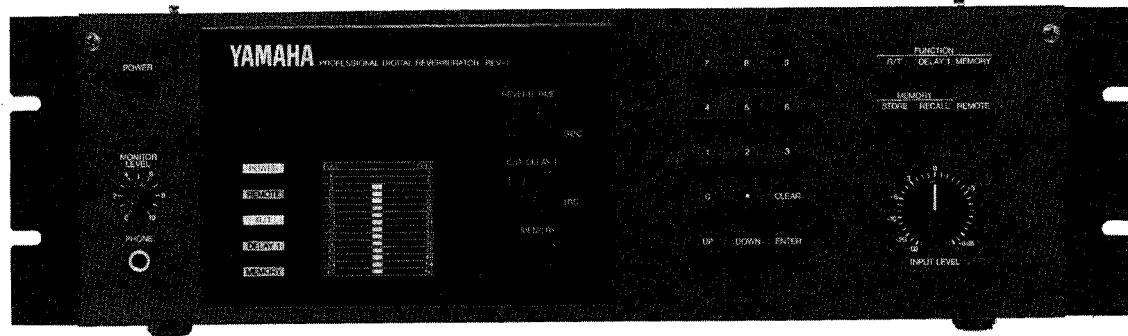


DIGITAL REVERBERATOR/REMOTE CONTROL UNIT

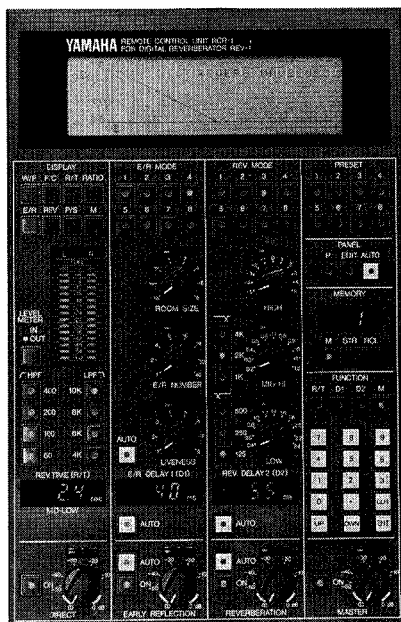
REV-1 RCR-1

SERVICE MANUAL

● REV-1



● RCR-1



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006588

SINCE 1887



YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

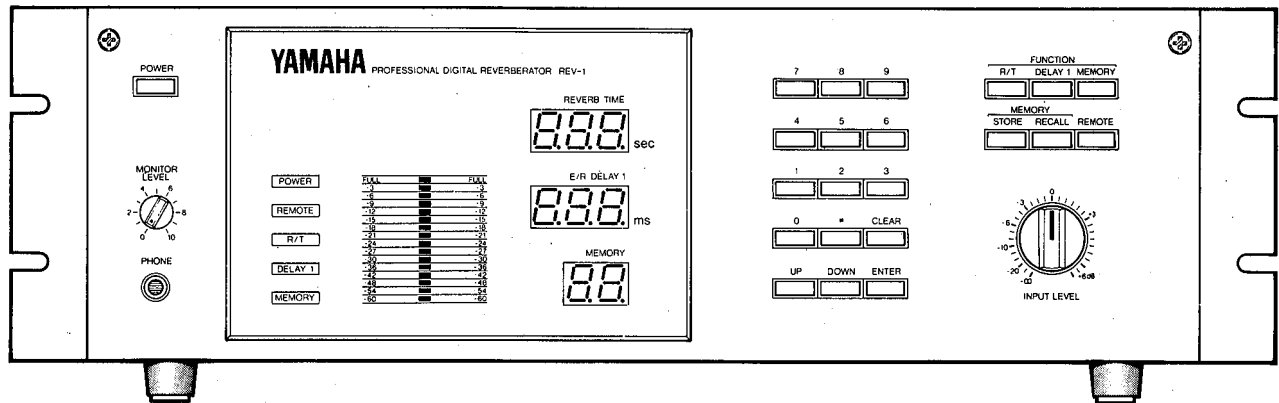
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REV-1/RCR-1

