Chapter 19: Other Functions

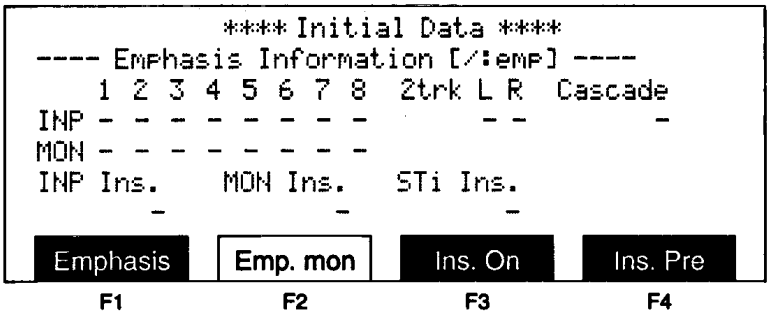
Emphasis

Input Emphasis Monitor

The [Emp. mon] LCD function monitors the incoming digital audio's emphasis status.

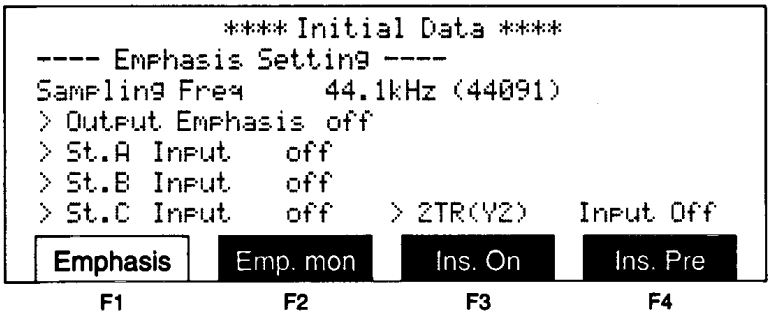
_ no emphasis

/ emphasis



Output Emphasis

The [Emphasis] LCD function is used to set the emphasis status for all digital outputs. If the Output Emphasis parameter is set to on, all digital output signals are emphasized. If the Output Emphasis parameter is set to off, no digital output signals are emphasized. The Output Emphasis setting is unaffected by the input signal's emphasis status, since the DMC1000 can add and remove emphasis to and from the input signals to match with the Output Emphasis setting. However, emphasis for Yamaha 8-pin DIN and M format digital signals cannot be detected automatically, so you must set the emphasis input status for these formats yourself. See "Yamaha 8-pin DIN Format Emphasis" on page 120 and "M Format Emphasis" on page 120.

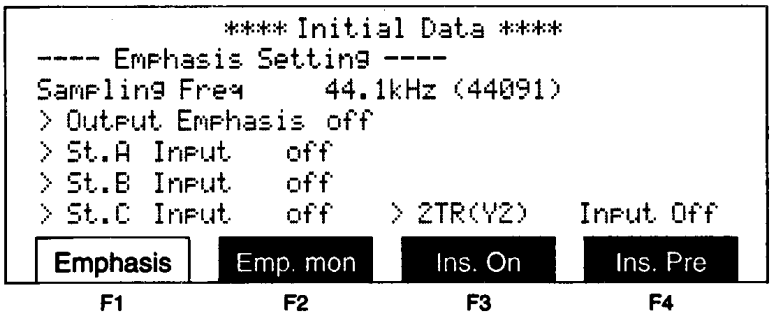


The [Emphasis] LCD function also indicates the sampling frequency (wordclock frequency) in kHz and (Hz).

Yamaha 8-pin DIN Format Emphasis

Because emphasis cannot be detected automatically for Yamaha 8-pin DIN format digital signals, you must set the emphasis input status for this format. If these settings are wrong, there will be noticeable boost or cut of frequencies above 3.5 kHz.

The emphasis status for the Yamaha 8-pin DIN format inputs can be set on the [Emphasis] LCD function.



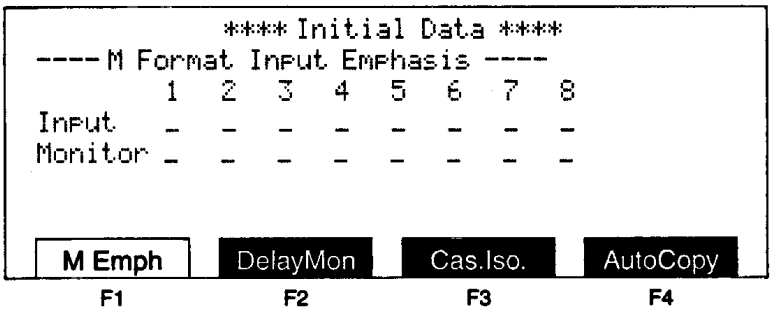
Use the PARAMETER SELECT keys to select an input and the PARAMETER ADJUST keys or data entry wheel to set the input emphasis status (on/off).

M Format Emphasis

Because emphasis cannot be detected automatically for M format digital signals, you must set the emphasis input status for this format. If these settings are wrong, there will be noticeable boost or cut of frequencies above 3.5 kHz.

The emphasis status for the M format inputs can be set on the [M Emph] LCD function.

- _ no emphasis
- / emphasis



Use the PARAMETER SELECT keys to select an Input channel or Monitor channel and the PARAMETER ADJUST keys or data entry wheel to set the input emphasis status.

What is Emphasis?

Emphasis is a technique that was originally developed to improve the performance of the first generation of A/D, D/A converters. Since then, converter technology has improved enormously, thus eliminating the need for emphasis. Emphasis functions have been included on the DMC1000 to cater for situations where, for example, digital audio data from an old master tape that was recorded with emphasis is being remixed, etc.

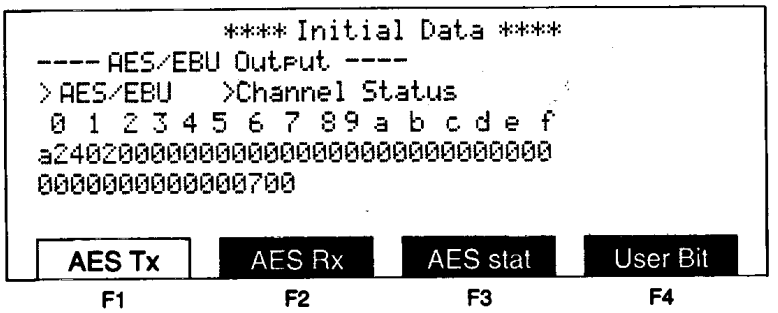
AES/EBU Channel Status & User Bits

Output Channel Status (Hex)

The [AES Tx] LCD function displays the channel status or user bits of the AES/EBU or CD/DAT digital output signals. All values are displayed in hexadecimal. This information may prove to be useful when troubleshooting.

Although values can be changed, it is recommended that unless you have a very good understanding of channel status information, etc., you do not change any values.

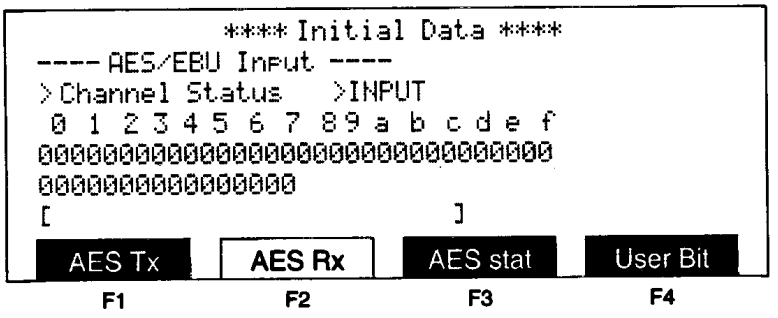
AES/EBU and CD/DAT output user bits can be set using the [User Bit] LCD function. See "AES/EBU User Bits" on page 122.



Use the PARAMETER SELECT and PARAMETER ADJUST keys or data entry wheel to select the AES/EBU or CD/DAT output, and Channel Status or Users Bits.

Input Channel Status (Hex)

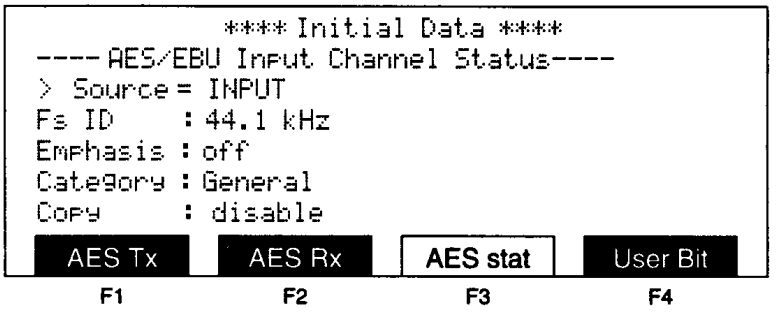
The [AES Rx] LCD function displays the channel status or user bits of an AES/EBU INPUT CHANNEL (1/2, 3/4, 5/6, 7/8), CD/DAT1 input, CD/DAT2 input, or the AES/EBU 2TR MONITOR INPUT. The input to be monitored must be set as the wordclock source. If it isn't, the error message "Wrong WORD-CLOCK" will be shown. All values are displayed in hexadecimal. This information may prove to be useful when troubleshooting.



Use the PARAMETER SELECT and PARAMETER ADJUST keys or data entry wheel to select INPUT or 2TRK, and Channel Status or Users Bits.

Input Channel Status (ASCII)

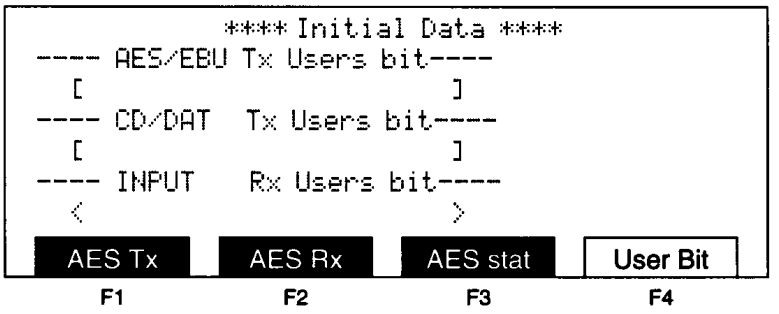
The [AES stat] LCD function displays channel status information of an AES/EBU INPUT CHANNEL (1/2, 3/4, 5/6, 7/8), CD/DAT1 input, CD/DAT2 input, or the AES/EBU 2TR MONITOR INPUT. The input to be monitored must be set as the wordclock source. If it isn't, the error message "Wrong WORD-CLOCK" will be shown. All values are displayed as ASCII characters, and the parameters displayed include sampling frequency, emphasis, category, and copy. For AES/EBU input signals the Category is always Professional, and Copy is always set to enable. However, these parameters will be different for CD/DAT input signals.



Use the PARAMETER ADJUST keys or data entry wheel to select INPUT or 2TRK.

AES/EBU User Bits

The [User Bit] LCD function can be used to enter user bit information into the AES/EBU and CD/DAT output signals. In addition, user bits from any AES/EBU or CD/DAT input can be monitored. The input to be monitored must be set as the wordclock source. If it isn't, the error message "Wrong WORD-CLOCK" will be shown. All values are displayed as ASCII characters



Use the PARAMETER SELECT keys to position the cursor and the PARAMETER ADJUST keys or data entry wheel to enter characters. Up to 24 characters can be entered as user bit information. AES/EBU Tx Users bit information will be included in the left and right data channels and sent via all AES/EBU outputs.

What are User Bits?

User bits refers to a number of data bits that are transmitted with AES/EBU and CD/DAT format digital audio signals. As the name implies, they are for users to enter user information such as time and date of recording, program identification, take number, cue information, etc.

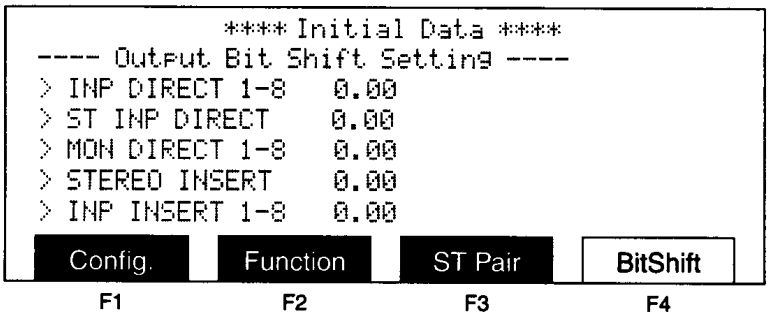
SMPTE timecode also contains a number of user bits specifically for transmitting user information such as time and date, reel number, etc.

Bit Shifting Digital Output Signals

Digital signals sent from the following digital outputs can be bit shifted from 0.00 bits to 63.75 bits, in 0.25 bit steps.

INP DIRECT 1-8	INP DIO 1-8	STEREO SDIF2 TTL
ST INPUT DIRECT	MON DIO 1-8	STEREO AES/EBU
MON DIRECT 1-8	AUX SEND 1	STEREO CD/DAT
STEREO INSERT	AUX SEND 2	MONITOR Y2
INP INSERT 1-8	AUX SEND 3	MONITOR AES/EBU
MON INSERT 1-8	STEREO Y2	BUS 1-8 DSUB
ST INPUT INSERT	STEREO SDIF2 422	BUS 1-8 AES/EBU

Bit shift settings are made using the [BitShift] LCD function shown below.



Use the PARAMETER SELECT keys to scroll through the list of digital outputs and the PARAMETER ADJUST keys or data entry wheel to set a bit shift.

Why Do We Need Bit Shift?

Bit shifting is sometimes required to compensate for digital signal delays caused by long connecting cables and many digital audio processing devices. Both wordclock and digital audio signal are susceptible to these delays. Delays of this kind typically cause signal level changes, noise, or distortion. Usually they can be detected and corrected by ear, however, in a complex system an oscilloscope is useful to check the exact delay size and the amount of bit shift required to correct it. Basically, the transition point of the wordclock signal should align with the start of each audio data word, as shown in Fig 19-1.

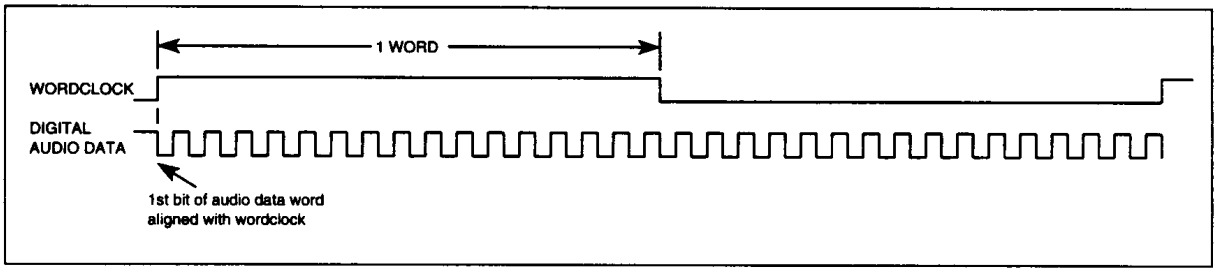


Figure 19-1 Wordclock and audio data word alignment

The relationship between wordclock and digital audio word for the Yamaha Y1, Yamaha Y2, Sony, and Mitsubishi digital audio formats can be seen more clearly in "Digital Audio Formats" on page 165.

Note: There are 64 bits in AES/EBU and Yamaha format audio data words, and 32 bits in SDIF2 and M format audio data words.

There are various factors that affect data delays including data cable length, the number of devices that a signal is passed through, the processing performance ability of the devices, and the system wordclock setup.

It should be noted that these delays are relatively small in relation to audible delays. A data delay of 10 samples at 44.1 kHz is about 200 µs.

The following examples demonstrate situations in which bit shifting may be required to correct delays.

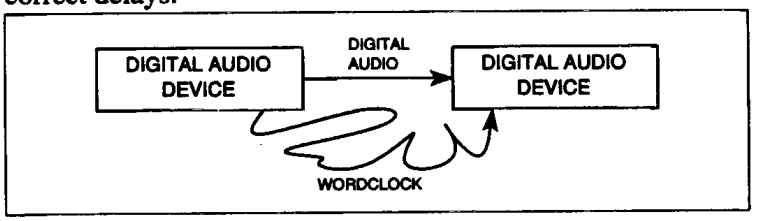


Figure 19-2 Wordclock delay caused by differing cable lengths

In Fig 19-2, the wordclock signal is delayed by the long wordclock cable, so the digital audio will not be interpreted correctly by the receiving device. By bit shifting the digital output, the digital audio can be delayed to realign it with the wordclock.

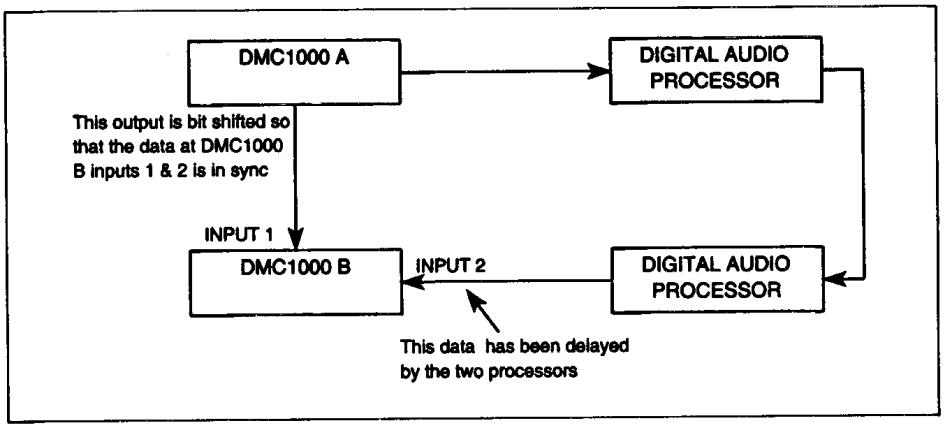


Figure 19-3 Digital audio data delay caused by multiple device processing

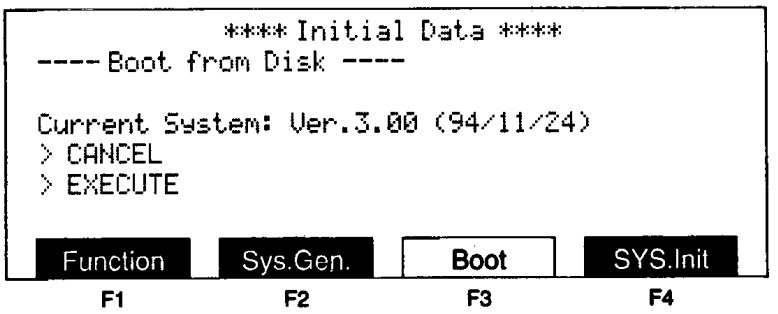
In Fig 19-3, the digital audio data appearing at DMC1000 B INPUT 2 has been delayed by the two digital audio processors, so it cannot be mixed correctly with the data that is sent directly from DMC1000 A. By bit shifting the direct signal, the two signals can be realigned.

Loading the System Software from Disk

To load the system software from floppy disk, insert the system software disk into the disk drive and power on the DMC1000, or follow the procedure below.

1. With the DMC1000 already powered up, insert the system software disk into the disk drive.
2. Locate the [Boot] LCD function shown below.

Note: The [Boot] LCD function does not appear in the [Function] menu.



3. Use the PARAMETER SELECT keys to select "EXECUTE".
4. Press the [+1/ON] key. The message "Are you sure ?" will appear.
5. Press the [+1/ON] key to execute, or the [–1/OFF] key to cancel the operation.
6. If you are loading a new version of the system software, you **must** now execute the [SYS.Init] LCD function. See "System Initialize" on page 126. If you have just re-loaded the same version system software, you do not need to.

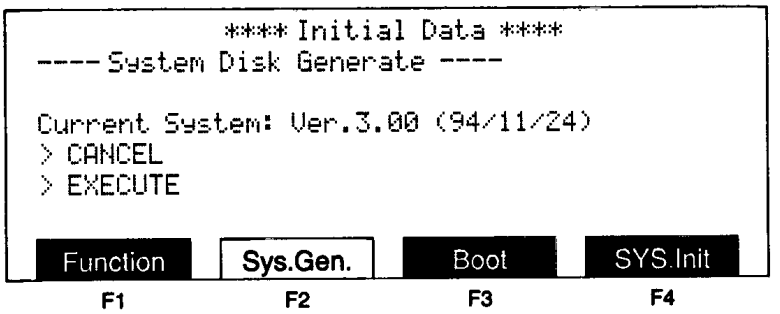
Note: The operating system software is copied from disk into the DMC1000's battery backed up RAM, so the [Boot] LCD function only needs to be used once. This also applies when you are installing a new version of the operating system.

Backing Up the Operating System

To make a backup copy of the operating system, follow the procedure below.

