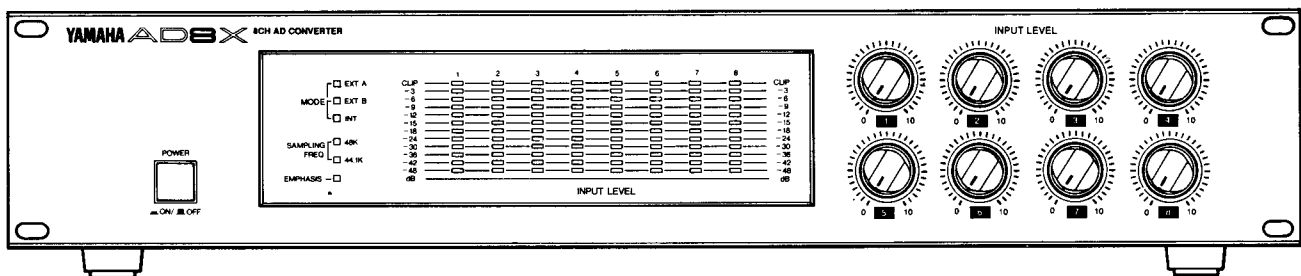


YAMAHA

8CH AD CONVERTER 8 VOIES CONVERTISSEUR AD

AD8X

Operation Manual
Manuel d'instructions
Bedienungsanleitung



Introduction

The AD8X is a high-performance 8-channel analog-to-digital converter that has been designed primarily for use with the Yamaha DMR8 Digital Mixer/Recorder, DRU8 Digital Recorder, or DMP7D Digital Mixing Processor. Unprecedented conversion precision and sonic performance are achieved with advanced high-rate 1-bit delta-sigma converters and Yamaha's innovative "digital floating" technology. The result is 19-bit audio quality, dynamic range greater than 110 dB, THD as low as 0.0018%, and eminently smooth, natural sound.

Please read this operation manual thoroughly before using the AD8X, and keep it in a safe place for later reference.

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PRECAUTIONS (!! PLEASE READ THIS BEFORE PROCEEDING !!)

1. Avoid Excessive Heat, Humidity, Dust and Vibration

Keep the unit away from locations where it is likely to be exposed to high temperatures or humidity — such as near radiators, stoves, etc. Also avoid locations which are subject to excessive dust accumulation or vibration which could cause mechanical damage.

2. Avoid Physical Shocks

Strong physical shocks to the unit can cause damage. Handle it with care.

3. Do Not Open The Case Or Attempt Repairs Or Modifications Yourself

This product contains no user-serviceable parts. Refer all maintenance to qualified Yamaha service personnel. Opening the case and/or tampering with the internal circuitry will void the warranty.

4. Make Sure Power Is Off Before Making Or Removing Connections

Always turn the power OFF prior to connecting or disconnecting cables.

5. Handle Cables Carefully

Always plug and unplug cables — including the AC cord — by gripping the connector, not the cord.

6. Clean With a Soft Dry Cloth

Never use solvents such as benzine or thinner to clean the unit. Wipe clean with a soft, dry cloth.

7. Always Use the Correct Power Supply

The power requirements for the AD8X are clearly marked on the rear panel. Make sure the specified mains voltage matches the voltage in your area before using the unit!

8. Electrical Interference

Since the AD8X contains digital circuitry, it may cause interference and noise if placed too close to TV sets, radios or similar equipment. If such a problem does occur, move the AD8X further away from the affected equipment.

9. Cooling Measures

The unit is provided with vents top and bottom through which air can circulate for cooling of the internal circuitry. Make sure that the unit is placed in a well ventilated area, and that there are no obstructions to the vents, especially the ones at the bottom of the unit. Be particularly careful when mounting the unit in a rack .

FCC INFORMATION (U.S.A.)

1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

2. **IMPORTANT:** When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product **MUST** be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

3. **NOTE:** This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate, please contact Yamaha Corporation of America, Electronic Service Division, 6600 Orangethorpe Ave, Buena Park, CA 90620

* This applies only to products distributed by YAMAHA CORPORATION OF AMERICA.