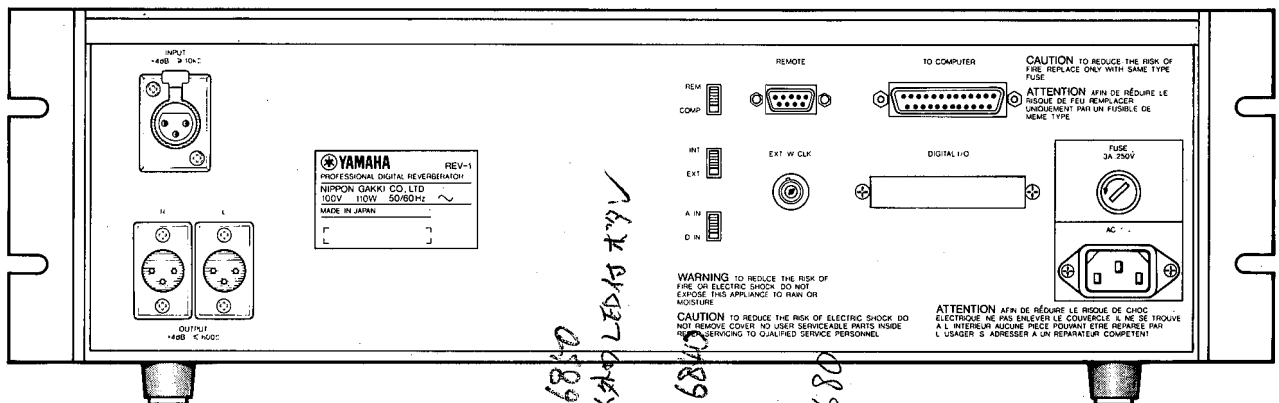
REV-1/RCR-1

PANEL LAYOUT

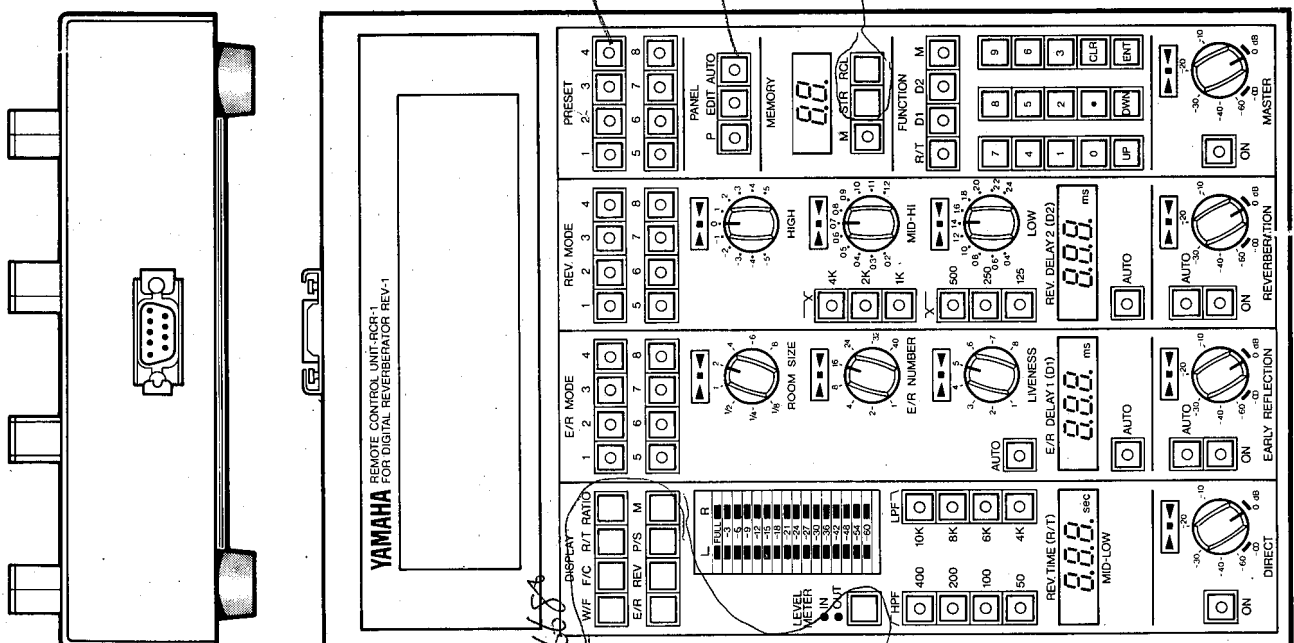
FRONT PANEL



REAR PANEL



REMOTE CONTROL PANELS



■ SPECIFICATIONS(仕様)

■ Sound Output Modes

The REV-1 has three output modes:

- a) Direct Sound
- b) Early Reflections
- c) Reverberation

■ Programs

Input Filters

- ① Low Pass Filter 4,6,8,10kHz
- ② High Pass Filter 50,100,200,400Hz

Early Reflections (E/R)

- ① Maximum (L and R) 40 each
- ② Initial Delay (Delay 1) 0 to 600msec

Early Reflection Time 0 to 370msec

E/R Modes (8 types)

- ① ROOM ② HALL-S ③ HALL-M
- ④ HALL-L ⑤ RANDOM ⑥ REVERSE
- ⑦ PLATE ⑧ SPRING

Room Size (8 steps)

$\times 1/8, \times 1/4, \times 1/2, \times 1, \times 2, \times 4, \times 6,$
and $\times 8$

E/R Number (8 steps)

1, 2, 4, 8, 16, 24, 32, 40

Liveness (8 steps)

1, 2, 3, 4, 5, 6, 7, 8
dead ----->live

Reverberations (REV)

Initial Delay (Delay 2)

..... 0 to 600 msec

Reverberation Time 0.1 to 99.9 sec

Reverberation Modes (8 Types)

- ① Super High Density
- ② High Density/High Initial Diffusion
- ③ High Density/Low Initial Diffusion
- ④ Medium Density
- ⑤ Medium Low Density
- ⑥ Low Density
- ⑦ Super Low Density
- ⑧ Equally Spaced Diffusion

Reverberation time can be set Independently
in four frequency bands.

(残響時間の4帯域分割制御)

Low (11 steps, standard-Mid-Low range)

$\times 0.4, \times 0.6, \times 0.8, \times 1.0, \times 1.2, \times 1.4,$
 $\times 1.6, \times 1.8, \times 2.0, \times 2.2,$ and $\times 2.4$

Mid-Low-Standard Reverberation Time

Mid-High (11 steps, standard-Mid-Low range)

$\times 0.2, \times 0.3, \times 0.4, \times 0.5, \times 0.6, \times 0.7,$
 $\times 0.8, \times 0.9, \times 1.0, \times 1.1,$ and $\times 1.2$

High (11 steps, standard-Mid-Low range)

-5, -4, -3, -2, -1, 0, +1, +2, +3, +4,
and +5

Crossover Frequencies

Low/Mid-Low 125, 250, 500Hz

Mid-Low/Mid-High 1, 2, 4 kHz

■ Main Unit

(Input)

Number of Input Channels 1
 Circuit Electronically Balanced
 Input Impedance -- greater than or equal
 to 10 kohms
 Nominal Input Level +4dB
 Maximum Input Level +20dB
 Connector XLR-3-31

(Output)

Number of Output Channels
 2 (L and R)
 Circuit Electronically Balanced
 Output Impedance 600 ohms or less
 Connector XLR-3-32
 Nominal Output Level +4dB
 Maximum Output Level +18dB
 Frequency Response
 20Hz to 18kHz +/-1dB

Harmonic Distortion (in Delay Mode)
 less than or equal to 0.03%
 @ 1kHz, maximum output

Dynamic Range
 1.Reverberation Mode85dB
 2.Echo Mode85dB
 3.Delay Mode90dB

Sampling Frequency 44.1kHz

Number of Quantization Bits 16

Memory
 ROM (1~30) 30 sets
 RAM (31~90) 60 sets

The memory (RAM) is backed up with a battery
 after power switch is turned off.

電源OFF時のメモリー(RAM)保持---Ni-Cdバッテリーにてバックアップ。

Environmental Temperature
 0 to 40°C (32° to 95° F)

Power Requirements

Japanese & U. S. Models AC100V~120V±10% 50/60Hz
 General Model AC220V~240V±10% 50/60Hz

Power Consumption

Japanese Model 110W
 U. S. Model 150W
 General Model 150W

Weight 10kg (22 lbs.)

