

TASCAM

TEAC Professional Division

688

MIDISTUDIO



OWNER'S MANUAL

570011901

Table of Contents

Block Diagram	5	MIDI MIXER CONTROL	
INTRODUCTION		Transmitting MIDI Program Change commands from the 688	34
Understanding the Mixer Scene Display	7	Changing scenes via External MIDI commands	35
Multitrack Cassette Recorder	9	Controlling Mutes with MIDI Note messages	35
The Recording System	11		
Mixer Subsystems	11	FEATURES AND CONTROLS	
BRIEF GUIDE	14	Mixer section	36
OPERATIONS GUIDE		Monitor Section	38
Tracking	17	Scene Routing Display and Controls	39
Overdubbing	19	Recorder Section	43
Mixdown	20	Autolocator Section	45
Punch-in or Insert Recording	21	Meter Section	46
Bouncing tracks (ping-pong)	24	Back panel	47
Using the Scene Display	25	Front Panel	49
Transferring All Scenes	27		
Using Effects with the MIDISTUDIO 688	28	Care and Maintenance	60
MIDI SYNCHRONIZATION		How the dbx works	61
Introduction to MIDI Sync	30	Specifications	62
The Recording system with MIDI Synchronization	31	Level Diagrams	65
Procedures for MIDI Sync Recording	32	Optional Accessories	67
Mixer operation during MIDI Sync	33	MIDI Implementation chart	68
Using External Sync Devices	33	FACTORY PRESET SCENES	69
Synchronizing the 688 to another tape deck	34		

© 1990 TEAC Corporation. All rights reserved under international and Pan American copyright conventions. This book may not be reproduced in whole or in part, by mimeograph or any other means, without permission.

Important Safety Precautions



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN



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



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



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

This appliance has a serial number located on the rear panel. Please record the model number and serial number and retain them for your records.
Model number _____
Serial number _____

WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Safety Instructions

CAUTION:

- Read all of these instructions.
- Save these instructions for later use.
- Follow all warnings and instructions marked on the audio equipment.

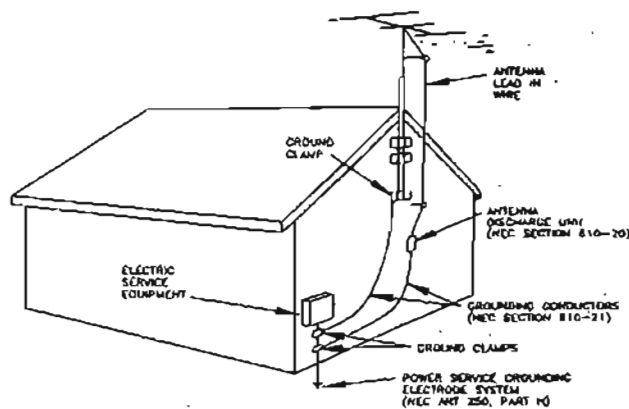
1. **Read Instructions** — All the safety and operating instructions should be read before the appliance is operated.
2. **Retain Instructions** — The safety and operating instructions should be retained for future reference.
3. **Heed Warnings** — All warnings on the appliance and in the operating instructions should be adhered to.
4. **Follow Instructions** — All operating and use instructions should be followed.
5. **Water and Moisture** — The appliance should not be used near water — for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. **Carts and Stands** — The appliance should be used only with a cart or stand that is recommended by the manufacturer.
- 6A. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.



7. **Wall or Ceiling Mounting** — The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. **Ventilation** — The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. **Heat** — The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
10. **Power Sources** — The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. **Grounding or Polarization** — The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
12. **Power-Cord Protection** — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

13. **Cleaning** — The appliance should be cleaned only as recommended by the manufacturer.
14. **Power Lines** — An outdoor antenna should be located away from power lines.
15. **Outdoor Antenna Grounding** — If an outside antenna is connected to the receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70 — 1984, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See Figure below.

EXAMPLE OF ANTENNA GROUNDING
AS PER NATIONAL
ELECTRICAL CODE



NEC — NATIONAL ELECTRICAL CODE

16. **Nonuse Periods** — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
17. **Object and Liquid Entry** — Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
18. **Damage Requiring Service** — The appliance should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the enclosure damaged.
19. **Servicing** — The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel.

How to Use This Manual

The 688 MIDISTUDIO is different in major ways from previous PORTASTUDIOS. The basic structure of the mixer, the features of the tape transport, the MIDI implementation, and the electronic switching are all new. To get the most out of your 688, spend some time now to READ THE MANUAL! You'll be glad you did. Even if you're experienced, you'll discover some tricks you haven't tried before.

This manual is divided into sections.

INTRODUCTION: Everyone, from expert to novice, should read this part.

OPERATIONS GUIDE: This covers the "how to" procedures of basic multitrack recording with the 688. It advances to instructions about using effects, bouncing tracks, and punching in.

MIDI OPERATIONS: After you've worked with and are comfortable with the mixer and the recorder sections, read this if you want "how to" procedures of MIDI synchronization. Non-MIDI users don't need this part.

FEATURES AND CONTROLS: Everyone should use this "what is it?" dictionary that defines every control and indicator on the 688 in detail.

You'll get the best results by having your system set up so you can experiment with it as you read. Don't make the mistake of booking a crucial recording session before you've had free time to really get to know your 688.

Introduction

The 688 MIDISTUDIO® is an 8-channel multitrack cassette recorder, a 20 input mixing system with electronic routing control, and a MIDI Tape Synchronizer combined into a single workstation. It's the first 8-track PORTASTUDIO® expressly designed to meet the challenge of the MIDI revolution. Its mixing section is designed in a new way to accommodate the greater number of line inputs in a typical MIDI studio, up to 20 at once plus 4 effect returns. Each main channel can access up to 4 effects busses, so you can use a variety of different effects (reverbs, delays, choruses etc.) on different inputs. MIDI Tape Synchronization with Song Position Pointer (same as that used by the TASCAM MTS-30) is built in, so that the capabilities of MIDI sequencing can be blended with the advantages of multitrack recording.

In addition, the MIDISTUDIO can be synchronized to other multitracks (like the TASCAM MSR-16 or 238) or to a video cassette recorder using the TASCAM MIDIZER. (Connection of the MIDIZER to a VCR may require the IF-1000 Parallel Interface Unit.)

Precautions

Changing the Memory Back-up Battery

The included battery lasts about 5 years. We recommend you to change the battery in advance to prevent accidental erasure of the contents of the 99 scene memories. If the battery has run low, when you turn on the 688 you will see the switch settings of factory preset scene 01, instead of the last scene you used. For information on how to change the battery, consult TASCAM or your nearest TASCAM dealer.

Voltage Conversion

This unit is adjusted to operate on the electric voltage specified on the unit, power cord tag, or packing carton.

NOTE: This voltage conversion is not possible on models sold in the U.S.A., Canada, U.K., Australia or Europe.

ALWAYS DISCONNECT THE POWER LINE CORD BEFORE MAKING THESE CHANGES.

For general export units, if it is necessary to change the voltage requirements to match your area, locate the voltage selector on the rear of the 688 and set that to the required position.

Note for U.K. Customers only

Due to the variety of plugs used in the U.K., this unit is sold without an AC plug. Please request your dealer to install the correct plug to match the mains power outlet where your unit will be used as per these instructions.

IMPORTANT

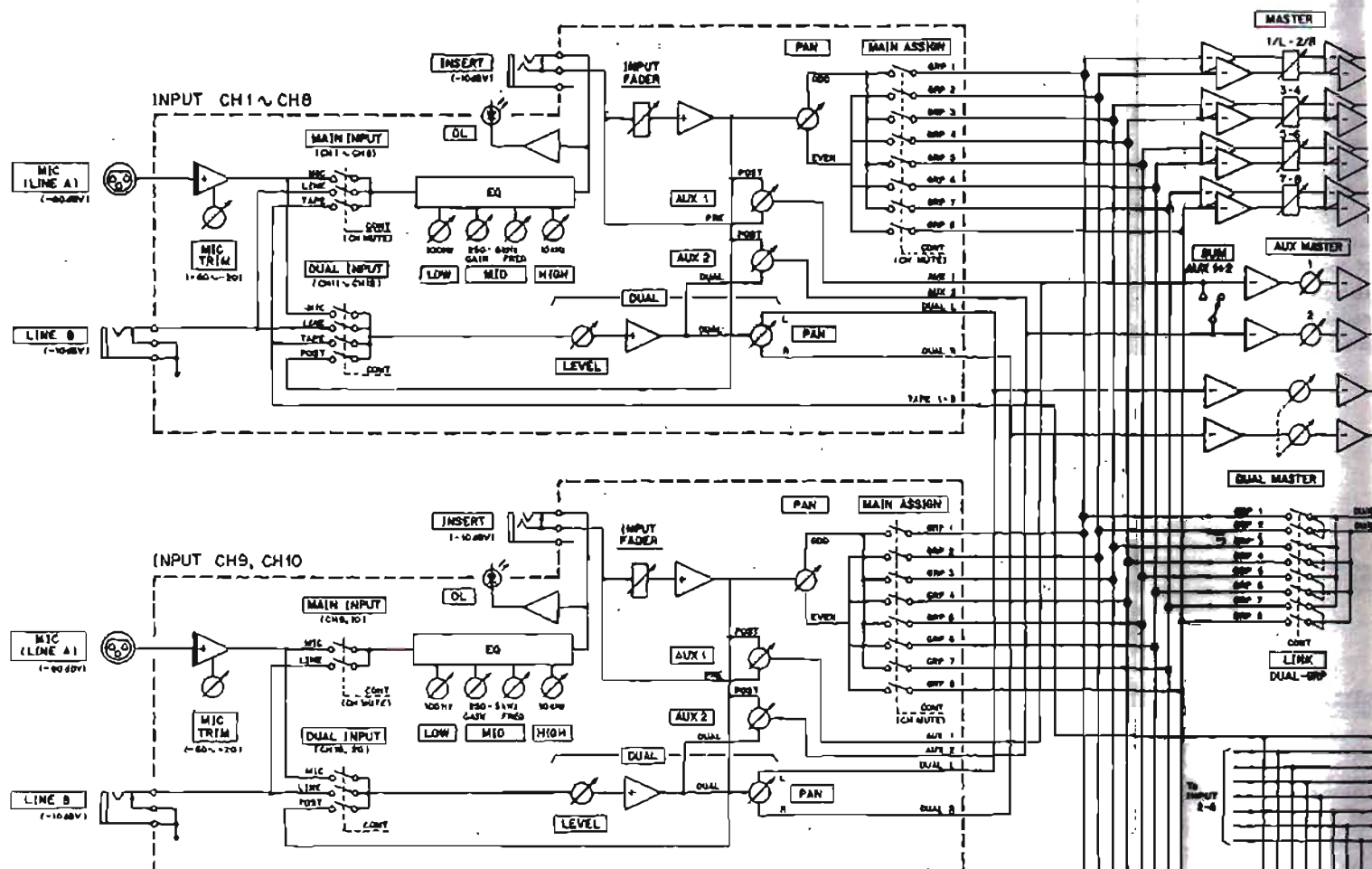
The wires in this mains lead are coloured in accordance with the following code:

BLUE:	NEUTRAL
BROWN:	LIVE

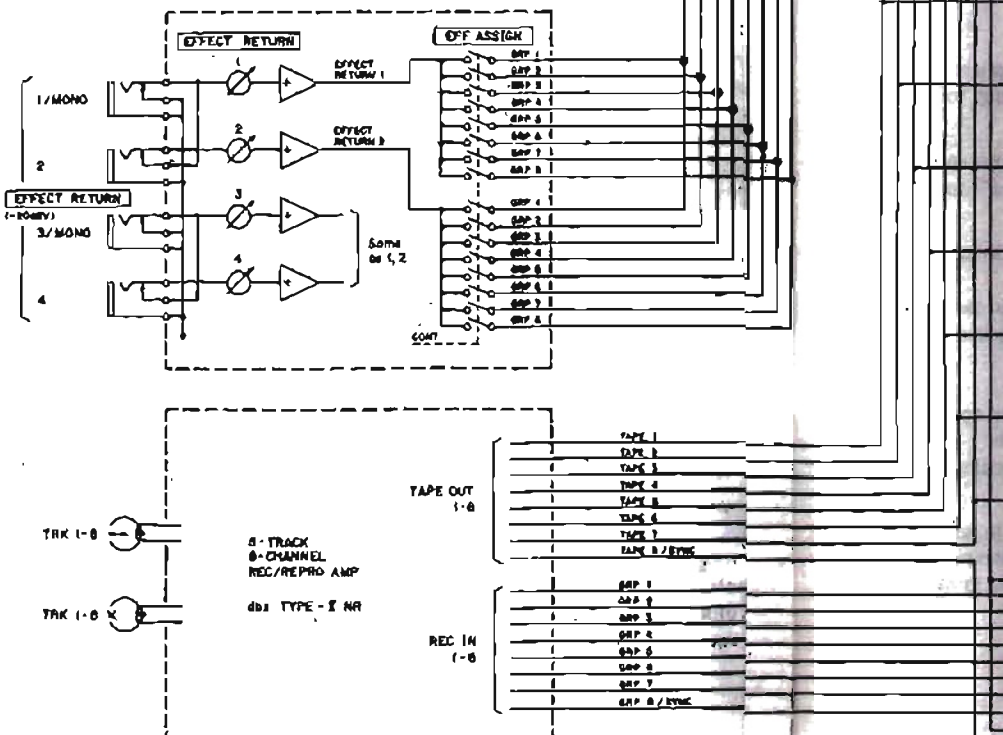
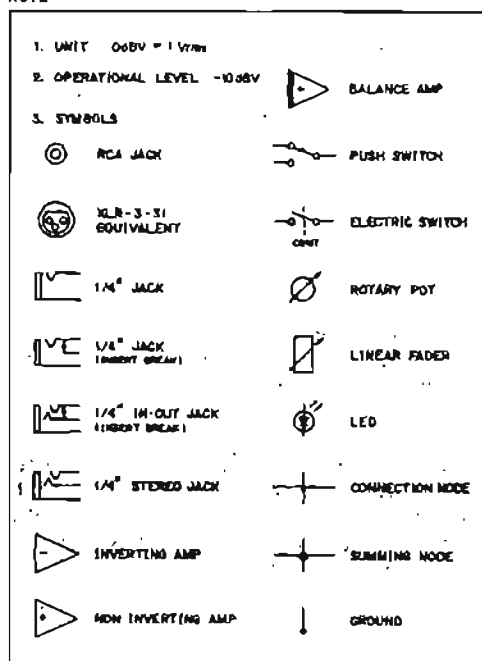
As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured marking identifying the terminals of your plug, proceed as follows:

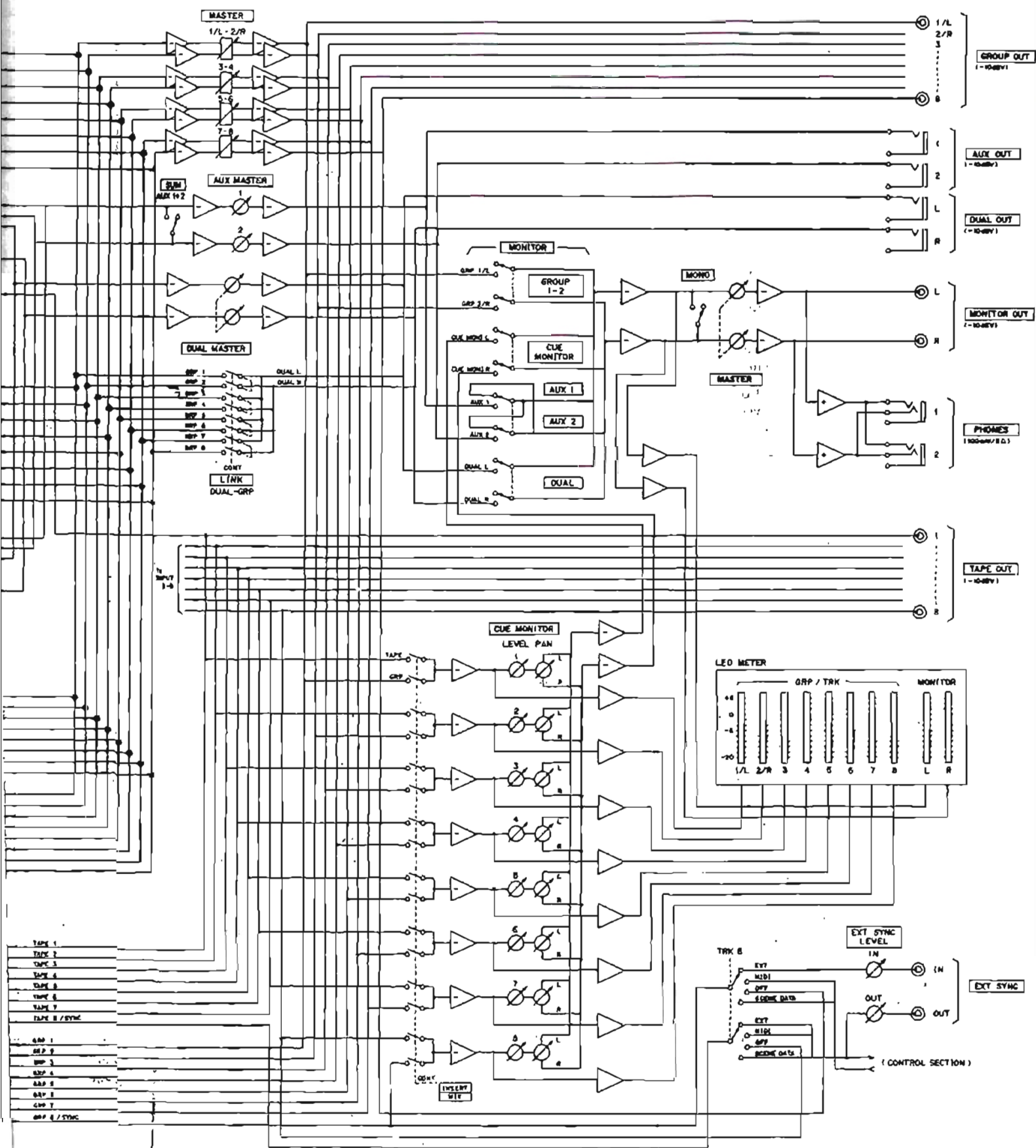
The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

Block Diagram



NOTE





Understanding the Mixer

Mixer Routing/Scene Display

To make the 688 MIDISTUDIO easy to use, TASCAM designed an electronic switching system that controls and memorizes all mixer routing into 99 "scenes". Recalling a scene changes the routing of the whole mixer at once, instead of having to switch each channel individually. The 688 comes from the factory with Scenes 1-12 already preset with the most commonly used settings, so you can get started just by pressing the UP, DOWN, and RECALL keys.

What is routing?

Every control on a mixing console performs one of three relatively simple tasks:

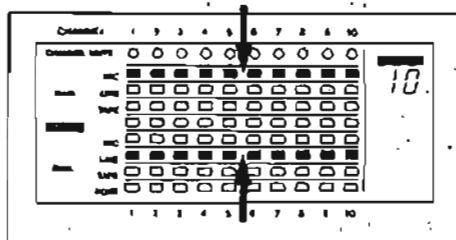
1. Where FROM—called "input selection" or "sourcing".
2. Where TO—called "assignment".
3. How MUCH—called level, gain, attenuation, trim, mute, on/off, etc. etc.

The mixer of the 688 contains 146 different switches. This is more than the scene display can show at once, so there are three "display pages" to each scene:

INPUT page

This is the page that shows the source ("where from") of each of the 20 channels of the mixer:

These black squares show that MAIN channels (1-10) are getting their inputs from the MIC jacks.

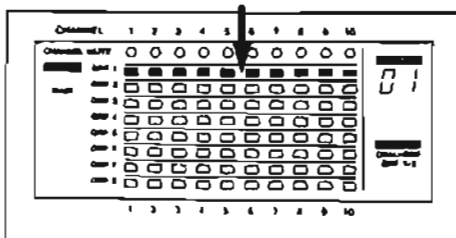


These show that the DUAL channels (11-20) are getting their inputs from the LINE jacks.

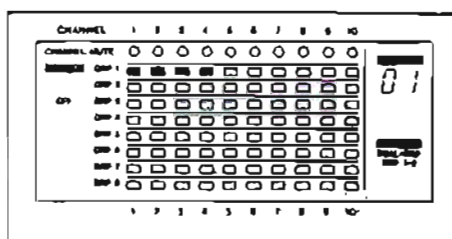
ASSIGN MAIN page

This is the "where to" display for the MAIN channels (1-10). It shows which channels are assigned to which of the eight output groups of the mixer, ready for recording:

These black squares show that MAIN channels 1-10 are assigned to Group 1, ready to be recorded on Track 1:



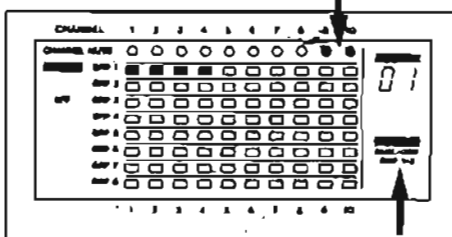
The ASSIGN EFF page works just like the MAIN page, sending any of the four EFFECT RETURNS to any of the eight GROUPS.



Other settings (all pages)

Some settings are visible regardless of page: DUAL LINK and CHANNEL MUTE:

A black dot indicates when a MAIN channel (1-10 only) is muted (turned off):

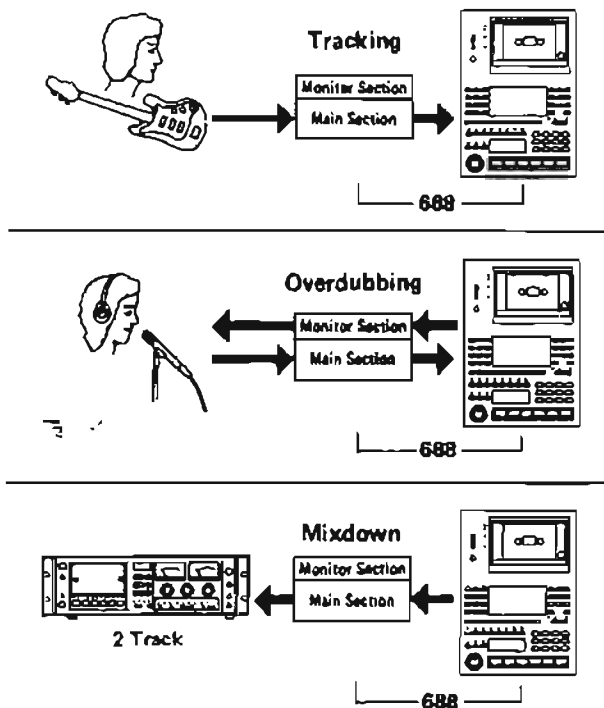


This shows that the DUAL mix (channels 11-20) has been linked to Groups 1 and 2. (Dual Left to 1, Dual Right to 2.)

You may have noticed that there is no "Assign Dual" screen for inputs 11-20. The DUAL channels (11-20) cannot be assigned individually. Instead, the dual section acts as a stereo submixer whose left and right outputs can be LINKED to the group outputs for recording. DUAL LINKs should be turned OFF when you want to use the DUAL section to monitor some inputs—that is, hear them, but not record them.

The Three Steps to Multitrack

Why are all these scenes and INPUT and ASSIGN switches necessary? Because there are three basic steps to multitrack recording. In each step, the signal flow through the mixer has to change direction:



Notice how the arrows in the pictures above change direction.

In **TRACKING** and **OVERDUBBING**, the mixer inputs are usually microphones or instruments, going to different tracks of the recorder. In **OVERDUBBING**, part of the mixer must be used to monitor previous tracks while you record new ones, so there is a two-way flow through the console. In **MIXDOWN**, signal comes from the multitrack and is sent to an external 2-track recorder.

On a mixer with mechanical switches, you have to press dozens of separate switches to go from overdub to mix-down modes. But because of the 688's scene display, all you have to do is change scenes (by pressing UP, DOWN, or the number keys, then RECALL), and everything changes for you.

Factory Presets

The first 12 scenes come from the factory with settings that will help you get started. You can see this data in more detail in the charts on pages 56-60.

Scenes 1-8 are dedicated to tracking or overdubbing onto the eight tracks of the recorder, one at a time:

Scene	Assign MAIN	Assign EFF	Input MAIN	Input DUAL	Dual Link
01	GROUP 1		MIC	LINE	GRP 1-2
02	GRP 2		.	.	.
03	GRP 3		.	.	GRP 3-4
04	GRP 4		.	.	.
05	GRP 5		.	.	GRP 5-6
06	GRP 6		.	.	.
07	GRP 7		.	.	GRP 7-8
08	GRP 8		.	.	.

These scenes are identical except for their ASSIGNments. All inputs are active—the mics through the MAIN channels 1-10, and the lines through DUAL channels 11-20, with LINKS ON.

Scene 12 is the **MIXDOWN** scene. Here, the **TAPE** becomes the source of the main channels, and everything is assigned in stereo to Groups 1 and 2:

Scene	Assign MAIN	Assign EFF	Input MAIN	Input DUAL	Dual Link
12	GROUP 1-2		TAPE	LINE	GRP 1-2

These factory presets are just a suggestion, and there are 87 blank scenes available so you can build scenes that fit your own studio. (Even the first 12 can be erased or changed at any time.)

For example, if you want a synthesizer plugged into a 1/4" **LINE (B)** jack to go through a MAIN channel instead of the DUAL, you just have to make a scene with **LINE** as the main channel source. **LINE** can be selected as the input for the MAIN channel, the DUAL channel, or both channels simultaneously. The same is true for **MIC**, and the eight **TAPE** tracks.

Note that while the XLR jacks are labeled **MIC** on the scene display, they can accept line-level inputs (from synthesizers, etc.) if the **TRIM** is turned down. This makes it possible to have 20 line sources at once with the 688. A simple XLR-to-phone adapter is all that is needed—this is why the jacks are labeled **MIC (LINE A)**.

Multitrack Cassette Recorder

The 688 records on readily available standard (Philips) Compact Cassette tape, high bias Type II. You can record on any or all eight tracks of the 688 at any time.

With proper operating techniques, it is not necessary to leave a guard band between music and sync tone tracks because of the low crosstalk of the TASCAM heads. Using DBX noise reduction the sonic quality of the 688 is only exceeded by reel-to-reel recorders with noise reduction.

The transport controls of the MIDISTUDIO are microprocessor operated, allowing high reliability and automatic functions that make the unit easier to use:

- REHEARSE and AUTO IN-OUT use the counter to electronically mark punch-in and out times. Once you have set the points, you can practice an insert several times before actually recording, with machine precision each time.
- A three position autolocator (MEMO 1 and 2 and Zero) allows key positions to be located automatically.
- REPEAT allows a section to be played over and over between the MEMO 1 and MEMO 2 points for rehearsal.

• There are two counter displays, one showing the current position and the other showing an autolocate or punch point.

• The counter display can show either reel revolutions or acts as a timer showing how long the transport has been in PLAY or RECORD mode.

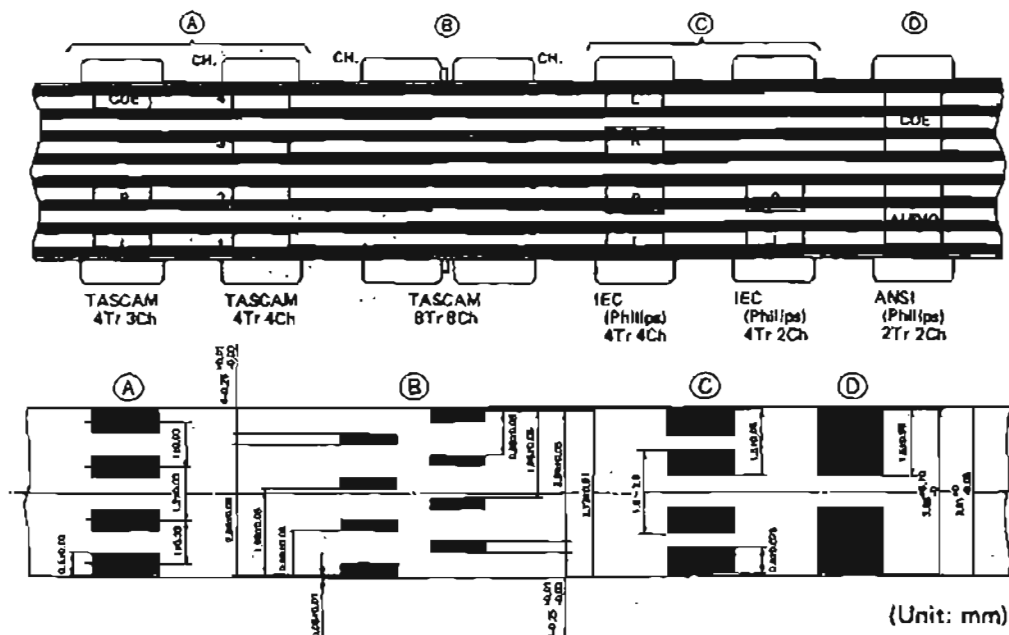
In addition, the transport capstan motor is servo-controlled, so that the tape speed can be increased or decreased with the PITCH CONTROL to match pitch or for special effects. The capstan can be externally controlled by a synchronizer (such as the TASCAM MIDIIZER) connected to the ACCESSORY 2 Interface of the 688 so the tape will "lock" to another recorder, either audio or video, using SMPTE Time Code.

The 688 can be remotely controlled by the optional RC-88 remote control unit which puts the transport controls up to 5 m (15 ft.) away. Punch-in and Punch-out can be engaged using the optional RC-30P footswitch, which gives you an "extra hand" in the recording process. During Rehearse and Auto In-Out modes, you can even put the deck into PLAY or REWIND with the RC-30P, for totally "hands free" operation.

Track Format and Tape Recommendations

The 688 MIDISTUDIO uses a basis speed of 9.5 cm/sec. (3-3/4 ips) which is two times (2X) the normal speed of a standard audio cassette. It also employs a discrete 8-

channel format head developed especially by TEAC for TASCAM multitrack cassette recorders. Here is a comparison of various cassette formats:



Tapes recorded on stereo cassette recorders will not play back properly on the 688 because of the differences in the track format and tape speed. For the same reasons, tapes recorded on the 688 MIDISTUDIO will not play back properly on stereo cassette recorders. Material recorded

on the 688 must be mixed down to stereo for final distribution.

The 688 MIDISTUDIO, like all multitrack cassette recorders, records and plays the tape in one direction

only. The 688 needs the entire width of the tape to record its eight tracks, eliminating the option of recording on both sides (actually, it's both directions). Therefore, you should decide which side (side "A" or side "B") you want to use and use that side exclusively. It's a good idea to get into the habit of consistently using the same side on all multitrack tapes.