CANADA

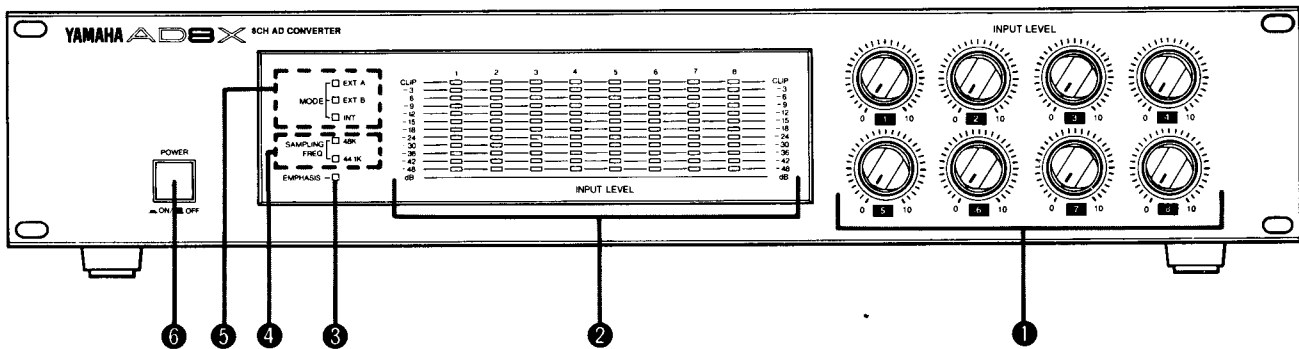
THIS DIGITAL APPARATUS DOES NOT EXCEED THE "CLASS B" LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATION OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA "CLASSE B" PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDICTE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

* This applies only to products distributed by YAMAHA CANADA MUSIC LTD.

FRONT PANEL / REAR PANEL

● FRONT PANEL



❶ INPUT LEVEL Controls

Independent level controls for each of the eight input channels. The input level controls are located immediately after the input balanced amplifiers and before the emphasis amps (still in the analog domain). The input level controls have 31-step scales to facilitate precise, repeatable level settings.

❷ INPUT LEVEL Meters

Independent 12-segment peak meters for each channel. Levels are indicated in approximate dB, and the CLIP segments at the top of each range indicate signals above the clipping threshold of the internal circuitry. The input level meters are digitally driven at a point after A/D conversion.

❸ EMPHASIS Indicator

Lights when the rear-panel EMPHASIS switch (❸) is turned ON.

❹ SAMPLING FREQ Indicators

One of these two indicators — 44.1K or 48K — will light to indicate the sampling frequency at which the AD8X is operating. The sampling frequency is determined by the setting of the rear-panel INT SAMPLING FREQ switch (❹) when the rear-panel MODE switch (❶) is set to INT, by the frequency of the word clock signal received at the WORD CLK connector (❶) when the MODE switch is set to EXT A, or by the frequency of the word clock signal received at the DIGITAL OUTPUT (W CLK IN EXT B) connector (❶) when the MODE switch is set to EXT B.

When the MODE switch is set to EXT A or EXT B and an external word clock signal is used, the 44.1K or 48K indicator will light once the AD8X is stably locked onto the received word clock.

❺ MODE Indicators

The EXT A, EXT B, or INT MODE indicator lights to indicate the setting of the rear-panel MODE switch (❶).

❻ Power Switch

Press to turn power ON or OFF.

Note: AD8X operation is suppressed immediately after the power switch is turned ON for the duration of the automatic power-on calibration program — approximately 5 seconds.