Dimensions (W×H×D)*

..... 18-7/8"×5-1/4"×14-5/8"
 (480mm×133mm×372mm)

* Measurements exclude feet, knobs,
 connectors, and other protuberances.

■ Remote Control Unit

Liquid Crystal Display (LCD) Modes

W/F = Waveform
 F/C = Filter and Crossover
 R/T = Reverberation Time
 RATIO = Reverberation Time Ratio
 E/R = Early Reflection Mode
 REV = Reverb Mode
 P/S = Preset Titles
 M = Memory Titles

Memory

RAM (91~99) 9 sets

Environmental Temperature

..... 0 to 40°C (32° to 95° F)

Power Requirements (Supplied Through
 Cable From Main Unit) DC+/-12V

Power Consumption 15W

Weight 1.8kg (4 lbs.)

Dimensions (W×H×D)*

..... 7-3/8"×1-3/4"×11-3/8"
 (186mm×45mm×289mm)

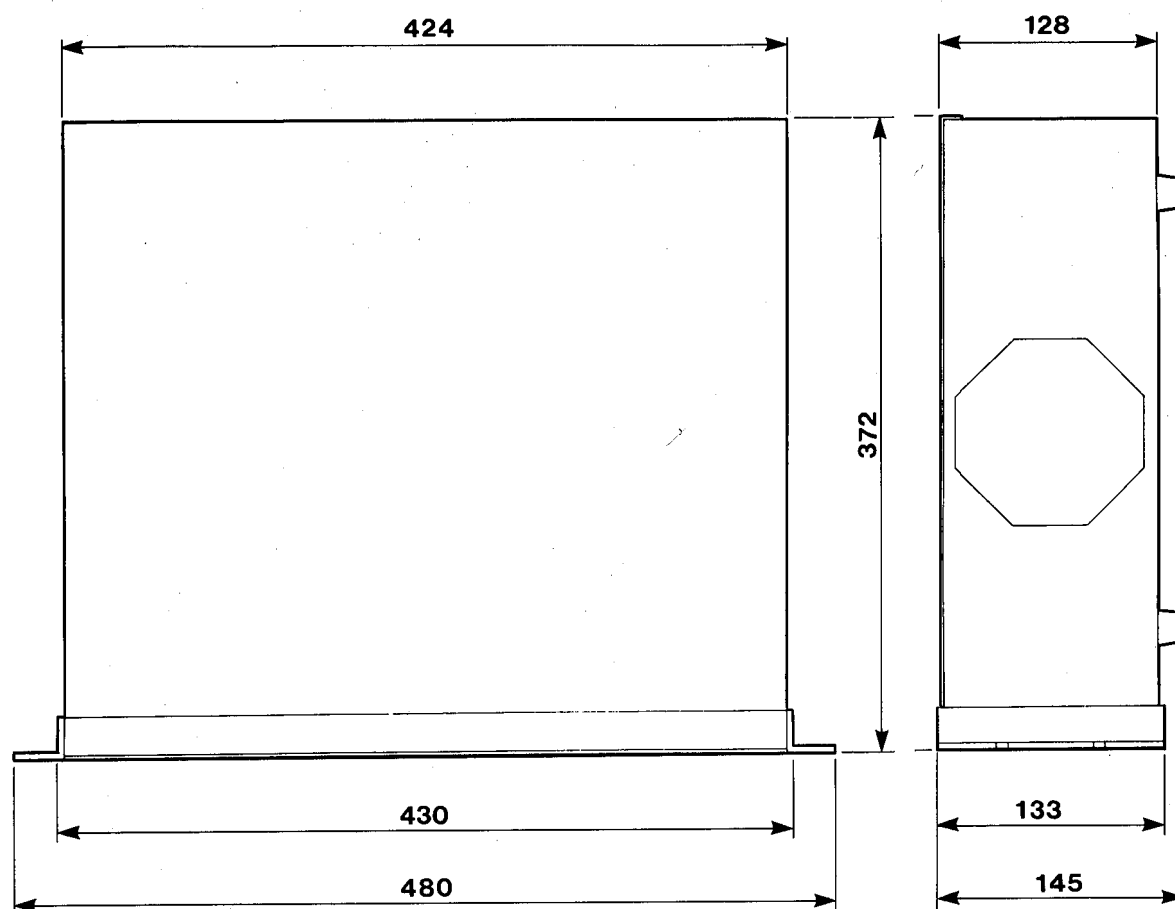
Remote Control Cable Length

..... 10m (33 ft.)

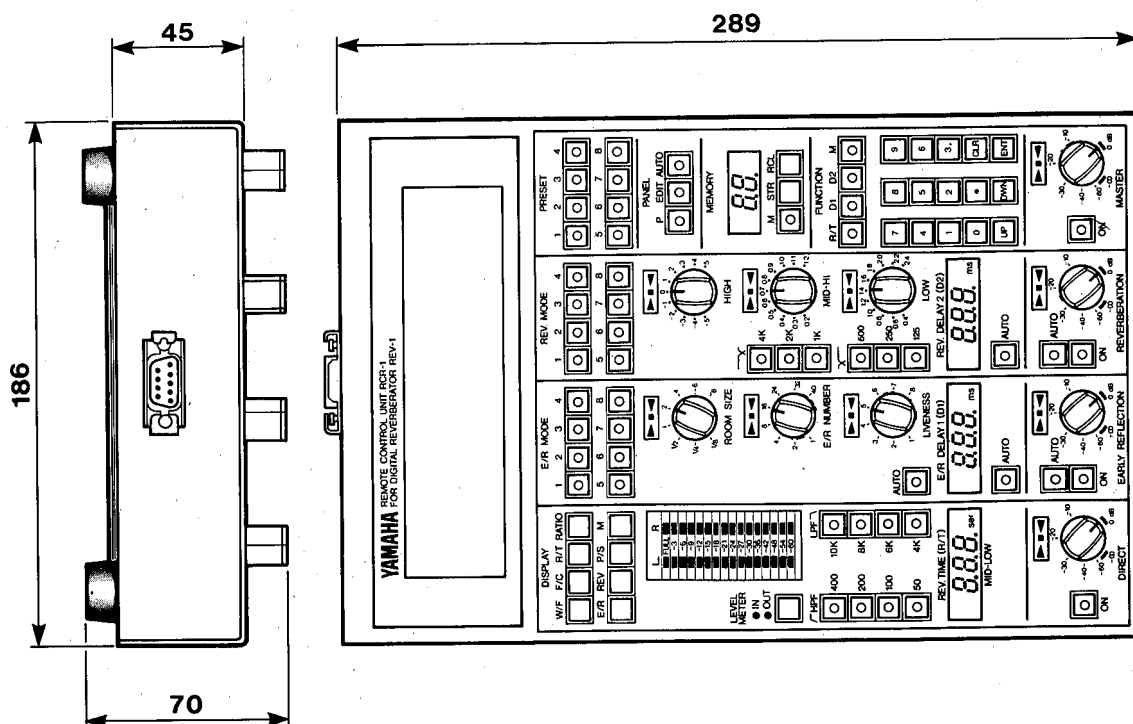
* Measurements exclude feet, knobs,
 connectors, and other protuberances.