1. Insert a DMC1000 formatted floppy disk into the disk drive. See "Disk Formatting" on page 90.
2. Locate the [Sys.Gen.] LCD function shown below.

Note: The [Sys.Gen.] LCD function does not appear in the [Function] menu.



3. Use the PARAMETER SELECT keys to select "EXECUTE".
4. Press the [+1/ON] key. The message "Are you sure ?" will appear.
5. Press the [+1/ON] key to execute or the [–1/OFF] key to cancel the operation.

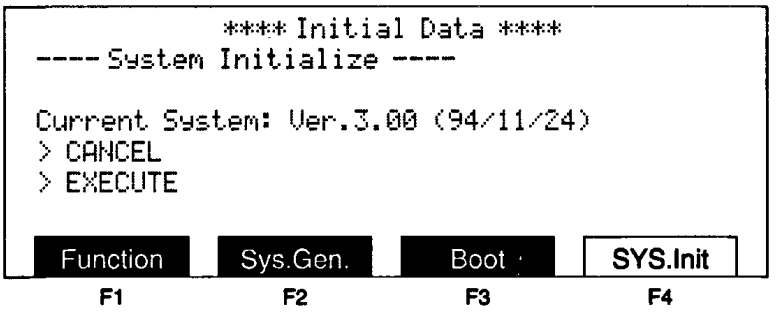
System Initialize

To reset all the setup data parameters to their initial settings, clear all internal scene memories, and perform a fader calibration, follow the procedure below.

Before proceeding, you may want to save the current setup, internal scene memories, and Controller and Program Change assignment tables to floppy disk. See "Saving Data" on page 90. Although automation data is not reset, we recommend that you save it to floppy disk before executing the [SYS.Init] LCD function.

1. Locate the [SYS.Init] LCD function shown below.

Note: The [SYS.Init] LCD function does not appear in the [Function] menu.



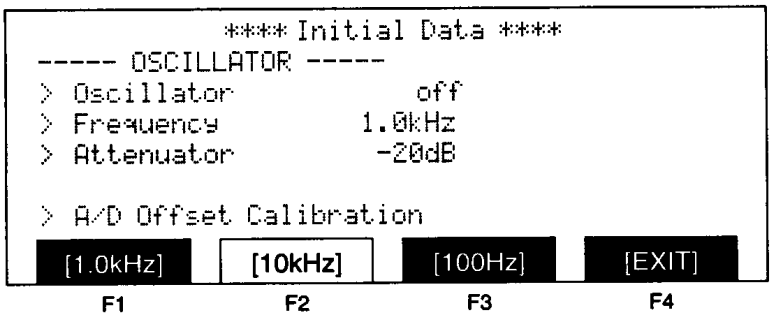
2. Use the PARAMETER SELECT keys to select "EXECUTE".
3. Press the [+1/ON] key. The message "Are you sure ?" will appear.
4. Press the [+1/ON] key to execute or the [–1/OFF] key to cancel the operation.
5. When the system initialization has finished, reload your scene memories, automation data, etc., as required.

Note: This function clears internal scene memories. Scene memories on a RAM card are not affected.

A/D Converter Offset Calibration

When the DMC1000 is powered on, the A/D Offset Calibration function measures the A/D converter's DC offset voltage, and then cancels it by applying a compensatory digital offset to the data after A/D conversion. As long as the room temperature remains the same as it was at power on, it will not be necessary to use this function. If, however, the room temperature does change drastically, for example, an air conditioner or heater causes a drastic temperature change, this function should be used to calibrate the A/D converter's offset.

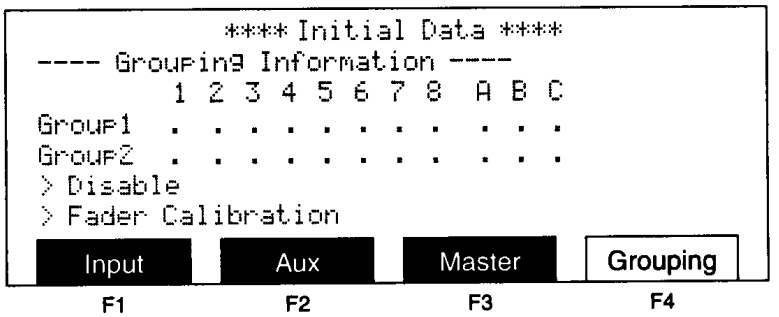
The A/D Offset Calibration function can be found on the [OSC] LCD function. Use the PARAMETER SELECT keys to position the cursor next to "A/D Offset Calibration", then press the [+1/ON] key to execute.



Fader Calibration

The Fader Calibration function calculates the torque required by each motor to drive its fader, smoothly, accurately, and consistently with other faders. Normally, you do not need to use this function. If, however, fader movements become abnormal, the DMC1000 is moved to a new location, or it has not been used for a long, this function should be used to calibrate the faders.

The Fader Calibration function can be found on the [GROUPING] LCD function. Use the PARAMETER SELECT keys to position the cursor next to "Fader Calibration", then press the [+1/ON] key to execute.

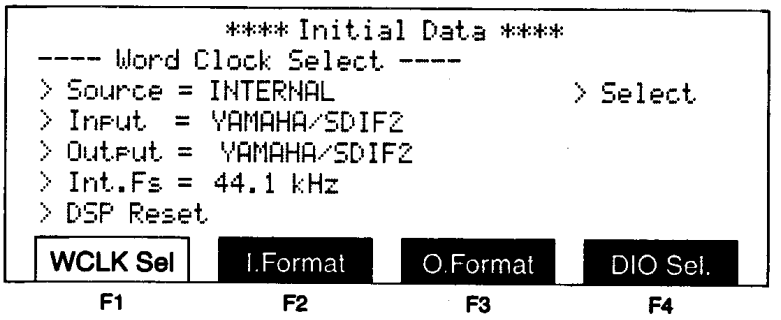


Fader calibration is performed automatically when the [SYS.Init] LCD function is executed.

DSP Reset

Usually the DMC1000 can internally compensate for external wordclock drift and other wordclock abnormalities. If, however, the DSP (Digital Signal Processor) circuits are forced to shut down due to wordclock abnormalities, all analog and digital outputs will be muted. In this case, the DSP Reset function should be used. Likewise, when you think you have set everything up correctly, for example, wordclock connections, source selection, etc., but no signal is being output, use this function.

The DSP Reset function can be found on the [WCLK Sel] LCD function. Use the PARAMETER SELECT keys to position the cursor next to "DSP Reset", then press the [+1/ON] key to execute.



A team of Yamaha runners will appear on the LCD while the DSP circuits are being reset.

Note: If the wordclock source is set incorrectly or the external wordclock becomes disconnected, the error message "Wrong WCLK Source is selected" will appear. This situation does not require a DSP Reset, just reconnect, correct, or select a different wordclock.

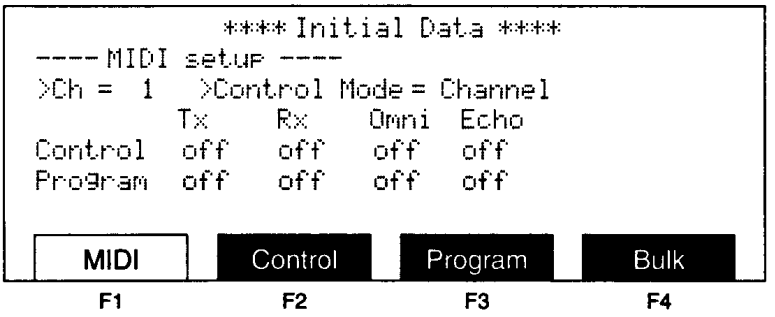
Chapter 20: MIDI & the DMC1000

Sending & Receiving

The DMC1000 can send and receive MIDI Program Change messages, MIDI Controller messages, System Exclusive messages, and System Real Time messages. MTC (MIDI Timecode) can be received, but not sent.

Basic Setup

The [MIDI] LCD function shown below is used to set the basic MIDI send and receive options for Controllers and Program Change messages.



Ch: the MIDI channel used for sending and receiving. When an "Omni" parameter is set to "on", this setting is ignored. See "Controllers" on page 131 for an explanation about how the MIDI channel setting relates to the two Controller modes.

Control Mode: the mode used for Controller messages: Channel mode or Register mode. See "Controllers" on page 131 for a full explanation of those modes.

The following parameters can be set independently for MIDI Controllers and Program Change messages.

Tx: set to "on", messages are sent. Set to "off", messages are not sent.

Rx: set to "on", messages are received. Set to "off", messages are ignored.

Omni: set to "off", messages are sent and received on the specified MIDI channel ("Ch"). Set to "on", messages are sent and received on all MIDI channels. However, when the Control mode is set to "Channel", the "Control" "Omni" parameter is ignored.

Echo: set to "on", messages received at the MIDI IN connection are sent via the MIDI OUT connection.

Program Change

When a Program Change message is received, the scene memory assigned to that Program Change message is recalled.

When a scene memory is recalled on the DMC1000, the Program Change message assigned to that scene memory is output, if the "Program Tx" parameter on the [MIDI] LCD function is set to "on". Likewise, if the "Auto.PLAY→MIDI Out" parameter on the [Config.] LCD function is set to "on", when a scene memory is recalled by the automation [At.MemEd] Memory Sequence Edit LCD function, the Program Change message assigned to that scene memory is output. These Program Change messages can be used to recall scene memories on a number of DMC1000s in cascade, to recall effects programs, or to trigger other MIDI devices.

Program Change messages received from other MIDI devices can be recorded as part of the automation data. See "Automation & MIDI" on page 118.

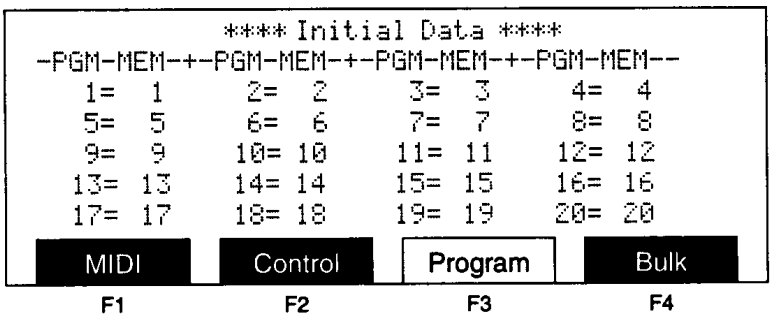
Assigning Scene Mems to Program Change

The "MIDI Program Change Assignment Table" on page 193 lists the initial assignments, and can also be used to note down user assignments.

The [Program] LCD function shown below is used to assign scene memories to Program Change messages.

PGM: Program Change message

MEM: scene memory



With the cursor located in a "PGM" column, use the PARAMETER ADJUST keys or data entry wheel to scroll through the assignment listing.

To change an assignment, position the cursor in the "MEM" column to the right of the required PGM using the PARAMETER SELECT keys. Then, use the PARAMETER ADJUST keys or data entry wheel to select a MEM. A setting of "**" means no assignment.

If two scene memories are assigned to the same Program Change message, both messages can be used to recall the scene memory. However, when the scene memory is recalled on the DMC1000, only the lowest Program Change message will be output by the DMC1000.

Scene memory to Program Change message assignments can be saved to floppy disk. See "Floppy Disk Operations" on page 89. They can also be saved via MIDI Bulk Dump. See "Bulk Dump (System Exclusive)" on page 132.

Controllers

MIDI Controllers can control up to 1,152 DMC1000 parameters, divided into 12 banks, with 96 parameters in each bank. Controller messages can be processed in one of two modes:

Channel mode: each bank uses a different MIDI channel. The MIDI channel used by each bank depends on the currently set MIDI channel setting.

For example,

bank 0 MIDI channel = n + 0

bank 1 MIDI channel = n +1

bank 11 MIDI channel = n + 11

Where n = the currently set MIDI channel.

If a bank's MIDI channel exceeds 16, MIDI channel assignments will start again from 1. For example, if bank 11's MIDI channel is calculated to be 19, it will in fact be MIDI channel 3.

Register mode: Parameter Select 98 (Non-Registered Parameter LSB) is used to specify the bank number. In this mode, all Controller data is sent and received on one MIDI channel.

When a Controller message is received, the DMC1000 parameter assigned to that Controller message is controlled, if the "Control Rx" parameter on the [MIDI] LCD function is set to "on".

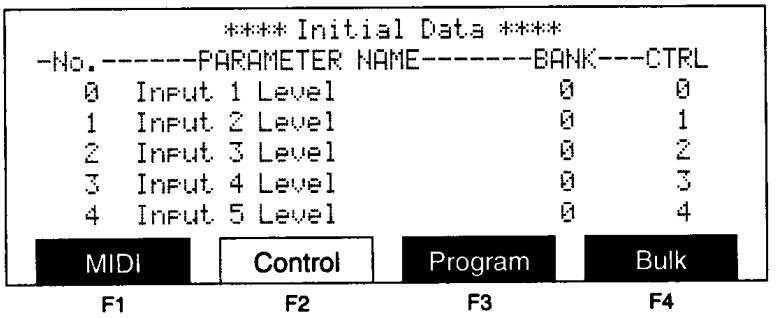
When a parameter is adjusted on the DMC1000, the Controller message assigned to that parameter is output, if the "Control Tx" parameter on the [MIDI] LCD function is set to "on". Likewise, if the "Auto.PLAY→MIDI Out" parameter on the [Config.] LCD function is set to "on", when a parameter is controlled during automation playback, the Controller message assigned to that parameter is output. Controller messages can be used to control parameters on a number of DMC1000s in cascade, or to control other MIDI devices.

Controller messages received from other MIDI devices can be recorded as part of the automation data. See "Automation & MIDI" on page 118.

Assigning MIDI Controllers

The "MIDI Controller Assignment Table" starting on page 194 lists the initial Controller assignments, and can also be used to note down user assignments.

The [Control] LCD function shown below is used to assign Controllers.



With the cursor located in the "No." column, use the PARAMETER ADJUST keys or data entry wheel to scroll through the assignment listing.

To change an assignment, position the cursor in the "BANK" or "CTRL" (Controller) column using the PARAMETER SELECT keys. Then, use the PARAMETER ADJUST keys or data entry wheel to select a BANK or CTRL. A setting of "**" means no assignment.

If two or more parameters are assigned to the same Controller, all those parameters will be controlled by that Controller.

Controller assignments can be saved to floppy disk. See "Floppy Disk Operations" on page 89. They can also be saved via MIDI Bulk Dump. See "Bulk Dump (System Exclusive)" on page 132.

Multi Controller Assign

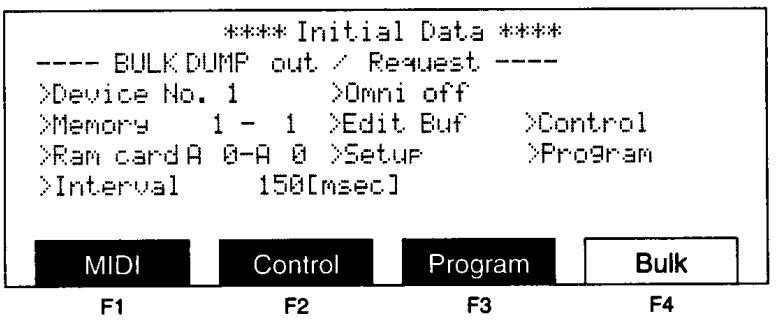
The Config parameter *Multi Controller Assign* is useful when MIDI Control Changes are assigned to several parameters. With *Multi Controller Assign* set to on, the lowest Control Change in the lowest bank has priority, and the parameter assigned to that Control Change is effective.

This function should be used only when MIDI Control Changes are assigned to several parameters. If you can, try and keep each Control Change assigned to only one parameter.

Bulk Dump (System Exclusive)

The following data can be sent and received as MIDI Bulk Dump data: internal scene memories, RAM card scene memories, setup data, edit buffer data, MIDI Controller assignments, and MIDI Program Change assignments.

The [Bulk] LCD function shown below is used to send and request MIDI Bulk Dump data.



Device No.: the device No. should be set to match the device No. set on the device that is sending or receiving the Bulk Dump data. When set to "off", no Bulk Dump data can be sent or received.

Omni: if "Omni" is set to "on", Bulk Dump data can be sent and received even if the device numbers do not match.

Interval: some MIDI devices have small MIDI data buffers, so they need an interval (pause time) between Bulk Dump data blocks. Refer to your MIDI device's *Operating Manual* for the recommended interval time. For Bulk Dump transfer between DMC1000s, this parameter can be left at 150 ms.

The following data types can be sent or requested. Position the cursor at the ">" symbol to the left of the required data type, then press the [+1/ON] key to send the data as Bulk Dump, or press the [–1/OFF] key to send a Bulk Dump request message. In both cases the message "Are You Sure ?" will appear. Press the [+1/ON] key for yes, and the [–1/OFF] key to cancel the operation.

Memory: this parameter allows you select a range of scene memories: 1~32 with no RAM card, 1~96 with a RAM card inserted.

Note: The "Memory" parameter settings affects Bulk Dump send only. If, for example, a Bulk Dump is received containing scene memories 23~40, then scene memories 23~40 will be overwritten, you cannot receive scene memories selectively.

Ram card: this parameter allows you select a range of scene memories from the RAM card: A0~B31. That is, 32 memories in bank A and 32 in bank B.

Note: The "Ram card" parameter settings affects Bulk Dump send only. If, for example, a Bulk Dump is received containing scene memories 33~54, then scene memories 33~54 will be overwritten, you cannot receive scene memories selectively.

Edit Buf: edit buffer data consists of the same parameters that are stored within a scene memory. This allows you to save the current console settings as MIDI Bulk Dump data, without having to use an internal scene memory or RAM card scene memory.

Setup: setup data.

Note: If you want to load setup data, make sure that the "Set-up Memory Protect" parameter on the [Config.] LCD function is set to "off".

Control: Controller assignments.

Program: Program Change message assignments.

Bulk Dump & DMC1000 Cascade

See "Cascade, Scene Memories, & MIDI" on page 136.

System Real Time Messages (MIDI Clock)

See "Automation & Synchronization" on page 101.

MTC

See "Automation & Synchronization" on page 101.

SetupMem Change BULK Out

The "SetupMem Change BULK Out" parameter on the [Config.] LCD function is for use with the *Project Manager* software. Refer to the *Project Manager* manual for details.

Fader Start Command

When the Fader Start Command parameter is set to on, MIDI Note On/Off messages are transmitted when a fader is raised from infinity (-∞). This can be used in conjunction with a "MIDI to trigger" interface box to trigger start other devices when a DMC1000 fader is raised.

Chapter 21: Cascading the DMC1000

To expand the number of channels, DMC1000s can be linked together using the 25-pin D-sub CASCADE connections. The CASCADE connection carries the Stereo bus, the three Aux buses, the eight Bus (group) buses, and the Solo bus between each DMC1000, so all buses can be mixed down using one DMC1000. The DMC1000 with a CASCADE IN connection only works as the Master mixing console. A multitrack recorder, 2-track master recorder, etc., should be connected to the Master DMC1000.

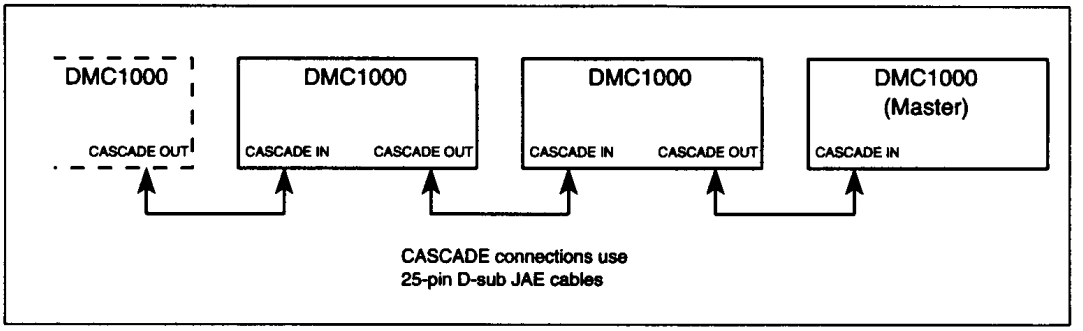


Figure 21-1 Cascading DMC1000s

Delay Setup

From input to output, it takes the DMC1000 a finite time of 10 samples to process a digital audio signal. So in a cascade system, delay compensation must be applied to the Input channels, Monitor channels, and Stereo channels of each DMC1000 excluding the first one in the cascade.

For example, in Fig 21-2 three DMC1000s are cascaded to form a 24-channel system. Each DMC1000 is fed eight channels of digital audio from an AD8X AD Converter. The digital audio arriving at the CASCADE IN connection on DMC1000 B will have been delayed by DMC1000 A. So the Input channels, Monitor channels, and Stereo channels of DMC1000 B must be delayed 10 samples. Accordingly, the digital audio arriving at the CASCADE IN connection on DMC1000 Master will have been delayed by DMC1000 A and DMC1000 B. So the Input channels, Monitor channels, and Stereo channels of DMC1000 Master must be delayed 20 samples.