Tape Type

The 688 MIDISTUDIO is internally adjusted for HIGH BIAS "Type II" tape. This means that for best results, you should only use tapes of this type. Examples would include TDK SA, Maxell XL-II or equivalent formulations. We strongly suggest that you select one good quality brand and use it exclusively. The time you spend creating your multitrack master is much more valuable than the money you save by buying inferior tape. The cassette shell essentially becomes a part of the 688's transport. Poor quality shells can cause wrinkles, snarls and shredding of the edges of the tape with use. Even small scratches on the tape oxide can cause "dropouts" (temporary loss of signal) on one or more of the tracks. High quality tapes are less likely to cause problems in the long run.

Accidental Erase/Record Protection

To protect a finished master tape, it is necessary to punch out both record protect tabs. Even though you are recording in only one direction, the 688 MIDISTUDIO uses the entire width of the tape, as mentioned above. If, for example, you remove only one of the tabs, you could accidentally insert the cassette into the 688 backwards and erase all eight tracks of the master.



Tape Length

Use the shortest possible tape for a given work. It is not unusual to play a tape 100 times before you are finished, so select a cassette length that is as close as possible to the length of the program you plan to record. Cassettes C-60 length and shorter are often made from thicker stock than longer cassettes.

The tape used in C-120 cassettes is extremely thin and can cause winding problems, crimping, wrinkling, and other damage to the oxide coating of the tape which will destroy your work. Don't use C-120s in the 688.

Remember that at 2X normal speed, and the "one-side-only" 8-track single direction format means that you have only 1/4X normal play time.

(approx.)

C-30	7.5 min.
C-46	11.5 min.
C-60	15 min.
C-90	22.5 min.

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

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

This product is manufactured to comply with the radio interference of EEC directive "82/499/EEC."

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das

MISCHPULT MIT MAGNETTONBANDGERÄT 688

(Gerät, Typ, Bezeichnung)

In Übereinstimmung mit den Bestimmungen der

AMTSBLATT 163/1984, VFG 1045/1984, VFG 1046/1984

(Amtsblattverfügung)

funk-entstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes abgelehnt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.

TEAC CORPORATION

Name des Herstellers/Importeurs

ADVARSEL

Lithiumbatteri — Eksplosionsfare ved fejlagtig
håndtering. Udskiftning må kun ske med batteri
af samme fabrikat og type.
Lever det brugte batteri tilbage til leverandøren.

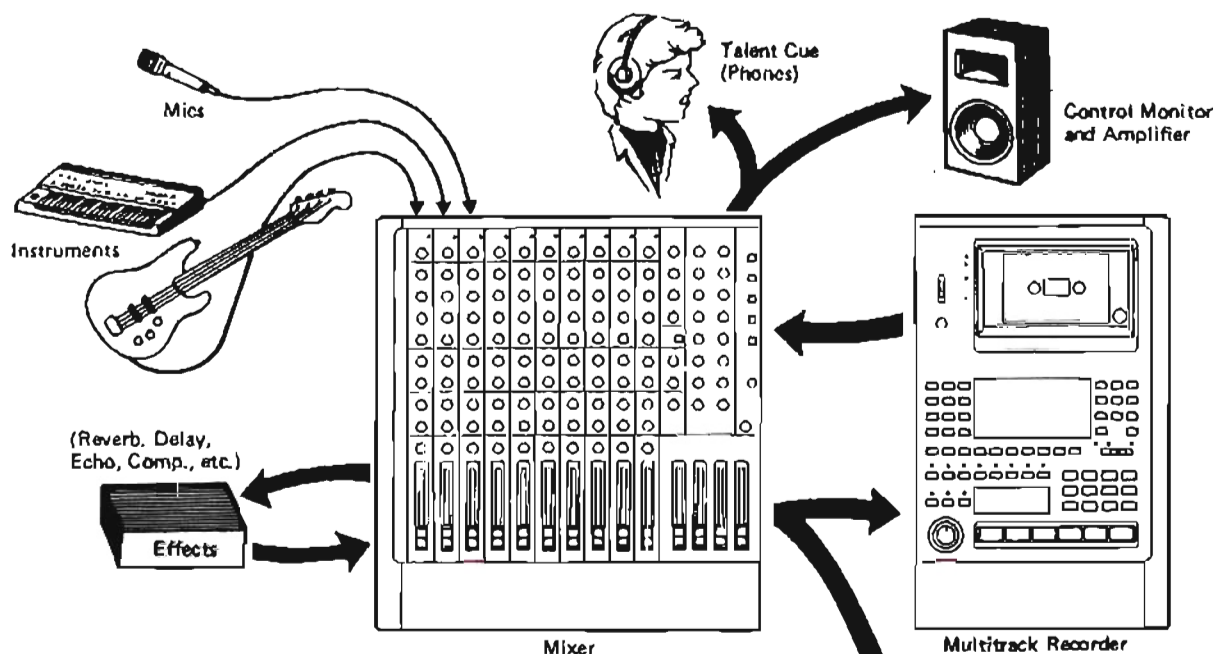
VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en ekvivalent
typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt fabrikantens instruktion.

CONFORME AL D.M. 13 APRILE 1989
DIRETTIVA CEE/87/308

THE APPLIANCE CONFORMS WITH EEC DIRECTIVE 87/308/EEC REGARDING INTERFERENCE SUPPRESSION

The Recording System



There are six elements to a complete recording system:

- Multitrack recorder
- Mixer
- 2-track (Mixdown) Recorder
- Input devices (microphones, synthesizers)
- Output devices (headphones or amp and speakers)
- Effect processors

The MIDISTUDIO contains two of these elements—the mixer and the multitrack recorder—in one unit. Even though they are wired together internally, it is important to understand that they still act as separate elements.

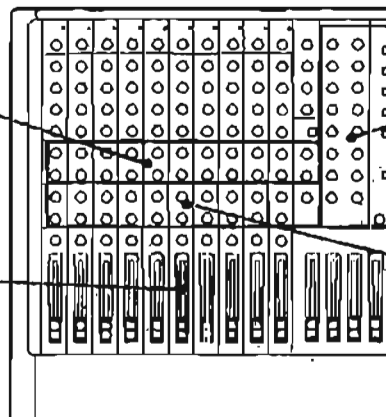
When you plug into Input 1, you're plugging into a channel of the mixer, NOT Track 1 of the recorder. You have to use the mixer controls to assign that input to the track of the recorder you want to record on.

Mixer Subsystems

The mixer of the 688 is easy to understand if you break it down into several subsystems and learn the purpose of each section based on where it gets its signal FROM and where it sends signal TO.

Aux Mix: This section gets its signal from the main or dual sections, and sends it out to external signal processing devices.

Main Mix: This is the recording mixer. It gets signal from multiple inputs, processes them for level and tone, and sends them to tape recorder tracks.



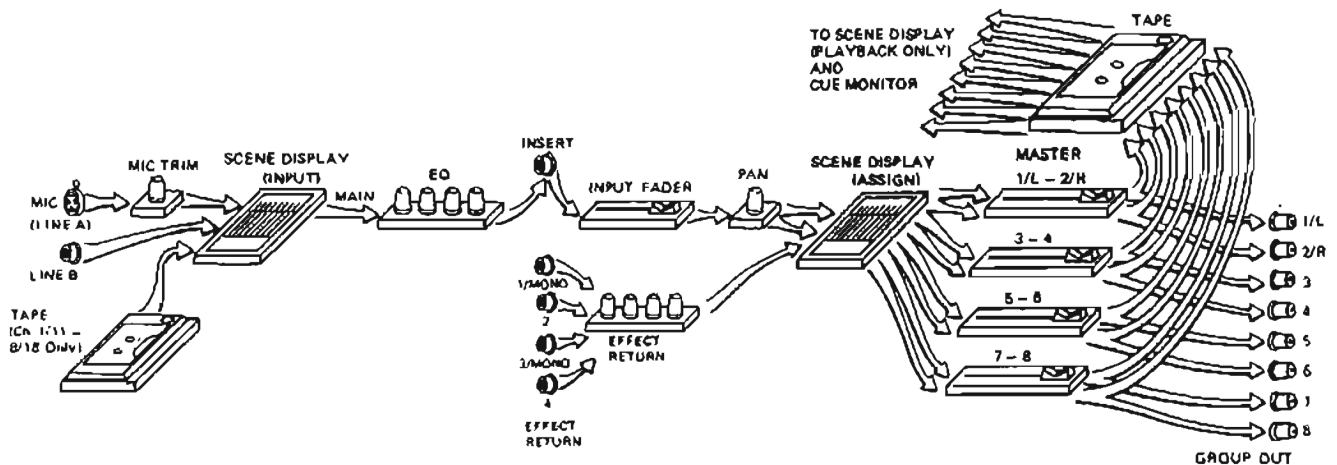
Monitor Mix: This is the listening mixer. It gets signal from the tape recorder, or from any of the other mixer subsystems, and sends them to your control room speakers or headphones.

Dual Mix: This section can add 10 extra sources to the Main, Monitor, or Aux systems. It gets signal from multiple inputs, or from post-Main fader. Its stereo output can be heard in the Monitor, linked to the Main Mix for recording, or connected to external effect devices.

Main Mix: This subsystem (Channels 1-10) is the largest in the 688. Its purpose is to control signals going to the multitrack recorder during tracking and overdubbing, and to the stereo recorder during mixdown. The Main Mix offers the most control—each channel has a linear fader, an equalizer, an insert point, and can be individually assigned to any of the eight Groups. Each Group connects to its corresponding tape track. Each channel of the Main Mix can get signal from its corresponding Mic or Line jack, and send it to any of the eight Group outputs and tape tracks.

During mixdown or bouncing tracks, channels 1-8 can get signal from the multitrack tape. The pan pot and ASSIGN MAIN page determine the destination of a channel: Group 1 to Track 1, Group 3 to Track 3, and so on.

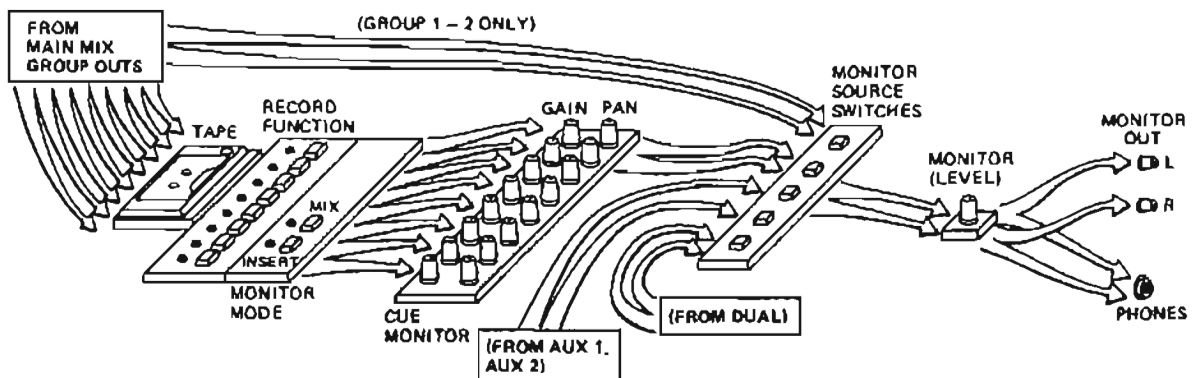
The EFFECT RETURNS are actually four specialized inputs to the Main Mix. They can be assigned to any of the eight Groups via the ASSIGN EFF page, allowing you to record effects onto any track, or onto the mixdown deck.



Monitor Mix: It's important that the engineer/producer/performer has a separate mix to listen to and make adjustments on, without affecting the Main Mix going to tape. The 688 has an 8x2 Tape CUE MONITOR mixer and Monitor Source switches for this purpose. The CUE MONITOR always gets its signals from the multitrack tape. But what does a track send to this mixer during RECORD or READY mode, especially before a punch-in? This is set by the MONITOR MODE keys. If both are off, pressing a RECORD FUNCTION (track arming) switch

selects the Group as the Monitor and Meter source. INSERT keeps the source of a Rec-ready track TAPE until the moment of punch in. MIX allows you to hear both live and tape in the CUE MONITOR during the "preroll".

The five MONITOR Source switches choose which mixer(s) you are listening to—this Cue Monitor, the Dual, Aux 1 or 2, or directly to Group 1-2 of the Main Mix.

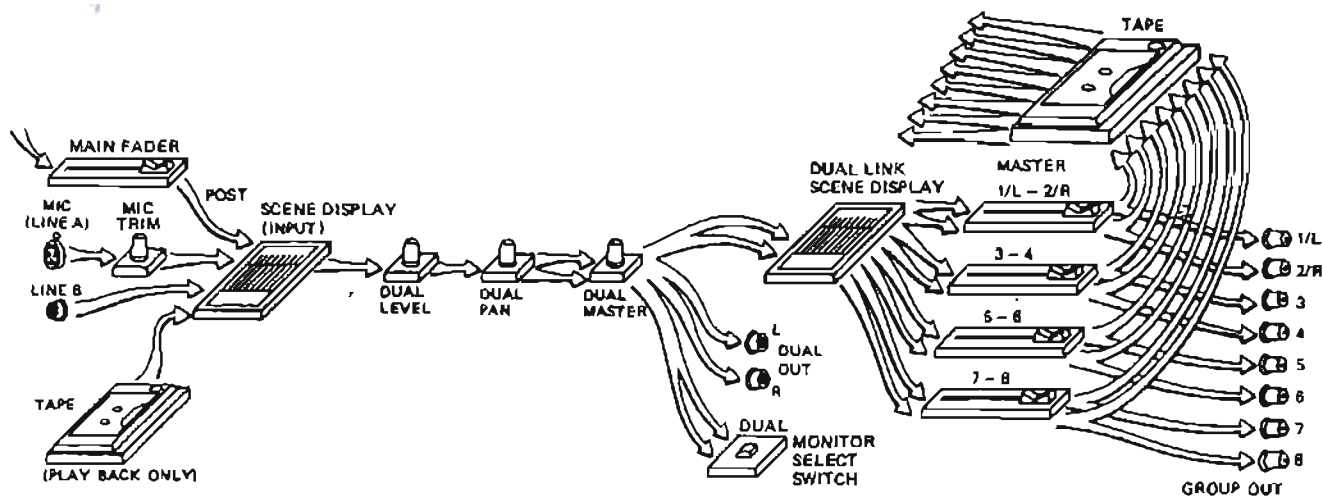


Dual Mix: Each channel of the DUAL section can get its Input signal from the corresponding MIC or LINE input jacks, TAPE track (Ch. 11-18 only), or Main Channel Fader (POST). The Dual acts as a totally independent 10x2 stereo submixer, and can be used for either recording or listening.

Link Dual-Grp makes the 688 into a 20x8 console, while maintaining a compact size. When you need to record more sources than the ten channels of the Main mix can handle, the LINK function assigns the output of the dual section to any of the Groups for recording. For example, during final mixdown with MIDI-controlled tracks,

pressing LINK GRP 1-2 allows you to send up to 13 live sources and 7 tape tracks to the mixdown deck: 10 via Main, 10 via the Dual Mix.

When LINKs are *off*, and DUAL is pressed on the Monitor Select switch, it acts as an expander to the monitor mixer, allowing you to hear up to ten live MIDI-controlled Instruments without recording them. Any changes you make to the Dual Level and Pan controls will be in your headphones/monitors only, and won't affect the Main Mix going to tape (similar to the way the CUE MONITOR mixer works).

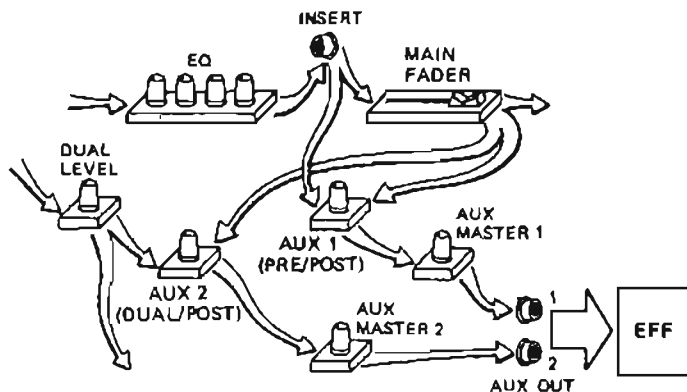


Aux Mix: The AUX 1 and AUX 2 submixer signals come from various points in the Main or Dual signal paths. Let's assume that you have a digital delay, reverb, or another signal processor that you want to use on more than one input simultaneously. Your 688 is able to send signals of any combination of Input channels to the AUX 1 and AUX 2 OUT jacks on the back panel. These outputs can then be connected to your signal processor, and the processor's output(s) can be connected to the EFFECT RETURNS, or even back to another mixer input.

Aux 1 always gets its signal from the MAIN signal path,

either before (PRE) or after (POST) the main fader. This allows it to be used as either an independent headphone feed (similar to "monitor" or "foldback" controls on a PA board) or as an effect send from channels 1-10.

Aux 2 can get its signal either from the MAIN path (POST, same as Aux 1), or from the DUAL path. This allows it to be used as a second effect send from main channels 1-10, or as the only effect send from dual channels 11-20.



Input selection and adjustments

MIC (LINE A): These balanced XLR jacks can be the input of either the Main or Dual channel. Microphones or line-level devices such as synthesizers may be connected here, with level adjustment by the MIC TRIM control. In the factory preset scenes, this MIC jack signal is sent through the Main channel controls.

LINE B: These 1/4" jacks are for LINE-level signals only, and can be the input for either the Main or Dual channel. In the factory preset scenes, however, LINE signals are sent through the DUAL channel controls.

INSERT: This is a 3-conductor send/receive jack for the insertion of an external signal processor (such as a compressor) between the EQ and Channel Fader of the MAIN channel.

OL: Overload indicator for the MAIN channel input signal. Lower the MIC TRIM or output volume of the source if this flashes.

MIC TRIM: Sets how much preamplification will be added to the MIC (LINE A) jack. Turn to the right if the signal needs amplification, to the left if the signal is so loud it is distorting the mixer electronics.

Equalization and Aux send

Equalizer: 3 band with a midrange frequency sweep.

HIGH: Shelving type treble control with shelving point at 10 kHz, can affect frequencies from 2 kHz to 20 kHz.

MID: Sweep frequency range is 250 Hz to 5 kHz.

LOW: Shelving type bass control with shelving point at 100 Hz, can affect frequencies from 20 Hz to 500 Hz.

AUX 1: A pre or post-fader effect send from the MAIN channel. The center position is OFF. Turn to the right to send signal to AUX 1 Master from the POST-fader point, and to left to send signal from the PRE-fader point.

AUX 2: A post-fader effect send from the MAIN or DUAL channel. The center position is OFF. Turn to the left to send signal to AUX 2 Master from the post DUAL level control point, and to right to send signal from the post MAIN fader point.

DUAL Channel Output section

DUAL LEVEL: Sets the volume of the DUAL channel feeding the DUAL MASTER control.

DUAL PAN: Sets the pan position (left-right balance) of the DUAL channel in the DUAL MASTER stereo mix.

MAIN Channel Output section

PAN: Sets the pan position (left-right balance) of the MAIN channel between odd/even groups (left for GRP 1, 3, 5 and 7, right for GRP 2, 4, 6 and 8, center for all) via the ASSIGN MAIN screen display.

Channel fader: Sets the volume of the MAIN channel feeding the group master faders.

OUTPUT JACKS: Rear panel (not shown)

GROUP OUT 1-8: Connect 1/L and 2/R to the inputs of your mixdown deck. The GROUP OUT jacks can also be connected to external mixers, etc.

TAPE OUT 1-8: These are the direct outputs of the multitrack recorder.

EFFECT RETURN 1-4: These are the input jacks for the effect devices.

AUX OUT 1 and 2: Connect these to the inputs of effect devices.

DUAL OUT: These are the output jacks of the DUAL stereo mix as a stereo effect send or additional monitor.

MONITOR OUT: Connect these to the monitor amplifier in your control room.

Monitor Section

CUE MONITOR LEVEL/PAN: These controls create track tape for your phones and monitor system (switch is on). If a track is in Safe mode, the source PAN control is Tape; in Record mode, the source is the mixer being recorded. In Record Ready mode, the MONITOR MODE keys.

MONITOR switches: These select what signal is sent to the PHONES, and see displayed on the MONITOR LEVEL/PAN control. When a switch is pressed down, you can hear any or all of 1-2, CUE MONITOR, AUX 1, AUX 2, and DUAL. The MONO switch makes the monitor mix monophonic.

MASTER: This controls the overall level of the monitor mix to the MONITOR OUT jacks and the built-in headphones.

Effect Return Section

EFFECT RTN 1-4: Controls the volume of the EFFECT RETURN signals feeding the GROUP MASTERS via ASSIGN EFFECT screen display.

Master Section

SUM switch: Combines the signal from the AUX 1 buss with the signal from the AUX 2 buss.

AUX MASTER 1-2: These are the master controls for the two effect send outputs.

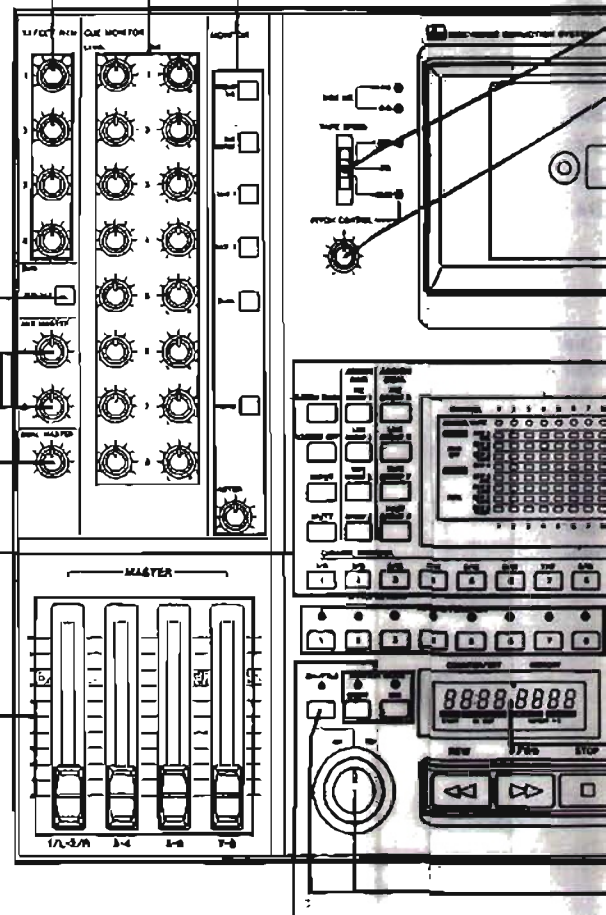
DUAL MASTER: This is the master control for the DUAL stereo mix (Channels 11-20).

GROUP MASTER faders: Adjusts the output levels of the Group mixes to GROUP OUT jacks, CUE MONITOR controls, and to the multitrack recorder.

Monitor Section

Scene Display and keys: This section controls all routing of signal flow through the 688's mixer. There are three "pages" or modes to the display; the black squares display the different switch settings for INPUT and ASSIGNment in the mixer channels. The keys have different functions on each page. All switch settings can be stored in 99 scene memories; the first 12 scenes are loaded with the most commonly used settings. An Introduction to the Scene Display is on page 7. Details of operation are on pages 25-27. Definitions of each key are on pages 39-42. Graphs of the factory presets are on pages 59-63.

MONITOR MODE keys: These determine the source of a CUE MONITOR control whose RECORD FUNCTION light is flashing: Group (both keys off), Tape playback (INSERT on), or a mix of Tape and Group (MIX on). The eight TRK/GRP meters follow the same logic.

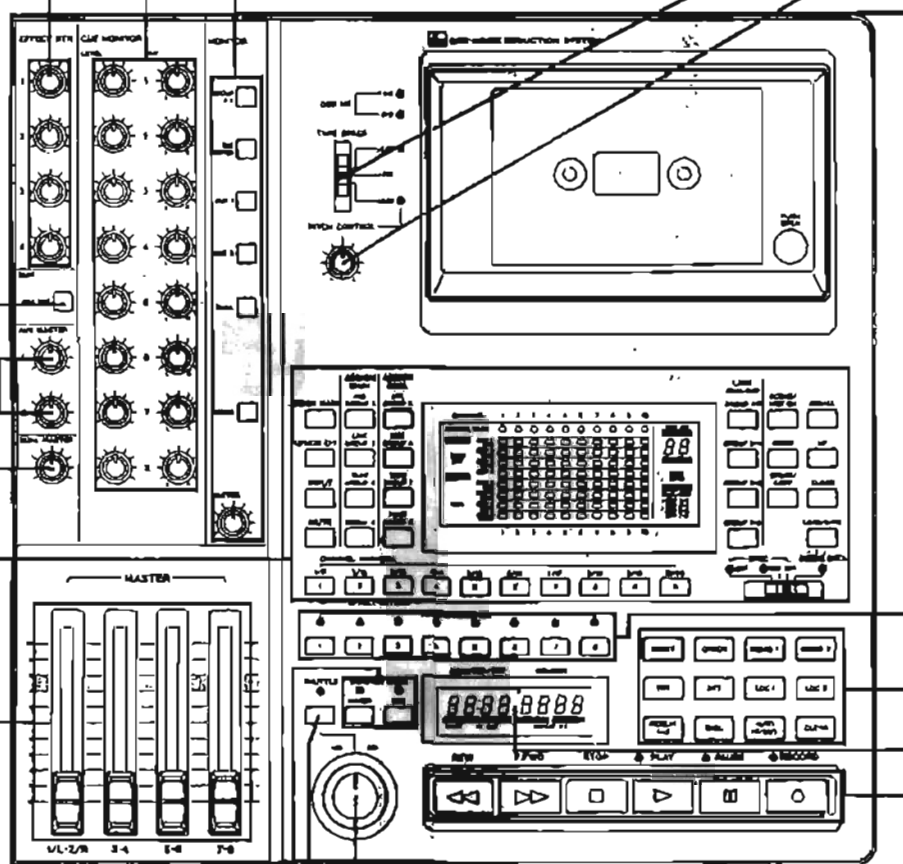


Monitor Section

CUE MONITOR LEVEL/PAN: These controls create a stereo mix from the 8 track tape for your phones and monitor system (if the CUE MONITOR switch is on). If a track is in Safe mode, the source of its CUE LEVEL and PAN control is Tape; in Record mode, the source is the Group output of the mixer being recorded. In Record Ready mode, the cue source is set by the MONITOR MODE keys.

MONITOR switches: These select what signals you will hear in the PHONES, and are displayed on the MONITOR L/R meter. Depending on what is pressed down, you can hear any or all of the five mixes; GROUP 1-2, CUE MONITOR, AUX 1, AUX 2, and DUAL. MONO switch makes the monitor mix monophonic.

MASTER: This controls the overall level of the monitor mix and send signal to the MONITOR OUT jacks and the built-in headphone amp.



Recorder

TAPE SPEED: transport. speed ($\pm 12\%$)

PITCH CONTR: Record or P

RECORD FUN: into Rec Re example, G LED will flas

RESET: Press

TRT: Tape Run TRT mode, RECORD.

MEMO 1 and point.

CHECK: Show

LOC 1 and 2: point.

RTZ: Return-position.

REPEAT: Press MEMO point

RHSL: Rehear then prevlew

AUTO IN/OUT: you've set it

CLEAR: Used the current

COUNTER: To the Memory

TRANSPORT M

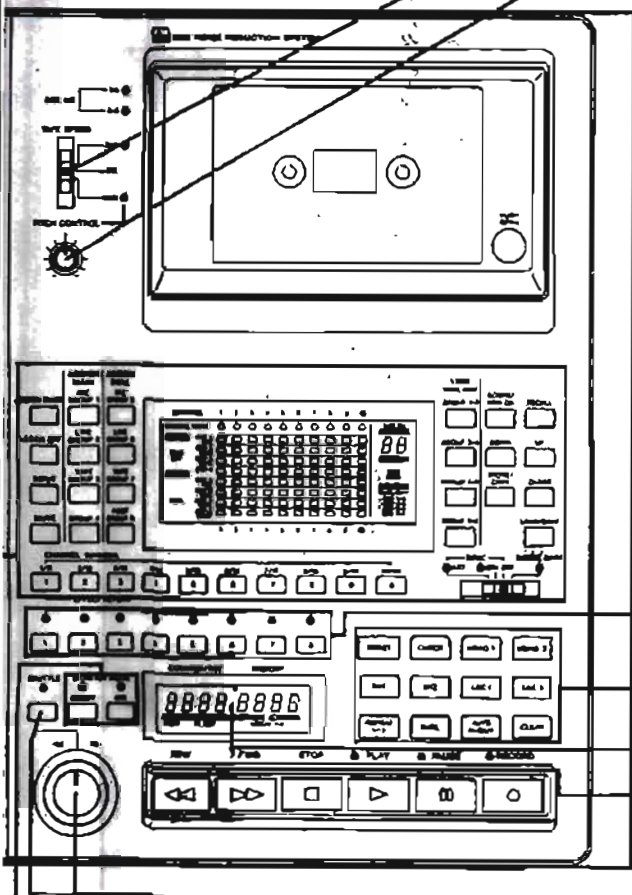
SHUTTLE key: use the audio cue.

DBX NR 1-4/: reduction or leave it on.

VEL/PAN: These controls create a stereo mix from the 8 channels of the monitor system (if the CUE MONITOR is in Safe mode, the source of its CUE LEVEL and CUE PAN is the Group output of the mixer; in Record mode, the source is the Group output of the mixer; in Record Ready mode, the cue source is set by the CUE keys).

MONITOR: These select what signals you will hear in the monitor system. The MONITOR L/R meter is displayed on the MONITOR L/R meter. Depending on the MONITOR mode, you can hear any or all of the five mixes; GROUP MONITOR, AUX 1, AUX 2, and DUAL MONITOR. The MONITOR mode makes the monitor mix monophonic.

MONITOR LEVEL: Controls the overall level of the monitor mix and send signal to the MONITOR L/R meter and the built-in headphone amp.



Recorder controls

TAPE SPEED: Sets the status of the PITCH CONTROL function of the transport. FIX position for standard; VARI for Play/Record in variable speed ($\pm 12\%$); EXT for the external control.

PITCH CONTROL: Increases or decreases the speed of the transport in both Record or Play mode, over a 12% range.

RECORD FUNCTION switches 1-8: Press these keys to put the multitrack into Rec Ready mode. Each Group of the mixer connects to a track; for example, Group 1 connects to tracks 1. When a track is in Rec Ready, its LED will flash. In Record mode, the LED will turn solid.

RESET: Press to change the current tape location in the counter to "0000".

TRT: Tape Run Time; Switches the counter display from COUNTER mode to TRT mode, which shows the minutes and seconds elapsed in PLAY and RECORD.

MEMO 1 and 2: Press to enter the current counter location as a MEMO point.

CHECK: Shows the Memory point in MEMORY display.

