

# Owner's Manual

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# Model 280

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MULTITRACKER

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**Fostex**



**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.

### "WARNING"

" TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK,  
DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOIS-  
TURE."

## SAFETY INSTRUCTIONS

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, and the like.
6. **Carts and Stands** — The appliance should be used only with a cart or stand that is recommended by the manufacturer.
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. **Nonuse Periods** — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
15. **Object and Liquid Entry** — Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
16. **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.
17. **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.



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.

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## SECTION 1. INTRODUCTION

Thank you for purchasing the Fostex Model 280 Multitracker. With proper use and maintenance it should give you years of satisfactory performance.

Model 280 consists of an 8-input mixer (4 mic/line and 4 line) combined with a high quality, high speed 4-track cassette recorder with built-in Dolby C noise reduction.

You can perform all of the standard multitrack recording techniques, such as overdubbing, punch-in/out recordings and ping-pong recordings. In addition, multiple effects processing is available with two AUX sends and stereo receive circuits. Sophisticated transport operation in the form of a 2-point memory system with automatic locate and automatic punch-in/out is at your fingertips.

Finally, the optional MTC-1 lets you control the Model 280 with MIDI sequencers, thus allowing you to run multiple musical instruments and signal sources simultaneously.

Please take the time to read this manual so that you are thoroughly acquainted with the proper operational and maintenance procedures.

## SAFETY PRECAUTIONS

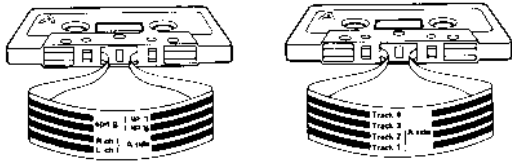
- The AC adaptor supplied is interconnected between the house AC outlet and the AC Adaptor Jack of this unit. This adaptor can be used on both 50 and 60 Hertz without any change. Absolutely do not use an AC adaptor of another manufacturer. If this adaptor is to be used in an area of different voltage, consult your nearest Fostex dealer or the main office Service Department.
- When disconnecting the AC adaptor from the AC outlet, always grasp the AC plug itself to pull out. It can break the internal wire if the cord is pulled directly.
- Do not plug in or out the AC adaptor with wet hands. You could receive an electric shock.
- It is dangerous to continue using a cord with worn insulation. Stop using it if the cord is damaged.
- Do not open the case and touch anything inside. There is danger of receiving an electric shock if you do. It could also harm the unit.
- Be careful not to allow any water, liquids or metal objects such as a hair pin to get inside. It could result in electric shock.  
If water, etc. should accidentally get inside, immediately pull out the AC adaptor from the outlet and contact your nearest Fostex dealer or service station.
- Be sure to switch on this unit first before switching on power to the other equipment to avoid damaging them. Also, when the input and output plugs are to be plugged in or out of this recorder, be sure the input volume control of that channel or buss, is set to "0".

## SECTION 2. BEFORE OPERATING THE MODEL 280

There are a few important considerations which you should be aware of before you attempt to operate the Model 280:

### 1. Recording Format.

Standard cassette recorders record up to two tracks at a time; two in one direction (Side A) and two in the opposite direction (Side B). As shown in the diagram below, the multi-track format allows recording of up to four tracks in the same direction. After completing a multitrack tape on your 280, remove both cassette tabs to prevent accidental erasure or re-recordings.



Standard Cassette Deck

Model 280

### 2. Tape Speed.

Standard cassette recorders record and play back at 1-7/8 ips (inches per second). The model 280 records and plays back at 3-3/4 ips—twice the speed for better fidelity. Thus a C-90 will yield 22.5 minutes of recording time; a C-60, 15 minutes, and a C-30, 7.5 minutes.

### 3. Type of Tape.

Use High Bias (CrO<sub>2</sub>, Type II) tapes ONLY. We recommend Maxell UD-XL2 or TDK SA or the equivalent—always look for the 70  $\mu$ sec EQ designation.

NEVER USE: (1) C-120 type tapes of any kind because the tape is too thin to withstand the rigors of multitrack recording; (2) metal tape

### 4. Impedance.

All electronic devices have a characteristic called impedance which refers to resistance in the circuit(s). The unit of measurement is stated in Ohms ( $\Omega$ ). In general, input impedance should be about ten times higher than output impedance. When connecting other equipment to the 280, check to see that there is an impedance match (specifically with microphones); if a mis-match occurs, anything from sound deterioration to serious damage could result.

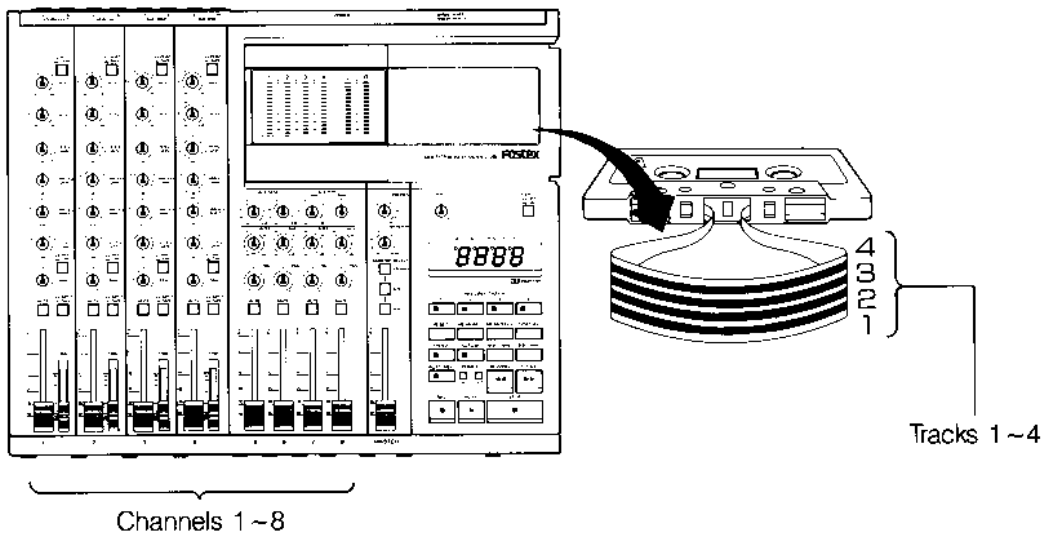
**NOTE:** You'll find that most "outboard" gear available today and most musical instruments can be connected to your 280 readily and without worry.

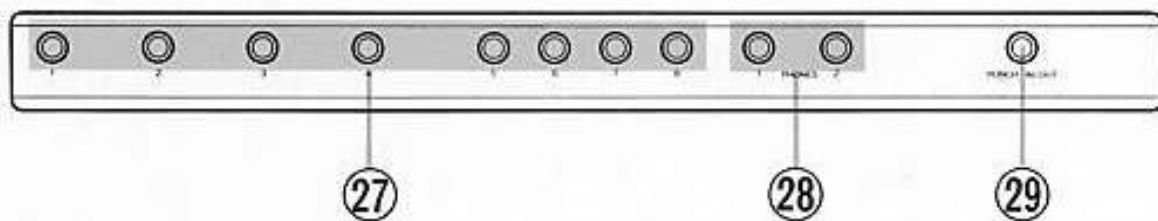
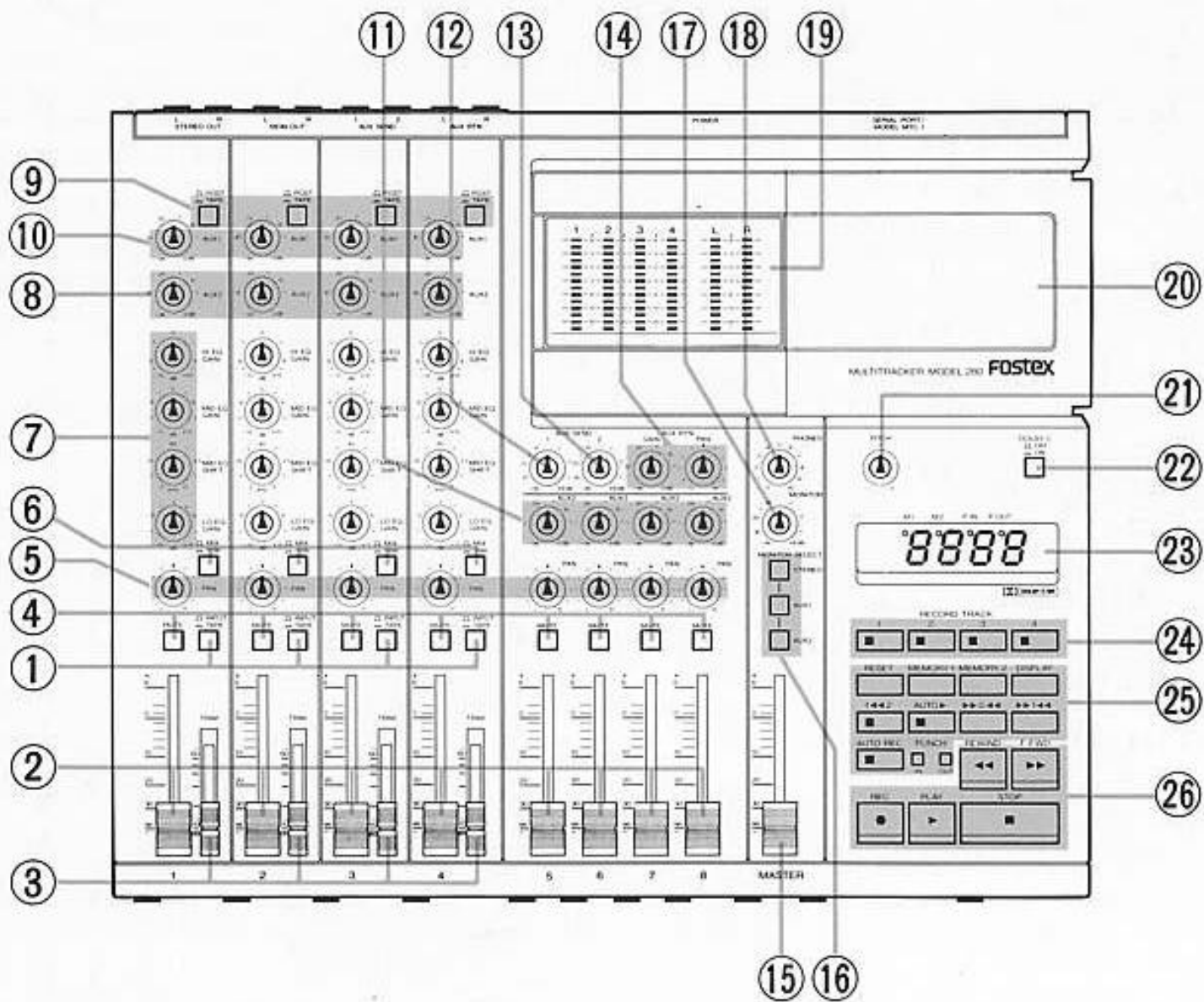
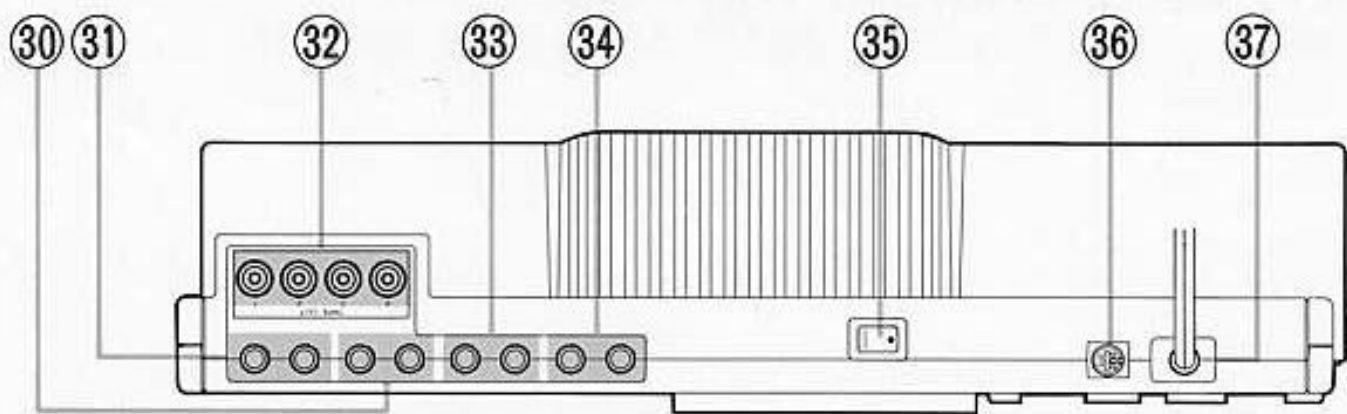
The main exception is electric guitars, just because there is such a wide variety of design, plus the tendency to customize stock designs for a "hotter sound." Thus in some cases, a "direct box" will be necessary. Never plug anything rated in watts (W) directly to a 280 input.

### 5. The difference between track and channel.

"Track" refers to a physical space on the cassette tape (1 ~ 4); "channel" refers to a signal pathway through the mixer (1 ~ 8), as shown in the diagram below.