• All specifications subject to change
 without notice.

● REV-1

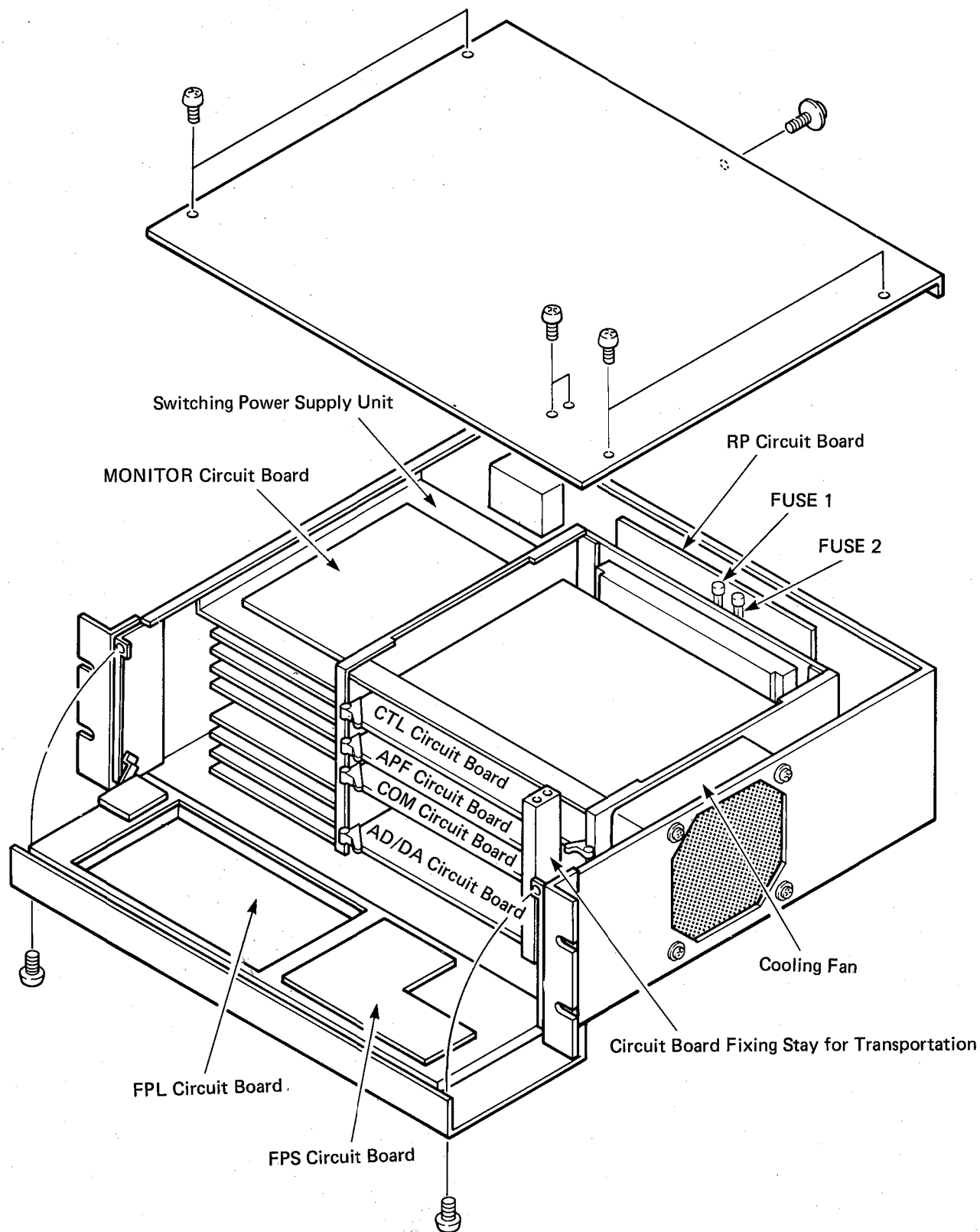


● RCR-1



REV-1/RCR-1

■ UNIT LAYOUT



REV-1/RCR-1

■ DISASSEMBLY PROCEDURE (分解手順)

● REV-1

● Front Panel Removal

Remove the two screws ① and ② on the front panel and swing down the front panel toward you.

● Top Cover Removal

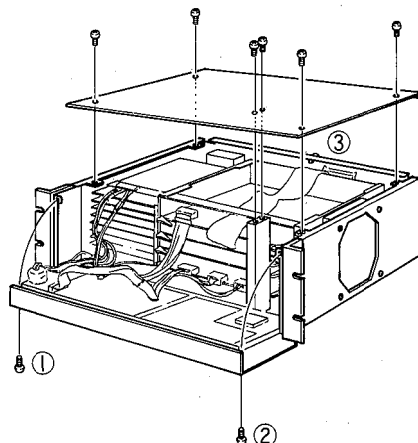
- a) Remove the six screws on the top cover.
- b) Loosen the screw ③ on the rear panel and take off the top cover.

