Panasonic

DA Converter
Operating Instructions
Model No. **WZ-DA96**
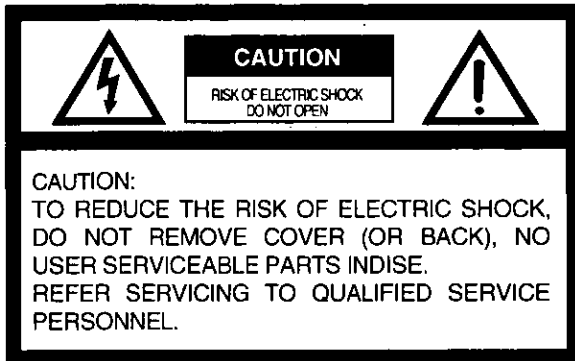
RAMSA
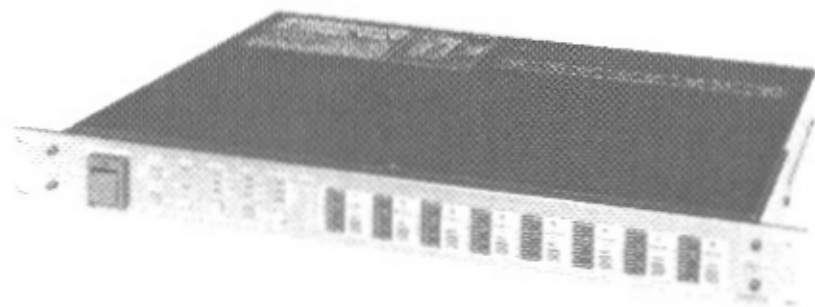
IMPORTANT SAFETY INSTRUCTIONS

* Read all of the instructions in this manual.
* Read the CAUTION indicated on the top cover, and the power ratings indicated on the bottom of this apparatus.
* Keep these instructions for future reference.
* Heed all warnings.
* Follow all instructions.
* Clean only with a damp cloth.
* Do not block any of the ventilation openings. Install in accordance with the instructions in this manual.
* Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
* Do not defeat the safety purpose of the grounding-type plug. A grounding–type plug has two blades and a third grounding prong. The third prong is provided for your safety. When the provided plug does not fit into your electrical outlet, consult an electrician for replacement of the obsolete outlet.
* Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and at the point where they exit from this apparatus.
* Only use attachments/accessories specified by the manufacturer.
* Unplug this apparatus during lightning storms or when unused for long periods of time.
* Refer all servicing to qualified personnel. Servicing may be required when the apparatus has been damaged in any way. This can include items such as the power-supply cord, or if the plug is damaged, if liquid has been spilled or objects have fallen into the apparatus, if the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

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Contents

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OVERVIEW

Thank you for choosing this Panasonic/RAMSA product!

Everyone here sincerely appreciates the confidence you have placed in us to deliver the finest quality audio product possible. We are certain you will find the 96 Series of DA Converters will not disappoint you, and will allow you to make the difficult job of converting Digital to Analog signals with a level of quality you may never have experienced before.

Panasonic engineers have pursued the highest sound quality for many years. Everything we have learned has gone into these converters to make them the best sounding products available. We have utilized all of our available technologies to create the 96 Series by carefully selecting each component. We created a custom LSI, and designed our PC circuit board layout for the lowest noise and distortion possible.

Now you can have higher quality sound than you ever imagined out of your existing digital audio system, whether you are using a DAW (such as ProTools), Digital Tape Recorders of any format, or virtually ANY digital audio system. No matter what type of work you do – from audio PostProduction for Television, Film, to major Recording Studios and Project Studios - your sound quality will benefit from the performance of our 96 Series DA converters.

These multi-functional devices are designed to be perfect for use in CD pre-mastering, DVD authoring, Digital Audio Workstation interfaces (DAW) and Modular Digital Multi-track (MDM) recording.

These units are also right at home in professional sound reinforcement applications wherever digital is being interfaced with analog equipment and high quality audio is a must. There is even a "key lock" function that prevents accidental mis-operation of the unit by disabling the front panel controls, so you can control user access of your system.

The 96 Series features the latest generation of DA converter with proprietary circuitry to realize the remarkable dynamic range of 118 dB.

The 96 Series accepts up to 8-channels of digital inputs in the Dual-Wire or Single-Wire format based on the AES3 Hi-Sampling standard to meet your system requirements and outputs analog audio. It also has an ADAT input built-in, and TDIF input and Dual AES input card is available as an option.

This chapter is designed to give you a basic overview of the features and functionality of the Panasonic RAMSA 96 Series of DA Converter. Specific features are discussed in detail later in this manual, so please refer to the specific chapter that covers any function you do not completely understand for more detail.

Features

State of the Art performance 8 channel/24 bit/96 kHz DA Converter

• Delta-Sigma system, 128-time Over-Sampling DA Converters are utilized.

• Extremely stable Solid capacitors are used in the reference circuit for long term reliability and high quality high frequency response.

• Analog dynamic range of 118 dB is achieved.

• Crosstalk of 114 dB is accomplished by optimum PC board layout and taking advantage of both discrete parts and SMDs (Surface Mount Devices).

• Carefully selected components, low-leakage transformer, hi-precision metalized resistors, customized capacitors and even a specially made grounding screw all contribute to the highest sound quality of the 96 Series.

High bit, high sampling interface

• Single-Wire Double-Speed AES and Optional Dual-Wire AES mode connections assure compatibility with all types of digital audio equipment.

• Built-in ADAT Interface with either 24-bit/48-kHz/8-channel mode or 24-bit/96 kHz/4-channel mode assure easy interface with a multitude of Digital Audio devices, including MDM's and DAW's.

• Optional TDIF Interface with either 24-bit/48-kHz/8-channel mode or 24-bit/96-kHz/4-channel mode allows easy interface with 24 bit DTRS compatible devices.

• Sync to external Wordclock ranging from 44.1 -6% up to 96 +6%.

• Wordclock output can be set to follow either the front panel selected sampling frequency, or the internal clock output.

Low noise power supply and separate grounding system

• Discrete power supply circuit contributes to low impedance and low noise.

• Wide (4mm) PCB traces for power and ground lines, plus large capacitors in each channel assure wide channel separation specifications.

• A specially designed screw is utilized to assure the quality of the units grounding, for an external GND terminal provided on the rear panel for connection to other devices.

Precision Metering

• Digital metering is provided on DA96 with 10 LEDs featuring a Zoom, Adjust and Peak hold mode.

• Peak detection level adjustable from among -6, -5, -4, -3, -2, -1, -0.5 and 0.0 dBFS by DIP switches on the rear panel.

• Meter position adjustable from pre- matrix and post- matrix.

Low power consumption

• Digital circuits are contained on a single custom LSI with a 2.5/3.3 V operating voltage. This reduces power consumption and heat dissipation greatly, while reducing interference between the digital and analog circuits.

• Well-planned temperature dispersion minimizes the affect of heat on the components.

Customizing

• 8-memory banks can store your customized patterns with Digital Volumes and Matrix assignments for each channel. 4 patterns for 5.1 Surround are factory preset.

• Digital Volume makes adjustment possible from -10 dBFS to +10 dBFS with front panel operations.

• In and Out channel assignment is available with Matrix Setting.

• Each channel has switching functions for MUTE on/off and PHASE normal/inverse.

• Solo monitoring is available to be assigned to Output 1 & 2 in Monaural or Stereo.

• A "Key lock" function protects your customized settings from being disturbed by unauthorized persons or by accident.

Major Controls & Their Functions
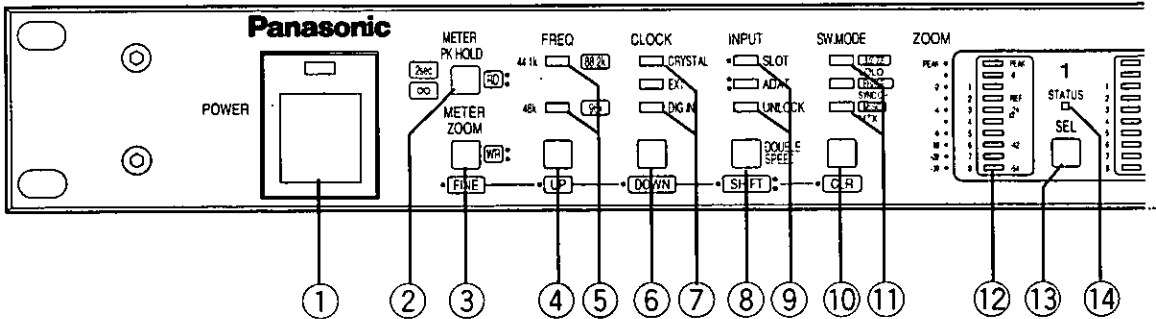
Let's get acquainted with the controls on the front panel. We will now list each control and LED indicator and briefly describe their function for you.

First of all, you should be aware that there are buttons that have more than one function. These multiple-function buttons are identified by one or two dots adjacent to button names, and have three operation modes - Normal mode, Shift 1 mode and Shift 2 mode. In this manual, when we refer to these Shift modes, we will designate description of them with < > brackets.

Indicators on the front panel (such as LEDs) also have different functions according to their operation modes. During the <Shift 1 Mode> the SLOT indicator blinks in green, and in the <Shift 2 Mode> the ADAT indicator blinks.

The <Shift Mode> operations are describes after the normal operations.

FRONT PANEL (NORMAL Mode)
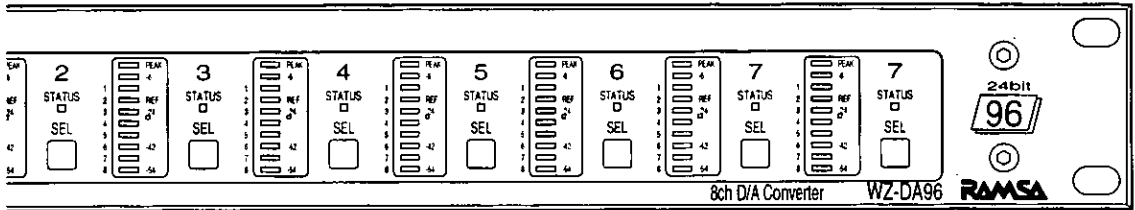
① Power Switch and Power Indicator [POWER]

Turns on and off the power. The indicator illuminates while the power is on.

② Meter Peak Hold LED Button [METER PK HOLD]

Peak hold time changes each time the button is pressed as follows.

> 0 second (LED: OFF) → 2 seconds (LED: Green) → infinity (LED: Red) → 0 second (LED: OFF)

③ Meter Mode Selection LED Button [METER ZOOM]

Meter mode toggles between the normal display and zoomed display each time the button is pressed.

> Normal (LED: OFF) → Zoom (LED: Red) → Normal (LED: OFF)

④ Frequency Selection Button [FREQ]

There are four applicable sampling frequencies.

The default is CRYSTAL, 48 kHz.

When CLOCK is set to CRYSTAL, the frequency is selected and advances as follows each time the button is pressed.
The corresponding LED illuminates.

> 44.1 kHz → 48 kHz → 88.2 kHz → 96 kHz → 44.1 kHz

When CLOCK is set to EXT or DIG. IN and the unit receives a wordclock signal of 48 or 96 kHz, the frequency selected advances as follows each time the button is pressed. The corresponding LED illuminates.

> 48 kHz → 96 kHz → 48 kHz

When CLOCK is set to EXT or DIG. IN and the unit receives a wordclock signal of 44.1 or 88.2 kHz, the frequency selected advances as follows each time the button is pressed. The corresponding LED illuminates.