#### The difference between track and channel.





## SECTION 3. THE CONTROLS AND CONNECTIONS: WHERE THEY ARE AND HOW THEY WORK.

(The names and numbers in parentheses are as they will be referenced throughout this manual.)

### 1. INPUT SELECTOR (INPUT SELECTOR (1))

This button selects the signal source to be "fed" to channels 1~4.

**INPUT:** Whatever signal source is connected to the respective INPUT jack (27)—microphone, musical instrument, etc.—will be active.

**TAPE:** Track outputs from the recorder are wired to successive channel inputs. Thus Track 1 to Channel 1, Track 2 to Channel 2, etc.

### 2. INPUT FADER (INPUT FADER (2))

This slide control adjusts the overall gain of the selected signal source (1).

### 3. INPUT TRIM (TRIM (3))

This smaller slide control allows you to "fine tune" the gain for the selected signal source on inputs 1~4. The higher settings (-60) are for low level sources such as microphones; the lower settings (-10) are for line level sources such as a drum machine, electronic keyboard, etc.

**NOTE:** When the INPUT selector (1) is set to TAPE, this control is not in the circuit.

### 4. MUTE CONTROL (MUTE (4))

When this button is pressed, the active signal source for that channel is muted (no sound). This control is helpful for concentrating on one or more signal sources without disrupting fader (2) and trim (3) settings for the channel(s) you wish not to hear. Press again to release the mute function.

### 5. CHANNEL PAN CONTROL (PAN (5))

This rotary control positions the left/center/right image of that signal source as applied to the stereo bus (see "The Stereo Bus" on page 17).

**NOTE:** If the MIX/TRK selector (6) on channels 1~4 has been set to TRK, this control is not in the circuit. On channels 5~8, it is always active.

### 6. MIX/TRACK SELECTOR (MIX/TRK SELECTOR (6))

This button determines the routing path of the signal source.

**MIX:** signal sources of channels 1~4 are sent to the stereo bus in accordance with the setting(s) of the PAN control(s) (5).

**TRK:** signal sources of channels 1~4 are sent to directly to the corresponding tracks 1~4 of the recorder.

**NOTE:** If the INPUT selector (1) is set to TAPE, only the MIX position of this control is operative—thus avoiding the potential for a feedback loop.

### 7. EQUALIZER (EQ (7))

Three bands of equalization (tone control) are provided for channels 1~4.

The HI EQ control is fixed at 10kHz.

The MID EQ control (SHIFT) is sweepable from 200Hz—5kHz.

The LO EQ control is fixed at 100Hz.

All three gain controls are continuously variable  $\pm 15$ dB; full counterclockwise is maximum cut; full clockwise is maximum boost. The center position is flat.

### 8. AUX 2 SEND CONTROL (AUX 2 (8))

This rotary control adjusts the amount of post-fader gain for the corresponding active input signal to be sent to a signal processor. This is an independent mono bus for all input channels (1~8) with a master send level control (13).

### 9. AUX 1 SELECTOR (AUX 1 SELECTOR (9))

This button selects the status of the AUX 1 send signal.

**POST:** The post-fader signal of the corresponding active input.

**TAPE:** The playback signals of tracks 1~4 are wired to channels 1~4.

### 10. AUX 1 SEND CONTROL (AUX 1 (10))

This rotary control adjusts the amount of gain for the selected signal to be sent to a signal processor. This is an independent mono bus for inputs 1~4 with a master send level control (12).

### 11. AUX 2 SEND CONTROL (AUX 2 (11))

Same function as (8) above, for channels 5~8.

### 12. AUX 1 SEND MASTER (AUX 1 MASTER (12))

Adjusts overall gain for the AUX 1 bus—channels 1~4—a mono mix which is present at the AUX SEND 1 output jack (33).

### 13. AUX 2 SEND MASTER (AUX 2 MASTER (13))

Adjusts overall gain for the AUX 2 bus—channels 1~8—a mono mix which is present at the AUX SEND 2 output jack (33).

### 14. AUX RETURN CONTROLS (AUX RTN (14))

These controls adjust the status of the return signal(s) from the signal processing unit(s) to the stereo bus.

**GAIN:** Adjusts the overall gain of the return signal(s).

**PAN:** This control has a dual function, depending on how the effects return signal(s) are patched to the input jacks (34).

•When a mono return signal is patched to either L or R, this control functions as a normal pan pot, allowing you to position the return signal from left to center to right onto the stereo bus.

•When either a stereo signal or two mono signals are patched to both L and R, this control adjusts the relative balance between them onto the stereo bus. Additional adjustments on the signal processor's output controls may be necessary to achieve the desired effect.

### 15. STEREO MASTER FADER (MASTER FADER (15))

This ganged slide control adjusts the overall output level of the stereo bus—the signals present at the STEREO OUT jacks (31).

### 16. MONITOR SELECTOR (MONITOR SELECT (16))

These selector buttons determine the status of the signals present at the MON OUT jacks (30) and the PHONES jacks (28), which are wired in parallel but have independent level controls.

**STEREO:** The stereo mix present at the STEREO OUT jacks (31) is heard.

**AUX 1:** The mono mix present at the Aux 1 Send jack (33) is heard.

**AUX 2:** The mono mix present at the Aux 2 Send jack (33) is heard.

**NOTE:** Typically, you'll want to monitor only one bus at a time—STEREO for mixdown, AUX 1 for recording and AUX 2 for overall effects send. But special circumstances may call for the ability to hear two or even all three signals simultaneously—which you can do with the 280.

### 17. MONITOR LEVEL CONTROL (MONITOR (17))

Adjusts the overall output level of the selected signal(s) on the monitor bus, present at the MON OUT jacks (30).

**NOTE:** Do not confuse the monitor level with the record level. You can set the monitor level almost wherever you wish, depending on the size of your room, the efficiency of your loudspeakers and your hearing perception. The record level (signals being sent to the recorder) should be set as close as possible to average zero meter readings—too low and you'll have a lot of hiss, too high and you'll have a lot of distortion.

### 18. HEADPHONES LEVEL CONTROL (PHONES (18))

Adjusts the overall output level of the selected signal(s) on the monitor bus, present at both PHONES jacks (28).

### 19. LED BARGRAPH METER (METER (19))

14-point Led bargraph meters indicate levels from -20 to +6. Meters 1~4 correspond to tracks 1~4; L and R correspond to the stereo bus.

### 20. CASSETTE TRANSPORT (TRANSPORT (20))

The compact cassette is loaded here.

### 21. PITCH CONTROL (PITCH (21))

Tape speed can be adjusted from +12% to -12%; 0 is 3-3/4 ips.

### 22. NOISE REDUCTION SWITCH (DOLBY C NR (22))

For best sonic results keep this switch ON during normal operation. The OFF position is for calibration and alignment. You do not need to turn off the Dolby NR when recording SMPTE time code or sync-to-tape signals from sequencers/drum machines.

### 23. MEMORY/COUNTER DISPLAY (DISPLAY (23))

This numerical display has five functions depending on the status of the LEDs to the upper left of the four digits:

**M 1 ONLY ON:** indicates position of Memory Point 1.

**M 2 ONLY ON:** indicates position of Memory Point 2.

**P. IN ONLY ON:** indicates auto punch-in point.

**P. OUT ONLY ON:** indicates auto punch-out point.

**ALL FOUR OFF:** functions as tape counter.

### 24. RECORD TRACK SELECTOR (RECORD TRACK (24))

These buttons select the track(s) to be recorded. When a button is pressed the LED inside blinks to indicate record ready. In this condition, you can alternate between Input Monitor and Tape Monitor each time the RECORD button (26) is pressed when the transport is in the STOP mode. (See "Input Monitor" on page 7.) Press the RECORD button (26) and the PLAY button (26) simultaneously to enter the record mode, and the blinking LED changes to ON.

**NOTE:** When recording with the stereo bus, L corresponds to tracks 1 and 3; R corresponds to tracks 2 and 4.

### 25. MEMORY/AUTO FUNCTION KEYS (MEMORY/AUTO (25))

Your 280 is capable of sophisticated transport programming. You can automatically locate the 0 point, shuttle between Memory Points 1 and 2, as well as automatically punch-in and -out. (See "The Locate Function" on page 8 and "Auto Punch-in/out" on page 10 for operational details.)

### 26. TRANSPORT CONTROL BUTTONS (TAPE COMMANDS (26))

In addition to the obvious control commands of Stop, Play, Record, Fast Forward and Fast Rewind, these control buttons have the following functions:

#### •CUEING MODE

When you want to find a specific section on a recorded tape, but don't know exactly where it is, use the cueing mode—slower than fast forward or fast rewind, so you can hear cues that will help you search more efficiently. Press either of the fast wind buttons and the play button simultaneously and hold both down. Release the play button first, then the fast wind button, and the transport will enter the cueing mode in the direction chosen.

While the transport is in motion, each time you press the play button and the fast wind button simultaneously you will alternate between cueing speed and fast wind speed (both of which are fixed).

#### •MANUAL PUNCH-IN/OUT

When the 280 is in the play mode, press the play button and the record button simultaneously to punch-in (at that instant the 280 enters the record mode).

When the 280 is in the record mode, hold down the play button, then quickly tap the stop button to punch-out (at that instant the 280 returns to the play mode).

#### •REC LED

A four function LED has been installed within the Record button to indicate the status of the recorder:

**(1) Red Light ON:** Tracks selected by RECORD TRACK (24) are in the record mode.

**(2) Green Blinking:** Tracks selected by RECORD TRACK (24) are in the Input Monitor mode; non-selected tracks are in the Tape Monitor Mode.

**(3) Green ON:** No tracks have been selected by RECORD TRACK (24); the recorder is in the Record Ready Mode. Engaging a Record Track Selector button in this condition automatically places that track in the record mode and the LED changes to Red ON.

**NOTE:** This procedure is an alternate method of punching-in and -out.

**(4) LED OFF:** No recording, regardless of RECORD TRACK (24) status. All tracks in tape monitor and normal playback mode.

**NOTE:** In this condition, each time the record button is pressed, the 280 alternates between status (2) and status (4).

## **FRONT PANEL SECTION**

### **27. INPUT JACKS (INPUT (27))**

Channels 1~4: Standard 1/4" phone jacks for microphones (-60dBV) or line level signals (-10dBV); adjustable via TRIM (3).

Channels 5~8: Standard 1/4" phone jacks for line level signals (-10dBV) only.

### **28. HEADPHONE JACKS (PHONES (28))**

Two standard 1/4" phone jacks for two sets of stereo headphones.

### **29. PUNCH-IN/OUT JACK (PUNCH (29))**

Optional Fostex Model 8051 Foot Switch is connected here for remote foot control of punch-in/out recordings. The 8051 can also be used to set the punch-in/out points. (See "Auto Punch-in/out Function, page 10).

## **REAR PANEL SECTION**

### **30. MONITOR OUT JACKS (MON OUT (30))**

The signal(s) selected by MONITOR SELECT (16) is present at these standard 1/4" phone jacks. Normally, the amplifier which drives the monitor speakers is connected here.

### **31. STEREO OUT JACKS (STEREO OUT (31))**

The output of the stereo bus is present at these standard 1/4" phone jacks. Normally, these are the line level outputs to the mixdown recorder.

### **32. TAPE OUT JACKS (TAPE OUT (32))**

These standard RCA pin jacks carry the tape playback signals of tracks 1~4 directly (without going through the mixing bus). They may be used as additional sends to an external mixer for monitor cueing for the musicians or for effects processing.

Track 4 may also be used to trigger sequencers for MIDI interface. (See "Tape Sync," page 21).

### **33. AUX SEND JACKS (AUX SEND 1, 2 (33))**

Standard 1/4" phone jacks for the two independent mono mixes which are normally used as effects sends to signal processors such as reverbs, equalizers, etc.

**NOTE:** Since the AUX 1 bus can access the tape playback signals via the POST/TAPE button (9), it may be used as an additional monitor cue for musicians.

### **34. AUX RETURN JACKS (AUX RTN L & R (34))**

Standard 1/4" phone jacks for effects returns or inputs to the stereo bus are of the contact switch type and function as follows:

- When only one input is used, the input signal will be sent to both L and R of the stereo bus.

- When both inputs are used, the L return is routed to stereo bus L and the R return is routed to stereo bus R.

**NOTE:** Gain and Pan are adjusted by AUX RTN (14) on the 280 as well as by the output controls of the devices connected here.

### **35. POWER SWITCH (POWER (35))**

When your 280 is interconnected, make sure the faders and output level controls are in their nominal or minimum positions before turning it on.

### **36. SERIAL PORT (SERIAL (36))**

Connect the Fostex optional MTC-1 here for MIDI interface.

### **37. AC CORD (AC (37))**

Plug into your local power company here.

## **INPUT MONITOR/TAPE MONITOR**

In the multitrack recording process, the ability to select different combinations of input signals yet to be recorded (input monitor) with tape signals which have already been recorded (tape monitor) is often crucial to success.

During the initial recording (basic tracks) the musicians, of course, need to hear themselves play. That monitor/cue feed is straightforward enough. But when the overdubbing process begins, the situation becomes more complicated.

The performing musicians may have monitor/cue requirements which differ from those of the producer and/or recording engineer.

You'll find that the 280 has the built-in flexibility to adapt.



