stand-by mode signal	39	A10	0	
8	NMI		Non-maskable interrupt	40	A9	0	
9	P20	I/O	Port 2	41	A8	0	Ground
10	P21	I/O		42	Vss		
11	P22	I/O		43	A7	0	Address bus
12	P23	I/O		44	A6	0	
13	P24	I/O		45	A5	0	
14	P25	I/O		46	A4	0	
15	P26	I/O		47	A3	0	Data bus
16	P27	I/O		48	A2	0	
17	P50	I/O	49	A1	0		
18	P51	I/O	50	A0	0		
19	P52	I/O	Port 5	51	D7	I/O	
20	P53	I/O		52	D6	I/O	
21	P54	I/O		53	D5	I/O	
22	P55	I/O		54	D4	I/O	
23	P56	I/O		55	D3	I/O	
24	P57	I/O		56	D2	I/O	
25	P60	I/O	Port 6	57	D1	I/O	
26	P61	I/O		58	D0	I/O	
27	P62	I/O		59	BA	0	Bus available
28	P63	I/O		60	LIR	0	Load instruction register
29	P64	I/O		61	R/W	0	Read/Write control
30	P65	I/O		62	WR	0	Write control
31	P66	I/O		63	RD	0	Read control
32	P67	I/O		64	E	0	Enable

• HD63B50P (IG147300) ACIA (Asynchronous Communications Interface Adaptor)

Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	Vss		Ground	13	R/W	I	Read/Write Enable
2	Rx Data	I	Receive data	14	E	I	Data bus
3	Rx CLK	I	Receive clock	15	D7	I/O	
4	Tx CLK	O	Transmit clock	16	D6	I/O	
5	RTS	I/O	Request to send	17	D5	I/O	
6	Tx Data	O	Transmit data	18	D4	I/O	
7	IRQ	I	Interrupt request	19	D3	I/O	
8	CS0	I	Chip select	20	D2	I/O	
9	CS2	I		21	D1	I/O	
10	CS1	I		22	D0	I/O	
11	RS	I	Resist select	23	DCD	I	Data carrier detect
12	Vcc		Power supply (+5V)	24	CTS	I	Clear to send

• YM6104 (XE788A00) DEQ2 (Digital Equalizer)

Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	VDD	I	+5V	12	Vss	I	Earth (Ground)
2	XMD	I	Alteration of Sync. (=+5V) or Asynch. (=0V) for CDI input terminal (Synch: 1:1), Asynch: 16:1)	13, 14	SI0, SI1	I	INPUT for Serial data signal
3	CRS	I	Initialized Serial Control Interface	15, 16	SO0, SO1	O	OUTPUT for Serial data signal
4	CDI	I	Inputs of μ PGM, Para, Ser. Cont. Data of Control Reg.	17	OVF	O	Detector for OVER Flow
5	CDO	O	Outputs of μ PGM, Para, Ser Cont. Data of Control Reg.	18	TEST	I	For test. Normally connecting to +5V
6	XCLK	I	In/Out clock for CDI & CDO	19	C2	O	Output is delayed Data of 2nd bit of P. Reg. by 1 bit.
7	TRG	I	Determines transmit timing of PARA. to Para. Reg. from T BFR.	20	C1	O	Output is delayed Data of 1st bit of P. Reg. by 1 bit.
8	ESL	I	Timing determination of data for External at Ext. Shift CLK	21	C0	O	Output is delayed Data of 0 bit of P. Reg. by 1 bit.
9	ELD	I	Timing determination of data for Inner at Ext. Shift CLK	22	CEMD	I	+5V: It's necessary to input 2 Byte for CE to CDI
10	ECLK	I	Input Shift CLK of IN/OUT SR at Ext Shift CLK	23	IC	I	Initialized for DEQ
11	CLK	I	System Clock	24	Sync	I	Synchro. signal for system

• **YM3818** (XC354001) DSPM (Digital Signal Processor)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	MDAT15	I/O	Data bus	33	V _{DD}		Power supply
2	MDAT14	I/O		34	MADR7	I	Address bus
3	MDAT13	I/O		35	MADR6	I	
4	MDAT12	I/O		36	MADR5	I	
5	MDAT11	I/O		37	MADR4	I	
6	MDAT10	I/O		38	MADR3	I	
7	MDAT9	I/O		39	MADR2	I	
8	MDAT8	I/O		40	MADR1	I	
9	MDAT7	I/O		41	MADR0	I	
10	MDAT6	I/O		42	TESTR	I	Test pin
11	MDAT5	I/O		43	TEST1	I	
12	MDAT4	I/O		44	SYNC	I	Synch pulse
13	MDAT3	I/O		45	CLK	I	Master clock
14	MDAT2	I/O		46	CE	I	Chip enable
15	MDAT1	I/O		47	IC	I	Initial clear
16	MDAT0	I/O		48	MOD7	I	Modulation data
17	SI1	I	49	MOD6	I		
18	SI0	I	50	MOD5	I		
19	SO1	O	51	MOD4	I		
20	SO0	O	52	MOD3	I		
21	XMD	I	53	MOD2	I		
22	XCLK	I	54	MOD1	I		
23	TO	O	55	MOD0	I		
24	CRS	I	56	MDAT23	I/O	Data bus	
25	CDO	O	57	MDAT22	I/O		
26	CDI	I	58	MDAT21	I/O		
27	TMI	O	59	MDAT20	I/O		
28	REF	O	60	MDAT19	I/O		
29	OE	O	61	MDAT18	I/O		
30	WE	O	62	MDAT17	I/O		
31	CAS	O	63	MDAT16	I/O		
32	RAS	O	64	V _{SS}		Ground	

• **YM3934** (XE798A00) PMM 2 (Peak Meter Module)

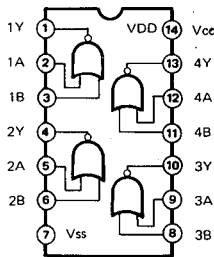
Pin No.	NAME	I/O	FUNCTION	Pin No.	NAME	I/O	FUNCTION
1	NC		Meter data output	33	NC		Digital in data
2	NC			34	NC		
3	NC			35	NC		
4	DB11	O		36	D10	I	
5	DB10	O		37	D11	I	
6	DB9	O		38	D12	I	
7	DB8	O		39	D13	I	
8	DB7	O		40	D14	I	
9	DB6	O		41	D15	I	
10	NC			42	NC		
11	DB5	O		43	D16	I	
12	DB4	O	44	D17	I		
13	DB3	O	45	D18	I		
14	DB2	O	46	D19	I		
15	DB1	O	47	D110	I		
16	DB0	O	48	D111	I		
17	NC		49	NC		Falling and holding times are determined by these inputs.	
18	NC		50	NC			
19	NC		51	NC			
20	NC		52	NC			
21	OVD	I	Overflow data	53	HT1	I	
22	OMODE	I	Output mode control	54	HT0	I	
23	IMODE	I	Input mode control	55	FT1	I	
24	NC		Test pin	56	FT0	I	
25	TST	I		57	V _{SS}		Ground
26	V _{DD}		Power supply	58	V _{DD}		Power supply
27	V _{SS}		Ground	59	NC		Channel select
28	ICLK	I	System clock input	60	C3	O	
29	SYNC	I	Synch. pulse	61	C2	O	
30	RST	I	Initial reset	62	C1	O	
31	DIEN	I	Digital input enable	63	NC		
32	NC			64	NC		

• **AK5327-VP (XG898A00) ADC (Analog to Digital Converter)**

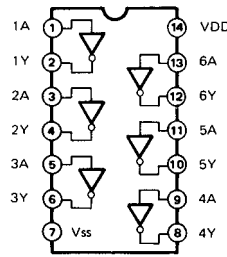
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	AGND		Analog ground	15	SCLK	I	Serial output data clock
2	AINL	I	Left channel analog input	16	SDATA	O	Serial data output
3	ZEROL	I	Zero level input for left channel	17	VD1+		Positive digital power supply
4	VA+		Positive analog power supply	18	VD2+		Positive digital power supply
5	VA-		Negative analog power supply	19	DGND		Digital ground
6	APD	I	Analog power down	20	DCLKA	I	Digital section input clock
7	ACAL	I	Analog calibrate	21	NC		No connection
8	NC		No connection	22	ACLKA	O	Analog section output clock
9	DCAL	O	Digital calibrate output	23	CLKIN	I	Master input clock
10	DPD	I	Digital power down	24	LGND		Logic ground
11	TST1		Test inputs	25	VL+		Positive logic power supply
12	TST2			26	ZEROR	I	Zero level input for right channel
13	TST3			27	AINR	I	Right channel analog input
14	L/R	I	Left/Right select	28	VREF	O	Voltage reference output

■ **IC BLOCK DIAGRAM (ICブロック図)**

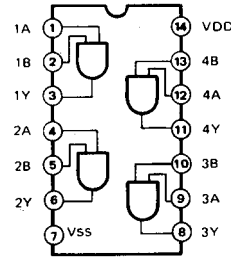
- **SN74HC02N (IR000250)**
Quad 2 Input NOR



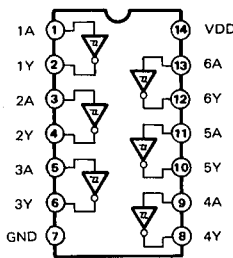
- **SN74HCU04N (IG142250)**
Hex Inverter
- **SN74HC04N (IR000450)**
Hex Inverter



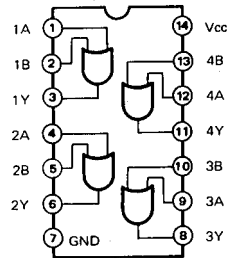
- **SN74HC08N (IR000850)**
Quad 2 Input AND



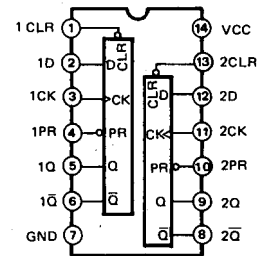
- **SN74HC14N (IR001450)**
Hex Inverter



- **SN74HC32N (IR003250)**
Quad 2 Input OR

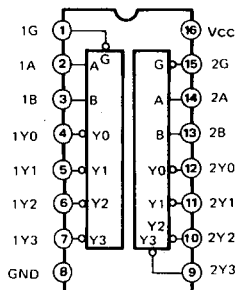


- **SN74HC74N (IR007450)**
Dual D-Type Flip-Flop

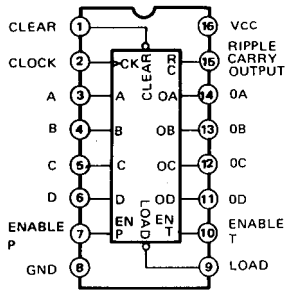


INPUTS				OUTPUTS	
PR	CLR	CLK	D	Q	Q̄
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H	H
H	H	f	f	H	L
H	H	f	L	L	H
H	H	L	X	Q _o	Q̄ _o

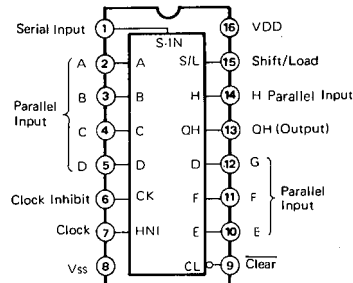
- **SN74HC139N (IR013950)**
Dual 2 to 4 Demultiplexer



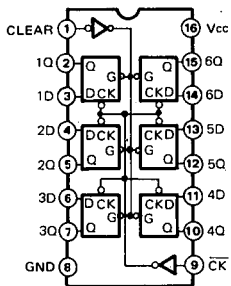
- **SN74HC163N (IR016350)**
SYNC. Binary Counter



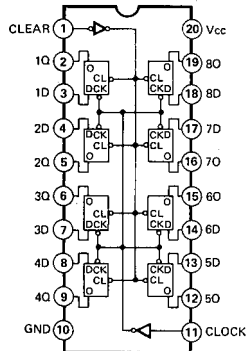
- **SN74HC166N (IR016650)**
8-Bit Shift Register



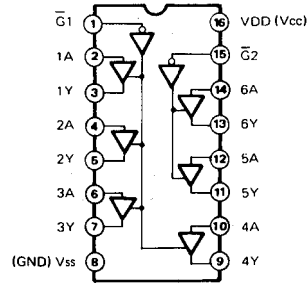
- **SN74HC174N (IR017450)**
Hex D-Type Flip-Flop



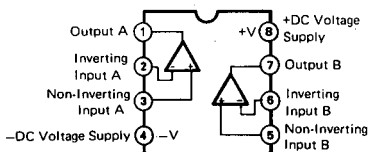
- **SN74HC273N (IR027350)**
Octal D-Type Flip-Flop



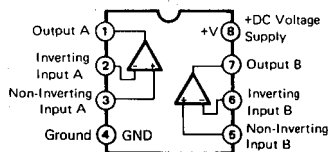
- **SN74HC367N (IR036750)**
Hex 3-State Bus Buffer



- **M5238P (XA013001)**
- **NE5532P (IG102500)**
- **NJM4556DE (XA772001)**
Dual Operational Amplifier