❼ ANALOG INPUT Connectors 1 Through 8

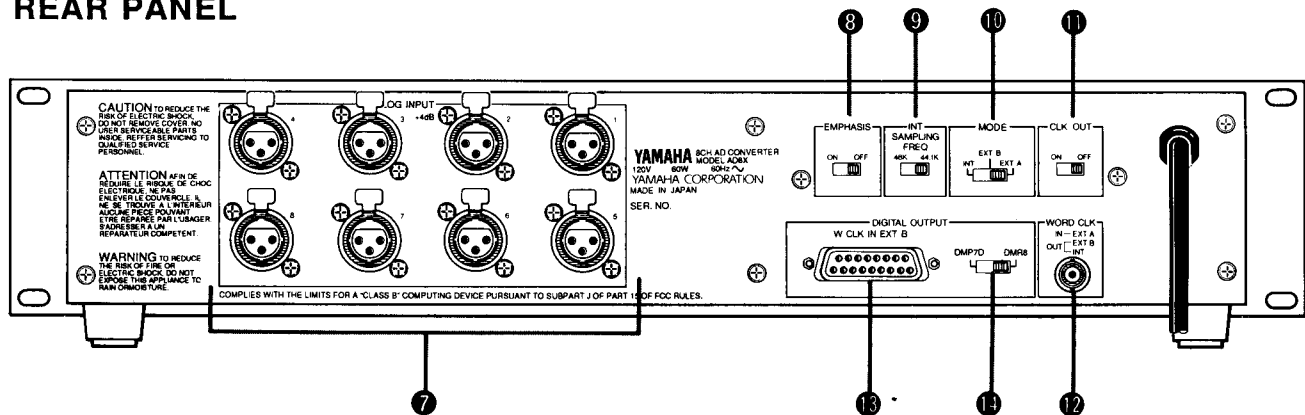
These electronically balanced XLR-3-31 type connectors accept the analog input to each of the eight AD8X channels. Nominal input level is +4 dB.

❽ EMPHASIS Switch

Turns the internal pre-emphasis amp ON or OFF. The front-panel EMPHASIS indicator lights when this switch is turned ON.

This switch should be turned OFF unless an appropriate de-emphasis circuit will be operating in digital-to-analog conversion or related equipment at a later stage in the reproduction chain. Turning pre-emphasis ON without corresponding de-emphasis does not result in any improvement in signal-to-noise ratio.

● REAR PANEL



⑨ INT SAMPLING FREQ Switch

Sets the AD8X internal sampling frequency to 44.1 kHz or 48 kHz. The sampling frequency switch has no effect when the MODE switch is set to EXT A or EXT B and the AD8X is synchronized to an external word clock signal.

⑩ MODE Switch

Determines the source of the word clock signal to which AD8X operation will be synchronized.

When set to the INT position, the AD8X is synchronized to its own internal clock oscillator, and the sampling frequency is determined by the setting of the INT SAMPLING FREQ switch (⑨).

When set to the EXT A position, the internal clock generator is de-activated and the AD8X is synchronized to an external word clock signal received via the WORD CLK connector (⑫).

When set to EXT B, the internal clock generator is de-activated and the AD8X is synchronized to an external word clock signal received via the DIGITAL OUTPUT (W CLK IN EXT B) connector (⑬).

⑪ CLK OUT Switch

⑫ WORD CLK Connector (IN-EXT A/OUT-EXT B, INT)

This BNC connector either transmits or receives a standard TTL-level word clock signal.

When the MODE switch (⑩) is set to EXT A, the internal clock is de-activated and the AD8X will lock to an external 44.1 or 48 kHz word clock signal received at the WORD CLK connector. In this case, the CLK OUT switch (⑪) has no effect.

When the MODE switch (⑩) is set to EXT B, the internal clock is de-activated and the AD8X will lock to an external word clock signal received at the DIGITAL OUTPUT (W CLK IN EXT B) connector (⑬). In this case, the received word clock signal will be re-transmitted via the WORD CLK connector if the CLK OUT switch (⑪) is set to ON. The WORD CLK connector is inactive if the CLK OUT switch is turned OFF.

