

Owner's Manual

Model

160

RECORDER/MIXER



Fostex[®]

Figure Model 160 Main Panel Features

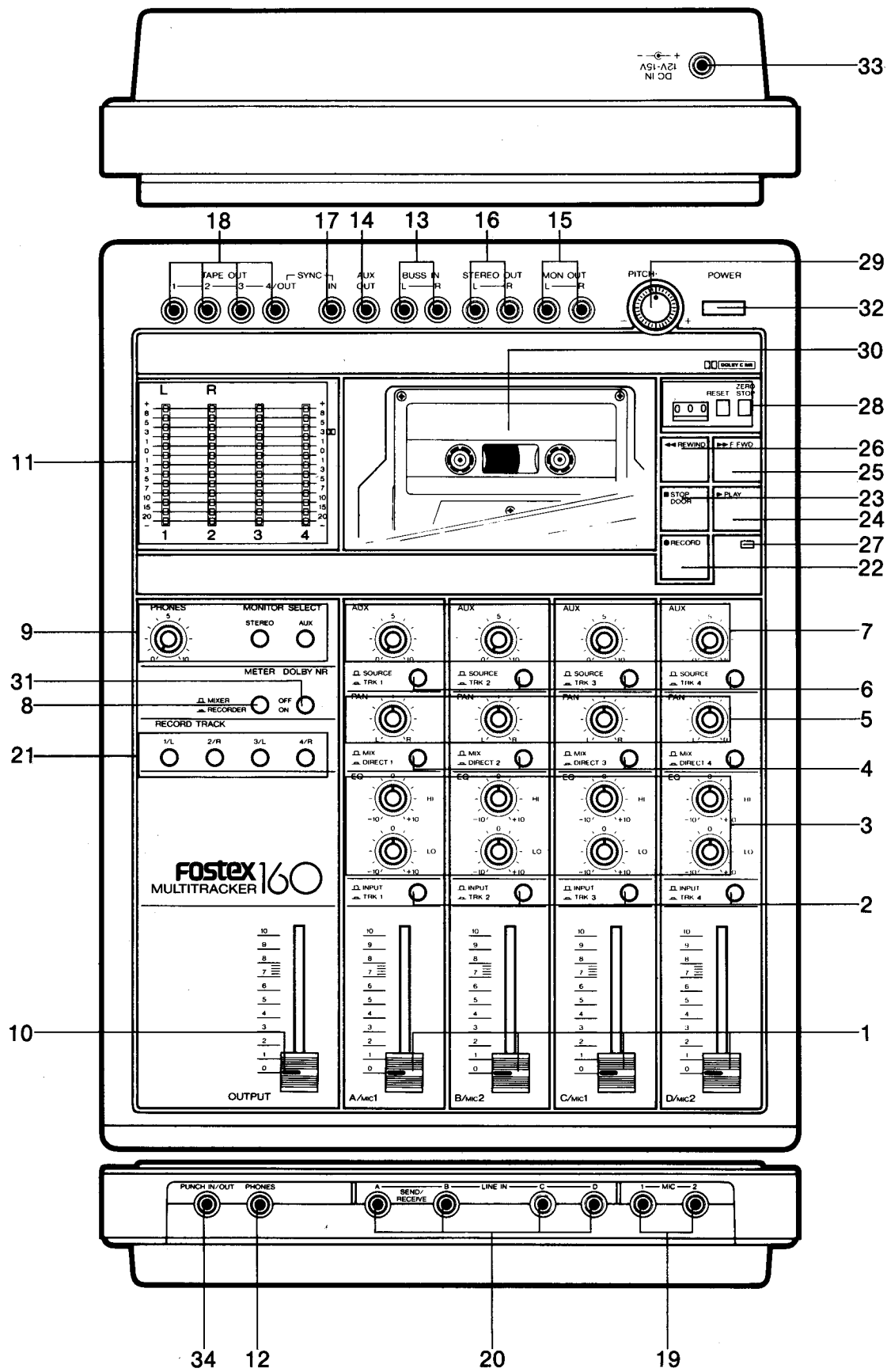


TABLE OF CONTENTS

	PAGE		PAGE
SECTION 1	Introduction, Preliminary Notes	SECTION 7	Interface Suggestions
SECTION 2	Controls, Indication and Connector	SECTION 8	Routine Maintenance
SECTION 3	Basic Operation	SECTION 9	Block Diagram
SECTION 4	Stereo Recording		Fostex Information Service
SECTION 5	Punch-in Recording	SECTION 10	Specifications
SECTION 6	Plus One Ping Pong Recording		

WARNING: To avoid possible electric shock hazard, do not expose this appliance to rain or moisture. There are no user serviceable parts inside. Refer servicing to qualified service personnel.

SECTION 1. INTRODUCTION

Thank you for purchasing the Fostex Model 160 Multitracker. It contains a 4-track cassette recorder with integral mixer, and is capable of high quality recordings.

In order to write this operating manual we have had to make a few assumptions.

We assume that you know the basics of recording — where, in general, to place the mic; how to set a relative balance between source levels and tape levels; and the fact that you need another deck in order to tape your mixes.

If you need a basic reference about tape recording, see Glossary, Page 16 in order to use the Model 160 in its fullest capacity. You will not need to spend a whole lot of time, and most assuredly, you will not have to become a recording engineer in order to make good tapes on the Model 160.

But you own a rather sophisticated recording instrument. Learning the basics of recording will help you enormously in making the best tapes you can.

The information in the manual is presented in the sequence normally followed in making a multitrack master. The initial recording (reference track), overdubbing and mixdown.

Following these topics, we cover some advanced applications, stereo recording and other related procedures.

If you are quite familiar with inter-connecting and operating this kind of gear, a look at the specifications and the block diagram in Section 9 will suffice.

Otherwise, we recommend reading the front and rear panel descriptions in Section 2, as well as the interface information in Section 7.