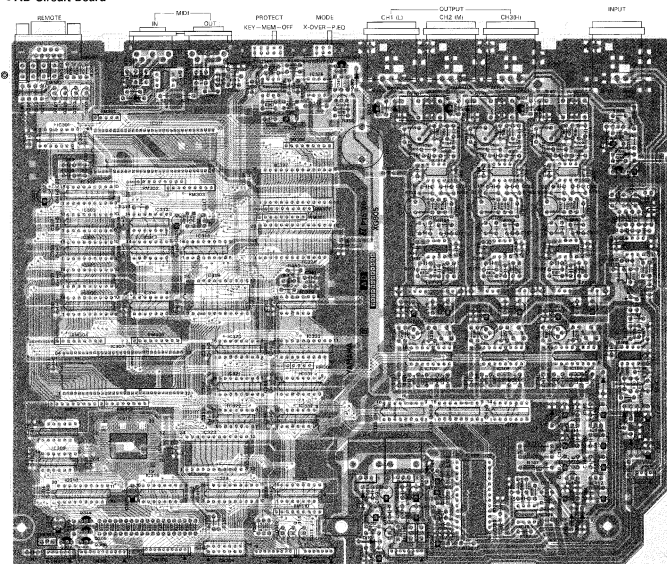


- **NJM2903D (IG031000)**
Dual Single-Supply Comparator



■ CIRCUIT BOARDS (シート基板図)

● AD Circuit Board



3NA-V157880

Notes

- Circuit Board: AD-V15788001 XG80380
- C101-103: 15k 1/8W 20%

C104: AR5327VP (XG826A00) ADC

C105, 106: SN74HC168N (XG146500) SHIFT REGISTER

C107-109: PC3M01P (XG804A00) DAC

C110, 112: M5278.00 (XG945A00) 5V 100mA

C111, 113: M5278.00 (XG945A00) -5V 100mA

C114: NLM319A (XG854A00) REGULATOR

C116: NLM4585DE (XG172001) OP AMP

C117, 119, 121: M52446AAR-10 (XG951A00) DRAM 256K

C122, 301: M52446AAR-10 (XG951A00) DRAM 256K

C202-306: M52446AAR-10 (XG951A00) DRAM 256K

C207: M52446AAR-10 (XG951A00) DRAM 256K

C208, 332: SN74HC04N (R000450) INVERTER

C209, 212: SN74HC04N (R000450) INVERTER

C211: HD63803VP N (XG245001) CPU

C212: SN74HC14N (R001450) INVERTER

C310: SN74HC02N (R000250) NOR

C314: SN74HC20N (R000250) OR

C315: YM5334 (XG788A00) PMMC

C317: P82518C (R01142000) SYSTEM RESET

C318: SN74HC139N (R0139500) DECODER 2-4

C319: HD63803VP (R0142000) CPU

C320, 321: SN74HC139N (R0139500) DECODER 2-4

C322: SN74HC139N (R0139500) DECODER 2-4

C326: NLM2930D (R0031000) COMPARATOR

C328: TMS27C256 (XG863A00) EPROM

C329: L12664R-12 (XG817A00) SRAM 8K

C330: SN74HC104N (R0142200) INVERTER

C331: SN74HC174N (R0174500) D-FF

C335: SN74HC87N (R0087500) BUS DRIVER

LPF01-103: LP2003B8 (XG561001) ACTIVE LPF
 - Photo Coupler: PC301: PC-900V (V6181900)
 - Transistor: Q101, 103, 105, 106, 309: 2SA1015 Y (M101521)

Q102, 104, 301-304: 2SC1815 Y (C181520)

305, 310: 2SA473A C.D (R147310)

Q303-307, 314: 2SC1213A C.D (R121310)

Q311-313: 2SC1213A C.D (R121310)
 - Transistor Array: IC310: BA6212 (V074800)

IC316: TD9268P (R0138700)
 - Diode: D101, 102, 109, 110, 301, 302: 1SS133 (R0003450)

D103-108, 111-113: 11ES4 (V8481900)
 - Zener Diode: ZD101, 102: MTZ4.7C 4.7V (F010870)

ZD103, 104: RD5.6B2 5.6V (F005600)
 - Monolithic Gata. Cap.: C118, 121, 125: 0.1 25V Z (VA782200)

C119-142: 1.5 25V Z (FZ06910)
 - Semiconductive Cera. Cap.: C135: 0.1 16V M (FZ004100)
 - Electrolytic Cap.: C315: 470 10V (LR82470)
 - Trimmer Potentiometer: VR101: B10K (VAD24800) LEVEL adj.

VR102-104: B10K (VPS60100) D.A. NSB adj.
 - Resistor Array: RM301-308: RM54 J 103 (VAB22500)

RM302-308, 310-312: RM54 J 103 (R004230)
 - Metal Film Resistor: R101: 680K 1/8W F (VCS26900)

R102, 168, 169, 177, 184, 190, 200: 320K 1/8W F (VCS21700)

R103, 104: 5.20K 1/8W F (VCS04700)

R105, 106: 2K 1/8W F (VCS23200)

R11: 10K 1/8W F (VCS23200)

R111: 10K 1/8W F (VCS23200)

R113, 114: 3.3K 1/8W F (VCS26200)

R118: 1K 1/8W F (VCS26200)

R120: 3.3K 1/8W F (VCS23700)

R126: 200K 1/8W F (VCS26200)

R136, 141, 142: 4.7K 1/8W F (VCS26200)

R160, 169, 188: 1K 1/8W F (VCS24500)

R161, 170, 189: 10K 1/8W F (VCS24500)

R162, 164, 172, 173, 191: 1K 1/8W F (VCS2500)

R163, 175, 184: 300 1/8W F (VCS21600)

R169, 186, 178, 185, 197, 209: 10K 1/8W F (VCS19000)

R180, 161, 178, 180, 188, 199: 24K 1/8W F (VCS2500)

R340: 2.4K 1/8W F (VCS2400)

R342: 1K 1/8W F (VCS2500)

R346: 10K 1/8W F (VCS2400)

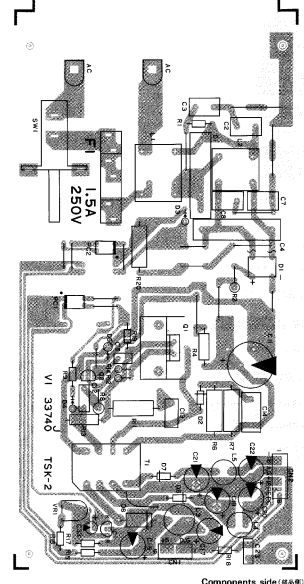
Others 23spec:
 - Metal Oxide Film Resistor: R147, 148, 215: 150K 2W J (V773700)
 - Solid Resistor: R347: 10M 1/4W K (R020990)
 - Coil: L101-106, 301-305: 20uH FLR200DN (V8839000)
 - EMI Filter: EMI 101, 102, 301-305, LS MT Y223N (FZ06970)
 - Ceramic Resonator: X301: 4MHz CSA4.0 (R0004800)

X302: 12.8MHz (V573700)
 - Slide Switch: SW301: SSSU12 2/3MS (V1575400) PROTECT

SW302: SSSU12 2/2IS (V8303300) MODE/POX OVER
 - Relay: RY 01-103: DC12V RY12W (K0001900)
 - XLB Connector: JK 015: XLB-3-31HCV (V1437300) INPUT

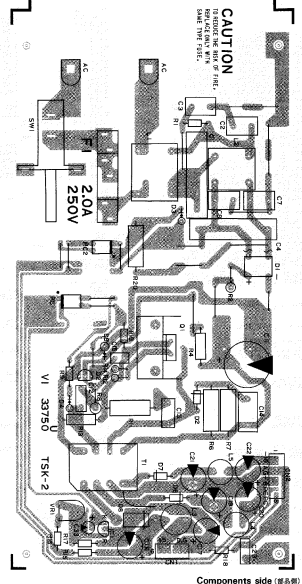
JK 102-104: XLB-3-32PCV (V1579600) OUTPUT CH1, CH2, CH3
 - DIN Jack: D301, 302: SP SK0266 x 2 (V3342200) MIDI IN/OUT
 - D-Sub Connector: CN307: D SUB 9P (V1576000) REMOTE
 - Lithium Battery: R301: SONY/CR2032 (V5338400)

Power Supply Unit Japanese model



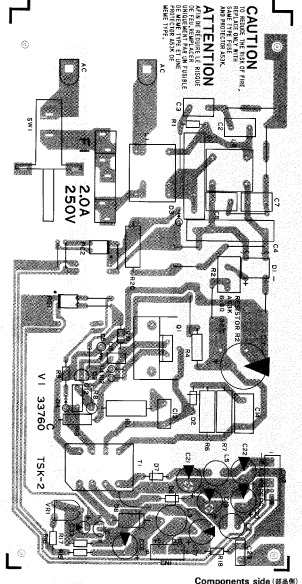
Components side (部品側)

U.S. model



Components side (部品側)

Canadian model

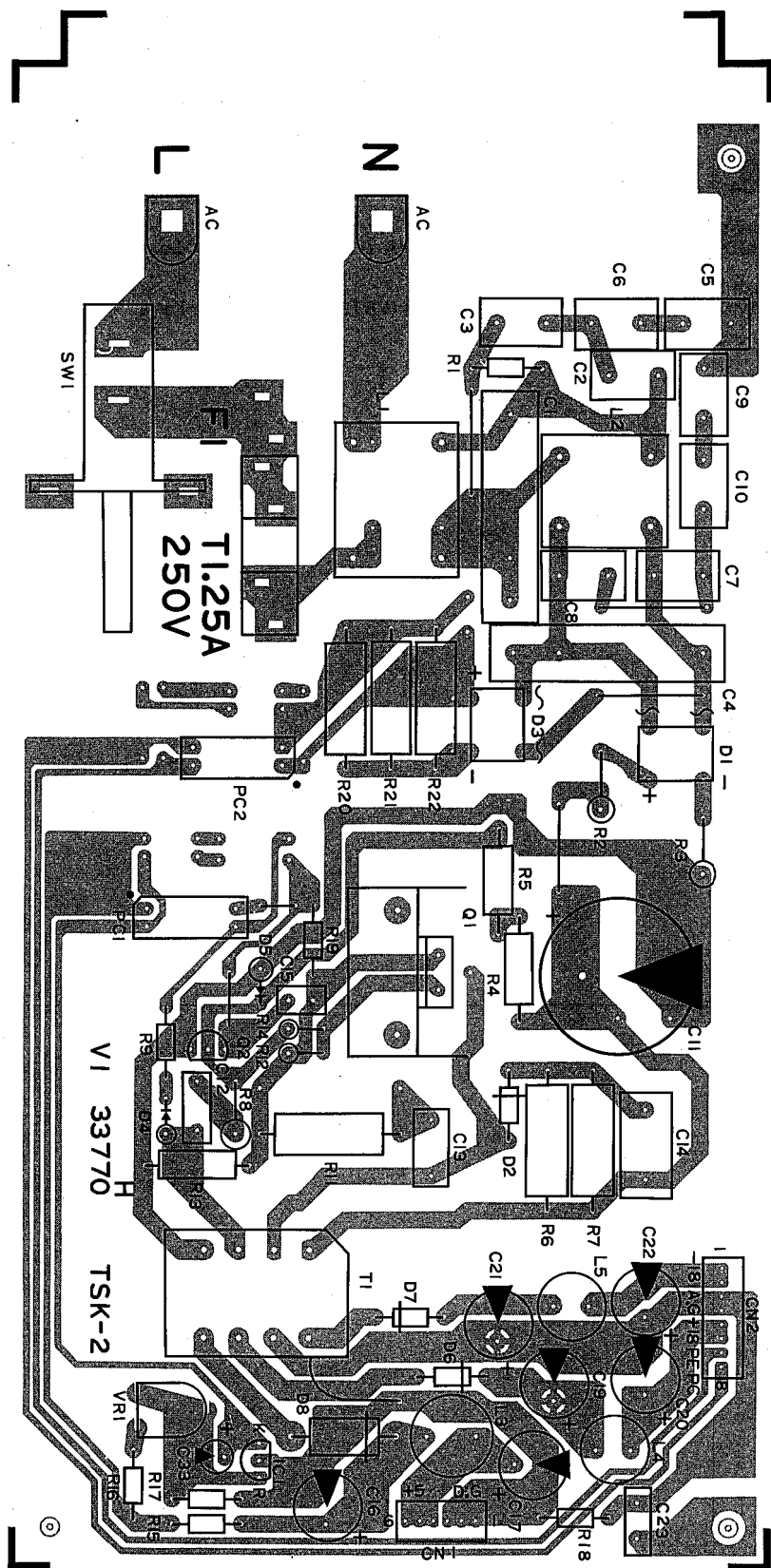


Components side (部品側)