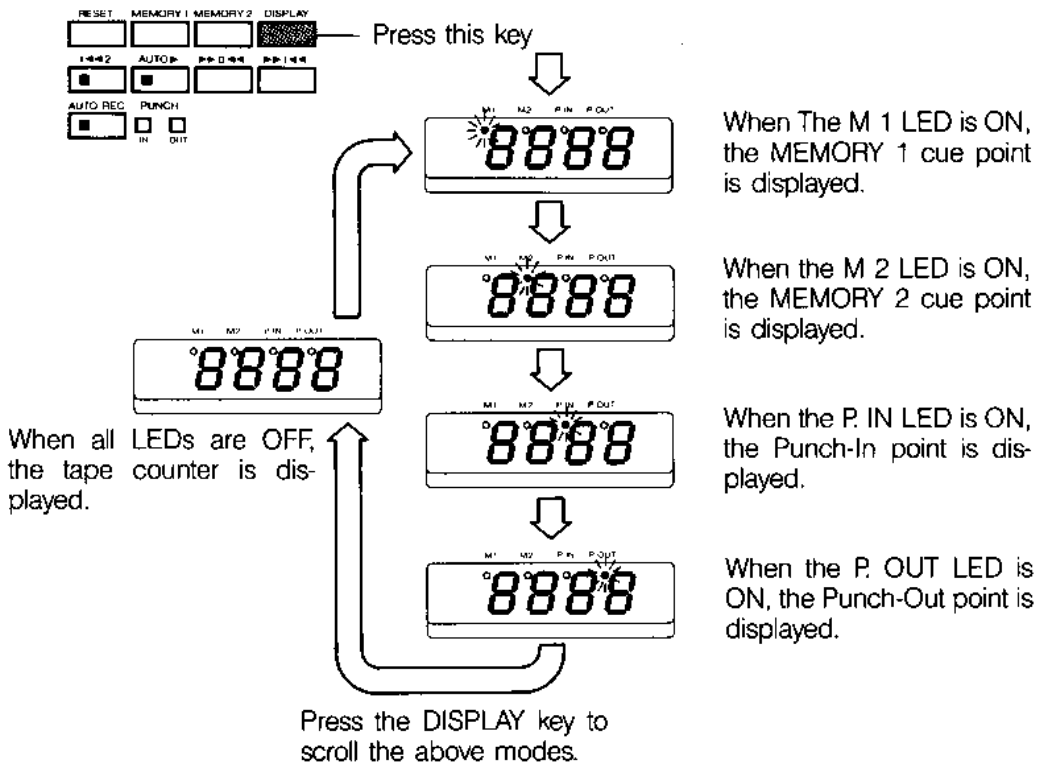
## SECTION 4. AUTOMATIC OPERATIONAL FEATURES

There are a number of convenient automatic operations that your 280 can perform. In this section we will discuss how you can take full advantage of the command keys in the Memory Auto Function Section (25).

### <THE LOCATE FUNCTION>

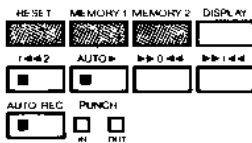
#### 1. HOW TO ENTER DATA IN THE MEMORY.

Let's first review the meaning of the status LEDs to the left of the four digits in the numerical counter.



Command keys MEMORY 1, MEMORY 2 and RESET.

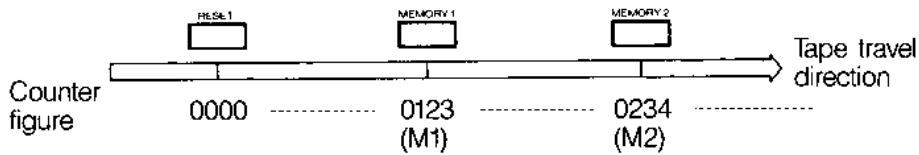
Whatever mode the recorder is in—play, fast wind, stop—the instant that a command key is pressed, the corresponding number displayed in the tape counter (all LEDs OFF) is automatically entered as a cue point, or reset (to 0000).



**MEMORY 1:** The counter figure at that moment is entered as the locate Memory 1 cue point.

**MEMORY 2:** The counter figure at that moment is entered as the locate Memory 2 cue point.

**RESET:** The counter figure changes to 0000.

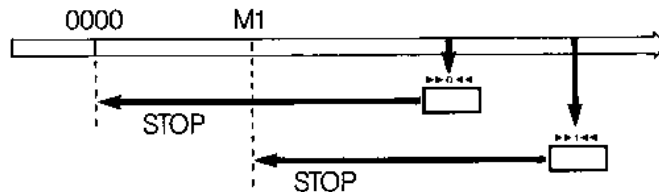
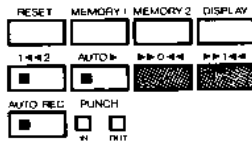


After entering the selected figure, press the DISPLAY key to review or confirm the memory points.

**NOTE:** Whenever a new cue point is entered, previous data is erased. When the counter figure is reset to 0000, the M 1 and M 2 cue points are adjusted accordingly to the new 0000 reference.

## 2. HOW TO AUTOMATICALLY LOCATE THE >>0<< AND >>1<< CUE POINTS.

When either of these command keys is engaged, the tape will automatically fast wind to the selected cue point and stop, regardless of the tape position prior to the command.



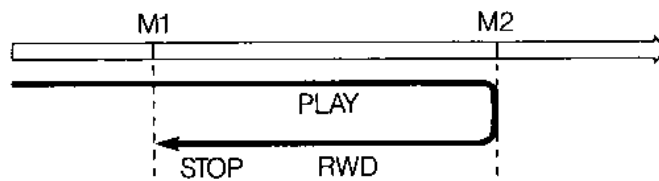
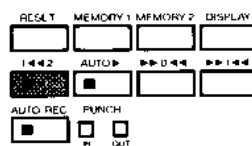
## 3. HOW TO AUTOMATICALLY RETURN FROM M 2 TO M 1 (1<<2).

Press the 1<<2 command key and note that the LED inside the key lights. When the tape then reaches the M 2 cue point, it will automatically return to the M 1 cue point and stop.

**NOTE:** If the LED blinks, this is an error indication. It means that the M 2 cue point is "behind" (less than)

the M 1 cue point and that this function is therefore inoperative.

To disengage this auto return mode, simply press the 1<<2 command key again and note that its LED is extinguished.

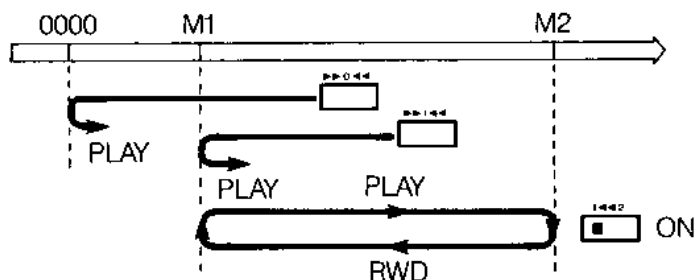
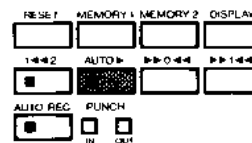


## 4. AUTO PLAY AND AUTO REPEAT

When this command key is engaged, the LED inside lights. After locating the appropriate cue point, the transport automatically enters the play mode. If auto return (above) is engaged as well, the transport will shuttle auto-

matically between M 1 and M 2.

To disengage the auto play mode, simply press the command key again and note that its LED is extinguished.



## < THE AUTO PUNCH-IN/OUT FUNCTION >

### WHAT IS PUNCH-IN/OUT?

It is the process of re-recording over a portion of a pre-recorded track. The typical example is to fix a bad note in an otherwise acceptable performance. Rather than record the entire performance all over again, it's often easier to fix the mistake(s).

Other uses of this technique are to correct minor timing errors (someone starts too soon or too late) or to eliminate unpleasant sounds from an open mic (a cough or a breath intake).

You can also use this technique to take advantage of unused portions of a track. For example, let's say the lead guitar part does not play continuously from the beginning to the end of the song. You might want to add some percussion effects in the sections where the lead guitar is silent. The punch-in/out recording process is just the way to do this.

The process can be made much easier with the 280's automatic functions, but whether you employ this technique manually or automatically, you must be very careful that your timing is pin-point accurate.

### METHODS OF MANUAL PUNCH-IN/OUT RECORDING

**NOTE:** Be sure that the AUTO REC command key is disengaged (LED is off).

In the following examples, track 1 is used for the punch-in out process.

In Method 1, the Fostex optional 8051 foot switch is used. This is a very useful accessory if you are a working alone—both playing as well as operating the 280. It plugs into the dedicated input jack on the front panel (24).

**NOTE:** Do not use foot switch controls other than the Fostex Model 8051.

In Method 2, you use the RECORD TRACK selector buttons (24) to punch-in and out, and in Method 3, the transport control buttons (26). There is no inherent difference between

**NOTE 1:** The biggest risk with this procedure is that if you punch-in too early or punch-out too late, you could ruin the very thing that you're trying to fix!

**NOTE 2:** It's very important that you match the level and feel of the punch-in/out recording to the pre-recorded performance; otherwise, it will be obvious that the final recording was not made continuously.

**NOTE 3:** Try to set punch-in and punch-out points that are not hypercritical, such as in the middle of a musical or vocal phrase. Thus if there's a mistake in the second chorus, for example, re-record the entire second chorus.

There are two methods of punch-in/out recordings with the 280:

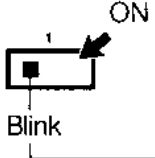

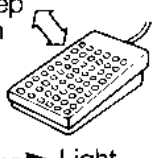
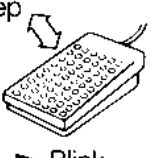
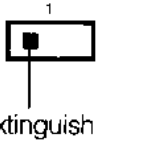
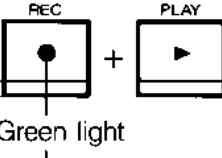
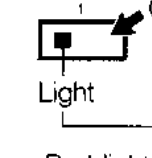
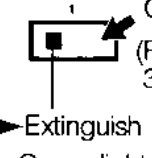
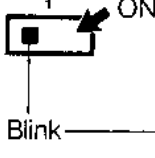

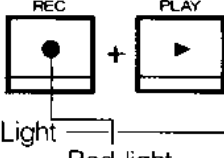
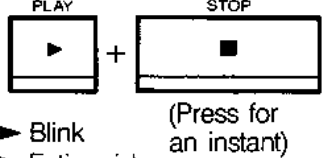
- Manually, whereby you physically manipulate the record controls.
- Automatically, whereby you program the 280 to carry out the process.

methods 2 & 3; it's more a matter of "feel" and personal preference.

Whichever method you decide to use, it's always a good idea to rehearse the procedure several times so that you'll know exactly when to punch-in and when to punch-out. During the rehearsal, listen to tape monitor via headphones.

To hear the "live" performance (what will eventually be the "take" or the actual punch-in/out recording) slide one ear can behind or above the ear.

When you are ready to make the recording, you can position the headphones over both ears if you like because the monitor signal will automatically switch from tape to input (punch-in point) to tape (punch-out point).

	Initial setting (RECORD TRACK)	Play	Punch in	Punch out
Method 1 Using the 8051 foot switch				
Method 2 Using RECORD TRACK (24)				
Method 3 Using RECORD button (26)				

•[REC] + [PLAY] means to press the RECORD and PLAY buttons simultaneously.

•[PLAY] and [STOP] means to hold down the play button, then quickly tap the stop button.

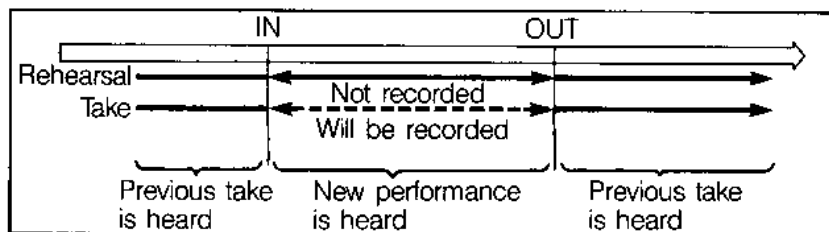
## AUTOMATIC PUNCH-IN/OUT RECORDING.

First switch off the RECORD TRACK selectors (24)—LEDs extinguish, and proceed to enter the cue points for punch-in and punch-out.

Operating procedure	REC [REC] LED	Punch		Operation
Press AUTO REC → Blinks	LED OFF	LED OFF	LED OFF	Enters the punch in/out mode
Enter the recorder in PLAY				
Press [REC] (1st press) (or step on 8051 foot switch)	Green blink (Individual mode)	LED ON		IN point is put in memory
Press [REC] (2nd press) (or step on 8051 foot switch)	LED OFF (All track in play mode)		LED ON	OUT point is put in memory
*3rd time and after is ignored				
To clear the registered IN/OUT points, press the AUTO REC key (25) again to extinguish the LED inside the key (PUNCH IN/OUT LED (25) will also be extinguished).				

When the punch-in and punch-out cue points have been entered, confirm their accuracy by ear—this is your ultimate reference. Now you're ready to rehearse. During rehearsal, in the section prior to the punch-in point, you'll be listening to tape monitor. At the punch-in point, the monitor signal automatically switches to input (new "live"


performance), and at the punch-out point, it reverts to tape monitor again. You can rehearse without worry of altering anything already recorded because the rehearsal signal is in the monitor only; it will not be recorded.