LOC 1 and 2: Press to fast wind (LOCate) the transport to either MEMO point.

RTZ: Return-To-Zero — press to fast wind the transport to the "0000" position.

REPEAT: Press to set up a continuous play-rewind loop between the two MEMO points.

RHSL: Rehearsal. In this mode, you set the Punch-In/Out point "on the fly", then preview what it sounds like before actual recording.

AUTO IN/OUT: Press to start the automatic punch-in/out with the points you've set in Rehearsal.

CLEAR: Used to turn off the RHSL and AUTO IN/OUT functions and clear the current in/out points from memory.

COUNTER: Two four-digit display that shows the current tape position and the Memory point, used for autolocation functions.

TRANSPORT KEYS: These work the same as on any cassette recorder.

SHUTTLE key and control knob: Pressing the SHUTTLE key allows you to use the control to move the tape forward or reverse to find a particular audio cue.

DBX NR 1-4/5-8 (Rear panel, not shown): This turns the dbx noise reduction on and off for each group of tracks (1-4 and 5-8). Normally, leave it on.

Step-By-Step Operations Guide: Tracking

Following are step-by-step instructions for the basic procedures of the MIDISTUDIO. They will give you the basic experience you need to fully understand the sections that explain the capabilities of the 688 in detail, so you can customize it for your own situation.

SETUP

Preset the controls: To avoid problems, begin with the power off. Make sure the following controls are set:

- Bring all the faders down.

In the channels:

- Set all MIC TRIMS to full counter-clockwise (7 o'clock)
- Set all EQs, AUX 1 and 2, and PAN controls (main, dual and cue monitor) to center (12 o'clock)

In the master and monitor section:

- Turn all the EFFECT RETURNS, AUX and DUAL MASTERS, the CUE MONITOR LEVELs, and the monitor MASTER off (to full counter-clockwise (7 o'clock))
- Put all the MONITOR SWITCHES (from GROUP 1-2 to MONO) in their OFF position (up).

In the transport section:

- Set the TAPE SPEED to FIX.
- Set the SYNC switch to OFF.

Plug in headphones or monitor amplifier and speakers: Make sure the headphones are stereo. Inserting any mono jack into the headphone jack shorts out the headphone amplifier.

If you'd rather use a monitor speaker setup, connect the MONITOR OUT jacks on the back of the 688 to the inputs of your power amplifier.

RECORDING THE FIRST TRACK

Prepare to Record

Insert a cassette: Press on the cassette door's lower right hand corner, and it will spring open. Insert a high quality blank High Bias (Type II) tape. Close the door.

If you want to use a microphone for your first experiments, plug it into the MIC (LINE A) XLR jack 1/11. If you want to use an instrument, plug it into the LINE B phone jack just below it. Set any volume controls on the instrument to maximum.

In these first exercises using factory presets, MIC will go through the Main channel, and the LINE instrument will go through the Dual channel. Later, you can alter the factory presets to bring LINE B through the Main channel, but stick with this procedure for now.

Turn the power on.

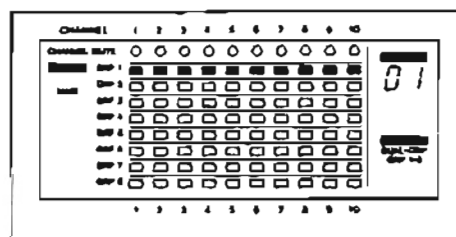
- On the rear of the unit set the DBX switches to IN. The LEDs will go on the control panel.
- Check to see that both the SYNC "EXT" and "MIDI" LEDs are off.

Select the input and output for the channel

1. On the numbered CHANNEL keys, press "0" then "1". This should make "SCENE 01" appear in the assign display and the scene number will blink; it's a special factory preset intended for recording all inputs onto track 1 (unless your unit has already been used by someone else, in which case you should see pp. 27 "Restoring Factory Presets").

Alternately, you can use the UP/DOWN keys to make the scene appear in the display.

Press the ASSIGN MAIN key. The screen should look like this:

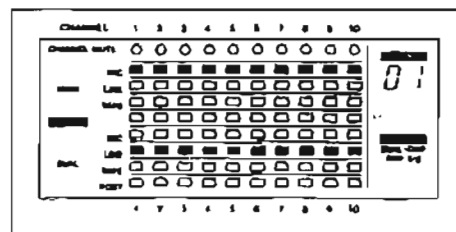


This shows that all Main channels and the Dual output are routed to Group 1. If you are using a microphone, make sure the Main pan pot is turned to the center, or to the left. If you are using an instrument, do the same for the Dual pan pot. If the pan pots are turned hard right, they can't send signal to Grp 1 even though they're assigned there.

2. Press RECALL. The scene number will stop blinking and Scene 01 is activated.

To recall scenes you can optionally use the RC-60P footswitch. When connected to the REMOTE UP/DOWN Jack on the front and pressed, it has the same effect as pressing UP/DOWN and then RECALL.

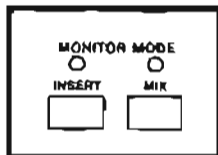
3. Press the INPUT key and make sure the scene looks like this:



4. Press the ASSIGN MAIN key to switch the screen to show the MAIN switch settings again.

Set the output level

5. **Microphone:** Increase the Channel 1 fader to the shaded area between 7 and 8.
Instrument: Turn up the DUAL LEVEL 11 pot to about "2 o'clock". Also, increase the DUAL MASTER pot to the same position.
6. Increase the MASTER 1/L-2/R fader to the shaded area between 7 and 8.
7. Press RECORD FUNCTION switch #1. The red LED above the key will start to flash.
8. Check to see that the MONITOR MODE "INSERT" is not pressed above the shuttle knob. If it is, you cannot hear the input source until you put Track 1 into record mode.



9. **Microphone:** While performing into the mic, slowly increase the MIC TRIM until the average level of the TRK/GRP 1 meter reads around 0 dB. Occasional peaks to "+8" are OK.

Instrument: Start with the instrument's volume controls up full. While performing, lower or raise the DUAL LEVEL control for the proper meter readings.

In any case, if the CHANNEL OL (overload) INDICATOR blinks, reduce the MIC TRIM level or the instrument's level control, to avoid distorting the mixer.

Set the monitor level

10. In the MONITOR section, press the CUE MONITOR switch (down position). Slowly increase the CUE MONITOR LEVEL #1 control until the MONITOR L and R meters read "0 dB".
11. If you haven't already, put on the headphones and increase the MASTER monitor rotary control to a comfortable listening level. This will not affect the meter readings.

IMPORTANT: Do not change the settings of the MASTER and CHANNEL faders to adjust the monitor level—change the monitor controls only.

Put the recorder into record mode

12. Press PLAY and allow the tape to run for about 15 seconds. This will run the tape leader onto the take-up reel, and put the beginning of the tape in front of the heads.
13. Press the TRT key until the COUNTER/TRT display is in counter mode. It will show 4 numbers without a colon.
14. Press RESET. This "zeros out" the COUNTER display, so you can use the RTZ (Return to Zero) key when you're done recording to get back to this point on the tape.
15. Check to see that only RECORD FUNCTION switch #1 is on with its LED flashing.
16. While holding RECORD, press PLAY. The RECORD FUNCTION, RECORD, and PLAY lights will all go on solid, and you are now recording on track 1. Perform your first track.
17. Press STOP, then RTZ. The 688 will rewind the tape to the start position.

LISTENING TO THE FIRST TRACK

1. Press the RECORD FUNCTION switch #1, so you can't accidentally erase what you've just recorded. Its LED will go out.
 2. Start playing the tape. If necessary, slowly increase the CUE MONITOR LEVEL #1 control to the desired level.
 3. Adjust the MONITOR MASTER level for a comfortable listening level.
- At this point, you have completed the first track, also called a take or pass. If the recording quality, level, and performance are OK, proceed to the next step: recording an overdub.

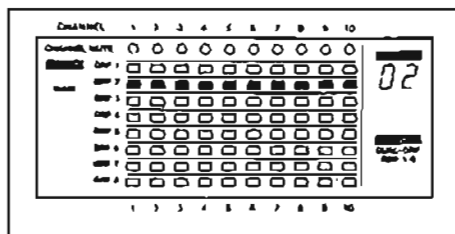
Step-By-Step Operations Guide: Overdubbing

Overdubbing is recording new tracks while listening to previously recorded tracks with the CUE MONITOR section.

In this quick tutorial, we're going to continue using the factory preset Scene settings as our basis.

Route the source to Track 2

1. **SCENE:** On the numbered CHANNEL keys, press "0" then "2". This should make "SCENE 02" appear in the assign display and the scene number will blink. Then press **RECALL**. The ASSIGN MAIN screen should look like this:



This shows that all channels are assigned to Group 2. Make sure the PAN control of any channel you wish to record is in the center, or to the right. You do not need to repatch the microphone or instrument you used in the first exercise, if you're using the same source for the overdub.

Set the output level

This is the same procedure as in recording the first track.

3. Press **RECORD FUNCTION** switch #2. The red LED above the key will start to flash. Make sure all other **RECORD FUNCTION** switch are OFF.

NOTE: If you want to record different sources for the overdub, set their levels as you did in Steps 5 and 9 on the previous page.

4. Play the instrument or speak into the microphone, to check that the TRK/GRP 2 meter reads in the middle, averaging around "0 dB", and the channel's OL indicator is only occasionally flashing. If necessary, lower the MASTER 1/L-2/R fader.

Set the monitor level

Monitoring is what makes overdubbing different from tracking. You need to set the levels of the first track and your live instrument in the cue monitor, without disturbing the settings that control how much goes to the tape recorder. (See p. 8, "The three steps to multitrack".)

5. Check to see that the **MONITOR MODE INSERT** light is OFF. Make sure **CUE MONITOR** is the only switch pressed in the **MONITOR** section. (For details of how **INSERT** and **MIX** affect the **CUE MONITOR**, see page 43.)
6. While playing your instrument, slowly increase the **CUE MONITOR LEVEL #2** control for "0 dB" on the **MONITOR** meters.

7. If you haven't already, put on the headphones and increase the **MASTER** monitor rotary control to a comfortable listening level.

8. Press **PLAY** and increase the **CUE MONITOR LEVEL #1** control to hear the playback of track 1 in your headphones, along with your live instrument.

9. Adjust the **CUE MONITOR LEVEL** or **PAN #1** and **#2** until you hear the balance you want in your headphones.

10. Press **RTZ** to rewind the tape to the start position.

Put the recorder into record mode

11. While holding **RECORD**, press **PLAY**. The **RECORD** **FUNCTION**, **RECORD**, and **PLAY** lights will all go on solid, and you are now recording on track two. Perform your first overdub.

12. Press **STOP**, then **RTZ**. The 688 will rewind the tape to the start position.

Listen to the overdub

13. Press the **RECORD FUNCTION** switch #2, so you can't accidentally erase what you've just recorded. Its LED will go out.

14. Press **PLAY**. You will hear the playback of both track 1 and 2. You can re-adjust the **CUE MONITOR LEVEL** and **PAN** controls to get a stereo monitor mix of the first two tracks.

Performing overdubs 3 to 8

Tracks 3 thru 8 can be recorded using almost the identical procedure as above. The differences are:

- Different preset scenes (03 thru 08)
- Different **RECORD FUNCTION** switches
- Use **MASTER** fader 3-4, 5-6 or 7-8 to set the record levels
- Use **CUE MONITOR LEVEL/PAN** controls 2-8 to set the monitor levels

You can connect new sources to any empty **MIC** or **LINE** jacks as long as you use the factory preset scenes 03-08 for the each assign all channels to one group like the presets 01 and 02.

To record on more than one track simultaneously, you will probably have to create your own scenes following the procedure on pages 23-25. But to help you get started, here are two shortcuts:

Factory Scene 10 assigns one **MIC** jack to each track (Ch. 1 to GRP 1, Ch. 5 to GRP 5 etc.). Just patch the mic into the same channel as the track you want to record. You can record eight mic sources, each on a separate track.

Using **Scene 11**, which assigns every input to all eight Groups at once, you can record on any odd and even track using the **PAN** controls for assignment.

For example, to record on Tracks 3 and 4 simultaneously:

1. Recall Scene 11.
2. Press RECORD FUNCTION switches #3 and #4.
3. For the channels you want to record only on track 3, set the PANs "hard left". Pan "hard right" the chan-

nels you want to record on track 4 only.

4. Increase MASTER fader 3-4 until you get the proper meter readings. Be sure to MUTE or pull the fader down of any unused channels.

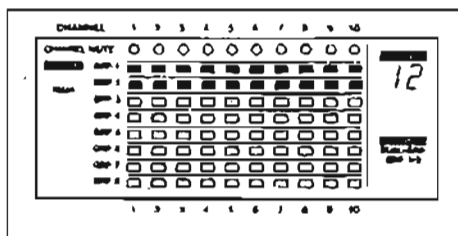
Scene 11 can be used to record onto any odd/even track pair, for example 1 & 2, 3 & 4, 7 & 8 etc.

Step-By-Step Operations Guide: Mixdown

When the 8 tracks are all recorded, the final step is mixing them into a standard stereo format. This procedure is known as Remixing or Mixdown. You will need another tape recorder for this. During this procedure the tracks are blended together and balanced to create the desired sound.

Put the MIDISTUDIO into mixdown mode

1. If your 688 still has the factory presets, press UP or DOWN until you arrive at SCENE 12. Press RECALL. In this preset, the INPUT page will show TAPE as the source of MAIN channels 1-8. Make sure the ASSIGN page looks like this:



2. Rewind the tape to the start of the take by pressing RTZ. Make sure all RECORD FUNCTION switches on the 688 are off.

Prepare the mixdown recorder

3. If your mixdown recorder has an input level control, set it to its nominal position. Consult the manual for your recorder to see how to do this. The goal is that when the MIDISTUDIO's MONITOR L and R meters read 0 dB, the meters on your two-track will also read 0 dB, so there's no confusion.
4. Connect the GROUP OUT jacks 1 and 2 (also labeled L and R) to the line level inputs of your mixdown stereo recorder using good quality shielded cable.
5. Put a blank high-quality tape on your mixdown deck. Run off fifteen seconds of tape to get past the leader if necessary. Reset the deck's counter to zero so you can rewind to that point.
6. Set the mixdown deck so that it will meter input. This depends on the deck: some have their own RECORD FUNCTION switches, others have an INPUT switch, others must be put into REC PAUSE mode.

7. Press the MONITOR GROUP 1-2 switch and make sure all other MONITOR switches (CUE MONITOR, DUAL etc.) are UP. This makes the MONITOR L and R METERS track the stereo output level to the tape deck.

Set your monitoring level

8. SOURCE MONITORING:

- a) Turn off all MONITOR switches except GROUP 1-2.

or

TAPE MONITORING:

- a) Connect the line outputs of your mixdown recorder to the inputs of your monitor amp. Ideally, your monitoring amp has an input switch that will allow it to switch between the 688's monitor output and the 2-track output.
- b) Adjust the output level of your mixdown deck for the overall level. Alternatively (especially if your deck's meters follow the output level control), adjust the level using the controls on your monitor amp.

Set the output level

9. Set the MASTER 1/L-2/R fader to nominal (shaded area between 7 and 8).

10. Press PLAY on the 688.

11. Use the PAN, EQ and channel fader controls to get the right stereo balance, timbre and levels.

12. Adjust the overall level using the MASTER 1/L-2/R fader until the MONITOR L/R meters read between -3 and 0 dB.

At this point, the meters on your mixdown recorder should be reading the same; if not, adjust the input level control of the mixdown recorder. When in doubt, the meters of the mixdown deck should be your reference.

Record the Mixdown

13. Rewind the 688 to the beginning point using RTZ.

14. Press RECORD-PLAY on your mixdown deck, or release PAUSE, so it's rolling in record.

15. Press PLAY on the 688.

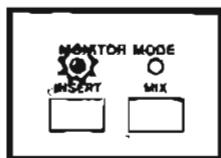
16. When finished, stop both recorders. Rewind and play the tape on the mixdown deck. Listen to the results; if you're not satisfied, make notes of changes you'd like to make and repeat the mixdown, making the desired changes.

Advanced Operations Guide: Punch-In or Insert Recording

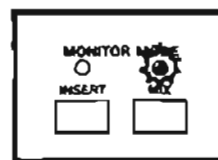
"Punching in" or "insert recording" is when you record over a small section of a previously recorded track in order to fix a mistake or improve a performance, while keeping the rest of the track as before. The mixer settings should be exactly the same as they were during the original recording. The 688 can manually punch-in with the RECORD (*) button, the RECORD FUNCTION switches, or the optional RC-30P footswitch. You can also program an automated punch-in and out with the REHEARSAL and AUTO IN/OUT functions.

Monitoring during inserts: You must decide what you want to hear in the CUE MONITOR during the preroll and postroll, before and after the punch-in. This is set by the MONITOR MODE keys above the shuttle knob.

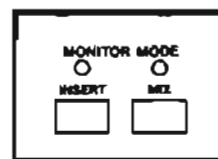
In INSERT mode, the monitor automatically switches from the original recording to the live instrument at the moment of punch-in ("INSERT" on the 688 is similar to "pre-roll sync" on other recorders).



To hear both the live instrument and the original track in the monitor, so you can play along during the preroll, press MIX mode.



If INSERT and MIX are both off, once you press a track's RECORD FUNCTION switch you can only hear the live instrument, not the track playback, in its CUE MONITOR channel. Use this mode to set your record levels.



MANUAL PUNCH-IN

METHOD A: Punching with the RECORD key or footswitch

Get ready to record

1. Press the RECORD FUNCTION switch of the track you intend to insert on. Its LED will start blinking.
2. If you are fixing a mistake right after the original recording, don't touch any volume settings—they should be the same. If not, adjust the monitor and record levels as you would for a normal overdub.

Preroll

3. Rewind the tape to a point before the punch-in point. You may wish to press MEMO 1 so you can return to this point.
4. Press PLAY. You will be able to hear both your live instrument and tape playback. Adjust the MONITOR GROUP LEVEL to control the "live" instrument, and the DUAL to control tape playback.
5. When the tape reaches the desired punch-in point, press RECORD or the footswitch to start recording. The RECORD LED and RECORD FUNCTION LED both stay on.
6. Punch out by pressing STOP, PLAY, or the footswitch.

METHOD B: Punching with the RECORD FUNCTION switch

This method is sometimes called "rolling in record" and requires that you have a free hand.

1. After the recording and monitoring levels are set, make sure that all tracks are SAFE (no LEDs blinking).
2. Press RECORD and PLAY together to start playing the tape. The RECORD LED will blink, showing that the 688 is in record-ready mode.
3. Press the RECORD FUNCTION switch of the punch-in track when the tape reaches the punch-in point. The LEDs above the Track and RECORD button will light steadily, showing that recording is taking place.
4. To punch out, press RECORD FUNCTION again (you could also press STOP or PLAY).

CAUTION: Avoid punching in-out of tracks using RECORD FUNCTION switch when their adjacent tracks are in Record (for example, punching in-out of track 2 and/or track 4 while recording track 3).

REHEARSAL AND AUTO IN/OUT PROCEDURES

The 688 MIDISTUDIO can automatically punch in and out for you, relying on its built-in counter for reference.

Rehearsing Inserts (RHSL)

Before you actually record an insert, the 688 allows you to "preview" the punch-in and out points with its special REHEARSE function. During a rehearsal, the tracks in record ready mode will be muted between the punch in and out points but won't actually record. If INSERT is on, what you hear in your monitor mix will be the same as during recording; so if a punch accidentally overruns existing material you can change the points until you've got exactly what you want. During a rehearsal, the MEMORY display will show you what's going to happen next, and when.

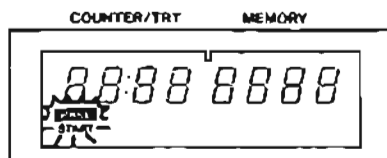
- At any time before you enter the OUT point (in step 7 of the procedure below) you can press STOP, PAUSE, REW and F.FWD to abort the procedure and enter new points. Once you have entered the OUT point those transport keys, though active, don't clear the memory points. PLAY and RECORD have special effects during the RHSL SET procedure as specified below.

Entering the automatic preroll and punch in/out points

1. Press INSERT in the MONITOR MODE keys (above the shuttle knob) and CUE MONITOR in the MONITOR switch row (above the MASTER 7-8 fader).

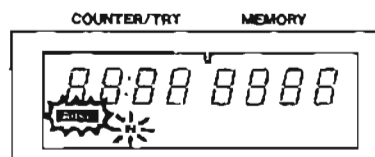
This allows you to hear punch-in track during pre- and postroll and your "live" instrument during punch-in.

2. Press the RECORD FUNCTION switch of the track you want to punch-in on. Its LED will start blinking. Check to make sure that all other tracks are in safe mode.
3. Press the RHSL switch. "RHSL" will appear in the counter window. As long as this indicator blinks or, as you'll see later, lights on solid, you can't actually record: you are "rehearsing" your insert recording.
4. Adjust the record and monitoring levels as you would for a manual punch in.
5. Press PLAY. This sets the preroll START point, as indicated by the appearance of "START" under the RHSL indicator. The right side MEMORY display window will show the counter position you started at.



If you press PLAY again before performing the next step, that point is memorized as a new START point and the old one is erased from memory.

6. At the punch-in point, press RECORD or the footswitch. The tape playback will be muted on the record track, "IN" will appear in the counter display, and the MEMORY display will show the counter position you punched-in at. The LED over the RECORD button will blink (which shows you that recording is not actually taking place, even though you can't hear the tape anymore).



7. Press PLAY or the footswitch when the tape reaches the punch-out point. You will be able to hear the tape track again. "OUT" appears under the counter, and the MEMORY display shows the Punch-out point that has been put into memory. The RECORD LED will go out.

After 3-second postroll, the RHSL indicator will begin blinking, the MEMORY display will show "START", while the tape will automatically rewind back to the START point. You are now in Rehearsal Play mode.

NOTE: Tape may not stop exactly at the start counter position because of inertia. This is normal and does not move the preroll and punch-in/out points you have set.

Rehearsing the punch-in ("dry run")

During Rehearsal Play mode, the MEMORY display will show you the counter position of the upcoming IN and OUT points.

1. Make sure that the 688 is in "Rehearsal Play" mode with the RHSL indicator blinking. Press the RECORD FUNCTION switch of the track you want to punch-in on. Its LED will start blinking. Check to make sure that all other tracks are in safe mode.
2. Press PLAY or RC-30P footswitch. The 688 will begin playing from the MEMORY START point. The MEMORY display will show the upcoming punch-in point.

You can use REW then press PLAY to start listening to the tape from a point lower than the preset START point.

3. When the tape reaches the displayed IN point (i.e., when the COUNTER readout matches the MEMORY readout), "START" will change to "IN". The MEMORY display will switch to show you the upcoming punch-out point. The monitor switches from tape to "live" instrument on the punch-in track. The RECORD LED will start blinking.

4. When the tape reaches your preset punch-OUT point, "IN" will change to "OUT". You will be able to hear the tape again. The RECORD LED will go out, indicating that the "dry run" record is over.

5. After a 3-second postroll, the tape will automatically rewind to the "MEMORY START" point, ready for as many rehearsals as you wish.

Practice the performance until you are sure that you will get it right when actually recording. Remember, once you punch-in over existing material, that original signal is erased!

To Leave REHEARSAL Mode:

There are a number of ways to end rehearsal modes:

- To definitely QUIT rehearsal at any time without recording, press CLEAR. The RHSL memory points will be cleared and the RHSL LED will go out.
- To temporarily leave rehearsal, press STOP, PAUSE, REW or F.FWD. The MEMORY display will continuously show the start point regardless of where you move the tape to. To resume rehearsal press PLAY when you are at a point lower than the IN point. If you are not, "START" should be blinking, asking you to rewind the tape back behind the IN point.
- To change the memory points, press CLEAR and go through the SET procedure again.
- Ejecting the tape or turning the power off will clear the RHSL memory points.

Actual Auto Punch-in

Once you're sure your performance and the in/out points selected are correct, you're ready to actually record the insert. RHSL should be blinking in the display. All tracks should be in SAFE mode except the ones you intend to record.

1. Press the AUTO IN/OUT key. "AUTO IN/OUT" (blinking) replaces "RHSL" in the display.
2. Press PLAY or the footswitch to begin the preroll from the START point. The upcoming IN point will be displayed in the MEMORY window.
3. When the tape reaches the MEMORY IN point, the punch-in track will automatically enter the actual record mode, and the RECORD button and track RECORD FUNCTION LEDs will turn on solid. New material is being recorded, erasing the original part. The MEMORY display will show the upcoming OUT point.
4. When the tape reaches the MEMORY OUT point, the 688 punches out of Record. The RECORD LED will turn off and the track's FUNCTION LED will be blinking.
5. After a 3-second postroll, the AUTO IN/OUT display will begin blinking and the tape will automatically rewind to the MEMORY START point.

To review the result, press PLAY or the footswitch. The tape will play the entire segment and rewind to the start point.

To try again, re-enter AUTO REC by pressing AUTO. "AUTO IN/OUT" will turn solid again and you can record another pass using the same points.

To quit the auto in/out procedure at any time, press the CLEAR switch. The AUTO IN/OUT LED which was blinking will turn off. By hitting CLEAR, you erase all of the memory points, START, IN and OUT.

To abort a take and rewind to the start, press PLAY, STOP, REW, or the footswitch before the OUT point is reached. "AUTO IN-OUT" will be solid, showing you're still in AUTO REC mode.

To set new points, you must press CLEAR, then go through the Rehearsal procedure again.

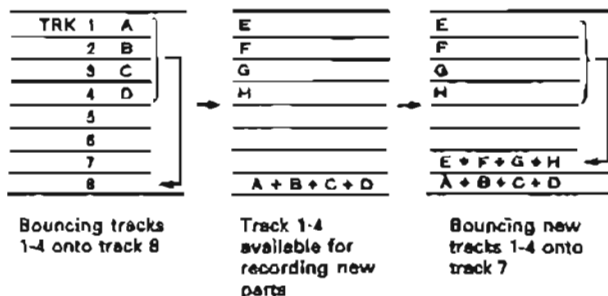
ABOUT PUNCHING IN

Selecting in and out points: For both musical and technical reasons, when punching in or out of a track, you must select points that are "in the clear", i.e., in the pauses between phrases or notes. It sounds unnatural and makes the insert noticeable if you record a new note before the old one has ended, or are holding a note as you punch in or out. For this reason, some session players leave a beat or two of silence between passages they might want to edit later. Making inserts well requires some practice. Many engineers count bars and beats to keep track of the punch in and out points and hit them on cue. Because of the spacing between the erase and record heads, you need to anticipate your in/out points by a fraction of a second for extremely tight cues.

Advanced Operations Guide: Bouncing Tracks (Ping-Pong)

The recording capability of the 688 MIDISTUDIO is not limited to eight tracks. You can "bounce" or combine tracks you have recorded to an empty track, and then replace the original tracks with new material. A bounce is like a mixdown, except you are recording to one of the tracks of the 688 instead to an external recorder.

The following diagrams depict the process.



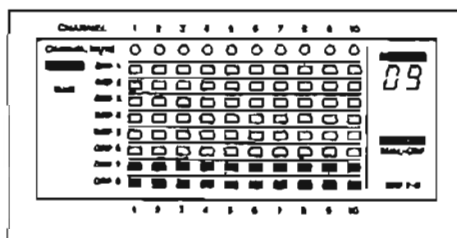
Also, while you are bouncing, you can add live sources to the combination of the prerecorded tracks. Any mixer channel that is not being used for Tape can be used to add a new part.

Using these techniques, it is possible to get up to 28 "passes" onto tape, without re-recording any part more than once. Thanks to the quality of the 688's recorder section, it's hard to tell the difference between original and bounced tracks, if you follow the proper steps.

In this example, we will combine material from tracks 1-4 plus a live synthesizer onto Tracks 7 and 8 in stereo.

Prepare the mixer

1. If you are using factory preset scenes, go to Scene 09 and press RECALL. The screens should look like this:



2. Check to make sure that neither INSERT nor MIX is on above the shuttle knob and, in the MONITOR switch row, the CUE MONITOR switch only is on.
3. Bring up the CUE MONITOR LEVEL controls 7 and 8. Turn all other CUE MONITOR LEVEL controls off (fully left). During a bounce, it's important that you don't hear anything in the mix except the mix feeding the tape recorder.
4. Plug the synthesizer into any input feeding the main mixer (in the preset, MIC (LINE A) INs 7-10).

Prepare the recorder

5. Press the RECORD FUNCTION switches for tracks 7 and 8. Those lights should start to blink. All other RECORD FUNCTION switches and lights should be off.

6. Rewind the tape to the beginning of the song.

Set recording levels

7. Set the main faders to their nominal position.

8. Press PLAY. Slowly increase the GROUP 7-8 MASTER fader until the GROUP meter reads around 0 dB. If you are adding live sources to the mix, play them and adjust the level. Get the mix you want. If you wish, you can add effects to the mix.

9. Rewind the tape to the start of the selection.

Bounce the tracks

10. Press PLAY and RECORD. Tracks 7 and 8 will record a copy of what is on tracks 1-4, plus any live instrument you add to the mix.

11. At the end of the selection, press STOP and rewind to the beginning. Do not change the settings of any controls yet.

Listen to playback

12. Press the RECORD FUNCTION switches 7 and 8 to prevent accidental erasure of the tracks. Their LEDs will go out.

13. Press PLAY to hear the result. Make sure that any CUE MONITOR LEVEL controls other than 7 and 8 are off (fully left).

Repeat bouncing

Once you are totally satisfied with the mix on track 7 and 8, you can record new material on tracks 1-4, then bouncing them onto tracks 5-6 the same way you bounced onto track 7-8. Of course, this will erase the "first generation" tracks, but you have a "second generation" copy on track 7-8.

Using the Scene Display

Once you have become familiar with the basics of multi-track recording using the factory presets, you will want to make customized presets to fit your own studio. There are 99 different scenes possible in memory. By creating your own scenes you can:

- Set up a library of often-used scenes that you can recall with just a few keystrokes
- Set up a chain of scenes that follow your own habit of recording in sequence
- Create a series of scenes that mute unused channels for quiet recording

— **THE SCENE DISPLAY** is a preset display that shows you the switch settings of the mixer section and change them if necessary. To keep the screen at a reasonable size, it doesn't show everything at once. There are three "pages" to a scene, each with its own display key: ASSIGN MAIN, ASSIGN EFF, and INPUT. DUAL LINK and CHANNEL MUTE is shown on every page. Other keys are used to change settings, which then can be saved in memory as a SCENE. Even when a display is "hidden", its switch settings are active and can be copied from one scene to another. A SCENE in memory consists of all switch settings: main and effects assign, main and dual input, dual-group links, and channel mutes.