- Notes
- | | | | |
|----------------------------|---|--------------------------|---|
| Power Supply Unit: | IV(337400) J
IV(337500) U
IV(337600) C | 18. Fuse
F 1:
F 1: | T 1.5A 250V (IX800920) J
2A 250V ST4 (IX800930) U, C |
| 1. IC | μPC1093J (IX802360) REGULATOR | 19. Power Transforms | TUM017A (IX802460) |
| 2. Photo Coupler | PC817 (IX000480) | | |
| 3. Transistor | 2SC2655 (IX552940) | | |
| 4. FET | 2SK1153 (IX803780) | | |
| 5. Diode | 10DF6 (IX800390)
1SS1655 (IX000040)
1SS84 (IX001380)
D 8, 7:
D 8:
D 9: | | |
| 6. Zener Diode | RD12E (IX006500) | | |
| 7. Diode Stack | D 1:
51WB40 (IX563160) | | |
| 8. Flame Proof C. Resistor | R 5, 15:
4700 1/4W (HV455470)
R12:
8.2K 1/4W (HV456820)
R14:
10K 1/4W (HV456820) | | |
| 9. Metal Oxide Resistor | R 2:
6.80 3W (HX801450) J, U
R 3:
100K 1/4W (HL312100)
R 6, 7:
28K 2W (HL312100)
R 8:
820 1/2W (HX804130)
R 9:
82K 2W (HL312100)
R11:
10 1W (HL312100)
R13:
100K 2W (HL326100)
R20: | | |
| 10. Fuse Resistor | R 2:
6.80 5W (HX801390) C | | |
| 11. Trimmer Potentiometer | VR 1:
RVFC8P 81K (HX801400) | | |
| 12. Ceramic Cap. | C 2, 3, 7, 8:
100P 1K (FX800250)
C13:
0.01, 250V DE (E1241100)
C14:
0.01, 50V Z (F15141100)
C23: | | |
| 13. Mylar Cap. | C12:
0.22, 50V J (JA565220)
C16:
0.022, 50V K (PC34220) | | |
| 14. Metallized Mylar Cap. | C 1, 4:
0.1, 250V (F2000680) | | |
| 15. Electrolytic Cap. | C11:
100, 200V (FX800240)
C18, 17:
1000, 10V (FX500580)
C19-22:
330, 25V M (JJ448330) | | |
| 16. Choke Coil | L 1:
NF85203A 20mH (IX800990)
L 2:
NF85A103 10mH (IX800980)
L 3:
FL112150K-35 (IX801060)
L 4, 5:
FL8470K-30 (IX802450) | | |
| 17. Power Switch | SW 1:
FS88213V (IX800440) J
IS-31 (IX800250) U, C | | |

J: YG-406-011
U: YG-406-012
C: YG-406-013

North European & British models



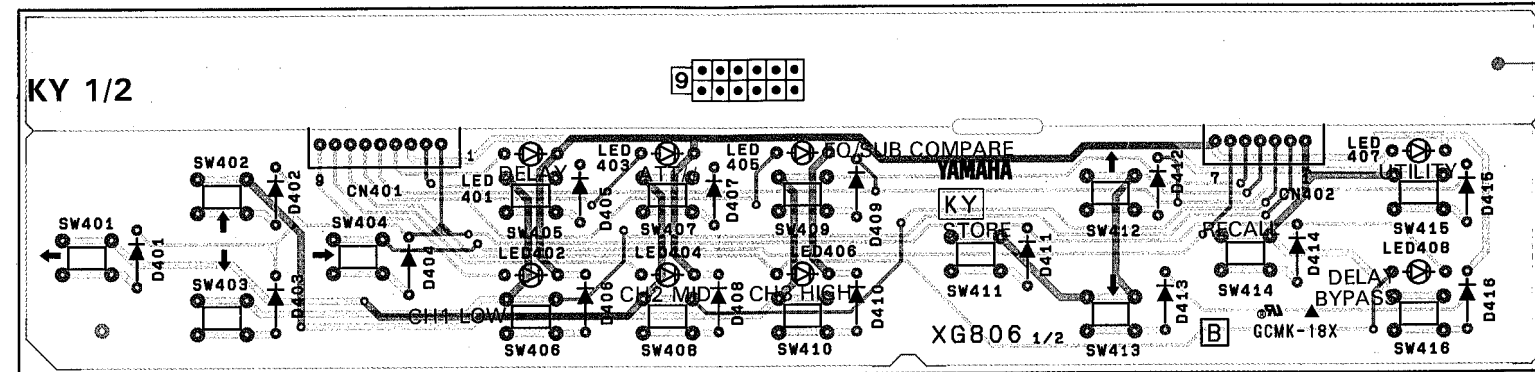
Components side (部品側)

Notes)

- Power Supply Unit: (VI337700) H, B
- IC
IC 1: μ PC1093J (IX802360) REGULATOR
 - Photo Coupler
PC 1,2: PC511 (IK000490)
 - Transistor
Q 2: 2SC2655 (IX552940)
 - FET
Q 1: 2SK513 (IX802380)
 - Diode
D 2: 10DF6 (IX802390)
D 4: 1SS84 (IF001380)
D 6, 7: 11DQ06 (IH001530)
D 8: 31DQ04 (IX802410)
 - Zener Diode
D 5: RD12E (IF006500)
 - Diode Stack
D 1,3: S1WB60 (IX553900)
 - Flame Proof C. Resistor
R 9: 560 Ω 1/4W (HJ355560)
R12: 8.2K Ω 1/4W (HV456820)
R14: 15 Ω 1/4W (HV456820)
R19: 5.1K Ω 1/4W (HX801380)
 - Metal Oxide Resistor
R 2,3: 6.8 Ω 3W (HX801450)
R 4,5: 100K Ω 1W (HL318100)
R 6,7: 68K Ω 2W (HL327680)
R 8: 82 Ω 1/2W (HX804130)
R11: 150 Ω 2W (HL325150)
R13: 2.7 Ω 1W (HL313270)
R20~22: 100K Ω 2W (HL328100)
 - Trimmer Potentiometer
VR 1: RVF08P B1K (HX801400)
 - Ceramic Cap.
C 2,3,7,8: 1000P 250V (FX800550)
C 5,6,9,10: 2200P 250V (FX551060)
C13: 68P 2KV (FX800560)
C14: 0.01 μ 250V DE (FI324100)
C23: 0.01 μ 50V Z (FG744100)
 - Mylar Cap.
C12: 0.22 μ 50V J (UA555220)
C15: 0.022 μ 50V K (FC364220)
 - Metallized Mylar Cap.
C 1,4: 0.1 μ 250V (FZ000680)
 - Electrolytic Cap
C11: 47 μ 400V (FZ006890)
C16,17: 1000 μ 10V (FX550550)
C19~22: 330 μ 25V M (UJ448330)
 - Choke Coil
L 1: LUMR3403 (GX801480)
L 2: NFR6UA103 10mH (GX800980)
L 3: FL11Z180K-35 (GX801060)
L 4, 5: FL9H470K-30 (GX802450)
 - Power Switch
SW 1: MM-13-1 (KX802560) H, B
 - Fuse
F 1: 1.25A 250V EAK (LX800940)
 - Power Transformer
T 1: TMA025 (GX800810)

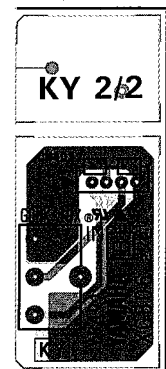
● KY Circuit Boards

KY 1/2



Components side (部品側)

KY 2/2

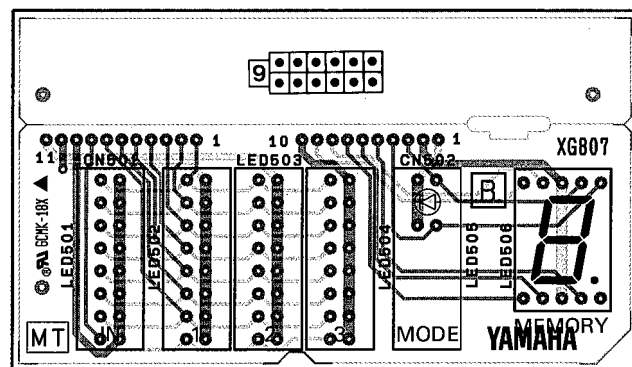


Components side (部品側)

Notes)

- | | |
|--------------------------------|-------------------------------------|
| Circuit Board: | KY (VI578900) XG806B0 |
| 1. Diode
D401 ~ 416: | 1SS133 (IF003450) |
| 2. LED
LED401 ~ 408: | GL1HD212 RE (VG149600) Switch LEDs |
| 3. Variable Resistor
VR401: | A10K EWH-14A (VA757600) INPUT Level |
| 4. Push Switch
SW401 ~ 416: | EVO-QSL04M (VB799000) Function Keys |

● MT Circuit Board



Components side (部品側)

Notes)

- | | |
|---------------------------------|-----------------------------------|
| Circuit Board: | MT (VI579000) XG807B0 |
| 1. LED Display
LED501 ~ 504: | SX-25J (VA039100) Level meters |
| LED505: | LN516RK (VI575100) Mode indicator |
| LED506: | SX-25Y GR 7seg. (VI697200) MEMORY |

■ TEST PROGRAM (テストプログラム)

● Precautions

1. Remove all devices connected to the DDL3.
If the MODE switch is turned to X-OVER when the system entered the test program mode, the connected speaker system will be damaged. When the test is initiated, the DELAY TIME of DSP chip is set to 0msec. and signal bypasses the DEQ chip.
2. After the system has entered the test program mode, the ROM, ACIA and Battery checks will be performed automatically. If these checks are OK, the LCD will indicate "TEST BATT. OK" message.
3. Select a test number by using the following procedure. Pressing the "↑" (MEMORY up) key will increase the test-number, and pressing the "↓" (MEMORY down) key will decrease it. Press the RECALL key to initiate the test.

● Test Entry

While pressing the DELAY and UTILITY keys, turn on the POWER switch.

● Exit

1. If the test 7 is activated after completion of tests 1 through 6, normal operation will be restored. Without completion of tests 1 through 6, the test 7 is initiated, "CHECK NOT END" message will appear. The test numbers that have been performed will be indicated by the following LED indicators:
 - Test 1: DELAY
 - Test 2: ATT/φ
 - Test 3: EQ/SUB COMPARE
 - Test 4: CH1 LOW
 - Test 5: CH2 MID
 - Test 6: CH3 HIGH
2. If the test 21(k) is activated, normal operation will be restored regardless of completion of tests.

● 準備

1. テストプログラム起動時は、入力信号がダイレクトに出力端子に出力されるため、出力端子に通常使用機器を接続したまま行なわないこと。特に、X-OVERモードで使用機器を接続したままで行なうと、スピーカーを破壊する危険があるので、絶対に行なわないこと。
2. テストプログラム起動時に、ROMのチェックサム、LSIの制御回線のチェック、バッテリーチェックを自動的に行なう。
テスト終了後、“TEST BATT. OK”を表示する。
3. テストプログラムモードに入ったら、メモリー・アップとメモリー・ダウンキーでテストナンバーを選択し、RECALLキーを押してプログラムを実行する。
4. テストプログラム起動時、DSP-LSIはDELAY = 0ms、DEQ-LSIはバイパス状態にセットされ信号が出力される。

● テストプログラムの起動方法

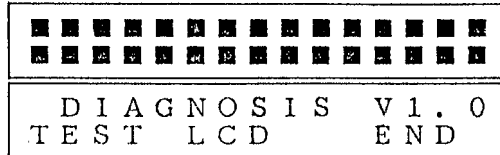
DELAYキーとUTILITYキーを押しながら、POWER ONする。

● EXIT

1. テストプログラム1-6まで行い、初期設定までの項目が終了すると、テスト7を実行することにより通常モードに戻ることができる。
チェックが終了していない場合は、LCDに“CHECK NOT END”を表示する。
なお、テストプログラム1-6までは各シーケンスが終了すると、対応するLEDが点灯する。各シーケンスとLEDの対応は、
 - # 1 : “DELAY”
 - # 2 : “ATT/φ”
 - # 3 : “EQ/SUB COMPARE”
 - # 4 : “CH1 LOW”
 - # 5 : “CH2 MID”
 - # 6 : “CH3 HIGH”
 となる。
2. テストプログラム1-6まで終了していない場合でも、テスト21(K)を実行することにより通常モードに戻ることができる。

1. TEST 1: LCD Check

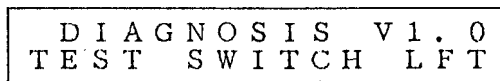
- 1-1. Select test number 1, and press the RECALL key to initiate the test.
- 1-2. All dots of LCD are turned ON and OFF five times and then the TEST END message will appear on the LCD.
- 1-3. Verify the proper lighting of all dots on the LCD.

**2. TEST 2: LED Check**

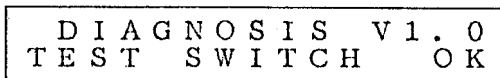
- 2-1. Select test number 2, and press the RECALL key to initiate the test.
- 2-2. The 7-segments LED will indicate sequence numbers "0" to "5".
- 2-3. The P.EQ LED of the MODE section will light and then X-OVER will light.
- 2-4. The switch LED indicators will light one after another in sequence.
- 2-5. All of LED indicators and segments will then simultaneously light and then turn OFF, and the MEMORY number display will show "2". At this time, the LEVEL meter LED will remain OFF.
- 2-6. Verify proper lighting of all LED indicators and segments, and proceed the program to next test.