Delay compensation settings are made on the [Delay] LCD function. See "Delay" on page 37 for full details.

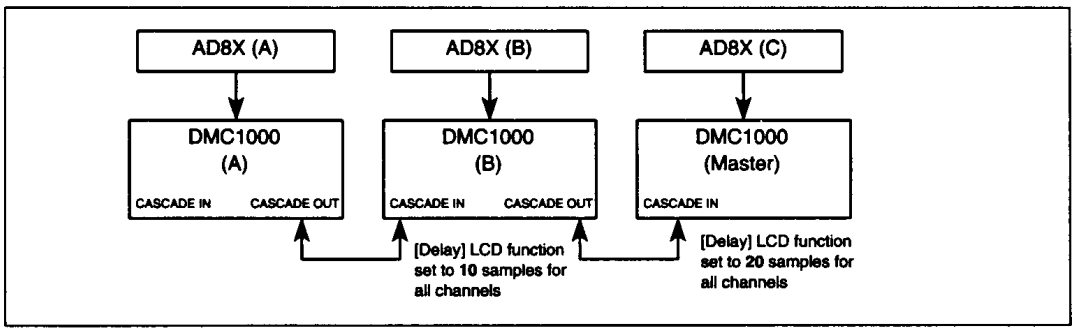


Figure 21-2 Delay compensation in a cascade system

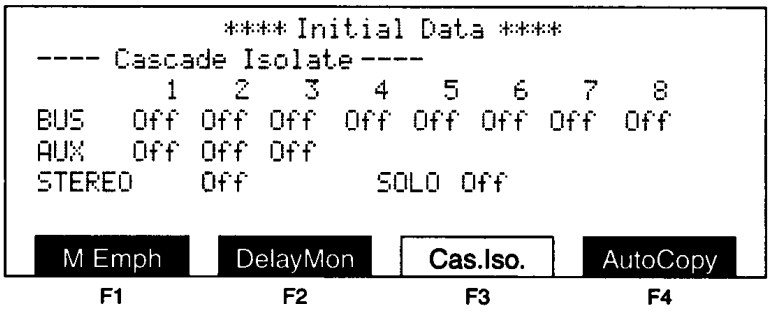
Cascade Bus Isolation

On each DMC1000 in a cascade system, individual buses can be isolated (disconnected) from the cascade bus system using the [Cas.Iso.] LCD function shown below.

`Off` not isolated

`On` isolated

Initially, no buses are isolated from the cascade bus (all Off).

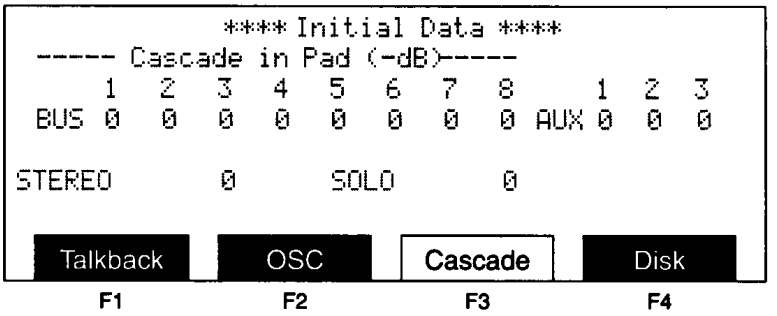


Use the PARAMETER SELECT keys to select a bus and the PARAMETER ADJUST keys or data entry wheel to set it.

Cascade Bus Pads

A pad can be set for each bus signal appearing at the CASCADE IN connection. This could be used when the cascade bus signals are at a relatively high level and you need to attenuate them slightly to provide some more mixing headroom for the Master DMC1000.

Pad range: 0 to ∞ dB, adjustable in 6 dB steps.



Use the PARAMETER SELECT keys to select a bus and the PARAMETER ADJUST keys or data entry wheel to set the pad level.

Solo

As well as the Solo signal bus, the Solo control bus is also carried in the cascade connection. So pressing a [SOLO] key on any DMC1000 will engage solo operation.

The Solo mode, SOLO or AFL, should be selected on the master DMC1000 using the SOLO [AFL] key. See "SOLO [AFL] key" on page 62.

Cascade, Scene Memories, & MIDI

In a cascade system, you can store and recall scene memories on all DMC1000s using the MEMORY [STORE] and [RECALL] keys on the Master DMC1000. When a scene memory is stored on the Master DMC1000, a MIDI Scene Memory Store Request message is sent to the other DMC1000s in the system, which then store their current console settings into a scene memory with the same number as that selected on the master. Fig 21-3 shows how to make the MIDI connections in 24-channel cascade system.

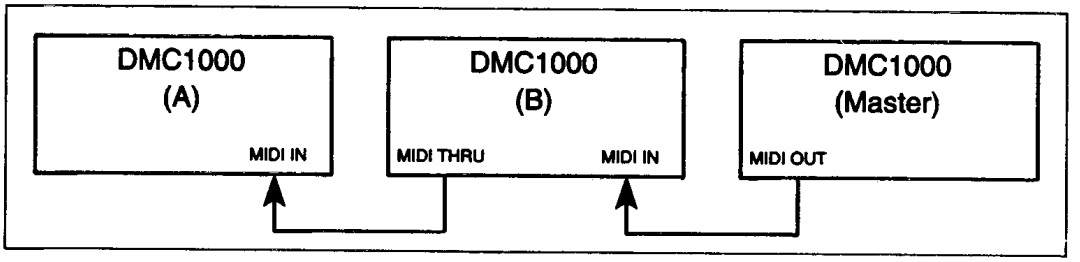


Figure 21-3 Cascade MIDI connections

The "Store Req. OUT Prohibit" parameter on the [Config.] LCD function should be set to "off". So that a Scene Memory Store Request message is sent when a scene memory is stored.

The "Store Req. IN Prohibit" parameter on the [Config.] LCD function should be set to "off".

Note: If the "Internal Mem. Protect" parameter on the [Config.] LCD function is set to "on", the specified scene memory (1~32) will not be stored. Likewise, if a request to store a RAM card scene memory (33~64) is received, but there is no RAM card inserted or the inserted RAM card is set to WRITE PROTECT ON, no scene memory will be stored.

Cascade & MIDI Bulk Dump

The cascade system shown in Fig 21-3 allows you to transfer individual, or all scene memories from DMC1000 Master to another DMC1000 via MIDI Bulk Dump. To transfer a scene memory from DMC1000 A or B, you would have to connect the respective MIDI OUT to the MIDI IN of the DMC1000 that you want to receive that scene memory Bulk Dump. The sending and receiving DMC1000s must be set to the same Device No. See "Bulk Dump (System Exclusive)" on page 132. The MIDI Controller and Program Change assignment tables could be transferred in the same way.

Chapter 22: Video Edit Controllers

The DMC1000 can be controlled using ESAM II protocol commands from a video edit controller, which is EDL (Edit Decision List) driven. The "Audio/Video System 1" on page 146 shows how the DMC1000 can integrated into a video edit environment. In this type of system, the video edit controller could be used to control the DMC1000's faders, and other parameter adjustments could be recorded, edited, and played back using automation, which is synchronized to external timecode.

The DMC1000's internal configuration is, obviously, different to that of dedicated video edit audio mixers, which typically have functions such as *output crossfade* and *source crossfade*, however, ESAM II commands can be used to recall scene memories, control channel faders, and select the C-R monitor source.

ESAM II protocol is supported by many video edit controllers including Ampex ACE200, Sony BVE9100, CMX3600 and OMNI, to name just a few.

Remote Parity

The RS422 CONTROL connection can be set to use Even or Odd parity. Even parity is used mostly, however, you should check the *Operating Manual* of the controlling device to see which parity type it uses.

The CONTROL parity setting is made using the "Remote Parity" parameter on the [Config.] LCD function.

ESAM II Source Mode

If you are using an Ampex ACE200 editor, the "ESAM2 Source Mode" parameter on the [Config.] LCD function should be set to "A". Likewise, if you are using a Sony BVE9100 editor in Source Command mode, it should be set to "A". However, if you are using a Sony BVE9100 editor in Machine Command mode, this setting is ignored.

ESAM II Command List

The DMC1000 can be controlled using the following ESAM II protocol commands.

FROM MACHINE	03 01 B4 XX	
TO MACHINE	03 01 B5 XX	
FROM SOURCE	03 01 A1 XX 03 01 A2 XX	CHANNEL 1 (L) ODD CHANNEL 2 (R) EVEN
TO SOURCE	03 01 A3 XX 03 01 A4 XX	CHANNEL 1 (L) ODD CHANNEL 2 (R) EVEN
TRANSITION DURATION	04 01 A7 XX XX 04 01 A8 XX XX 05 01 BF NN XX XX	CHANNEL 1 (L) ODD CHANNEL 2 (R) EVEN MULTI CHANNEL
TRANSITION START	03 01 A9 XX	
ALL STOP	02 01 A0	
MONITOR MODE	03 01 AA XX	

Each command is explained in full below.

FROM MACHINE03 01 B4 XX

XX = machine number. The machine number corresponds to a DMC1000 scene memory number. When this command is received, scene memory number (XX+1) is recalled. Obviously, you must store something in the scene memory before it can be recalled.

Note: When using the FROM MACHINE command to recall scene memories, make sure that the fade time setting is adopted.

TO MACHINE 03 01 B4 XX

XX = machine number. The machine number corresponds to a DMC1000 scene memory number. This command specifies the scene memory to be recalled when a TRANSITION START command is received. Note: this command only specifies the scene memory number, it does not recall it. Recall starts when a TRANSITION START command is received.

FROM SOURCE 03 01 A1 XX CHANNEL 1 (L channel). Odd DMC channels
03 01 A2 XX CHANNEL 2 (R channel). Even DMC channels.

XX represents the channel selected as the source in bit-pattern form. For example, 03 01 A1 03 will select to channels 1 and 3. 03 01 A2 0C will select channels 6 and 8. The faders of the selected channels will be set to 0 (unity gain) position, and all other faders will be set to their minimum position. Be sure to pan odd-numbered channel to the left, and even-numbered channels to the right before this command is received.

TO SOURCE	**03 01 A3 XX**	**CHANNEL 1**
	03 01 A4 XX	**CHANNEL 2**

XX represents the channel selected as the source in bit-pattern form. This command specifies the channel that is to be selected when a TRANSITION START command is received. Note: this command only specifies the channel, it does not select it. When a TRANSITION START command is received, the fader levels of the specified channels will change over a period of time that is specified by the TRANSITION DURATION command.

TRANSITION DURATION	**04 01 A7 XX XX**	**CHANNEL 1**
	04 01 A8 XX XX	**CHANNEL 2**

XX XX specifies the period of time over which the transition is to occur in 16-bit binary form. The transition time is limited to one of the 52 fade time patterns allowed by the DMC1000. The DMC1000 will select the longest fade time that does not exceed the specified transition duration.

05 01 BF NN XX XX

NN specifies the DMC1000 channel (1~8. NN = 0 for channel 1). Separate transition durations can be set for each channel.

TRANSITION START 03 01 A9 XX

Starts the transition, which will be carried out over the specified TRANSITION DURATION time.

ALL STOP 02 01 A0

Sets all faders to minimum position.

MONITOR MODE 03 01 AA XX

Selects the C-R monitor source: Stereo output (as selected by pressing the [ST] key), which would be the feed to the recording VTR or 2TR monitor input (as selected by pressing the [EXT] key), which would be the recording VTR's monitor playback. It can also be used to mute the selected monitor source.

XX bit 7 1 = STEREO, 2 = 2-TRACK

XX bit 5 1 = MUTE, 0 = MUTE OFF

Chapter 23: System Examples

8-Track DMC1000/DRU8 System

In this system (Fig 23-1) we are using the DMC1000 and DRU8 Digital Recorder. Input sources are connected via an AD8X, and a DAT Recorder is used for mastering. The DRU8 is remotely controlled using the RC8 Controller/Locator. The DRU8 is wordclock master, the sampling frequency is 44.1 kHz, and no emphasis is used. The DMC1000 is synchronized to the DRU8 using SMPTE timecode. Although this system uses an AD8X for A/D conversion, the DMC1000 does have six analog input connectors for the Stereo channels.

DRU8

Connect the DRU8's DIGITAL IN/OUT SLAVE connector to the DMC1000's MONITOR CHANNEL DIGITAL I/O connector using a DDK crossed cable. Connect the DRU8's TIMECODE OUT connector to the DMC1000's TIMECODE IN connector using a balanced XLR type cable. Connect the RC8 to the DRU8's REMOTE connector.

Set the "System Clock" to INT, the "Sampling Frq" to 44.1 kHz, and the "INT Clock Mode" to Xtal. On the INPUT SELECT menu page, set all eight inputs to S. Set the "REMOTE TYPE" to TYPE 1.

DMC1000

To set the wordclock source, locate the [WCLK Sel] LCD function. Use the dial to set the "Source" to MON DIO. Move the cursor to "Select", then press the [+1/ON] key. The "Input" and "Output" parameters should be set to YAMAHA/SDIF2. On the [I.Format] LCD function, set she "Input Channel Format Select" parameter to Y1, and the "Monitor Channel Format Select" parameter to DIO.

On the [Time Code] LCD function, set the "Frame Type" to that recorded on the DRU8 tape. The timecode source should be set to TC INPUT.

NOTE: to synchronize the automation function to an external timecode source, the "Sync" parameter on the Automation LCD function must be set to TimeCode, and the "Source" parameter on the [Time Code] LCD function must be set to TC INPUT.

AD8X

Connect the AD8X's DIGITAL OUTPUT connector (W CLK IN EXT B) to the DMC1000's INPUT CHANNEL INPUT connector using a JAE straight cable. Set the DIGITAL OUTPUT switch to DMP7D and the MODE switch to EXT B. Set the EMPHASIS switch to OFF. The sampling frequency is set automatically by the external wordclock that is connected via the 25-pin D-sub cable. Analog input connection to the AD8X is made using balanced XLR type connectors.

Control Room Monitor Amplifier

The control room's monitor amplifier is connected to the DMC1000's ANALOG MONITOR OUT, LARGE L & R connectors using balanced XLR type cables.

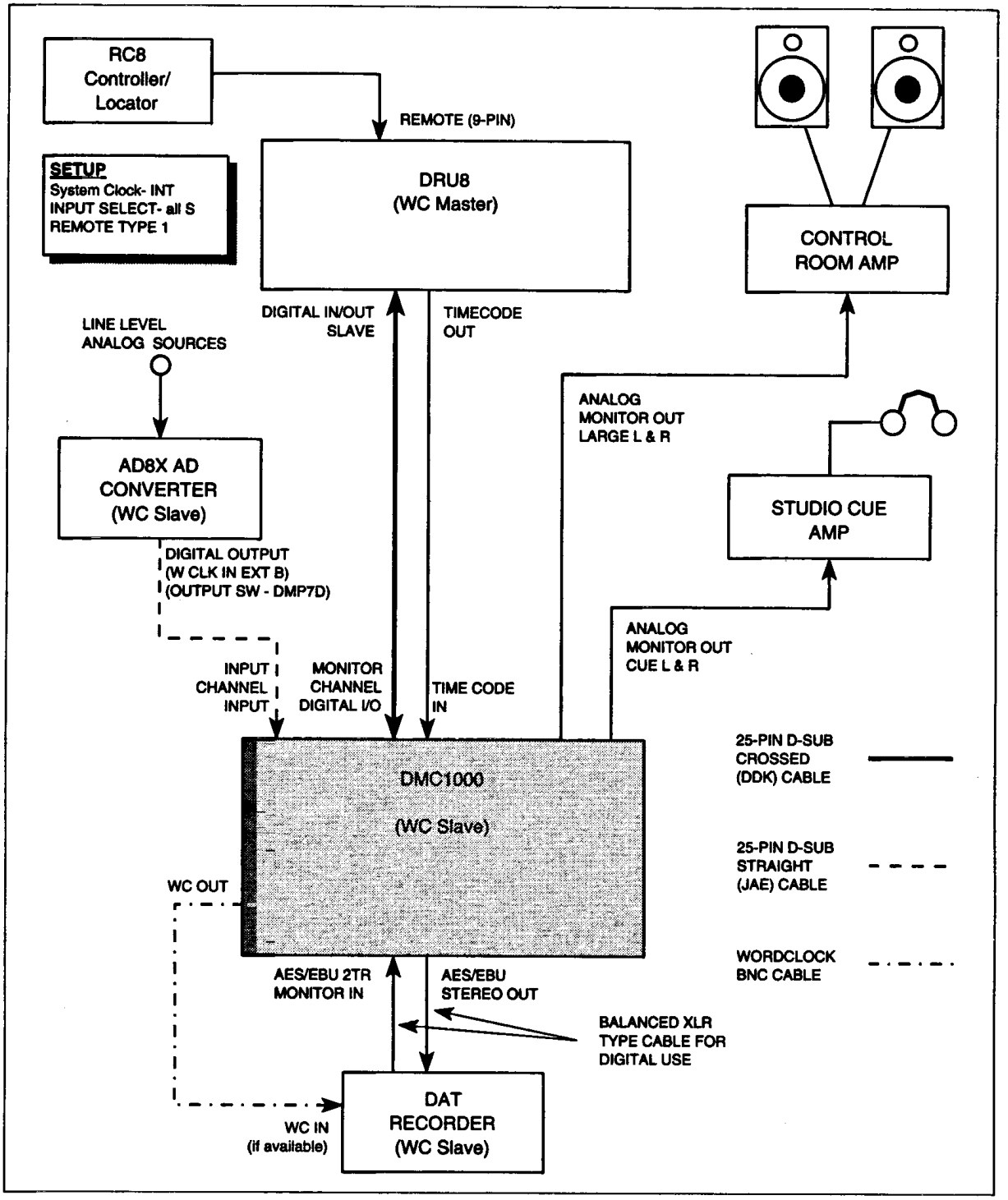


Figure 23-1 8-Track DMC1000/DRU8 System

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	MONDIO	Input Channel Format	Y1	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as timecode on DRU8 tape
Output	YAMAHA/SDIF2	2Track In Format Select	AES		

24-Track DMC1000 System

DMC1000s can be cascaded together to provide 16-, 24-, 32- and 48-track systems. The recorder could be a number of DRU8s or a multitrack recorder. See "DMC1000/Sony Multitrack System" on page 149 and "DMC1000/Mitsubishi Multitrack System" on page 151.

This system (Fig 23-2) is basically an extension of the DMC1000 8-track system, we're using three DMC1000s and three DRU8s. Stereo output and monitoring is handled by DMC1000 A. Control of the three DRU8s is provided by the RC24 Controller/Locator, which also provides comprehensive timecode location facilities and, when necessary, independent control of each DRU8. DRU8 A is the wordclock master and also the timecode source. The sampling frequency is 44.1kHz and no emphasis is used. Mastering is to a DAT recorder. Timecode is connected to each unit using balanced XLR type cables.

DMC1000

The DMC1000s should be set up the same as for the "8-Track DMC1000/DRU8 System" on page 140. Also make the Cascade connections as shown in Fig 23-2 using JAE straight cables. For DMC1000 A, the "Source" parameter on the [WCLK Sel] LCD function should be set to MONDIO. For DMC1000s B and C it should be set to WCLKIN, which is the BNC connection.

NOTE: on the [Cascade] LCD function, all buses should be set to 0, and on the [Cas.Iso.] LCD function, all buses should be set to Off.

DRU8

Connection of the DRU8s and the settings for DRU8 A are the same as for the "8-Track DMC1000/DRU8 System" on page 140. DRU8s B and C should both be set to EXT, BNC "System Clock".

RC24 & AD8X

Connect the RC24 to the PW24 using the supplied 25-pin D-sub cable. Connect each DRU8 to the relevant REMOTE connector on the PW24 (A, B, C) using 9-pin D-sub cables.

The AD8Xs are set up the same as for the "8-Track DMC1000/DRU8 System" on page 140.

See the DMC1000 "8-Track DMC1000/DRU8 System" on page 140 for details about connecting a control room monitor amplifier and a studio cue monitor amplifier.

NOTE: the M20P cassettes that are going to be used in the DMR8 MASTER and SLAVE, must be formatted at the same time using ALL REC in Parallel Chase mode.

IFU4

DRU8 A WORD CLK output is connected to the IFU4's INPUT (TTL) 1 connector. The IFU4's TTL outputs are connected to DRU8s B and C and DMC1000s B and C.

DMC1000 A takes its wordclock source directly from DRU8 A via the MONITOR CHANNEL DIGITAL I/O connection. All wordclock connections use BNC cables.