UNDERSTANDING THE SWITCH SETTINGS

The switches on the 688, like switches on any other recording mixer, control three things:

WHERE FROM: Where is the signal coming from? The MIDISTUDIO calls this INPUT select. The possible sources for a channel include MIC, LINE, TAPE, or POST.

WHERE TO: Where does the signal go to? In the MIDISTUDIO, there are eight GROUPS or mixes that are connected directly to the input of the eight-track recorder and also to the GROUP OUT jacks. The MIDISTUDIO calls this ASSIGN.

Another "where to" switch setting, on the right hand side of the display, is called LINK DUAL-GROUP. This can send the left and right outputs of the DUAL submixer to the Group 1-2, 3-4, 5-6 and 7-8 outputs if desired.

HOW MUCH: Most controls on a mixer are "how much" controls. The CHANNEL MUTE is in this category.

In summary, each black square in a SCENE display stands for an electronic switch that's turned on, showing where from (Input), where to (Assign), or how much (Channel Mute). (See p. 7-8 for an overview of the Scene Display.)

MEMORY indicator: This will appear underneath the Scene Number display when changes to a scene are being stored in a temporary memory "buffer" or workspace.

While "MEMORY" is on solid, you can't make any changes to the screen. You must perform a STORE-SCENE or CLEAR operation to turn the MEMORY indicator off.

MEMORY will blink while editing a scene, until you move to another scene, STORE, or CLEAR.

OPERATION OF THE SCENE DISPLAY

When you want to change the settings of a scene, there are three steps:

- a) Select the page you want to work on by pressing one of the keys on the left marked ASSIGN MAIN, ASSIGN EFF, or INPUT
- b) Press the routing key(s) (ASSIGN MAIN MIC, GROUP 1) you want to select. A routing shows that it's "armed" by blinking in the display.

- c) Press the numbered CHANNEL MAIN/DUAL keys of the channels you want to change.

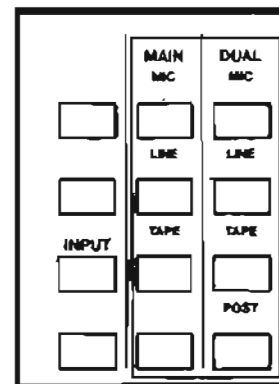
That's all there is to it.

Selecting Inputs

1. Press the INPUT key.

INPUT shows both MAIN and DUAL at once. In upper half of the screen you can select the input sources for main channels 1-10; in the lower half you select the sources for dual channels 11-20.

2. On the INPUT page of the display, the routing keys (four in a column headed ASSIGN MAIN, and four next to it headed ASSIGN DUAL) act as input source select keys, like this:



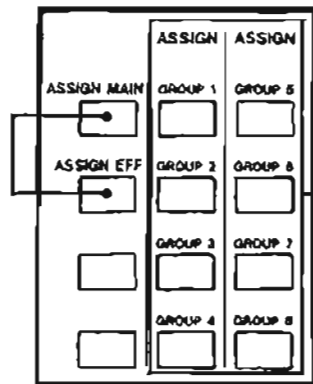
Press the Input source (MAIN TAPE, DUAL LINE etc.) you want. You can only select one at a time. The Indicator of the source you've selected will flash, and the 688 is now "armed" in that mode.

3. Press the numbered CHANNEL keys for the channels you want to switch to the new source. A black square will appear in the channel column, in the row corresponding to the input you've chosen, and any other inputs that were on previously will turn off—there can only be one input per channel. You will also notice that "MEMORY" starts blinking under the scene number, to show you that the changes you are making are in a temporary memory area.

4. To choose a different source, repeat steps 2 and 3. When you are finished with your setting, proceed to "Saving Scenes" on the next page.

Assigning to Groups

1. Press the **ASSIGN MAIN** or **ASSIGN EFF** key.
2. On an **ASSIGN** page, the routing/arming keys act as **GROUP 1-8** keys, like this:



Press the **GROUP** keys you want. You can select multiple groups at once (all will be flashing). Press a **GROUP** key a second time if you need to "disarm" it.

3. Press the numbered **CHANNEL** keys for the channels you want to assign to the new destination. Black squares will appear in the channel column, in the row corresponding to the groups you've chosen. "MEMORY" will start blinking.

Note that because there are only four **EFFECT RETURNS**, only the first four **CHANNEL** keys have any effect while you are in **ASSIGN EFF** mode.

4. To turn a group off, repeat steps 2 and 3. The second time you press a channel key, the groups will turn off. When you are finished with your setting, proceed to "Saving Scenes" below.

You must make your assign, mute or input selection before pressing the **CHANNEL** keys. One of the indicators must be flashing to show you it is "armed". If you press the number keys first, it has the effect of changing the **SCENE** to that number. If you accidentally do this, simply press **CLEAR** to return to the original status.

Ways to leave an edit mode:

- Press **CLEAR**. This will wipe out any changes you have made and return you to the original scene.
- Press **UP** or **DOWN**, then **RECALL**. This will switch the 688 to a new scene, while keeping the edited version in the **MEMORY** buffer for later storage. You will not be able to edit again until the **MEMORY** indicator is off (see "Saving Scenes", below).

Setting Channel Mutes

Unlike the other scene edit modes, you can turn mutes on and off, from any of the display pages.

1. Press the **MUTE** key. "Channel Mute" will begin to flash.
2. Press the numbered **CHANNEL** key of the channel you want to turn on or off. A black dot will appear at the top of the column when a channel is muted. You can only mute the **MAIN** channels 1-10; the **DUAL** channels do not have mutes.

3. To turn a mute off, simply press the **CHANNEL** key again until the black dot turns off.

Linking the Dual to the Group Outputs

You can add the **DUAL** channels 11-20 into the main group mix anytime you want to record more than the ten channels of the **MAIN** mixer to a track at once. This can be done either for the first tracking or at final mixdown.

1. Press any of the **LINK DUAL-GROUP** keys. The "Link" Indicator will appear, along with the groups you have selected. Any **DUAL PAN** controls that feed the left side of the mix will go to odd-numbered groups (1, 3, 5 and 7), and the right side feeds groups 2, 4, 6 and 8.
2. To turn the links off, press the **LINK** key again. When both links are off, the "LINK DUAL-GROUP" indicator disappears completely.

SAVING SCENES

Any changes you make to the scene setting—mutes, links, assignments or inputs—are only temporary. You need to store them to one of the memory locations, otherwise they will be lost when you turn the power off.

"MEMORY" Indicator: Right under the two-digit scene number display, this indicator shows that you have made some changes to a scene. You can think of it as a temporary "buffer" memory, that you can carry **UP** and **DOWN** to other memory locations where they can be permanently stored.

The **MEMORY** indicator will;

- a) blink when any changes are made to a scene.
- b) turn solid when the **STORE/COPY** key is pressed.
- c) turn solid when **UP** or **DOWN** is pressed.

To store or make a copy of a scene:

1. Finish making changes to a scene, or press **STORE/COPY** to copy an unchanged scene into the **MEMORY** buffer.
2. Go to the scene number you want to store the memory in, using the **CHANNEL** number keys, or by using the **UP/DOWN** keys.
3. Hold the **STORE** key and press **SCENE/MIDI CH**. The contents (if any) of the scene number will be replaced by the memory buffer, and the **MEMORY** indicator will go out.

To Return to the original version of a scene

This can be done only if you haven't done the **STORE-SCENE** procedure above.

1. Press **CLEAR**. The **MEMORY** indicator will go out, and the switch settings will return to the original version.

To erase a scene

1. Recall the scene whose switch settings you want to erase.
2. Hold the **CLEAR** key and press the **SCENE/MIDI CH** key. The contents of the scene will totally be cleared.

Transferring All Scenes

SAVING ALL SCENES TO DATA TAPE

When you've invested a lot of time in 99 scenes, you don't want them to disappear by accident or design. The TAPE SAVE feature of the 688 allows you to take all the scene data in the 688's memory banks and save it onto standard cassette tape. It serves as a backup copy, or long-term storage area.

If you have a MIDI data filer or MIDI devices that have System Exclusive record capability and want to save scenes to those, see the paragraphs with the corresponding heading.

1. Insert a blank cassette into the tape well.
2. Press the **RECORD FUNCTION** switch for Track 8. The light will begin to blink.
3. Press **PLAY** and **RECORD**. The record lights will turn solid.
4. Turn the **SYNC** switch to the **SCENE DATA** position.
5. Press the **SAVE/LOAD** key until "SAVE" appears under the scene number display. There will be a pause; you will see signal on the GRP 8 meter. The scene number will then begin to count upwards from 01 to 99; this takes a few minutes.
6. When the saving is complete, the tape will automatically stop. Take the cassette out of the well and store it in a safe place. You may want to punch out the record protect tabs of the cassette so the data cannot be accidentally erased.

LOADING ALL SCENES FROM DATA TAPE

This is the procedure to follow when you want to replace the entire memory contents of the 688 with what's on a data tape. There's no safe way to replace only some of the scene data and not others.

1. Insert the data cassette into the tape well.
2. Cue up the tape. Listen to track 8; you'll hear a solid tone then a warbling tone. The warbling tone is the beginning of the data; cue the tape up a few seconds before that begins.
3. Turn the **SYNC** switch to the **SCENE DATA** position.
4. Press the **SAVE/LOAD** key until "LOAD" appears under the scene number display.
5. Press **PLAY**. When the warbling tone starts, the scene number will begin to count upwards from 01 to 99; this takes a few minutes.
6. When loading is complete, the tape will automatically stop. You will find that the scene contents are now what was stored on tape.

SAVING ALL SCENES TO MIDI DATA FILER OR PROPERLY EQUIPPED MIDI DEVICE

1. Connect the 688's MIDI OUT to your MIDI filer's MIDI IN.
2. Press **SCENE/MIDI CH** so the MIDI CH indicator is showing. If the two-digit display says "of", press **UP** or **DOWN** until the display reads "on" or any of the 16 MIDI channels. Get your MIDI data filer ready to receive System Exclusive data, following the procedure in its manual.
3. Turn the **SYNC** switch to the **SCENE DATA** position.
4. Press the **LOAD/SAVE** key until "LOAD" appears under the scene number display.
5. Hold the **STORE/COPY** key and press the **LOAD/SAVE** key again; "LOAD" will change to "SAVE". There will be a pause as the scene data is sent out (as MIDI exclusive messages) to the MIDI filer.
6. When saving is through, "SAVE" will switch back to "LOAD". Operate the filer to save the received data as per instructions in the manual for your filer.

LOADING ALL SCENE DATA FROM MIDI FILER

1. Connect the 688's MIDI IN to the MIDI filer's MIDI OUT.
2. Set the MIDI channel of the 688 to match the data filer's send channel, and have the filer enter Bulk Out Ready mode.
3. Turn the **SYNC** switch to the **SCENE DATA** position.
4. Press the **LOAD/SAVE** key until "LOAD" appears under the scene number display.
5. Have the filer start sending out the scene data. The scene number will begin to count upwards from 01 to 99; this takes a few seconds.
6. When loading is through, the scene number "99" will blink. You will find that the scene contents are now what was stored on MIDI filer.

RESTORING FACTORY PRESETS

CAUTION: If you have customized any scenes, 01 thru 99, they will all be erased as you restore the presets. If you want, save them first on tape or MIDI filer as per instructions above.

If you want to restore all the factory presets 01-12, hold **CLEAR** and turn the power on. You'll find all 01-12 presets recovered at once. You cannot restore individual presets.

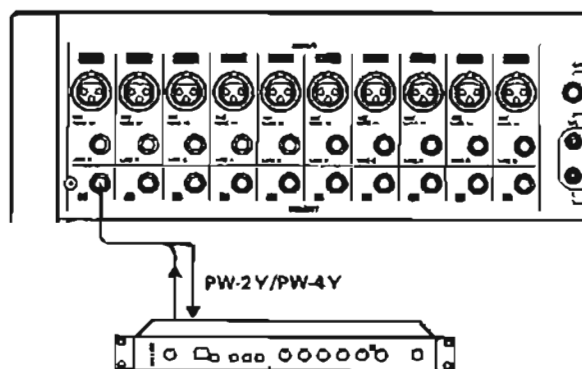
Using Effects with the MIDISTUDIO 688

Effects and signal processing is one of the areas where you can really start to have fun customizing your sound, and develop your own unique recording style. Because there are so many possibilities, it also can be confusing. There are many different effect units on the market, all with different controls, types of inputs and outputs, and other characteristics. Read the manual of your effects device, and the following sections to get the complete story of what's possible for your particular situation.

1. **In-line processing:** The processing that's easiest to understand doesn't involve the MIDISTUDIO directly at all. You can plug your instrument directly into the input of the effect device, and plug the output of the device directly into a line input of the MIDISTUDIO. The whole signal gets processed (flanged, doubled, limited, delayed etc.), and only one instrument can use that processor. Effect pedals for guitar are typically used this way. To get a mix of processed ("wet") and original ("dry") signal, the unit must have its own "MIX" or "BALANCE" control.

2. **Insert processing:** This is closely related to in-line processing. There are eight special two-way send/receive jacks on the back panel called INSERT jacks. Each one has the effect of inserting a signal processor into the main channel (1-10) signal path right after the INPUT switch. Whatever input (mic, line, or tape) is chosen for that channel can be sent to its own individual external processor (typically an EQ or compressor), and then returned directly into the channel path. This requires a special Y-cable with a stereo 3-conductor tip-ring-sleeve phone plug on one end, split to two cables with mono plugs, one for the input (send) to the device and one for the output (return). (TASCAM PW-2Y/PW-4Y Insertion Cable can be used for this purpose). With INSERT only one instrument can use a processor at a time. It has several advantages, though:

- The signal at the insert jack has already been preamplified and equalized. This means you can put a microphone signal through a line level processor (most effects pedals can't take mics directly).
- It's easy to move a processor from one channel to another, just by moving the insert cable from one jack to another. It's also easy to disconnect the effect by simply unplugging the insert cable.
- Certain devices, notably graphic equalizers and compressor/limiters, are designed for in-line or insert use, dedicated to one instrument at a time.
- It's possible to have a different effect device on each channel.



3. **Send/return mix processing:** This is the most common method of effect processing, especially for reverb and delay. It allows a number of different channels to use the same effect, while allowing you to control how much effect is mixed with each channel. Each of the 20 mixer channels can send signals to the AUX 1 or AUX 2 outputs on the back panel. These outputs can then be connected to the input of effect devices. The processed signals from the devices come back into the mix via the EFFECT RETURNS. Finally, the effect is mixed onto one of the groups with the EFFECT ASSIGN screen. This whole path— from the Auxes to the reverb and back into an effects return—is called an effects loop. The AUX system controls how much signal goes to the reverb unit; the EFFECT RETURNS control how much comes back from the reverb unit.

See p. 13 "Aux Mix", to see a diagram of how the signal flows through the Aux system.

SETTING EFFECT SEND LEVELS

The goal is not to distort the device, while staying above the noise that effect units generate. To get the best signal-to-noise from most effects units, you should send it as strong a signal as you can. With a properly set input signal in the MIDISTUDIO, the channel AUX turned up to about 3 o'clock (POST), and the AUX MASTER at about 2 o'clock, you should get a fairly loud signal from the AUX OUT jack. If your effects device has an input level control of its own, it should be set so the meter or signal light of the effects device is just under the overload point on peak signals. When you want to hear less effect overall, turn down the EFFECT RETURN, not the AUX MASTERS.

SETTING THE OUTPUT LEVEL OF EFFECT DEVICES

If the effect send level has been set properly, in most cases the output level should be set as high as possible without clipping (distorting) the Effects Return of the 688, but low enough so that you have a reasonable range of control. If you can get the effect sound you want with the Effects Return control in the 12 to 2 o'clock range, you're in the ballpark. If, on the other hand, very small settings of the Effects Return still give you a mix drowning in effects, turn down the output level of your effect device.

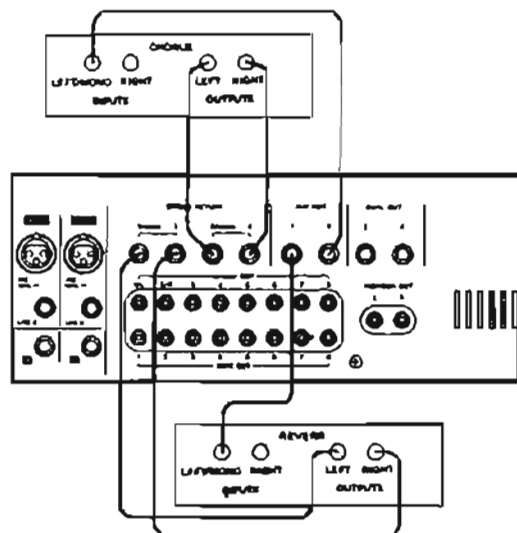
Some effect units have rear panel switches setting input and output level ranges between "+4" and "-20 dB". In this case, try setting the input to -20 (high sensitivity) and the output to +4 (full output level).

Setting the mix/balance control on effect devices

When it's being used in a send-return mix, set the mix/balance of your effect devices all the way to "wet" or full processing with no direct original signal. In send/receive processing, the dry signal goes down the MIDISTUDIO's CHANNEL fader to be mixed with the effect return signal on a group master. Therefore, you don't need any "dry" signal coming to the effects return. The mix/balance control is set toward "dry" only when you're using the effects device as an INSERT or in-line processor.

HOW TO CONNECT YOUR EFFECTS DEVICES

There is no absolute "right" or "wrong" way to do this—there are several ways, each with its own consequences.



This is the most common method. Aux 1 feeds a reverb unit, which has a synthesized stereo output patched into effect returns 1 and 2. Aux 2 feeds a chorus device with a stereo output patched into effect returns 3 and 4.

Mono returns: If you have an effects device with a single mono output, you can patch its output into a single effects return. Using the effects assign screen, you can assign the return to any or all of the groups. During a final mix to groups 1 and 2, you can assign it to left, center (both) or right.

A special feature of effect returns 1 and 3 allows continuously variable control between left and right if desired: a mono effect connected to RETURN 1 will also go to RETURN 2 if nothing is plugged into the RETURN 2 jack. By assigning EFF RTN 1 to group 1, and EFF RTN 2 to group 2, you can "pan" the mono effect anywhere between the left and right by adjusting the level of the RTN 1 and 2 controls.

Putting the same effect on all 20 inputs (SUM)

If you want to use one effect device for signals from both the MAIN channels 1-10 and the DUAL channels 11-20, press the SUM switch. This is a "where to" switch that links the AUX 1 and AUX 2 submixes together. Aux 2 is used in DUAL position to send from 11-20, and Aux 2 in POST position for 1-10. You can plug the output of either AUX 1 or AUX 2 to the effect device—they will both be the same.

NOTE: In order to use Aux 1 and 2 as separate sends, make sure the SUM switch is OFF!

Patching effects to an input channel: There's no law that says the output of an effects device must be plugged into an EFFECT RETURN, either. They can also be plugged into LINE Inputs, and sent to either the MAIN or DUAL mix, if you are cautious about one thing: make sure the AUX 1 and AUX 2 pots of those channels are set to the center (off) position. Otherwise, you will be sending the output of the effect device back to itself, which is a kind of feedback. If the effect device is a digital delay, feedback has the same effect as a regeneration (number of echoes) control. An advantage of returning effects to a main channel is that you can EQ the effect return.

To record reverb onto a track: Simply assign the return to the track being recorded (using the ASSIGN EFF screen) and adjust the controls for the sound you want.

To hear reverb in the headphones but not record the reverb:

Group 1-2 Method: Assign the EFFECT RETURN to GROUPS 1 and 2. Press the GROUP 1-2 switch in the MONITOR SOURCE. As long as you're not recording Track 1 or 2, the recording will be "dry".

Dual Method: Patch the effect device output into a LINE B jack and select LINE as the input of the corresponding dual channel. Make sure DUAL LINK is off. Press DUAL in the MONITOR SOURCE switch. Use the channel of the Dual mix for effect monitoring.

Cue Monitor Method: Assign the EFFECT RETURN to an empty track that will be erased later. Put the track into record ready, and control the headphone level with the CUE level controls.

Using the Dual as an effect send

During mixdown, the dual section can serve as an additional pair of effect sends, or as a stereo effect send.

1. Hook the DUAL OUT jacks to the inputs of two effects units (for example, Dual L to a digital delay, and Dual R to a gated reverb). Alternatively, if you have a true (as opposed to synthesized) stereo effect device, the dual can connected to it.
2. Connect the outputs of the effects units to two effects returns.
3. Set the input of the dual section to POST. By using the DUAL LEVEL and PAN controls, you can set the level of send to the delay and gated reverb from channels 1-10.

Using the Dual as an effect send means that it can't be linked to the main mixer, or used as a separate monitor. See p. 13, "Dual Mix" for more information.

MIDI Synchronization

INTRODUCTION TO MIDI SYNC

The advantages of MIDI Sync operation

If your music includes electronic keyboards and drum machines, MIDI sync allows you to use them without using up a tape track. Instead of recording the sound of the keyboard on tape, you record the actual movements of your hands on the keyboard into a sequencer, which is the electronic equivalent to a player piano roll. The advantages are:

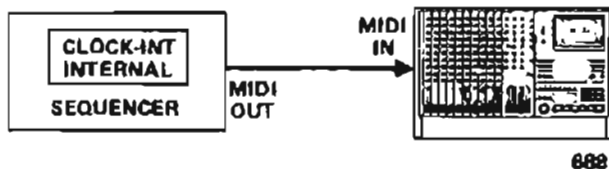
- Tape tracks are freed for non-MIDI instruments such as guitars and vocals
- You can try different sounds on the keyboard to see what fits best, while listening to playback
- It's easier to get a "perfect" performance out of a sequencer
- You can change or edit the musical performance in the sequencer as a master tape "evolves" into a final mix—for example a drum part can be totally rewritten after the overdubs are recorded, but still be in perfect tempo
- You can use one sequencer to play many different MIDI instruments simultaneously
- You can use the sequencer to get the parts right, and the multitrack to record each sound on a different track, thereby getting 3 different sounds out of the same synthesizer

You lose one track (#8) to the sync tone, but you gain control of as many MIDI virtual instruments as you can obtain.

On the other hand, MIDI is not magic. Great recordings have been made without it—after all, MIDI is only a few years old. MIDI sequencers vary from the simple to the extremely complex, but all of them require some level of skill and musical knowledge. It's possible to get so tied up in MIDI technology that inspiration disappears; but for those who take the time to practice using it, it becomes an extension to their musical ability.

This section of the manual assumes that you have read the preceding sections of this manual and understand the operation of the 688's mixer and assignment screen. In this section we're going to focus on just those functions that make the MIDISTUDIO different from previous PORTASTUDIOS: the ability to accept MIDI clocks from a sequencer, translate them into a recordable FSK sync tone with song position pointer information, record the tone on Track 8, and when the tape is played back translate that tone back into MIDI clocks and song pointers that allow a MIDI sequencer to "chase lock" the tape tracks and control synthesizers in perfect synchronization.

MIDI TAPE SYNC SAVE MODE



Click track and sync tone analogy

Before there was MIDI or sync tone, there was the human equivalent: a "click track". This was a metronome that was recorded on one track of the recorder as a time base for the musicians doing overdubs. The drummer would hear the click track in his headphones, and play along in tempo.

MIDI synchronization is analogous to that. The tape signal recorded on track 8 is the electronic equivalent of a click track, with the added element of song position pointer ("bar one, click, click, click, bar two, click, click..."). The sequencer has an internal metronome or "clock" that it uses to set tempo. It transmits this clock to its MIDI OUT jack, which is connected to the MIDI IN jack of the 688. MIDI can't be recorded directly onto tape, because it is a digital signal at a very high frequency beyond the reach of analog tape.

However, the MIDI Tape Synchronizer (MTS) built into the 688 can translate the MIDI clock signals into a warbling audio tone (called FSK) which can be recorded on tape. If you listen to this FSK, you'll notice that the tone varies according to the tempo of the sequencer. On playback, this tone has to be changed back into MIDI language so the sequencer can "listen" to the clock via MIDI, and follow the tape recorder. This is done by the MTS, which sends clocks to the MIDI OUT of the 688, to be connected to the MIDI IN of the sequencer.

The 688 is only concerned with MIDI clock, start, stop, and song pointer messages. All the other MIDI data the sequencer transmits (such as note on, note off, and controller commands) is ignored, and not recorded onto tape.

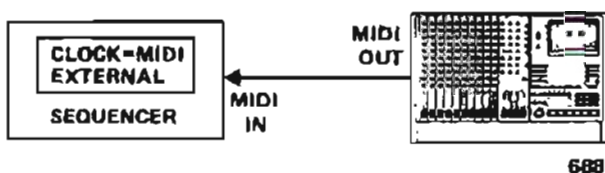
Know your sequencer

You're going to have to open the manual for your sequencer, whatever it may be, to learn the details of how it works. Before you can stripe, you need to know:

- How to record a sequence
- How to set the tempo of the sequencer (its internal clock)
- How to start it and make sure its MIDI OUT jack is sending clocks
- How to set the sequencer so it will not generate internal clocks when it receives START, but will follow clocks being sent from the 688's MIDI OUT to its MIDI IN. This is called MIDI CLOCK, or EXT MIDI mode.

Note: Many sequencers and drum machines have their own tape sync system, and typically have 3 clock modes: INTERNAL, MIDI, and TAPE. Don't be confused—as far as the sequencer is concerned, it's in MIDI clock mode, not tape, because the MIDISTUDIO is handling the tape sync chore by itself, and sending MIDI clocks to the sequencer.

MIDI TAPE SYNC LOAD MODE



The most common technique is to record a sequence, or a drum pattern, into the sequencer before you get involved with the multitrack. In a sense, the tracking procedure now takes place in MIDI instead of to tape. Certainly you need some kind of PORTASTUDIOs pattern that's audibly playing so you can set the tempo correctly.

What is a virtual track? A "virtual" track is an instrument under MIDI control that plays back in synchronization with the tape, whose sound appears at one of the inputs of the mixer. We call it virtual because it isn't actually on the tape, but for all practical purposes behaves as if it was a separate track of its own—it can be changed in

level, EQ'd, reverbed, or edited (on the sequencer) separately from the others.

Confusion with sequencer tracks: The word "track" is used by some sequencer makers differently than we do when we refer to a virtual track. A single sequencer track may transmit information to up to 16 different MIDI instruments, each one on a separate MIDI channel. For our purposes, though, a "virtual track" represents a piece of hardware with a line level signal output, and each of the 16 different instruments represents a "virtual track" to us, even if your sequencer sees them as one stream of data.

THE RECORDING SYSTEM WITH MIDI SYNCHRONIZATION

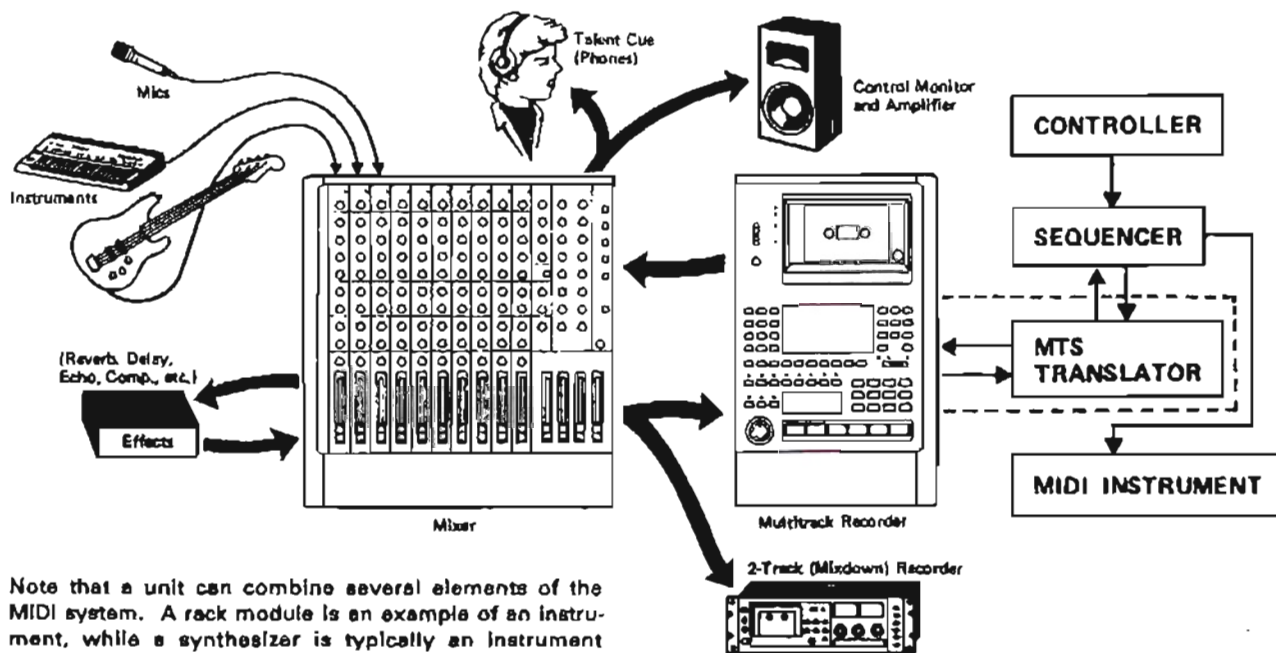
On page 11, we showed you the traditional multitrack system with its six elements.

When you add MIDI sync, you add 4 elements:

- **SEQUENCER:** This is the unit that records MIDI note on-off and other controller information
- **CONTROLLER:** This is a unit that transmits MIDI note and other controller data, typically a master keyboard; it could also be a PORTASTUDIOs, wind controller, MIDI guitar interface, or something else
- **MIDI INSTRUMENT:** This is any unit that can respond

to MIDI input by producing a sound.

• **MIDI TAPE SYNC TRANSLATOR:** Since MIDI data can't be recorded directly on tape, there has to be a translator that turns the MIDI clocks into an audible tone. In the MIDISTUDIO, this translator is built-in; but you can also choose to use a sync tone generator that's separate or built-in to the sequencer or drum machine (see "Using External Sync Devices, page 33"). If your application requires SMPTE time code, you'll need a SMPTE-to-MIDI converter like the TASCAM MIDIZER.



Note that a unit can combine several elements of the MIDI system. A rack module is an example of an instrument, while a synthesizer is typically an instrument combined with a controller. A drum machine is an instrument combined with a sequencer, and a "workstation" can combine all three. Many sequencers include their own tape sync translator, though it usually can't take advantage of song pointer like the MTS translator built into the 688 can.

The flow of MIDI Clocks (System Common signals)

Understand that there are two different types of data in the MIDI stream that we're concerned with. System Common signals consist of timing commands that se-

quencers send and receive. They are "broadcast" to every element in the system, but are only used by sequencers. They include START, STOP, CONTINUE, SONG POSITION POINTER, and MIDI CLOCKS.

The MIDISTUDIO needs to receive these system common signals from the sequencer during the SAVE operation. Later, the sequencer needs to receive these signals from the MIDISTUDIO (during LOAD).