When the MODE switch (⑩) is set to INT, the AD8X is synchronized to its own internal word clock. In this case, the internal word clock signal will be transmitted via the WORD CLK connector if the CLK OUT switch (⑪) is set to ON. The WORD CLK connector is inactive if the CLK OUT switch is turned OFF.

Since the WORD CLOCK connector can function as either an output or an input, several AD8X units can easily be synchronized to a "master" AD8X unit or other clock source for multitrack recording or other multi-channel applications.

⑬ DIGITAL OUTPUT (W CLK IN EXT B) Connector

⑭ DMP7D/DMR8 Switch

The DIGITAL OUTPUT (W CLK IN EXT B) connector allows direct connection of the AD8X to a Yamaha DMR8 Digital Mixer/Recorder, DRU8 Digital Recorder, or DMP7D Digital Mixing Processor. This one connector delivers all 8 channels of converted audio to the receiving device, while at the same time receiving the required word clock signal.

Set the DMP7D/DMR8 switch to DMP7D when connecting to a DMP7D, or to DMR8 when connecting to a DMR8 or DRU8. Also make sure that the MODE switch (⑩) is set to EXT B if you intend to synchronize the AD8X to the DMP7D, DMR8 or DRU8 word clock.

OPTIONAL FUNCTIONS

The following two functions all require modification of internal switch settings. Attempting to make these modifications yourself will void the warranty! Refer these and any other modifications to qualified Yamaha service personnel.

■ Bit-shift Delay Compensation

Long cables can delay an external word clock signal sufficiently to cause distortion of the audio signal or complete loss of synchronization. Depending on how your system is set up, you might need to compensate for this type of delay in order to achieve optimum performance. An internal Bit Shift switch can be adjusted by qualified Yamaha service personnel to compensate accurately for any delay in 1/2-bit increments (refer to the timing chart on page 7).

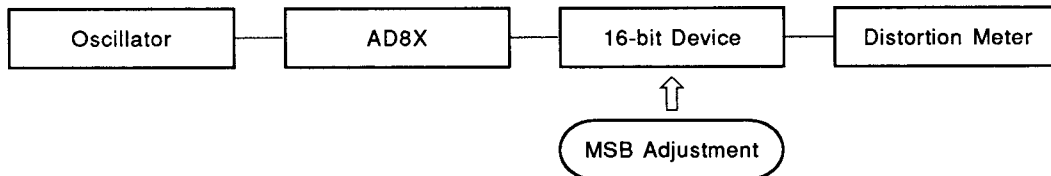
■ Clock Line Termination

The WORD CLOCK I/O connector features an internal terminating resistor switch that can be set for the most stable clock operation in synchronized systems.

Connecting the AD8X to a 16-bit Device (DMP7D)

When the AD8X (19-bit resolution) is connected to a 16-bit device such as the Yamaha DMP7D Digital Mixing Processor, a buzzing noise may sometimes occur due to residual noise modulation when reproducing low-level signals if the MSB of the 16-bit D/A converter is not properly adjusted. If this problem does occur, turning the AD8X internal Noise Shaping switch ON (while the power is turned OFF) can result in a significant reduction in noise. If the problem persists, however, it will be necessary to readjust the MSB of the 16-bit D/A converter. The basic design of the AD8X eliminates the possibility of MSB error.

● Adjustment Setup (Figure 1)



Connect a low-distortion oscillator, the AD8X, the 16-bit device to be adjusted, and a distortion meter as shown in the Figure 1. Set the appropriate AD8X attenuator to MAX, set the oscillator to produce a 1-kHz sine wave at the lowest level at which the distortion meter will operate, and adjust the MSB trimmer of the 16-bit device to produce the lowest reading on the distortion meter.

* In the case of a DMP7D or other Yamaha device, please refer this adjustment to qualified Yamaha service personnel.