3. TEST 3: Panel Switch Check

- 3-1. Select test number 3, and press the RECALL key to initiate the test.
- 3-2. The switch name "LFT" (Cursor left) will appear on the LCD as shown below.



- 3-3. Press the key of which the name is indicated on the LCD. Pressing the correct key can advance the program.
- 3-4. When these switch tests have been completed successfully, the message "OK" will appear on the LCD.

**1. テスト1：LCD表示器の動作チェック**

- 1-1. テストナンバー1を選択し、RECALLキーを押してテストを実行する。
- 1-2. LCD表示器が5回点滅した後、下図の様に变化する。
- 1-3. 目視により確認する。

2. テスト2：LED点灯チェック

- 2-1. テストナンバー2を選択し、RECALLキーを押してテストを実行する。
- 2-1. メモリーLEDが、0、1……………5と順次点灯する。
- 2-3. モードLEDが、P.EQ、X-OVERと順次点灯する。
- 2-4. キー内のLEDが順次点灯する。
- 2-5. レベルメーターを除く全LEDが点灯する。その後LEDが消灯し、メモリーLEDが"2"を表示して停止する。
- 2-6. LEDがすべて点灯するかを目視により確認する。

3. テスト3：スイッチ動作の確認

- 3-1. テストナンバー3を選択し、RECALLキーを押してテストを実行する。
- 3-2. LCDに次の表示がでる。

- 3-3. "カーソル←"キーを押すと、"LFT"のブリンクが"PUP"になる。
- 3-4. "パラメーター↑"キーを押すと、"PUP"のブリンクが"PDN"になる。以降、同じ様にスイッチを順番に押していき、最後に"DELAY BYPASS"キーを押すと次の表示になる。

3-5. If an incorrect key is pressed, the routine cannot proceed to the next switch test. Press the RECALL key to initiate this test again.

4. TEST 4: REMOTE Terminal Check

- 4-1. Connect pins 6, 7, 8 and 9 of REMOTE terminal to ground.
- 4-2. Select test number 4, and press the RECALL key to initiate the test.
- 4-3. If the result of test is OK, "OK" will be shown on the LCD.

```
DIAGNOSIS V1.0
TEST D-SUB OK
```

5. TEST 5: MIDI Check

- 5-1. Connect the MIDI OUT jack to the MIDI IN with a MIDI cable.
- 5-2. Select test number 5, and press the RECALL key to initiate the test.
- 5-3. The results of test will be displayed on the LCD. When the test is OK, the LCD will display the message shown below.

```
DIAGNOSIS V1.0
TEST MIDI OK
```

If the output data from the MIDI OUT doesn't return to CPU chip through the MIDI IN, or if the received data at CPU is not correct, the LCD will display the following message.

```
DIAGNOSIS V1.0
TEST MIDI NG
```

6. TEST 6: Initialization

- 6-1. Select test number 6, and press the RECALL key to initiate the test. The LCD will display the RAM INITIALIZE message.

```
DIAGNOSIS V1.0
RAM INITIALIZE ?
```

- 6-2. If the STORE key is pressed, memorized data (utility data and etc.) will be initialized and the following message will be displayed.

```
DIAGNOSIS V1.0
SET INITIALIZE
```

3-5.途中で、キーを押す順番をまちがえた場合は、“RECALL”を押してからチェックを再開する。

4. テスト4：リモート端子の動作チェック

- 4-1. リモート端子(CN307)の6、7、8、9ピンのデータが、正常に受け取られるかをチェックする。
- 4-2. テストナンバー4を選択し、RECALLキーを押してテストを実行する。
- 4-3. リモート端子(CN307)の6、7、8、9ピンをすべてGNDに接続すると、次の表示になる。

5. テスト5：MIDI入出力チェック

- 5-1. MIDI IN, MIDI OUT 端子をMIDIケーブルで接続すること。
- 5-2. テストナンバー5を選択し、RECALLキーを押してテストを実行する。
- 5-3. チェック結果がOKの時は、次のようにLCDに表示される。

MIDI OUT端子に出力した信号が、MIDI IN端子を経由してCPUに戻ってこない時、あるいは、戻ってきた信号が正常でない時は、次のようにLCDに表示される。

6. テスト6：メモリーデータ等の初期設定

- 6-1. テストナンバー6を選択し、RECALLキーを押してテストを実行する。

- 6-2. STOREキーを押すと、LCDに次の表示がでてメモリーデータ、ユーティリティーデータ等の初期設定を行なう。

7. TEST 7: Exit
Refer to EXIT.

7. テスト7: EXIT
EXITの項目参照。

8. TESTS 8-12: DRAM Check

8-1. Select test number 8, and press the RECALL key to initiate the test. The following message is then displayed on the LCD.

8. テスト8-12: D-RAMチェック

8-1. テストナンバー8を選択し、RECALLキーを押してテストを実行する。

```

DIAGNOSIS V1.0
TEST DRAM   ***
    
```

8-2. Attach an amplifier/speaker system to the OUTPUT connector.

8-2. OUTPUT端子にアンプとスピーカを接続する。

8-3. Apply a sine wave signal of +8.5dBm, 1kHz to the INPUT connector.

8-3. INPUT端子に±8.5dBm、1kHzの正弦波を印加する。

8-4. Execute TESTS 8 through 12 (c) in sequence to check to see if deterioration of the sound quality exist due to a bad or faulty DRAM IC.

8-2. テスト8~12を順次実行し、下表の様に信号の分解能を落して出力し、出力信号をモニターして不良のD-RAMを見つける。

TEST	DRAM IC no.				MESSAGE AT ***
	MSB		LSB		
8	IC306	IC305	IC304	IC303	THR
9	IC305	IC304	IC303	IC302	04B
10	IC304	IC303	IC302	0000	08B
11	IC303	IC302	0000	0000	12B
12	IC302	0000	0000	0000	16B

9. TEST 13: DEQ Chip Check

9. テスト13: DEQ-LSIのチェック

9-1. Select test number 13(d), and press the RECALL key to initiate the test. The LCD will indicate TEST 13 entry by displaying the message shown below.

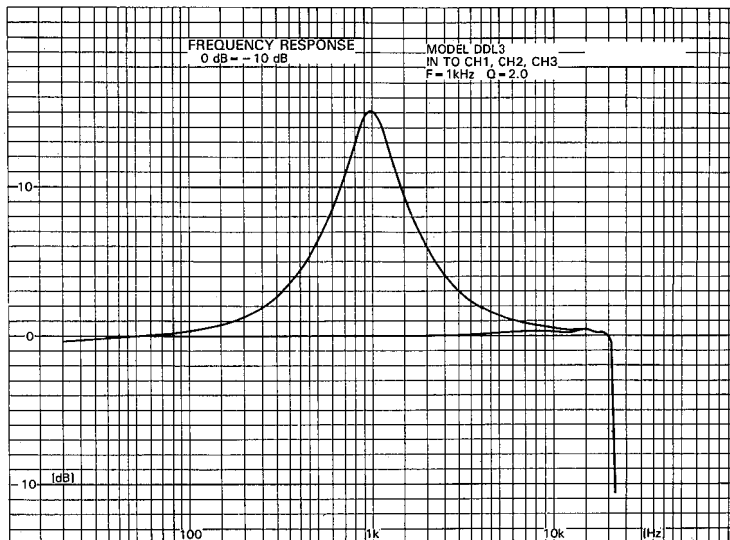
9-1. テストナンバー13(d)を選択し、RECALLキーを押してテストを実行する。

```

DIAGNOSIS V1.0
TEST DEQ
    
```

9-2. Verify the frequency characteristics of the OUTPUT connector as shown below.

9-2. 周波数特性を測定し、DEQ-LSIが正常かどうかチェックする。



10. TEST 14: AD Check

- 10-1. Select test number 14(e), and press the RECALL key to initiate the test.
- 10-2. When a signal of -10dBm , 100Hz is applied to the INPUT, output signals of $0 \pm 1.5\text{dB}$ will be obtained at the OUTPUTS 1 through 3. If the input signal is increased within $+6.5 \pm 1.5\text{dBm}$, a clipped signal will be obtained at the outputs.

10. テスト14：A/Dチェック

- 10-1. テストナンバー14(e)を選択し、RECALLキーを押してテストを実行する。
- 10-2. 入力端子INPUT(JK101)より、 $-10\text{dBm}/100\text{Hz}$ の入力信号を印加した時、出力端子OUTPUT CH1、CH2、CH3(JK102-JK104)には、 $0 \pm 1.5\text{dBm}$ の出力信号が得られること。また、入力信号を徐々に上げていき、JK102-JK104のいずれかの出力端子を監視する。出力信号が、 $+6.5 \pm 1.5\text{dBm}$ の範囲内で、出力信号にクリップ波形が現われることを確認する。(クリップ波形は、歪率計をモニターするのが望ましい。)

11. TEST 15: Slide Switch Check

- 11-1. Select test number 15(f), and press the RECALL key to initiate the test.
- 11-2. Then the LCD will then show a switch name and the underline cursor will indicate which slide switch to set as shown below.

11. テスト15：リアパネル部スライドスイッチの動作チェック

- 11-1. テストナンバー15(f)を選択し、RECALLキーを押してテストを実行する。
- 11-2. "PROTECT SW."の接点の位置をLCD内のカーソルにて表示する。

DIAGNOSIS	V1.0
TEST S-SW	<u>K</u> /M/O

K; KEY M; MEMORY O; OFF

In this test, the PROTECT and MODE switches are checked.

- 11-3. リアパネル部、“PROTECT SW.”(SW301)及び“MODE SW.”(SW302)を切り替えた時、データを正常に受け取るかチェックする。

12. TEST 16: KEY and LED Port Check

TEST 16(g) is utilized by the factory for shipping inspection purposes; it is not intended for field service use.

12. テスト16：KEY、LEDポートチェック

このテストは、工場出荷検査用のチェックですので、ここでは実行しません。

13. TEST 17: DAC Adjustment (MSB)

- 13-1. Select test number 17(h), and press the RECALL key to initiate the test.
- 13-2. Attach an amplifier/speaker system to the OUTPUT.
- 13-3. Sine wave signals of approximately -60dBm , 500Hz are obtained at the OUTPUT CH1, CH2 and CH3 connectors.
Monitor each outputs with a distortion meter and adjust VR102 for CH1, VR103 for CH2 and VR104 for CH3 so that minimum distortion waveform is achieved.

13. テスト17：D/AコンバーターのMSB調整

- 13-1. テストナンバー17(h)を選択し、RECALLキーを押してテストを実行する。
- 13-2. INPUT端子よりの入力信号に関係なくDSP-LSI内で正弦波を発生し、各出力端子より、約 $-60\text{dBm}/500\text{Hz}$ の信号が出力されるので、その出力信号を低歪率アンプに通して歪率計に接続する。アンプの出力信号と歪率計の歪波形をモニターし、ゼロクロスの歪波形が最小となり、最も波形のつなりの良い位置に調整ボリュームVR102(CH1)、VR103(CH2)、VR104(CH3)を調整する。

■ INSPECTIONS (検査)

1. Control and Switch Settings

1-1. Unless otherwise specified, the control and switches are to be set as follows;

INPUT level control: MAX.
MODE switch: P.EQ
PROTECT switch: OFF

1-2. The output loads of each OUTPUT CH1, CH2 and CH3 connector pin2 and pin3 are to be terminated by a 600 ohm load resistor.

1-3. Disconnect all devices connected to the DDL3.

1-4. Initiate the TEST PROGRAM 17.

2. Measuring Instruments

2-1. Prepare the following: AF signal generator, AC voltmeter, distortion meter, and an oscilloscope.

2-2. For the distortion measurement, a low-pass filter with a cut-off frequency of 80kHz and -6dB/oct must be used.

2-3. For the noise level measurement, a low-pass filter with a cut-off frequency of 12.7kHz and -6dB/oct must be used.

2-4. The output impedance of the AF signal generator must be less than 600ohms.

2-5. The input impedance of the measuring instruments must be over 1 Megaohm.

3. Inspection

3-1. Gain

When a signal of -10dBm , 100Hz is applied to the INPUT connector, an output signal of $0 \pm 1.5\text{dBm}$ is to be obtained at each OUTPUT (CH-1, CH2 and CH3) connector.

3-2. Frequency Characteristics

When a signal of approximately -10dBm is applied to the INPUT connector, the frequency characteristics of each OUTPUT (CH1, CH2 and CH3) should be within the range listed in the table below. The reference frequency used is 1kHz.

20Hz - 5kHz	$\pm 1.0\text{dB}$
6kHz - 20kHz	+2, -3dB
23kHz -	$\geq -10\text{dB}$

3-3. Distortion Factor

When a signal of 1kHz is applied to the INPUT connector, and adjust the INPUT level control so that the output signal of $+10\text{dBm}$ should be obtained at each OUTPUT (CH1, CH2 and CH-3) connector with a distortion factor of less than 0.03%.