The flow of MIDI commands (Channel Voice signals)

Another type of MIDI data is the actual performance information: NOTE ON, NOTE OFF (for each of the 128 different notes in the MIDI spec) is the most basic—it's like a command saying, "Play C# in the middle of the keyboard until I tell you to stop." Besides what note is played, it's capable of transmitting how it was played—loud or soft (VELOCITY) information, AFTERTOUCH, and other controllers including PITCH BEND, MOD WHEEL, SUSTAIN PEDAL—the possibilities are almost endless. (For a complete list, see the MIDI chart on page 58).

These are called Channel Voice messages because the MIDI stream may control different voices, each on its own MIDI channel. A NOTE ON message is always "broadcast" on one channel or another, so that a note meant for the piano doesn't wind up going to the trumpet. (An instrument can also be set to OMNI mode, where it will play any note no matter what channel it's on).

The 688's MIDI Tape Sync feature works only with System Common messages, while Channel Voice messages are handled by the sequencer. The Channel Voice messages PORTASTUDIOS are NOT recorded on tape. The MIDI THRU jack of the 688 simply echoes them from the sequencer to the instruments.

However, if desired, the 688 will respond to and issue a limited number of Channel messages. Program Change can change the 688 from one scene to another, and certain NOTE messages can turn individual mutes on and off. For more details on how to do these, refer to the section "MIDI Mixer Control" on page 34.

PROCEDURES FOR MIDI SYNC RECORDING

Just as MIDI sync adds 4 components to the system, it adds one more step to the process: before you can start tracking, you have to record the sync tone. This is called stripping the tape. If you could see the bursts of timing information on the tape, they occur regularly in stripes like the lines across frames of film.

Get the sequencer ready to play:

1. Enter a song into the sequencer. If there is a tempo setting or conductor track in the sequencer, set that.
2. Set MIDI Clock out enable to ON: Some sequencers will not send clocks to the output unless you tell them to.
3. Connect the MIDI OUT of the sequencer to the MIDI IN jack of the MIDISTUDIO using a standard MIDI cable.

Get the MIDISTUDIO ready to record the FSK tone:

4. Set the SYNC switch of the MIDISTUDIO to MIDI. The green light will turn on.
5. Press the SAVE/LOAD switch of the MIDISTUDIO so that the word SAVE appears in the LCD window under the SCENE number. You are "saving" the tempo of the sequencer to tape; later you will "load" it back into the sequencer.

6. Put TRK 8 into REC READY. The red LED will start flashing.

Record the MTS Sync tone

7. Press RECORD and PLAY simultaneously.

8. A few seconds later, press START on your sequencer. The SCENE number will begin to increase: it is showing the number of bars (calculated four beats to a bar).
9. When the sequencer stops (either automatically or because you press STOP on it), wait a few seconds, then press STOP on the MIDISTUDIO.

Play back the MTS tone into the sequencer

10. Rewind the tape.
11. Connect the MIDI OUT of the MIDISTUDIO to the MIDI IN of your sequencer using a standard MIDI cable.
12. Set your sequencer to follow external MIDI clock input.
13. Turn the RECORD FUNCTION of Track 8 to OFF.
14. Press the SAVE/LOAD switch so that the word "LOAD" appears under the SCENE number.
15. Press PLAY on the MIDISTUDIO. When the tape reaches the START point, it should start the sequencer. You will be able to hear the virtual tracks that are being controlled by the sequencer.

CAUTION: There are sequencers that may not be able to start within a song because they do not implement Song Position Pointer. If you have the problem check with the manual for your sequencer.

Overdubbing into a sequencer during sync mode

During sync operation, you may want to add more tracks to your sequencer ("virtual overdubs") while listening to the tape. If your sequencer has only one MIDI IN, though, it must be patched to receive clocks from the 688 instead of receiving Channel Voice messages from the controller keyboard. The 688 does not have MIDI Merge, so plugging the controller into the 688's MIDI IN will not solve the problem. There are several other things you can do, however:

- Obtain a MIDI Merge box (2 MIDI IN, 1 MIDI OUT). This will merge the output of the controller with the clocks from the 688.
- If you have a sequencer based on a personal computer, you can obtain a second MIDI interface to plug into another port of the computer, and use it exclusively for clocks from the 688 while the first port is used for the controller.
- Put your sequencer back into CLOCK INTERNAL mode and perform the overdub onto the tracks without using tape sync.

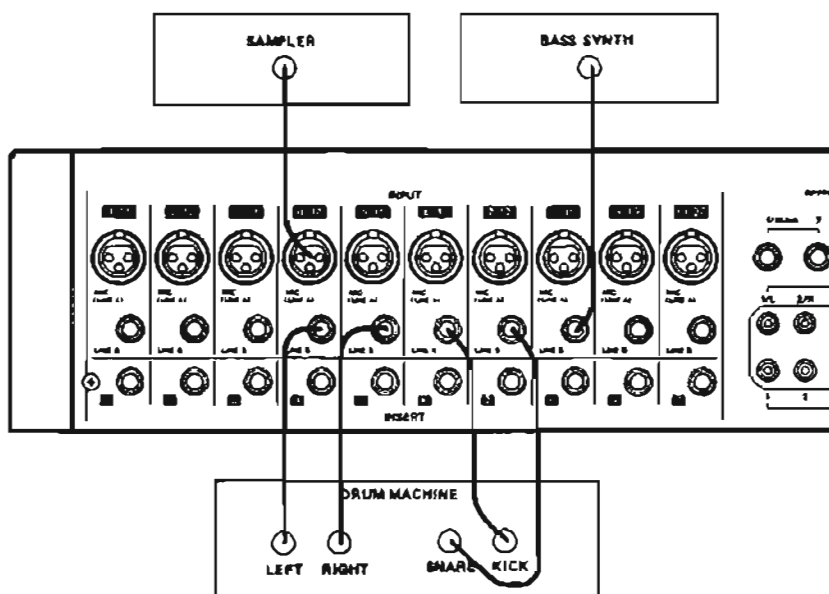
MIXER OPERATION DURING MIDI SYNC

When virtual tracks are used with the MIDISTUDIO, you need to decide what inputs will appear where. A lot depends on whether you want to actually record sounds on the multitrack, or wait until final mixdown.

Seven tape tracks plus thirteen other inputs: Since track 8 will be used for recording the MTS tone, you never need to listen to that track—it's internally routed to the translator. So in MIDI sync operation, channel 8 (Main) and channel 18 (Dual) are both free to be used for instrument or mic input.

Hookup Example: Here we have a drum machine with 4 outputs—2 for stereo mix, and separate outputs for the kick and snare. We've decided we don't want to record the drums except in the final mix, so we patch the drums into line inputs 4, 5, 6 and 7, and bring them to the DUAL mix so we can monitor them all the time. We have a synthesizer with mono output plugged into line in 8, playing a bass part. We'll save this for the final mix as well, and bring it to DUAL so it can be monitored.

We have a sampling keyboard plugged into MIC 4's jack—all we have to do is turn the TRIM control down so the high line level of the sampler doesn't distort the 688's electronics.



USING EXTERNAL SYNC DEVICES

To use an external sync system instead of the built-in MTS:

1. Take the TAPE SYNC OUT of the external device and plug it into the EXT SYNC IN Jack of the 688.
2. Set the SYNC switch on the 688 to EXT. The yellow LED will turn on.
3. Turn the RECORD FUNCTION for Track 8 on.
4. Turn both INSERT and MIX off in the MONITOR MODE keys so you can see the sync tone on the GRP/TRK 8 meter.
5. Set the EXT SYNC IN LEVEL control until Group 8's meter reads 0 dB.
6. Start recording, start the sequencer, and record the tone (this procedure depends on your external device).

For playback:

7. Connect the EXT SYNC OUT jack to the input of the external device. To start with, set the EXT SYNC OUT LEVEL to the "3 o'clock" position (a quarter turn below full output).

8. Press PLAY. When tape reaches the start point, the sequencer should start.

If you experience miscueing or problems (especially while overdubbing onto track 7), try this trick: turn down the EXT SYNC OUT LEVEL control until the sequencer stops playing. Then turn it back up until it resumes, and a little past that point. By turning down the SYNC OUT LEVEL, you are also turning down any other interference that may be going out the jack, putting it below where the external sync unit can be confused by it.

MIDI Mixer Control

SYNCHRONIZING THE 688 TO ANOTHER TAPE DECK

Machine synchronization is much more complicated than MIDI synchronization. MIDI is done electronically, while synchronizing two tape machines together involves motors, inertia, and other factors in addition to electronics.

It also involves SMPTE Time Code, an audio tone recorded on a track of the recorder the same way that MTS sync tone is. But instead of MIDI clocks and Song Pointer, SMPTE time code continuously issues the time in hours, minutes, seconds, and frames. A *synchronizer* reads this time code from two tape machines at once, then issues commands to the slave machine that cause it to "chase-lock" with the master machine..

The 688 MIDISTUDIO is equipped with a serial interface port (ACCESSORY 2) that allows it to be either master or slave when connected to the TASCAM MIDIIZER or other synchronizers that support the TASCAM serial interface standard. A complete explanation of procedures will be found in the manual for your synchronizer but here are a few notes about recording and playing back SMPTE that you must know.

Recording SMPTE Time Code

1. Take the TIME CODE GENERATOR OUT of the synchronizer and plug it into the EXT SYNC IN Jack of the 688.
2. Set the SYNC switch on the 688 to EXT. The yellow LED will turn on.
3. Turn the RECORD FUNCTION for Track 8 on.
4. Turn both INSERT and MIX off in the MONITOR MODE keys so you can see the time code on the GRP/TRK 8 meter.
5. Set the EXT SYNC IN LEVEL control until Group 8's meter reads 0 dB. Alternatively, the time code generator may have its own output level control.
6. Press RECORD and PLAY. Press START on the time code generator.

For playback:

7. Connect the EXT SYNC OUT jack to the Time Code Input (either Master or Slave) of the synchronizer. To start with, set the EXT SYNC OUT LEVEL to the "3 o'clock" position (a quarter turn below full output).
8. Press PLAY. The time code display on the synchronizer or reader should increment. To verify that the machine is getting time code (and not counting tech pulses), temporarily unplug the ACCESSORY 2 Jack from the 688. If the reader still is running, and it stops and starts as you stop and play the 688, you've successfully recorded SMPTE.

In addition to the MIDI Sync capabilities, the 688 also provides access to functions which are achieved relying on MIDI program change and Note On/Off commands. You don't have to use any of them if you don't want to. But you should be aware of the possibilities. More specifically you can:

- Use an "UP/DOWN" footswitch to issue Program Change commands to your MIDI instruments from the 688.
- Send Program Change commands from a MIDI keyboard or other controller to change scene numbers of the 688.
- Use note commands from a keyboard or sequencer to individually mute and unmute the main channels of the 688.
- Set the MIDI channel of the 688 so it will send and receive commands on any MIDI channel.

TRANSMITTING MIDI PROGRAM CHANGE COMMANDS FROM THE 688

Hookup

1. Connect a MIDI cable from one of the MIDI OUTs of the 688 to the MIDI IN of the instrument.
2. (Optional) Connect the RC-60P footswitch to the REMOTE UP/DOWN Jack of the 688. (Otherwise, you can use the 10-number keys of the UP/DOWN keys directly on the 688.)

Setting the MIDI channel

3. Press the SCENE/MIDI CH key until the MIDI CH Indicator appears above the scene number. Now the number display will show the current MIDI send and receive channel: ON (omni on, which makes the 688 receive all MIDI channel and send messages on channel 1), 1-16, or OF (off, which makes the 688 ignore all Program Change and Note On/Off messages).
4. Find out what MIDI channel your instrument is receiving on (the default setting is usually channel 1). Check the owner's manual for your instrument if you don't know how.
5. Using the UP and DOWN keys, set the MIDI channel of the 688 to the channel of your instrument.
6. Press the SCENE/MIDI CH key. The number display will go back to showing the scene number, and the MIDI CH indicator will go out.

Check Operation

7. Press the 10-number keys or the UP/DOWN keys then RECALL. Your instrument should change programs at the same time the 688 changes scenes.

Note about Program Numbers

The MIDI spec calls for 128 different program change commands, 00 through 127. The 688 can transmit and recognize 00 through 99. Each instrument interprets the Program Change command in its own way. Experiment with your setup and read your owner's manuals to take best advantage of the patch change feature.

CHANGING SCENES VIA EXTERNAL MIDI COMMANDS

Just as we used the 688 to send commands to the synthesizer, a synthesizer can send commands to the 688 to recall scenes.

Hookup

1. Connect a MIDI cable from the MIDI OUT of the instrument to the MIDI IN of the 688.

Setting the MIDI Channel

2. Press the SCENE/MIDI CH key until the MIDI CH indicator appears above the scene number. Now the number display will show the current MIDI send and receive channel: ON (omni-on, which makes the 688 receive all MIDI channel port messages on channel 1), 1-16, or OF (off, which makes the 688 ignore all Program Change and Note On/Off messages).
3. Find out what MIDI channel your instrument is transmitting on (the default setting is usually channel 1). Check the owner's manual for your instrument if you don't know how.
4. Using the UP/DOWN keys, set the MIDI channel of the 688 to the channel of your instrument.
5. Press the SCENE/MIDI CH key. The number display will go back to showing the scene number, and the MIDI CH indicator will go out.

Check Operation

6. Change the program or patch on your instrument. The 688 should change scenes at the same time your instrument changes the patch.

CONTROLLING MUTES WITH MIDI NOTE MESSAGES

The 688 makes also it possible to mute individual input channels with MIDI note commands. To experiment with this, you must have a velocity-sensitive keyboard capable of sending notes 36 through 45.

NOTE: To use MIDI note messages for controlling mutes, the MIDI CH should be "on" or any of 1-16. You can set mute on/off individually with note message, but it has no effects if the MIDI CH is OF (off).

1. Go through the "Changing scenes via external MIDI commands" procedure above for hookup and channel setting.
2. Hold the STORE/COPY key while the MIDI CH indicator is on above the number display.

3. The number display will be flashing "on" or "of". This flashing is to show it's only the individual key muting that will be turned off. Press the UP/DOWN key while holding the STORE/COPY to turn the note feature on or off. (for this, set it to "on".)

4. Press SCENE/MIDI CH. The display will return to showing the scene number, and the MIDI CH indicator will go out.

5. On the MIDI keyboard, hit the key which has note number 36 harder. The 688 main channel 1 mute should go on.

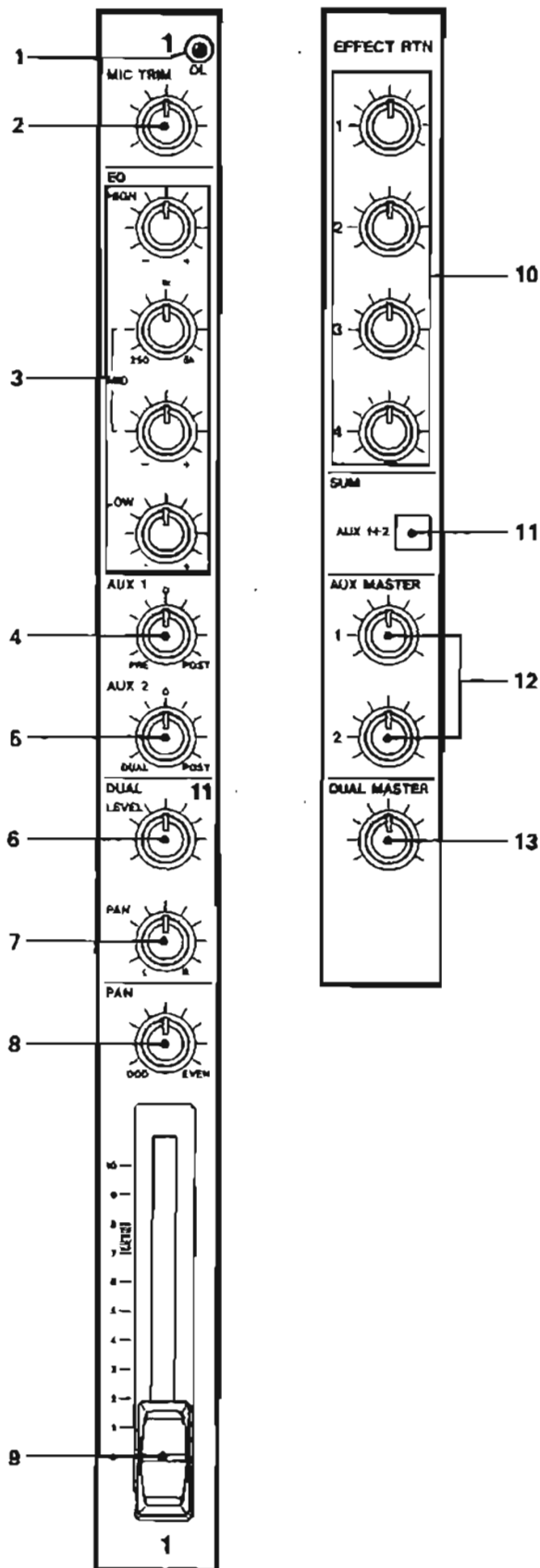
6. Softly press the same key, and mute should go off. This procedure should work for each note going up the scale (#37 will turn on/off mute the main channel 2, etc.)

In most applications, you will not directly address the 688 this way. Instead a sequencer will issue the note commands of different velocities to change the mute settings. Also, the 688 issues its own note commands, so you can write a sequence by "playing" mutes of the 688 into the sequencer. The Note On command is followed very quickly by a Note Off command (gate time of each note on is 1); if you hook the MIDI OUT of the 688 to a MIDI instrument, you may be able to hear the short notes that result when you turn a MUTE on/off.

To turn note muting off: Go through steps 2-4 above, leaving the display in the "of" position.

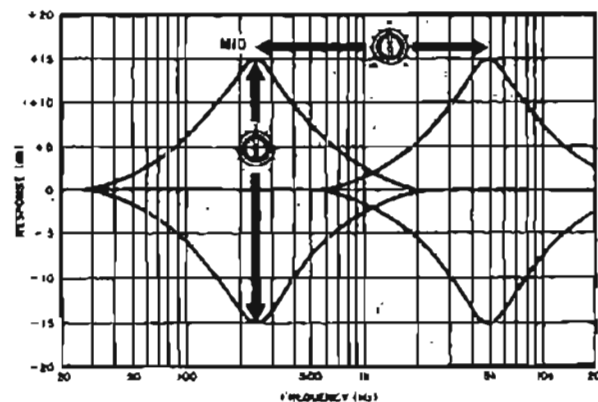
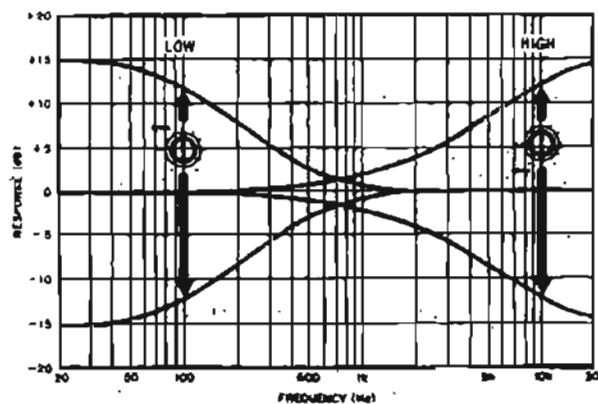
NOTE: When you set the MIDI channel of the 688 to omni "ON", the 688 transmits MIDI commands on channel 1, though it receives external commands on all the 1-16 channels.

Features and Controls



MIXER SECTION

- 1. MIC TRIM:** This sets how much preamplification level there is on the XLR MIC Input only; it doesn't affect the LINE or TAPE inputs. The MIC TRIM should be set high enough to amplify the source above the noise floor of the electronics, but not so high that it distorts the sound of the mixer. When the MIC TRIM is turned all the way to the left, no gain is added to the signal, and it can be used as a LINE A jack. Use this setting whenever you have a high-level source (such as a synthesizer) connected to the top MIC/LINE A jack. When the MIC TRIM is turned full clockwise the signal at the MIC jack will be amplified 40 dB, which is needed by low-level microphone sources. You can determine the proper MIC TRIM level for your application with the help of the OL Indicator.
- 2. OL (OverLoad) Indicator:** This indicator will light if the signal travelling through the Main channel is too loud. Lower the MIC TRIM or output control of the instrument until the OL indicator blinks faintly only on the loudest peaks, if at all.
- 3. Equalizer:** The three-band with midrange sweep equalizer allows you to adjust the tonality of the signal going through the MAIN channel only. It gets its signal from the MAIN INPUT switch, and sends it to the MAIN CHANNEL fader via the INSERT jack. HIGH is a treble shelving-type control with a hinge point of 10 kHz, which can affect signals from 20 kHz down to 5 kHz. The MID section is a peak-and-dip sweep type, with two controls: the SWEEP control allows you to select the specific frequency range you want to affect



(centered from 250 Hz, upper bass, to 5 kHz, low treble), while the MID LEVEL controls whether that frequency band will be increased or decreased. LOW is a bass shelving control, with a hinge point of 100 Hz, that can affect signals from 20 Hz up to 250 Hz. HIGH, MID and LOW level controls work similarly to the controls on other audio equipment: turn to the right of center to boost, to the left of center to cut, or leave in the center for no effect (flat response).

4. **AUX 1:** This is a combination "where from" and "how much" control. It typically controls how much signal will go to an external effects device or headphone mix. It gets its signal from a point just before (PRE) or after (POST) the MAIN CHANNEL fader. It sends signal down the AUX 1 buss to AUX MASTER 1.

Unlike most "effects" sends, the OFF position of the AUX 1 knob is the center detent (12 o'clock). Turn to the right of center to send signal to AUX 1 from the POST-fader point, or to the left of center to send signal to AUX 1 from the PRE-fader point. The farther you turn it either way, the louder it will be—if it's turned all the way to the left, it's at full volume.

POST means that when you change the level on the MAIN CHANNEL fader the AUX 1 send will also change. Use POST if AUX 1 is connected to an effects unit, because when you fade out a signal you (usually) don't want its reverb to stay in the mix. PRE means that AUX 1 will not be affected by changes to the MAIN CHANNEL fader. This is useful when AUX 1 is used as a performer's headphone mix, because once you've got their mix set, you don't want it to change as you adjust the mix feeding the tape recorder. In PA applications, this is called a "monitor" or "cue" control. See p. 28, "Using Effects with the MIDISTUDIO 688".

5. **AUX 2:** This controls how much signal is sent to the AUX 2 MASTER and output jack. It is typically used to send a mix to a second external effects device (such as a reverb). It works the same way as AUX 1 (above) with one important exception: when you turn it to the left of center, AUX 2 will get its signal from a point after the DUAL LEVEL control. The most common use for AUX 2 is as the effects send for the dual section (channels 11-20). Turning it to the right (POST) gives you the same POST-MAIN fader signal that appears at AUX 1's POST, in case you want to have two different effects on the MAIN input. See p. 28, "Using Effects".

6. **DUAL LEVEL:** This controls how much of the signal chosen by the DUAL INPUT on the scene display (either MIC, LINE, TAPE or POST) goes to the DUAL PAN just below it, and then on to the DUAL MASTER stereo output. The Dual section is usually used for tape monitoring during tracking and overdubbing, but can also be used for eight additional inputs to the main mix, or as a stereo effects send from the main channels.

7. **DUAL PAN:** This control allows you to create stereo mixes by sending the DUAL input in continuously variable degrees anywhere to the left or right of the stereo DUAL OUTPUT. It gets its signal from the DUAL LEVEL and sends it down the dual L/R busses to the DUAL MASTER control.

8. **PAN (Main):** This control allows you to create stereo mixes by sending the MAIN input in continuously variable degrees anywhere to the left or right sides of the main mix: pan left to feed ASSIGN GROUPs 1, 3, 5 and 7, pan right to feed ASSIGN GROUPs 2, 4, 6 and 8. Between "hard left" and "hard right" settings, signal is available (in differing degrees) to all eight groups. The PAN gets its signal from the MAIN CHANNEL fader and sends it to the ASSIGN GROUP electronic switches controlled by the scene display. A PAN control is a combination "where to/how much" control, in that it controls both the level and direction of a signal. Note that even if a channel is assigned to a group, if the PAN is set all the way to the other side, no signal will get through to that group.

9. **Main Channel Fader:** This linear slide fader varies the level feeding the PAN control and GROUP ASSIGN switches, the POST side of AUX 1 and 2, and the POST position of the DUAL INPUT switch. The fader is set for unity gain (level in=level out) in the middle of the shaded area between 7 and 8.

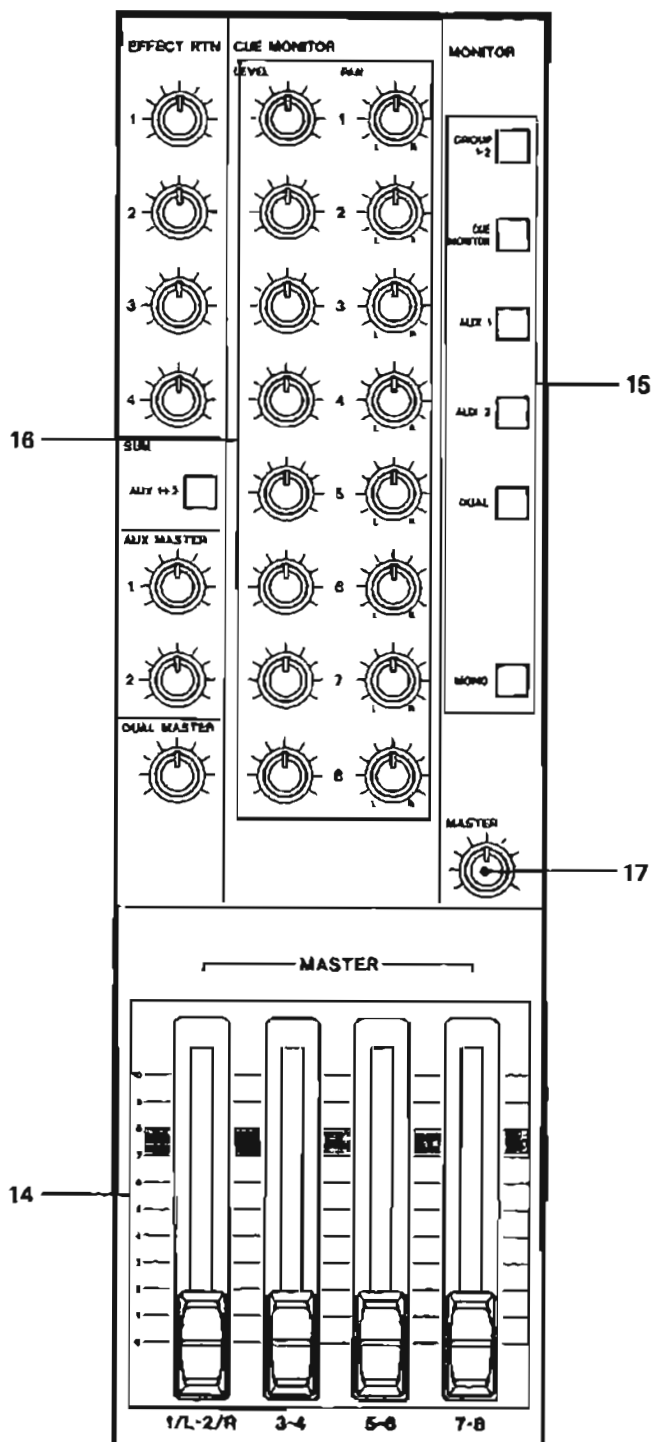
10. **EFFECT RTN 1-4:** These control set how much signal is sent from the four EFFECT RETURN JACKS to the EFFECT ASSIGN screen display, where any effect return may be assigned to any group. Once an effects return is assigned to a group, it goes to the GROUP MASTER FADER to be mixed along with the main signals to be recorded.

A special feature of the effect returns is for those who use mono effect returns. If a signal (for example, the output of a reverb) is plugged into Return #1, but there is nothing plugged into Return #2, the reverb signal will go to both EFFECT RTN 1 and EFFECT RTN 2 controls. By assigning each RETURN to a different group, you can vary the two controls to send signal anywhere between the two groups, similar to using a pan pot. EFFECT RTNs 3 and 4 work the same way. See p. 28, "Using Effects".

11. **SUM switch:** This SUMS or combines the signal from the AUX 1 buss with the signal from the AUX 2 buss. Its main application is when you want to send signal from all 20 inputs, both MAIN 1-10 (using AUX 1) and DUAL 11-20 (using AUX 2) to the same effect unit (for example, a reverb). The SUM takes place before (pre) the AUX 1 and AUX 2 MASTER. See p. 28, "Using Effects with the MIDISTUDIO 688".

12. **AUX MASTER, 1 and 2:** These are the master volume controls for the AUX 1 and AUX 2 mixes. They get their signal from the AUX LEVEL controls in the channels to their left. The signal then goes to the AUX 1 and AUX 2 OUT jacks on the back panel, and the AUX 1 and 2 MONITOR SWITCHES. Adjust the AUX MASTERS until you have the correct level feeding your external effects device. See p. 28, "Setting Effects Send Levels".

13. **DUAL MASTER:** This is the master volume control for the DUAL stereo mix. It gets its signal from all DUAL LEVEL and PAN controls (11-20) to its left. It sends signal to the DUAL OUT L and R jacks on the back panel, the DUAL LINK switches in the Scene Display, and to the Monitor DUAL switch.



14. GROUP MASTER faders (1/L-2/R, 3-4, 5-6 and 7-8): These faders adjust the output levels of the groups. They get their signal from the ASSIGN GROUP switches in the routing display. They send signals to the eight GROUP OUT jacks on the back panel, to the Monitor GROUP 1-2 SWITCH, and to the multitrack recorder. The leftmost fader controls the output level of groups 1 and 2, and is labeled "L/R" because during mixdown the GROUP OUT 1/L and 2/R jacks normally feed the stereo two track recorder. The next three faders control the output levels of the corresponding groups.

MONITOR SECTION

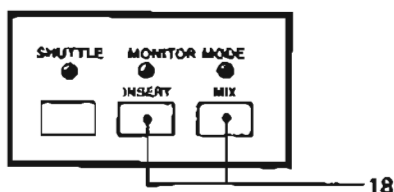
This section controls what you hear in your headphones or monitor speakers. It takes signals from all other mixes and allows you to hear any of them in combination. You can adjust the level you hear without disturbing the level going to the outputs or to tape.