> 44.1 kHz → 88.2 kHz → 44.1 kHz
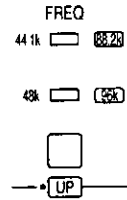
⑤ Frequency Selection Indicator [FREQ] [44.1 k, 48 k, 88.2 k, 96 k]

The selected frequency is displayed on the LED as follows.

LED	Color	Frequency
44.1	Green	44.1 kHz
48	Green	48 kHz
44.1	Red	88.2 kHz
48	Red	96 kHz

⑥ Clock Source Selection Button [CLOCK]

This button selects the clock source form among CRYSTAL, EXT and
DIG. IN. The unit synchronizes to the wordclock input when EXT is
selected, and to the digital audio input when DIG. IN is selected. The
default is CRYSTAL. The unit ignores pressing this button in the AUTO-
MODE selection . See page 38 for details.

CLOCK
☐ CRYSTAL
☐ EXT
☐ DIG.IN

☐

--•[DOWN]——

⑦ Clock Source Selection Indicator [CRYSTAL EXT DIG. IN]

Clock selection status is displayed on the respective LED.

Status	Crystal LED	EXT LED	DIG. IN LED
Internal	ON	OFF	OFF
EXT WCK IN	OFF	ON	OFF
EXT DIG. IN	OFF	OFF	ON

The DIG. IN LED will blink two or three times if the CLOCK button is pressed
during the AUTO-MODE selection to notice the operator that the source is fixed to
DIG. IN. See page 41 for details.

The DIG. IN LED will blink continuously to warn the operator of unmatched clock,
e.g., when the panel selection is set to Normal although the DIG. IN is Dual.

⑧ Input Selection Button [INPUT] and Rx Rate Indicator [DOUBLE SPEED]

This button toggles the input source of digital audio signals
between SLOT and ADAT. The unit receives input signal through
the AES input card (standard installed) or optionally installed in the
slot such as WZ-AEDSA or WZ-TDDA when SLOT is selected.
The unit receives input signal through the ADAT IN optical
terminal on the rear panel when ADAT is selected. The respective
indicator illuminates. The default is SLOT.

INPUT
• ☐ SLOT
: ☐ ADAT
☐ UNLOCK
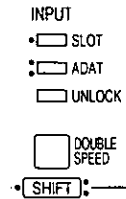
☐ DOUBLE SPEED
• [SHIFT] : ——·

The DOUBLE SPEED LED displays Rx Rate (reception status) of
AES/EBU inputs as shown below. Note that you need to select a
sampling FREQ properly when the LED blinks.

DOUBLE SPEED LED	Rx Rate	FREQ Selection
On:	Double Speed	88.2/96 kHz
Blink	Double Speed	44.1/48 kHz
Off:	Normal	44.1/48 kHz

⑨ Input Selection Indicator [SLOT] [ADAT] [UNLOCK]

Input selection status is displayed on the respective LED.

If SLOT is selected, SLOT indicator illuminates while synchronization goes well
with the input signal and the unit, or it blinks while sync errors arise.

If ADAT is selected. ADAT indicator illuminates while synchronization
goes well with the input signal and the unit, or it blinks while sync errors
arise.

SW.MODE
☐ ⊏⊐
SOLO
☐ ⊏⊐
SYNC CH
☐ ⊏⊐
MTX

UNLOCK indicator illuminates in Red when the internal clock is unlocked.

The SLOT indicator will blink two or three times if the INPUT button is
pressed during the AUTO-MODE selection for warning that the input is
fixed to SLOT.

☐
• [CLR]
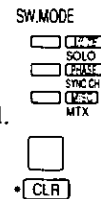
⑩ Switch Mode Button [SW MODE]

SEL buttons in the meter section are assigned multiple functions: 3
functions of 2 MODE. MODE 1 consists of MUTE, PHASE and
MISC (miscellaneous) while MODE 2 consists of SOLO, SYNC
CH and MTX (matrix setting).

Pressing the SW MODE button for at least 2 seconds will toggle
the operation between MODE 1 and MODE 2. Letters printed
normally on the panel stand for MODE 1 functions while the
inverse letters stand for MODE 2.

Pressing this button assigns MUTE, PHASE or MISC
(miscellaneous) to SEL buttons when the operation is in MODE 1.

The respective indicator illuminates in green.

MUTE → PHASE → MISC → MUTE

Pressing this button assigns SOLO, SYNC CH or MTX to SEL buttons when the operation is in MODE 2. The respective indicator illuminates in red.

SOLO → SYNC CH → MTX → SOLO

⑪ Switch Mode Indicator [MUTE] [PHASE] [MISC] [SOLO] [SYNC CH] [MTX]

MUTE, PHASE or MISC indicator illuminates in Green when the corresponding function is selected with the SW MODE button in the operation MODE 1.

SOLO, SYNC CH or MTX indicator illuminates in Red when the corresponding function is selected in the operation MODE 2.

Meter Section

⑫ Level Meter

A 10-point bar graph meter is provided for each channel in the meter section. The meters display levels in the normal or zoom mode, and are set by the METER ZOOM LED button. The normal scale is on the right side the each meter, while the zoom scale is placed at the left side adjacent to the meter section.
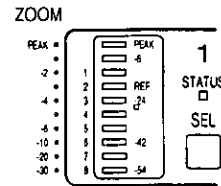
In the normal mode the right side scale is refereed.

PEAK, -6, -12, -20(REF), -24, -30, -36, -42, -48, -54

In the zoom mode the left side scale is refereed.

PEAK, -1, -2, -3, -4, -5, -6, -10, -20, -30

Numbers from 1 to 8 are placed at the left side adjacent to individual 10-point meters. These numbers indicate an input channel number that is assigned to the output channel via the matrix when the MODE 2 is set to MTX matrix setting. See the MODE 2 Setting with SEL Button for more information.

⑬ Select LED Button [SEL]

Each channel has a SELECT LED button. Pressing the SW MODE button assigns a function to SEL buttons from among 6 functions below.

When MUTE is selected with the SW MODE button, pressing a SELECT button toggles the signal output on the channel between passing and muting.

LED OFF: Passing the signal to the output

LED ON: Muting the output signal

When PHASE is selected with the SW MODE button, pressing a SEL button toggles the signal phase on the channel between normal and inverse.

LED OFF: Normal phase

LED ON: Inverse phase

When MISC is selected with the SW MODE button, SEL buttons on each channel are assigned individual functions.

Channel 1 SEL button toggles the meter position and Channel Status for all channels between pre-matrix and post-matrix.
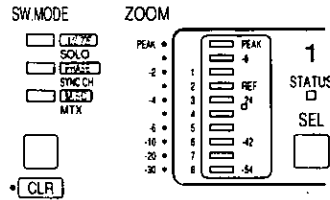
> LED OFF: Level meters read POST-MTX signals.

> LED ON (Red): Level meters read PRE-MTX signals.

Channel 2 SEL button toggles the input channels to the unit via the AES/EBU card between 1-8 and 9-16.

> LED OFF: Channel 1-8 signals to the AES/EBU are taken into the unit.

> LED ON (Red): Channel 9-16 are taken in.

Channel 3 SEL button is not used.

Holding down the channel 4 SEL button displays the status of sub-code check for Fs (sampling frequency).

> LED OFF: Sub-code check is disabled.

> LED ON (Red): Sub-code check is enabled.

Channel 5 SEL button toggles the selection mode for transmission format between manual and automatic.

> LED OFF: AUTO-MODE is disabled.

> LED ON (Red): AUTO-MODE is enabled.

SEL buttons for channel 6 through 8 do not function in this mode.

When SOLO is selected with the SW MODE button, pressing a SEL button toggles the solo assignment to the channel between on and off.

> LED OFF: The channel is deselected for SOLO monitor.

> LED ON (Red): The channel is selected.

When SYNC-CH is selected with the SW MODE button, pressing a SEL button toggles the clock source assignment to the channel between on and off.

> LED OFF: The channel is deselected for clock source.

> LED ON (Red): The channel is selected.

When MTX is selected with the SW MODE button, the input channel assignment is changed from 1 to 2 and so forth each time the SEL button on the output channel is pressed. The assigned input channel is displayed on the 10 point meter LED.

⑭ Status Indicator [STATUS]

Input signal status is displayed on the STATUS indicators for each channel.

LED On: The input signal is supplied normally.

LED Blink: The input signal errs in sub-code (CRCC), parity or data validity.

LED Off: No signal input.

Note: The sub-code (CRCC) check is ignored if the DIP switch #2 on the rear panel is set to Off.

FRONT PANEL<SHIFT Mode>

Shift mode operations are briefly described
below. Operating procedures will be detailed
later in Shift Mode Operating Procedures.
There are two Shift Modes : Digital Volume
Adjust mode (SHIFT Mode 1 •) and Pattern
Memory mode (SHIFT Mode 2••). Major
buttons and indicators are marked with a dot
[•] on the front panel to identify that is
related to (SHIFT Mode 1 •), and with two
dots [••] for (SHIFT Mode 2 ••).

Pressing the <•SHIFT••> INPUT button for
at least 2 seconds will change the operation
modes as shown.

```
┌─────────────────────┐
│      Power On       │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│  Normal Operation   │
└─────────────────────┘
           │          Press <SHIFT> button
           │          for 2 seconds.
           ▼
┌─────────────────────┐
│ Digital Volume Adjust│
│      <SHIFT 1>       │
└─────────────────────┘
           │          Press <SHIFT> button.
           ▼
┌─────────────────────┐
│ Pattern Memory RD/WR │
│      <SHIFT 2>       │
└─────────────────────┘
           │          Press <SHIFT> button.
```
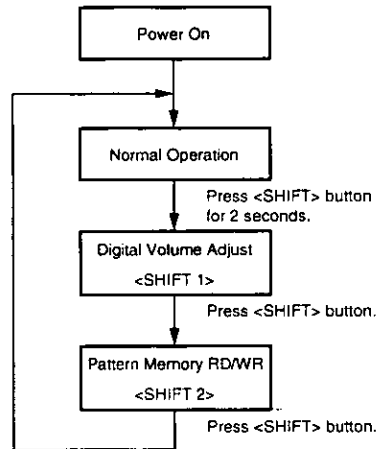
DIGITAL VOLUME ADJUSTMENT <SHIFT MODE 1 •>

This mode is provided for each channel to adjust the digital volume by 0.1 or 1 dB
per step. Assignments to buttons and LEDs are as follows.
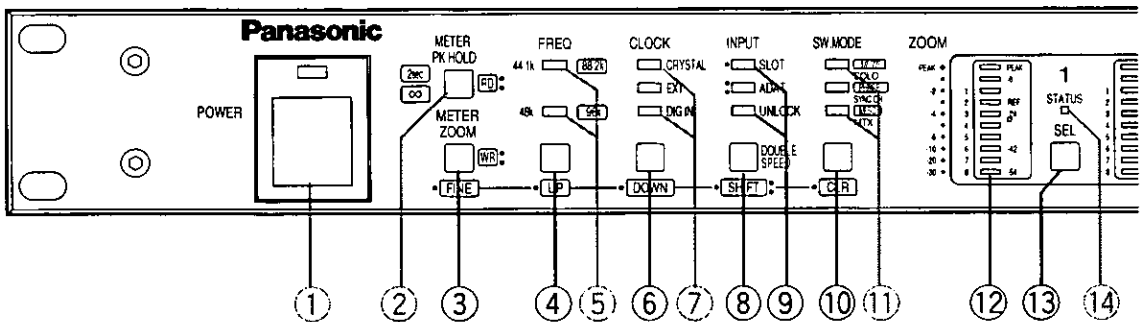
③ <•FINE> button

Hold down this button to adjust digital volume with fine step (0.1 dB/step). Press <UP> or <DOWN> button while holding down this button and observing meter display. The meter scale is zoomed from 1 dB up to 0.1 dB per point, and volume change step is reduced from 1 dB to 0.1 dB.