MIDI

The DMC1000 has many MIDI options: automation can be synchronized to external MTC. Parameters can be assigned to one of 1,152 Controllers. That's 12 groups of MIDI Controllers 1~96. Each group can be assigned to an individual MIDI channel, or Register mode allows all Control Messages to be sent on one MIDI channel. In effect, all parameters that are controlled by the DMC1000's automation function can be controlled by an external MIDI computer. Also scene memories can be assigned to MIDI Program Change messages, allowing scene memory recall via MIDI.

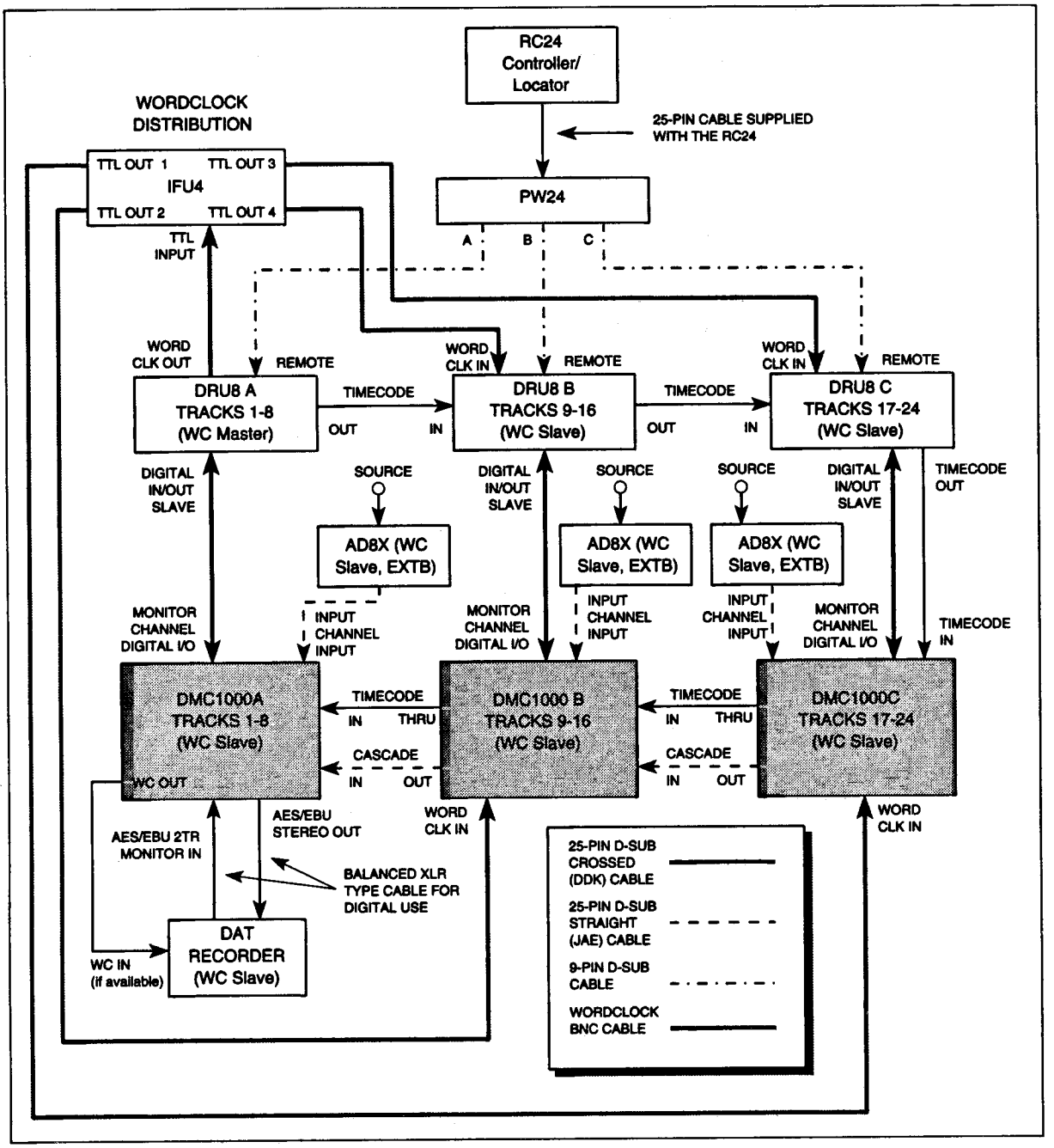


Figure 23-2 24-Track DMC1000 System

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	(A) MONDIO, (B & C) WCLK IN	Input Channel Format	Y1	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as timecode on DRU8 tape
Output	YAMAHA/SDIF2	2Track In Format Select	(A) AES		

Mastering to DAT

In this system, eight tracks from the DRU8 are being mixed down through the DMC1000 onto DAT. During mixdown, the DMC1000's automation could be synchronized to external timecode or MTC.

Connection to the DAT Recorder is made via the AES/EBU STEREO OUT connector. The DAT Recorder is monitored via the 2TR MONITOR IN (AES/EBU, CD/DAT). The DAT Recorder takes its wordclock source from the DRU8.

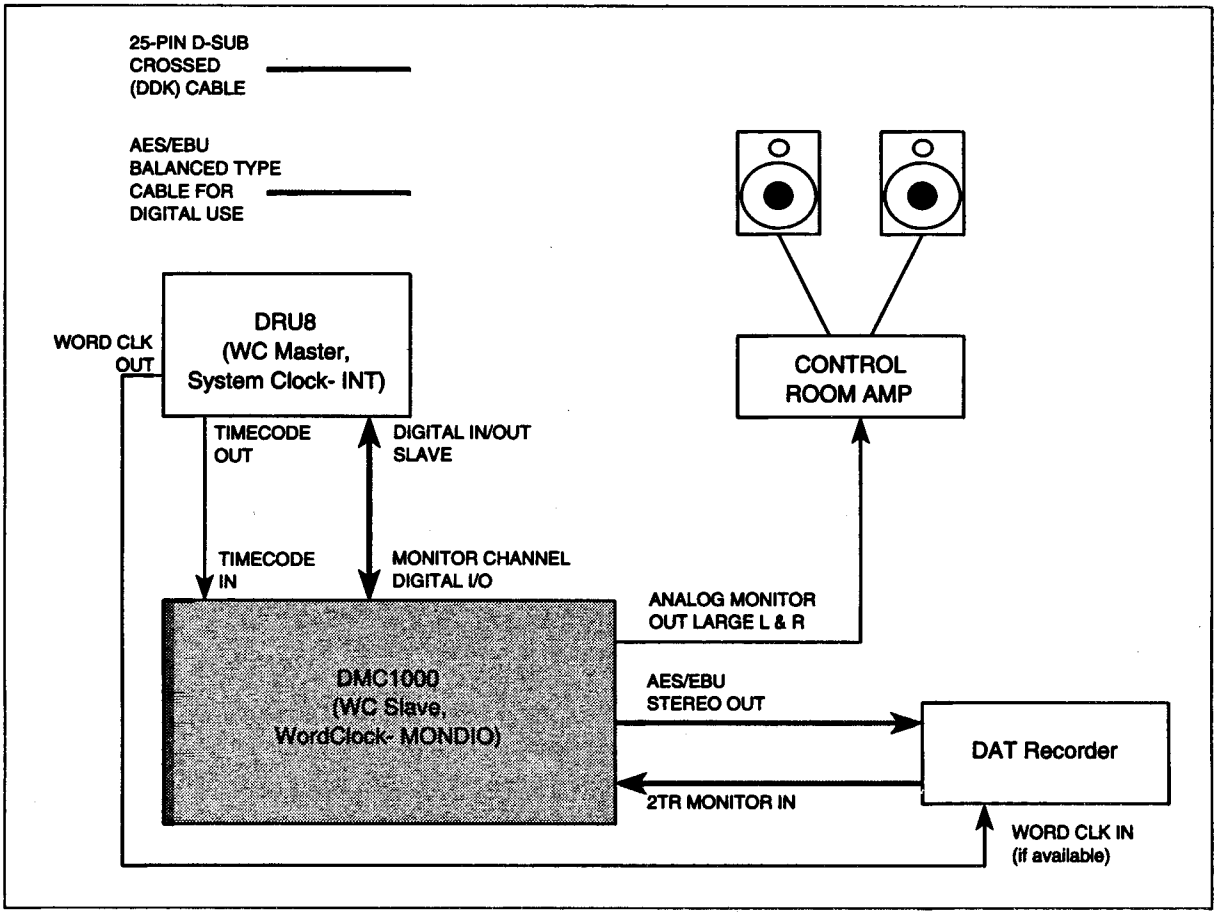


Figure 23-3 Mastering to DAT

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	MONDIO	Input Channel Format	Y1	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as timecode on DRU8 tape
Output	YAMAHA/SDIF2	2Track In Format Select	AES		

Mastering to a Digital 2-Track

Fig 23-4 shows a digital 2-track being used for mastering. Input and output connections could be AES/EBU or SDIF2 format. An optional wordclock connection is shown.

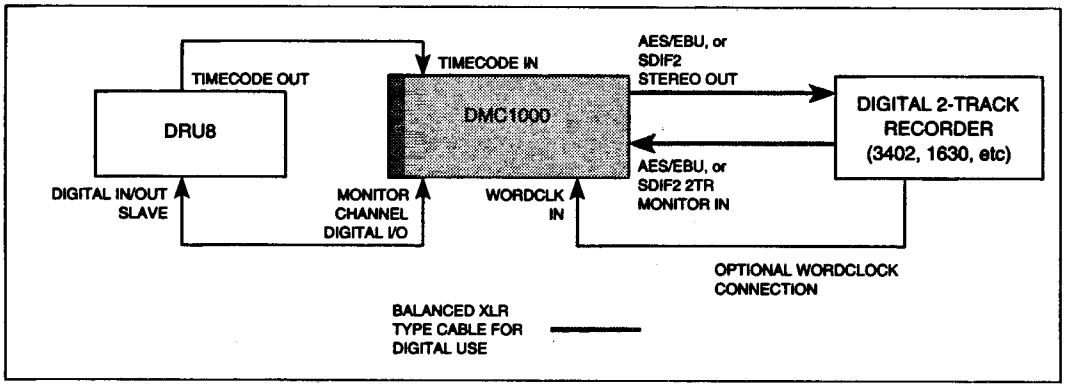


Figure 23-4 Mastering to a Digital 2-Track

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	WCLK IN or whichever input is used	Input Channel Format	Y1	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as timecode on DRU8 tape
Output	YAMAHA/SDIF2	2Track In Format Select	AES or SDIF2		

Mastering to an Analog 2-Track

Fig 23-5 shows an analog 2-track being used for mastering. The DMC1000's ANALOG MONITOR OUT LARGE L& R connectors are connected to the 2-track recorder's inputs. The LARGE LEVEL control should be set to its maximum position, so that the level of the signal appearing at the large L&R outputs corresponds with the L STEREO R meters.

NOTE: the CLIP LEDs on the L STEREO R meters actually indicate the maximum output level, which is +18 dBm. The –14 dB LEDs indicate output levels of +4 dBm.

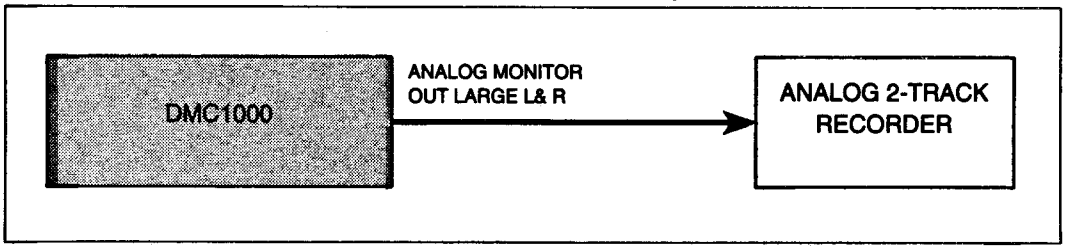


Figure 23-5 Mastering to an Analog 2-Track

Mastering to a YPDR601

The Yamaha YPDR601 Optical Disc Recorder can also be used for mastering. It uses a high-quality robust medium that is cost effective. However, it should be remembered that CD-R recording is a once only process (WORM).

Audio/Video System 1

In Fig 23-6 the DMC1000 is being used to mixdown and sweeten audio material from four digital VTRs. The AES/EBU stereo outputs of the four VTRs, A, B, C and D, are connected to the DMC1000's AES/EBU CHANNEL INPUTS. From the DMC1000, audio material is fed to a recording VTR. The recording VTR is monitored via the DMC1000's 2TR MONITOR IN connection.

The VTRs could be any of the following. D1, D2, D3, or any VTR with AES/EBU input and output connections. The VTR's AES/EBU output signals must all be in phase.

All edits are controlled by an EDL driven video editor, which is connected to all the VTRs and the DMC1000. The video editor is using ESAM II protocol commands to recall scene memories, control channel faders, and select the C-R monitor source on the DMC1000. An in-house Video Sync generator supplies all the VTRs and the video editor with a video sync reference signal.

Timecode is output from the recording VTR and fed to the DMC1000. This should be used as the sync source for the DMC1000 automation. Automation allows fully automated mixdown, that is, automation of every adjustable parameter on the DMC1000.

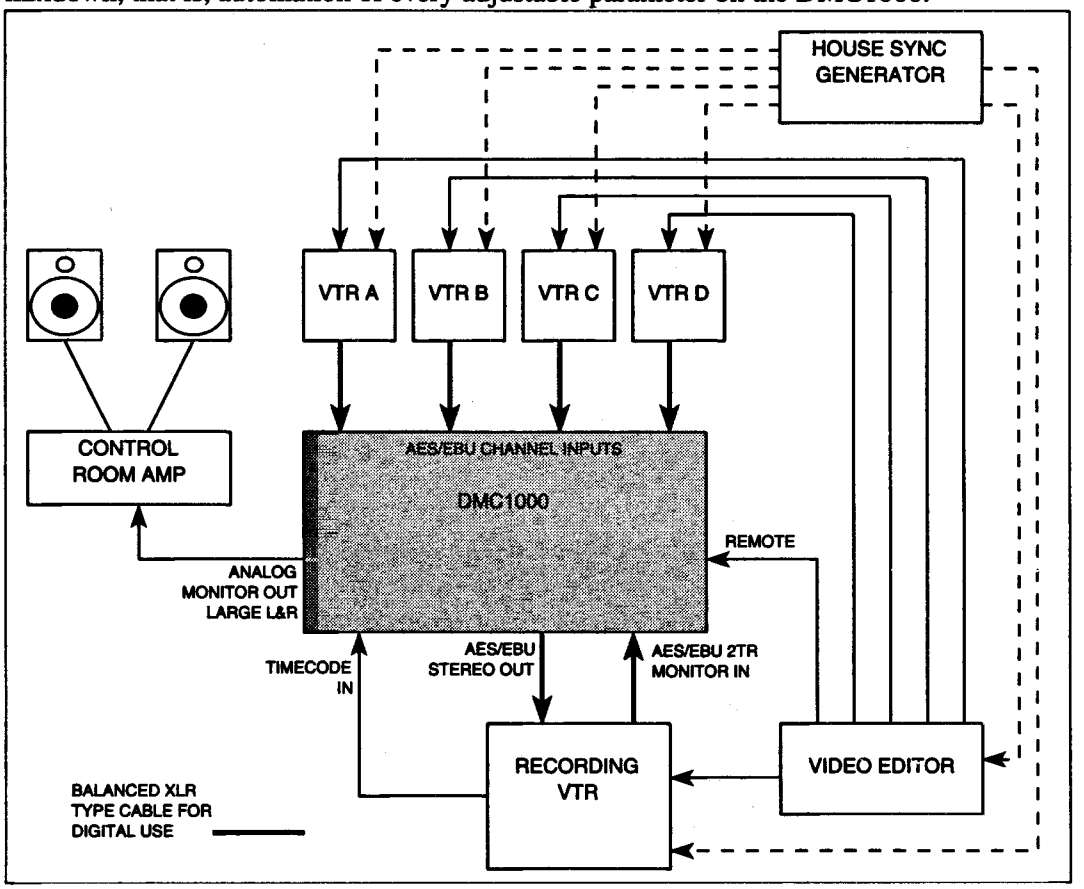


Figure 23-6 Audio/Video System 1

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	AES/EBU 1/2CH	Input Channel Format	AES	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as timecode on DRU8 tape
Output	YAMAHA/SDIF2	2Track In Format Select	AES		

Audio/Video System 2

In Fig 23-7 the DMC1000 is used in conjunction with the Screen Sound post production editing system. The DMC1000 with full automation, 64 scene memories, internal effects processing, and touch sensitive fader selection, greatly expands the flexibility of the Screen Sound system.

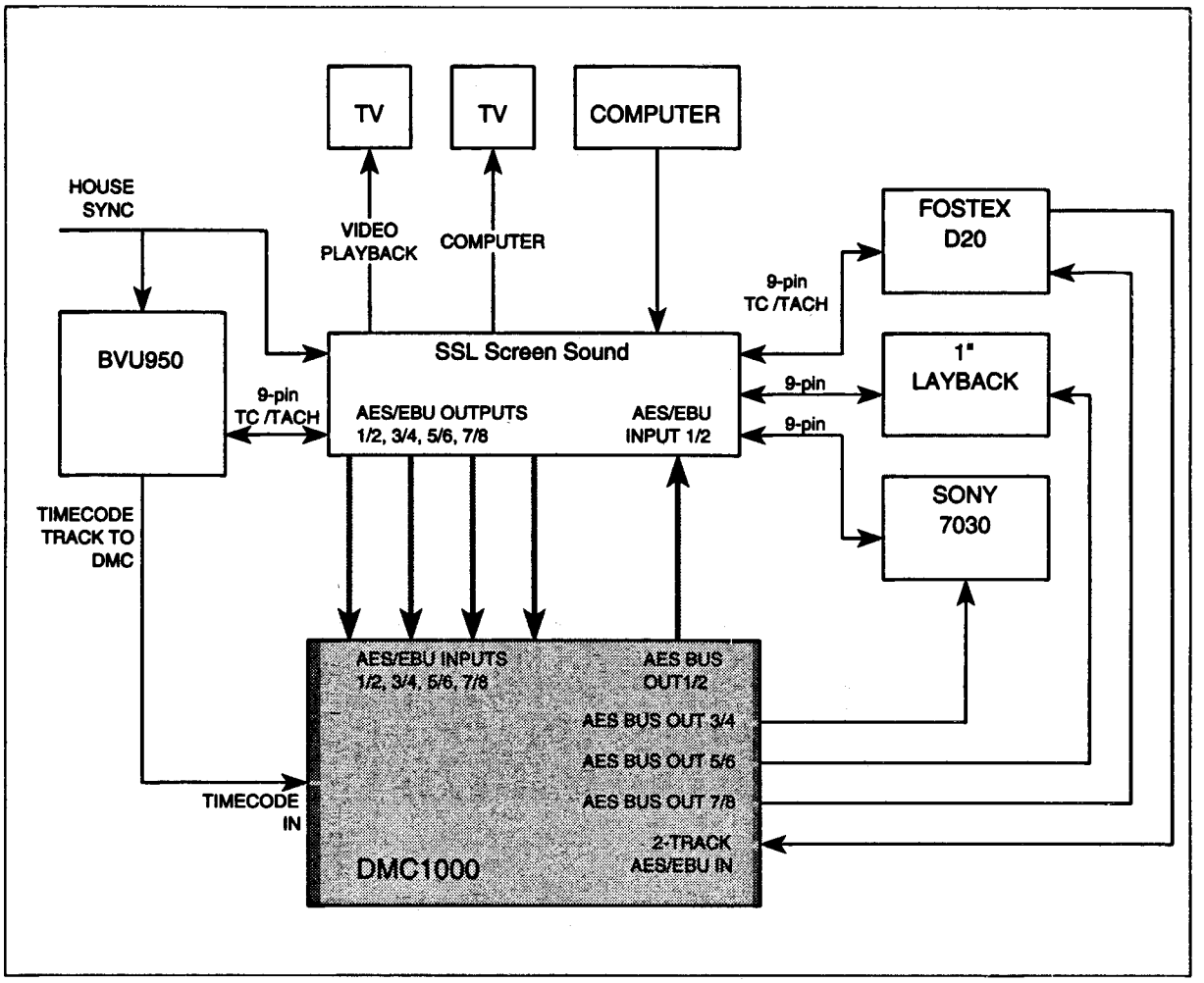


Figure 23-7 Audio/Video System 2

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	AES/EBU 1/2CH	Input Channel Format	AES	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as timecode on BVU950 tape
Output	YAMAHA/SDIF2	2Track In Format Select	AES		

DMC1000/Hard Disk Recorder System

In Fig 23-8, the DMC1000's AES/EBU BUS OUT connectors output audio data to a hard disk recorder. Some hard disk recorders have only one digital input. In this case, only the BUS OUT 1/2 connector would be used. On the hard disk recorder, the two digital signals can be assigned to any pair of tracks (or a single track). The outputs from the hard disk recorder are connected to the DMC1000's AES/EBU CHANNEL INPUTS.