● フロントパネルの取りはずし

フロントパネルのネジ2本①、②を外して、フロントパネルを手前にたおします。

● トップボードの取りはずし

- a) トップカバーのネジ6本を外します。
- b) リアパネルのネジ③をゆるめて、トップカバーを外します。

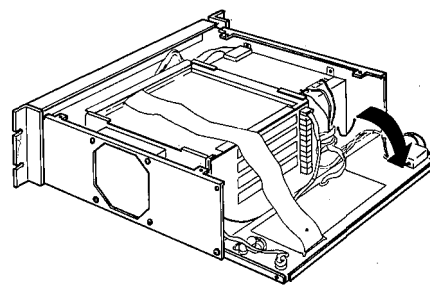
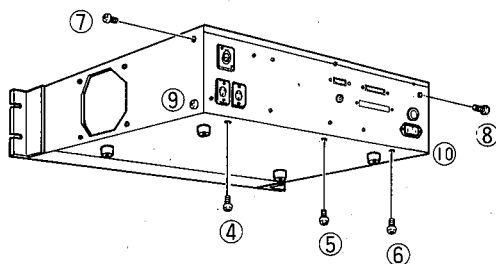


● Rear Panel Removal

- a) Remove the three screws ④, ⑤ and ⑥ from the bottom cover.
- b) Remove the two screws ⑦ and ⑧ on the side panels.
- c) Loosen the screws ⑨ and ⑩ and swing down the rear panel away from the back chassis.

● リアパネルの取りはずし

- a) ボトムカバーのネジ3本④～⑥を外します。
- b) サイドパネルのネジ⑦、⑧を外します。
- c) ネジ⑨、⑩をゆるめて、リアパネルをうしろにたおします。

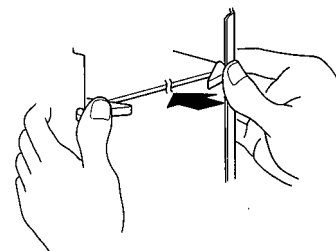
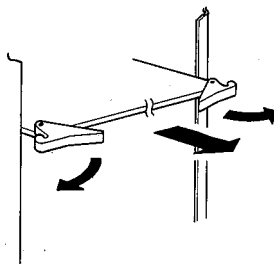
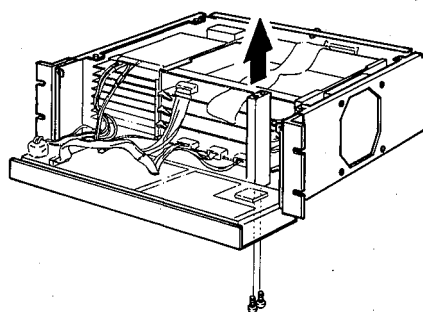


● CTL, APF, COM, AD/DA Circuit Board Removal and Reinstallation.

- a) Remove the two screws from the bottom cover and take off the circuit board fixing stay for transportation.
- b) Any circuit board can be removed by unhooking both sides of the card puller.
- c) Any circuit board should be inserted into the slot along the side rail by pushing the card puller using both hands.

● CTL、APF、COM、AD/DA シートの取りはずし、取り付け

- a) ボトムボードのネジ2本を外して、輸送用基板固定ステーを取りはずします。
- b) 基板両側のカードプラを両側に開け、基板を取り出します。
- c) ガイドレールにそって基板を入れ、両手でカードプラを押しスロットに入れます。

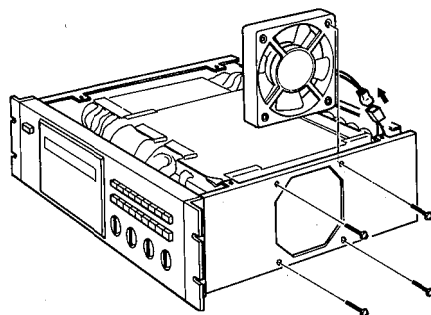


● Cooling Fan Removal

- Remove the top cover.
- Disconnect the 2P connector.
- Remove the four screws securing the fan and take out the cooling fan.

● 冷却ファンの取りはずし

- トップカバーを外します。
- 2Pコネクタを外します。
- ファン固定用ネジ4本を外して、冷却ファンを取りはずします。

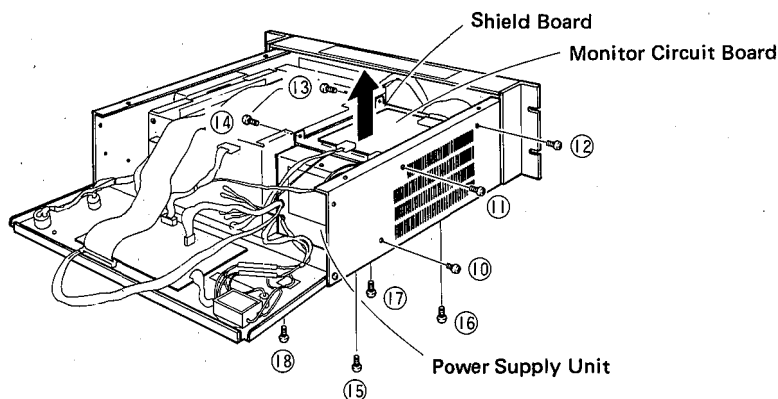


● Power Supply Unit Removal

- Disconnect the power supply cable.
- Remove the screw ⑩ with cable that connects to ground.
- Remove the four screws ⑪, ⑫, ⑬ and ⑭, then take off the monitor circuit board and shield board.
- Remove the four screws ⑮, ⑯, ⑰ and ⑱ securing the power supply unit, then take out the power supply unit.

● 電源ユニットの取りはずし

- 電源ユニットの各コードを抜く。
- 電源ユニットのアース線のネジ⑩を外す。
- ネジ4本⑪～⑭を外し、モニターシートとシールド板を外す。
- 電源ユニットのネジ4本⑮～⑱を外して、電源ユニットを取りはずします。



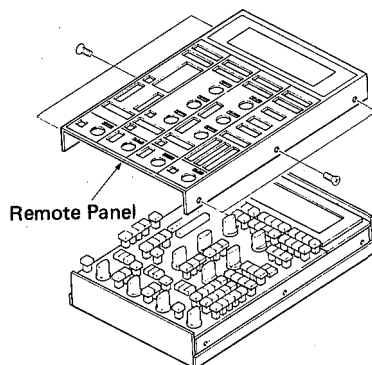
●RCR-1

● Remote Panel Removal

Remove the six screws on the remote panel, then take off the remote panel.

● リモートパネルの取りはずし

ネジ6本をはずし、リモートパネルを取りはずします。



● LCD Module Assembly Removal

- Remove the four screws ① on the LCD module assembly, then take off the LCD module assembly.
- Remove the two connectors.