③ <•FINE> LED

ON: 0.1 dB/step

OFF: 1 dB/step

④ <•UP> button

Pressing this will increase the gain one step up by 0.1 or 1 dB.

⑥ <•DOWN> button

Pressing this will decrease the gain one step down by 0.1 or 1 dB.

⑧ <• SHIFT••> button

Pressing this will change the operation mode from Digital Volume Adjust to Pattern Memory mode.

⑨ <•SLOT> LED

Blinking in green: The unit enters the Digital volume Adjust mode.

⑩ <• CLR> button

Pressing this button will revert the deviation value on the selected channel to zero.

⑫ 10-point Level Meter

Displays the deviation values with 0.1 dB or 1 dB scale per point.

⑬ SEL button

Pressing a SEL button specifies the channel whose Digital Volume will be adjusted.

⑬ SEL LED

ON:	The channel is ready for Digital Volume adjustment.
OFF:	The channel is deselected.
	To adjust all channels at once, deselect all channels.

Pattern Memory Read / Write <SHIFT Mode 2 ••>

There is a total of 8 pattern memories including 4 factory preset for Surround routings. On the front panel numbers from 1 to 8 represent the output channel in the normal operation, while these numbers stand for the memory bank numbers in the Pattern Memory operation.

Assignments to the button and LEDs on the panel are as follows.
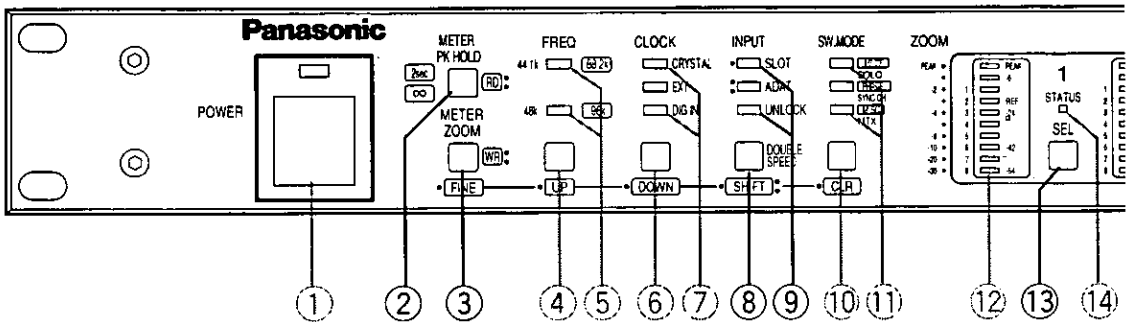
② <•• RD> button

While no memory is assigned, pressing this button will toggle the unit status between READ standby mode and Idle (neither READ nor WRITE) mode.

While a memory has been selected, pressing this button will implement to read out the selected memory to the current.

② <••RD> LED

Blinks several times while the memory read is implemented.

③ <••WR> button

Pressing this button will implement writing the contents in the current onto the selected memory.

③ <••WR> LED

Blinks several times while memory write is implemented.

⑧ <• SHIFT ••> button

Pressing this button will change the operation mode from the Pattern Memory to the normal operation.

⑨ <••ADAT> LED

Blinks in green when the unit enters the Pattern Memory mode.

⑬ SEL button:

While neither READ nor WRITE mode is selected, pressing a SEL button will specify the memory number.

While READ is selected, pressing a SEL button will read out the contents of the selected memory to the current.

⑬ SEL LED

OFF:	The memory number is deselected.
Blinking:	The memory number has been selected.
ON:	The memory number is the latest accessed.

Note: The LED will blink if the memory matches to both "Blinking and Illuminate" conditions.

REAR PANEL

㉑ Analog Output [ANALOG OUTPUT +4 dB 10kΩ (BAL)]

These XLR connectors supply analog signals to line level devices. The output level is +4 dB for each channel.

㉒ DIP Switch [1 2 3 4 5 6 7 8 ON OFF]

An 8-position DIP is provided for settings. See page 33 for instructions on these functions.

㉓ ADAT Input [ADAT IN]

This optical connector accepts digital audio signal from external ADAT compatible devices in either Normal ADAT mode (8-CH 44.1/48 kHz), or Dual Track mode (4-CH 88.2/96 kHz).

㉔ Wordclock Input Connector [WORDCLOCK IN]

This BNC accepts the wordclock signal supplied by an external device. To synchronize the internal clock frequency to the wordclock in signal, select by pressing the CLOCK button, then select the desired frequency by using the FREQ button.

㉕ Wordclock Output Connector [WORDCLOCK THRU]

This BNC supplies the wordclock looped through the WORDCLOCK IN.

㉖ Digital Input Connector [AES/EBU DIGITAL INPUT AES1 AES 2 AES 3 AES 4]

These XLR connectors accept AES/EBU digital inputs. Input channels for Dual AES mode are selected from a set of 1, 2, 3 and 4 or 5, 6, 7 and 8 by CH SEL button in the SW. MODE 1, MISC operation.

㉗ Grounding Terminal [SIGNAL GND]

Connect with other device's GND to avoid possibility of grounding loops or noise if necessary.

㉘ AC Power [AC IN]

Connect the supplied power cable.
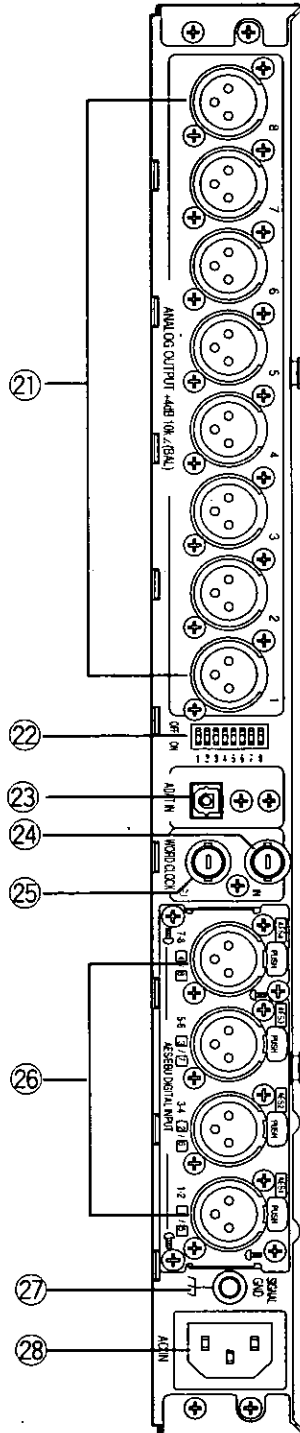
Quick Start

Complete the 10 steps below before you begin using this unit.

1. Connect a digital source to the Digital Input or ADAT Input on the rear panel.

2. Connect analog outputs to speakers through amplifiers.

3. Connect the WCK IN with an external wordclock source, if you let the unit sync to the external device.

4. Turn on the DA Converter, and the POWER indicator on the front panel illuminates.

To reset to the DEFAULT settings, turn on the DA Converter while holding down the [FREQ] and [CLOCK] buttons simultaneously.

5. Select input source from SLOT or ADAT with the [INPUT] button.

6. Select the clock source from CRYSTAL, EXT or DIG.IN with the [CLOCK] button.

7. Select a DIG. IN channel from AES 1 through AES 4 when you use the standard input card, or AES 8 when you use an option card WZ-AESDA.

8. Supply digital input, and select an appropriate Fs from 44.1, 48, 88.2, and 96 kHZ with the [FREQ] button.

9. Check the connected digital device to see if it is producing an audible signal, then confirm that the level meter on the DA Converter displays the signal at the correct level. Adjust using the instructions in the next chapter.

10. Check the outputs to speakers.

Signal Flow

The chart below shows how the digital inputs are converted to audio signals. The input data are supplied to AES 1 through 8 terminals (SLOT) or ADAT input on the rear panel. The Receive PLL (Phase Locked Loop circuit) examines whether the data match to any of prefixed frequencies, and supplies the output to the following stage. Unlock error information is supplied when the Receive PLL can not find out a proper frequency. The Format Converters interpret the data and rebuild them with the single or dual format that are fed to the MTX (matrix) stage.

The digital meter can select either intake position from Pre-MTX or Post-MTX. After the MTX, there are Phase Inverters, Digital Volume controls and Mute switches equipped for each channel, while the SOLO switches are provided only for channel #1 and #2.

The DAC transforms digital data into analog signal. These analog signals go through the LPF (low-pass-filter), attenuators, output stages and finally reach to the output terminals.

WCK IN and THRU terminals are equipped on the rear panel. The clock generator, internal crystal and internal PLL are provided as shown at the bottom in the chart.
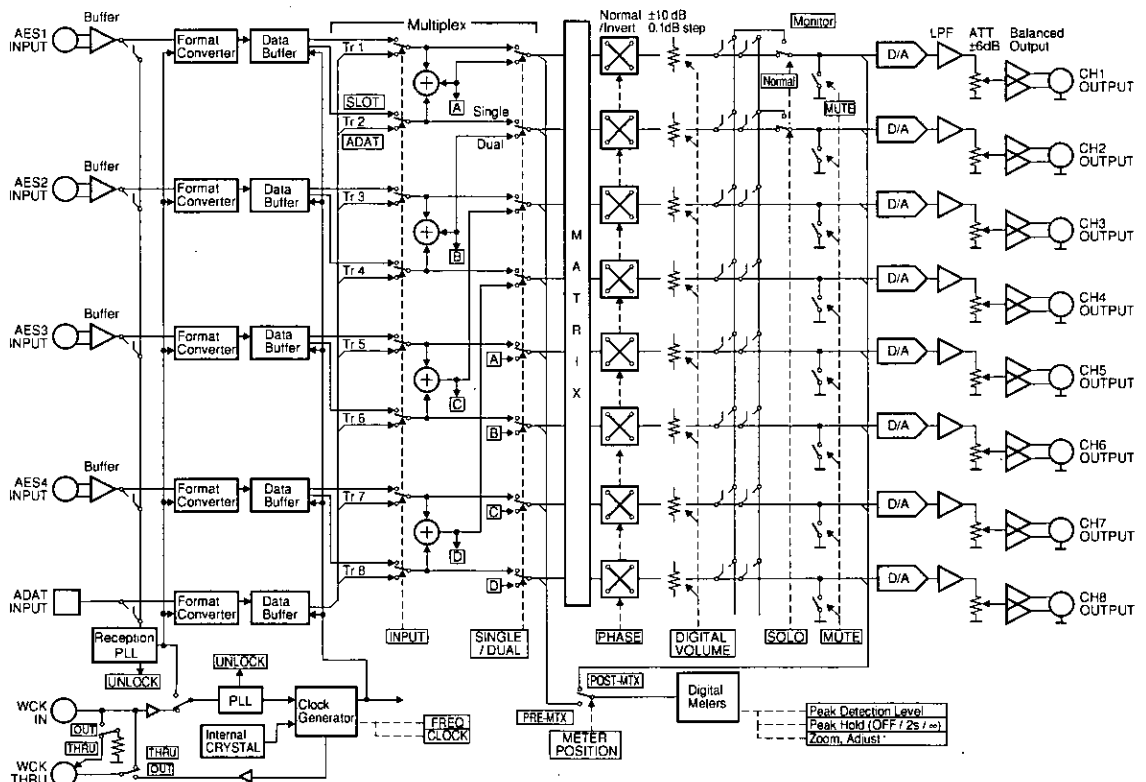
Digital Volume Adjustment

This mode is provided for all or selected
channels to adjust the digital volume up or
down to a maximum of 10 dBFS with a 0.1
dBFS accuracy. Deviation values from the
origin are displayed on each 10-point meter.