During this rehearsal, the process will be a whole lot easier if you take advantage of the 280's auto repeat function. Enter an M 1 cue point comfortably before the punch-in point and an M 2 cue point after the punch-out point, engage the 1 < 2 and the AUTO > command keys, and the transport will automatically shuttle between M 1 and M 2 as you practice.




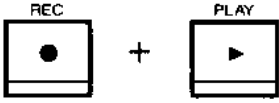
Confirm that the AUTO REC LED is blinking and that both P. IN and P. OUT LEDs are ON. Select the track for rehearsal by pressing the appropriate RECORD TRACK selector. Press the RECORD button once or twice until the LED is OFF, then enter PLAY at the M 1 point, and the 280 will operate automatically as follows:

When you're ready to make the actual punch-in/out recording ("take"), stop the tape at the M 1 point, press the RECORD and PLAY buttons simultaneously, and the 280 will automatically punch-in and punch-out:

Tape travel	 Internal LED	Operation
Enter recorder in PLAY mode	Extinguished	All track in the TAPE MONITOR mode
Pass the IN point	Green blink (Individual state)	Selected track only changes to input monitor
Pass the OUT point	Extinguished	All tracks returns to input monitor

Rewind

After recording the "take" switch off the RECORD TRACK selector and check the sound. If you're not satisfied, repeat the "take" procedure. When you are satisfied with the results, press the AUTO REC command key and note that the internal LED is extinguished. The auto punch-in/out mode will then be cancelled and the P. IN and P. OUT points will be cleared.

Tape travel	 LED	 LED	 LED	Operation
Stops in front of IN point	Blink	LED OFF	Blink	
	LED ON	↓	↓	Take is started
Passes the IN point	↓	Red LED ON	LED ON	Punch IN
Passes the OUT point	Blink	LED OFF (All track PLAY mode)	Blink	Punch OUT

**NOTE 1:** After repeated rehearsal, the P. IN and P. OUT cue points might drift a bit from their original sonic references. For this reason, always make a final check of the cue points and re-set them as necessary before you make the actual recording ("take").

**NOTE 2:** If the mistake which you're going to fix happens near the end of the performance, there may be no need to punch-out (you simply punch-in and continue until the end of the performance). In which case, you need not enter a punch-out cue point.

**NOTE 3:** When the 280 is in the normal record mode (press RECORD and PLAY simultaneously), the AUTO REC command will not be functional; consequently, pressing this key after punch-in will not induce punch-out.

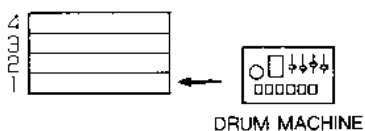
**NOTE 4:** Any RECORD TRACK (24) not selected during the "take" will enter the record ready mode (green LED) the instant it reaches the punch-in point.

**NOTE 5:** If the Model 8051 foot switch is engaged during the "take," it will have the same effect as a manual punch-out command.

## SECTION 5. BASIC OPERATING PROCEDURES

In this section, the most basic multitrack recording procedure will be explained. A single musician will perform four different parts, record each of those parts on four different tracks, and then mix them down to stereo in the finished product.

**Step 1:** A drum machine is recorded on track 1. (Usually, you record the rhythm part(s) first so that subsequent parts will be performed in the correct tempo.)



**Step 2:** An electric bass is overdubbed on track 2. (If there are two musicians working together, the drum machine (track 1) and bass (track 2) would probably be recorded simultaneously.)



( IN RECORDING MODE FINISHED RECORDING )

Now we present a detailed explanation of the above operations:

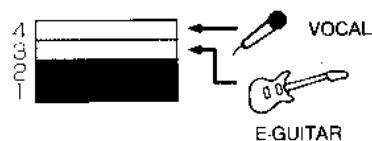
### <STEP 1: RECORDING THE DRUM TRACK>

1. First turn all controls on the 280 to their 0 or minimum settings, then plug the output of the drum machine to the INPUT 1 jack (27) and set the INPUT selector (1) to INPUT.
2. Set the MIX/TRK selector (6) to TRK, thereby sending the drum machine directly to track 1.
3. Select track 1 of the RECORD TRACK (24)—the LED inside will blink—then press the RECORD button (26) once—the LED inside will blink green. Track 1 is now in the input monitor mode.
4. Set INPUT fader 1 (2) to the 0 position. Start the drum machine and adjust the TRIM fader (3) so that the meter indication of track 1 (19) averages 0.

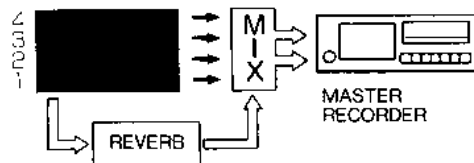
Of necessity, our examples throughout the rest of this manual will be of a general nature. You will find that each recording situation, each song or project, requires its own specific procedure.

In outline form, here is an overview of our basic example:

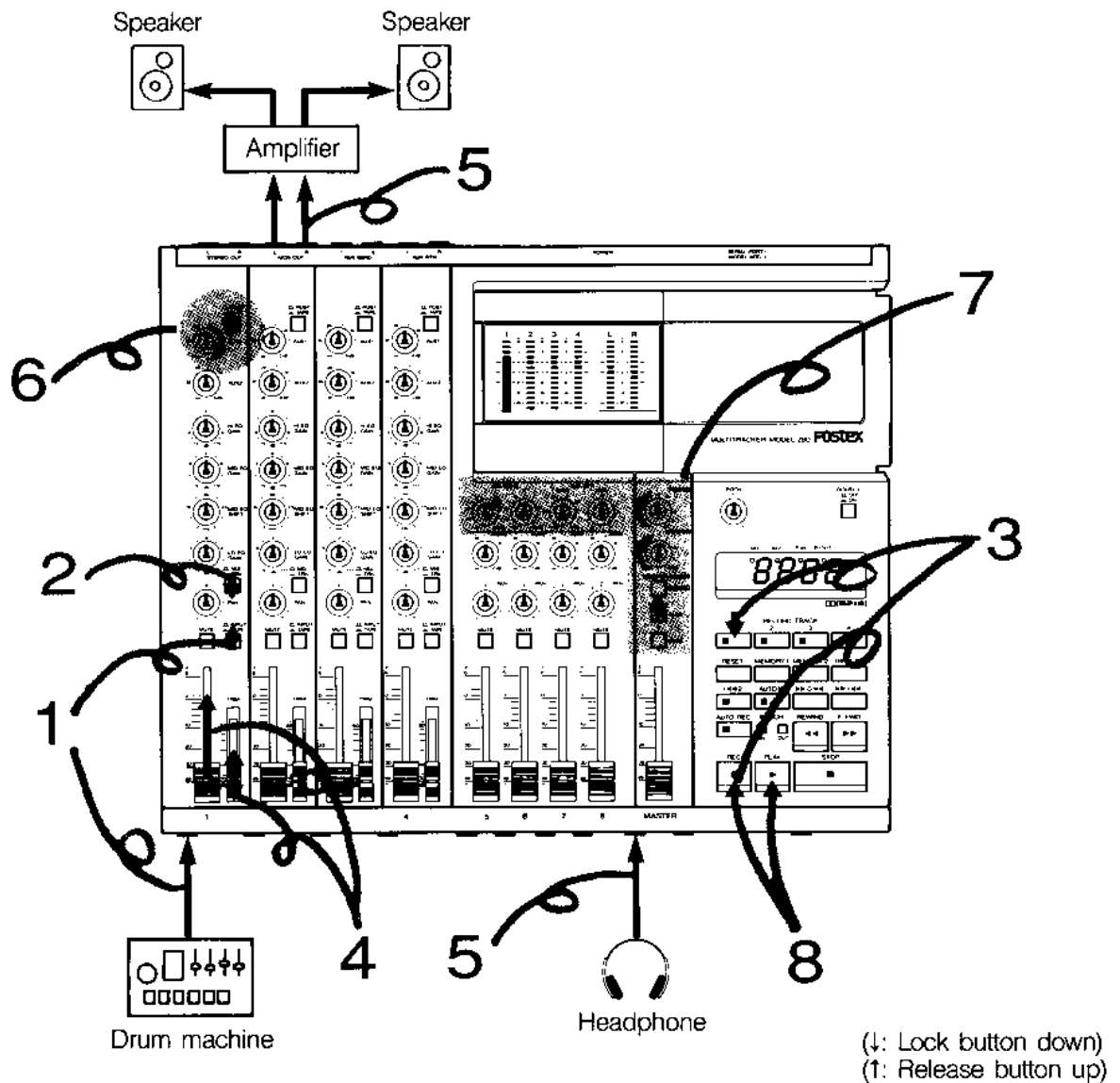
**Step 3:** The lead guitar and lead vocal are then overdubbed on tracks 3 & 4, respectively. (Usually the lead parts are the last to be recorded so that these performances benefit from a nearly complete "soundtrack.")



**Step 4:** These four parts are now blended (mixed) into the final product which is recorded on a standard cassette deck (master recorder). We will use a reverb unit to add depth to the final recording. (You can, of course, add reverb and other effects during the original recording and/or overdubs.)



**NOTE:** You are just setting levels at this stage, don't worry about content. If your level readings are constantly in the  $-10$  to  $-20$  range, bring them up with increased fader settings or you will have hiss problems. If your level readings are constantly "peaking" in the  $+3$  to  $+6$  range, bring them down with decreased fader settings or you will have distortion problems. When recording instruments with very sharp initial attacks such as bass/snare drums and thumb "popping" basses, you find that you need to set the levels in the  $-5$  to  $-10$ dB range for less tape saturation. A compressor such as the MN-50 will help solve this problem.



<STEP 1: RECORDING THE DRUM TRACK>

5. Your ears are always the final reference, and a good amplifier/speaker connection to the MON OUT jacks (30) will provide the best listening source.  
With line level sources such as drum machines and electronic instruments, listen through speakers for best results. With vocals and acoustic instruments, headphones (28) are necessary to avoid feedback from the "live" microphones.
6. Set the AUX 1 selector (9) of channel 1 to TAPE, and increase the AUX 1 gain control to a nominal level (between -10 and 0).
7. Select AUX 1 only in the MONITOR selector (16) and set the AUX 1 SEND master level control (12) to a nominal 0 level. Finally, adjust the MONITOR level (17)—or PHONES (18)—to a comfortable listening level. Now adjust the EQ controls (7) as required, and note that you may have to make additional adjustments on all of the level controls in the recording and monitor circuits.

**NOTE:** The channel INPUT (2) and TRIM (3) faders control the level of the signal being sent to the recorder (track 1). Use the meter reading (19) as your main reference. The AUX 1 send (10) and master (12) level controls, plus the MONITOR master (17) or PHONES master (18) control the overall level at which you choose to listen. Use your ears as your main reference. The record signal and the monitor signal are independent circuits which carry the same sonic information.

8. Now you're ready to record. Press the PLAY button and the RECORD button simultaneously. The RECORD TRACK LED (24) and the REC LED (26) will light red (ON). Any track placed in the recording mode will monitor the input signal.

**NOTE:** Since this first recording (basic track) will be used as a reference for all additional recordings, it's a good idea to begin with a rhythmic count-off with the snare drum before the actual downbeat or upbeat of the performance begins. (This makes overdubbing a lot easier.)

## <STEP 2: OVERDUBBING THE ELECTRIC BASS ON TRACK 2>

### WHAT IS OVERDUBBING?

It is the process of listening to one part (track) while recording another in synchronization. "Track layering" is another term for this procedure. It is the essence of multitrack recording. Invented by Les Paul in collaboration with Ampex audio engineers some thirty years ago, the overdub has had a greater impact on popular music than the electric guitar which bears his name.

Here, we'll overdub the electric bass on track 2.