● LCD モジュール Ass'y の取りはずし

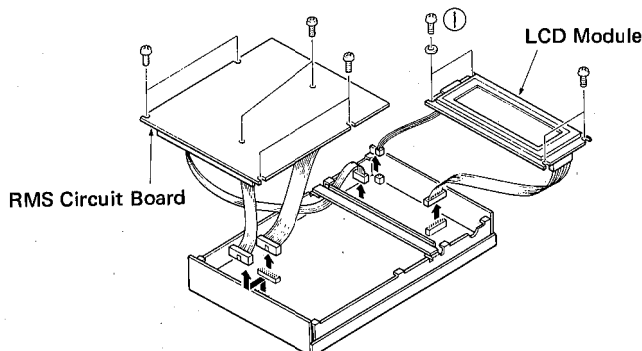
- LCD モジュール Ass'y のネジ 4 本①をはずし、LCD モジュール Ass'y を取りはずします。
(ネジ①のとりはずしの際、平座金をなくさないようご注意ください。)
- コネクター (2箇所) をはずします。

● RMS Circuit Board Removal

- Remove the six screws ② and ③ on the RMS circuit board, then take off the RMS circuit board.
- Remove the three connectors.

● RMS シートの取りはずし

- ネジ 6 本②、③をはずせば、RMS シートがはずせます。
- コネクター (3箇所) をはずします。



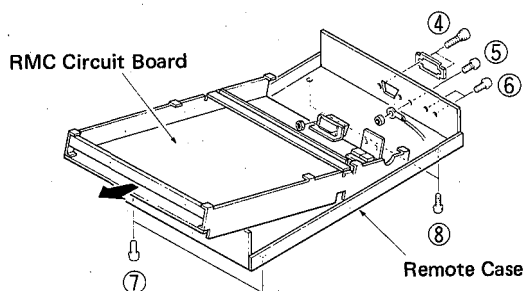
● RMC Circuit Board Removal

Remove the nine screws ④, ⑤, ⑥, ⑦ and ⑧ from the remote case and diagonally, then take off the RMC circuit board from remote case.

Screws ④, ⑤ are fastened by the Hexagonal nuts.

● RMC シートの取りはずし

ネジ 9 本④～⑧をはずし、リモートケースからRMCシートを少し斜めにしながら取りはずします。
ネジ④、⑤は、六角ナットで固定されています。



■CHECKS AND ADJUSTMENTS (調整検査)

- When taking the following measurements use an oscilloscope and a level meter with an input impedance of over 50K Ω .

測定に使用するオシロスコープ、レベル計は入力インピーダンス50K Ω 以上のものを使用して下さい。

Set the REV-1 in the following conditions unless instructed otherwise.

本体のツマミ、SW類は特に指定のない限り下記の条件で行なって下さい。

INPUT LEVEL MAX
 MONITOR LEVEL MAX
 REM/COMP SWITCH..... REM
 INT/EXT SWITCH INT
 A IN/D IN SWITCH..... A IN

Terminate the L and R channel outputs with 600 Ω loads.

OUT PUT L, R CHの負荷は、600 Ω とする。

Measuring Conditions 測定条件

Distortion Meter (歪率計)..... with 30KHz Low-pass filter 30KHz ローパスフィルター付

Level Meter (レベルメーター)..... with DIN AUDIO Band-pass filter DIN AUDIO バンドパスフィルター付

Emphasis (エンファシス)..... Applied (有) In initial

Deemphasis (ディエンファシス)..... Applied (有)

納入時 AD/DA シートは回路切替用スイッチコネクターで A/D側にはエンファシス、D/A側にはディエンファシスがかけられています。

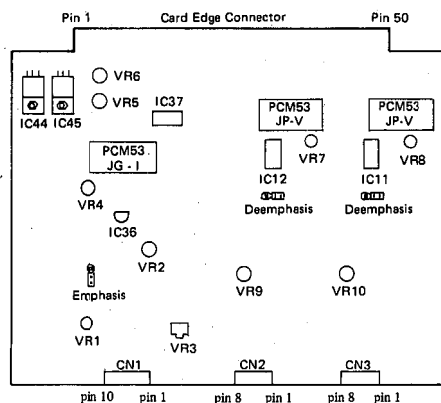
- * When checking the functions of the CTL, APF, and COM circuit boards, the boards can be inserted any slot position, except the AD/DA circuit board slot. The AD/DA circuit board must remain in its own slot.

回路動作をチェックする場合には、CTL, APF, COM シートの挿入位置を入れ替えてもよい。

[AD/DA CIRCUIT BOARD]

In the adjustments 1) ~ 5), an extender board (part #: NB 830630) is necessary.

1) ~ 5) の調整については、延長基板が必要。

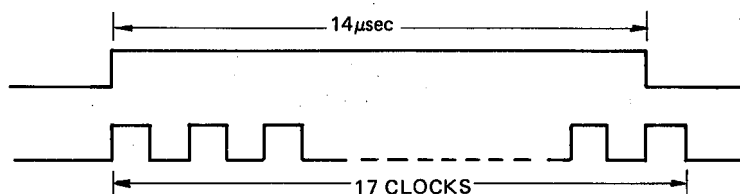


(AD/DA CIRCUIT BOARD)

1) Successive Approximation Clock Adjustment (逐次比較クロック調整)

Adjust VR5 and VR6 to get A/D conversion time of $14\mu\text{sec}$ at pin 10 and the successive approximation clock duty cycle of about 50% at pin 9 of IC37 (Am2502).

IC37(Am2502)のpin10で A/D 変換時間が $14\mu\text{sec}$ 及びpin 9 で逐次比較クロックの Duty 比が50%程度となるようにVR 5 及び VR 6 で調整する。



2) Balanced Output Adjustment (バランス出力調整)

Feed a 1KHz 0dB sine wave signal to the Input observe the Output at pin 2 and pin 3 with a dual-trace oscilloscope. Adjust VR9 and VR10 on AD/DA circuit board according to their combination listed in the following Table 1 to get the pin 2 and pin 3 outputs balanced with the same level and in inverse phase.