Operating Procedures

1 Enter the Digital Volume Adjust Mode with
the <• SHIFT ••> button. The SLOT LED
will blink.

2 Press the SEL buttons on the channels you
wish to adjust. The SEL LEDs will illuminate
in red on the selected channels. Press the
button again to deselect. Note that all the
channels will be selected when no SEL
indicator illuminates (deselected).

> Power On
>
> Normal Operation
>
> Press <SHIFT> button
> for 2 seconds.
>
> Digital Volume Adjust
> <SHIFT 1>
>
> Press <SHIFT> button.
>
> Pattern Memory RD/WR
> <SHIFT 2>
>
> Press <SHIFT> button.

3 While holding down the <• FINE> button the deviation unit along with meter
display unit will change from 1 dB to 0.1 dB. <• FINE> LED displays selection
status as follows. Hold down or release the <• FINE> button as may be the case.

> <• FINE> LED ON: 0.1 dB per step is applied to the deviation unit and meter
> display.
>
> <• FINE> LED OFF: 1 dB is applied.

4 Press the <• UP> or <• DOWN> button to increase or decrease the gain while
observing the meter display.

The meter reads as shown below in the table. Plus or minus deviation is identified by
the start point of meter lighting. The meter lighting starts from the top and goes
downward in minus deviation, while it starts from the bottom end and rises upward
in plus deviation. None of meter point illuminates when the digital volume is
calibrated to 0 dB.
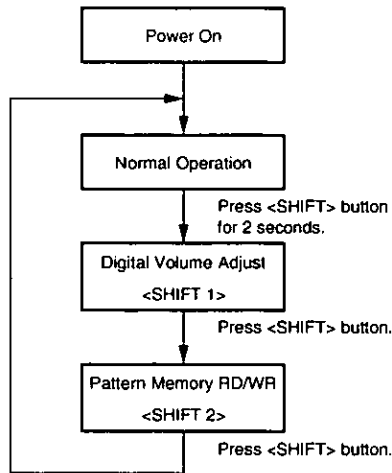
Deviation value is specified by the sum of 1 dB deviation and 0.1 dB's. Observe the both deviation values and add them while switching over the unit by pressing the <• FINE> button.

Deviation value [dB] = (# of meter points lit in 1 dB) x 1 + (# of meter points lit in 0.1 dB) x 0.1

		Digital Volume									
		-10.0	-9.9	−3.0	-0.1	0.0	+2.9	+5.3	+8.6	+9.9	+10.0
Unit	1.0dBF										
	0.1dBF										

Pattern Memory Read/Write

Pattern Memories

Eight (8) memory banks are provided for the digital volume and matrix assignment for each channel. The stored pattern can be read out to the current memory, and the current data can be stored into the pattern memory. The factory preset is shown below for each channel. Digital volumes for all channels are set to 0. The matrix IN and OUT assignments are set to the same channel numbers for memories #1 through #4, while the four surround routings are preset in memories # 5 through #8.

Item	Pattern Memory	#1	#2	#3	#4	#5	#6	#7	#8
Digital Gain	Out CH1	0	0	0	0	0	0	0	0
	Out CH2	0	0	0	0	0	0	0	0
	Out CH3	0	0	0	0	0	0	0	0
	Out CH4	0	0	0	0	0	0	0	0
	Out CH5	0	0	0	0	0	0	0	0
	Out CH6	0	0	0	0	0	0	0	0
	Out CH7	0	0	0	0	0	0	0	0
	Out CH8	0	0	0	0	0	0	0	0
MTX Assign	Out CH1	Input 1	Input 1	Input 1	Input 1	Input 1	Input 1	Input 1	Input 1
	Out CH2	Input 2	Input 2	Input 2	Input 2	Input 2	Input 2	Input 3	Input 3
	Out CH3	Input 3	Input 3	Input 3	Input 3	Input 5	Input 3	Input 2	Input 2
	Out CH4	Input 4	Input 4	Input 4	Input 4	Input 6	Input 5	Input 5	Input 4
	Out CH5	Input 5	Input 5	Input 5	Input 5	Input 3	Input 6	Input 6	Input 5
	Out CH6	Input 6	Input 6	Input 6	Input 6	Input 4	Input 4	Input 4	Input 6
	Out CH7	Input 7	Input 7	Input 7	Input 7	Input 7	Input 7	Input 7	Input 7
	Out CH8	Input 8	Input 8	Input 8	Input 8	Input 8	Input 8	Input 8	Input 8

The pattern #1 shown in the table is the same as the factory setting for the current memory.

	Speaker 1	Speaker 2	Speaker 3	Speaker 4	Speaker 5	Speaker 6
Normal	L	R	C	SB	SL	SR
P. Memory #5	L	R	SL	SR	C	SB
P. Memory #6	L	R	C	SL	SR	SB
P. Memory #7	L	C	R	SL	SR	SB
P. Memory #8	L	C	R	SB	SL	SR

The surround speaker connection is recommended as drawn below.

The pattern #5 through #8 at default are provided for adaptability to various input sources. The table lists the relationship between speaker positions and speaker numbers.

Operating Procedures

Reading and writing the pattern memories are enabled by pressing the <• SHIFT ••> button for at least 2 seconds, then pressing it normally. In the Pattern Memory operation the channel numbers from 1 to 8 represent the pattern memory numbers.

READ

There are two ways of READ operations, [1 Pattern selection then Read mode] and [2 Read mode then Pattern selection].

[1 Pattern selection then Read mode] while Read is deselected.

1-1 Select a memory number with a SEL LED button. The selected SEL LED starts blinking in red.

Select other SEL button when you wish to change the selection.

1-2 Press the <RD ••> button. The memory read is implemented while the <RD ••> LED and the SEL LED blink slowly two or three times.

After blinking the SEL LED turns on to stand for the latest accessed.

1-3 Press other SEL LED button when you wish to change the readout pattern number. Then, press the <RD ••> button while the newly selected SEL LED blinks. The new pattern is read out to the current memory, and <RD ••> and SEL LEDs change as described above 1-2.

[2 Read mode then Pattern selection] while no Pattern is selected.

2-1 Press the <RD ••> METER PK HOLD button while no memory pattern is selected. The <RD ••> LED blinks to prompt you select a SEL button.

2-2 Press the SEL button on the pattern number you wish to read out. The memory READ is implemented while the <RD ••> LED and the selected SEL LED blink slowly two or three times.

After blinking, the <RD ••> LED keeps on blinking, and the SEL LED turns on to stand for the latest accessed.

2-3 Press other SEL LED button when you wish to change the readout pattern number. The new pattern is read out to the current memory, and the LEDs change to the same status as described above 2-2.

Notes:

• To deselect READ mode, press the <RD ••> METER PK HOLD button while the <RD ••> LED blinks quickly. The <RD ••> LED goes off.

• To deselect the pattern number, press the blinking SEL LED button while the <RD ••> LED goes off. The blinking SEL LED goes off if it was not the latest accessed, or illuminates if it was the latest accessed.

WRITE

The WRITE mode enables you to store the content in the current memory into the selected memory bank from #1 to #8.

Caution:

Memories #5 through #8 contain the preset Surround Patterns as the factory default settings. Please refrain from overwriting if you wish to retain them as the default settings.

1 Select a destination number from among 1 to 8 with the SEL LED button. The LED starts blinking.

2 Press the <WR ••> METER ZOOM LED button. WRITE is implemented while the <WR ••> LED and SEL LED blink slowly twice.

After blinking, the <WR ••> LED goes off and the SEL LED turns on to stand for the latest accessed.

Note:

• Pressing the <WR ••> button will be ignored when no memory is selected.

DIP Switch Setting

On the rear panel, an 8-bit DIP switch is provided. The following pages in this chapter describe each function in more detail. Default settings are marked with *.

Switch #8 through #6 are reserved for future development.

OFF ON

Switch #5 through #3 select the peak detection level from among 8 options.

SW #	Peak Detection Level in dBFS							
	-6.0*	-5.0	-4.0	-3.0	-2.0	-1.0	-0.5	0
5	Off	On	Off	On	Off	On	Off	On
4	Off	Off	On	On	Off	Off	On	On
3	Off	Off	Off	Off	On	On	On	On

Switch #2 enables or disables the CRC (Cyclic Redundancy Check).

SW #	CRC	
	Disabled*	**Enabled**
2	Off	On

Switch #1 enables or disables the super clock reception.

SW #	Super Clock Reception	
	Disabled*	**Enabled**
1	Off	On

Reserved for Future Use

Peak Detection Level

0.0dBFS   -3.0dBFS

-0.5dBFS   -4.0dBFS

-1.0dBFS   -5.0dBFS

-2.0dBFS   -6.0dBFS

CRC
Enabled
Disabled

Super Clock Reception
Enabled
Disabled

OFF ON
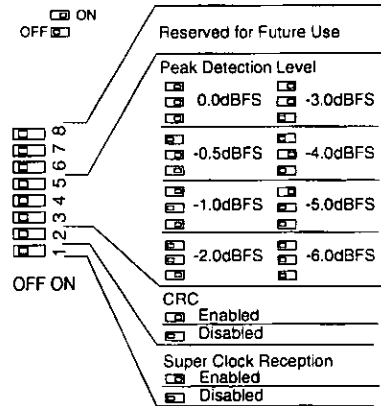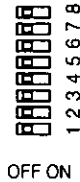
Peak Detection

The peak dots in the meters are used as a peak indicator alerting you if the level reaches a point that you select just prior to clipping. Set DIP switches #5-#3 to -3 dB to use it as a peak meter.

CRC in Sub-code

When set to On and a CRC error is detected, the STATUS LED on the erred channel will blink in green. When set to Off, all the STATUS LEDs will not be affected by CRC errors.

Super Clock Reception

Set DIP switch #1 to ON when using the wordclock-in supplied from an 888 I/O. You need to connect WCK IN on this unit with SLAVE CLOCK OUT on the 888 I/O, and set the clock to EXT with CLOCK button on the front panel. Refer to System Configuration in this manual for detailed connection and setting.

SW. MODE 1 Setting with SEL Button

MUTE

Mute is applied to unwanted channels not to supply the output signals.

1 In the SW. MODE 1 operation, press the [SW MODE] button to select the MUTE mode for the [SEL] button. The MUTE LED illuminates in green.

2 Press the SEL button on each channel to toggle MUTE On or Off. The SEL LED on each channel displays the status as follows. The default is Off.

> **OFF:** The output signal on the channel is supplied to the rear panel.
> **Illuminates in Red:** The output channel is mute.

PHASE

Signal phase is switchable between normal and inverse for each channel.

1 In the MODE 1 operation, press the [SW MODE] button to select the PHASE mode for the [SEL] button. The PHASE LED illuminates in green.

2 Press the SEL button on each channel to toggle the phase. The SEL LED on each channel displays the status as follows. The default is normal.

> **OFF:** Normal phase
> **Illuminates in Red:** Inverse phase

MISC (Miscellaneous)

SEL buttons on channel 1 through channel 5 are assigned individual function as follows.

To enter the MISC mode, press the [SW MODE] button twice in the MODE 1 .
The MISC LED illuminates in green.

Meter Position (CH 1)

Signal intake positions for 10-point meters and STATUS indicators for all channels can be selected from Post-matrix or Pre-matrix .

1 Enter the MISC mode.

2 Press the SEL button on the channel 1 to toggle the meter position. The SEL LED on the channel 1 displays the status as follows. The default is POST-MTX.