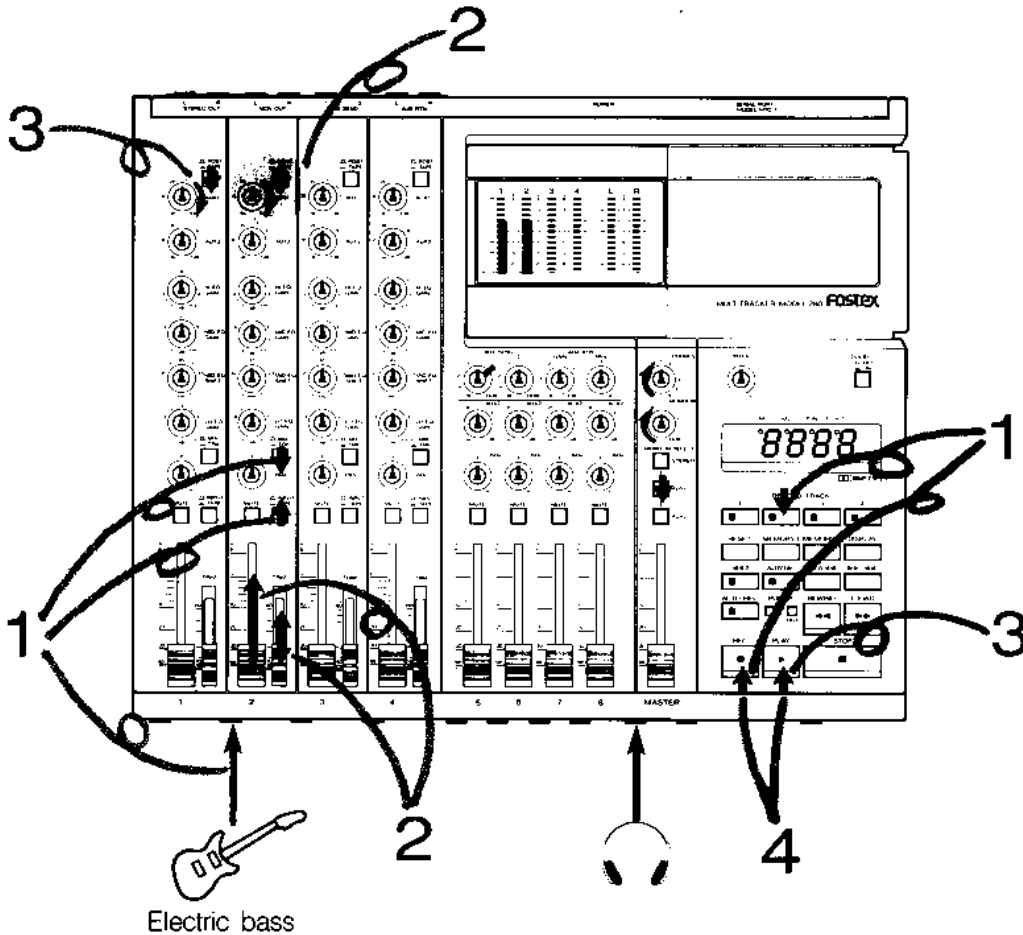
1. Plug the instrument into INPUT 2 (27), and as in Step 1, select INPUT (1), TRK (6), RECORD TRACK 2 (24) and press the RECORD button once.

**NOTE:** Be sure that RECORD TRACK 1 (24) is off.

2. As in Step 1, adjust TRIM (3), AUX 1 TAPE (9), AUX 1 Master (10), EQ (7) as necessary, and adjust INPUT level (2) with the meter (19).

**NOTE:** Since there isn't any high frequency information present in most bass parts, turn the 10k EQ control to minimum.

3. Rehearse the bass part against the drum part by pressing the PLAY button, and adjust the monitor mix level with the AUX 1 controls (channel 1 for the drum; channel 2 for the bass).
4. When you're satisfied with the rehearsal and ready for a "take," press PLAY and RECORD simultaneously.
5. Rewind, turn RECORD TRACK selector 2 OFF (24) and check the playback through monitor speakers.

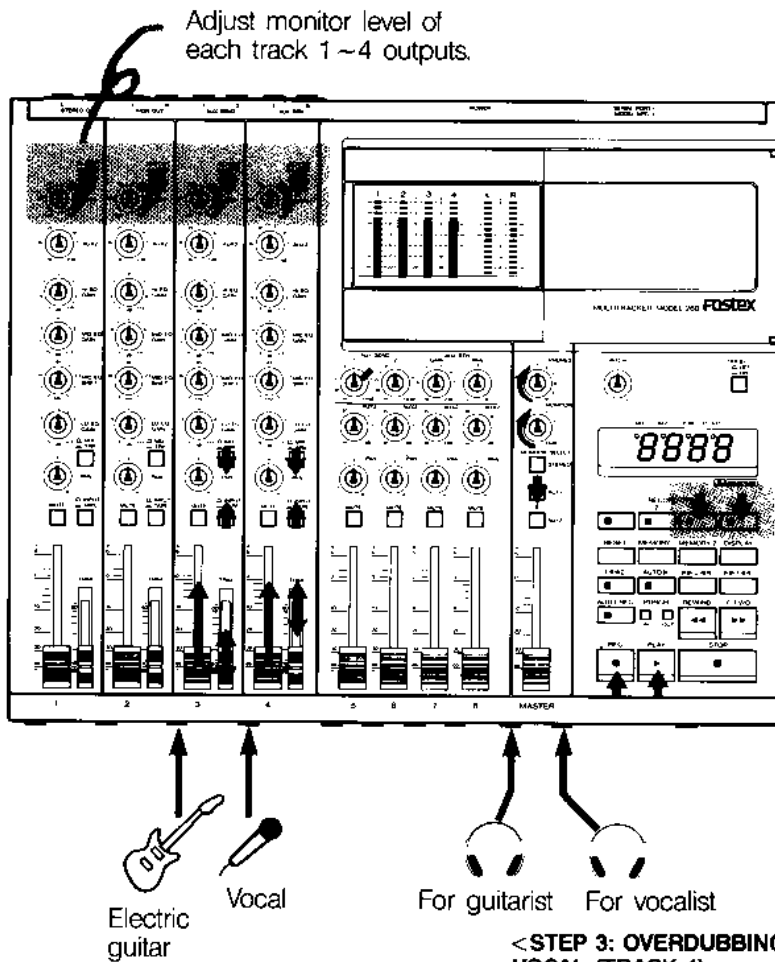


## <STEP 2: OVERDUBBING THE ELECTRIC BASS ON TRACK 2>

## <STEP 3: OVERDUBBING THE ELECTRIC GUITAR (TRACK 3) AND VOCAL (TRACK 4)>

Follow the same procedure explained above. (When you record the vocal you will have to use headphones for the rehearsal and "take.")





Recording is also possible on tracks 3 and 4 at the same time.

<STEP 3: OVERDUBBING THE ELECTRIC GUITAR (TRACK 3) AND VOCAL (TRACK 4)>

## <STEP 4: ADD REVERB AS YOU MIXDOWN.>

### WHAT IS MIXDOWN?

It is the process of playing several tracks of pre-recorded program material (four in our case) and blending them into a composite signal (stereo in our case). Mixdown is the final balancing of the individual tracks in terms of level (gain), placement (pan), and depth (reverb).

Mixdown is the final coming-together of all the parts and pieces. It is the process whereby the finished product is produced and copied (master recorder). Many people consider mixing an art in itself.

1. Patch the STEREO OUT jacks (31) to the line inputs of the master recorder (standard cassette deck)—make sure that the L and R designations on both machines match. Now patch AUX 1 and AUX 2 send jacks (33) to the input of the reverb, and patch the output of the reverb to the AUX RTN jacks (34).

**NOTE:** If the reverb is monaural, use AUX 1 Send and AUX RTN L.

2. Switch OFF all four RECORD TRACK selectors (24). Set the INPUT selectors of channels 1~4 (1) to TAPE.
3. Set all four MIX/TRK selectors (6) to MIX, thus sending track outputs 1~4 to the stereo bus via PAN (5).
4. Select only the STEREO signal in the MONITOR SELECT (16).

5. Press PLAY and adjust the overall stereo output level with the MASTER fader (15). Individual tracks are adjusted for level (INPUT faders (2)), PAN (5) and tone (EQ controls (7)).

**NOTE:** Tape output does not go through the TRIM (3) controls.

6. Now we'll add reverb. Set all AUX 1 selectors (9) to POST. This sends the signal present after the fader setting to the AUX 1 send control. (AUX 2 is always the post-fader signal.)

7. Set the AUX 1 master (12) and the AUX 2 master (13) to 0 and set the AUX RTN controls, GAIN and PAN (14), to their center positions. These are reference settings. The AUX 1 and AUX 2 signals are sent to the reverb, processed, and then returned to the 280's stereo bus where they are mixed with the original "dry" sound.

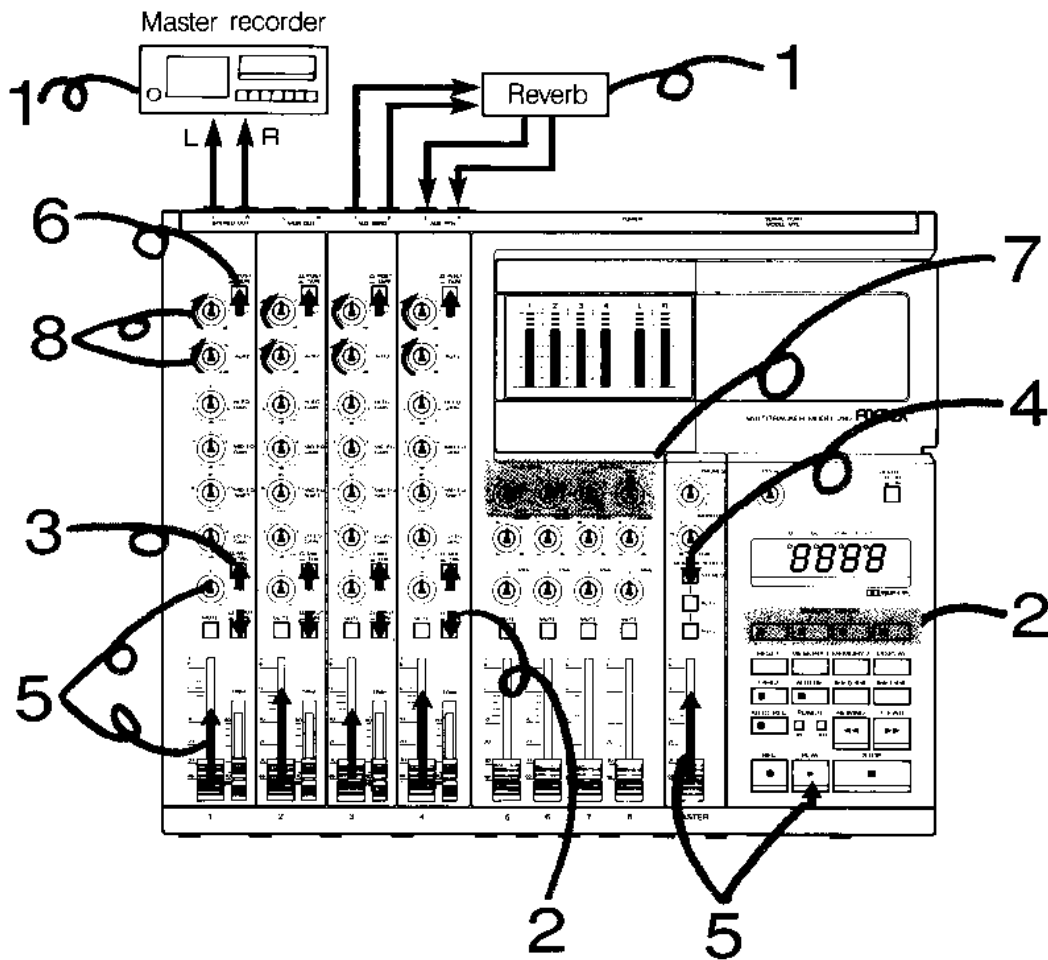
**NOTE:** The reverb unit itself will probably have input and output level controls which should be adjusted in conjunction with the 280's send and return controls.

8. The AUX 1 (10) and AUX 2 (8) gain controls of channels 1~4 determine how much signal from each individual channel will be sent to the reverb. As in all matters of mixing, taste and judgment will determine how much of any given effect is appropriate.

**NOTE:** If a stereo reverb is used, balance is obtained by adjusting AUX 1 and AUX 2 separately; if a monaural reverb is used, adjust AUX 1 only.

9. You will no doubt make several passes or trial mixes before you are ready to record the results. When you are ready, use the meter indications (19) of the 280 and the MASTER fader (15) to set up the proper record level of the master recorder. (A 0 meter reading on the 280 should

yield a corresponding 0 reading on the master recorder.) Enter the master recorder in the record mode, press PLAY on the 280, and record your mixdown.  
**NOTE:** Fade-ins and fade-outs are accomplished with the 280's MASTER fader (15).



< STEP 4: ADD REVERB AS YOU MIXDOWN. >

## SECTION 6. ADVANCED OPERATING PROCEDURES

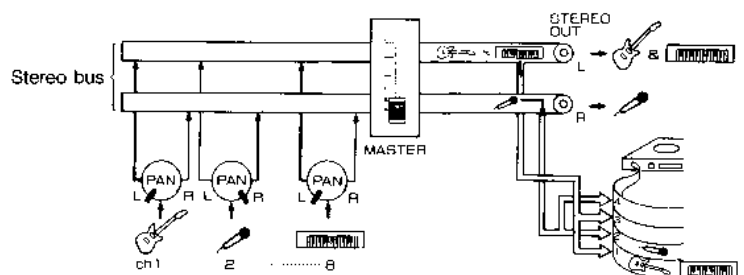
In the previous section, we deliberately keep the example as simple as possible (one instrument per track, channel 1 to track 1, etc.). Obviously, your 280 is capable of much more recording/mixing flexibility and sophistication.

### WHAT IS THE STEREO BUS?

The stereo bus is an independent mixing network within the 280 which is accessed through the PAN controls (5). Overall gain of the mixed signals is determined by the MASTER fader (15), which stereo signal is then present at the STEREO OUT jacks (31).