15. MONITOR switches:

- GROUP 1-2:** This is simply an on-off switch that brings the groups 1 and 2 directly into the monitor mix.
- CUE MONITOR:** This is an on-off switch that allows you to hear the 8x2 Tape CUE MONITOR mix section on its left. It should be ON for every stage except final mixdown.
- AUX 1 and 2:** These are the on-off switches between the AUX MASTER controls and the MONITOR MASTER. When they're on, they allow you to hear the mix being sent to the AUX OUT jacks. Typically they're used when you want to check the mix being sent out to a reverb unit. When either AUX is switched on alone, it can be heard through both monitor left and right (i.e., in the center); if both AUX 1 and AUX 2 switches are ON they split in stereo with AUX 1 on the left and AUX 2 on the right.
- DUAL:** This is the on-off switch that brings the signal from the DUAL MASTER into the monitor mix. If the dual section is used as a monitor mix for virtual (MIDI) tracks during tracking and overdubbing, this switch is usually left on until mixdown.
- MONO:** This makes the stereo monitor mix into a mono mix. There are two main applications for it. During overdubbing, many performers play better when they're listening in mono; in final mixdown, the engineer can use the MONO switch to check how the mix will sound when played back on a mono system, such as a car radio.

16. CUE MONITOR LEVEL/PAN Controls 1-8: These controls get signal from their respective tape track or Group output (see chart below), and send signal to the CUE MONITOR switch. They allow you to control an independent monitor mix of tape tracks in your headphones or monitor speaker.

17. Monitor MASTER control knob: This is the overall volume control for the monitor mix. It gets its signal from the switches and controls above it, and sends it to the MONITOR OUT L/R jacks on the back panel, and the PHONES jacks on the front panel.



18. MONITOR MODE INSERT/MIX keys: These, in combination with the RECORD FUNCTION switches, determine the input source of the eight channels of the CUE MONITOR mixer and the eight GRP/TRK meters, according to the following tables:

• When neither INSERT nor MIX is pressed on.

RECORD FUNCTION LED	CUE MONITOR and METER SOURCE
Off	Tape Playback
Blinking (Ready)	Group Out
On Solid (Record)	Group Out

• When INSERT is pressed on.

RECORD FUNCTION LED	CUE MONITOR and METER SOURCE
Off	Tape Playback
Blinking (Ready)	Tape Playback
On Solid (Record)	Group Out

• When MIX is pressed on.

RECORD FUNCTION LED	CUE MONITOR and METER SOURCE
Off	Tape Playback
Blinking (Ready)	Tape Playback and Group Out
On Solid (Record)	Group Out

SCENE ROUTING DISPLAY AND CONTROLS

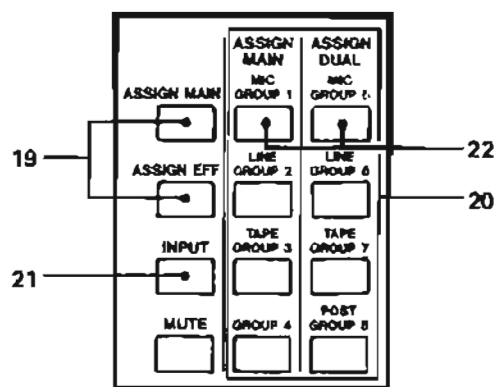
19. ASSIGN keys, MAIN and EFF: These key switch the scene display between two "where to" pages: ASSIGN MAIN shows the groups the 10 MAIN channels are going to, and ASSIGN EFF shows the group assignments for the 4 EFFECTS returns.

Press either key to change the scene display from one "page" to the other. If you were in any previous input or assign modes, it will "disarm" them, turning off any flashing GRP or INPUT indicators.

As long as either ASSIGN MAIN or EFF is pressed on, the right two switch row are in the GROUP ASSIGN mode and allow you to change the current assign settings (see #20).

20. GROUP keys (1-8): While the ASSIGN MAIN or ASSIGN EFF page is being displayed, these eight keys function as GROUP ASSIGN keys. (When the INPUT page is displayed, these 8 keys will act as Input Source Select keys instead—see #21-25 below).

The GRP indicator(s) will start flashing and any MUTE or INPUT indicators that had been flashing will stop. While any GRP indicator is flashing, press any of the ten CHANNEL keys to send (assign) a channel's signal to the group output(s). Pressing the CHANNEL key again will turn that group off.



The ASSIGN MAIN switch of a channel gets its signal from the lower PAN control, and sends it to the GROUP MASTER fader. Note that if a channel's pan pot is turned all the way to the right, no signal will go to the odd-numbered groups even if the channel is assigned to those groups. The ASSIGN EFF switches get their signals from the EFFECT RETURN level controls, and also send it on to the GROUP MASTER faders.

From the MASTER faders, signal is sent to:

1. the multitrack tape
2. the GROUP OUT jacks
3. the MIX position of the MONITOR MODE switch.

Groups 1 and 2 are also sent to a MONITOR SOURCE switch. The meters display the GROUP output level according to the tables in #18 above.

21. INPUT key: Press this key to change the scene page from ASSIGN MAIN/EFF to INPUT page and switch the right 8 keys to act as Input Source Select keys. This allows you to see and change the source of each of the MAIN and DUAL channels. The next step is to "arm" one of the four following input modes.

22. MIC: On the INPUT page of the display, press either key to enter MIC INPUT mode (and automatically leave MUTE or any other INPUT mode). While the MIC indicator is flashing, press any of the ten CHANNEL keys (#27) to select the XLR microphone jack as a source for that channel. Pressing the CHANNEL key again turns the mic selection off. (The mic signal passes through a preamp and the MIC TRIM control at all times.)

If you've pressed MIC in the left ASSIGN MAIN column, you will be choosing MIC as the source for a main channel (1-10), sending it through the EQ, Insert point, and Main Channel fader.

If you've pressed MIC in the right ASSIGN DUAL column, you will be choosing MIC as the source for a dual channel (11-20), sending it to the DUAL LEVEL control.

Typically, you'll route mics through the main channel path so they can be equalized, compressed (via the Insert jack) and sent to the multitrack recorder via the groups.

23. **LINE:** On the INPUT page of the display, press either key to enter LINE INPUT mode (and automatically leave MUTE or any other INPUT mode). While the LINE indicator is flashing, press any of the ten CHANNEL keys (#27) to select the line Jack as a source for that channel. Pressing the CHANNEL key again will turn the line selection off.

If you've pressed LINE in the left ASSIGN MAIN column, you will be choosing LINE B as the source for a main channel (1-10), sending it through the EQ, insert point, and Main Channel fader.

If you've pressed LINE in the right ASSIGN DUAL column, you will be choosing LINE B as the source for a dual channel (11-20), sending it to the DUAL LEVEL control.

Typically, you'll bring a LINE input to the main mix if it needs EQ, or it needs to be recorded onto multitrack. Bring a line input to the dual mix if it's MIDI controlled and you want to monitor it but not record it until mixdown.

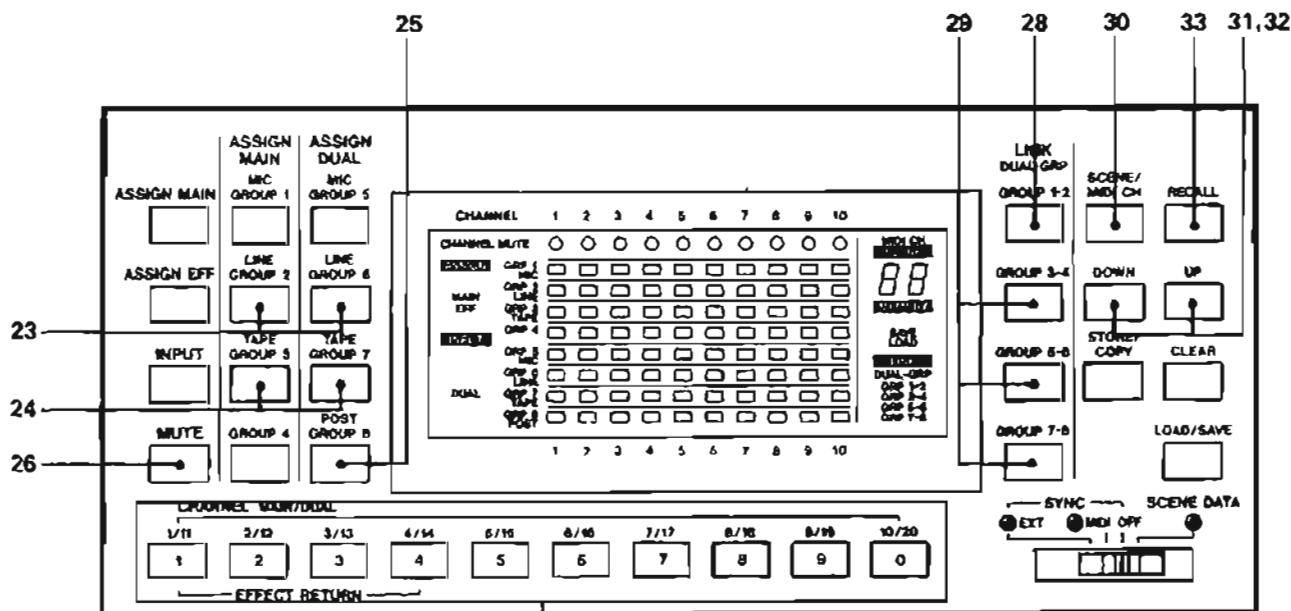
24. **TAPE:** On the INPUT page of the display, press either key to enter TAPE INPUT mode (and automatically leave ASSIGN, MUTE or any other INPUT mode). While TAPE indicator is flashing, press any of the first eight CHANNEL keys (#27) to select the output of the multitrack tape as the input source for that channel. Pressing the CHANNEL key again will turn the tape selection off. Pressing CHANNEL keys 9-0 will have no effect, because there are only 8 tape tracks.

If you've pressed TAPE in the left ASSIGN MAIN column, you will be choosing tape as the source for a main channel (1-8). This is the route usually taken during mixdown or bouncing tracks (see p. 13).

If you've pressed TAPE in the right ASSIGN DUAL column, you will be choosing tape as the source for a dual channel (11-18), which can be used as an additional monitoring position during tracking and overdubbing.

25. **POST:** This key has effect only on the lower half of the INPUT page, since only the DUAL channels can be put into POST mode. Press the POST key to enter POST INPUT mode (and automatically leave ASSIGN, MUTE or any other INPUT mode). While the POST indicator is flashing, press any of the ten CHANNEL keys (#27) to select the post-fader main signal as the source for the DUAL control just above it. Pressing the CHANNEL key again will turn the post selection off.

POST is usually used when you want the DUAL to act as an effects send, similar to the way the AUX 1 and AUX 2 pots work when you turn their pots to the right. When POST is on, the DUAL pots lose their independence; so instead of thinking of them as channels 11-20, they become "AUX 3-4" from the MAIN channels 1-10. When you bring down fader 1, the signal to the DUAL 11 pot will go down in proportion, because it's getting its signal from a point after the main fader. See p. 29, "Dual as an Effect Send".



26. MUTE key: Press this key to enter CHANNEL MUTE mode (and automatically leave ASSIGN or INPUT mode). When the CHANNEL MUTE indicator is flashing, press any CHANNEL key (#27) to mute that channel. This will turn off the signal just after the channel fader, so it can't reach the group outputs, AUXes, or the INSERT jack. Press the CHANNEL key again to turn the signal back on (unmute). The round dots at the top of the display show when a channel is muted.

Mutes can also be turned on or off by MIDI NOTE ON/OFF commands. (See p. 35)

NOTE: Only MAIN channels (1-10) can be muted; the DUALs will be unaffected (unless they are in POST mode).

27. CHANNEL Number keys: The ten keys underneath the LCD display numbered 1-9 and 0 serve two purposes:

Scene number keys: To go to scene 79, for example, press "7" and "9". The routing for scene 79 will appear, but the scene number is blinking to show you that the mixer isn't actually switched to scene 79 settings until you press RECALL.

Channel/dual mix keys: When any of the GRP or MIC-LINE-TAPE-POST indicators are flashing, the first 10 keys become CHANNEL keys, and will turn the flashing function on or off for that main or dual channel.

NOTE: Pressing CLEAR will return you to the original scene display if you accidentally press the number keys and the scene number is flashing.

28. LINK DUAL-GRP 1-2: Press this key to patch the stereo mix from the DUAL MASTER onto the GROUP 1-2 MASTER output, so signals from the DUAL channels can be recorded onto tracks 1 and 2 or mixed down to an external two track. The LINK DUAL-GRP indicator will light with GRP 1-2 underneath. Anything panned to the left side of the dual mix will go to group 1, anything panned to the right will go to group 2. Press the LINK GRP 1-2 key again to disconnect the DUAL output from the groups.

29. LINK DUAL-GRP 3-4, 5-6 and 7-8: These are similar to LINK DUAL GRP 1-2 above. Press these keys to patch the stereo mix from the DUAL MASTER onto the GROUP 3-4, 5-6 and 7-8 MASTER output, so they can be recorded onto the corresponding pairs of tracks. The LINK DUAL-GRP indicator will light with GRP followed by numbers underneath. Anything panned to the left side of the dual mix will go to odd-numbered groups, anything panned to the right will go to even-numbered groups. Press the LINK GRP keys again to disconnect the DUAL outputs from the groups.

30. SCENE/MIDI CH key: This key switches the two-digit number display between the MIDI Channel (1-16, off, or omni) and SCENE (01-99) modes. The SCENE mode is used most of the time; in this mode the scene number can be changed by UP/ DOWN or by the NUMBER keys if no editing mode is armed. The display will

automatically switch to SCENE if you press any channel/number, assign, or input key. MIDI CH mode is used to change the MIDI channel the MIDISTUDIO receives on; typically you'll set it one time and then leave it alone. You can only switch to MIDI CH mode if the scene number is not flashing (press CLEAR or RECALL).

The MIDI Channel display is chosen when you want the MIDISTUDIO to change from one scene to another in response to external MIDI Program Change commands, which are transmitted on one or more of the sixteen MIDI channels. You can change the MIDI channel only with the UP/ DOWN keys. In addition to the numbers 1-16 corresponding to the channels, there are two other choices: "on" and "of". "on" stands for omni mode; in this mode any Program Change command received regardless of channel will change the scene number. Omni mode is useful when you're troubleshooting a system, but not a likely choice for normal operation. "of" stands for off, which is where you should set it if you don't want the MIDISTUDIO to respond to any Program Change commands at all. See p. 35, "Changing scenes via External MIDI commands."

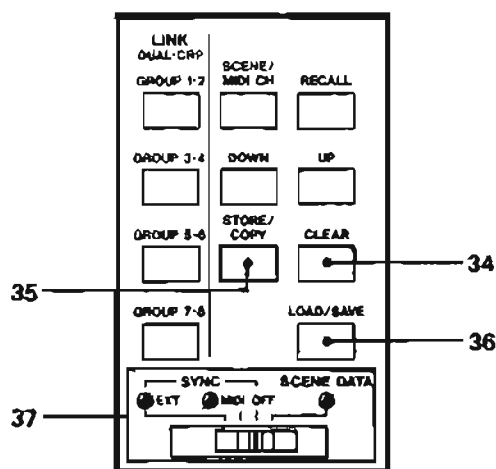
Note that the MIDI channel does not affect system common or system real time messages: the MIDI timing and synchronization commands (clock, Song Pointer, start/stop etc.) go through the entire system regardless of channel.

Storage function of MIDI/SCENE: When the MIDI/SCENE key is pressed while holding STORE/COPY, the current scene contents will be replaced by whatever is in the buffer memory (which is displayed when you press STORE). This STORE-SCENE is how you permanently save your edited scenes.

Clear function of MIDI/SCENE: When the MIDI/SCENE key is pressed while holding CLEAR, the current scene contents will be totally emptied—no inputs selected, no assignments, no links, no mutes. See p. 26, "Saving Scenes".

31-32. UP and DOWN keys: Increases or decreases the current MIDI channel or SCENE number depending on the mode (see #30). The numbers will scroll continuously if you hold the key down.

33. RECALL key: Press this key to actually switch the MIDISTUDIO to the settings of a displayed scene. When the scene number is blinking, the setting shown in the display is not the current actual setting—you need to RECALL it from memory to change the settings of the electronic switches.



34. CLEAR: This key is essentially a "stop the current mode" switch—in computer use similar to an "escape" key. Press it to:

- * Return the SCENE display to showing the current scene after browsing through some other ones, or accidentally hitting a NUMBER key
- * Leave any ASSIGN or INPUT mode
- * Abort a STORE/COPY action—turn the MEMORY display off and return to the original version of a scene
- * Totally CLEAR the contents of a scene memory by holding CLEAR and pressing SCENE/MIDI CH
- * CLEAR all 99 scenes, returning the first 12 to the original factory presets by holding CLEAR and turning on the power. Make sure you've saved any valuable scenes to tape (see p. 27, "Transferring All Scenes") before doing this.

35. STORE/COPY: This key is used when you want to store a scene to one of the 99 memory locations. Changes made with the ASSIGN and INPUT keys are temporarily held by MEMORY but need to be stored before the 688 is powered down, CLEARED, or another scene is RECALLED.

Pressing STORE places whatever routing data is in current memory (MAIN and EFF assigns, MAIN and DUAL inputs, DUAL-GRP LINKs, and CHANNEL MUTES) into a MEMORY buffer or holding area. The MEMORY indicator appears under the scene number to show you that the data has been memorized. You can now look at other scenes until you find one that you want to replace with what's in MEMORY.

You can press and hold STORE to compare the MEMORY buffer scene with the contents of the scene that will be replaced.

To permanently store the MEMORY buffer into a SCENE, hold STORE and press the MIDI CH/SCENE key; the MEMORY indicator will disappear. Pressing CLEAR before doing a STORE/SCENE operation will erase the contents of the memory buffer, turn off the MEMORY indicator, and return you to the original scene. See p. 26, "Saving Scenes".

36. LOAD/SAVE: This key is active only in MIDI SYNC or SCENE DATA modes (set by the 4 position SYNC switch). Press this key to switch between SAVE or LOAD in the display under the scene number. "Save" means saving information onto tape, and "load" means loading data from the tape (track 8) into either the MIDI SYNC translator or the scene memories of the MIDISTUDIO. See p. 32, "Procedures for MIDI Sync recording" and p. 27, "Transferring All Scenes".

37. SYNC switch: This switch has 3 positions with accompanying LEDs, plus OFF. It directly affects the signals going to and from track 8 of the tape deck. It decides whether track 8 will be used for:

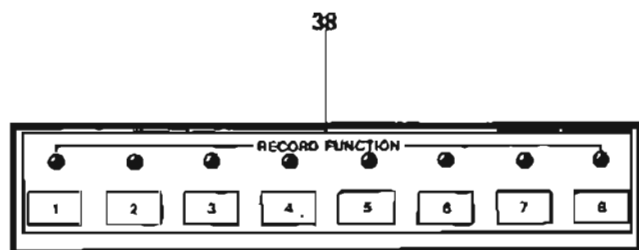
- a) an external sync unit
- b) the Internal MIDI Tape Sync
- c) for normal recording
- d) to transfer the data of the 99 scenes to/from a backup tape.

EXT mode (yellow LED) switches the input and output of tape track 8 to the EXT SYNC jacks and level controls on the back panel. Use this when you want to use some other form of synchronization (for example, SMPTE or an FSK tone generated by the sequencer itself) instead of the Internal MIDI synchronization of the MIDISTUDIO. See p. 30, "Using External Sync Devices".

MIDI mode (red LED) dedicates track 8 to use by the Internal MIDI Tape Synchronizer (MTS). This is the most common mode of operation if you use a MIDI sequencer. In MIDI SAVE mode (see "Save/Load switch" above), MIDI clocks and start-stop commands received by the MIDISTUDIO's MIDI IN jack will be translated into a warbling tone called an FSK signal that can be recorded on Track 8. In LOAD mode this FSK signal is sent from track 8's output directly to the input of the MTS, which translates it back into MIDI signals for the MIDI OUT jack, where it can be connected to sequencers or drum machines to follow in perfect synchronization with the tape.

OFF mode is the only way to get conventional audio signals onto track 8 from GROUP 8 of the mixer. This is the mode to use if you are not using any MIDI or SMPTE synchronization.

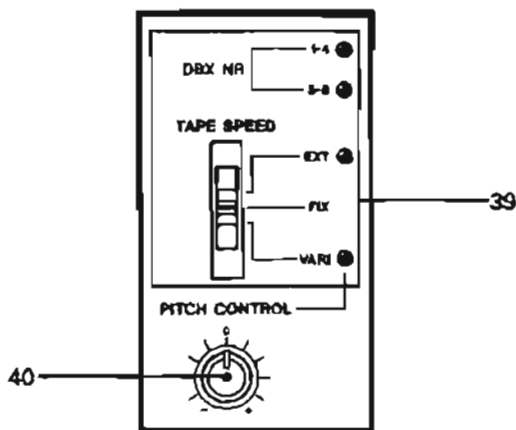
SCENE DATA mode (red LED) is used to save SCENE data onto a cassette tape. In SAVE DATA mode, the settings of all 99 scenes are changed into a computerized tone that you record on track 8 of a cassette. Later, if you have edited scenes and want to return the MIDISTUDIO's memory to its previous version, you get the cassette and go through the DATA LOAD operation. In both cases, you will see the SCENE number increase about every second; a complete save or load operation takes about a few minutes. There is no way to save or load individual scenes; DATA takes a "snapshot" of the entire memory. DATA is also used to save scene data via MIDI System Exclusive files. (See p.27)



RECORDER SECTION

38. RECORD FUNCTION switches and LEDs: Pressing any of these eight switches puts the corresponding track into Rec-Ready mode, or directly into Record mode if RECORD and PLAY have already been pressed.

RECORD FUNCTION LED	Track status
Off	Safe: Recording cannot occur on that track.
Blinking	Record Ready: Recording on that track will occur when RECORD and PLAY are pressed.
On solid	Record: Recording on that track is in progress (RHSL or Actual) or, if RECORD and PLAY were PAUSED, recording will resume when PLAY is pressed.



39. TAPE SPEED switch: This three position switch controls the status of the PITCH CONTROL function.

In the FIX position, the PITCH CONTROL will be locked off and the tape will run at 9.5 cm/sec. (3-3/4 ips).

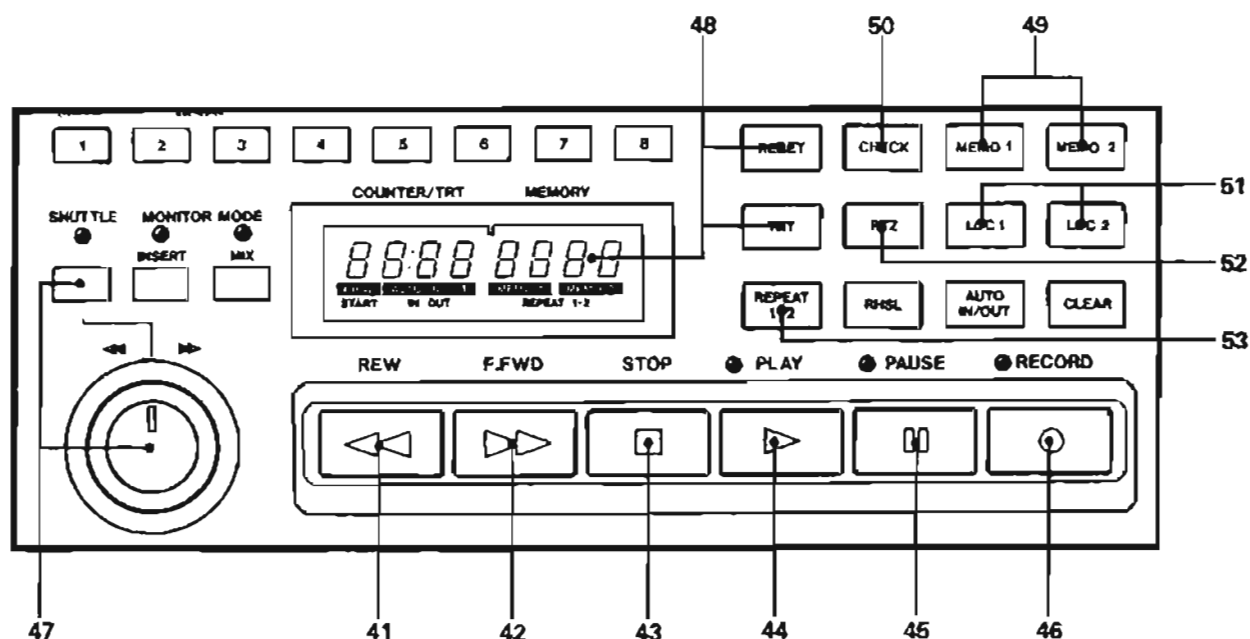
In the VARI position, the PITCH CONTROL will function and an LED will indicate that it is on.

In the EXT position, the transport speed of the recorder will be controlled by a device plugged into the SERIAL connector on the back panel. SMPTE Synchronizers and Controllers, such as TASCAM MIDiIZER, will normally be used with this function. The yellow LED for EXT will light steadily, indicating that the capstan motor is under control of an FM 9.6 kHz reference signal coming from the exterior. Interruption of this external signal will cause the LED to blink.

40. PITCH CONTROL: Provides a plus or minus 12% variation to the tape speed both in Record and Play modes. Turn the knob to the left to lower the speed, or to the right to increase the speed.

This can sometimes be used to save parts that are a little out-of-tune, or to create sound effects such as flanging. Note that if you record with the dial at its maximum or minimum settings, you will NOT have the ability to make further adjustment in that direction upon playback.

CAUTION: The PITCH CONTROL affects the record speed also. Check to make sure that the TAPE SPEED select switch is set to FIX unless you are using the PITCH CONTROL intentionally.



41. **REW key:** Winds the tape at high speed in reverse.
42. **F.FWD key:** Winds the tape at high speed in forward direction.
43. **STOP key:** Stops any tape motion.
44. **PLAY key:**
- Pressing this key alone starts playback.
 - If pressed together with RECORD, starts recording.
 - Pressing the key during recording stops the recording ("punch out") without stopping the tape motion.
 - If pressed during REC PAUSE, the PLAY key resumes recording (green LED stays ON).
 - If PLAY is pressed after LOC or RTZ, the transport will automatically enter Play mode as soon as the memory point is reached.
45. **PAUSE key:** Temporarily stops play or recording. To resume the function interrupted, press PLAY.
- Pressing PAUSE alone while in STOP puts the recorder into a Play Standby mode. If pressed together with RECORD while in STOP, the key puts the recorder into a Record Standby mode.
- If PAUSE is pressed after LOC or RTZ, the transport will automatically enter Pause mode as soon as the memory point is reached.
46. **RECORD key:** Pressing this button alone has no effect. Pressing it together with PLAY carries two functions:
- Recording will begin if one or more RECORD FUNCTION switches (#38) have already pressed with the track indicators blinking in the meter window.

* Recording can also be initiated by pressing RECORD during PLAY. See "PUNCH-IN or INSERT Recording, page 21.

2) If all RECORD FUNCTION switches (#38) are off, the recorder will enter a Record standby mode as indicated by a blinking RECORD LED.

RECORD LED	Recorder Mode
Blinking	Record standby - No actual recording is in progress. As you press a RECORD FUNCTION switch or switches, recording will begin on those tracks.
On solid	Record mode - Recording is taking place. RECORD FUNCTION indicators that were blinking turn on solid.

47. **SHUTTLE switch and Control knob:** When the SHUTTLE key is pressed, the red LED above the key will light, and the knob beneath can be used to roll tape forward or in reverse as you monitor its playback, at continuously variable speeds determined by the amount of knob rotation.

The further the knob is rotated clockwise, the faster the tape will roll in the forward direction (toward the right). Conversely, as the knob is rotated counterclockwise, the tape will roll backward (toward the left).

Returning the knob to its original, centered position will pause the tape.

Pressing STOP or any other transport control keys will disable the SHUTTLE function.

CAUTION: Extensive use of the SHUTTLE causes premature wearing of the heads. Use the SHUTTLE sparingly!

48. COUNTER display with the RESET and TRT switches: (As for the MEMORY display, refer to #49 and 50.) The 4-digit COUNTER display has a double function.

1) When the 688 is first turned on, the COUNTER switches to its normal tape counter mode and displays "0000" (not 00:00).

2) Pressing the "TRT" (Tape Run Time) switches the display from COUNTER mode to TRT mode, as indicated by a colon ":" in the window.

NOTE about TRT mode:

- The maximum readout time is 69 minutes and 59 seconds (displayed as 69:59).

- Unlike the normal COUNTER mode which counts tape motion in both forward (RECORD, PLAY and F.FWD modes) and reverse (REW mode) directions, TRT mode counts only in RECORD and PLAY modes.

- The TRT display is calculated from the capstan motor and will not necessarily be accurate with elapsed time as read from your wrist watch or wall clock.

Both the COUNTER and TRT modes are active at the same time. Therefore, switching the display from one mode to another does not disable or reset the previously displayed readout. You can switch COUNTER display modes as often as needed and the readouts will not be cancelled or reset to "0000".

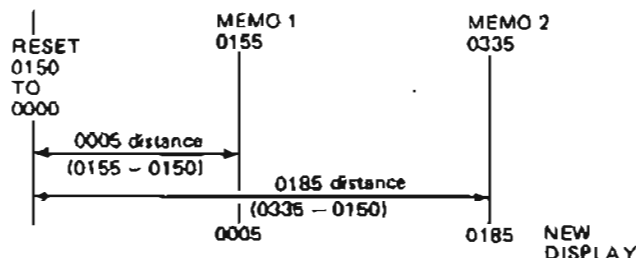
RESET switch: This switch has effect only on currently displayed readout. When the 688 is turned off, both the displayed and hidden readouts are reset.

The current tape location readouts (displayed or hidden) can be put into memory system of the 688. See the next item, #49.

AUTOLOCATOR SECTION

49. MEMO 1 and MEMO 2: These keys are used to establish two autolocation points in the 688 memory system. They can be used while the tape is stopped or rolling. Pressing either key at any point on the tape loads the current tape counter number into that memory register and into the MEMORY display. Each time the key is pressed, a new MEMO point is established, erasing all previous memories in that register. "MEMO 1" or "MEMO 2" will light in the MEMORY windows to show which location is currently being displayed. Both MEMO points are erased when power is turned off or when a cassette tape is ejected.

The MEMO points will not move even if the Zero position is changed by the RESET key (#48). For example, if MEMO 1 is pressed at counter "0155" and RESET is afterwards pressed at "0160", then the 688's memory system will calculate where the "0155" point is with respect to the new Zero position and display the MEMO 1 point as "0005".



The MEMO points are based on the counter readouts and the counter is based on revolutions of the cassette hub. The MEMO points are subject to variations in tape pack. Slight drifting of a cue point after a number of fast wind operations is normal.

50. CHECK key: This key toggles the MEMORY display between the contents of MEMO 1 and MEMO 2. The corresponding indicators will light to show which one is being displayed.

51. LOC 1 and LOC 2: Pressing either of these keys causes the tape to roll (in either F.FWD or REW) to the corresponding MEMO point. While fast winding, the MEMO indicator will flash in the display. The tape will stop when it reaches the MEMO point. If PLAY is pressed while the tape is locating, the 688 will automatically enter Play mode after reaching the memorized point.