> **OFF:** Post-matrix
> **ON:** Pre-matrix

To Halve Channels (CH 2)

The unit receives 16 channels through 8 wires when a Dual AES Input card is installed, and it applies the Normal or Double Speed format. However, either 8 of the first or later half should be selected to match the capability of the DA unit.

1 Enter the MISC mode.

2 Press the SEL button on the channel 2 to toggle the input channel between 1-8 and 9-16. The SEL LED on CH 2 displays the status as follows. The default selection is channel 1-8, and the LED is Off.

> **OFF:** Channel 1-8 are selected.
> **ON:** Channel 9-16 are selected.

> **Note:** This selection is available only when the Normal or Double Speed format is applied to the optionally installed Dual AES Input card.

CH 3 is not used.

Sub-Code Check Display (CH 4)

The readout of Fs description in the sub-code is displayed on the LEDs as follows
while the SEL button on the channel 4 is being held down in the MISC mode.

Fs readout	FREQ 44 LED	FREQ 48 LED
44.1 kHz	Blink in Green	As it is
48 kHz	As it is	Blink in Green
88.2 kHz	Blink in Red	As it is
96 kHz	As it is	Blink in Red
176.4 kHz	Blink in Orange	As it is
192·kHz	As it is	Blink in Orange
Unknown	Blink in Orange	Blink in Orange

Auto-MODE Selection (CH 5)

Transmitting MODE is selected manually or automatically. When Auto-MODE selection is enabled, the input source will be fixed to SLOT and the clock source will be DIG. IN. The unit interprets a description about the Fs in the sub-code of the designated DIG. IN source, and drives the internal Fs.

1 Enter the MISC mode.

2 Press the SEL button of the channel 5 to toggle the Auto-MODE function between ON and OFF. The SEL LED of the channel 5 displays the status. The default is OFF.

> **ON:** Auto-MODE selection is enabled.
>
> **OFF:** MODE selection is made only manually.

While Auto-MODE selection is enabled, transmitting MODE will be changed if a manual operation is made or the the sub-code description varies. Frequency change is based on the priority to the late operation.

The SEL LED on the channel 5 may blink while operating in the Auto-MODE.

> **Blinking:** Sub-code description is unable to read, or it is unknown.

See Auto MODE Selection in Appendix for details.

SW. MODE 2 Setting with SEL Button

SOLO

Output terminal 1/2 on the rear panel is assigned a special task for SOLO monitor in monaural (MONO) or stereo when the unit enters SOLO mode. Select the desired channels for monitor as follows.

1 In the MODE 1 operation, press the [SW MODE] button to select the SOLO mode for the [SEL] button. The SOLO LED illuminates in red.

2 MONO (monaural) Assignment: An output channel is supplied to both outputs 1 and 2 on the rear panel.

2-1 While no channel is selected, press the SEL button on the desired channel to assign it to SOLO.

    The SEL LED will illuminate in red on the assigned channel.

2-2 While a channel is selected in MONO, press the SEL button on the currently selected channel to deselect it.

    The SEL LED will go out and the channel will be deselected.

2-3 While a channel or a pair of channels is selected. press any other SEL LED buttons to change assignment from the currently selected channel(s) to the new one.

    The newly selected SEL LED will illuminate and the channel is assigned to SOLO in MONO.

2-4 While a pair of channels is selected in stereo, press one of the SEL buttons of the pair to change assignment from stereo to MONO.

    The SEL LED whose SEL button is pressed will keep on lighting while the other SEL LED of the pair will go out. The channel is assigned to SOLO in MONO.

3 STEREO Assignment: A pair of channels is supplied to the output 1 and 2 on the rear panel.

3-1 While no channel, a channel in MONO or a pair in stereo is selected, press two SEL buttons on the desired channels sequentially to assign them to SOLO.

> The channel whose SEL button is pressed earlier will be assigned to the output 1 while the other channel will be the output 2. The SEL LEDs will illuminate in red on the assigned channels.

3-2 While a pair of channels is selected in stereo, press one of the SEL buttons of the pair to deselect the other channel. This will change the assignment from stereo to MONO.

> The SEL LED on the other channel will go out and the channel will be deselected.

> The output signal whose SEL button is pressed will dominate both outputs 1 and 2 in MONO.

Notes:

• The first and second buttons will be accepted while the third button onward be ignored if more than two buttons are pressed at a time.

• To deselect a pair of stereo, press any of the lighting LED button twice.

SYNC CH(Sync Source Channel Selection)

One out of available channels can be selected for the clock source. Channels #5 through #8 are available only when Dual AES Input card WZ-AESDA is installed in the unit.

1 In the MODE 2 operation. press the [SW MODE] button to select the SYNC CH mode for the [SEL] button. The SYNC CH LED illuminates in red.

2 Press the SEL button on the channel you wish to designate. The SEL LEDs on the meter section display the status. The default selection is CH 1.

ON: The channel is selected for the clock source.

OFF: The channel is deselected.

These procedures are essential for the DA unit even when you select CRYSTAL or EXT for the CLOCK. otherwise the unit will be unlocked.

MTX (Matrix Setting)

This mode is provided for making matrix assignments between 8 input and 8 output channels. An input channel can be assigned to multiple output channels while an output channel can accept only one input.
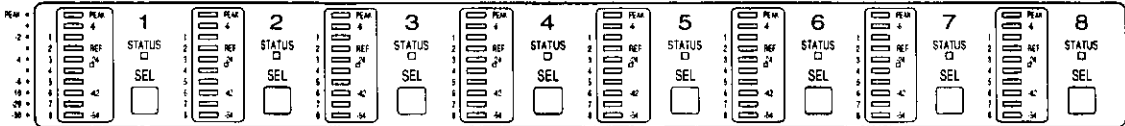
1 Enter the MTX mode.

1-1 Press the [SW MODE] button for at least 2 seconds appropriate times to enter MODE 2 for SEL button function. Any of SOLO, SYNC CH or MTX indicator illuminates in red.

1-2 Press the [SW MODE] button repeatedly until the MTX LED illuminates in red.

One of the lower 8 among 10-point will display the assigned input channel referring to the numbers 1 through 8 adjacent to the meter.

2 Press repeatedly the SEL button on the output channel you wish to change. The assignment changes as follows, and the respective LED on the meter illuminates.

$$CH1 \rightarrow CH\ 2 \rightarrow CH\ 3 \rightarrow CH\ 4 \rightarrow CH\ 5 \rightarrow CH\ 6 \rightarrow CH\ 7 \rightarrow CH\ 8 \rightarrow CH1$$

Other Settings

Receiving Format Selection

There are three data formats: Normal mode, Dual mode and Double Speed mode. Receiving format is specified by frequency selection with the FREQ button on the front panel except AUTO-MODE selection. The DOUBLE SPEED LED indicates selection status as follows.

Rx Format	Frequency[FREQ]	[DOUBLE SPEED] LED
AES/EBU (Normal)	44.1/48 kHz	OFF
Dual AES (Dual Wire)	88.2/96 kHz	OFF
Double Speed AES	88.2/96 kHz	ON

Note: Change the frequency selection from 44.1/48 kHz to 88.2/96 kHz when the [DOUBLE SPEED] LED blinks during Double Speed AES reception.

Memory Resume & Memory Clear

Resume

The DA converter stores the following settings while the power is off, including the user selected settings. Items marked with * are default values that the DA converter resets to when a Memory clear is performed.

Digital volume	-10 dB ~ 0 dB* ~ +10 dB (*See page 30)
Matrix settings	Same In & Out CH number (*See page 30)
Mute	OFF*/ON
Phase	NOR*/INV
In CH selection	1 ~ 8*/9 ~ 16
Fs	44.1/48*/88.2/96 kHz
Clock selection	CRYSTAL*/EXT/DIG. IN
Clock source wire	AES 1*
Input source selection	SLOT*/ADAT
Slow-roll-off	OFF*/ON
Meter position	Post MTX*/Pre MTX
Meter peak hold time	OFF*/2s/infinity
Meter display mode	Normal*/Zoom
FREQ Auto-selection	OFF*/ON
Key lock	OFF*/ON
Latest accessed P-memory	From 1* to 8

Memory Clear

To reset the unit back to the factory default settings, press the POWER switch while holding down the FREQ and CLOCK buttons simultaneously.

Self Diagnosis

To enter the self-diagnosis program, perform the following functions.

- Press the POWER switch while holding down the FREQ <UP> and INPUT <SHIFT> buttons simultaneously.

LED Test

All of LEDs will illuminate on the front panel.

Front Panel Button Test

Press any button one at a time and the LED corresponding to the button turns off.

DIP Switch Status Test

This is a method to check the setting of the rear panel DIP switches from the front panel using the meter LEDs.

CAUTION: Turn the unit off when the diagnosis is completed. Turn on the unit again and allow it to re-initialize in order to return to normal operation.

Key Lock

In an environment where it is desirable to protect the unit from accidental use, or from use by an authorized operator, we have provided a "Lock Out" or "Key Lock" function.

- To activate or deactivate "KEY LOCK", turn on the POWER switch while holding down the CLOCK and INPUT buttons simultaneously.
- To deactivate "KEY LOCK" while the power is turned on, press the INPUT button for at least 2 seconds. SLOT or ADAT LED will go out for a second then resume.

.Clock Unlock Display

There are three unlock displays responding to the error conditions. Refer to the SIGNAL FLOW for the receive PLL and master PLL.

> **SLOT LED:** Blinks in green when the receive PLL is unlocked and the SLOT is selected for input.
>
> **ADAT LED:** Blinks in green when the receive PLL is unlocked and the ADAT is selected for input.
>
> **DIG. IN LED:** Blinks in green when the Fs sampling frequency is unmatched with the receive PLL, however, the receive PLL is LOCKED.

Internal Setting
&
Options

Warning!

Only qualified service personnel or system installers should make all internal settings adjustment, option card installation, or rack mounting. If adjustments are required, please refer to the Service Manual available for this product.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION:
TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK), NO USER SERVICEABLE PARTS INDISE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

SA 1965
The lightning flash with arrowhead symbol, within an equilateral triangle, is interned to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

SA 1966
The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Internal Setting

Wordclock-Out Setting

In the factory default setting, the Wordclock THRU output connector receives the signal from the Wordclock IN and loops it though. If you desire to have the Wordclock THRU connector send the internal clock to the connected device, there are adjustments that can be made to do so. Please refer to the Service Manual for the procedure.

Once you have made the change described above, Wordclock IN automatically sets the 75Ω termination to On, while the Wordclock THRU outputs the internal clock signal.

We provided this feature because we wanted you to have complete flexibility in connecting to today's wide variety of digital audio equipment. Some devices need to receive word clock at a specific frequency, and then they internally convert to the selected sampling frequency. As an example, there are some devices that need a 48kHz-wordclock signal for operation at 96 kHz. They double the clock speed internally. Other devices require a 96 kHz Wordclock signal for 96 kHz operation. You should consult the manual for the device you are connecting to for proper setting of the Wordclock.

Options

Dual AES Input Card WZ-AESDA

This card receives an 8-channel, 24 bit, 96 kHz digital audio input signal in a format that conforms to the AES Dual Mode standard. For more information, see the instruction manual supplied with the card.
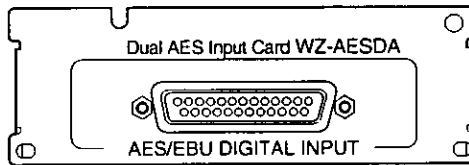
Pin Assignment
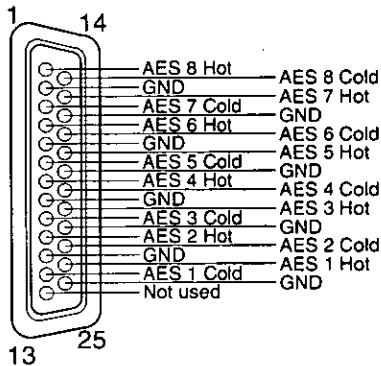
Recommended Cable

Panasonic part # 96DB-XLRF (DB-25 to 8 Female XLR, Length 3m), DA Input cable is recommended.