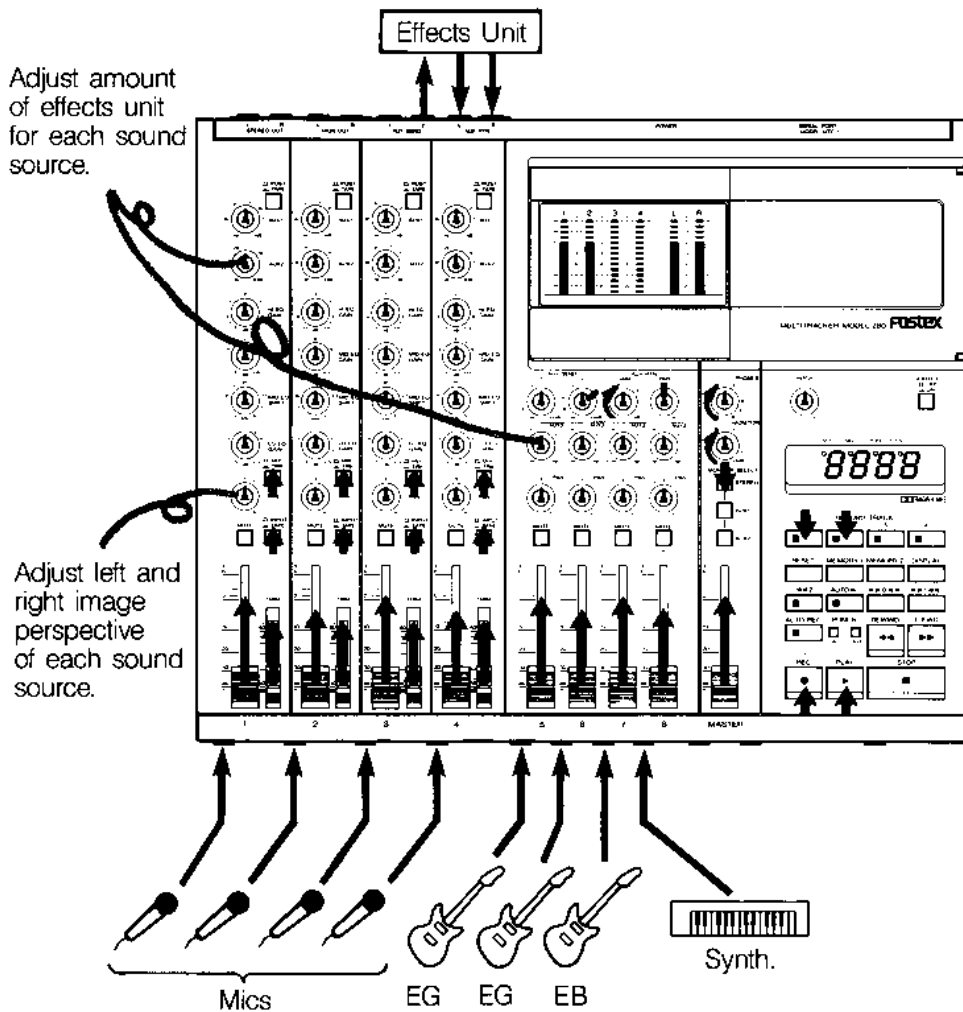
In addition, the output of the stereo bus is also sent to the recorder, as shown in the drawing. The L output is sent to tracks 1 & 3 and the R output is sent to track 2 & 4.

Thus input signals to all eight channels of the 280 could be recorded either in mono (all PAN controls (5) full left to track 1, full right to track 3) or in stereo.



In this section, three examples will be examined.

<EXAMPLE 1: STEREO RECORDING OF 8 SOUND SOURCES.>



<EXAMPLE 1: STEREO RECORDING OF 8 SOUND SOURCES.>

1. Connect the microphones and instruments as shown in the drawing and set all four INPUT selectors (1) to INPUT. Set the four MIX/TRK selectors (6) to MIX. (These settings are not necessary for channels 5~8 because input signals here are automatically routed to the stereo bus.)
2. Select only STEREO in the MONITOR selector (16). When more than two headphone sets are required, connect the MON OUT jacks (30) to an external amplifier and use its headphone output(s).
3. Set the MASTER fader (15) and the channel 1 INPUT fader (2) to the nominal 0 reference, begin the signal source for channel 1, adjust the left-to-right perspective with PAN (5) and adjust the EQ (7). Then adjust TRIM (3) for the proper meter reading (19).
4. Press MUTE (4) for channel 1, begin the sound source for channel 2, and adjust gain, pan and tone for channel 2. This method of muting while setting individual channel levels is very useful. Continue this procedure for all channels (5~8 have no TRIM (3) controls because they are set for line level (-10dBV) signal sources.)
5. AUX 2 (8), (11) is used for a mono effects send. Connect the AUX 2 send jack (33) to the input of an external processor and connect the output to the AUX RTN jack (34). The total amount of processed signal applied to the stereo bus is adjusted by AUX RTN GAIN (14).
6. Cancel MUTE (4) for all channels, and begin rehearsing. You'll no doubt need to make further adjustments of gain, tone and pan as all sound sources play together.  
**NOTE:** Try to maintain a relative balance among the INPUT faders (2) and the MASTER fader (15). The 0 setting is the nominal reference. If most of the input faders are set low while the master is set high (or vice versa), there is an imbalance between gain stages and problems of noise or distortion will result.
7. This composite mix (original plus processed sound) will be recorded in stereo on tracks 1 & 2. Engage the corresponding RECORD TRACK selectors (24), press the RECORD and PLAY buttons simultaneously and begin recording. Meters L & R (19) will carry the output signal of the stereo bus and meters 1 & 2 (19) will indicate the recording level to tracks 1 & 2.

## <EXAMPLE 2: OVERDUBBING ON TRACK 3>

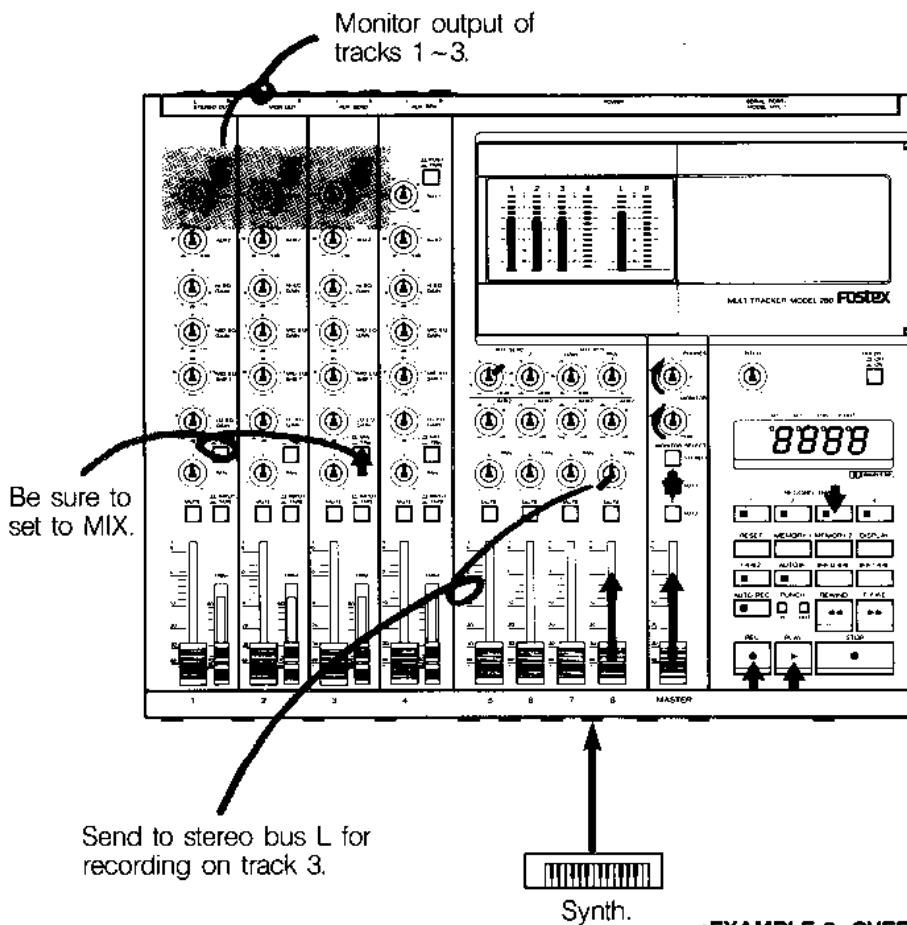
In this example, we'll leave the synthesizer connected to channel 8 (Example 1) and overdub it on track 3 while monitoring the stereo mix on tracks 1 & 2.

1. Engage MUTE (4) for channels 1~7 so that you can concentrate on channel 8. Rotate the channel 8 PAN (5) control fully counter-clockwise to L. Now set the channel 8 INPUT fader (2) and the MASTER fader to the 0 reference level and the synth signal will be sent to stereo bus L (L corresponds to track 3).
2. Select AUX 1 only in the monitor selector (16), and set the AUX 1 selectors (9) of channels 1~3 to TAPE. The AUX 1 bus now functions as an independent monitor mixer and you can set your desired mix of tape signals (stereo mix of Example 1 on tracks 1 & 2, new synthesizer part

on track 3) without affecting the recording to be overdubbed.

3. Select RECORD TRACK (24) for track 3 only (all others off) and press the RECORD button once to engage input monitor for rehearsal (REC LED (26) blinks green), then press PLAY to rehearse. When you're ready to record a "take" press RECORD and PLAY simultaneously.

**NOTE:** When recording with the stereo bus, always set the MIX/TRK selector (6) to MIX on the channel(s) which correspond to the track(s) to be recorded. If the selector is set to TRK, the input signal for that channel (muted in this example) is sent instead of the stereo bus output.



<EXAMPLE 2: OVERDUBBING ON TRACK 3>

## <EXAMPLE 3: PING-PONG RECORDING OF 7 PARTS ONTO 4 TRACKS>

### WHAT IS PING-PONG RECORDING?

It is the process of mixing two or more pre-recorded tracks onto an unrecorded track so that additional parts may be overdubbed. "Track bouncing" is another term for this procedure.

It is an effective way to increase the number of overdubs and

to "fill out" the overall sound of the performance. It does, however, require careful planning and selection of the parts to be ping-pong recorded because as "copies" (second generation) of the original recordings (first generation), they will be slightly diminished in quality.

Here are the steps in making a 7-part assembly:

Step 1. Record the basic track (A) and two overdubs (B) and (C) on tracks 1, 2 and 3.

TRK 4	
TRK 3	C
TRK 2	B
TRK 1	A

Step 2. Mix tracks 1, 2 and 3 and record them onto track 4.

TRK 4	A+B+C
TRK 3	
TRK 2	
TRK 1	

Step 3. Overdub (D) and (E) on tracks 1 and 2

TRK 4	A+B+C
TRK 3	
TRK 2	E
TRK 1	D

**NOTE 1:** Be careful when attempting to ping-pong to adjacent tracks (for example, track 2 to track 1 or track 3) because oscillation or feedback could occur in some cases. If this happens, try lowering the send level and/or turning down the high frequency tone control. Better yet, start over with a different recording sequence.

**NOTE 2:** A characteristic of all analog cassette tape recorders is that in the ping-pong recording procedure (actually, any repeat recording) the highs are attenuated and the lows are accentuated. Use the EQ controls to compensate for this phenomenon.

Step 4. Mix tracks 1 and 2 and record them onto track 3.

TRK 4	A+B+C
TRK 3	D+E
TRK 2	
TRK 1	

Step 5. Record (F) and (G) on tracks 1 and 2.

TRK 4	A+B+C
TRK 3	D+E
TRK 2	G
TRK 1	F

**NOTE 3:** Once the ping-pong recording is made, and the original tracks have been re-recorded with subsequent overdubs, the relative balance cannot be changed. In the above example, the signal on track 4 (A+B+C) and track 3 (D+E) is each a single composite entity. Hence the importance of rehearsal and planning.

**NOTE 4:** Always save the most important parts (lead vocals and instrumentals, usually) for the final overdubs so that you have individual control over them during mixdown (F and G in the above example).