SPECIFICATIONS

General Specifications

Frequency Response	20 Hz — 20 kHz, +0.5, -1.0 dB (fs = 48 kHz) 20 Hz — 19.5 kHz, +0.5, -1.0 dB (fs = 44.1 kHz)
Total Harmonic Distortion *	less than 0.0018 % (@ +23 dB, 1 kHz) less than 0.005 % (@ +4 dB **, 1 kHz)
Dynamic Range *	greater than 110 dB (EMPHASIS=OFF)
Hum & Noise *	less than - 90 dB
A/D Conversion	19 bits (Digital Floating)
Sampling Frequency	48 kHz/44.1 kHz

Controls

INPUT LEVEL Controls	Rotary volume with 31 degree detent
INT SAMPLING FREQ Switch	48 kHz/44.1 kHz
EMPHASIS Switch	Pre-Emphasis ON/OFF (T1=50 μ s., T2=15 μ s.)
MODE Switch	EXT A (external clock)/EXT B (external clock)/INT (internal clock)
CLK OUT Switch	EXT A Clock Out ON/OFF (EXT B or INT mode)
DMP7D/DMR8 Switch	Pin assign select for DMP7D/DMR8
Bit Shift Select	For external word clock (EXT A or EXT B mode) (Selectable on internal PCB)

Displays

INPUT LEVEL Meters	12 points bargraph digital peak meter
LED Indicator	MODE; EXT A/EXT B/INT, SAMPLING FREQ.; 44.1K/48K, EMPHASIS

Power Requirements

U.S. & Canadian Models	120 V (105 — 130 V) AC, 60 Hz
General Model	220 — 240 V (\pm 10 %) AC, 50/60 Hz

Power Consumption

U.S. & Canadian Models	60 W
General Model	60 W

Dimensions (W x H x D)

480 (W) x 99.8 (H) x 364.1 (D) mm
(18-7/8" x 3-7/8" x 14-5/16")

Weight

8.0 kg (17 lbs 10 oz)

* Measured by 8192 points FFT Method with Hanning Window.

Total Harmonic Distortion includes all spectrums through the passband without D.C.

** INPUT LEVEL control is nominal position and input level is -20 dB of full scale.

- 0 dB = 0.775 Vrms
- Specifications and appearance subject to change without notice.
- Patent pending

■ Input/Output specifications

● Analog input specifications

Input terminal	Input impedance	Sensitivity *	Input level (@ 1 kHz)		Connector
			Nominal	Max. non-clipping level	
ANALOG INPUT (CH 1—8)	10 kΩ	-2 dB (616 mV)	+4 dB (1.23V)	+23.2 dB (11.2 V)	XLR-3-31 type** (Balanced)

0 dB = 0.775 Vrms

* Sensitivity is the lowest level that will produce the nominal output level when the input level is set to maximum.

** Pin 1: GROUND, Pin 2: HOT (+), Pin 3: COLD (-)

● Digital input specifications

Input terminal	Input level	Connector
WORD CLOCK (EXT A)	TTL	BNC

● Digital output specifications

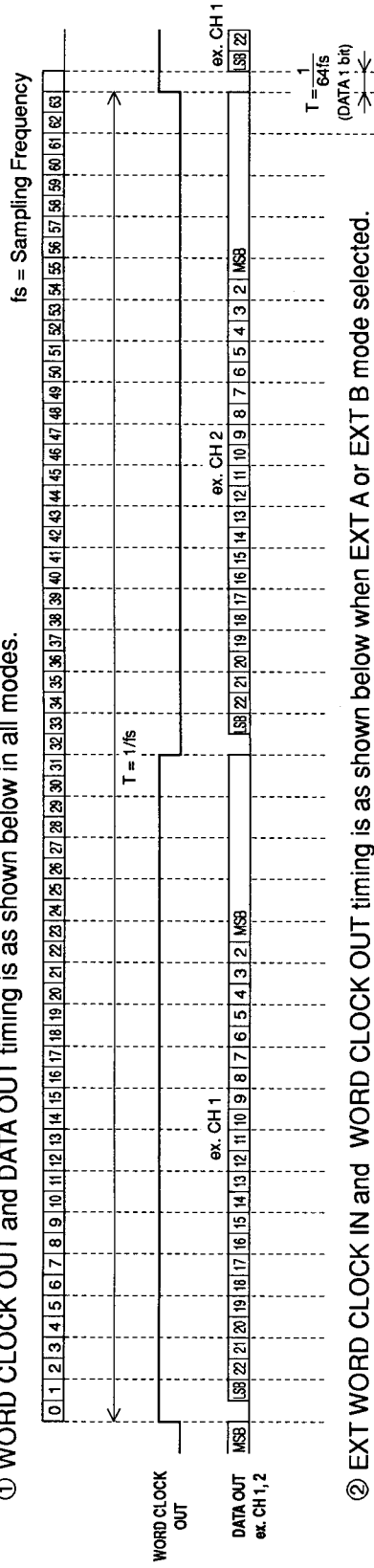
Output terminals		Format	Output level	Connector
DIGITAL OUTPUT	CH 1—8	YAMAHA (MEL2)	RS422	D-sub connector 25P (Female)
	WORD CLOCK IN/OUT			
	EMPHASIS	TTL		
WORD CLK (EXT B, INT)			TTL	BNC