TDIF Input Card WZ-TDDA

This receives 8-channel/24-bit/48kHz or 4-channel/24-bit/96kHz data in TDIF format from an external DTRS digital tape recorder such as TASCAM DA88, DA38, DA98 or DA78. For more information, see the instruction manual supplied with the card.
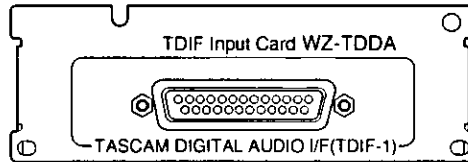
Pin Assignment
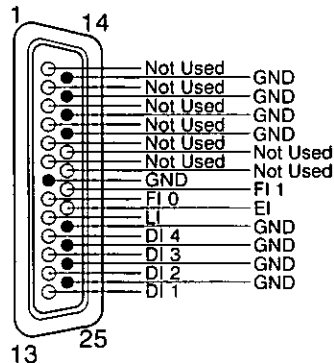
Recommended cable

If you are using this card ONLY for the input of the DA96, Panasonic part # DA/DB-TDIF (DB25 to DB25 (TDIF), Length 3m) is recommended. PW-88D (1m) or PW-88DL (5m) supplied by TASCAM are also recommended.

If you intend to use the DA96 in conjunction with a DTRS and an AD96 or AD96M simultaneously, you may need the Y cable shown on the next page.

DB25 Y Cable

To connect the AD converter (TDIF Card installed) with the DA converter WZ-DA96 and a DTRS device (DA88 and so forth) you will need the Y cable shown below. Panasonic part # 96TDIF-Y is recommended. If you decide to build it yourself, make sure you are using the proper wire.
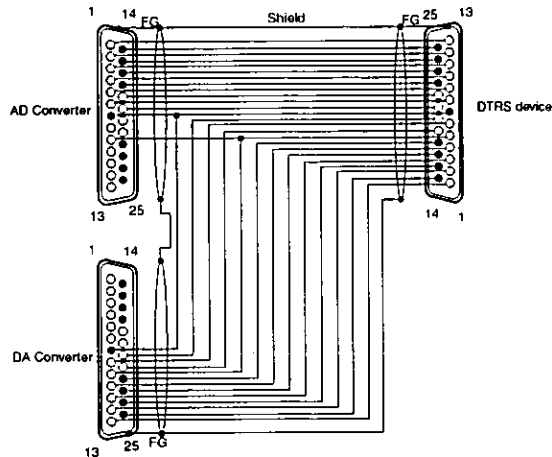
Mounting in the Rack

Install the DA converter in the rack by using the four screws that are included with the unit.

EIA 19" rack
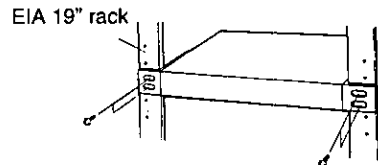
Caution:

- Before mounting the DA converter, make certain that the rack mounting brackets on both sides the unit are attached. These brackets provide the necessary support for the unit.

- Do not block the ventilation openings or the slots on the cover to prevent the unit from overheating. You should always keep the temperature in the rack below 45°C (113°F).

- Do not mount the DA unit right above the heat source such as a power amplifier or power supply. Mount the unit below the heat source taking at least a space of 44 mm (1-3/4 inch).

- Secure the rear of the unit to the rack by using additional mounting brackets (optional), especially if the rack is subject to vibrations.

System Configuration

Connection 1:	Connecting with the DA7 Digital Mixer
Connection 2:	Connecting with the ADAT & BRC
Connection 3:	Connecting with TDIF
Connection 4:	Connecting with ProTools

CONNECTING WITH THE DA7 DIGITAL MIXER (CONNECTION 1)

This configuration allows the DA7 to use its ADAT digital outputs as 5.1 Surround monitoring outputs.

Wordclock:

WR-DA7 should be the master, and one DA Converter and 2 AD Converters will slave to DA7.

• Connection

1. Connect between the Wordclock-Out (75Ω=ON) on the DA7 and the Wordclock-In on the AD converter with a 75Ω BNC cable.

2. Connect between the Wordclock-Out on the AD converter #1 and the Wordclock-In on the AD converter #2 with a 75Ω BNC cable.

3. Connect between the Wordclock-Out on the AD converter #2 and the Wordclock-In on the DA converter with a 75Ω BNC cable.

4. Connect between the ADAT-Outs on the AD converters and the ADAT-Ins on the WR-ADAT cards installed in the DA7 with two optical cables.

5. Connect between the ADAT-Out on the WR-ADAT cards and the ADAT-In on the DA converter with an optical cable.

6. Connect between the ADAT-Out on the ADAT card #3 and the DIGITAL-In on the ADAT with an optical cable.

7. Connect between the ADAT- IN on the ADAT card #3 and the DIGITAL-OUT on the ADAT with an optical cable.

8. Connect between the DA7 and the DAT: REC Out to AES/EBU In and 2TR A In to DAT Out with two XLR cables.

9. Connect Analog Outputs 1-6 with appropriate speakers through amplifiers.

• Setting

1. On the DA7, set the SOURCE SELECT to follow either the ADAT or the DAT in 2TR A. If the digital audio recorders are not being used, or they are being slaved to the console for Wordclock, then select "INT 44.1 K" or "INT 48 K". If you are using the ADAT in SLOT 3, set the SLOT 3 of the DIGITAL INPUT SELECT to INPUT 9-14 and 15/16, in the [D-I/O> INPUT SET] window.

2. Set SLOT 3 to INS in the [D-I/O>TO SLOT] window to function SLOT 3 in send-return mode.

3. On the front panel of the AD converter, select "EXT" by pressing the CLOCK

button to be slaved to DA7's wordclock. Set both the DIP switch #7 and 8 to ON to meet the REF level of -14dBFS.

4. On the DA unit, select "EXT" by pressing the CLOCK button to slave to the DA7.

5. On the DA unit, select "ADAT" by pressing the INPUT button to receive ADAT input.

6. On the ADAT, select "DIG" by pressing the CLOCK SELECT switch to sync to the digital input.
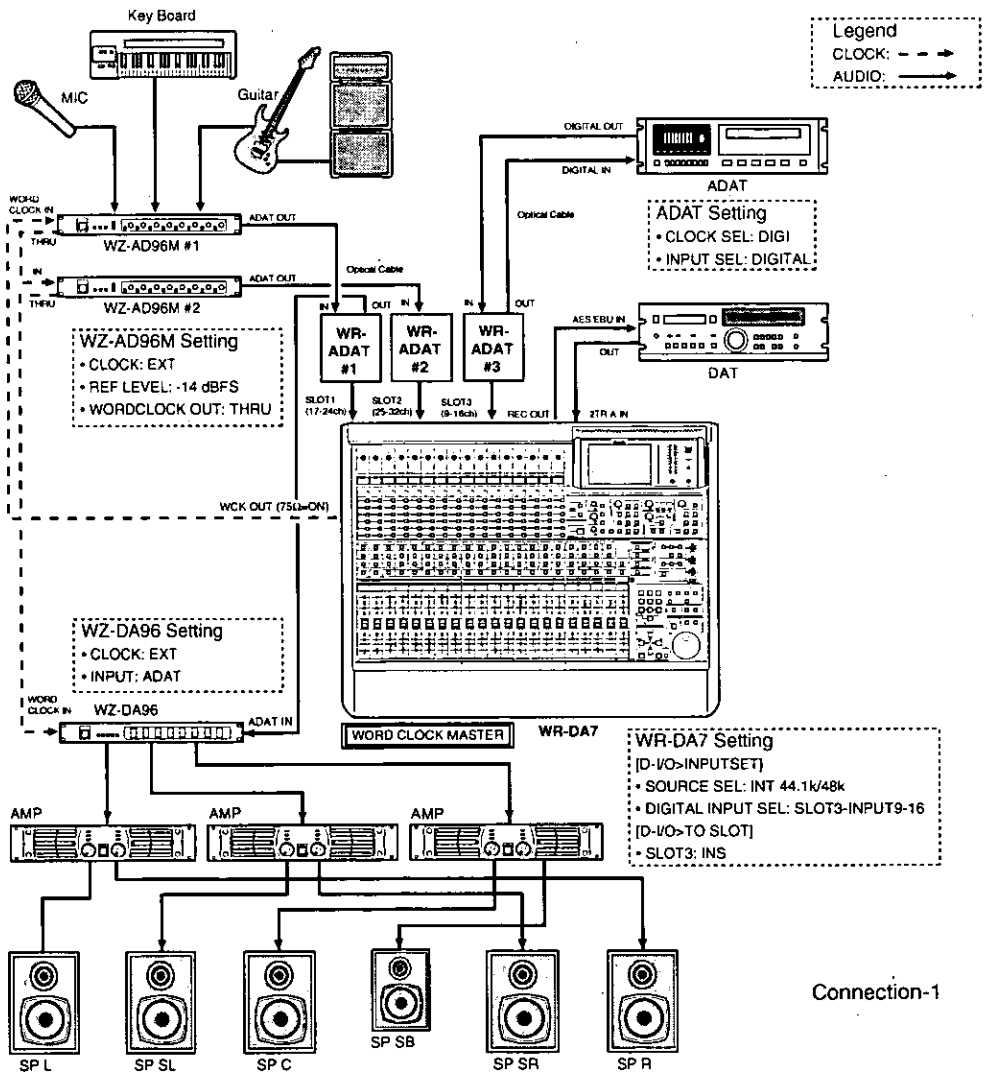
Connection-1

CONNECTING WITH THE ADAT & BRC (CONNECTION 2)

Wordclock master: WZ-AD96/96M AD Converter

• Connection

1. Connect between the Wordclock-Out on the AD converter and the WCK In on the DA converter with a 75Ω BNC cable. In addition, connect between the WCK THRU on the DA converter and the 48 kHz wordclock In on the BRC with a 75Ω BNC cable. Note that in order for this to work properly, both the CN907 and 908 jumpers inside the AD converters must be set to the "OUT" positions. Consult the service manual for this product for instructions on how to adjust the internal jumper settings.

2. Connect between the ADAT Out on the AD converter and the Digital-In on the ADAT with an optical cable to transmit the digital audio data from channels 1-8.

3. Connect between the DIGITAL Out on the ADAT and ADAT-In on the DA converter with an optical cable to monitor the sound.

4. Connect between the Remote Out of the ADAT on the BRC and SYNC-In on the ADAT with a SYNC cable to control the ADAT remotely and to complete the connection for ADAT synchronization.

• Setting

1. On the AD converter, select "CRYSTAL" by pressing the CLOCK button to let it work as the wordclock master. In addition, select a sampling frequency by pressing the FREQ button. Note that if 88.2 or 96 kHz is selected, you should move DIP switch #6 to On to keep sending 44.1 or 48 kHz wordclock to the BRC and ADAT.

2. Set DIP switch #7 on the AD converter to Off and #8 to On to meet the REF level to -16 dBFS. See Chapter 3 on "REF Level Setting" in this manual.