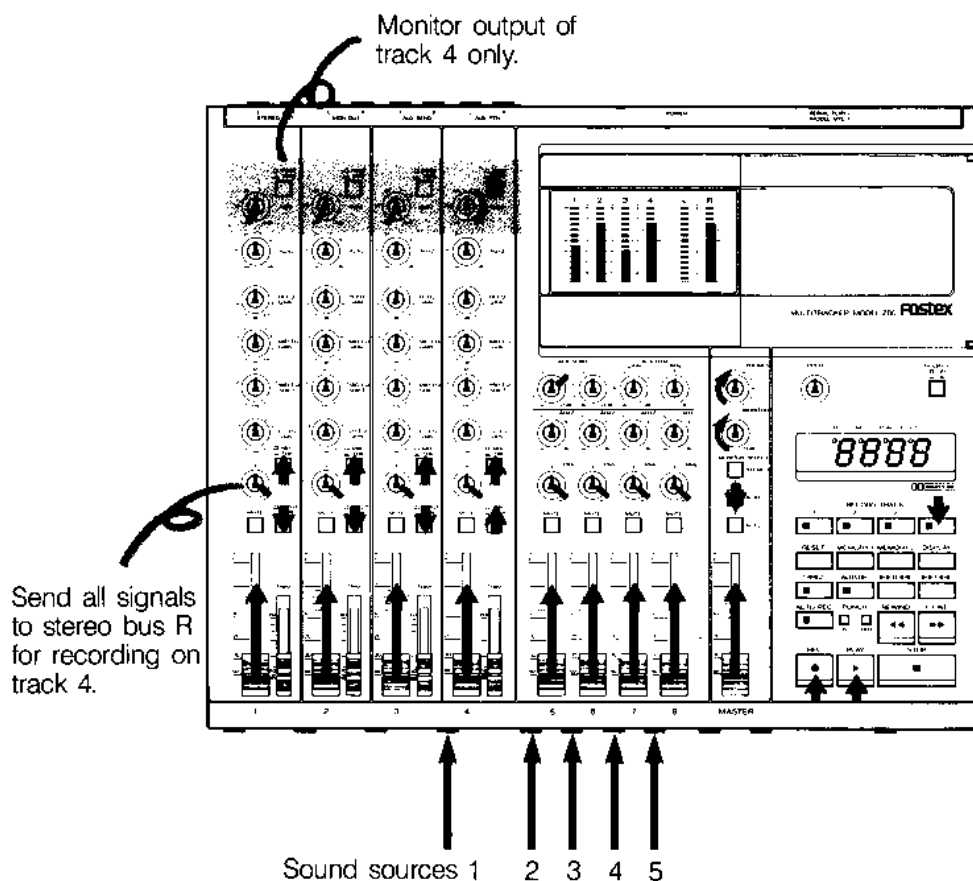
## < ADDITIONAL PING-PONG RECORDING EXAMPLE >

While you are transferring pre-recorded tracks to an open one, there's nothing to prevent you from adding additional "live" parts at the same time. Here, we'll transfer tracks 1, 2 and 3 to track 4 while simultaneously recording five "live" parts for a total of 8 parts on track 4.

1. Connect the microphone and instruments to channels 5~8 as shown in the diagram. On channel 4, set the INPUT selector (1) to INPUT and the MIX/TRK selector (6) to MIX. Adjust TRIM (3) as previously explained in Example 1.
2. For channels 1~3, set all INPUT selectors (1) to TAPE and all MIX/TRK selectors to MIX. These settings connect track outputs 1~3 to the INPUT faders (2) and places them on the stereo bus. (TRIM controls (3) are not in the circuit with these settings.)
3. Select only AUX 1 in the MONITOR selector (16) and set the AUX 1 selector (9) to TAPE.
4. Place track 4 in the input monitor mode with the RECORD TRACK button (24) and the RECORD button (26) as previously explained.

5. Set the MASTER fader (15) to the 0 reference and rotate all 8 PAN controls (5) to the extreme R setting (fully clockwise). Press PLAY to begin rehearsal.
6. Balance the mix with the INPUT faders (2) and adjust EQ controls (7) for channels 1~4 as required.
 

**NOTE:** If you wish, you can take advantage of the AUX 2 bus (8) and send an independent mono mix to an external processor and patch its output to AUX RTN (14), which places the processed signal on the stereo bus.
7. When levels are properly set and rehearsal is complete, press RECORD and PLAY simultaneously to begin recording the "take".



< ADDITIONAL PING-PONG RECORDING EXAMPLE >

## SECTION 7. GENERAL PROCEDURES

By now it should be apparent that there are a few general procedures to be followed during each phase of the multi-track recording process:

1. Start by "zero-ing" the controls. Set all controls to their 0, off or minimum position. Adjust only those controls which will be in the signal patch of the procedure you are about to begin.
2. Set the record level first—remember that EQ (7) is after the INPUT fader (2) but before the MASTER fader (15)—then adjust the monitor level.

3. Rehearse before you record. Sometimes, in order to move things along, you'll want to make a quick reference recording just to hear where things stand. But take the time to rehearse both the performance and the operational procedure before each "take".
4. Just because it's a "take" doesn't mean it's a "keeper." You can always do it again, and while recording can sometimes be tedious, you only have to get it right once.

### < TAPE SYNC >

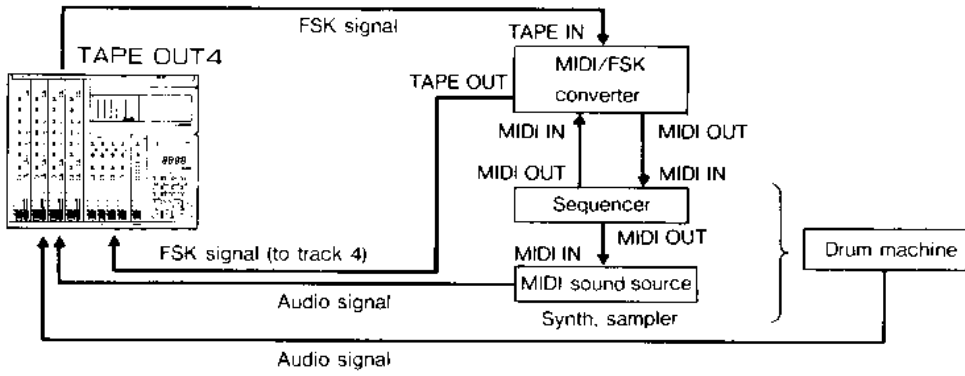
#### WHAT IS TAPE SYNC?

It is the process of dedicating one of the tracks on the recorder to trigger multiple instruments through MIDI, which will then play in tandem with the parts recorded on tape. There are many advantages of tape sync:

- MIDI-controlled instruments need not be recorded on tape. Only acoustic instruments and vocals need to be recorded, thus saving track space.
- Better overall sound quality is achieved when the MIDI-controlled instruments are mixed directly to the master recorder during mixdown.
- Greater production flexibility is achieved through tape sync because you are free to re-program MIDI instruments (except tempo) right up until the final mix.

**NOTE:** MIDI signals cannot be recorded directly onto tape. An FSK device (Frequency Shift Keying) translates the MIDI clock data into frequencies which may then be recorded. When these control frequencies are then played back, the FSK device translates them back into MIDI data. Most modern sequencers, drum machines and MIDI control devices have these FSK circuits built-in; in some cases you may need to purchase an outboard converter.

Connecting the 280 for tape sync

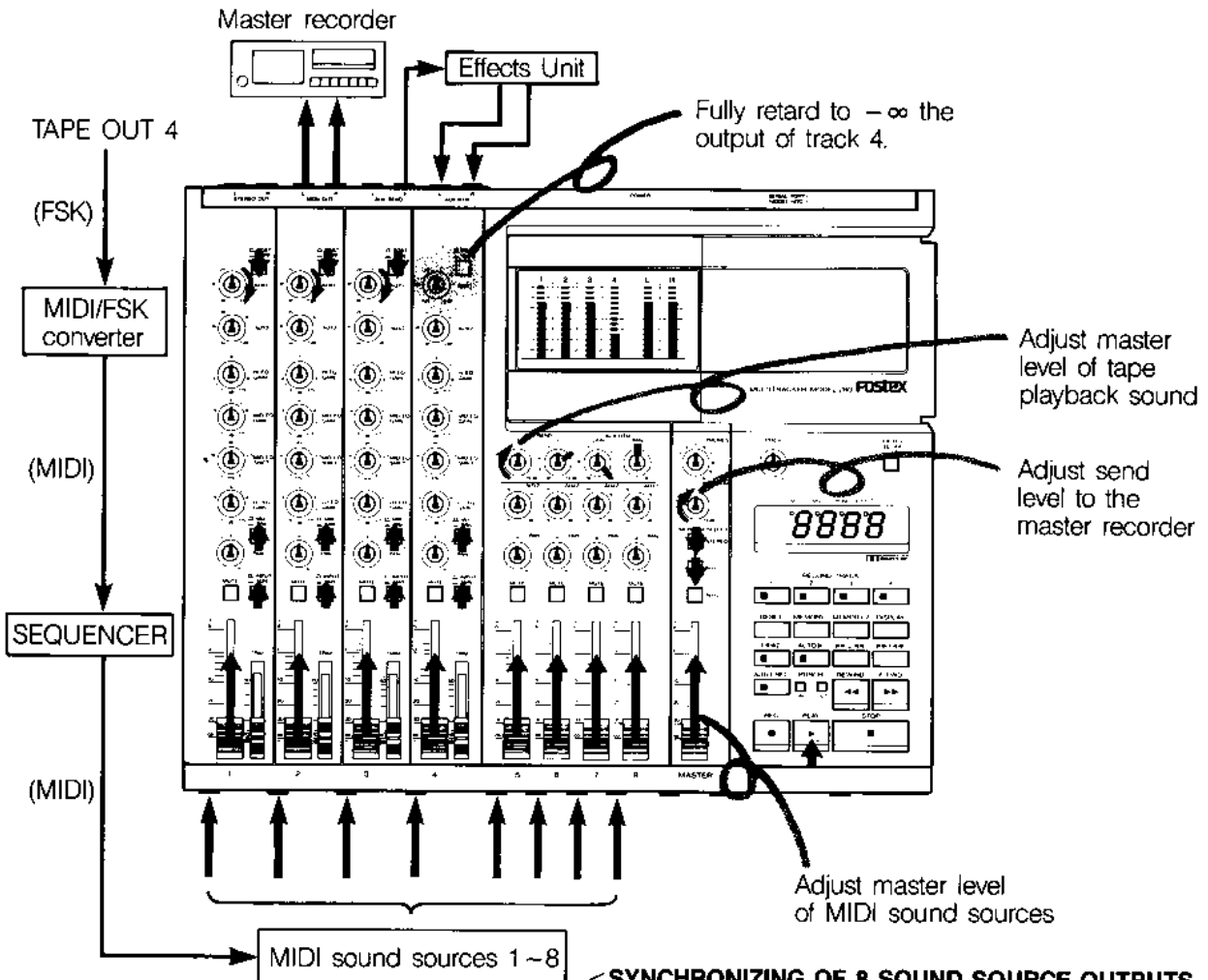


Here are two examples of a tape sync set-up:

**EXAMPLE 1:** A total of eight "live" sound sources will be mixed to stereo with tracks 1~3 at the center PAN perspective.

**EXAMPLE 2:** Tracks 1~3 plus three "live" sound sources will be mixed to stereo using two signal processors (mono-in/stereo-out type).

**EXAMPLE 1.**



< SYNCHRONIZING OF 8 SOUND SOURCE OUTPUTS (TAPE SOUND AT CENTER PERSPECTIVE) >

- The tempo control information is first programmed into the sequencer (do this carefully because tempo cannot be changed later).
  - Patch the sequencer (directly or through an FSK converter) to track 4, and patch the part(s) which will act as a rhythm guide for overdubs to track 1 (this signal will be replaced by the final overdub, after tracks 2 and 3 are recorded). Keep the Dolby NR on.
  - Record the control signal in one continuous pass.
- NOTE:** Regarding the proper record level of the FSK signal and the required length of the pilot tone, which indicates standby before start, refer to the Owner's Manual of the MIDI device being used.
- Using track 1 as a monitor reference, make the overdubs on tracks 2 & 3.
  - Make the final overdub on track 1 using tracks 2 and 3 for monitor reference.
  - Now patch the MIDI instruments and set the 280 controls as shown on page 22

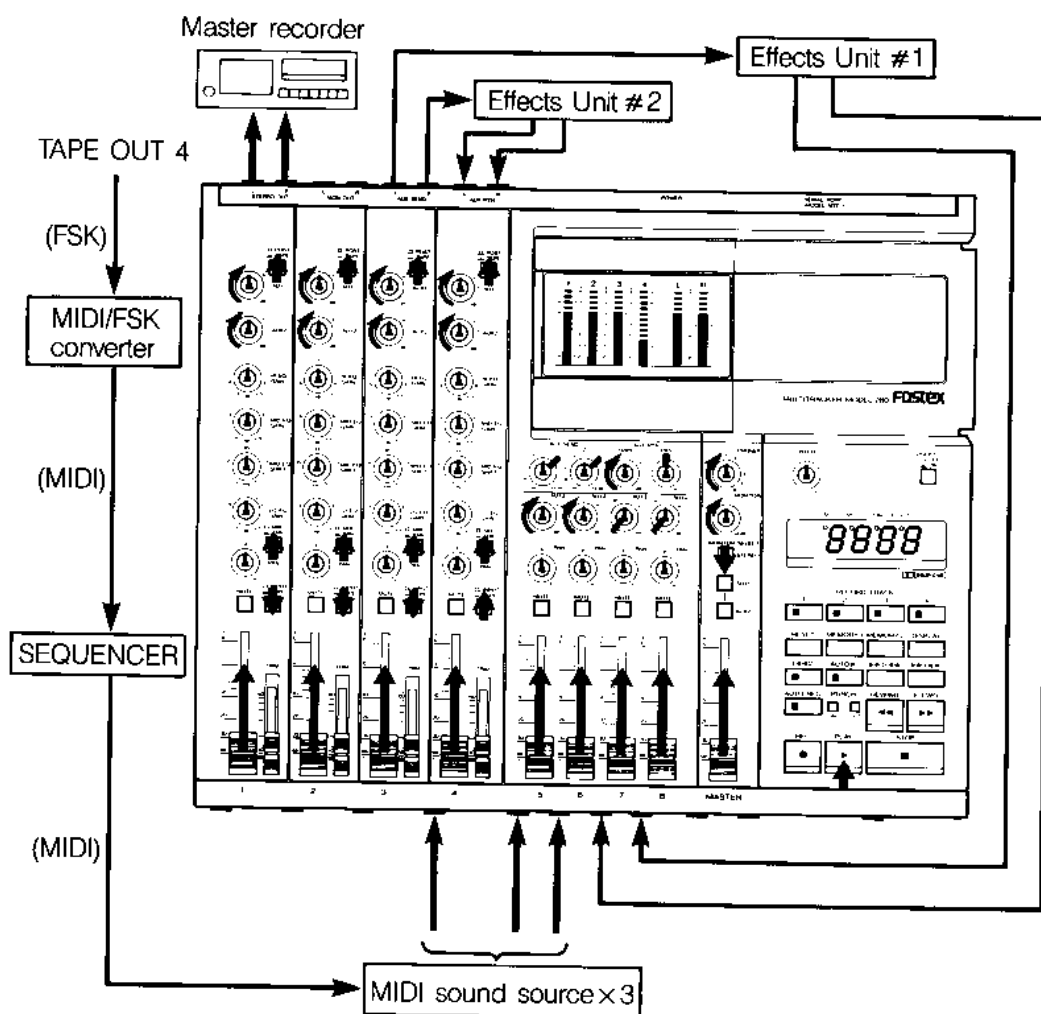
**NOTE:** Use Tape Out 4 (32) only to drive the sequencer. These tape outputs are direct and by-pass the mixing network.