When the tape overshoots the memorized point, it will roll back at Slow Play speed, stopping at, or if PLAY has been pressed, starting playback from the memorized point. Don't hit PLAY during that Slow Play interim.

If so, the tape may be blocked. If this happens by accident, defeat it by pressing STOP.

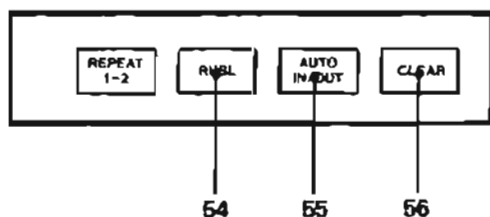
52. RTZ (Return to Zero): Pressing the RTZ key will cause the 688 to fast wind the tape to the COUNTER "0000" point on the tape.

53. REPEAT: The REPEAT function provides a "Playback Loop" or "Block Repeat" between the two programmed MEMO points. Note that MEMO 2 does NOT have to be a number greater than MEMO 1. When REPEAT is enabled and the current counter number is between the two MEMO points, the tape will play to the higher MEMO location, rewind to the lower MEMO location and start over.

To disable the REPEAT function, press the REPEAT key again. The REPEAT Indicator will be turned off.

During REPEAT all the transport keys are active: If you fastwind the tape out of the loop, the REPEAT Indicator will blink showing that if you want to resume the repeat you have to go back to a point within the loop. Pressing LOC 1 and 2 will resume the repeat. If the tape is at a point lower than the START point, pressing PLAY will normally start playing, and when the loop end is reached it will rewind to the start point to resume the repeat.

In actual Recording, the REPEAT function will not activate, even if the REPEAT Indicator is on solid. The 688 will continue recording after the higher MEMO location.



54. RHSL (Rehearsal) key: RHSL is the first stage of an automatic punch-in recording. During Rehearsal Set mode ("RHSL" indicator blinking in the window), the 688 memorizes the preroll, punch-in and out counter locations that are used for rehearsals and for AUTO IN/OUT.

In Rehearsal mode, the RHSL function switches the output of tracks in Rec Ready mode from tape to source and back again at the preset points but no signal will be recorded to tape. This allows you to hear what a punch-in will sound like before you actually record it, without having to manually press any keys or footswitch.

When the RHSL indicator is on solid, the 688 is in RHSL Ready mode, and pressing PLAY will start a rehearsal loop.

The MEMORY display will read out the following messages as you go through the Rehearsal Set operations (RHSL indicator on solid).

- 1) "START xxxx" appears as you press PLAY and the 688 will start the preroll.
- 2) "IN xxxx" appears as you press RECORD. This loads the 688's memory with the Punch-In point.
- 3) "OUT xxxx" appears as you press PLAY again. This loads the 688's memory with the Punch-out point.
- 4) After a 3-second postroll, the tape will automatically rewind to the START point. While rewinding, the START number will flash in the display.
- 5) Pressing PLAY will start the rehearsal loop. (Or you can press AUTO then PLAY to start the actual recording without passing through any rehearsal.)

As you go through the Rehearsal loop ("RHSL" on solid), the MEMORY display will let you know the upcoming IN and OUT locations as follows:

- 1) The display number changes to show the IN point as you press PLAY to start the preroll.
- 2) The display number changes to show the OUT point as you reach the IN point. At the same time, the indication "START" changes to "IN".
- 3) The indication "IN" changes to "OUT" as you reach the OUT point. The display number does not change and continues to show the OUT point until you reach the loop end.

55. AUTO IN/OUT key: After you have set the tape's preroll START point, the Punch-IN and Punch OUT points in RHSL mode, entering the 688's AUTO IN/OUT mode puts it into a ready state to commit the record Punch to tape.

- Pressing this key puts the 688 into its Automatic Punch-In/Out mode.
- Pressing PLAY or the RC-30P footswitch initiates the actual recording by activating the Automatic Punch-In/Out sequence (Preroll, Punch-In, Punch-Out and Postroll).

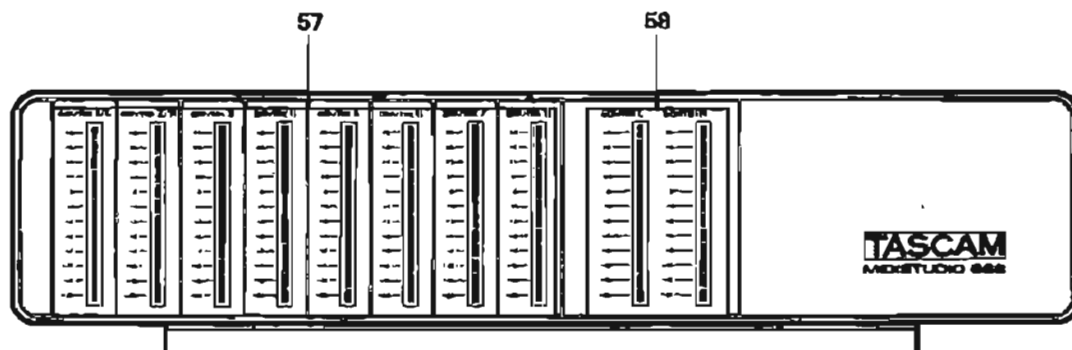
56. CLEAR key: This key is used to turn off the RHSL and AUTO IN/OUT functions. If CLEAR is pressed while the 688 is in RHSL or AUTO IN/OUT, the 688 will turn off the current mode and return to normal operation. Pressing CLEAR during any other modes has no effect.

METER SECTION

The meter panel can be locked at the desired angle by tightening with appropriate Phillips screwdriver the screw whose location is shown in the illustration above.

57. GRP/TRK 1-8 meter: They show group and track signal levels. Whether registered signal is Group or Track is determined by the settings of the RECORD FUNCTION and the MONITOR MODE switches. See switching logic tables on page 39.

58. MONITOR L and R meter: The right two meters show the level in the monitor mix selected by the MONITOR switches (#15). The meters are "Pre" (before) the rotary MASTER level control and this control does not affect the meter readings.



BACK PANEL

- 59. MIC (LINE A) 1/11-10/20:** These XLR connectors are for connection of low-impedance balanced microphones. They are also used for instruments with low output levels that need preamplification, such as guitars and basses. Higher output devices (line level, such as synthesizers) may be connected here if the MIC TRIM control is turned all the way down. Signal goes from this jack to the channel's MIC TRIM control. Pin assignment is as follows: Pin 3 is high, Pin 2 is low and Pin 1 is shield (ground).
- 60. LINE B 1/11-10/20:** These jacks are intended for line level inputs (nominal signal level of -10 dBV or 0.3 volts) such as synthesizers and audio equipment that do not need preamplification. These jacks can be connected to the MAIN and DUAL mix, depending on the settings of the INPUT page of the display.
- 61. INSERT jacks 1-10:** The INSERT jack is a three-conductor (Tip-Ring-Sleeve or "stereo") 1/4" phone jack inserted into the MAIN channel signal path between the EQ and the channel fader. If nothing is plugged into this jack it is bypassed; but with the proper cable (a 1/4" TRS "stereo" to two 1/4" "mono" phone splitter cable, such as the TASCAM PW-2Y or PW-4Y Insertion Cable) INSERT allows you to take the preamplified signal of a MAIN channel and route it through an external signal processor (typically a compressor, limiter, or graphic equalizer). For more information, see p. 28 "Using Effects." Devices plugged into the INSERT point feed the channel fader, the PRE position of AUX 1.
- 62. EFFECT RETURN jacks 1-4:** These jacks send signal directly to the EFFECT RETURN LEVEL knobs on the front panel. Connect the outputs of your effects devices to these jacks, although you can connect any other line input if desired. Each EFFECT RETURN JACK is normally independent and may be assigned to any of the group outputs via the EFF ASSIGN screen. However, if a signal (for example, the output of a reverb) is plugged into return #1, but nothing is plugged into return #2, the reverb signal will go to both EFFECT

RETURN 1 and EFFECT RETURN 2 controls. Similarly, a signal patched into RETURN 3 "normals" to both the 3 and 4 LEVEL controls if there is no signal patched into RETURN 4. The input level expected by these jacks is -10 dBV (0.3 volts).

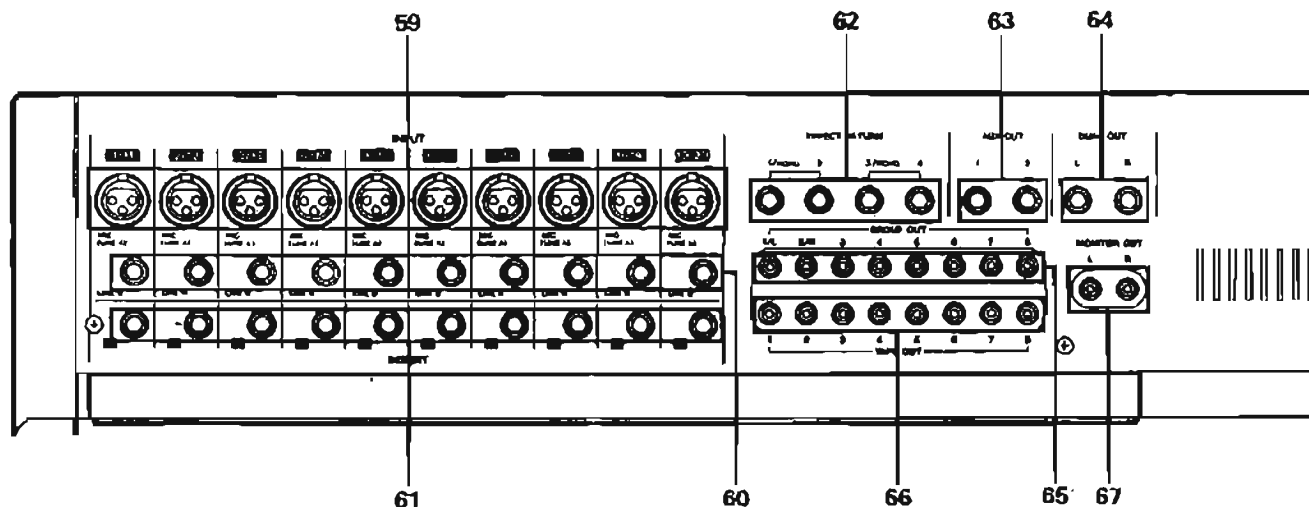
63. AUX OUT jacks 1 and 2: These are the outputs from the AUX mixes of the MIDISTUDIO. Signal comes here directly from the AUX 1 and 2 MASTER level controls. They are typically connected to the inputs of external devices such as reverbs, digital delays, etc. They may also be used to feed a separate monitor or headphone amplifier. They provide a nominal output level of -10 dBV (0.3 volts).

64. DUAL OUT L and R jacks: Signal comes here directly from the DUAL MASTER level control. Connect here if you want to use the DUAL as a stereo effect send or additional monitor (see p. 29, "Dual as effect send"). Otherwise, these jacks are not used.

65. GROUP OUT jacks 1-8: These jacks are the outputs of the mixer section of the MIDISTUDIO. Signal comes to these jacks directly after the four GROUP MASTER FADERS. The 1/L and 2/R jacks are typically connected to your two-track mastering recorder at mixdown. Another use of the GROUP OUT jacks is when you want to send the mixer outputs of the MIDISTUDIO to the sub inputs of a larger console.

66. TAPE OUT jacks 1-8: These jacks are the outputs of the multitrack recorder of the MIDISTUDIO. Use them if you want to mix the tape down with an external mixing console, or if you want to make a backup copy of your master 8-track onto another tape deck.

67. MONITOR OUT L and R jacks: This is the connection point to your control room monitor amplifier; it's a line level version of the same signal that feeds the PHONES jack. Signal comes here from the MONITOR SWITCH panel and MONITOR MASTER LEVEL control, which allows these jacks to have any combination of the GROUP, CUE MONITOR, AUX, or DUAL outputs as needed. The L/R meters on the right side of the display show the level of this output.



68. MIDI jacks: These jacks are for the connection of MIDI sequencers for synchronization to the MIDISTUDIO. They follow the MIDI specification.

MIDI IN: This jack typically accepts the MIDI OUTPUT of a sequencer. When used in MIDI SYNC SAVE mode, timing commands (start, stop, timing clocks) received by this jack will be translated and recorded onto track 8. Note that no other MIDI information (such as Channel Voice information) is recorded, although it will be "echoed" out the OUT/THRU jack in certain modes. See p. 32, "Procedures for MIDI Sync Recording". MIDI Program Change messages received at the MIDI IN jack will change the scenes of the MIDISTUDIO, if the MIDISTUDIO is set to receive them, even in EXT SYNC or OFF modes. See p. 35, "Changing scenes via external MIDI commands."

MIDI OUT: In MIDI Sync LOAD mode, this jack sends start, stop, song position pointer, and clock to the MIDI IN of the sequencer connected to it. See p. 32, "Playback the sync tone". Note that the MIDISTUDIO does not generate or pass any other MIDI commands (such as note on/off or program change) to this jack. During SAVE mode, the OUT jack is disconnected to prevent a signal loop from being formed.

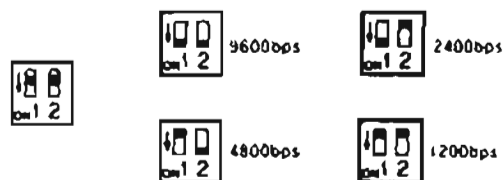
MIDI OUT/THRU: This jack has the same output as the MIDI OUT jack except during MIDI SAVE operations, when it becomes a THRU jack. A THRU jack passes along information received at the IN jack, so while the MIDISTUDIO is getting the clocks from the sequencer, it passes along the note-on/off information to THRU so a synth can be heard for reference. During LOAD (playback), this jack is typically used to run a second sequencer or drum machine in addition to the one connected to the OUT jack.

69. EXT SYNC jacks and LEVEL controls: These are connected to the input and output of track 8 when the MIDISTUDIO is in EXT SYNC mode. If you are using external MIDI synchronization (such as that built-in to a sequencer), or are using SMPTE time code, connect to these jacks. The IN LEVEL should be set so that signal is recorded between -5 and 0 dB on Tape 4's meter.

The OUT LEVEL should be set to match the level expected by the external device. The LEVEL controls under most conditions should be set to nominal level (2 o'clock). With certain FSK tones, lowering the OUT LEVEL will eliminate miscueing while track 7 is being recorded. See p. 33, "Using External Sync."

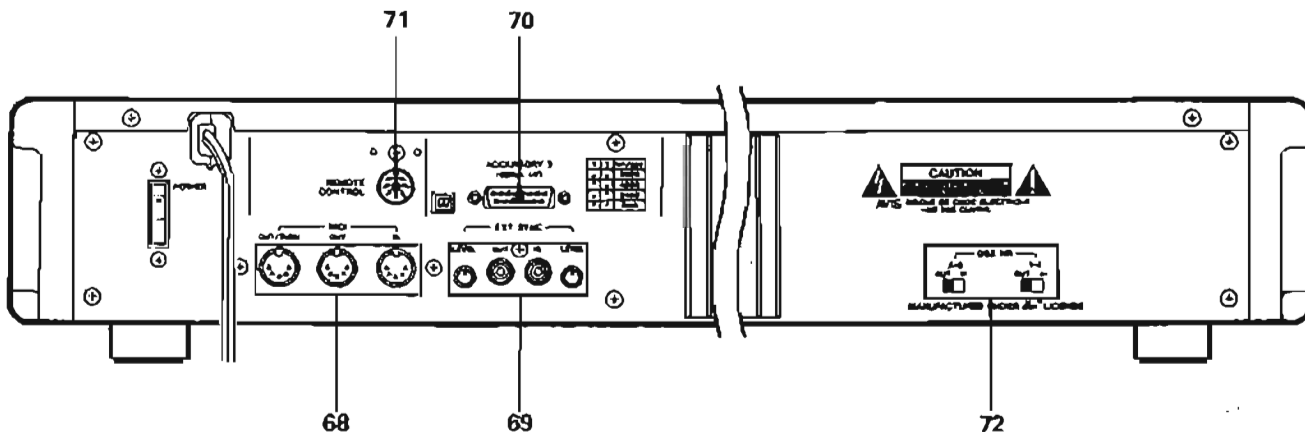
70. ACCESSORY 2 (SERIAL I/F): This is a serial I/O port conforming to the RS-232C standard for linking the MIDISTUDIO to an external computer of serial synchronizers (such as the TASCAM MIDIIIZER).

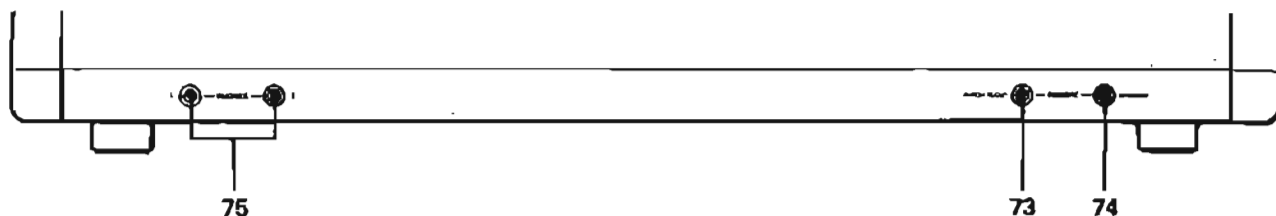
The dip switch adjacent to the D-SUB connector is used to select the bit rate as per the illustration shown below.



71. REMOTE CONTROL jack: This is the connection point for the RC-88 remote control, which gives you remote control of all transport functions, record functions, plus rehearsal and auto record.

72. DBX NR switches 1-4 and 5-8: When these switches are set to their IN positions, the corresponding LEDs on the control panel will light indicating that the built-in dbx noise reduction system for each group of tracks (1-4 and 5-8) is turned on. In EXT or MIDI SYNC or SCENE DATA modes, track 8 is disconnected from the dbx system even if the 5-8 switch is in IN position, so the system does not affect the sync signals going to and from track 8.





FRONT PANEL

- 73. **PUNCH IN/OUT Jack:** Plug the optional RC-30P footswitch in here for hands-free punch-in. In RHSL and AUTO IN/OUT modes, the footswitch will also start PLAY.
- 74. **UP/DOWN Jack:** Plug the optional RC-80P footswitch here for remote control of scene displays. It has the same effect as pressing UP or DOWN and RECALL.
- 75. **PHONES 1/2 Jacks:** Any stereo headphone with a 1/4" TRS stereo plug may be plugged in to this jack. Lower impedance headphones (to 8 ohms) will be louder than high impedance (150 to 600 ohms) headphones in most cases. Do not plug a standard mono 1/4 cable into this jack under any circumstances.

"ACCESSORY 2" SERIAL CONNECTOR

The MIDISTUDIO 688 operates to its full potential when interfaced with the MIDIZER, an intelligent, highly versatile serial synchronizer, which provides a link between SMPTE/EBU based audio/video production and MIDI music creation. It shifts between time code and MIDI data to constantly adapt the 688 and other associated machines/units to ever changing requirements of each application.

Specifically, advanced functions the MIDIZER provides access to, include Record On/Off programming (up to 16 individual tracks), 20-point Autolocation either referenced to time code address or MIDI coded bar/beat numbers, Time code triggered events, MIDI Program Change which can be controlled with time code too, and more.

The method of communications performed in compliance with the RS-232C standard differ depending on the mechanical/electrical characteristics and system programs of the associated machines/devices, and a small error in communications thwarts the interfaced system and even causes this to run "wild." For detailed technical information about the use of the 688's Serial Connector, consult TASCAM or your local TASCAM dealer.

Care and Maintenance

Even though the heads used in your 688 have high wear resistance and are rigidly constructed, performance degradation or electro-mechanical failure can be prevented if maintenance is performed regularly.

CLEANING

The first things you will need for maintenance are not expensive. The whole kit with the swabs and fluids you will need of months will cost less than a couple of high quality cassettes.

We cannot stress the importance of cleaning too much. Clean up before each session. Clean up after every session. Clean up every time you take a break in the middle of a session.

Here's why:

1. Any dirt or oxide build-up on the heads will force the tape away from the gaps that record and playback. This will drastically affect the response. Even so small a layer of dirt as one thousandth of an inch will result in degraded performance. All the money you have paid for high performance will be wiped out by a bit of oxide. Wipe it off with head cleaner and you're back to normal.
2. Tape and tape oxide act very much the same way as fine sandpaper. The combination will slowly grind down the tape path. If you do not clean off this abrasive material on a regular basis, the wear will be much more rapid and will become irregular. Even wear on heads can be compensated for with electronic adjustments for a while, but uneven wear can produce notches on heads and guides that will cause the tape to "skew" and skip around, making adjustment impossible. This ragged pathway also chews up the tape, producing more abrasive material, which in turn causes more uneven wear. This begins a vicious circle that cannot be stopped once it gets a good start. The only solution to this will be to replace not only the heads, but the tape guides as well. Being conscientious about cleaning the tape path on your 688 will more than double the life of the heads and tape guides.

Cleaning the Heads and Tape Guides

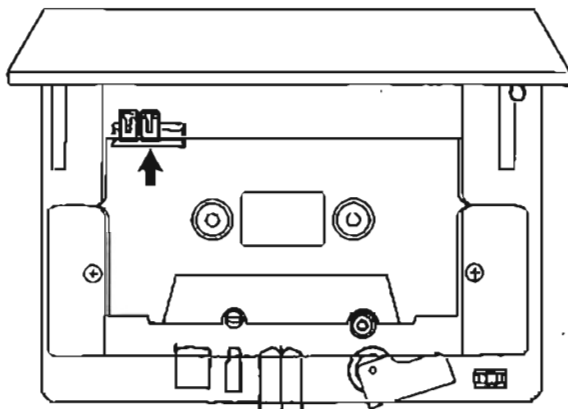
All heads and metal parts in the tape path must be cleaned after every 6 hours of operation, or before starting and after ending a recording session.

1. Open the cassette door.
2. Using a good head cleaning fluid and a cotton swab, clean the heads and tape guides until the swab comes off clean. Wipe off any excess cleaning fluid with a dry swab.

Cleaning the Pinch Roller

Clean the pinch roller at least once each day the deck is used. Use a good rubber cleaner.

1. Push up the transport protection lever as illustrated above. Press PLAY key to engage the pinch roller and capstan shaft, while holding the protection lever up.



2. Lightly press a cotton swab moistened with rubber cleaner to the pinch roller on the right-hand side of the capstan shaft. This will prevent the swab from becoming entangled. Clean it until there is no visible residue on the pinch roller or coming off onto a clean swab.
3. Using a clean cotton swab, wipe off all excess rubber cleaner from the pinch roller. Make certain that there is no foreign matter remaining on either the pinch roller or the capstan shaft.

Cleaning the Capstan Shaft

After cleaning the pinch roller, clean the capstan shaft. Lightly press a cotton swab moistened with head cleaning fluid to the rotating capstan shaft.

DEGAUSSING (DEMAGNETIZING)

A little stray magnetism can become quite a big nuisance in tape recording. It only takes a small amount (.2 Gauss) to cause trouble on the record head. Playing 10 cassettes will put about that much charge on the heads. A little more than that (.7 Gauss) will start to erase high frequency signals on previously recorded tapes. You can see that it's worth taking the trouble to degauss regularly.

DEGAUSSING IS ALWAYS DONE WITH THE RECORDER TURNED OFF. If you try it with the electronics on, the current pulses produced by the degausser will look just like audio signals to the heads. These pulses are around 10,000 Gauss, and will seriously damage the electronics and/or meters. Turn off your 688, then turn on the degausser at least 1 m (3 ft.) away from the recorder.

Be certain that your degausser has either a plastic cover or plastic tape covering the tip. Make sure that no metal ever touches the tape heads as it will scar them and ruin them.

Slowly move in to the tape path. Move the degausser slowly back and forth, touching lightly all metal parts in the tape path. Slowly move it away again to at least 1 m (3 ft.) from the recorder before turning it off.

Be sure to concentrate while you are degaussing. Don't try to hold a conversation or think of anything else but the job you are doing. If the degausser is turned on or off by accident while it is near the heads, you may put a permanent magnetic charge on them that no amount of careful degaussing will remove. You will have to get the heads replaced. Make sure you are wide awake for this job.

A clean and properly demagnetized tape recorder will maintain its performance without any other attention for quite a while. It won't ruin previously recorded material, nor will getting it back to original specifications be difficult.

CLEANING THE SURFACE OF THE 688

If the surface of the unit gets dirty, wipe the surface with a soft cloth or use a diluted neutral cleaning fluid.

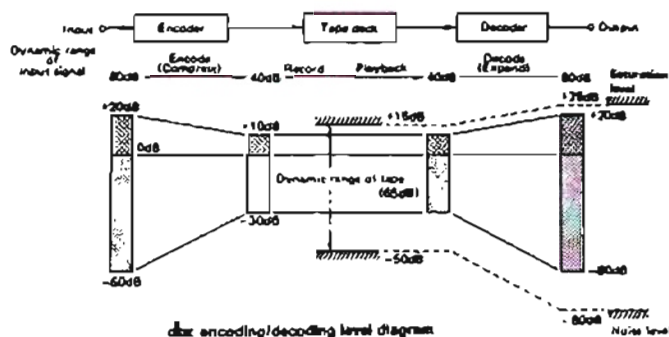
CAUTION: Do not use thinner, benzine, or alcohol, as they may damage the surface of the unit!

How the dbx works

The DBX® is a wide-band compression-expansion system which provides a net noise reduction (broadband, not just hiss) of a little more than 30 dB. In addition, the compression during recording permits a net gain in tape headroom of about 10 dB.

A compression factor of 2:1 is used before recording; then, 1:2 expansion on reproduce. These compression and expansion factors are linear in decibels and allow the system to produce tape recordings with over a 90 dB dynamic range — an important feature, especially when you're making live recordings. The DBX employs RMS level sensors to eliminate compressor-expander tracking errors due to phase shifts in the tape recorder, and provides excellent transient tracking capabilities.

To achieve a large reduction in audible tape hiss, without danger of overload or high-frequency self-erasure on the tape, frequency pre-emphasis and de-emphasis are added to the signal and RMS level sensors.



SUBSONICS AND INTERFERENCE

The DBX incorporates an effective bandpass filter. This filter suppresses undesirable subsonic frequencies to keep them from introducing errors into the encode or decode process. However, if rumble from trains or trucks is picked up by your microphone and fed to the DBX, modulation of the program material during low level passages may occur. This low-frequency component will not itself be passed through the recorder and so, will not be present at reproduce for proper decoding. If this low-level decoding error is encountered, and subsonics are suspected, we suggest the addition of a suitable high-pass filter in the Microphone Line.

Specifications

MECHANICAL CHARACTERISTICS

Tape:	Compact Cassette (C-30 to 90), High-Bias (Type II, CrO ₂)
Track Format:	8-track/8-channel, single directional record/play
Head Configuration:	8-channel record/play (sandust) x 1 8-channel erase (ferrite) x 1
Motor:	DC servo capstan motor x 1 DC reel motor x 1 DC ancillary motor x 1
Tape Speed:	9.5 cm/sec. (3-3/4 ips), ± 1.0%
Pitch Control:	± 12 % (approx.)
Wow and Flutter:	0.04% WRMS, ± 0.06 % W.Peak
Fast Winding Time:	85 sec. (approx.) with C-60
Dimension (WxHxD):	608 x 147.6 x 551 mm (23-15/16" x 5-13/16" x 21-11/16")
Weight:	17.5 kg (38-9/16 lbs.)

ELECTRICAL CHARACTERISTICS

Mixer Section

MIC (LINE A) Input (XLR Balanced x 10)

Mic Impedance:	Less than 600 ohms
Input Impedance:	2.8k ohms
Nominal Input Level:	-60 dBV (1 mV) at Trim Max. to -20 dBV (0.1 V) at Trim Min.
Maximum Input Level:	+2 dBV (1.26 V) at Trim Min.

LINE B Input (1/4" phone jack x 10)

Input Impedance:	20k ohms
Nominal Input Level:	-10 dBV (0.3 V)
Maximum Input Level:	+12 dBV (4.0 V)

INSERT (1/4" TRS phone jack x 10)

-Send (Tip)-

Output Impedance:	100 ohms
Nominal Load Impedance:	10k ohms
Minimum Load Impedance:	2k ohms
Nominal Output Level:	-10 dBV (0.3 V)
Maximum Output Level:	+10 dBV (3.0 V)

-Receive (Ring)-

Input Impedance:	5k ohms
Nominal Input Level:	-10 dBV (0.3 V)
Maximum Input Level:	+10 dBV (3.0 V)

EFFECT RETURN (1/4" phone jack x 8)

Input Impedance:	20k ohms
Nominal Input Level:	-10 dBV (0.3 V)
Maximum Input Level:	+10 dBV (3.0 V)

GROUP OUT (RCA jack x 8)

Output Impedance:	100 ohms
Nominal Load Impedance:	10k ohms
Minimum Load Impedance:	2k ohms
Nominal Output Level:	-10 dBV (0.3 V)
Maximum Output Level:	+10 dBV (3.0 V)

AUX OUT (1/4" phone jack x 2)

Output Impedance:	100 ohms
Nominal Load Impedance:	10k ohms
Minimum Load Impedance:	2k ohms
Nominal Output Level:	-10 dBV (0.3 V)
Maximum Output Level:	+10 dBV (3.0 V)

DUAL OUT (1/4" phone jack x 2)

Output Impedance: 100 ohms
 Nominal Load Impedance: 10k ohms
 Minimum Load Impedance: 2k ohms
 Nominal Output Level: -10 dBV (0.3 V)
 Maximum Output Level: +10 dBV (3.0 V)

MONITOR OUT (RCA jack x 2)

Output Impedance: 100 ohms
 Nominal Load Impedance: 10k ohms
 Minimum Load Impedance: 2k ohms
 Nominal Output Level: -10 dBV (0.3 V)
 Maximum Output Level: +10 dBV (3.0 V)

PHONES OUT (1/4" stereo phone jack x 2)

Nominal Load Impedance: 8 ohms
 Maximum Output Level: 100 mW + 100 mW (at 8 ohms)

EQUALIZER

HIGH (Shelving): 10 kHz, ± 12 dB
 MID (Peaking): 250 Hz to 5 kHz, sweepable, ± 16 dB
 LOW (Shelving): 100 Hz, ± 12 dB

Recorder Section

Record/Playback Channel: 8 in number
 Noise Reduction: bx NR (ch.1-4 and 5-8 switchable separately; ch 8 disconnected from NR as long as the SYNC switch is ON)

**TAPE OUT (RCA jack x 8) /
EXT SYNC OUT (RCA jack x 1)**

Output Impedance: 100 ohms
 Nominal Load Impedance: 10k ohms
 Minimum Load Impedance: 2k ohms
 Nominal Output Level: -10 dBV (0.3 V)

EXT SYNC IN (RCA jack x 1)

Input Impedance: 10k ohms
 Nominal Input Level: -10 dBV (0.3 V)
 Minimum Input Level: -16 dBV (0.15 V)

Others**Power Requirements**

USA/CANADA: 120 V AC, 60 Hz
 U.K./AUSTRALIA: 240 V AC, 50 Hz
 EUROPE: 220 V AC, 50 Hz
 General Export: 120/220/240V AC, 50/60 Hz

Power Consumption: 65 W

TYPICAL PERFORMANCES**Mixer Section**

Frequency Response: 20 Hz to 20 kHz, $\pm 1/2$ dB
 Signal-to-Noise Ratio: UNWTD(20 Hz to 20 kHz)/HF A WTD
 (at Nominal Input Level)

10 MICs* to GROUP OUT 60 dB/62 dB
 1 MIC* to GROUP OUT 69 dB/74 dB
 10 LINE B_s to GROUP OUT 71 dB/72 dB
 1 LINE B to GROUP OUT 71 dB/78 dB

(* = at Trim Max.)