3. On the AD converter, select output channels 1-4 or 5-8: after entering the SHIFT operation mode if 88.2 or 96 kHz is used. The selected channel outputs will be recorded on the ADAT's tracks: output channels "1, 2, 3 and 4" or "5, 6, 7 and 8" will be recorded onto track 1/2, 3/4, 5/6 and 7/8 respectively.

> (1) To enter the SHIFT operation mode, press the WORD LENGTH button for 2 second or more.

> (2) Press the FREQ button to select the output channels. The FREQ LED's indicate the selection.

> CH 1-4: The FREQ LED 44.1k/88.2k lights.

> CH 5-8: The FREQ LED 48k/96k lights.

4. On the BRC, select "48 k Input" by pressing the EXT SYNC switch to sync to the wordclock.

5. On the ADAT's front panel, press the DIGITAL IN switch to receive digital audio input.

6. On the DA unit, select "EXT" by pressing the CLOCK button to slave to the DA7.

7. On the DA unit, select "ADAT" by pressing the INPUT button to receive ADAT input.

8. On the DA unit, select the same frequency as the AD unit uses by pressing the FRQ button to match them.

The playback data recorded with 96 kHz or 88.2 kHz sampling on the ADAT will be routed as follows. Track 1/2, 3/4, 5/6 and 7/8 will be supplied to Output 1, 2, 3, and 4 respectively on the DA unit.

Legend
CLOCK: - - →
AUDIO: ——→

Key Board

MIC

Guitar

48KHz IN

BRC

REMOTE OUT TO ADAT

BRC Setting
• EXT SYNC: 48k INPUT

SYNC Cable

WORD CLOCK MASTER

WORD CLOCK THRU/OUT)

WZ-AD96/AD96M

ADAT OUT

WORD CLOCK MASTER

WZ-AD96/AD96M Setting
• CLOCK: CRYSTAL
• REF LEVEL: -16 dBFS
• WORD CLOCK-OUT: OUT

Optical Cable

DIGITAL IN

SYNC IN

Optical Cable

OUT

ADAT

WORD CLOCK IN

THRU

ADAT IN

WZ-DA96

WZ-DA96 Setting
• CLOCK: EXT
• INPUT:ADAT

SP

SP

ADAT Setting
• CLOCK SELECT: EXT(AUTO)
• INPUT SELECT: DIGITAL

AMP

Connection-2

CONNECTING WITH TDIF (CONNECTION 3)

Wordclock master: WZ-AD96/96M AD Converter

• Connection

1. Install the TDIF output card, which is an option card for the AD96 series converters, into the rear slot. See the instructions included with the card for more detailed instructions.
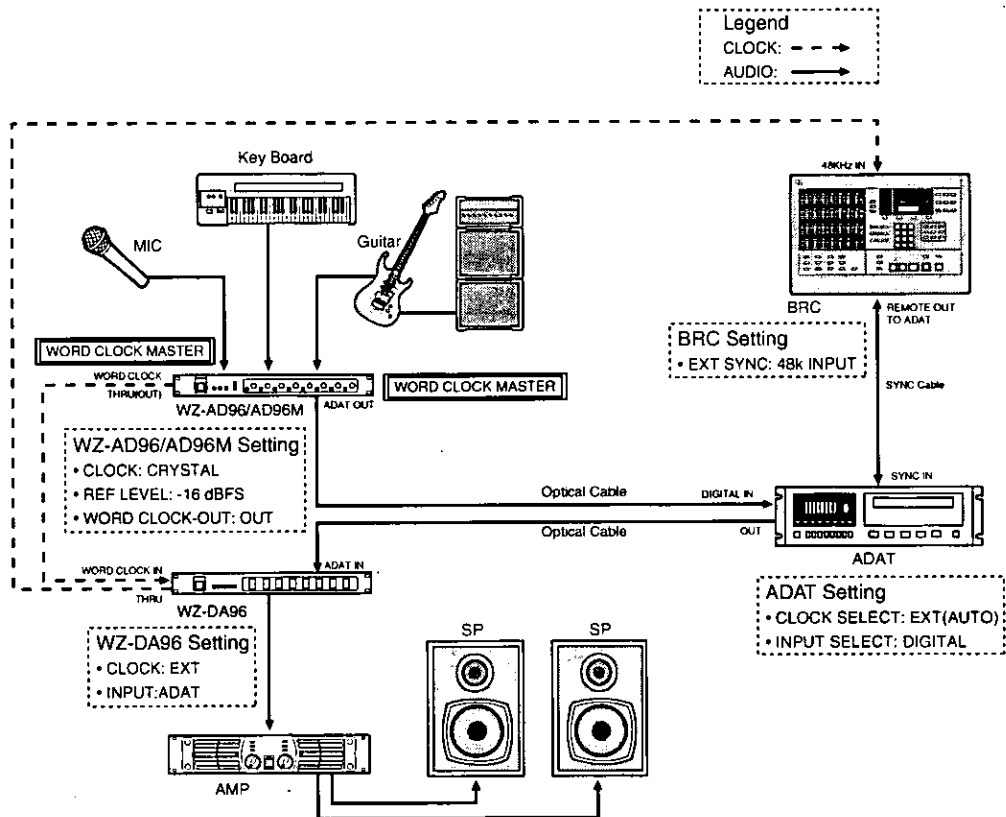
2. Connect between the Wordclock-Out on the AD converter and the WCK IN on the DA converter with a 75Ω BNC cable. In addition, connect the WCK THRU on the DA converter and WORD SYNC In on the DA88 with a 75Ω BNC cable. Note that in order for this to work properly, both the CN907 and 908 jumpers inside the AD converters must be set to the "OUT" positions. Consult the service manual for this product for instructions on how to adjust the internal jumper settings.

3. Connect the TDIF Out on the AD converter and the TDIF-1 (DIGITAL I/O) on the DA88 with a DB25 Y cable as illustrated. In addition, connect one end of the DB25 Y cable to the TDIF In on the DA converter to monitor the sound. See page 35 for detailed information on DB25 Y cable.

• Setting

1. On the AD converter, select "CRYSTAL" by pressing the CLOCK button, and then select a sampling rate by pressing the FREQ button. Note that if 88.2 or 96 kHz is selected, you should move DIPswitch #6 to On in order to keep sending 44.1 or 48 kHz wordclock to the DA88.

2. Set DIPswitch #7 on the AD converter to Off and #8 to On to meet the REF level to -16 dBFS. See Chapter 3 on "REF Level Setting" in this manual.

3. On the DA88, select "WORD" by pressing the CLOCK switch in order for it to sync to the wordclock.

4. On the AD converter, select output channels 1-4 or 5-8: after entering the SHIFT operation mode if 88.2 or 96 kHz is used. The selected channel outputs will be recorded on the ADAT's tracks: output channels "1, 2, 3 and 4" or "5, 6, 7 and 8" will be recorded onto track 1/2, 3/4, 5/6 and 7/8 respectively.

    (1) To enter the SHIFT operation mode, press the WORD LENGTH button for 2 second or more.

    (2) Press the FREQ button to select output channels. The FREQ LED's indicate the selection.

    CH 1-4: The FREQ LED 44.1k/88.2k lights.

    CH 5-8: The FREQ LED 48k/96k lights.

5. On the DA88's front panel, press the DIGITAL IN switch to receive digital audio input.

6. On the DA unit, select "EXT" by pressing the CLOCK button to slave to the DA7.

7. On the DA unit, select "SLOT" by pressing the INPUT button to receive TDIF input.

8. On the DA unit, select the same frequency as the AD unit uses by pressing the FRQ button to match them.

The playback data recorded with 96 kHz or 88.2 kHz sampling on the ADAT will be routed as follows. Track 1/2, 3/4, 5/6 and 7/8 will be supplied to Output 1, 2, 3, and 4 respectively on the DA unit.
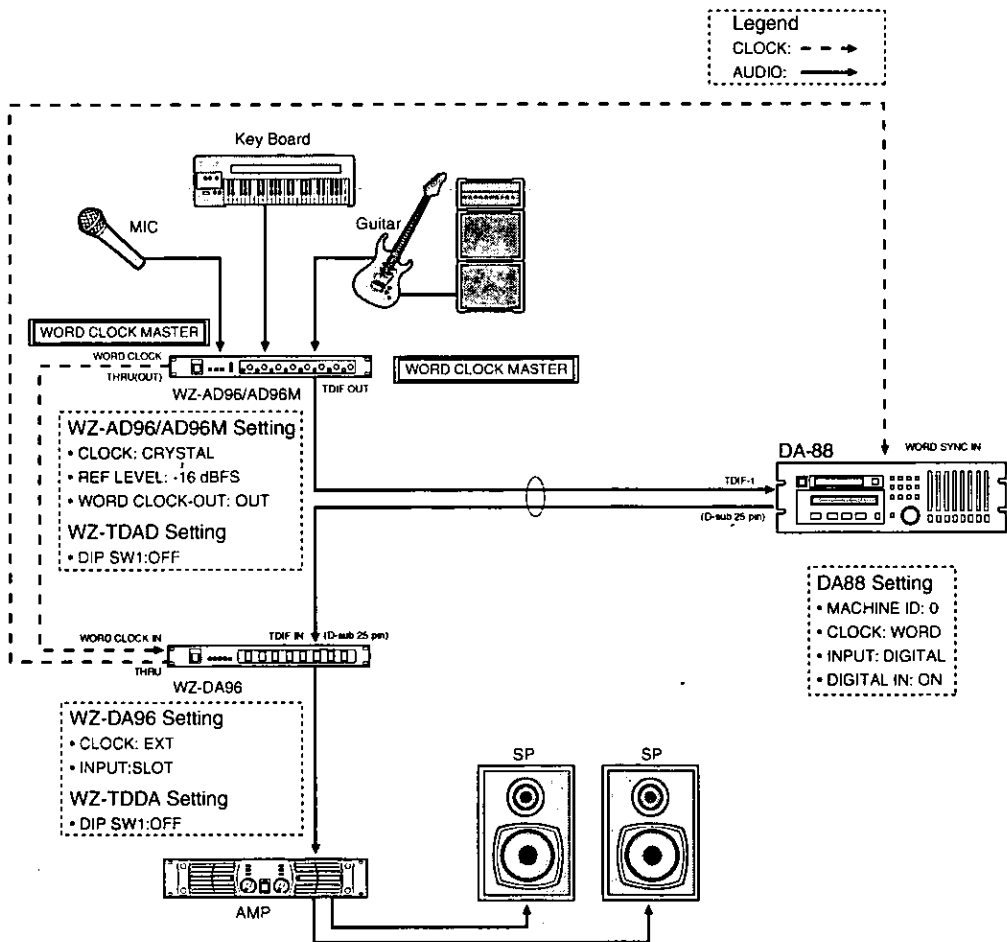
Connection-3

CONNECTING WITH PRO TOOLS (CONNECTION 4)

Wordclock master: Pro Tools 888 I/O

• Connection

1. Connect the SLAVE CLOCK OUT on the 888 I/O #1 and the SLAVE CLOCK IN on the 888 I/O #2 with a 75Ω BNC cable. Then connect between #2 and #3 in the same way as you did #1 and #2.

2. Connect the SLAVE CLOCK OUT on the 888 I/O #3 to the WCK In on the DA converter with a 75Ω BNC cable.

3. Connect the WCK Out on the DA converter and the WCK In on the AD converter #1 with a 75Ω BNC cable. Then, connect between Wordclock-Out on the AD converter #1 and Wordclock-In on the AD converter #2 with a 75Ω BNC cable. In the same manner, connect AD converter #2, #3 and the DA converter with 75Ω BNC cables.

4. Connect the AES/EBU Out on the AD converter #1 and the AES/EBU In on the 888 I/O #1 with XLR cables. For #2 and #3, connect in the same manner.