1. 準備

1-1. フロント及びリアパネルのボリューム及びスイッチは、特に指定の無い限り下記の状態とする。

INPUT VOL.MAX
MODE SW.P.EQ
PROTECT SW.....OFF

1-2. 出力端子OUTPUT CH1、CH2、CH3(JK102-JK104)の2-3ピン間に、 600Ω の負荷抵抗を接続する。

1-3. テストプログラム17を起動する。

2. 測定器

2-1. 歪率測定時は80kHz、 -6dB/OCT のローパスフィルターを使用すること。

2-2. ノイズレベル測定時は12.7kHz、 -6dB/OCT のローパスフィルターを使用すること。

2-3. 発信器の出力インピーダンスは、 600Ω 以下のこと。

2-4. 測定器の入力インピーダンスは、 $1\text{M}\Omega$ 以上のこと。

3. 検査

3-1. 利得

入力端子INPUT(JK101)より $-10\text{dBm}/100\text{Hz}$ の入力信号を印加した時、OUTPUT CH1、CH2、CH3(JK102-JK104)の各出力端子には、 $0 \pm 1.5\text{dBm}$ の出力信号が得られること。

3-2. 周波数特性

入力端子INPUT(JK101)より -10dBm 前後の信号を入力した時、OUTPUT CH1、CH2、CH3(JK102-JK104)の各出力端子の周波数特性は、1kHzを基準として下記の範囲内のこと。

20Hz - 5kHz	$\pm 1.0\text{dB}$
6kHz - 20kHz	+2, -3dB
23kHz -	-10dB 以下

3-3. 歪率

入力端子INPUT(JK101)より、1kHzの入力信号を印加して、出力端子OUTPUT CH1、CH2、CH3(JK102-JK104)の出力レベルが $+10\text{dBm}$ の時の歪率は、0.03%以内のこと。

3-4. Maximum Output

When a signal of 100Hz is applied to the INPUT connector and the INPUT level control is adjusted so that an output signal of +17.5dBm is obtained at each OUTPUT (CH1, CH2 and CH3) connector, the distortion factor should be less than 3%.

3-5. Noise Level

When the INPUT is opened, the noise levels of the CH1, CH2 and CH3 OUTPUTS should be less than -82.5dBm.

It should be noted that this adjustment must be performed approximately three seconds after POWER switch is turned ON. If noise levels are not within rated levels, perform the DAC(MSB) adjustment using TEST PROGRAM 17.

3-6. Meter Sensitivity

When an input signal of +10dBm, 1kHz is applied to the INPUT connector, the CLIP through -42 LEDs of the level meters (IN 1, 2 and 3) will all be lit. When the input signal level is adjusted to +5dBm, the CLIP will turn off. Next, adjust the input signal level to -6, -12 and so on to verify their readings. Finally if an input signal of -37dB is applied, the all LEDs should be OFF.

4. Initialization

4-1. While pressing the DELAY and DELAY BYPASS keys, turn on the POWER switch, RAM initialization will be performed.

4-2. Set control and switches as follows;

INPUT level control:	MIN.
MODE switch:	P.EQ
PROTECT switch:	OFF

3-4. 最大出力

入力端子 INPUT (JK101) に 100Hz の信号を入力し、レベルを徐々に上げていった時、OUTPUT CH1、CH2、CH3 (JK102-JK104) の各出力端子には、+17.5dBm の出力信号が歪率 3% 以内で得られること。

3-5. ノイズレベル

入力端子 INPUT (JK101) のプラグを外した時、OUTPUT CH1、CH2、CH3 (JK102-JK104) の各出力端子でのノイズレベルは、-82.5dBm 以下であること。

ノイズレベルの測定は、パワースイッチ ON した後 3 分程経過してから測定すること。

限度をわずかにオーバーする場合は、最大出力レベルを測定し、その値に対して -100dB 以下であれば OK とする。また、ノイズレベルが大きい場合は、各出力チャンネルの MSB 調整ボリュームの調整具合を確認すること。

3-6. メーター感度

入力端子 INPUT (JK101) に +10dBm/1kHz の信号を印加した時、レベルメーターの IN 及び CH1 - CH3 は、“CLIP” ~ “-42” まですべて点灯していること。

その後、入力信号を +5dBm にした時、“CLIP” が消灯すること。

更に、-6dB ステップで入力信号を下げた時、“-6”、“-12”……と順番に上から消灯していき、最後に入力信号を -37dBm にした時、すべての LED が消灯すること。

4. 出荷時のセット

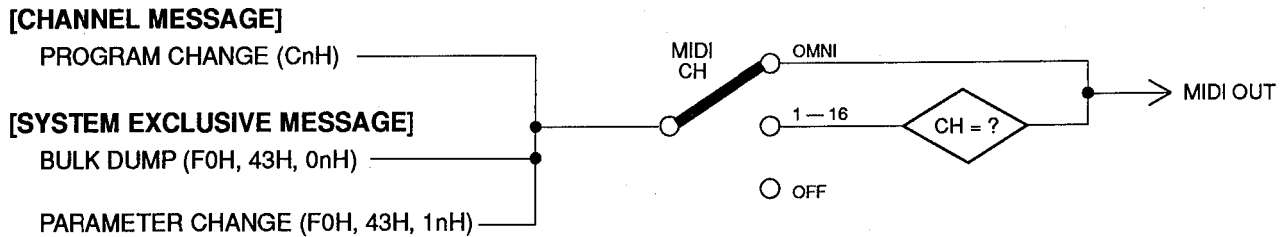
4-1. “DELAY” キーと “DELAY BYPASS” キーを押して POWER ON し、RAM イニシャライズ及びその他の初期設定をすること。

4-2. ボリューム、スイッチのセット

INPUT VOL.	……………MIN.
MODE SW.	……………P.EQ
PROTECT SW.	……………OFF

■ MIDI DATA FORMAT (MIDIデータフォーマット)

1. Transmission Conditions (送信条件)



2. Transmission Data (送信データ)

All MIDI data transmitted only when MIDI channel is set to 1 — 16 or omni.
(すべてのMIDIデータは、送信チャンネルがOMNIまたは1~16CHに指定されている時のみ送信される。)

2-1 Channel Information

1) Channel Voice Message

(1) Program Change

Transmitted whenever a program is recalled (within the same mode).

(プログラムのリコール時に送信する。
ただし、同一モード内のみ。)

STATUS 11000000 (Cn) n = channel No.
PROGRAM No. 0ppppppp p = 0~14

2-2 System Information

1) System Exclusive Message

(1) Bulk Dump

The data group to be bulk dumped is selected in the utility mode bulk dump function — MEM(No.), MEM*, PGM-TBL, SYS, ALL.

(送信するバルクダンプの組み合わせは、UTILITYモードにおいてMEM(No.), PGM-TBL、SYS、ALLから選ぶことができる。)

● 1 Memory Bulk Data [MEM(No.)]

```

11110000 (F0H) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0000nnnn (0nH) n=DEVICE NUMBER
01111110 (7EH) FORMAT NUMBER
00000001 (01H) BYTE COUNT (MSB)
00100100 (24H) BYTE COUNT (LSB)
01001100 (4CH) "L"
01001101 (4DH) "M"
00100000 (20H) " "
00100000 (20H) " "
00111000 (38H) "8"
00110111 (37H) "7"
00110000 (30H) "0"
00110011 (33H) "3"
01001101 (4DH) "M" MEMORY
0mnnnnnnnnn MEMORY NUMBER (m = 1~15*)
0ddddd }
  ? } DATA (154 byte*)
0ddddd }
0eooooe CHECKSUM
11110111 (F7H) EOx
  
```

* The memory number and the mode represented by the data type number must match.

(メモリーNo.とデータの中のタイプNo.のモードが一致しなければならない。
(両方の条件が満たされなければならない。))

	MEMORY NO.	Type No.
P.EQ	1 — 9	0
3WAY	10 — 12	1
2WAY	13 — 15	2

● All Memory (15) Bulk Data [MEM*]

The "1 Memory Bulk Data" described above is transmitted 15 times — once for each memory location.

(1メモリーバルクデータを連続して15メモリー分送信する。)

● Program Change Table Bulk Data [PGM-TBL]

```

11110000 (F0H) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0000nnnn (0nH) n=DEVICE NUMBER
01111110 (7EH) FORMAT NUMBER
00000011 (03H) BYTE COUNT (MSB)
00001010 (0AH) BYTE COUNT (LSB)
01001100 (4CH) "L"
01001101 (4DH) "M"
00100000 (20H) " "
00100000 (20H) " "
00111000 (38H) "8"
00110111 (37H) "7"
00110000 (30H) "0"
00110011 (33H) "3"
01010100 (54H) "T" TABLE NUMBER
00000001 (01H) "1" fix TABLE NUMBER
Oddddddd } DATA (384 byte)
Oddddddd }
Oeeeeeee CHECKSUM
11110111 (F7H) EOX
    
```

● System Setup Bulk Data [SYS]

```

11110000 (F0H) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0000nnnn (0nH) n=DEVICE NUMBER
01111110 (7EH) FORMAT NUMBER
00000000 (00H) BYTE COUNT (MSB)
00010010 (12H) BYTE COUNT (LSB)
01001100 (4CH) "L"
01001101 (4DH) "M"
00100000 (20H) " "
00100000 (20H) " "
00111000 (38H) "8"
00110111 (37H) "7"
00110000 (30H) "0"
00110011 (33H) "3"
01010011 (53H) "S" SYSTEM SETUP DATA
00100000 (20H) " "
Ovvvvvvv VERSION NUMBER (01)
Orrrrrrrr VERSION NUMBER (00)
Oddddddd } DATA (6 byte)
Oddddddd }
Oeeeeeee CHECKSUM
11110111 (F7H) EOX
    
```

● All Memory, Program Change Table, and System Setup Bulk Data [ALL]

The "All Memory Bulk Data," "Program Change Table Bulk Data," and "System Setup Bulk Data" transmissions described above are carried out in sequence.

(全メモリー、プログラムチェンジ表、システムセットアップバルクデータののすべてを連続して送信する。)

(2) Parameter Change

Transmitted when parameter data is edited.

(データはパラメータの値を変えた時に送信する。)

```

11110000 (F0H) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0001nnnn (1nH) n=DEVICE NUMBER
00011101 (1DH) GROUP NUMBER
Oppppppp PARAMETER NUMBER (0~116)
Oddddddd } DATA (4 byte)
Oddddddd }
11110111 (F7H) EOX
    
```

The DDL3 can be switched to two modes: PARAMETRIC EQ and CROSSOVER. In the CROSSOVER mode it is further possible to select 3-way or 2-way operation. The number of parameters in each mode and their ID numbers are shown in the chart below.

(DDL3は、EQモード、クロスオーバーモードの2つを切り替えることができ、クロスオーバーモードは、さらに3WAYタイプと2WAYタイプに分けられる。各モードのパラメータ数とパラメータNo.を次の表に示す。)

		No. of Parameters	Parameter Number
EQ Mode		46	0 — 45
CROSSOVER Mode	3WAY	36	46 — 81
	2WAY	35	82 — 116

117 total

PARAMETER CHANGE TABLE

PARAMETER GROUP/SUB. GROUP NUMBER = 1DH

1. EQ MODE PARAMETER NUMBER (No.) = 0 — 45

No.	PARAMETER NAME	No.	PARAMETER NAME	No.	PARAMETER NAME
0	CH1 DELAY TIME	16	CH1 LOW FREQUENCY	32	CH3 MID FREQUENCY
1	CH2 DELAY TIME	17	CH1 LOW GAIN	33	CH3 MID GAIN
2	CH3 DELAY TIME	18	CH1 MID FREQUENCY	34	CH3 MID Q
3	DELAY OFFSET	19	CH1 MID GAIN	35	CH3 HIGH FREQUENCY
4	CH1 ATTENUATE	20	CH1 MID Q	36	CH3 HIGH GAIN
5	CH2 ATTENUATE	21	CH1 HIGH FREQUENCY	37	CH1 CTRL PARAMETER
6	CH3 ATTENUATE	22	CH1 HIGH GAIN	38	CH1 CTRL MIN
7	CH1 PHASE	23	CH2 LOW FREQUENCY	39	CH1 CTRL MAX
8	CH2 PHASE	24	CH2 LOW GAIN	40	CH2 CTRL PARAMETER
9	CH3 PHASE	25	CH2 MID FREQUENCY	41	CH2 CTRL MIN
10	CH1 PARAMETRIC EQ	26	CH2 MID GAIN	42	CH2 CTRL MAX
11	CH2 PARAMETRIC EQ	27	CH2 MID Q	43	CH3 CTRL PARAMETER
12	CH3 PARAMETRIC EQ	28	CH2 HIGH FREQUENCY	44	CH3 CTRL MIN
13	CH1 SUBSONIC FILTER	29	CH2 HIGH GAIN	45	CH3 CTRL MAX
14	CH2 SUBSONIC FILTER	30	CH3 LOW FREQUENCY		
15	CH3 SUBSONIC FILTER	31	CH3 LOW GAIN		