If more than eight channels are required, DMC1000s can be cascaded together to provide 16-, 24-, and 32-channel mixing. See the "24-Track DMC1000 System" on page 142.

DMC1000 automation allows fully automated mixdown, that is, automation of every adjustable parameter on the DMC1000. In this system, automation is synchronized to the hard disk recorders timecode.

If the hard disk recorder does not have wordclock inputs and outputs, then the DMC1000's wordclock source should be set to AES/EBU.

If a 2-track recorder is used as wordclock master, a wordclock connection to the DMC1000 will be required.

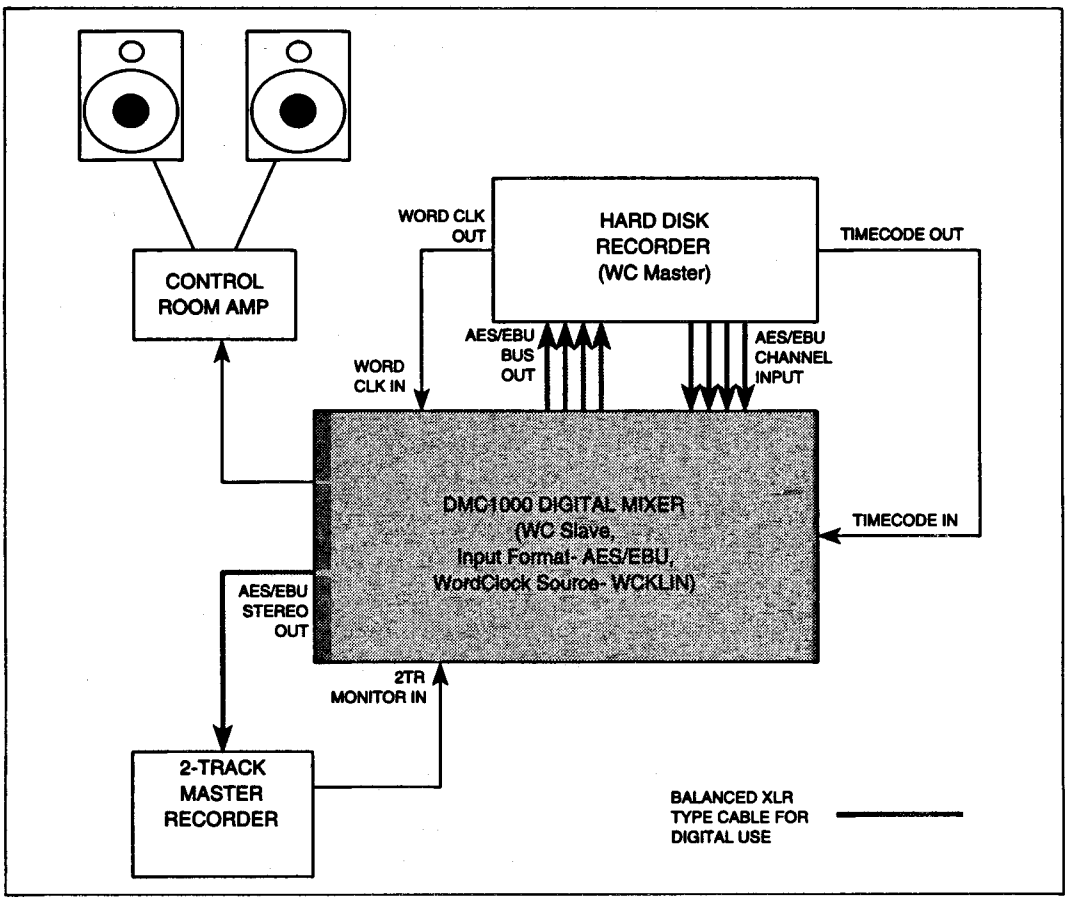


Figure 23-8 DMC1000/Hard Disk Recorder System

DMC1000 Setup

[WCLK Sel]		[I.Format]		[TimeCode]	
Source	WCLK IN	Input Channel Format	AES	Source	TC INPUT
Input	YAMAHA/SDIF2	Monitor Channel Format	DIO	Frame Type	same as hard disk recorder
Output	YAMAHA/SDIF2	2Track In Format Select	AES		

DMC1000/Sony Multitrack System

Fig 23-9 shows how three DMC1000s and a Sony PCM-3324 digital multitrack recorder can be integrated to form an all-digital 24-track recording system.

From DMC1000 to PCM-3324

PCM audio data from each DMC1000 is input to the IFU5B. JAE straight cables are connected from the DMC1000s' BUS OUT connectors to the IFU5B's FROM CONSOLE connectors. The DMC1000's BUS output format is set to SDIF2.

IFU5B

The IFU5B is a passive 32-channel normalized patch bay that allows PCM audio data transfer between Yamaha and other manufacturers' multitrack equipment. Typically, data is transferred track to track, that is, track 1 to track 1, track 2 to track 2, etc., *normalized*. However, using the bantam jacks on the front panel, individual channels from the DMC1000 can be rerouted to any track of the PCM-3324. In this example, 24 channels of data are input to the IFU5B, then output to the PCM-3324 via one 50-pin D-sub connector. The DISTRIBUTE A connections on the IFU5B front panel allow one DMC1000 track to be distributed among four PCM-3324 tracks. The DISTRIBUTE B connections work the same as A, so up to two DMC1000 tracks can be distributed.

As well as the 24 bus channels, the stereo L & R SDIF2 outputs of each DMC1000 are connected to the IFU5B. These can be patched through to any of the PCM-3324's 24 tracks using the bantam jacks on the IFU5B's front panel.

IFU4 (4 & 5)

These two IFU4s only need to be connected if the IFU5B's DISTRIBUTE connections are to be used. Each IFU4 takes one channel of PCM audio data in and distributes it among four buffered outputs (RS-422). Rear panel settings: INPUT SELECT A to TTL1/RS422, and INPUT SELECT B to RS422.

From PCM-3324 to DMC1000

IFU5A

The IFU5A is similar in operation to the IFU5B, but here we input the 24-tracks from the PCM-3324 via a 50-pin D-sub connector to the IFU5A and output the data to the DMC1000s using JAE straight cables. Each JAE straight connection carries eight channels of audio data. As with the IFU5B, tracks can be patched and rerouted using front panel bantam jacks. The DMC1000's CHANNEL INPUT connectors input format is set to SDIF2.

IFU4 (1)

This IFU4 is used to distribute the wordclock from the PCM-3324 to each DMC1000 using BNC cables. Also three RS-422 outputs are connected to the IFU5A's WORDCLOCK IN connections', which are subsequently fed through to the DMC1000s via the JAE straight cables that carry the audio data. Rear panel settings: INPUT SELECT A to TTL1/RS422, and INPUT SELECT B to TTL1.

IFU4 (2 & 3)

These two optional IFU4s provide the same facility as IFU4s 4 & 5, but for data being distributed through the IFU5A. Settings and connections are the same as for IFU4s 4 & 5.

NOTE: although the wordclock from the PCM-3324 is being fed to each DMC1000 through the IFU5A, it must also be connected to each DMC1000 using the BNC connections as shown. The wordclock source for each DMC1000 should be set to BNC. Connection to a Sony PCM-3348 digital multitrack would require two systems.

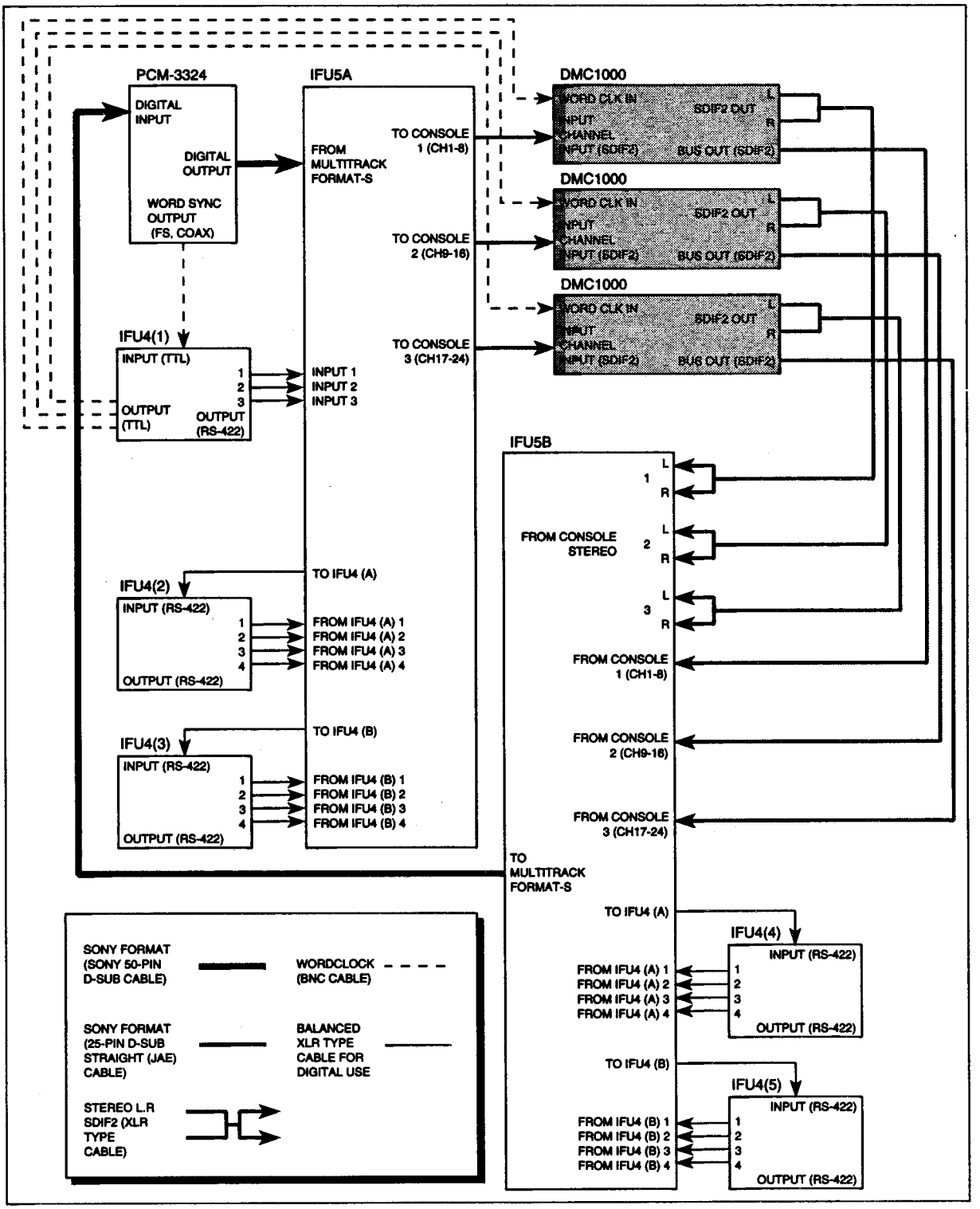


Figure 23-9 DMC1000/Sony Multitrack System

DMC1000 Setup

[WCLK Sel]		[I.Format]		[O.Format]	
Source	WCLK IN	Input Channel Format	SDIF2	BUS	SDIF2
Input /Output	YAMAHA/SDIF2				

DMC1000/Mitsubishi Multitrack System

Fig 23-10 shows how four DMC1000s and a Mitsubishi X850 digital multitrack recorder can be integrated to form an all-digital 32-track recording system.

From DMC1000 to X850

Audio data from each DMC1000 is input to the IFU5B. JAE straight cables are connected from the DMC1000's BUS OUT connectors to the IFU5B's FROM CONSOLE connectors. The DMC1000's BUS output format is set to M.

IFU5B

The IFU5B is a passive 32-channel normalized patch-bay that allows audio data transfer between Yamaha and other manufacturers' multitrack equipment. Typically, data is transferred track to track, that is, track 1 to track 1, track 2 to track 2, etc., *normalized*. However, by using front panel bantam jacks, individual channels from the DMC1000 can be rerouted to any track of the X850. In this system, 32 channels of data are input to the IFU5B, then output to the X850 via two 50-pin D-sub connectors. The DISTRIBUTE A connections on the IFU5B front panel allow a DMC1000 track to be distributed among four X850 tracks. The DISTRIBUTE B connections work the same as A, so up to two DMC1000 channels can be distributed.

IFU4 (5 & 6)

These two IFU4s only need to be connected if the IFU5B's DISTRIBUTE connections are to be used. Each IFU4 takes one channel of audio data in and distributes it among four buffered outputs (RS-422). Rear panel settings: INPUT SELECT A to TTL1/RS422, and INPUT SELECT B to RS422.

From X850 to DMC1000

IFU5A

The IFU5A is similar in operation to the IFU5B, but here we input the 32-tracks from the X850 via two 50-pin D-sub connectors to the IFU5A and output the data to the DMC1000s using JAE straight cables. Each JAE straight cable connection carries eight channels of PCM audio data and the wordclock that is used for audio data inputting. As with the IFU5B, tracks can be patched and rerouted using front panel bantam jacks. The DMC1000's INPUT CHANNEL INPUT connectors input format is set to M.

IFU4 (1)

This IFU4 is used to distribute the wordclock signal from the X850's INT CLOCK OUT connection to the DMC1000's BNC TTL WORD CLK inputs and through IFU5A to the DMC1000's INPUT CHANNEL INPUT (RS-422). Rear panel settings: INPUT SELECT A to TTL1/RS422, and INPUT SELECT B to TTL 1.

IFU4 (2)

This IFU4 is used to distribute the bitclock signal from the X850 to the DMC1000s (RS-422). Rear panel settings: INPUT SELECT A to TTL1/RS422, and INPUT SELECT B to RS422.

IFU4 (3 & 4)

These two optional IFU4s provide the same facility as IFU4 5 & 6, but for data being distributed through IFU5A. Settings and connections are the same as for IFU4s 5 & 6.

NOTE: the DMC1000 has two wordclock signals: one from the INT CLOCK OUT connector (via IFU4 1) and one carried in the DUB OUT A connection. The INT CLOCK OUT wordclock is used because it is more stable. On the [WCLK Sel] LCD function, the "Source" should be set to WCLK IN, and the "Input" should be set to M.

NOTE: if only one DMC1000 is being used, then IFU4 2 is not required. Also the DMC1000 should be connected to the IFU5B's 1(CH1-8) FROM CONSOLE connector and the IFU5A's BIT CLOCK OUTPUT should be connected to BIT CLOCK INPUT 1.

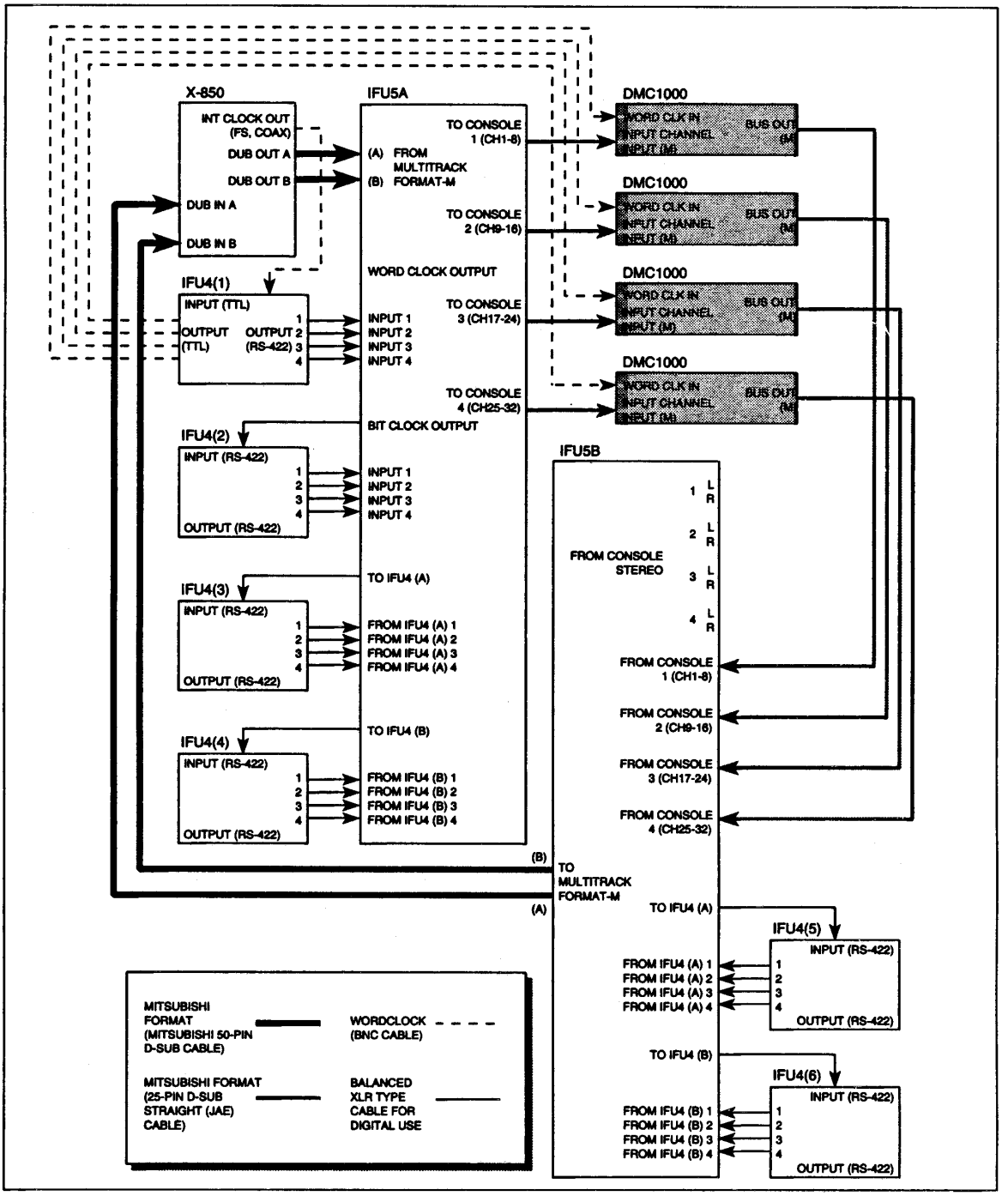


Figure 23-10 DMC1000/Mitsubishi Multitrack System

DMC1000 Setup

[WCLK Sel]		[I.Format]		[O.Format]	
Source	WCLK IN	Input Channel Format	M	BUS	M
Input /Output	M				

Appendix A

Troubleshooting

Symptom	Remedy
A input signal has been connected, but cannot be monitored.	Check the [I.Format] LCD function.
DMC1000 output signals are not received correctly by another device.	Check the [O.Format] LCD function.
The signal received via a digital input sounds distorted.	Is the device that is sending the digital signal synchronized to the same wordclock as that being used by the DMC1000?
	If the digital signal is at a different wordclock frequency (sampling frequency) to that used by the DMC1000, the signal will be noticeably distorted. If, however, the wordclock frequency is the same, the signal may sound correct, but it isn't.
	If the device is a DAT player that cannot be synchronized to an external wordclock, then that device must be used as wordclock master, and the DMC1000's wordclock source should set to the corresponding digital input connection.
High frequencies (above 3.5 kHz) appear to be unnaturally boosted or attenuated.	Check the emphasis settings. [Emphasis] and [M Emph] LCD functions.
No sound is output and yet all settings appear to be OK.	See "DSP Reset" on page 128.
No input signal appears on Input channels 7 & 8.	Are they set to receive the 2TR monitor input? See "2TR Monitor Signal into Input Channels 7 & 8" on page 69.
Stereo channel C is muted.	This is normal when talkback is being used?
Cannot return the internal effects.	Make sure that the input source for Stereo channels A (Effect 1) and B (Effect 2) is set to INT (external source). See "Using the Internal Effects" on page 76.
An input signal has been connected to Stereo channel A or B, but it cannot be monitored.	Make sure that the input source for these channels is set to EXT (external source). See "Using External Effects" on page 77.
While using the Group function, a fader seems to be very erratic.	Make sure that fader is not assigned to both Groups: 1 and 2.
The "Touch Sense Sel" parameter on the [Config.] LCD function is set to "on", but operation seems erratic.	The touch sense is triggered when a fader contacts skin. Touching the faders with a fingernail, pen, or other insulating object will not trigger the sensor.
Cannot set meter bank II to MON.	Make sure that meter bank I is not already set to MON.
Cannot locate the [Sys.Gen], [Boot], and [SYS.Init] LCD functions.	These LCD functions do not appear in the [Function] menu. Use the [PREV] and [NEXT] keys.
Cannot locate the Automation and Fader Edit LCD functions.	Double click the [AUTO] key for the Automation LCD function, and press the [AUTO] key repeatedly for the Fader Edit LCD function.
You've recorded some automation data, but it doesn't playback correctly.	Have you got a scene memory recall at the very beginning of the automated mix? See "The First Scene Memory" on page 104.
	All parameters must be recalled by the first scene memory. Make sure that the [S/R Prm.] LCD function is disabled before storing the first scene memory.
When automation playback restarts, the automation seems to take a while to get started.	If the amount of automation data is very large, say, more than 50% of the total memory available for all tracks, automation will take a while to calculate the current console settings. If this becomes a hindrance, use the Quick Automation Locate mode. See "Automation Locate Modes" on page 109.