- Set the sequencer in the MIDI slave mode and enter auto start. Begin rehearsing the mixdown and adjust levels and/or MIDI programming as necessary.
- When you are ready to begin recording the mixdown performance, connect the master recorder inputs to the MON OUT jacks (30) and select both STEREO and AUX 1 on the MONITOR selector (16).

**NOTE 1:** Tracks 1 ~3 are mixed by the AUX 1 bus controls and the MIDI sound sources (channels 1 ~8) are mixed by the stereo bus controls. Both buses are then mixed together and the composite stereo signal appears at the MON OUT jacks (30).

**NOTE 2:** If desired, you can also use the AUX 2 bus to send and return selected MIDI sound sources for additional signal processing, as shown in the diagram.

## EXAMPLE 2.



< SYNCHRONIZING THREE SOUND SOURCE OUTPUTS (TAPE SOUND: STEREO) >



- In this example, you will be able to send the tape playback signals to the stereo bus so that you adjust PAN (5) and EQ (7), as well as add additional signal processing with external units.
- Connect the master recorder and signal processors as shown on page 23.
- Set the INPUT selectors (1) of channels 1–3 to TAPE, channel 4 to INPUT.
- Set all MIX/TRK selectors (6) to MIX, thus placing tracks 1–3 and the MIDI sound source of channel 4 on the stereo bus.
- Connect the two additional MIDI sound sources to channels 5 and 6 and connect the stereo return of the AUX 1 signal processor to channels 7 and 8, thus placing these signals on the stereo bus.

- Select only STEREO on the MONITOR selector (16).
  - Use the AUX 1 bus to process signals of tracks 1–3 (tape playback) and use the AUX 2 bus to process signals of the MIDI sound sources (channels 4–6).
- NOTE:** Set the AUX 2 send controls (11) for channels 7 and 8 fully counterclockwise to minimum, because these inputs are used for the stereo return from the AUX 1 signal processor.
- Rehearse as necessary, then record your final mixdown.

## SECTION 8. ROUTINE MAINTENANCE

In addition to the normal care required of all electronic equipment, the cassette recorder section of your 280 requires regular cleaning and demagnetizing to keep it in top operating condition.

As the tape passes over the heads and guides, and between the pinch roller/capstan assembly, a small amount of oxide residue is left behind. This physical phenomenon is true of all tapes and all tape recorders.

Cotton swabs and proper cleaning solutions should always be handy.

**NOTE:** AVOID CHEAP SWABS THAT ARE SKIMPY IN THE COTTON DEPARTMENT—THEY CAN SCRATCH THE HEAD SURFACES.

The heads, guides and capstan shaft should be cleaned with anhydrous alcohol solutions; the pinch roller, with special rubber cleaning solutions. These cleaning agents are readily available.

**NOTE:** NO ORGANIC SOLVENTS (such as lacquer thinners) should ever be used on the heads, capstan shaft and guides. DO NOT USE SILICONE LUBRICANTS ON THE PINCH ROLLER! This will increase wow and flutter.

If you get lazy or forgetful and allow the oxide deposits to build-up, performance will suffer noticeably—especially high-end response and wow & flutter. If you have total disregard for these routine maintenance procedures, the heads could become magnetized and wreck every tape you try to play. The simplest rule to follow is: CLEAN AND DEMAGNETIZE BEFORE EVERY SESSION. If you're in to "all-nighters" and marathon sessions, do it every 8 hours. (Clean your tape recorder more often than your teeth!)

**NOTE:** Use either a hand demagnetizer (preferred) or a demagnetizing cassette and follow the instructions of the manufacturer. But avoid the cassette tapes with built-in or applied cleaning agents because too many of them contain an abrasive.

## SECTION 9. SPECIFICATIONS

### INPUT × 8

#### Input 1 ~ 4

MIC impedance	Less than 10kΩ
Input impedance	20kΩ
Rated input level MIC	- 60dBV (1mV)
Rated input level LINE	- 10dBV (0.3V)

#### Input 5 ~ 8

Input impedance	20kΩ
Rated input level	- 10dBV (0.3V)

### AUX RTN (L, R) × 1

Input impedance	6kΩ
Rated input level	- 10dBV (0.3V)

### STEREO OUT (L, R)/MONITOR OUT (L, R)/AUX SEND × 2

Output load impedance	Higher than 10kΩ
Rated output level	- 10dBV (0.3V)

### TAPE OUT × 4

Output load impedance	Higher than 10kΩ
Rated output level	- 10dBV (0.3V)

### HEADPHONE

Output load impedance	8 ~ 50Ω
Maximum output	80mW

### EQUALIZER

Shelving	100Hz ± 15dB
	10kHz ± 15dB
Parametric	200Hz ~ 5kHz ± 15dB

### RECORDING TAPE

Cassette tape	C-60, C-90
Hi-position	(CrO <sub>2</sub> , Type 2)
TDK SA, MAXELL XLII or equivalent	

### RECORDING TRACK

4 track one way recording

### NOISE REDUCTION

Dolby C type (ON/OFF switchable)

TAPE SPEED	9.5cm/s
WOW FLUTTER	0.05%
PITCH CONTROL	± 10%
RECORDING TIME	15 minutes (C-60)

### FREQUENCY RESPONSE

Mixer section	20Hz ~ 40kHz
Recorder section	40Hz ~ 14kHz

### S/N

Mixer section	MIC 65dB WTD
	LINE 76dB WTD
Recorder section	65dB WTD

### DISTORTION

Mixer section	Less than 0.05% (1kHz)
Recorder section	Less than 1.5% (1kHz, 0dB)

### CROSSTALK

Mixer section	Better than 60dB (1kHz)
Recorder section	Better than 50dB (1kHz)

### HEAD

4 channel erase (Ferrite)

4 channel record/playback (Hard Permalloy)

FAST WIND TIME 110 seconds (C-60 tape)

ERASURE Better than 70dB (1kHz)

### POWER CONSUMPTION

100V	19W
120V	22W
220V	22W
240V	22W

### WEIGHT

5kg.

### PHYSICAL DIMENSIONS

105(H) × 417(W) × 345(D)

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Noise reduction system manufactured under license from Dolby Laboratories Licensing Corporation.

## SECTION 10. TROUBLE-SHOOTING GUIDE

We know we're not perfect, but we have excellent quality control and quality assurance procedures firmly in place from engineering design throughout manufacture and shipping. Thus "pilot errors" are far more common than "out-of-the-box" problems.

So before you get mad at your 280, Fostex or your dealer, please take a few minutes to run through this check list of the most common sources of user frustration:

### •PROBLEM: INITIAL SET-UP, NO SOUND.

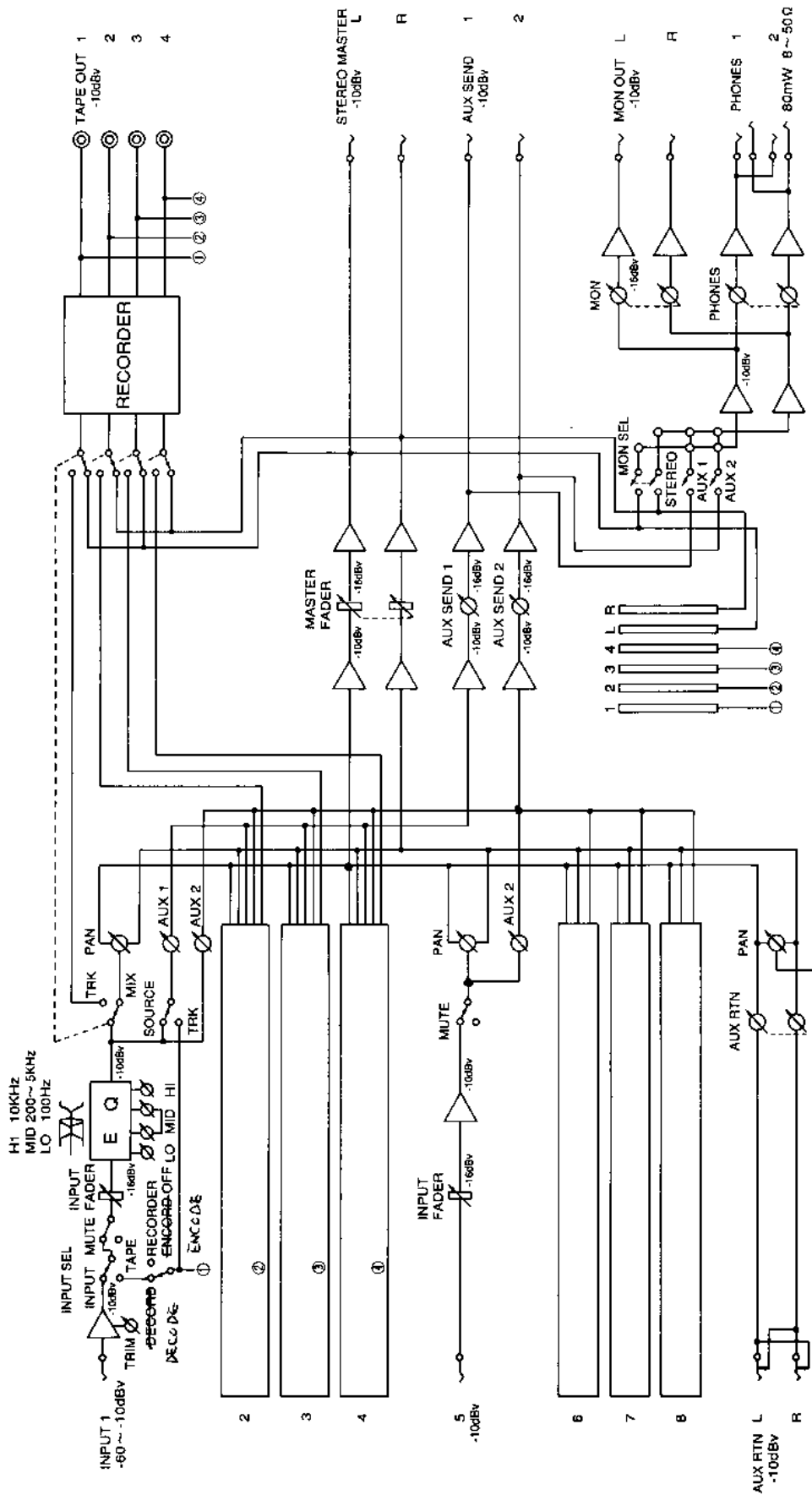
1. Is the power on? (You'd be amazed!)
2. Are all the plugs well-connected to the right jacks?
3. Could the cable be faulty?
4. Are the MASTER controls turned up?
5. Is there a MUTE button engaged?
6. Have you selected anything on the MONITOR selector?
7. Are you in INPUT monitor?
8. Is the cassette tape properly seated in the compartment?
9. Are the cassette record-prevention tabs missing?
10. Are the INPUT/TAPE, MIX/TRK and RECORD TRACK selectors set properly?

### •PROBLEM: IT USED TO WORK FINE, NOW IT SOUNDS WEIRD OR BAD.

1. When did you last clean & demagnetize? (This is the single most common problem encountered by our service technicians.)
2. Are you using the right kind of tape (70 μsec EQ only)?
3. Could the problem be due to tape drop-outs or tape deterioration?
4. Is the Dolby switch ON?
5. Is the PITCH control ON?
6. Are the gain controls and gain stages properly set?
7. Are the PAN and EQ controls properly set?
8. Are the input/output levels to an external unit properly calibrated?
9. Is there an input/output impedance mis-match?
10. Are the sequencer and/or MIDI-controlled instruments properly programmed?

If your problem is still nagging, contact your dealer or Fostex for the name of your nearest service facility.

# SECTION 11. BLOCK DIAGRAM



4 TRACK CASSETTE RECORDER

XC-27

88-4-25

**Fostex**

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