2. CROSSOVER MODE

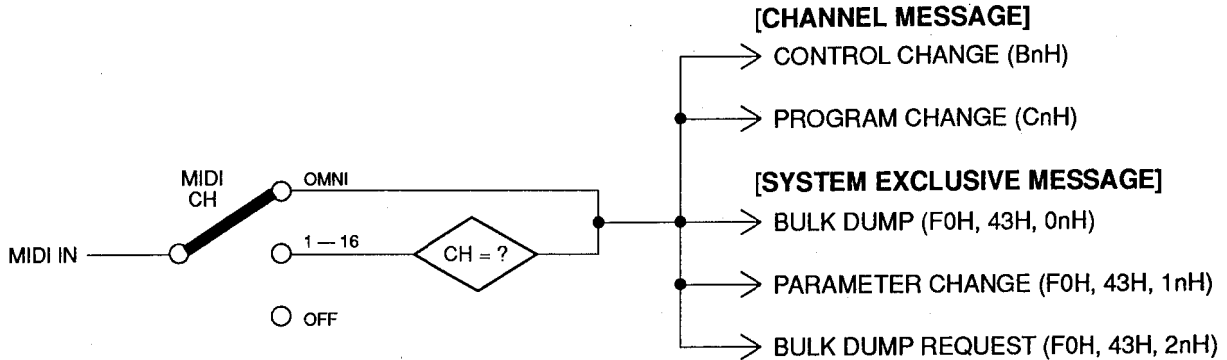
(1) 3WAY TYPE PARAMETER NUMBER (No.) = 46 — 81

No.	PARAMETER NAME	No.	PARAMETER NAME	No.	PARAMETER NAME
46	CH1 DELAY TIME	58	CH1 LOW FREQUENCY	70	CH3 HIGH-LPF FRQ
47	CH2 DELAY TIME	59	CH1 LOW FINE	71	CH3 HIGH-LPF SLOPE
48	CH3 DELAY TIME	60	CH1 LOW SLOPE	72	CH1 CTRL PARAMETER
49	DELAY OFFSET	61	CH2 LOW-MID FREQ	73	CH1 CTRL MIN
50	CH1 ATTENUATE	62	CH2 LOW-MID FINE	74	CH1 CTRL MAX
51	CH2 ATTENUATE	63	CH2 LOW-MID SLOPE	75	CH2 CTRL PARAMETER
52	CH3 ATTENUATE	64	CH2 HIGH-MID FRQ	76	CH2 CTRL MIN
53	CH1 PHASE	65	CH2 HIGH-MID FINE	77	CH2 CTRL MAX
54	CH2 PHASE	66	CH2 HIGH-MID SLOPE	78	CH3 CTRL PARAMETER
55	CH3 PHASE	67	CH3 HIGH FREQUENCY	79	CH3 CTRL MIN
56	CH1 LOW-HPF FRQ	68	CH3 HIGH FINE	80	CH3 CTRL MAX
57	CH1 LOW-HPF SLOPE	69	CH3 HIGH SLOPE	81	COMPARE

(2) 2WAY TYPE PARAMETER NUMBER (No.) = 82 — 116

No.	PARAMETER NAME	No.	PARAMETER NAME	No.	PARAMETER NAME
82	CH1 DELAY TIME	94	CH1 S.WOOF-LOW FRQ	106	CH3 HIGH-LPF SLOPE
83	CH2 DELAY TIME	95	CH1 S.WOOF-LOW FINE	107	CH1 CTRL PARAMETER
84	CH3 DELAY TIME	96	CH1 S.WOOF-LOW SLOPE	108	CH1 CTRL MIN
85	DELAY OFFSET	97	CH2 LOW-HPF FREQ	109	CH1 CTRL MAX
86	CH1 ATTENUATE	98	CH2 LOW-HPF SLOPE	110	CH2 CTRL PARAMETER
87	CH2 ATTENUATE	99	CH2 LOW FREQUENCY	111	CH2 CTRL MIN
88	CH3 ATTENUATE	100	CH2 LOW FINE	112	CH2 CTRL MAX
89	CH1 PHASE	101	CH2 LOW SLOPE	113	CH3 CTRL PARAMETER
90	CH2 PHASE	102	CH3 HIGH FREQUENCY	114	CH3 CTRL MIN
91	CH3 PHASE	103	CH3 HIGH FINE	115	CH3 CTRL MAX
92	CH1 S.WOOF-HPF FRQ	104	CH3 HIGH SLOPE	116	COMPARE
93	CH1 S.WOOF-HPF SLOPE	105	CH3 HIGH-LPF FRQ		

3. Reception Conditions (受信条件)



4. Reception Data (受信データ)

All MIDI data transmitted only when MIDI channel is set to 1 — 16 or omni.

(すべてのMIDIデータは、送信チャンネルがOMNIまたは1-16CHに指定されている時のみ送信する。)

4-1 Channel Information

1) Channel Voice Message

(1) Control Change

Controllers can be individually assigned to the DDL3 CH1, CH2 and CH3 using the utility mode CONTROLLER function.

(UTILITYモードにおいて、CH1、CH2、CH3それぞれにコントロールチェンジのコントローラーを設定することができる。)

1011nnnn (BnH) STATUS BYTE n = 0(channel No. 1)~
15(channel No. 16)

0ccccccc CONTROL NUMBER c= 0~31
64~95
102~120

0vvvvvvv VALUE v= 0~127

(2) Program Change

1100nnnn (CnH) STATUS BYTE n = 0(channel No. 1)~
15(channel No. 16)

0ppppppp PROGRAM NUMBER p= 0~127

4-2 System Information

1) System Exclusive Message

(1) Bulk Dump

The data group to be bulk dumped is selected in the utility mode bulk dump function — MEM(No.), MEM*, PGM-TBL, SYS, ALL.

(バルクダンプするデータ(MEM(No.)、MEM、PGM-TBL、SYS、ALL)は、UTILITYモードのバルクダンプファンクションで選択することができる。)

● 1 Memory Bulk Data

The data received is the same as that described in "1 Memory Bulk Data" in the preceding "Transmission Data" section.

(データ内容は、送信データの1メモリーバルクデータと同様。)

● All Memory (15) Bulk Data

The data received is the same as that described in "All Memory (15) Bulk Data" in the preceding "Transmission Data" section.

(データ内容は、送信データの全メモリー(15)バルクデータと同様。)

● Program Change Table Bulk Data

The data received is the same as that described in "Program Change Table Bulk Data" in the preceding "Transmission Data" section.

(データ内容は、送信データのプログラムチェンジ表バルクデータと同様。)

● System Setup Bulk Data

The data received is the same as that described in "System Setup Bulk Data" in the preceding "Transmission Data" section.

(データ内容は、送信データのシステムセットアップバルクデータと同様。)

● All Memory, Program Change Table, and System Setup Bulk Data

The data received is the same as that described in "All Memory, Program Change Table, and System Setup Bulk Data" in the preceding "Transmission Data" section.

(データ内容は、送信データの全メモリー、プログラムチェンジ表、システムセットアップバルクデータと同様。)

(2) Parameter Change

The data received is the same as that described in "Parameter Change" in the preceding "Transmission Data" section. The parameters of the currently selected program are changed accordingly when this data is received.

(データ内容は、送信データのパラメータチェンジと同様。受信すると、現在パネル上にあるプログラムの任意のパラメータ値が変わる。)

(3) Bulk Dump Request

The data group to be bulk dumped is selected in the utility mode bulk dump function — MEM(No.), MEM*, PGM-TBL, SYS, ALL.

(バルクダンプするデータ(MEM(No.), MEM, PGM-TBL, SYS, ALL)は、UTILITYモードのバルクダンプファンクションで選択することができる。)

● Program Change Table Bulk Dump Request

Bulk transmission of the program change table data occurs when this data is received.

(受信すると、プログラムチェンジ表をバルクアウトする。)

```
11110000 (FOH) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0010nnnn (2nH) n=DEVICE NUMBER
01111110 (7EH) FORMAT NUMBER
01001100 (4CH) "L"
01001101 (4DH) "M"
00100000 (20H) " "
00100000 (20H) " "
00111000 (38H) "8"
00110111 (37H) "7"
00110000 (30H) "0"
00110011 (33H) "3"
01010101 (55H) "U" TABLE USE
00000001 (01H) "I" fix TABLE NUMBER
11110111 (F7H) EOF
```

● Memory Data Bulk Dump Request

The data for the currently selected program is transmitted when this data is received.

(受信すると、任意のメモリーNo.のプログラムをバルクアウトする。)

```
11110000 (FOH) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0010nnnn (2nH) n=DEVICE NUMBER
01111110 (7EH) FORMAT NUMBER
01001100 (4CH) "L"
01001101 (4DH) "M"
00100000 (20H) " "
00100000 (20H) " "
00111000 (38H) "8"
00110111 (37H) "7"
00110000 (30H) "0"
00110011 (33H) "3"
01001101 (4DH) "M" MEMORY
0mmmmmmmm MEMORY NUMBER (m =1~15)
11110111 (F7H) EOF
```

● System Setup Data Bulk Dump Request

Bulk transmission of the system setup data occurs when this data is received.

(受信すると、システムセットアップデータをバルクアウトする。)

```
11110000 (FOH) STATUS BYTE
01000011 (43H) YAMAHA ID CODE
0010nnnn (2nH) n=DEVICE NUMBER
01111110 (7EH) FORMAT NUMBER
01001100 (4CH) "L"
01001101 (4DH) "M"
00100000 (20H) " "
00100000 (20H) " "
00111000 (38H) "8"
00110111 (37H) "7"
00110000 (30H) "0"
00110011 (33H) "3"
01001101 (4DH) "S" SYSTEM SETUP DATA
00100000 (20H) " "
11110111 (F7H) EOF
```

Function ...	Transmitted	Recognized	Remarks
Basic Default	1 - 16, off	1 - 16, off	memorized
Channel Changed	1 - 16, off	1 - 16, off	
Mode Default	x	OMNIoff/OMNIon	memorized
Mode Messages	x	x	
Mode Altered	*****	x	
Note	x	x	
Number : True voice	*****	x	
Velocity Note ON	x	x	
Velocity Note OFF	x	x	
After Key's	x	x	
Touch Ch's	x	x	
Pitch Bender	x	x	
Control Change 0 - 31	x	o	
Control Change 64 - 95	x	o	
Control Change 102 - 120	x	o	
Prog Change : True #	o 0 - 14 *****	o 0 - 127	*1
System Exclusive	o	o	
System : Song Pos	x	x	
System : Song Sel	x	x	
Common : Tune	x	x	
System :Clock	x	x	
Real Time :Commands	x	x	
Aux :Local ON/OFF	x	x	
Aux :All Notes OFF	x	x	
Mes- :Active Sense	x	x	
sages:Reset	x	x	
Notes: *1 = For program 1 - 128, memory #1 - #F is selected.			
Mode 1	OMNI ON, POLY	Mode 2	OMNI ON, MONO
Mode 3	OMNI OFF, POLY	Mode 4	OMNI OFF, MONO
		o	: Yes
		x	: No

DDL3

DIGITAL DELAY LINE

DDL3 / D1030

PARTS LIST

REGARDING PARTS REGISTRATION CHANGES IN ACCORDANCE WITH THE DDL3 MODEL NAME CHANGE.

DETAILS OF THE CHANGE:

The model name DDL3 has been changed to D1030. Another company has a similar product with the same name, constituting the name change.

The following parts have been registered for service use because of this change.

Please add them to the DDL3 service manual.

PARTS:

The cosmetic parts which lists the model's name will be changed.

The ROM has been changed to produce the corrected model name on LCD displayed when the power switch is turned on.

There are no other changes needed to the internal devices.

OVERALL ASSEMBLY P.2

New	Ref.No.	Parts No.	Description	Part name	Remarks
*	1	VL227400	Top Cover	Top cover	D1030
*	11	VL227500	Rear Panel	Rear panel	D1030
*	26	VL227600	Cover,Meter	Meter cover	D1030

ELECTRICAL PARTS P.3

*		XG963F0	IC TMS27C256		EPROM
---	--	---------	--------------	--	-------

SERVICE RESPONSE:

When DDL3 parts are out of inventory, please use the D1030 parts for service response.