入力 CH に 0 dBm 1 KHz の信号を入力し出力 CH XLR-3-32の 1 pinアースと 2 pin 及び 3 pin の出力信号を 2 現象オシロでそれぞれ観測する。

位相反転で同一レベルになるように AD/DA シートの VR 9、VR10 を Table 1 の組み合わせによって調整する。

[Table 1]

| OUTPUT | Output Adj. | D/A Gain Adj. |
|--------|-------------|---------------|
| L | VR 9 | VR 7 |
| R | VR10 | VR 8 |

3) A/D Gain & Offset Adjustment (A/D 利得及オフセット調整)

With the Input Level control to the maximum, center the VR3 and feed a 1KHz, +11.5dB sine wave signal to the Input terminal.

Adjust A/D gain with VR2 up to the clipping point of the output and adjust VR4 to get the upper clipping and lower clipping symmetrical.

Then, readjust VR2, turning it back until the clipping disappears.

INPUT VR を MAX にした状態で、VR 3 をセンターにし、入力に 1 KHz、+11.5dBm の信号を加える。

出力 CH の歪成分が少しクリップを示すところまで VR 2 で利得を上げ、クリップの歪成分が上下対称になるように VR 4 で調整する。

その後、クリップが消えるところまで VR 2 を戻す。

4) D/A Gain Adjustment (D/A 利得調整)

After Step 3, adjust VR7 and VR8 according to their combination listed in Table 1 to get the $+18\text{dB} \pm 0.1\text{dB}$ sine wave signal at each Output.

3) の状態で各出力 CH に $+18\text{dBm} \pm 0.1\text{dBm}$ の信号が出力されるように VR 7、VR 8 を Table 1 の組み合わせによって調整する。

5) By-Pass Level Adjustment (バイパスレベル調整)

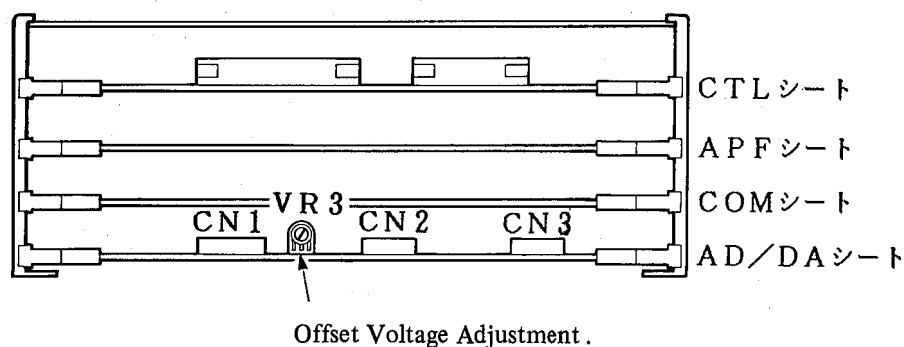
After Step 4, with By-pass switch "ON", adjust VR1 on each circuit board to get $+18\text{dB} \pm 0.1\text{dB}$ sine wave at each Output.

4) の状態で BYPASS-SW を ON にし出力 CH に $+18\text{dBm} \pm 0.1\text{dBm}$ の信号が出力されるように各シートの VR1 を調整する。

6) A/D Offset Voltage Adjustment (A/D オフセット電圧調整)

Turn down the Input Level control to minimum and connect a level meter to each Output corresponding to each section of the AD/DA circuit board. Adjust offset voltage by adjusting VR3 in each circuit board to get the minimum noise level and not to light up the input level meter.

各入力 VR は最小とし、出力 CH にレベルメータを接続する。ノイズレベルが最小で、入力レベルインジケータ LED が点灯しないように各シートのオフセット電圧調整 VR3 を調整する。



[MONITOR CIRCUIT BOARD]

Fan Voltage Adjustment (FAN 電圧調整)

Adjust the pot to get a voltage of $10.2 \pm 0.1\text{V}$ between pin 1 and pin 3 of CN7.

Fan speed can be controlled by this voltage.

CN7 の 1 pin と 3 pin 間の電圧が $10.2 \pm 0.1\text{V}$ となるように VR を調整する。又、この電圧によってファンスピードをコントロールすることができる。

LSI DATA TABLE

YM5107(SRB) Shift Register Bank

| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---------|-------------------------|-----|------------------------------|---------|-------------------------|-----|--|
| 1 | GND | I | Ground | 34 | $\overline{\text{OEA}}$ | I | Output enable A |
| 2 | YB8 | O | YB output 16 Bit x 128 stage | 35 | LS | I | Length Select (shift register stage) "O" 128 stage "I" 96 stage |
| 3 | YB7 | O | | 36 | $\phi 2$ | I | Master clock pulse |
| 4 | YB6 | O | | 37 | $\phi 1$ | I | |
| 5 | YB5 | O | | 38 | $\overline{\text{RES}}$ | I | Reset control |
| 6 | YB4 | O | | 39 | $\overline{\text{LDA}}$ | I | A input select (LOAD A) |
| 7 | YB3 | O | | 40 | $\overline{\text{LDB}}$ | I | B input select (LOAD B) |
| 8 | YB2 | O | | 41 | D10 | I | Data input bus (16bits) |
| 9 | YB1 | O | | 42 | D11 | I | |
| 10 | YB0 | O | | 43 | D12 | I | |
| 11 | $\overline{\text{OEB}}$ | I | Output enable B | 44 | D13 | I | |
| 12 | V _{gg} | I | DC supply (+1.7V) | 45 | D14 | I | |
| 13 | S1 | I | B output select | 46 | D15 | I | |
| 14 | S0 | I | | 47 | D16 | I | |
| 15 | CU | I | Counter control | 48 | D17 | I | |
| 16 | RE | I | Register enable | 49 | VDD | I | |
| 17 | GND | I | Ground | 50 | D18 | I | |
| 18 | YA15 | O | YA output 16 Bit x 128 stage | 51 | D19 | I | |
| 19 | YA14 | O | | 52 | D110 | I | |
| 20 | YA13 | O | | 53 | D111 | I | |
| 21 | YA12 | O | | 54 | D112 | I | |
| 22 | YA11 | O | | 55 | D113 | I | |
| 23 | YA10 | O | | 56 | D114 | I | |
| 24 | YA9 | O | | 57 | D115 | I | |
| 25 | YA8 | O | | 58 | YB15 | O | YB output 16 Bit x 128 stage |
| 26 | YA7 | O | | 59 | YB14 | O | |
| 27 | YA6 | O | | 60 | YB13 | O | |
| 28 | YA5 | O | | 61 | YB12 | O | |
| 29 | YA4 | O | | 62 | YB11 | O | |
| 30 | YA3 | O | | 63 | YB10 | O | |
| 31 | YA2 | O | | 64 | YB9 | O | |
| 32 | YA1 | O | | | | | |
| 33 | YA0 | O | | | | | |