LCD Messages

This section explains the various messages that may appear on the LCD. Some are error messages and some are just process confirmation messages.

Automation Messages

ABORTED! without Up-Date
Automation recording was aborted, no data updated.

****** Automation Data Up-Date ******
New automation data written to recording track.

Automation is ready to record !
You tried to operate the automation data in Record Ready mode.

Automation is running !
You tried to edit automation data while recording.

>>>> Auto Punch IN/OUT Enable <<<<
Auto punch in/out mode is enabled.

Cannot Insert control Data !
Cannot insert automation data.

Cannot Insert Memory Recall !
You tried to insert a scene memory recall into the automation data, but cannot because the track does not have enough free memory.

Data Copied from trk<n1> to trk<n2>
Data was copied from track <n1> to track <n2> using the Merge function.

>> Data too large, Cannot Merge ! <<
Cannot merge because the resulting data would be too large.

$$$$ Extract Count = <n> $$$$
The amount of automation data that was deleted using the Extract function.

Failed to copy Automation Data !
Data could not be copied.

Frame drop out #### (<n>)
<n> = the number of frames that timecode has dropped out.

>>> Failed to up-date Automation data <<<
After recording stopped, new data could not be merged correctly with existing data.

No Data to copy !
You tried to copy nonexistent data.

>>>> No Play Track Selected ! <<<<
No tracks are selected for playback.

No Time Code !

No timecode present at specified connection.

****** Please Wait ! ******

After automation recording, automation data is being updated.

>> Set Different Destination Trk No. <<

Destination track not specified correctly for the automation Merge function.

$$$$ Sorry ! No Back-up Data. $$$$

You tried to swap data on the same track (undo), but there is no previous data.

****** Swap New Data <-> Old Data ******

Data swapped successfully on the same track.

This track is recording now !

You tried to edit automation data while recording. Edit the data when recording has finished.

Time Code Stop

The timecode has stopped.

Time out of range !

You tried to insert a scene memory recall into the automation data, but cannot because it is out of the time range.

>> Track <n> is empty !<<

There is too much data in the track to be merged.

****** TR<n> cannot back-up old data ******

The track's automation data exceeds 50%, cannot back up the previous data.

Disk Messages

######## Disk Full ! ########

****** Disk Full ! ******

No more data can be saved to disk, because it is full. Use new disk.

Disk Read Error !

****** Disk Read Error ! ******

Disk cannot be read.

Disk Write Error !

***** Disk Write Error ! ******

Data cannot be written to disk.

Disk Write Protected !

Floppy disk is write protected.

File already exists !

A file with the same name already exists. Use another name.

File Cannot Close !

****** File Cannot Close ! ******

The file on disk cannot be closed.

File Cannot Open !

The file on disk cannot be opened.

Loading Track <n>

Loading automation data from disk. Please wait.

****** Make System Disk ******

Going to make a system disk.

Memory <n> was restored !

Scene memory <n> was loaded from disk.

######## No Disk ! ########

****** No Disk ! ******

No disk in disk drive. Insert disk.

######## No Files ! ########

****** No Files ! ******

A file with the specified name does not exist on this disk.

$$$$ No Load Track Selected ! $$$$

No [TRK] keys are selected for loading automation data from disk.

$$$$ re-try count = <n> $$$$

Disk data could not be read correctly. The DMC1000 will try to read the data <n> times. This message may appear if the disk drive head is dirty.

Searching Directory ...

Reading the disk directory. Please wait.

Select Load Track ! (USE [TRK] key)

Select a track for automation data loading using the [TRK] keys.

Unformated Disk !

Disk is not formatted.

RAM Card Messages

>>>> Memory Card not Ready ! <<<<

RAM card not prepared.

>>>> Memory Card Write Protected ! <<<<

RAM card is write protected.

>>>> RAM Card not ready ! <<<<

RAM card not prepared.

>>>> Ram Card write protected ! <<<<
RAM card is write protected.

>>>> Unformatted Card ! <<<<
RAM card has not been formatted.

$$ Warning ! Card Format conflict ! $$
RAM card is not formatted correctly.

MIDI Messages

>> BULK data check sum err <c> <n>-<n> <<
The checksum received and the checksum calculated from the data do not match. <c> = the sub data (the data after the DATA NAME), and <n> = checksum.

>>>> BULK data format missing ! <<<<
The data number or sub data is not correct for the received Bulk Dump data.

>>>> BULK byte count missing ! <<<<
The byte count of the received Bulk Dump data and the actual number of bytes received do not match.

>>>> BULK format No. missing ! <<<<
The format number of the received Bulk Dump data is not correct.

>>>> BULK header missing ! <<<<
The header of the received Bulk Dump data is not correct.

>> BULK ID (YAMAHA) No. missing ! <<
The ID number of the received Bulk Dump data is not YAMAHA.

>> BULK memory check sum mismatch ! <<
The data for the received scene memory is not correct.

>>>> Cannot bulk out Memory No.0 ! <<<<
You tried to send scene memory No. 0 as Bulk Dump data. Cannot send scene memory No. 0.

$$ Control Change BULK Received!! $$
MIDI Controller assignment data received as Bulk Dump.

$$$ Edit buffer BULK Received!! $$
Edit buffer data received as Bulk Dump.

$$$ Edit buffer BULK Transmitting!! $$
Edit buffer data sent as Bulk Dump.

>>> Illegal Memory No. ! <<<<
The scene memory number of the data received as Bulk Dump is incorrect.

>>>> Illegal Memory No.0 read only ! <<<<
Data for scene memory No. 0 cannot be received as Bulk Dump.

$$$$ Memory <n> BULK Received!! $$$$
Data for scene memory number <n> was received as Bulk Dump.

$$$$ Memory <n> BULK Transmitting!! $$$$
Data for scene memory number <n> was sent as Bulk Dump.

>>>> MIDI over run error ! <<<<
Over run error occurred during MIDI reception.

>>>> MIDI receive buffer full ! <<<<
The MIDI receive buffer is full.

>>>> MIDI transmit buffer full ! <<<<
The MIDI transmit buffer is full.

$$ Program Change BULK Received!! $$
MIDI Program Change assignment data received as Bulk Dump.

$$ Program Change BULK Transmitting!! $$
MIDI Program Change assignment data sent as Bulk Dump.

$$ Ram Card <c><n> BULK Received!! $$
Data for the RAM card received as Bulk Dump.

$$ Ram Card <c><n> BULK Transmitting!! $$
Data for the RAM card bank <c>, scene memory <n> sent as Bulk Dump.

$$$$ Setup BULK Received!! $$$$
Setup data received as Bulk Dump.

$$$$ Setup BULK Transmitting!! $$$$
Setup data sent as Bulk Dump.

>>>> Warning!! Device No. off <<<<
You tried to send Bulk Dump data with the "Device No." parameter set to off. Set the device No.

Channel Link Messages

Warning! Can't make Multiple Link!
Channels cannot be included in both link groups.

Wordclock Messages

Cannot detect WORD CLOCK !
Wordclock cannot be detected.

Emergency !! >>PLL UNLOCK <<
PLL unlocked because the wordclock has slipped. When locked, the program will be sent to the DSP. Please wait. If this message appears frequently, check the wordclock.

INTERNAL CLOCK was selected !
Internal wordclock source selected automatically.

>>>> PLL UNLOCK ! <<<<

PLL unlocked because the wordclock has slipped. When locked, the program will be sent to the DSP. Please wait. If this message appears frequently, check the wordclock.

Wrong WCLK Source is selected !

Wordclock setting is incorrect.

AES/EBU Messages

>>>> AES/EBU SUB over run error ! <<<<

An over run error occurred while receiving data from the SUB CPU for AES/EBU.

>> AES/EBU SUB receive buffer full ! <<

The buffer for receiving data from the SUB CPU for AES/EBU is full.

>> AES/EBU SUB transmit buffer full ! <<

The buffer for sending data from the SUB CPU for AES/EBU is full.

$$$$ Wrong WORD-CLOCK $$$$

The wrong wordclock source is selected for examining the channel status and user bits of the AES/EBU format signal.

System Setup Messages

>>>> Internal Memory Protected ! <<<<

The "Internal Mem. Protect" parameter on the [Config.] LCD function is set to "on".

>>>> Set-up Memory Protected ! <<<<

The "Set-up Memory Protect" parameter on the [Config.] LCD function is set to "on".

Fader Messages

**** Fader Calibration Complete ! ****

Fader calibration completed.

Fader Calibration Executing !

Fader calibration in progress.

>>>> FADER SUB over run error ! ##

An over run error occurred while receiving data from the fader SUB CPU.

>>> FADER SUB receive buffer full ! <<<

The buffer that receives data from the fader SUB CPU is full.

>> FADER SUB 1 transmit buffer full ! <<

The buffer that transmits data to the SUB CPU No. 1 (channels 1~5) of the main CPU is full.

>> FADER SUB 2 transmit buffer full ! <<

The buffer that transmits data to the SUB CPU No. 2 (channels 6~8, ST channel, and stereo master) of the main CPU is full.

Remote Messages

%%%% all stop (machine) %%%%

%%%% all stop (source) %%%%
ALL STOP command received.

AMX170 Protocol
An edit controller that uses AMX170 protocol is connected to the REMOTE connector.

Break Character Detected (<n>) !
A break character was detected.

<ESAM II Protocol>

[ESAM II Protocol]
An edit controller that uses ESAM II protocol is connected to the REMOTE connector.

%%%% from machine %%%%
FROM MACHINE command received.

%%%% from source %%%%
FROM SOURCE command received.

%%%% monitor mode %%%%
MONITOR MODE command received.

%%%% multi ch transition duration %%%%
MULTI CHANNEL TRANSITION DURATION command received.

%%%% recall mixer %%%%
Scene memory recalled.

>>>> REMOTE over run error ! <<<<
An over run error occurred while receiving data at the REMOTE connection.

>>>> REMOTE receive buffer full ! <<<<
The buffer that receives data from the REMOTE connection is full.

>>>> REMOTE transmit buffer full ! <<<<
The buffer that transmits data from the REMOTE connection is full.

%%%% save mixer %%%%
The current console settings are stored in a scene memory.

%%%% to machine %%%%
TO MACHINE command received.

%%%% to source %%%%
TO SOURCE command received.

%%%% transition duration %%%%
TRANSITION DURATION command received.

%% transfer register check sum error %%
The scene memory check sum sent as ESAM II is not correct.

%%%% transfer register read %%%%
Scene memory data sent.

%%%% transition start (machine) %%%%
MACHINE TRANSITION START command received.

%%%% transition start (source) %%%%
SOURCE TRANSITION START command received.

%%%% transfer register write %%%%
The data sent to the scene memory has been stored.

Other Messages

%%%% Calibration Done ! %%%%
A/D offset calibration completed.

>>> Cannot put title ! (No data) <<<<
Scene memory title cannot be displayed because there is no data in the scene memory.

>>>> Cannot recall this Memory ! <<<<
Cannot recall this scene memory because there is no data stored in it.

@@ DSP Rx ERR ! line (<n1> status (<n2>) @@
Communication with the DSP is not functioning correctly. <n1> = signal line, <n2> status value.

>>>> LINE #0 transmit buffer full ! <<<<

>>>> LINE #1 transmit buffer full ! <<<<

>>>> LINE #2 transmit buffer full ! <<<<
The (#0~#2) buffer that transmits data to the DSP is full.

>>>> Memory No.0 is read only ! <<<<

****** Memory No.0 is read only ! ******
You tried to store the console settings in scene memory No. 0.

>>>> TC Receive buffer full <<<<
The buffer that receives data from the timecode CPU was full, so the data was not received correctly.

>>>> TC Transmit buffer full <<<<
The buffer that transmits data from the timecode CPU was full, so the data was not sent correctly.

Setup DSP LSI ...
The DSP LSI program is being sent. Please wait.

SUB CPU communication error ! (<n>)

There is a communication error with the SUB CPU (A/D converter). The value of the AFL level, DIM level, RAM card battery, or internal battery is not sent to the main CPU. <n> = the section that is not sending.

>>>> SUB CPU(<n1>) Receive error (<n2>) <<<<

The fader SUB CPU (#0~#1) has a data reception error. <n1> = the signal line, and <n2> = data received.

> Warning Low Battery ! (INT RAM) <

The voltage of the internal backup battery is below 2.5 V.

> Warning Low Battery ! (Memory Card) <

The voltage of the RAM card battery is below 2.5 V.

> Warning Low Battery ! (RAM & Card) <

The voltage of the internal backup battery and the RAM card battery is below 2.5 V.

Please contact your Yamaha dealer to have the battery replaced.

If you receive any of the messages listed below, please contact your Yamaha dealer.

>> Address Error <<

>> Bus Error <<

>> CHK instruction <<

>> Division by 0 <<

>> Illegal Instruction <<

>> Line 1010 emulator <<

>> Line 1111 emulator <<

>> Privilege Violation <<

>> System Reserved Vector <<

>> Spurious Interrupt <<

>> Trace <<

>> TRAPV instruction <<

>> Vector Uninitialized <<

Glossary

AES/EBU: A digital interface format established by the AES (Audio Engineering Society) and EBU (European Broadcasting Union) that is used to transfer digital audio data between professional digital audio equipment. Two channels of digital audio (left/odd and right/even) are carried in one connection, usually an XLR type connection.

Bit clock: As well as a wordclock, some digital equipment such as the Mitsubishi X750 and X850 uses a bit clock signal. The bit clock synchronizes each bit in a data word. See "Mitsubishi (M) A Format (Input)" on page 166.

Bit shifting: Compensation for digital signal delays caused by long connecting cables and many digital audio processing devices. See "Bit Shifting Digital Output Signals" on page 123.

CD/DAT: A digital interface format established by Sony and Philips that is used to transfer digital audio data between consumer type digital audio equipment such as CD players, consumer DAT recorders, and the new DCC and Mini Disc recorders. Two channels of digital audio (left & right) are carried in one connection, usually a phono/RCA jack type connection. This format is often referred to as S/PDIF (Sony/Philips Digital Interface Format).

Channel mode: Each bank of DMC1000 parameters is set to send and receive MIDI Controller messages on individual MIDI channels.

Cut data: [ON] key (mute) data that is stored in scene memories and recorded as automation data.

DAT copy prohibit: SCMS (Serial Copy Management System).

DDK crossed cable: A 25-pin D-sub connecting cable that should be used for DMC1000 25-pin D-sub connections that input and output digital audio data. That is, all 25-pin D-sub connections that are labeled "I/O".

DIO: Digital I/O connections that carry the Input or Monitor channel inputs and the 8 Bus outputs. When connecting to a DRU8, for example, only one connection is required.

Emphasis: Before A/D conversion a 6 dB/octave boost starting at 3.5 kHz is applied to the audio signal. During D/A conversion the emphasis is automatically detected by the replay device and de-emphasis is applied.

ESAM II: (Edit Suite Audio Mixer) A remote control protocol for audio mixers used in the video edit environment, developed by Graham-Patten Systems.

Fade time: When a scene memory is recalled, this parameter specifies the rate (time) at which a channel fader moves to its new position.

Internal scene memories: Scene memories 1~32 that are stored inside the DMC1000.

JAE straight cable: A 25-pin D-sub connecting cable that should be used for input only and output only DMC1000 25-pin D-sub connections.

M: (Mitsubishi format) A digital audio format developed by Mitsubishi Electric Corporation. Each time slot (1 wordclock in length) is divided into 32-bit periods, and contains one PCM sample of between 16 and 24 bits. This format is used on the Mitsubishi X750 and X850 digital multitrack recorders.

Noise shaping: A technique used when long data words are shortened. See "Noise Shaping" on page 60.

RAM card scene memories: Up to 64 scene memories can be stored on a RAM card: 32 in two banks (33~96). So in combination with the internal scene memories (1~32), 96 scene memories are available during a mix session.

Register mode: All banks of DMC1000 parameters are set to send and receive MIDI Controller messages on the same MIDI channel.

Remote parity: Parity is a simple error checking system that is used to check for data errors in serial data transmissions such as RS232 and RS422. Parity makes all data words either even or odd by adding a parity bit onto the end of each word. The receiving device can then check each word, and if a word is not even or odd as expected, it knows that data word is incorrect.

Scene memories: Sometimes referred to as *mix snapshots* or *mix scenes,* they can be used to store console settings and can be recalled manually or synchronized to external timecode.

SDIF2: (Sony Digital Interface Format) A digital audio format developed by Sony Corporation. Each time slot (1 wordclock in length) is divided into 32-bit periods, and contains one PCM sample of between 16 and 20 bits. This format is used on the Sony PCM3324 and PCM3348 digital multitrack recorders.

S/PDIF: See CD/DAT.

User bits: A number of data bits that are transmitted with AES/EBU and CD/DAT format digital audio signals, which can be used to store information such as time and date of recording, program identification, take number, cue information, etc. SMPTE timecode also contains a number of user bits specifically for transmitting user information such as time and date, reel number, etc.

Wordclock: A clock signal that is used to synchronize the data processing circuits of all devices connected in a digital audio system. The wordclock frequency is the same as the selected sampling frequency.

Y1: (Yamaha Y1 format) This digital audio format is the mono (single channel) forerunner of Yamaha Y2:Y1 is mono, Y2 is stereo. Yamaha Y1 is still used on the Yamaha DMP7D and AD808. The AD8X can also output Yamaha Y1 format (DMP7D mode). Each time slot (1 wordclock in length) is divided into 64-bit periods, and contains one PCM sample of between 16 and 24 bits.

Y2: (Yamaha Y2 format)A digital audio format developed by Yamaha that is used to transfer digital audio data between Yamaha's professional digital audio equipment. Each time slot (1 wordclock in length) is divided into 64-bit periods, and contains two PCM samples of between 16 and 24 bits (left/odd and right/even).

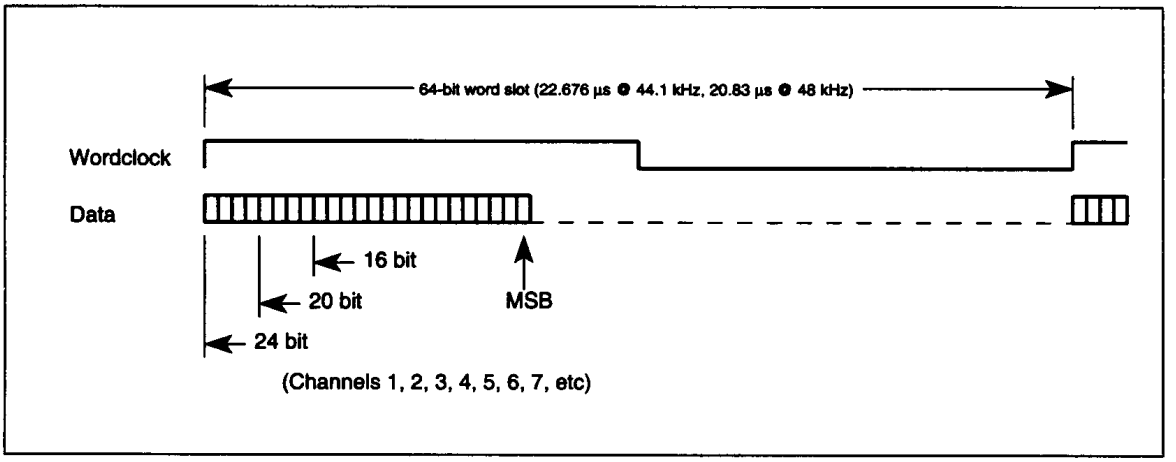
Further Reading

For those who would like to know more about the fascinating world of digital audio, here are a few suggested books.