● Digital output pin assignment table

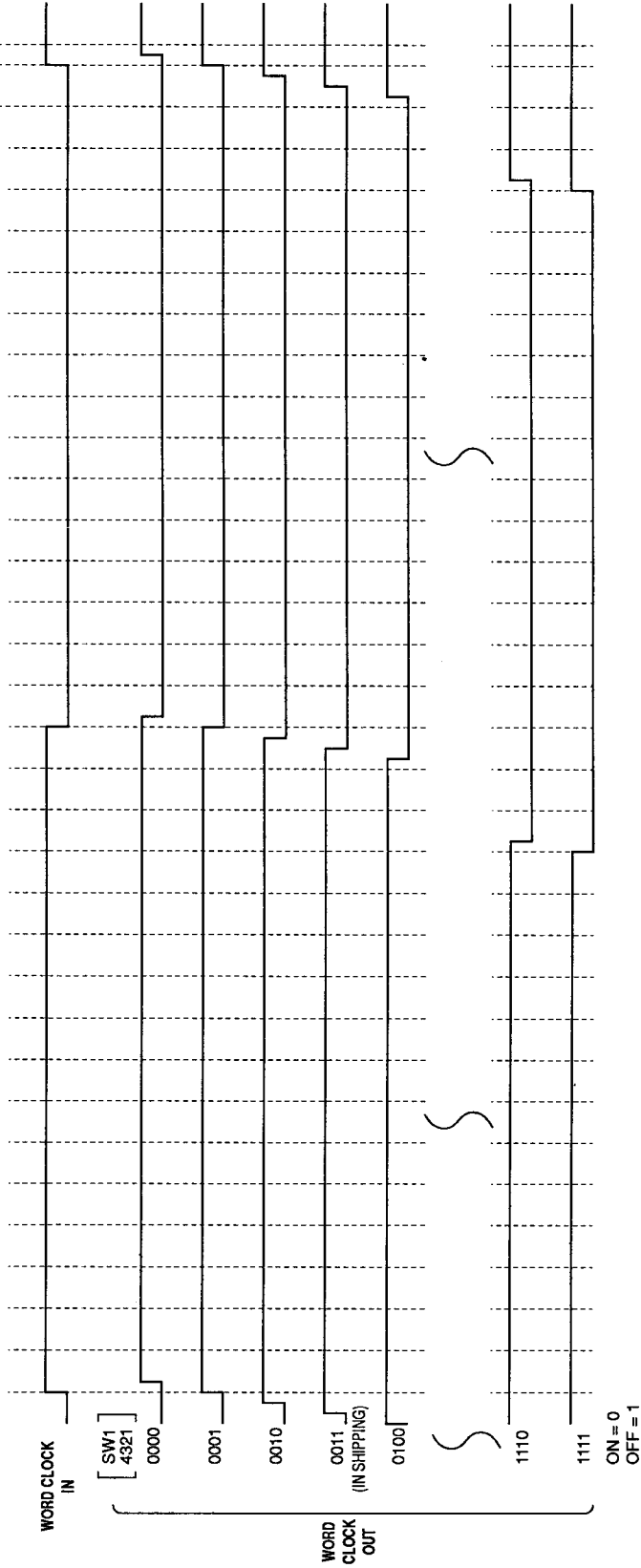
Pin No.	for DMP7D	for DMR8, DRU8
1	DATA CH 1, 2 (+)	DATA CH 1, 2 (+)
2	DATA CH 2, 1 (+)	DATA CH 3, 4 (+)
3	DATA CH 3, 4 (+)	DATA CH 5, 6 (+)
4	DATA CH 4, 3 (+)	DATA CH 7, 8 (+)
5	DATA CH 5, 6 (+)	N.C.
6	DATA CH 6, 5 (+)	N.C.
7	DATA CH 7, 8 (+)	N.C.
8	DATA CH 8, 7 (+)	N.C.
9	Word Clock Out (+)	Word Clock Out (+)
10	Word Clock In (+)	Word Clock In (+)
11	N.C.	Emphasis
12	Emphasis	N.C.
13	Ground	Ground
14	DATA CH 1, 2 (-)	DATA CH 1, 2 (-)
15	DATA CH 2, 1 (-)	DATA CH 3, 4 (-)
16	DATA CH 3, 4 (-)	DATA CH 5, 6 (-)
17	DATA CH 4, 3 (-)	DATA CH 7, 8 (-)
18	DATA CH 5, 6 (-)	N.C.
19	DATA CH 6, 5 (-)	N.C.
20	DATA CH 7, 8 (-)	N.C.
21	DATA CH 8, 7 (-)	N.C.
22	Word Clock Out (-)	Word Clock Out (-)
23	Word Clock In (-)	Word Clock In (-)
24	N.C.	N.C.
25	Ground	Ground