5. Connect between the AES/EBU Out on the 888 I/O #1 and the AES/EBU In on the DA converter with XLR cables in order to monitor the sound.

6. Connect Analog Outputs 1-6 with appropriate speakers through amplifiers.

• Setting

1. Set the SYNC MODE to "INTERNAL" and select the SAMPLE RATE to 44.1k or 48k on the 888 I/O #1.

2. Set Channel 1-8 INPUT to "DIGITAL", and 1-2 FORMAT to "AES/EBU" on the 888 I/O #1-3.

3. On the AD converter, select "EXT" by pressing the CLOCK button and set DIPswitch #7 to On and #8 to Off to match the REF level to -18 dBFS. See Chapter 3 "REF Level Setting" in the AD Conveter's instructions.

4. On the DA unit, set the DIP switch #1 to On, then select "EXT" by pressing the CLOCK button to slave it to the super clock of the ProTools 888 I/O.

5. On the DA unit, select "SLOT" by pressing the INPUT button to receive AES/EBU inputs supplied from the ProTools.

Legend
CLOCK: -- - →
AUDIO: →

MAC

Key Board

MIC

Guitar

WORD CLOCK MASTER

WORD CLOCK IN

THRU

AES/EBU DIGITAL OUTPUT(1-8ch)

AES/EBU DIGITAL INPUT(1-8ch)

888 I/O #1

COMPUTER

SLAVE CLOCK OUT

WZ-AD96/AD96M #1

OUTPUT(1-8ch)

WORD CLOCK IN

THRU

AES/EBU DIGITAL OUTPUT(1-8ch)

AES/EBU DIGITAL INPUT(1-8ch)

888 I/O #2

COMPUTER

IN

OUT

WZ-AD96/AD96M #2

WORD CLOCK IN

AES/EBU DIGITAL OUTPUT(1-8ch)

AES/EBU DIGITAL INPUT(1-8ch)

888 I/O #3

COMPUTER

IN

OUT

WZ-AD96/AD96M #3

Pro Tools 50pin Cable

WZ-AD96/AD96M Setting
• CLOCK: EXT
• REF LEVEL: -18 dBFS
• WORD CLOCK-OUT: THRU

Pro Tools 888 I/O Setting
• SYNC MODE: INTERNAL (#1)
• SAMPLE RATE: 44.1 kHz/48 kHz (#1)
• INPUT: DIGITAL
• 1-2FORMAT: AES/EBU

SUPER CLOCK (256X)

WORD CLOCK IN

WZ-DA96

OUT

AES/EBU DIGITAL INPUT(1-8ch)

WZ-DA96 Setting
• CLOCK: EXT
• INPUT:SLOT
• DIP SW #1: ON
• WCK OUT Setting: OUT

AMP

AMP

AMP

SP L

SP SL

SP C

SP SB

SP SR

SP R

Connection-4

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Technical Specifications

General

Power Requirement:	AC 120 V 60 Hz
Power Consumption:	18 W
Dimensions (mm):	480(W) x 44(H) x 350(D)
(inch):	18-7/8(W) x 1-3/4(H) x 13-3/4(D)
Weight:	5 kg (11 lbs)

Digital Input

Sampling Rate	44.1 kHz/ 48 kHz/ 88.2 kHz/ 96 kHz	
Digital Input Meter:		
Type		10-point Bar Graph
Peak-Hold		2 s/ ∞/ Off
Mode		Normal/ Zoom/ Digital Vol Adjust/ MTX Setting
AES/EBU Input		
Input Connector	XLR x 4	
Format	24bit, Normal/96k Double Speed Single Wire /96k Dual Wire	
ADAT Input	Optical x 1	
Format	24 bit, Normal/ 96k Dual Track	
Wordclock In	BNC x 1, 75 Ω auto-termination	

Digital Output

Wordclock Thru	BNC x 1, 75 Ω Looped-through or Internal Out

Analog Output

Analog Output	XLR x 8
Output Impedance	600 Ω Balanced
Maximum Output Level	+ 28 dBu
Dynamic Range	118 dB (A weighted)
Group Delay	33 Fs/s (0.687 ms at 48 kHz)
Channel Separation	114 dB

Frequency Response   + 0.0 dB –0.2 dB (at +4 dBu, 20 Hz to 20 kHZ)

Standard Accessories

Power Cord	x 1
Screw	x 4 (M5x10) For rack mounting
Rubber Foot	x 5

Optional Accessories

DUAL AES INPUT CARD (WZ-AESDA)

Input Connector	DB25
Format	24-bit, AES/EBU (AES3-1992)
Signal Level	RS-422
Channel Mode	8 ch x 2, 24bit, 44.1/48 kHz, Normal AES
	8 ch x 2, 24bit, 88.2/96 kHz, Double-Speed AES (Single Wire)
	8 ch, 24bit, 88.2/96 kHz, Dual AES
Dimensions (mm)	108(W) x 37(H) x 62(D)
(inch)	4-1/4(W) x 1-7/16(H) x 2-7/16(D)
Weight	100 g (0.22 lbs)

TDIF INPUT CARD (WZ-TDDA)

Input Connector	DB25
Format	TDIF-1
Signal Level	CMOS Level
Channel Mode	8 ch, 24bit, 44.1/48 kHz, Normal
	4 ch, 24bit, 88.2/96 kHz, Dual Track
Dimensions (mm)	108(W) x 37(H) x 62(D)
(inch)	4-1/4(W) x 1-7/16(H) x 2-7/16(D)
Weight	90 g (0.20 lbs)

Level Diagram

Digital Volume			LPF	Differential Amp.	Trimmer	BTL Amp.

Digital Input

D/A

Analog Output

±10dB
0.1dB step

24bit 96kHz

11.1dB

2.8dB

7.2dB
- 3.3dB
- 3.6dB

6.1dB

[dBu]

[dBFS]

+27.8dBu +30
21.7dBu +24.0dBu
17.9dBu +17.1dBu +20
14.6dBu
11.8dBu 11.0dBu
+10
0dBFS 0.7dBu 1.8dBu +7.9dBu
-2.1dBu +4.0dBu 0
-10dBFS -6.2dBu -5.4dBu -2.9dBu
-9.0dBu
-10
-20dBFS -19.3dBu
-20
-30dBFS
-30

-40

Dynamic Range
DIN = 115dB
A-weight = 118dB

-50

-60

-70

-80

-90dBu
-90
-97.8dBu -98.6dBu -97.4dBu
-100

-110

-120

-130

Block Diagram

The diagram below shows the hardware layout along with the rout from digital inputs to analog outputs. Refer to page 27 Signal Flow for more functionality.

Dimensions

420(16-9/16)

345(13-3/4)

5(3/16)

32

44

465(18-9/16)

480(18-7/8)

(1-1/4)

(1-3/4)

Unit: mm(inch)

High Sampling Digital Format

This section details the channel relationship between digital inputs and analog outputs depending on the format.

AES/EBU Inputs On the Rear Panel

Normal AES/EBU Mode

Word length=24 bit, Sampling rate=44.1/48 kHz, Rx rate=44.1/48 kHz

Digital Input	Analog Output CH #
AES (XLR) 1	1 & 2
AES (XLR) 2	3 & 4
AES (XLR) 3	5 & 6
AES (XLR) 4	7 & 8

Double Speed AES/EBU Mode

Word length=24 bit, Sampling rate=88.2/96 kHz, Rx rate=88.2/96 kHz

Digital Input	Analog Output CH #
AES (XLR) 1	1 & 2
AES (XLR) 2	3 & 4
AES (XLR) 3	5 & 6
AES (XLR) 4	7 & 8

Dual AES/EBU Mode

Word length=24 bit, Sampling rate=88.2/96 kHz , Rx rate=44.1/48 kHz

Digital Input	Analog Output CH #
AES (XLR) 1	1 or 5
AES (XLR) 2	2 or 6
AES (XLR) 3	3 or 7
AES (XLR) 4	4 or 8

Dual AES Input Card (Option)

Normal Speed AES/EBU Mode

Word length=24 bit, Sampling rate=44.1/48kHz, Rx rate=44.1/48kHz

Digital Input	Analog Output CH #
AES 1	1 & 2
AES 2	3 & 4
AES 3	5 & 6
AES 4	7 & 8

AES 5	1 & 2
AES 6	3 & 4
AES 7	5 & 6
AES 8	7 & 8

Double Speed AES/EBU Mode
Word length=24 bit, Sampling rate=88.2/96 kHz, Rx rate=88.2/96 kHz

Digital Input	Analog Output CH #
AES 1	1 & 2
AES 2	3 & 4
AES 3	5 & 6
AES 4	7 & 8
AES 5	1 & 2
AES 6	3 & 4
AES 7	5 & 6
AES 8	7 & 8

Dual AES/EBU Mode
Word length=24 bit, Sampling rate=88.2/96 kHz, Tx rate=44.1/48 kHz

Digital Input	Analog Output CH #
AES 1	1
AES 2	2
AES 3	3
AES 4	4
AES 5	5
AES 6	6
AES 7	7
AES 8	8

ADAT Input on the Rear Panel

ADAT Normal Mode
Word length=24 bit, Sampling rate=44.1/48 kHz

Digital Input	Analog Output CH #
CH 1	1
CH 2	2
CH 3	3
CH 4	4
CH 5	5
CH 6	6
CH 7	7
CH 8	8

ADAT Dual Track Mode

Word length=24 bit, Sampling rate=88.2/96 kHz

Digital Input	Analog Output CH #
CH1	1 or 5
CH2	1 or 5
CH3	2 or 6
CH4	2 or 6
CH5	3 or 7
CH6	3 or 7
CH7	4 or 8
CH8	4 or 8

TDIF Input Card (Option)

Normal TDIF Mode

Word length=24 bit, Sampling rate=44.1/48 kHz

Digital Input	Analog Output CH #
CH1	1
CH2	2
CH3	3
CH4	4
CH5	5
CH6	6
CH7	7
CH8	8

TDIF Dual Track Mode

Word length=24 bit, Sampling rate=88.2/96 kHz

Digital Input	Analog Output CH #
CH1	1 or 5
CH2	1 or 5
CH3	2 or 6
CH4	2 or 6
CH5	3 or 7
CH6	3 or 7
CH7	4 or 8
CH8	4 or 8

Auto Mode Selection

AES Input (Rx Rate)	Sub-code (Read-in)	Tx Mode	Output Signal	Fs Match Display CH 5 SEL LED
44.1 kHz	44.1 kHz	Normal	Output	ON
	48 kHz	Normal	Output	ON
	88.2 kHz	Dual	Output	ON
	96 kHz	Dual	Output	ON
	Unknown/Not readable	Normal	Output	Blink
48 kHz	44.1 kHz	Normal	Output	ON
	48 kHz	Normal	Output	ON
	88.2 kHz	Dual	Output	ON
	96 kHz	Dual	Output	ON
	Unknown/Not readable	Normal	Output	Blink
88.2 kHz	44.1 kHz	Normal	Output	ON
	48 kHz	Normal	Output	ON
	88.2 kHz	Double Speed	Output	ON
	96 kHz	Double Speed	Output	ON
	Unknown/Not readable	Double Speed	Output	Blink
96 kHz	44.1 kHz	Normal	Output	ON
	48 kHz	Normal	Output	ON
	88.2 kHz	Double Speed	Output	ON
	96 kHz	Double Speed	Output	ON
	Unknown/Not readable	Double Speed	Output	Blink
Unlock	44.1 kHz	–	Mute	–
	48 kHz	–	Mute	–
	88.2 kHz	–	Mute	–
	96 kHz	–	Mute	–
	Unknown/Not readable	–	Mute	–