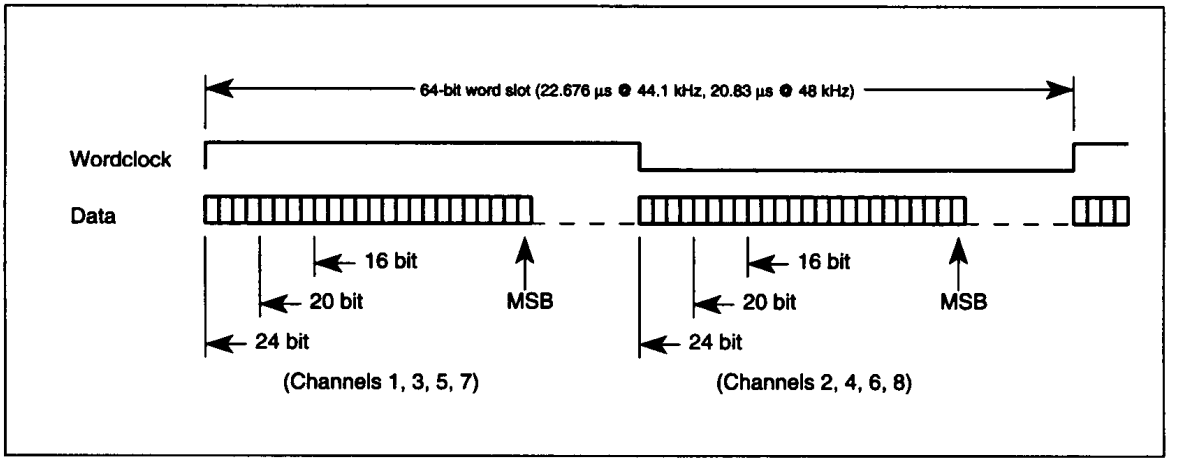
1. "*Professional Digital Audio Products Application Guide*", Yamaha.
2. "*Introducing Digital Audio*", Ian R Sinclair, 2nd edition, PC Publishing, 1992.
   A good all-round introduction to digital audio for experienced analog audio users. Second edition explains oversampling and bitstream techniques.
3. "*Principles of Digital Audio*", Ken C. Pohlmann, Howard W.Sams & Co, 1989.
   Covering all aspects of digital audio, this book is ideal for the newcomer who wants to know the basics – plus a bit more.
4. "*The Art of digital Audio*", John Watkinson, Focal Press (Butterworth Group), 1990.
   An essential read for digital audio professionals – but only for the serious!
5. "*Coding for Digital Recording*", John Watkinson, Focal Press (Butterworth Group), 1990.

Digital Audio Formats

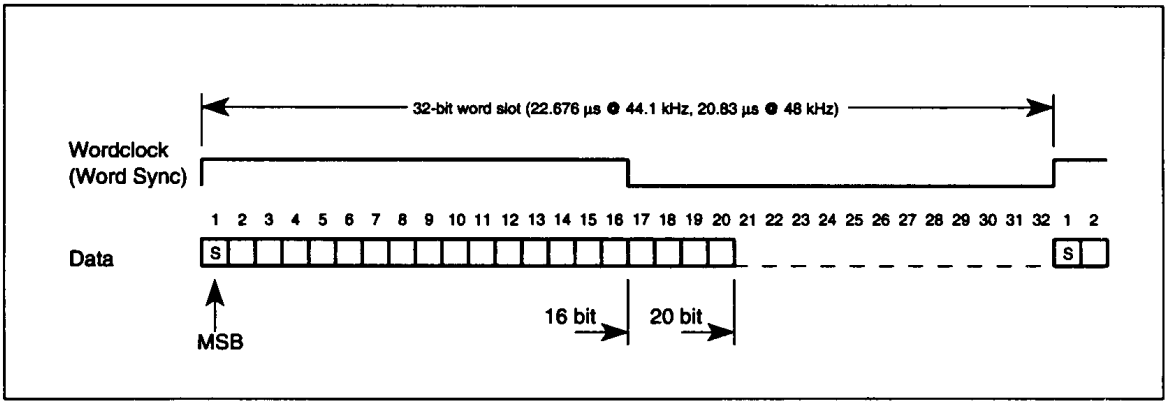
Yamaha Y1 Format (Input & Output)



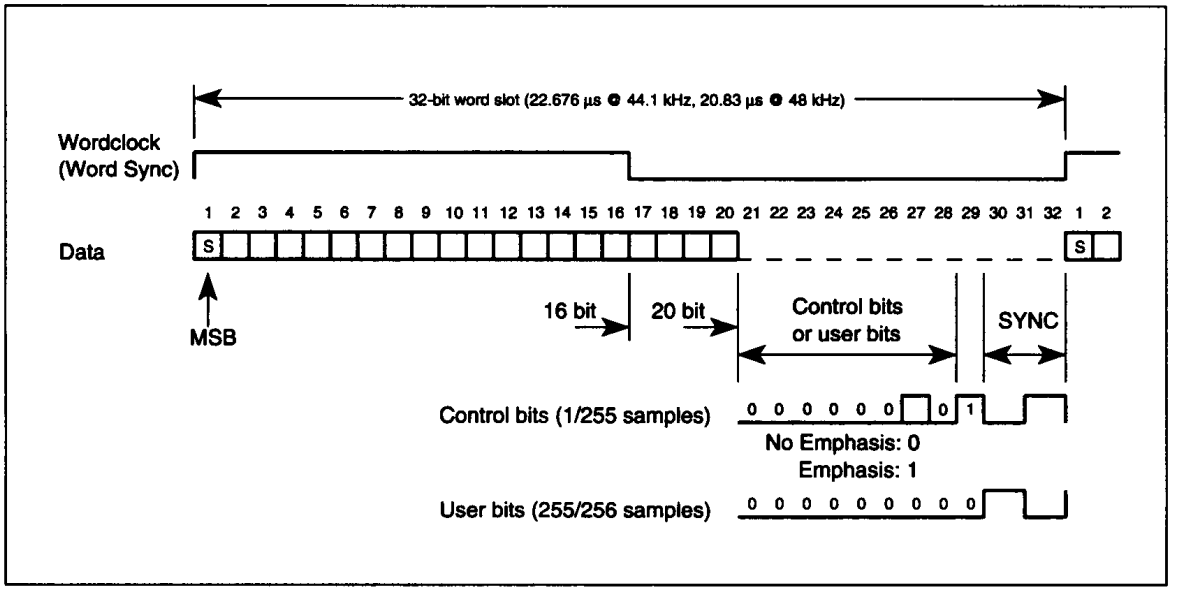
Yamaha Y2 Format (Input & Output)



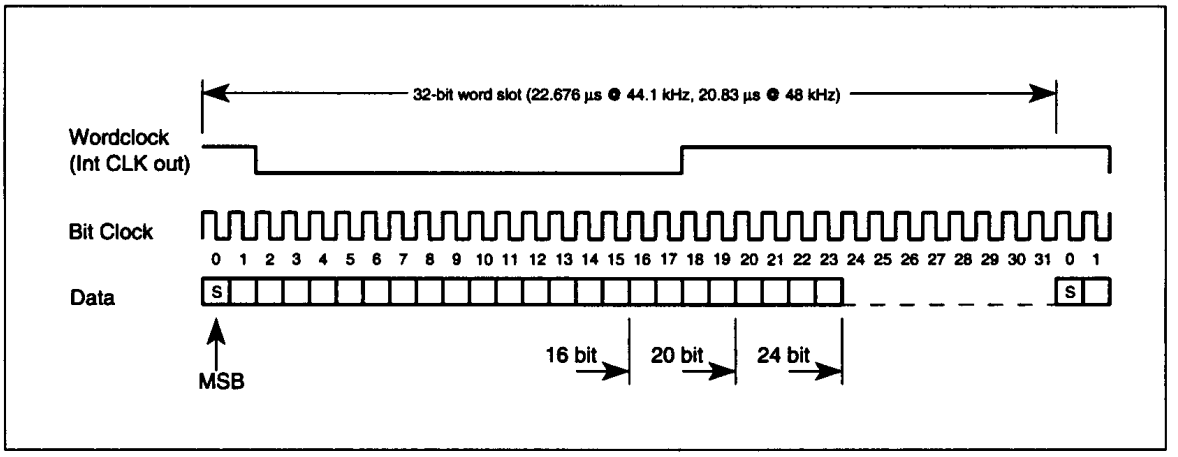
Sony SDIF2 Format (Input)



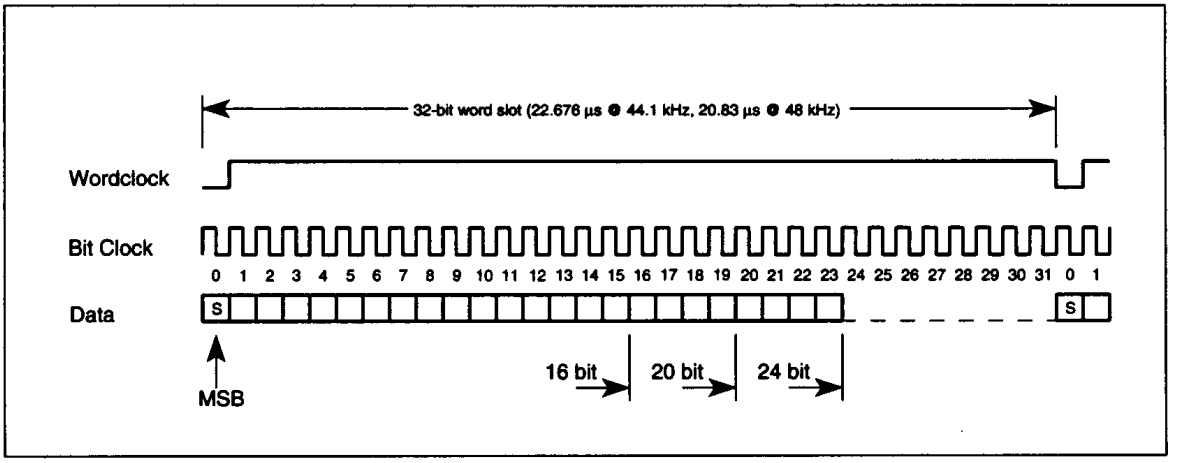
Sony SDIF2 Format (output)



Mitsubishi (M) A Format (Input)



Mitsubishi (M) B Format (Input & Output)



Associated Yamaha Digital Audio Equipment

DRU8 Digital Recorder

The Yamaha DRU8 Digital Recorder provides 8 tracks of 20-bit digital audio (120 dB dynamic range), comprehensive synchronization facilities, and a built-in digital monitor mixer. It can be used with the DMC1000 to form an all-digital recording and fully automated mixing system.

DRU8 tapes are fully compatible with the Yamaha DMR8, and 22 minutes of recording is available on one tape (fs @ 44.1 kHz). However, tape time can be increased by using extra DRU8s in Serial Chase mode. The number of available tracks can be increased by using extra DRU8s in Parallel Chase mode, with synchronization to sample accuracy. The DRU8 can be synchronized to SMPTE/EBU timecode and MTC. It is also compatible with many protocols: Sony BVE9100, CMX300, ACE200.

AD8X 8CH AD Converter

The Yamaha AD8X can convert up to eight analog signals to Yamaha Y2 format digital audio. It has a 19-bit resolution, 110 dB dynamic range, and 0.0018% THD. It can also be used as wordclock master.

DA8X 8CH DA Converter

The Yamaha DA8X can convert up to eight channels of Yamaha format digital audio to analog. As a compliment to the AD8X, it allows the DMC1000 to be integrated with analog equipment. It features 20-bit resolution, 8-times oversampling digital filters, 108 dB dynamic range, ≤0.0022% THD, and a S/N ratio of >113 dB.

AD2X 2CH AD Converter

The Yamaha AD2X can convert two analog signals to Yamaha Y2, AES/EBU, and CD/DAT format digital audio. It has a 19-bit resolution, 110 dB dynamic range, and 0.0018% THD. It can also be used as wordclock master.

DA2X 2CH DA Converter

The Yamaha DA2X can convert two channels of Yamaha Y2, AES/EBU, or CD/DAT format digital audio to analog. It uses a 20-bit bitstream converter (1-bit ΔΣ PDM D/A with 8-times oversampling filter), which provides a frequency response of 2 Hz ~ 22 kHz, THD of less than 0.001%, and a dynamic range of 110 dB. Yamaha Y2 and AES/EBU thru connections are also provided.

FMC8 Format Converter

The Yamaha FMC8 can convert up to eight channels of Yamaha format digital audio to and from Sony or Mitsubishi format. Conversion between the two non-Yamaha formats is also possible. Note: the DMC1000 can input and output Mitsubishi (M) and Sony (SDIF2) format signals without conversion.

FMC9 Format Converter (AES/EBU→YAMAHA)

The Yamaha FMC9 can convert up to four AES/EBU format digital audio signals to Yamaha Y2 format. It is ideally suited to audio/video applications with D1, D2, and D3 digital VTRs, and includes a 1-into-2 AES/EBU distribution facility.

IFU4 Interface Unit

The Yamaha IFU4 can convert up to four TTL level signals to RS422 level. TTL signals do not travel well over 10 meters, whereas RS422 signals can safely be sent 100 to 200 meters. The IFU4 can be used for digital audio, wordclock, and bit clock signal level conversion.

IFU5 A & B Interface Units

Two patchbays specifically designed for interfacing the DMC1000, DRU8, and DMR8 with larger digital multitrack recorders. Front panel jacks allow the rerouting of up to 32 digital audio channels, and bit clock and wordclock distribution is also catered for. Used in conjunction with the a Yamaha IFU4 Interface unit, two digital audio channels can be distributed to four front panel jacks.

DMP7D Digital Mixing Processor

The Yamaha DMP7D is an 8-into-2 digital mixer with comprehensive digital inputs and outputs. It features 3-band EQ, digital effects, MIDI control, and 30 scene memories. It can be used as a sub-mixer to supplement DMC1000 channels.

SPX1000 Multi-Effect Processor

The Yamaha SPX1000 is an all-digital multi-effect processor with 40 preset effects and up to 59 user effect memories. It provides a whole host of effects including reverb, delay, modulation, etc. It has Yamaha Y2 format digital inputs and outputs, so it can be interfaced directly to the DMC1000.

D2040 Digital Channel Divider

The Yamaha D2040 is a stereo 4-channel digital channel divider (crossover). Each channel features independent crossover filter, EQ, compression, and delay. Up to 15 user setups can be stored, and full remote control is available. It has Yamaha Y2 and AES/EBU format digital inputs, so it can easily be interfaced with the DMC1000. DA conversion uses the same high-performance converters as the DA2X.

DEQ5/5E Digital Equalizers

The Yamaha DEQ5 is an all-digital EQ processor that can provide 30-band graphic equalization or six bands of fully parametric equalization. Each channel features four notch filters, HP and LP filters, adjustable delay, and hum canceller. Up to 40 EQ snapshots can be stored and recalled using SMPTE/EBU timecode. The DEQ5E is an expander unit, and up to 23 units can be connected and controlled from one DEQ5. The DEQ5 features Yamaha Y2 and AES/EBU format inputs and outputs. The DEQ5E features AES/EBU format digital inputs and outputs.

DEQ7 Digital Equalizer

The Yamaha DEQ7 is an all-digital EQ processor that can be used as a graphic equalizer, 4-band fully parametric equalizer, 6-band notch filter, or band pass filter with variable LPF and HPF. It has 30 EQ presets and 89 user memories. Yamaha Y2 format digital inputs and outputs allow direct connection to the DMC1000.

DTR2 DAT Recorder

The Yamaha DTR2 is a full feature DAT Recorder featuring 1-bit ΔΣ AD converters with 64-times oversampling and 1-bit ΔΣ PDM DA converters with 256-times oversampling filters. It has RCA/phono CD/DAT (S/PDIF) input/output and balanced XLR type analog inputs and outputs. Start, Skip, and End IDs are supported, and a full-function wired remote control is provided.

DMC1000 Project Manager Software

With the Yamaha DMC1000 Project Manager software many DMC1000 parameters can be controlled from an Apple Macintosh computer – providing easy parameter access via a large-screen display and mouse. Project Manager also provides some additional functions: comprehensive effects editor and librarian, 8 additional fader groups including Monitor channels, 8 additional channel links (all inputs), parameters controlled by each link can be set individually, EQ snapshot, and librarian facility.

For project management – all scene memory names used in a project can be viewed together. Scene titles can be entered easily via the computer keyboard. In addition, all files relating to a project can be stored on the computer's hard disk and backed up to floppy disk.

Appendix B

Scene Memory Data

The following parameters are stored within a scene memory.

Fader Data	
Parameter No.	**Parameter**
0~7	Input 1~8 level
8~15	Monitor 1~8 level
16~23	Bus 1~8 master level
24~26	ST input A~C level
27	Stereo master level

Cut Data	
Parameter No.	**Parameter**
96~103	Input 1~8 on/off
104~111	Monitor 1~8 on/off
112~114	ST input A~C on/off
151	Stereo master on/off

Panpot Data	
Parameter No.	**Parameter**
28~35	Input 1~8 panpot
36~43	Monitor 1~8 panpot
44~51	Input 1~8 aux 3 panpot
52~57	ST input A~C L & R panpot
58	Stereo master balance
59	Monitor master balance
990~997	Monitor 1~8 aux 3 panpot

Channel Data	
Parameter No.	**Parameter**
308~315	Channel 1~8 monitor to bus on/off
316~323	Channel 1~8 bus to monitor on/off
785~792	Channel 1~8 fader flip
761~762	ST input A~B internal/external
864	Panpot mode nominal/+3 dB

Aux Data	
Parameter No.	**Parameter**
60~83	Input 1~8 aux 1, 2, 3 levels
84~92	ST input A~C aux 1, 2, 3 levels
93~95	Aux 1, 2, 3 master send levels
115~122	Input 1~8 aux 1 on/off
123~130	Input 1~8 aux 2 on/off
131~138	Input 1~8 aux 3 on/off
139~147	ST input A~C aux 1, 2, 3 on/off
148~150	Aux 1, 2, 3 master send on/off
251~258	Input 1~8 aux 1 pre/post
259~266	Input 1~8 aux 2 pre/post
267~274	Input 1~8 aux 3 pre/post
275~277	ST input A~C aux 1 pre/post
278~280	ST input A~C aux 2 pre/post
281~283	ST input A~C aux 3 pre/post
284~307	Reserved
998~1021	Monitor 1~8 aux 1, 2, 3 levels
1022~1029	Monitor 1~8 aux 1 on/off
1030~1037	Monitor 1~8 aux 2 on/off
1038~1045	Monitor 1~8 aux 3 on/off
1046~1053	Monitor 1~8 aux 1 pre/post
1054~1061	Monitor 1~8 aux 2 pre/post
1062~1069	Monitor 1~8 aux 3 pre/post

Effect Data	
Parameter No.	**Parameter**
865	Effect 1 select
866	Effect 2 select
867~886	Effect 1 parameters 1~10
887~906	Effect 2 parameters 1~10

EQ Data	
Parameter No.	**Parameter**
343~350	Input 1~8 HPF on/off
351~358	Monitor 1~8 HPF on/off
359~361	ST input A~C HPF on/off
362~369	Input 1~8 LPF on/off
370~377	Monitor 1~8 LPF on/off
378~380	ST input A~C LPF on/off
381~388	Input 1~8 HPF frequency
389~396	Monitor 1~8 HPF frequency
397~399	ST input A~C HPF frequency
400~407	Input 1~8 LPF frequency
408~415	Monitor 1~8 LPF frequency
416~418	ST input A~C LPF frequency
419~426	Input 1~8 EQ on/off
427~434	Monitor 1~8 EQ on/off
435~437	ST input A~C EQ on/off
438~565	Input 1~8 low, low mid, high mid, high: frequency, gain, Q, type
566~693	Monitor 1~8 low, low mid, high mid, high: frequency, gain, Q, type
694~741	ST input A~C low, low mid, high mid, high: frequency, gain, Q, type

Assign Data	
Parameter No.	**Parameter**
152~159	Input 1~8 Stereo bus assign
160~162	ST input A~C Stereo bus assign
163~226	Input 1~8 Bus 1~8 assign
227~250	ST input A~C Bus 1~8 assign

Delay Data	
Parameter No.	**Parameter**
907~922	Input 1~8 delay time
923~938	Monitor 1~8 delay time
939~944	ST input A~C delay time
945~960	Input 1~8 delay feedback gain
961~976	Monitor 1~8 delay feedback gain
977~982	ST input A~C delay feedback gain

Phase Data	
Parameter No.	**Parameter**
324~331	Input 1~8 phase normal/reverse
332~339	Monitor 1~8 phase normal/reverse
340~342	ST input A~C phase normal/reverse

Pad Data	
Parameter No.	**Parameter**
742~749	Input 1~8 pad
750~757	Monitor 1~8 pad
758~760	ST input A~C pad
851~858	Cascade in bus 1~8 pad
859~861	Cascade in Aux 1, 2, 3 pad
862	Cascade in Stereo bus pad
863	Cascade in Solo bus pad

Fade Time Data	
Parameter No.	**Parameter**
763~770	Input 1~8 fade time
771~778	Monitor 1~8 fade time
779~781	ST input A~C fade time

Setup Data

[ ] indicates the LCD function that is used to set that particular function.