APPLIED SERIAL NUMBERS:

HK01001 onwards (for products produced from April, 1991)

DIGITAL DELAY LINE

DDL3

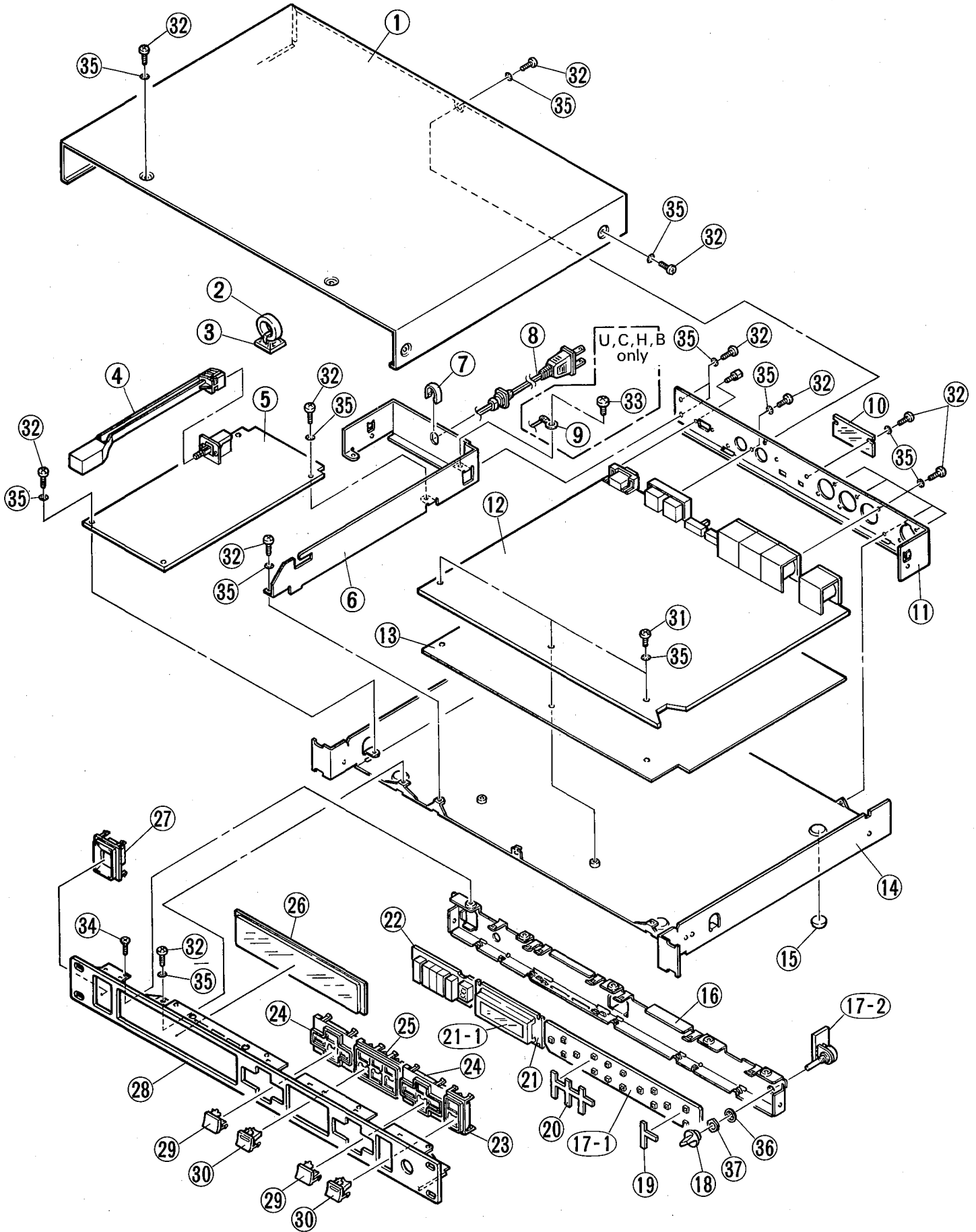
PARTS LIST

Notes DESTINATION ABBREVIATIONS

J : Japanese model	A : Australian model
U : U.S. model	E : European model
C : Canadian model	D : West German model
X : General model	B : British model
M : South African model	I : Indonesian model
H : North European model	

OVERALL ASSEMBLY (総組立)

DDL3



Ref. No.	Part No.	Description	部品名	Remarks	ランク
1	VI973300	Top Cover	トップカバー	DDL3	
2	GE300770	Ferrite Ring	フェライトリング		06
3	CB835590	Band Relief	バンド固定具		01
4	VF888700	Push Rod	プッシュロッド	POWER	02
5	VI337400	Power Supply Unit	電源ユニット	J	
5	VI337500	Power Supply Unit	電源ユニット	U	
5	VI337600	Power Supply Unit	電源ユニット	C	
5	VI337700	Power Supply Unit	電源ユニット	H,B	
6	VF891200	AC Panel	電源パネル	J	07
6	VF892500	AC Panel	電源パネル	U,C	07
6	VF892600	AC Panel	電源パネル	H,B	07
7	VD705000	Cord Strain Relief	コードストッパー	U,C	02
7	CB032840	Cord Strain Relief	コードストッパー	H,B	01
8	VD279200	AC Cord	電源コード	J	04
8	VD654200	AC Cord	電源コード	U,C	05
8	VD279800	AC Cord	電源コード	H	08
8	VH890200	AC Cord	電源コード	B	09
9	LA003690	Lug Terminal	ラブリグ端子	U,C,H,B	01
10	VI476800	Protect Cover	プロテクトカバー		
11	VI472000	Rear Panel	リアパネル		
12	VI578800	Circuit Board	A D シート		
13	VI577700	Isolation Sheet	絶縁シート		
14	VI470200	Bottom Cover	ボトムカバー		
15	CB037120	Foot	フット		01
16	VI470500	Sub Panel	サブパネル		
17	VI578900	Circuit Board	K Y シート		
17-1		Circuit Board	K Y シート 1/2		
17-2		Circuit Board	K Y シート 2/2		
18	VF888400	Knob	内ツマミ	INPUT Volume	02
19	VG893400	Partition	パーティション (小)		01
20	VG893300	Partition	パーティション (大)		01
21	VI575000	LCD Assembly	L C D Ass'y		
21-1	VH203400	LCD	液晶ディスプレイ		16
22	VI579000	Circuit Board	M T シート		
23	VI355400	Escutcheon	エスケッション		
24	VF890100	Escutcheon	エスケッション		01
25	VI355300	Escutcheon	エスケッション		
26	VI472700	Cover, Meter	メーターカバー		07
27	VF888600	Escutcheon, PSW	ハワイスイッチエスケッション		01
28	VI472600	Front Panel	フロントパネル		
29	VI473900	Push Button	プッシュボタン		
29	VF895400	Push Button	↑		01
29	VF895300	Push Button	↓		01
29	VI474000	Push Button	CURSOR →		
29	VF895800	Push Button	STORE		01
29	VF895900	Push Button	RECALL		01
30	VI473300	Push Button with lens	DELAY		
30	VI473400	Push Button with lens	ATT/φ		
30	VI473500	Push Button with lens	EQ/SUB COMPARE		
30	VI473600	Push Button with lens	CH1 LOW		
30	VI473700	Push Button with lens	CH2 MID		
30	VI473800	Push Button with lens	CH3 HIGH		
30	VI819900	Push Button with lens	DELAY BYPASS		02
30	VF896200	Push Button with lens	UTILITY		02
31	ED330066	Bind Head Screw	3.0×6 FCM3BL		01
32	ED330086	Bind Head Screw	3.0×8 FCM3BL		01
33	ED340066	Bind Head Screw	4.0×6 FCM3BL	U,C,H,B	01
34	EB330066	Flat Head Screw	3.0×6 FCM3BL		01
35	EV413036	Toothed Lock Washer	A φ 3.0 FCM3BL		01
36	EV410076	Toothed Lock Washer	A φ 7.0 ZMC2Y		01
37	ES200180	Hexagonal Nut	φ 7.0 ZMC2BL		01

* New Parts (新規部品)

ELECTRICAL PARTS (電気部品)

Ref. No.	Part No.	Description	部品名	Remarks	ランク
	VI578800	Circuit Board	AD	AD シート	DDL3
	VI578900	Circuit Board	KY	KY シート	
	VI579000	Circuit Board	MT	MT シート	
	VI337400	Power Supply Unit		電源ユニット	J
	VI337500	Power Supply Unit		電源ユニット	U
	VI337600	Power Supply Unit		電源ユニット	C
	VI337700	Power Supply Unit		電源ユニット	H, B
	VI578800	Circuit Board	AD	AD シート	
	XD853A00	IC	NJM7815FA	IC	REGULATOR 03
	XD854A00	IC	NJM7915FA	IC	REGULATOR 03
	XG945A00	IC	M5278L05	IC	5V 100mA
	XG948A00	IC	M5279L05	IC	-5V 150mA
	IG102500	IC	NE5532P	IC	OP AMP. 06
	XA013001	IC	M5238P	IC	OP AMP. 04
	XA772001	IC	NJM4556DE	IC	OP AMP. 03
	IG031000	IC	NJM2903D	IC	COMPARATOR 05
	IG118200	IC	PST518B-2	IC	SYSTEM RESET 04
	XC561001	IC	LP20C9B6	IC	ACTIVE LPF 08
	IR000250	IC	SN74HC02N	IC	NOR 03
	IG142250	IC	SN74HC04N	IC	INVERTER 01
	IR000450	IC	SN74HC04N	IC	INVERTER 03
	IR000850	IC	SN74HC08N	IC	AND 03
	IR001450	IC	SN74HC14N	IC	INVERTER 05
	IR003250	IC	SN74HC32N	IC	OR 03
	IR007450	IC	SN74HC74N	IC	D-FF 04
	IR013950	IC	SN74HC139N	IC	DECODER 2-4 05
	IR016350	IC	SN74HC163N	IC	COUNTER 03
	IR016650	IC	SN74HC166N	IC	SHIFT REGISTER 03
	IR017450	IC	SN74HC174N	IC	D-FF 05
	IR027350	IC	SN74HC273N	IC	D-FF OCTAL 05
	IR036750	IC	SN74HC367N	IC	BUS DRIVER 06
	IG147300	IC	HD63B50P	IC	ACIA 09
	XD245001	IC	HD63B03YP-N	IC	CPU 08
	XC354001	IC	YM3818	IC	DSPM 15
	XE798A00	IC	YM3934	IC	PMW2 12
	XE788A00	IC	YM6104	IC	DEQ2 11
	XG804A00	IC	PCM61PJ	IC	DAC 06
	XG898A00	IC	AK5327-VP	IC	ADC
	XF981A00	IC	M5M4464AP-10	IC	DRAM 256K 08
	XG517A00	IC	IC3664RL-12	IC	SRAM 64K 08
	XG962A00	IC	TBP28L22N	IC	BPROM 256K 07
	XG963A00	IC	TMS27C256	IC	EPROM
	VG181900	Photo Coupler	PC-900V	フォトカプラー	03
	IA067310	Transistor	2SA673A C, D	トランジスタ	03
	IA101521	Transistor	2SA1015 Y	トランジスタ	03
	IC121310	Transistor	2SC1213A C, D	トランジスタ	03
	IC181520	Transistor	2SC1815 Y	トランジスタ	03
	IG138700	Transistor Array	TD62506P	トランジスタアレイ	03
	VF074800	Transistor Array	BA6212	トランジスタアレイ	05
	IF003450	Diode	1SS133	ダイオード	01
	VB481900	Diode	11ES4	ダイオード	01
	IF005600	Zener Diode	RD5.6EB2 5.6V	ダイオード	01
	IF010670	Zener Diode	MTZ4.7C 4.7V	ツェナーダイオード	01
	VA762200	Monolithic Cera. Cap.	0.1μ 25V Z	積層セラコン	01
	FZ005610	Monolithic Cera. Cap.	1.5μ 25V Z	積層セラコン	03
	FZ004100	Semiconductive Cera. Cap.	0.1μ 16V M	積層セラコン	01
	UI828470	Electrolytic Cap.	470μ 10V	ケミコン	01
	HT560100	Trimmer Potentiometer	B100K	半固定抵抗	05
	VA024800	Trimmer Potentiometer	B10K	半固定抵抗	02
	HZ004730	Resistor Array	RMLS8 J 103	抵抗アレイ	02
	VA822600	Resistor Array	RMLS4 J 103	抵抗アレイ	01
	VC819600	Metal Film Resistor	75Ω 1/6W F	抵抗	01
	VC821600	Metal Film Resistor	430Ω 1/6W F	抵抗	01
	VC822400	Metal Film Resistor	910Ω 1/6W F	抵抗	01
	VC822500	Metal Film Resistor	1KΩ 1/6W F	抵抗	01
	VC822900	Metal Film Resistor	1.5KΩ 1/6W F	抵抗	01
	VC823200	Metal Film Resistor	2KΩ 1/6W F	抵抗	01
	VC823400	Metal Film Resistor	2.4KΩ 1/6W F	抵抗	01
	VC823700	Metal Film Resistor	3.3KΩ 1/6W F	抵抗	01
	VC824000	Metal Film Resistor	4.3KΩ 1/6W F	抵抗	01
	VC824600	Metal Film Resistor	7.5KΩ 1/6W F	抵抗	01
	VC824700	Metal Film Resistor	8.2KΩ 1/6W F	抵抗	01
	VC824900	Metal Film Resistor	10KΩ 1/6W F	抵抗	01
	VC825100	Metal Film Resistor	12KΩ 1/6W F	抵抗	01
	VC825200	Metal Film Resistor	13KΩ 1/6W F	抵抗	01
	VC825400	Metal Film Resistor	16KΩ 1/6W F	抵抗	01
	VC825700	Metal Film Resistor	22KΩ 1/6W F	抵抗	01
	VC825800	Metal Film Resistor	24KΩ 1/6W F	抵抗	01