Total Harmonic Distortion (THD)

1 MIC to GROUP OUT 0.06% (at 1 kHz, -40dBV input level at Trim Max, with 30 kHz low-pass filter inserted)
 1 LINE to GROUP OUT 0.04% (at 1 kHz, nominal input level)

Crosstalk: 60 dB (at 1 kHz)

Recorder Section

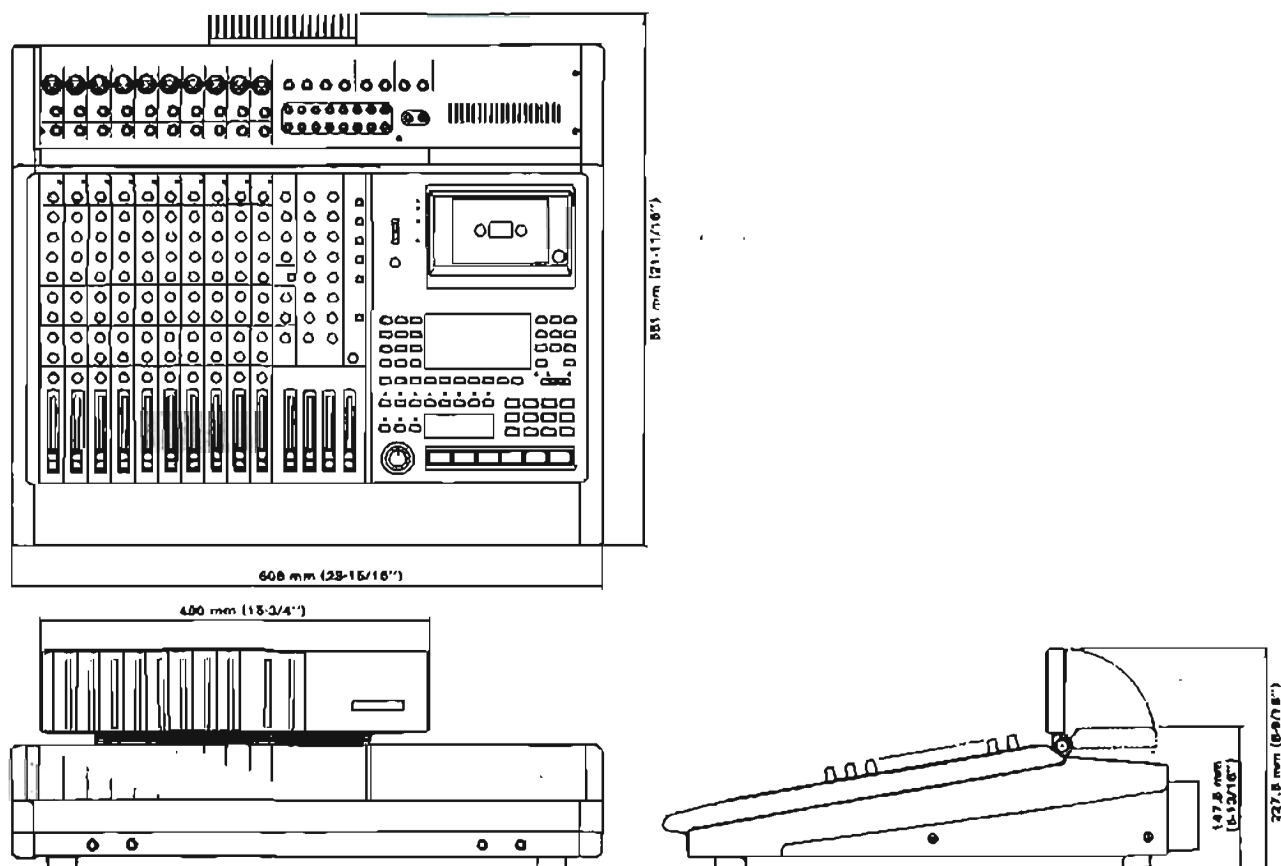
Frequency Response (overall): 40 Hz to 16 kHz, ± 3 dB (dbx NR out)
Signal-to-Noise Ratio: UNWTD(20 Hz to 20 kHz)/IHF A WTD
(overall, ref to 3% THD) 55 dB/58 dB (dbx NR out)
90 dB/93 dB (dbx NR in)
Total Harmonic Distortion (THD): 1.0% (at 400 Hz, 0 dB, dbx NR in)
Crosstalk (adjacent channels): 70 dB (at 1 kHz, 0 dB, dbx NR in)
50 dB (at 1 kHz, 0 dB, dbx NR out)
70 dB (at 1 kHz, +10 dB)
Erasure: 70 dB (at 1 kHz, +10 dB)

In these specifications, 0 dBV is referenced to 1.0 Volt rms. Actual voltage levels are also given in parentheses. To calculate the 0 dB \rightarrow 0.775 Volt reference level (i.e., 0 dBu or 0 dBm in a 600 ohm circuit) add 2.2 dB to the listed dBV value. (i.e., 0 dBV = +1.0 Volt = +2.2 dBm)

Changes in specifications and features may be made without notice or obligation.

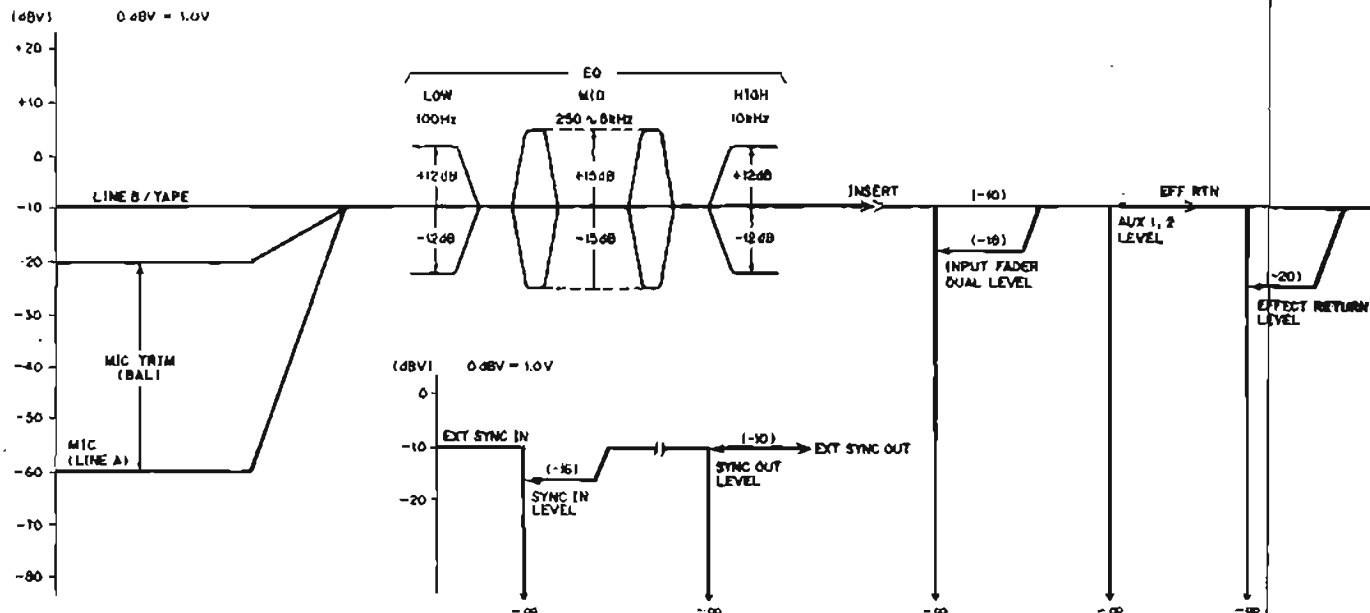
dbx is a registered trademark of dbx Incorporated.

Dimensions

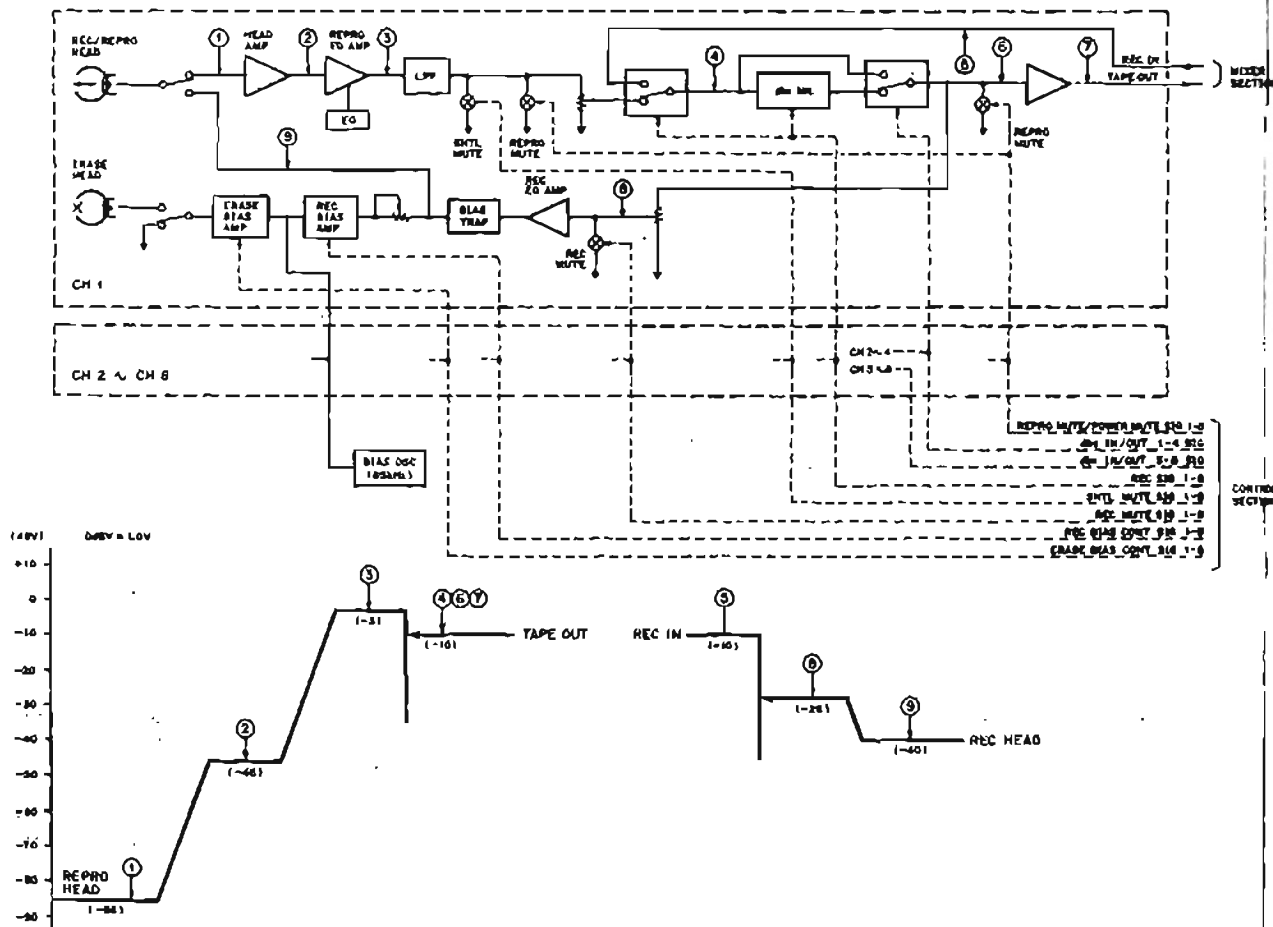


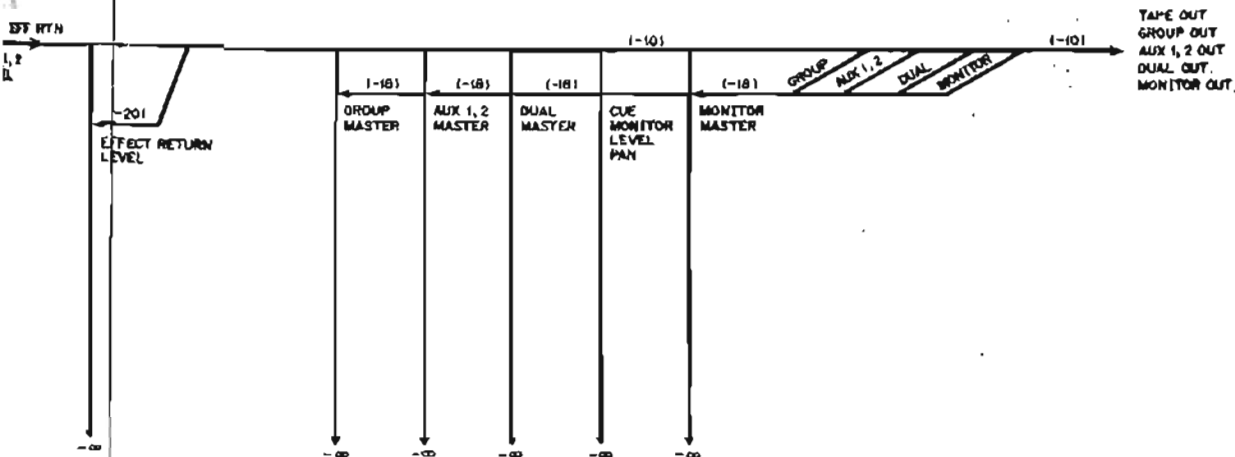
Level Diagram

MIXER SECTION

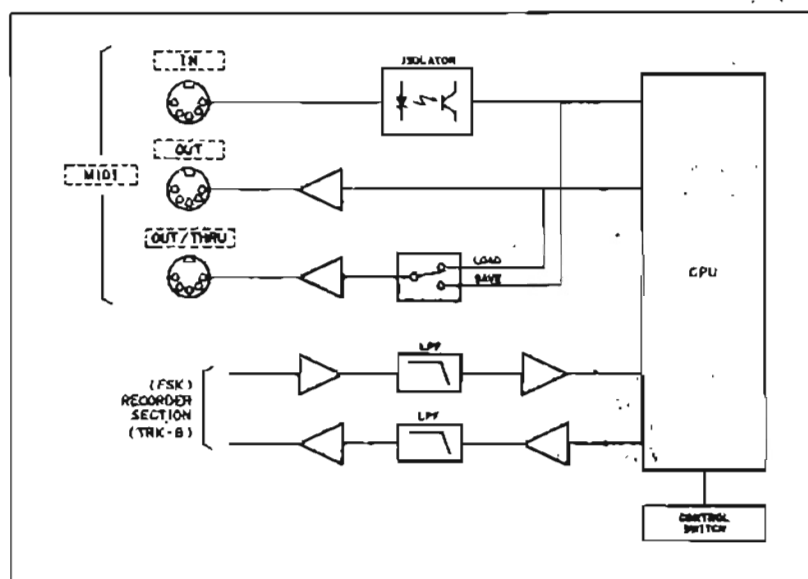


RECORDER SECTION





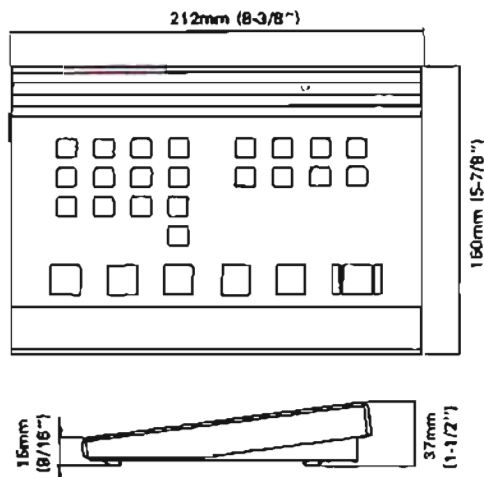
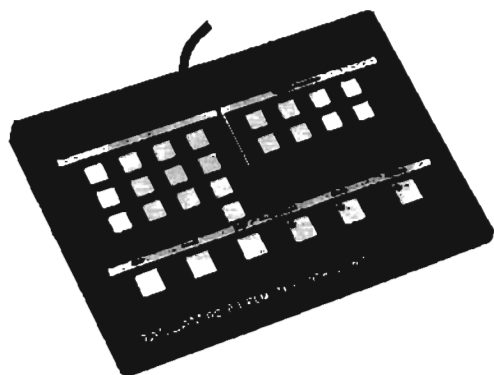
MIDI BLOCK DIAGRAM



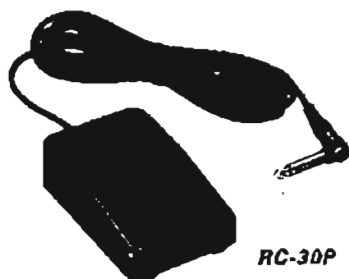
Optional Accessories

RC-88 Remote Control Unit

The RC-88 has duplicates of the rehearsal/auto punch-in and autolocator controls and the monitor mode INSERT in addition to the basic transport controls. The cable length is 5 m (15 ft).



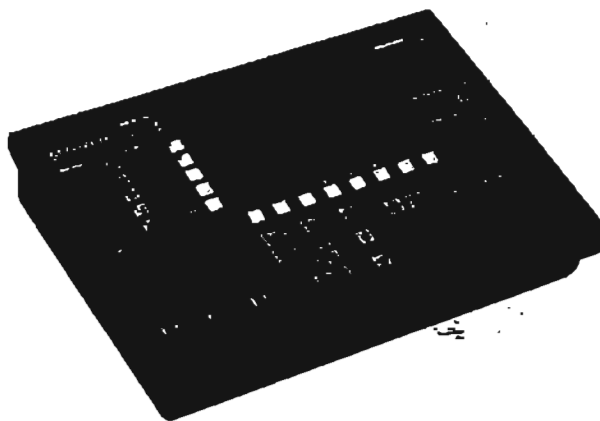
RC-60P/RC-30P Remote Footswitch



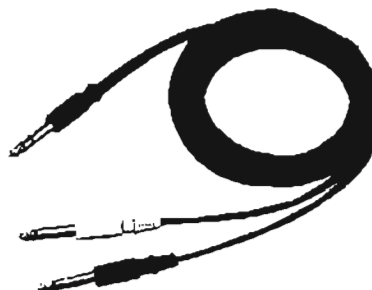
The RC-60P has double function and controls both the scene displays and, as with the RC-30P, punch-in/out operations.

MIDIIZER

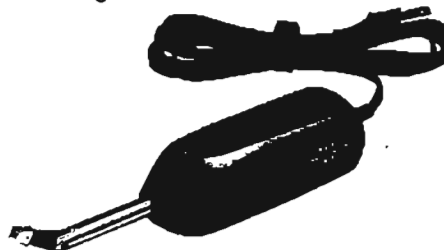
The MIDIIZER is a "Multi-Synchronizer" containing a SMPTE tape transport synchronizer combined with a MIDI-to-SMPTE synchronizer in a single low-cost unit. It is used to make different machines -- in this case tape transports and MIDI sequencers or rhythm units -- play at exactly the same rate of speed, from any desired starting point. This is called "chase-lock" capability. When the MIDIIZER is connected to these other units, it becomes the all-in-one master controller for the system.



PW-2Y (2 m) / PW-4Y (4 m) Insertion Cable



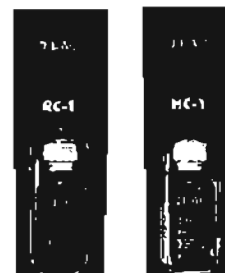
Head Demagnetizer



TZ-261 Cleaning Kit (Except U.S.)



HC-1 Head Cleaner & RC-1 Rubber Cleaner (U.S. only)



MIDI Implementation Chart

Model 688

Date : 89.06.01

Version : 1.0

Function		Transmitted	Recognized	Remarks
Basic Channel	Default	1-16	1-16	memorized trans./recog. on common ch
	Changed	1-16	1-16	
Mode	Default	x	x	memorized OMNI On/Off
	Messages Altered	x	x	
Note Number : True Voice		36-45	36-45	
			x	
Velocity	Note ON	○ 9nH, v=32, 96	○ v=1-127	enable On/Off memorized
	Note OFF	○ 9nH, v=00	x	
After Touch	Key's	x	x	
	Ch's	x	x	
Pitch Bender		x	x	
Control Change		x	x	
Prog Change : True #		○	○	Scene No=1-99 (PGM No=0-98)
			00-98	
System Exclusive		○	○	SCENE DATA
System Common	: Song Pos	○	x	
	: Song Sel	x	x	
	: Tune	x	x	
System Real Time	: Clock	○	○	*Continue not recognized
	: Commands	○	○*	
Aux Messages	: Local ON/OFF	x	x	
	: All Notes Off	x	x	
	: Active Sense	x	x	
	: Reset	x	x	
Notes				

Mode 1 : OMNI ON, POLY
Mode 3 : OMNI OFF, POLY

Mode 2 : OMNI ON, MONO
Mode 4 : OMNI OFF, MONO

○ : Yes
x : No

Factory Preset Scenes

Scenes 01-08: "Tracking/Overdubbing"

The first eight scenes are very similar to each other: the XLR MIC jacks are the INPUTs of MAIN channels 1-10, and the 1/4" LINE jacks are the INPUTs of DUAL channels 11-20. Each scene sends all these inputs to its own GROUP: Scene 01 assigns everything to Group 1, Scene 02 to Group 2, etc. Only the ASSIGN and LINK status changes from scene to scene.

01 Assign Main Page

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

01

DUAL-GRP GRP 1-2

02

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GRP	GRP 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

02

DUAL-GRP GRP 1-2

01 Assign Effect Page

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFFECT	GRP 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

01

DUAL-GRP GRP 1-2

02

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	POST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	POST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

02

DUAL-GRP GRP 1-2

01 Input Page

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	POST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	POST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

01

DUAL-GRP GRP 1-2

03

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

03

DUAL-GRP GRP 1-2

02

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

02

DUAL-GRP GRP 1-2

03

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GRP	GRP 1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1 2 3 4 5 6 7 8 9 10											

03

DUAL-GRP GRP 1-2

03

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUAL	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

03

DUAL-GRP
GRP 3-4

05

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

05

DUAL-GRP
GRP 5-6

04

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

04

DUAL-GRP
GRP 3-4

05

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFF	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

05

DUAL-GRP
GRP 5-6

04

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFF	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

04

DUAL-GRP
GRP 3-4

05

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUAL	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

05

DUAL-GRP
GRP 5-6

04

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUAL	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

04

DUAL-GRP
GRP 3-4

06

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

06

DUAL-GRP
GRP 5-6

06

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFFECT	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
06											
DUAL-GRP											
GRP 9-10											

07

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUAL	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07											
DUAL-GRP											
GRP 7-8											

06

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUAL	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
06											
DUAL-GRP											
GRP 9-10											

08

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
08											
DUAL-GRP											
GRP 7-8											

07

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07											
DUAL-GRP											
GRP 7-8											

08

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFFECT	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
08											
DUAL-GRP											
GRP 7-8											

07

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
EFFECT	GRP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	GRP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
07											
DUAL-GRP											
GRP 7-8											

08

CHANNEL		1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MAIN	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DUAL	MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
08											
DUAL-GRP											
GRP 7-8											

Scene 09: Bouncing onto Tracks 7 and 8

This scene allows you to re-record ("bounce") tracks 1-6 onto tracks 7 and 8, while adding up to 14 "live" sources: four MICs through MAIN channels 7-10, ten LINES through the DUAL section. Note the "stereo effect return" of the ASSIGN EFF page.

09 Assign Main Page

CHANNEL	1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 2 3 4 5 6 7 8 9 10

Scene 10: Feeding 8 Tracks with Separate Inputs

This scene allows you to record 8 tracks at once, each with its own MIC input (MIC 1 on track 1, MIC 2 on track 2, etc.) In addition, tracks 1 and 2 receive extra MIC inputs from MAIN channels 9 and 10. The DUAL section source is LINE, and it can be used to monitor "virtual" tracks without recording them, since in this scene DUAL LINKs are OFF.

10

CHANNEL	1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 2 3 4 5 6 7 8 9 10

09 Assign Effect Page

CHANNEL	1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 2 3 4 5 6 7 8 9 10

10

CHANNEL	1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 7	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GROUP 8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 2 3 4 5 6 7 8 9 10

09 Input Page

CHANNEL	1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 2 3 4 5 6 7 8 9 10

10

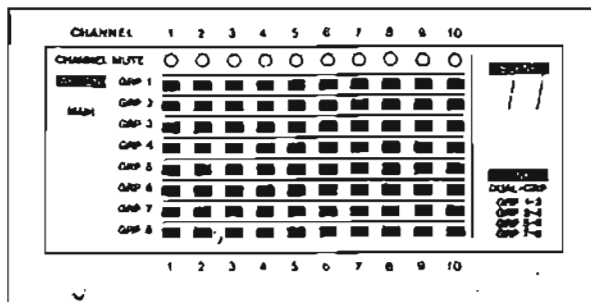
CHANNEL	1	2	3	4	5	6	7	8	9	10
CHANNEL MUTE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MIC	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LINE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TAPE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
POST	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1 2 3 4 5 6 7 8 9 10

Scene 11: Assignments to All Groups

This scene allows every input to be sent to all tracks at once. It is useful for "slating" or putting test tones on a tape. It can also be used instead of Scenes 1-8 for tracking. Simply MUTE or lower the fader of unused channels, and press the RECORD FUNCTION switch of the track you are currently recording. See p. 19.

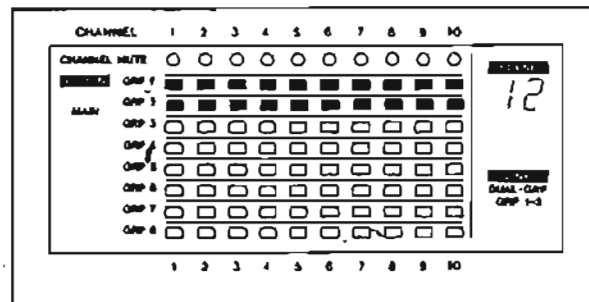
11



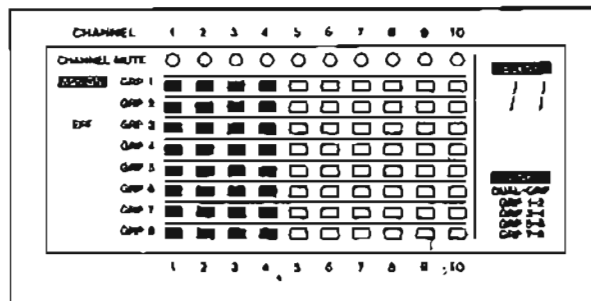
Scene 12: Mixdown

This scene is for final stereo mixdown to an external 2-track via Groups 1 and 2. The multitrack TAPE appears on the first 8 MAIN channels, and the DUAL mix is LINKED so LINE inputs (typically, MIDI virtual tracks or extra effect returns) can be added to the mix. Note the use of stereo pairs in the EFFECT RETURNS.

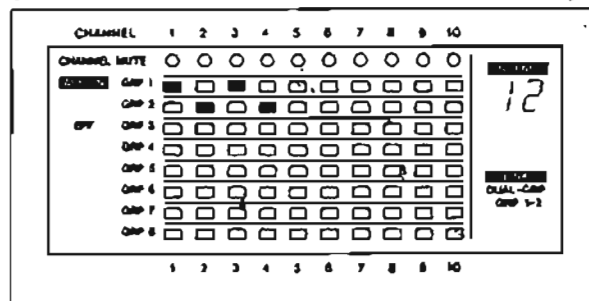
12



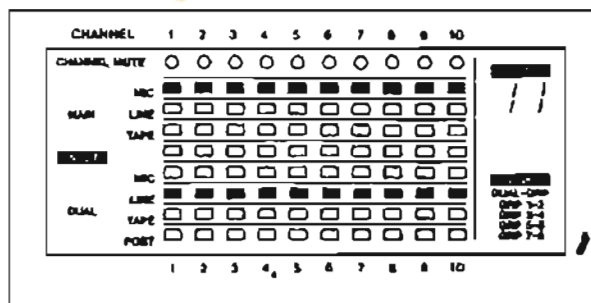
11



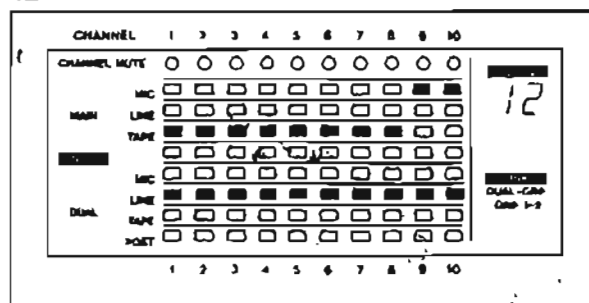
12



11



12



TASCAM

TEAC Professional Division

688

MIDISTUDIO

TEAC CORPORATION	Musashino Center Bldg., 1-19-18, Nakacho, Musashino-shi, Tokyo 180, Japan Phone: (0422) 52-5081
TEAC AMERICA, INC.	7733 Telegraph Road, Montebello, California 90640 Phone: (213) 726-0303
TEAC CANADA LTD.	340 Brunel RD, Mississauga, Ontario L4Z 2C2, Canada Phone: 416-890-8008
TEAC UK LIMITED	5 Marlin House, Marlin Meadow, The Croyley Centre, Watford, Herts, WD1 8YA, U.K. Phone: 0823-225235
TEAC DEUTSCHLAND GmbH	Bahnstrasse 12, 6200 Wiesbaden-Erbenheim, West Germany Phone: 06121-71580
TEAC FRANCE S.A.	17, Rue Alexis-de-Tocqueville CE 005 92182 Antony Cedex, France Phone: (1) 42.37.01.02
TEAC AUSTRALIA PTY., LTD.	106 Bay Street, Port Melbourne Victoria 3207, Australia Phone: (03) 646-1793

PRINTED IN JAPAN 0891U1-M-02276