Console Controls
FADER STATUS (BUS MSTR/channel fader)
CONSOLE STATUS (REC/MIX)
MASTER CHANNEL SELECT (MON/input)
GLOBAL (enable/disable)
STUDIO MONITOR (ON/off)
C-R MONITOR (on/off)
C-R MONITOR (large/SMALL)
CUE (on/off)
C-R MONITOR select (EXT/CUE/ST)
CUE (MON/cue)
C-R MONITOR DIM (ON/off)
C-R MONITOR (MONO/stereo)
METER SELECT HOLD (hold/fall)
METER SELECT I (LINE/TAPE/ST IN)
METER SELECT II (BUS/MONITOR)
METER SELECT III (CUE-MON/AUX)

Meters
Meter I: Input channel (Pre EQ/Post EQ/Post Fader) [Meter]
Meter II: Monitor channel (Pre EQ/Post EQ/Post Fader) [Meter]
Meter III: ST Input (Pre EQ/Post EQ/Post Fader) [Meter]
Meter I: ST IN (INT/EXT) [Meter]
Meter Hold time [Meter]
Meter Fall time [Meter]

Routing
Stereo InputA (INT/EXT) [Routing] [DIO Sel]
Stereo InputB (INT/EXT) [Routing] [DIO Sel]
C-R Monitor ST (After Fader Listen/Pre Fader Listen) [Routing]
AFL (After Fader Listen/Pre Switch Listen/After Panpot Listen) [Routing]
Direct Out (After Fader Listen/Pre Fader Listen/After Switch Listen) [Routing]

Grouping
Group 1 & 2 Grouping Information [Grouping]
Group (Enable/Disable) [Grouping]

Solo
Solo Mode (AFL/SOLO) [SOLO]
SOLO Safe Channels (Input & Monitor 1~8) [SOLO]

M Emphasis
M Format Input Emphasis (Input & Monitor 1~8) [M Emph]

MIDI
MIDI Channel [MIDI]
Control Mode (Channel/Register) [MIDI]
Control Tx (on/off) [MIDI]
Control Rx (on/off) [MIDI]
Control Omni (on/off) [MIDI]
Control Echo (on/off) [MIDI]
Program Tx (on/off) [MIDI]
Program Rx (on/off) [MIDI]
Program Omni (on/off) [MIDI]
Program Echo (on/off) [MIDI]

Bulk
Device No. (off, 1~16) [Bulk]
Omni (on/off) [Bulk]

LCD Function Table
User LCD Function table Setup [Function]

Output Bitshift Setup
Output Bitshift Setup (0~63.75) [BitShift]

Emphasis
Output Emphasis (off/on) [Emphasis]
St. Inputs A~C Emphasis (off/on) [Emphasis]
2TR (Y2) Input (off/on) [Emphasis]

Automation
Motor (On/Off) Automation

AutoCopy
Copy time [AutoCopy]
Copy track [AutoCopy]
Extract parameter [AutoCopy]
Punch IN/OUT (Manual/Auto) [AutoCopy]
Extract (on/off) [AutoCopy]

Fader Edit
Fader take over time (2.9 msec~ 21 sec) [Fader Ed]
Fader (RETURN/NO RET) [Fader Ed]

Configuration
Internal Mem. Protect (on/off) [Config.]
Set-up Memory Protect (on/off) [Config.]
Auto Fader Edit Screen (on/off) [Config.]
Auto EQ Screen (on/off) [Config.]
Auto C-R monitor Screen (on/off) [Config.]
Auto Effect Screen (on/off) [Config.]
Equalizer Constant (Q/Energy) [Config.]
AUX Send Ducking (on/off) [Config.]
Automation REC Mode (Insert/Replace) [Config.] Automation
Fader Edit Mode (Relative/Absolute) [Config.] Automation
Absolute Up-date Mode (REC Trk/ALL Trk) [Config.]
Automation Locate (Quick/Full) [Config.]
Bus Stereo Link (on/off) [Config.]
Time Code Frame Erase (off/on) [Config.]
CD/DAT Copy Prohibit (off/on) [Config.]
Remote Parity (Even/Odd/None) [Config.]
Noise Shaping (off/on) [Config.]
Noise Shaping bit No. (16~26) [Config.]
Grouping Memory (Scene/Setup) [Config.]
Link Parameter Memory (Scene/Setup) [Config.]
Mem Store Confirmation (off/on) [Config.]
Mem Recall Confirmation (off/on) [Config.]
Title Store Prohibit (off/on) [Config.]
Store Req.IN Prohibit (off/on) [Config.]
Store Req.OUT Prohibit (off/on) [Config.]
Auto.PLAY→MIDI Out (off/on) [Config.]
MIDI In → Auto.REC (off/on) [Config.]
Auto Clock Display (off/on) [Config.]
SetupMem Change BULK Out (off/on) [Config.]
TD Drop Warning Prohibit (off/on) [Config.]
S/R prm. to Scene Mem. (off/on) [Config.]
ESAM2 Source Mode (A/B)
Keep Touch Mode (off/on) [Config.]

Channel Link
Channel Link (disable/enable) [Ch Link]
Channel Link parameters [Ch Link]
Channel Link channel information [Ch Link]

Digital I/O Setup
INP 7/8 in (INPUT/2TRK) [DIO Sel.]
ST Input A~C (Digital/Analog) [DIO Sel.]

Output Format
BUS (Y1/Y2/SDIF2/M) [O.Format]
INPUT Direct (Y1/Y2/SDIF2/M) [O.Format]
MONITOR Direct (Y1/Y2/SDIF2/M) [O.Format]
ST Input Direct (Y1/Y2/SDIF2/M) [O.Format]

External Monitor Select
2TR Monitor Input Select [EXT Mon]

Wordclock Select
Source [WCLK Sel]
Input [WCLK Sel]
Output [WCLK Sel]
Int.Fs [WCLK Sel]

Timecode
Start Time [TimeCode]
Frame Type [TimeCode]
Source [TimeCode]

Insert on/off Setup
INP (off/on) [Ins. On]
MON (off/on) [Ins. On]
ST Input A~C (off/on) [Ins. On]
ST Master (off/on) [Ins. On]
Input 1~8 (pst/pre) [Ins. Pre]
Monitor 1~8 (pst/pre) [Ins. Pre]
ST Input A~C (pst/pre) [Ins. Pre]

CUE Select
Cue bus Select Menu (Aux 1/2/3) [CUE Sel]

Talkback
Talkback & slate to Bus 1~8 assign [Talkback]

Cascade Isolate
Bus 1~8 (off/on) [Cas Iso.]
Aux A~C (off/on) [Cas Iso.]
Stereo (off/on) [Cas Iso.]
SOLO (off/on) [Cas Iso.]

Automation Record Parameters
Automation REC Parameters [REC Prm]

Input Format
Input Channel Format Select [I.Format]
Monitor Channel Format Select [I.Format]
2Track In Format Select [I.Format]

Specifications

Input Channel, Monitor Channel, & Stereo Input Channel	Pad	0 ~ 96 dB (0.8 dB steps)
	Phase	Normal/reverse
	Emphasis	Emphasis, thru, de-emphasis
	EQ Frequency	20Hz ~ 20 kHz (all four bands)
	Gain	±18 dB
	Q	0.1 ~ 8.16
	Type	1 & 4 switchable peaking/shelving. 2 & 3 peaking.
	Delay	0 ~ 370 ms (Fs @ 44.1 kHz)
	Fader	100 mm motorized, with touch select
AD Conversion		18-bit
DA Conversion		20-bit, with 8-times oversampling digital filter
Frequency Response	Fs @ 44.1/48 kHz	20 Hz ~ 20 kHz, 0 +1 -3 dB
	Fs @ 32 kHz	20 Hz ~ 14 kHz, 0 +1 -3 dB
THD		<0.007% (@ +18 dB, 1 kHz)
Digital I/O Resolution		16 ~ 24-bit
Internal Processing Resolution	General	24-bit
	EQ	32-bit
Wordclock	Internal	44.1 kHz, 48 kHz
	External	32 kHz ~ 48 kHz ±10%
Data Storage	Internal Automation	512KB (128KB per track)
	Floppy Disk	3.5" 2DD (MS-DOS 720KB compatible format)
	RAM Card	Yamaha MCD64 (64kbyte)
Metering	Stereo	2 x 32-LED
	Channels	8 x 12-LED
	Bus	8 x 12-LED
	Aux/C-R monitor	4 x 12-LED
LCD Display		Backlit 40 x 8 character LCD (with contrast adjust)
Power Requirements	U.S. & Canadian model	120V AC, 60 Hz
	General model	230V AC, 50 Hz
	British model	240V AC, 50 Hz
Power Consumption		180 W
Free Air Operating Temperature Range		0°C ~ 35°C (32°F ~ 95°F)
Dimensions	**(W x D x H)**	770 x 904.2 x 362.5 mm (30.3" x 35.6" x 14.3")
Weight		57 kg (125.7 lbs)

Analog Input/Output Specs

Input/Output Connection	Nominal I/O Impedance	Input Level (@ 1 kHz)		DMC1000 Connector
		Nominal	Max. Before Clip	
ST INPUT (ANALOG) A, B, & C	600 Ω	+4 dBm (1.23V)	+18 dBm (6.16V)	XLR-3-31 type
AUX SEND (ANALOG) 1, 2, & 3	600 Ω	+4 dBm (1.23V)	+18 dBm (6.16V)	XLR-3-32 type
MONITOR OUT (ANALOG) LARGE, SMALL, STUDIO, & CUE	600 Ω	+4 dBm (1.23V)	+18 dBm (6.16V)	XLR-3-32 type
PHONES	8 Ω			Phone Jack
	40 Ω			

* 0dBm = 0.775V rms.

Digital Input Specs

Input	Format	Level	DMC1000 Connector
INPUT CHANNEL INSERT I/O (CH 1~8, wordclock, emphasis)	Y2	RS422 (emphasis: TTL)	25-pin D-sub (female)
MONITOR CHANNEL INSERT I/O (MONITOR 1~8, wordclock, emphasis)	Y2	RS422 (emphasis: TTL)	25-pin D-sub (female)
INPUT CHANNEL DIGITAL I/O (CH 1~8 in, 1~8 Bus out, wordclock, emphasis)	Y2	RS422 (emphasis: TTL)	25-pin D-sub (female)
MONITOR CHANNEL DIGITAL I/O (MONITOR 1~8 in, 1~8 Bus out, wordclock, emphasis)	Y2	RS422 (emphasis: TTL)	25-pin D-sub (female)
ST INPUT INSERT I/O (ST A, ST B, ST C, Bus 1~8 out, wordclock, emphasis)	Y2	RS422 (emphasis: TTL)	25-pin D-sub (female)
INPUT CHANNEL IN (CH 1~8, bit clock, wordclock, emphasis)	Y1 Y2 Mitsubishi SDIF2	RS422 (emphasis: TTL)	25-pin D-sub (female)
MONITOR CHANNEL IN (MONITOR 1~8, bit clock, wordclock, emphasis)	Y1 Y2 Mitsubishi SDIF2	RS422 (emphasis: TTL)	25-pin D-sub (female)
INPUT CHANNEL INPUT AES 1/2, 3/4, 5/6, 7/8	AES/EBU	RS422	XLR-3-31 type
ST INPUT A, B, & C Y2	Y2	RS422	8-pin DIN
Y2 2TR MONITOR INPUT (7-8)	Y2	RS422	8-pin DIN
SDIF2 L & R 2TR MONITOR INPUT (7-8)	SDIF2	TTL	BNC
SYNC 2TR MONITOR INPUT (7-8)	–	TTL	BNC
AES/EBU 2TR MONITOR INPUT (7-8)	AES/EBU	RS422	XLR-3-31 type
CD/DAT1 2TR MONITOR INPUT (7-8)	S/PDIF	0.5V pk~pk	RCA/phono
CD/DAT2 2TR MONITOR INPUT (7-8)	S/PDIF	0.5V pk~pk	RCA/phono
STEREO INSERT IN Y2	Y2	RS422	8-pin DIN
CASCADE INPUT (Bus 1~8, Stereo bus, Solo bus, Aux buses, wordclock, solo/AFL select, solo control, emphasis)	Y2	RS422 (solo/AFL select, solo control, & emphasis: TTL)	25-pin D-sub (female)
WORD CLK IN	–	RS422	XLR-3-31 type
		TTL	BNC

Digital Output Specs

Output	Format	Level	DMC1000 Connector
INPUT CHANNEL DIRECT OUT (CH 1~8, wordclock, emphasis)	Y1 Y2 Mitsubishi SDIF2	RS422 (emphasis: TTL)	25-pin D-sub (female)
MONITOR CHANNEL DIRECT OUT (MONITOR 1~8, wordclock, emphasis)	Y1 Y2 Mitsubishi SDIF2	RS422 (emphasis: TTL)	25-pin D-sub (female)
ST INPUT A-C DIRECT OUT (ST A, ST B, ST C, wordclock, emphasis)	Y1 Y2 Mitsubishi SDIF2	RS422 (emphasis: TTL)	25-pin D-sub (female)
BUS OUT (Bus 1~8, bit clock – Mitsubishi only, wordclock, emphasis)	Y1 Y2 Mitsubishi SDIF2	RS422 (emphasis: TTL)	25-pin D-sub (female)
BUS OUT AES/EBU 1/2, 3/4, 5/6, & 7/8	AES/EBU	RS422	XLR-3-32 type
STEREO OUT Y2	Y2	RS422	8-pin DIN
STEREO OUT SDIF2 L & R	SDIF2	RS422	XLR-3-32 type
STEREO OUT SDIF2 L & R	SDIF2	TTL	BNC
STEREO OUT AES/EBU	AES/EBU	RS422	XLR-3-32 type
STEREO OUT CD/DAT	S/PDIF	0.5V pk~pk	RCA/phono
STEREO INSERT OUT Y2	Y2	RS422	8-pin DIN
AUX SEND 1, 2, & 3	Y1	RS422	8-pin DIN
C-R MONITOR OUT AES/EBU	AES/EBU	RS422	XLR-3-32 type
C-R MONITOR OUT Y2	Y2	RS422	XLR-3-32 type
CASCADE OUT (Bus 1~8, Stereo bus, Solo bus, Aux buses, wordclock, solo/AFL select, solo control, emphasis)	Y2	RS422 (solo/AFL select, solo control, & emphasis: TTL)	25-pin D-sub (female)
WORD CLK OUT	–	RS422	XLR-3-32 type
	–	TTL	BNC

Connector Pin Outs

- CHANNEL DIGITAL I/O
- CHANNEL INSERT I/O
- MONITOR DIGITAL I/O
- MONITOR CHANNEL DIGITAL I/O
- ST INPUT A-C INSERT I/O

Signal Name	Pin Assignment	
	Hot	Cold
Data In Ch 1 - 2	1	14
Data In Ch 3 - 4	2	15
Data In Ch 5 - 6	3	16
Data In Ch 7 - 8	4	17
Data Out Ch 1 - 2	5	18
Data Out Ch 3 - 4	6	19
Data Out Ch 5 - 6	7	20
Data Out Ch 7 - 8	8	21
Wordclock In	9	22
Wordclock Out	10	23
Emphasis In	11	
Emphasis Out	12	
GND	13, 24, 25	

- INPUT CHANNEL
- MONITOR INPUT

Signal Name	Pin Assignment	
	Hot	Cold
Data In Ch 1	1	14
Data In Ch 2	2	15
Data In Ch 3	3	16
Data In Ch 4	4	17
Data In Ch 5	5	18
Data In Ch 6	6	19
Data In Ch 7	7	20
Data In Ch 8	8	21
Wordclock In	9	22
Wordclock Out	10	23
Bit Clock In (Mitsubishi)	11	24
Emphasis In	12	
GND	13, 25	

- INPUT CHANNEL DIRECT OUT
- MONITOR CHANNEL DIRECT OUT
- ST INPUT A-C DIRECT OUT
- BUS OUT 1~8

Signal Name	Pin Assignment	
	Hot	Cold
Data Out Ch 1	1	14
Data Out Ch 2	2	15
Data Out Ch 3	3	16
Data Out Ch 4	4	17
Data Out Ch 5	5	18
Data Out Ch 6	6	19
Data Out Ch 7	7	20
Data Out Ch 8	8	21
Wordclock Out	9	22
Wordclock In	10	23
Bit Clock Out (Mitsubishi)	11	24
Emphasis Out	12	
GND	13, 25	

- CASCADE IN

Signal Name	Pin Assignment	
	Hot	Cold
Bus 1-2 In	1	14
Bus 3-4 In	2	15
Bus 5-6 In	3	16
Bus 7-8 In	4	17
St In	5	18
Moni In	6	19
Aux 1 & 2 In	7	20
Aux 3 In	8	21
Wordclock In	9	22
Solo Control In	10	
Solo Select In	23	
Master Out	11	
Spare In	24	
Emphasis In	12	
GND	13, 25	

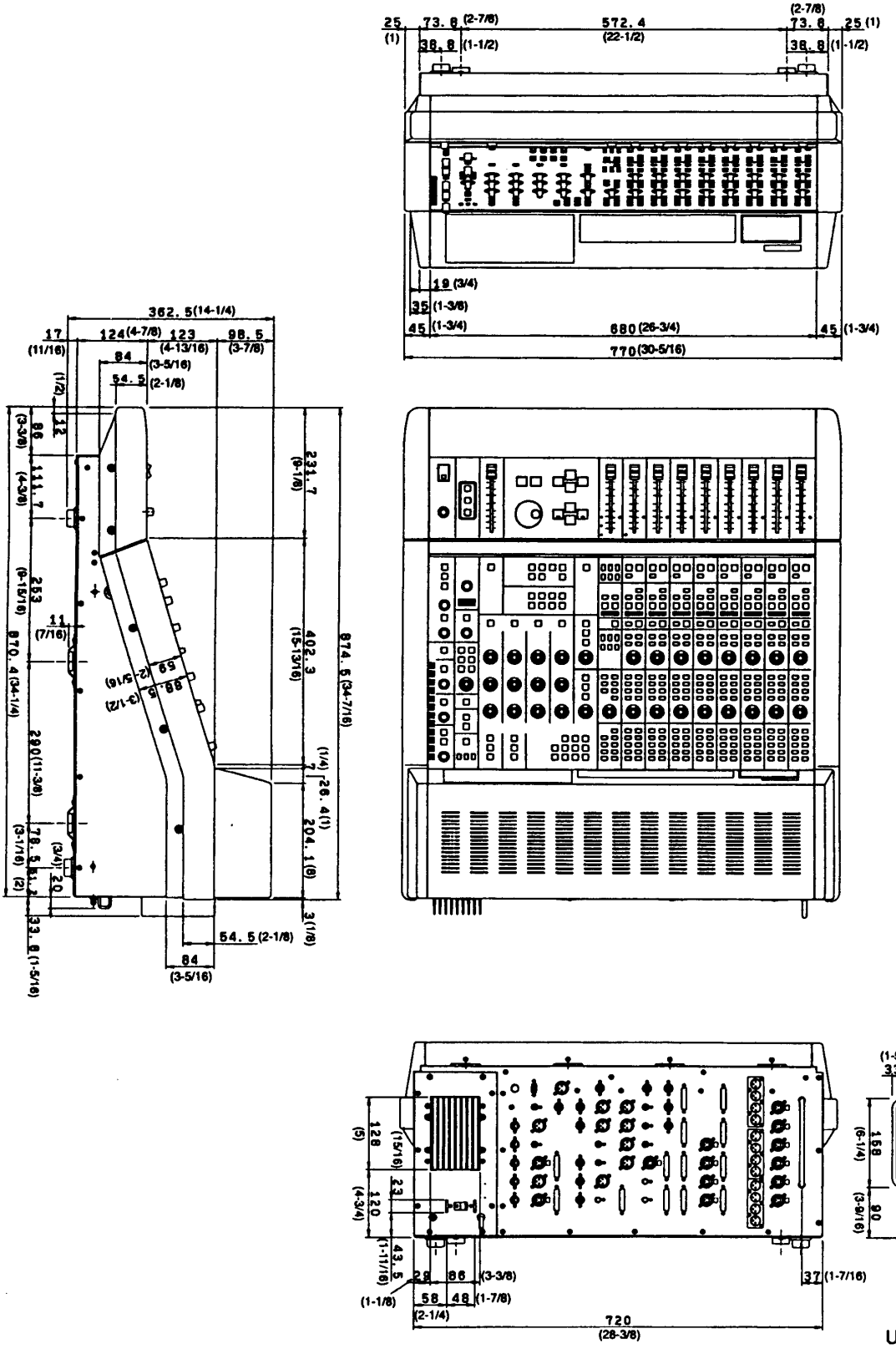
- CASCADE OUT

Signal Name	Pin Assignment	
	Hot	Cold
Bus 1-2 Out	1	14
Bus 3-4 Out	2	15
Bus 5-6 Out	3	16
Bus 7-8 Out	4	17
St Out	5	18
Moni Out	6	19
Aux 1 & 2 Out	7	20
Aux 3 Out	8	21
Wordclock Out	9	22
Solo Control Out	10	
Solo Select Out	23	
Master In	11	
Spare Out	24	
Emphasis Out	12	
GND	13, 25	

- REMOTE

Signal Name	Pin Assignment	
	Hot	Cold
Tx	7	2
Rx	3	8
Common	4, 6	
Frame GND	1, 9	

Dimensions



Unit : mm (inch)