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Ref. No.	Part No.	Description	部品名	Remarks	ランク
	VC826900	Metal Film Resistor	68KΩ 1/6W F	金属皮膜抵抗	01
	VC828000	Metal Film Resistor	200KΩ 1/6W F	金属皮膜抵抗	01
	VC828900	Metal Film Resistor	470KΩ 1/6W F	金属皮膜抵抗	01
	VC773700	Metal Oxide Film Resistor	150Ω 2W J	酸化金属被膜抵抗	01
	HI209990	Solid Resistor	10MΩ 1/4W K	ソリッド抵抗	01
	VB835000	Coil	20μH FL5R200QN	コイル	01
	FZ006970	EMI Filter	LS MT Y223NB	LCフィルター EMI	02
	QU004800	Ceramic Resonator	4MHz CSA4.00MG	セラミック共振子	03
	VI575700	Ceramic Resonator	12.8MHz	セラミック共振子	03
	VG502300	Slide Switch	SSSU12 2/2(S)	スライドスイッチ	MODE(P. EQ/X-OVE
	VI575400	Slide Switch	SSSU12 2/3(NS)	スライドスイッチ	PROTECT
	KC001900	Relay	DC12V RV12W	リレー	07
	VI443700	Cannon Jack	XLB-3-31PCV	キャノンジャック	INPUT
	VI579600	Cannon Jack	XLB-3-32PCV	キャノンジャック	OUTPUT(CH1/2/3)
	VF342200	DIN Jack	5P SK0266 × 2	DINジャック	MIDI IN/OUT
	VI576000	Connector	D-SUB 9P	コネクタ	REMOTE
	VE338400	Lithium Battery	SONY/CR2032	リチウム電池	03
	VI579500	Holder, XLB Jack		キャノンシールド	03
	BA808520	Heat Sink	T220M 25L	ヒートシンク	01
	VB438700	Angle Bracket, Earth		アース金具	01
	ED330086	Bind Head Screw	3.0 × 8 FCM3BL	バインドヘッドネジ	for REGULATOR (2
	EV413036	Toothed Lock Washer	A φ 3.0 FCM3BL	歯付金内歯形	for REGULATOR (2
	VI578900	Circuit Board	KY	KYシート	01
	IF003450	Diode	1SS133	ダイオード	01
	VG149600	LED	GL1HD212 RE	LED	Key's LEDs (8pcs
	VA757600	Variable Resistor	A10K EWH-14A	可変リレーボリューム	INPUT Level
	VB799000	Push Switch	EVQ-QSL04M	プッシュスイッチ	Funct. Keys (16pc
	VI579000	Circuit Board	MT	MTシート	01
	VA039100	LED Display	SX-25J	LEDディスプレイ	Level meter (4pc
	VI575100	LED Display	LN516RK	LEDディスプレイ	Mode ind. (1pc.)
	VI697200	LED Display	SX-25Y GR 7seg.	LEDディスプレイ	MEMORY
	VI337400	Power Supply Unit		電源ユニット	J
	VI337500	Power Supply Unit		電源ユニット	U
	VI337600	Power Supply Unit		電源ユニット	C
	VI337700	Power Supply Unit		電源ユニット	H, B
	IX802360	IC	μ PC1093J	IC	REGULATOR
	IK000480	Photo Coupler	PC817	フォトカプラ	J, U, C
	IK000490	Photo Coupler	PC511	フォトカプラ	H, B
	IX552940	Transistor	2SC2655	トランジスタ	03
	IX803780	FET	2SK1153	FET	J, U, C
	IX802380	FET	2SK513	FET	H, B
	IF000040	Diode	1SS1555	ダイオード	J, U, C
	IF001380	Diode	1SS84	ダイオード	01
	IH001530	Diode	11DQ06	ダイオード	08
	IX802390	Diode	10DF6	ダイオード	02
	IX802410	Diode	31DQ04	ダイオード	03
	IF006500	Zener Diode	RD12E	ダイオード	01
	IX553160	Diode Stack	S1WB40	ダイオードスタック	J, U, C
	IX553900	Diode Stack	S1WB60	ダイオードスタック	H, B
	HV456820	Flame Proof C. Resistor	15Ω 1/4W	不燃酸化カーボン抵抗	01
	HV455470	Flame Proof C. Resistor	470Ω 1/4W	不燃酸化カーボン抵抗	J, U, C
	HJ355560	Flame Proof C. Resistor	560Ω 1/4W	不燃酸化カーボン抵抗	H, B
	HX801380	Flame Proof C. Resistor	5.1KΩ 1/4W	不燃酸化カーボン抵抗	01
	HV456820	Flame Proof C. Resistor	8.2KΩ 1/4W	不燃酸化カーボン抵抗	01
	HX804130	Metal Oxide Resistor	82Ω 1/2W	酸化金属皮膜抵抗	01
	HL313270	Metal Oxide Resistor	2.7Ω 1W	酸化金属皮膜抵抗	H, B
	HL318100	Metal Oxide Resistor	100KΩ 1W	酸化金属皮膜抵抗	01
	HL313100	Metal Oxide Resistor	1Ω 1W	酸化金属皮膜抵抗	J, U, C
	HL324820	Metal Oxide Resistor	82Ω 2W	酸化金属皮膜抵抗	J, U, C
	HL325150	Metal Oxide Resistor	150Ω 2W	酸化金属皮膜抵抗	H, B
	HL327330	Metal Oxide Resistor	33KΩ 2W	酸化金属皮膜抵抗	J, U, C
	HL327680	Metal Oxide Resistor	68KΩ 2W	酸化金属皮膜抵抗	H, B
	HL328100	Metal Oxide Resistor	100KΩ 2W	酸化金属皮膜抵抗	01
	HX801450	Metal Oxide Resistor	6.8Ω 3W	酸化金属皮膜抵抗	J, U, H, B
	HX801390	Fuse Resistor	6.8Ω 5W	ヒューズ抵抗	C
	HX801400	Trimmer Potentiometer	RVF08P B1K	半周一定抵抗	03
	FG744100	Ceramic Cap.	0.01μ 50V Z	セラミックコンデンサ	01
	FX800550	Ceramic Cap.	1000P 250V	セラミックコンデンサ	03
	FX551060	Ceramic Cap.	2200P 250V	セラミックコンデンサ	H, B
	FI324100	Ceramic Cap.	0.01μ 250V DE	セラミックコンデンサ	01
	FX800230	Ceramic Cap.	100P 1KV	セラミックコンデンサ	J, U, C
	FX800560	Ceramic Cap.	68P 2KV	セラミックコンデンサ	H, B
	FC364220	Mylar Cap.	0.022μ 50V K	マイラーコンデンサ	02
	UA555220	Mylar Cap.	0.22μ 50V J	マイラーコンデンサ	02
	FZ000680	Metallized Mylar Cap.	0.1μ 250V	MMコンデンサ	02
	FX550550	Electrolytic Cap.	1000μ 10V	ケミコンデンサ	02

* New Parts (新規部品)

ランク : Japan only

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Ref. No.	Part No.	Description	部品名	Remarks	ランク
	UJ448330	Electrolytic Cap.	330 μ 25V M		02
	FX800240	Electrolytic Cap.	100 μ 200V	J, U, C	04
	FZ008890	Electrolytic Cap.	47 μ 400V	H, B	05
	GX800980	Choke Coil	NFR6UA103 10mH		05
	GX800990	Choke Coil	NFR5E203A 20mH	J, H, C	06
*	GX801480	Choke Coil	LUMR3403	H, B	05
	GX802450	Choke Coil	FL9H470K-30		
	GX801060	Choke Coil	FL11Z180K-35		03
	KX800440	Power Switch	ESB8213V	J	03
	KX802550	Power Switch	M-3-1	U, C	
*	KX802560	Power Switch	MM-13-1	H, B	
	LX800920	Fuse	T 1.5A 250V	J	01
	LX800930	Fuse	2A 250V ST4	U, C	02
	LX800940	Fuse	1.25A 250V EAK	H, B	02
	LB201880	Fuse Holder	PC-FH1	H, B	01
*	GX802460	Power Transformer	TUM017A	J, U, C	
	GX800810	Power Transformer	TMA025	H, B	09
	CX802990	Switch Panel	YG-4030-009		01
	EA030066	Pan Head Screw	3.0×6 ZMC2Y	for SW. panel (2p)	01
	EA030086	Pan Head Screw	3.0×8 ZMC2Y	for FET (1pc.)	01
	EV300036	Spring Washer	φ 3.0 ZMC2Y	3pcs	01
	EV200036	Flat Washer	φ 3.0 ZMC2Y	3pcs	01
*	VI575000	LCD Assembly	16×2 with LED	LCD Ass'y	
	VH203400	LCD	LM16X221	液晶ディスプレイ	16
	VD279200	AC Cord	7A 2.5m	J	04
	VD654200	AC Cord	10A 2.44m	U, C	05
	VD279800	AC Cord	6A 2.5m	H	08
	VH890200	AC Cord	10A 2.5m	B	09

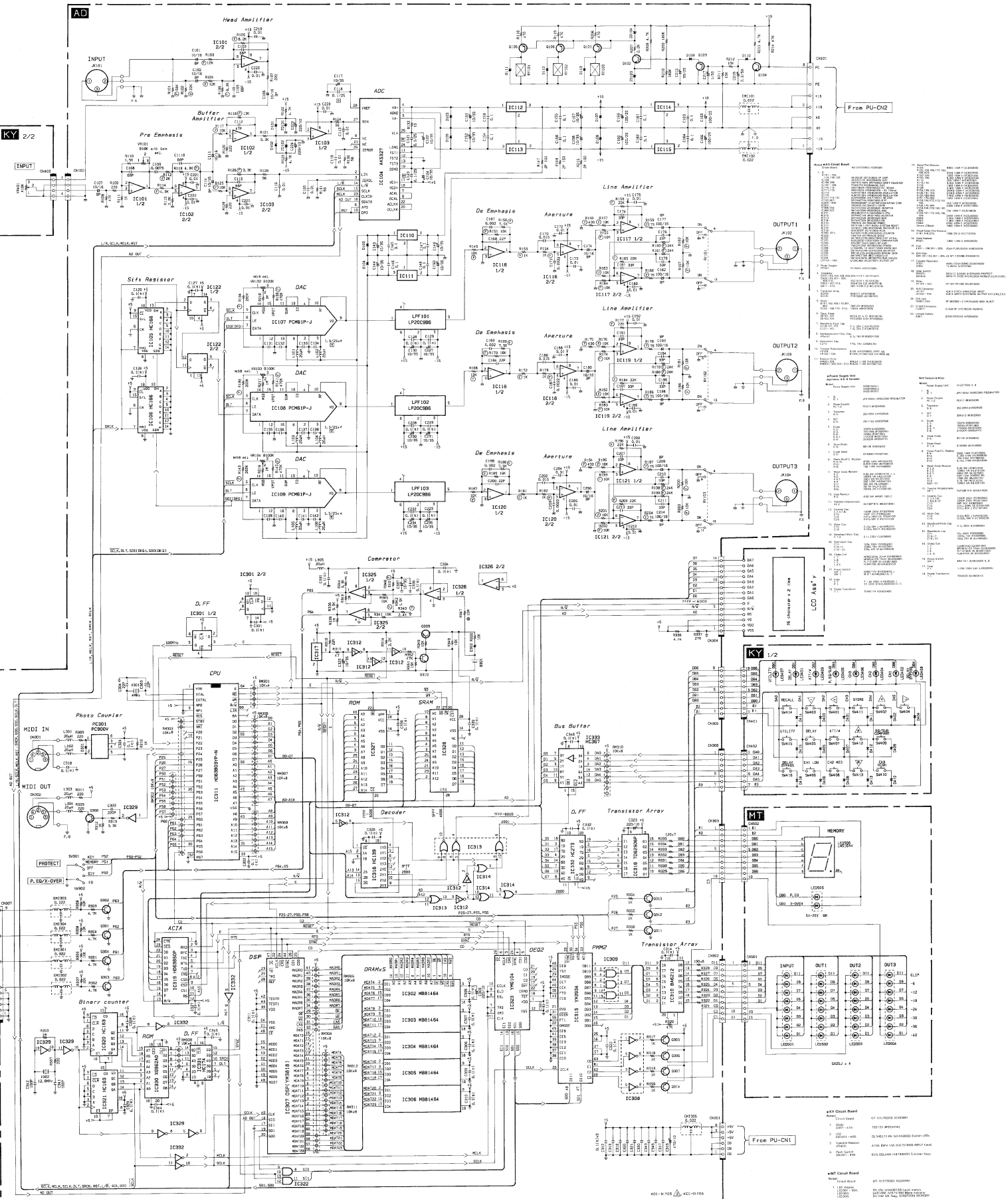
DIGITAL DELAY LINE
DDL3 / D1030

SERVICE ADDITIONAL MANUAL

THE DDL3 MODEL NAME CHANGE

The model name DDL3 has been changed to D1030.

Another company has a similar product with the same name,
constituting the name change.



Component List

Resistors: R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R145, R146, R147, R148, R149, R150, R151, R152, R153, R154, R155, R156, R157, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176, R177, R178, R179, R180, R181, R182, R183, 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