DATA OUTPUT TIMING CHART

① WORD CLOCK OUT and DATA OUT timing is as shown below in all modes.

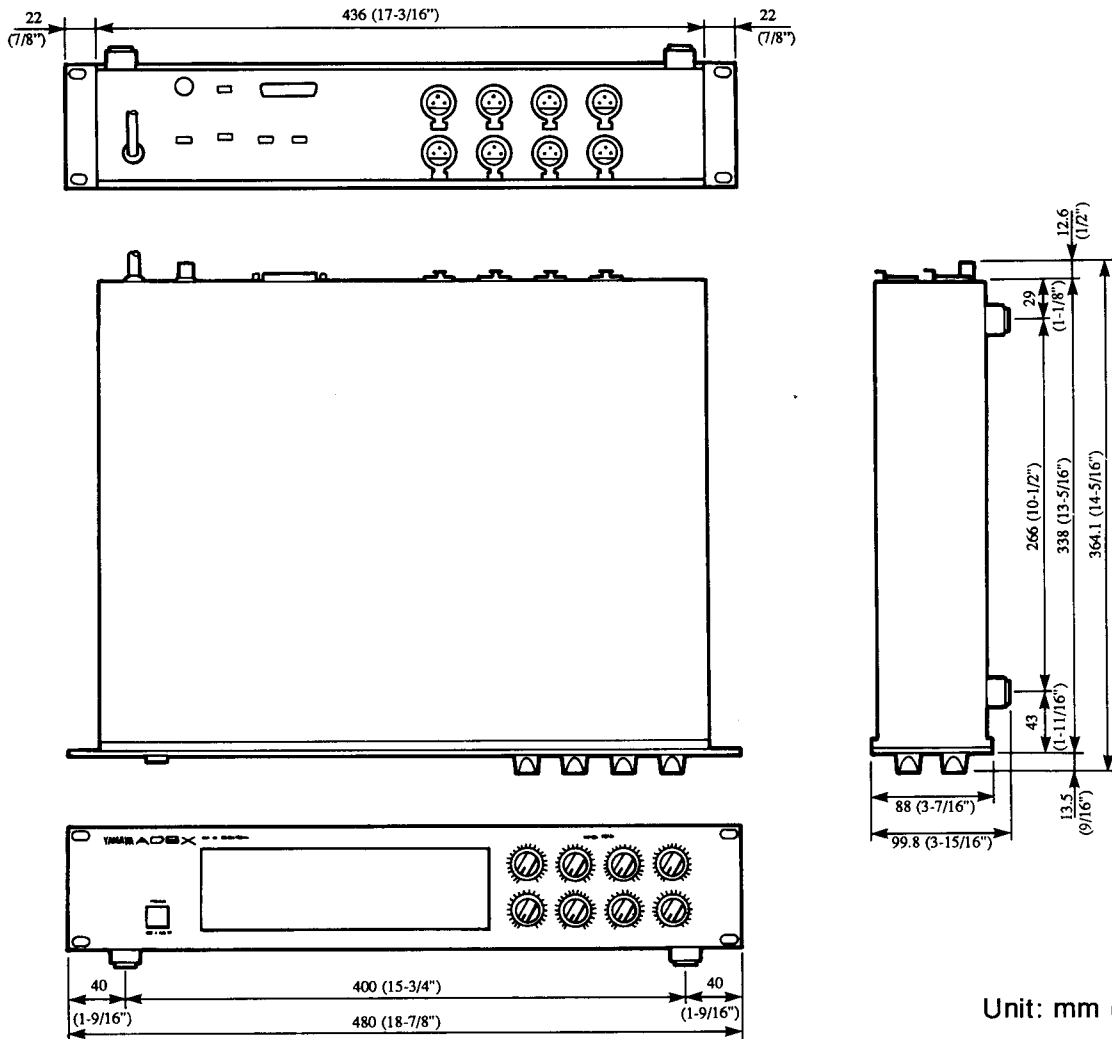


② EXT WORD CLOCK IN and WORD CLOCK OUT timing is as shown below when EXT A or EXT B mode selected.



* Every single increment of the setting with the DIP switch (SW1) inside the unit causes output timing to be shifted by 1/2 bit.

DIMENSIONS



Unit: mm (inch)

IMPORTANT NOTICE FOR THE UNITED KINGDOM

Connecting the Plug and Cord

WARNING : THIS APPARATUS MUST BE EARTHED

IMPORTANT. The wires in this mains lead are coloured in accordance with the following code:

GREEN-AND-YELLOW	: EARTH
BLUE	: NEUTRAL
BROWN	: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol \perp or coloured GREEN or GREEN-AND-YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

SERVICE

This product is supported by YAMAHA's worldwide network of factory trained and qualified dealer service personnel. In the event of a problem, contact your nearest YAMAHA dealer.

ENTRETIEN

L'entretien de cet appareil est assuré par le réseau mondial YAMAHA de personnel d'entretien qualifié et formé en usine des concessionnaires. En cas de problème, prendre contact avec le concessionnaire YAMAHA le plus proche.

KUNDENDIENST

Für dieses Gerät steht das weltweite YAMAHA Kundendienstnetz mit qualifiziertem, werksgeschultem Personal zur Verfügung. Bei Störungen und Problemen wenden Sie sich bitte an Ihren YAMAHA-Händler.

Dette apparat overholder det gældende EF-direktiv vedrørende radiostøj.

Cet appareil est conforme aux prescriptions de la directive communautaire 87/308/CEE.

Diese Geräte entsprechen der EG-Richtlinie 82/499/EWG und/oder 87/308/EWG.

This product complies with the radio frequency interference requirements of the Council Directive 82/499/EEC and/or 87/308/EEC.

Questo apparecchio è conforme al D.M.13 aprile 1989 (Direttiva CEE/87/308) sulla soppressione dei radiodisturbi.

Este producto está de acuerdo con los requisitos sobre interferencias de radio frecuencia fijados por el Consejo Directivo 87/308/CEE.

YAMAHA CORPORATION

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