Basic IC Functions

- 1) Employs as parameter storage and micro program storage of a digital filter using DPAP (Double Precision Arithmetic Processor).
 - 2) 16 bit x 128 stages serial register x 2 (YA channel YB channel)
 - 3) Simple realization of signal delay line using static or dynamic RAM would be built-in RAM address controller (YB channel)
 - 4) 64 pin QIL
- (1) DPAPを用いたデジタルフィルターを構成する場合のパラメータストア、マイクロプログラムストアとして用いる。
 - (2) 16 Bit x 128 ステージシリアルレジスター x 2 系列 (YA, YB)
 - (3) RAMのアドレスコントローラ内蔵(YB側)のため、スタティックRAMあるいはダイナミックRAMを用いた信号の遅延が容易に実現できる。
 - (4) 64pin QIL

●YM5210 (DPAP) Double Precision Arithmetic Processor

| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---------|------|-----|-----------------------|---------|------|-----|------------------------------|
| 1 | GND | I | Ground | 25 | VDD | I | DC supply (+5V) |
| 2 | RI0 | I | Register input select | 26 | φ | I | Master clock |
| 3 | RI1 | I | | 27 | AC0 | I | Accumulator select |
| 4 | RI2 | I | | 28 | AC1 | I | |
| 5 | OVF | O | Overflow output | 29 | X0 | I | X coefficient input (16bits) |
| 6 | D15 | I/O | Data bus (16bits) | 30 | X1 | I | |
| 7 | D14 | I/O | | 31 | X2 | I | |
| 8 | D13 | I/O | | 32 | X3 | I | |
| 9 | D12 | I/O | | 33 | X4 | I | |
| 10 | D11 | I/O | | 34 | X5 | I | |
| 11 | D10 | I/O | | 35 | X6 | I | |
| 12 | D9 | I/O | | 36 | Vgg | I | |
| 13 | GND | I | | 37 | Vgg | I | |
| 14 | D8 | I/O | | 38 | X7 | I | |
| 15 | D7 | I/O | | 39 | X8 | I | |
| 16 | D6 | I/O | | 40 | X9 | I | |
| 17 | D5 | I/O | | 41 | X10 | I | |
| 18 | D4 | I/O | | 42 | X11 | I | |
| 19 | D3 | I/O | | 43 | X12 | I | |
| 20 | D2 | I/O | | 44 | X13 | I | |
| 21 | D1 | I/O | | 45 | X14 | I | |
| 22 | D0 | I/O | | 46 | X15 | I | |
| 23 | OE | I | Output enable | 47 | RO0 | I | Register output select |
| 24 | QREN | I | Q Register enable | 48 | RO1 | I | |

● Basic IC Functions

- 16 bit x 16 bit 2's complement data Multiplier, 36 bit accumulator
 - 16 bit input register x 4 (R0, R1, R2, R3), 32 bit output register
 - 16 bit bidirectional data input/output, 16 bit coefficient input, 9 bit control data input, mono phase clock, 48pins DIP
 - Simple realization of double precision processing in data word's length 31 bit
- (1) 16Bit × 16Bit 2S Complement データを計算する乗算器、および 36Bit アキュムレータを内蔵。
 (2) Input Register 16Bit × 4 (R0, R1, R2, R3)
 Output Register 32Bit × 1
 (3) 16Bit 双方向データ入出力
 16Bit Coefficient Input
 9 Bit Control Data Input
 単相クロック
 48Pin DIP
 (4) データ語長 31 Bit での倍精度演算が容易に実現可能

●YM5211(PMM) Peak Meter Module

| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---------|-------|-----|--|---------|------|-----|---|
| 1 | Vss | I | Ground | 21 | D18 | I | Digital in data |
| 2 | RESET | I | Initial Reset/Power ON | 22 | D17 | I | |
| 3 | A0 | I/O | Address IN/OUT | 23 | D15 | I | |
| 4 | A1 | I/O | IN/CPU interface mode | 24 | D14 | I | |
| 5 | A2 | I/O | OUT/LED drive mode | 25 | D13 | I | Channel 0 data DC supply (+1.7V) |
| 6 | CS | I | Chip select | 26 | D12 | I | |
| 7 | F/S | I | Falling time is determined by this data. "L" Slow "H" Fast | 27 | D11 | I | |
| 8 | MODE | I | Control of function mode. "L" CPU interface mode "H" LED drive mode. | 28 | D10 | I | |
| 9 | CLK | I | System clock data in | 29 | CHO | I | Meter data output |
| 10 | Vss | I | Ground | 30 | VDD | I | |
| 11 | VDD | I | DC supply (+5V) | 31 | DO0 | O | |
| 12 | OVF | I | Overflow data | 32 | DO1 | O | |
| 13 | D15 | I | Digital in data | 33 | DO2 | O | Data strobe IN/LED drive mode OUT/ CPU interface mode |
| 14 | D14 | I | | 34 | DO3 | O | |
| 15 | D13 | I | | 35 | DO4 | O | |
| 16 | D12 | I | | 36 | DO5 | O | |
| 17 | D11 | I | | 37 | DO6 | O | Interrupt request for CPU interface mode |
| 18 | D10 | I | | 38 | DO7 | O | |
| 19 | D9 | I | | 39 | DSTB | I/O | |
| 20 | D8 | I | | 40 | TRQ | O | |

● Basic IC Functions

- 4 channel peak meter control
 - Function select/LED drive mode, CPU interface mode
 - 16 bit data input (Audio data)
8 bit x 2 data output (LED pattern) or 8 bit logarithm data outputs.
 - Falling time select/Fast time, Slow time
- (1) 4 チャンネルピークメータコントロール
 (2) モード選択: LED ドライブモード
 : CPU インターフェースモード
 (3) 16Bit データ入力 (オーディオデータ)
 8 Bit × 2 データ出力 (LED パターン)
 すなわち 8 Bit 対数データ出力
 (4) 降下時間選択: 速い
 : 遅い