Most operating procedures are organized step-by-step. Accompanying diagrams are labelled to show the controls associated with the numbered steps.

Please take the time to learn information which is new to you so that you can make the most of your Model 160 Multitracker.

PRELIMINARY NOTES

Format. Your Model 160 uses the professional cassette format of four tracks in one direction at a tape speed of 3-3/4 ips (9.5 cm/sec). Thus recording time is 15 minutes with a C-60 and 22-1/2 minutes with a C-90. You will note that tapes made on conventional Hi-Fi decks will not reproduce on the Model 160, and tapes made on your Model 160 will not reproduce on conventional Hi-Fi decks. You will be making multitrack master tapes with your Model 160; these will usually be mixed to stereo on a standard deck.

Recommended Tape. Use ONLY Maxell UD-XL-II, TDK SA or equivalent. Your 160 is biased and equalized for 70 μ sec EQ, Hi-Bias Tape. Never use C-120's, only C-60's or C-90's. You will be spending a lot of time in the making of your multitrack master tapes, so you'll want to protect them against accidental erasure by removing the tabs, and store them in clean, dry areas away from magnetic fields such as microwave ovens and speakers.

Connections/Interface. There are so many microphones, instruments and signal processors on the market today that it's virtually impossible to design a unit like the Model 160 with universal compatibility. Input and output impedances should match, as should levels, for most equipment. In some cases, you may need to purchase adaptors or interface units. Specifically, in the case of low impedance, balanced microphones (recommended for many applications), use the Fostex Model 1030 microphone input transformer.

Cables. Not all are the same. You may encounter a loss of high frequency response, not to mention hum and noise. As a general rule, try to keep all of your line level cable runs to 10 feet or less, and use low capacitance cable for best results. Use the shortest practical length for your mic cables and be prepared to use input transformers such as the Fostex Model 1030 for use with low impedance, balanced microphones.

CAUTION. Avoid switching off AC power to this recorder when it is in the PLAY or RECORD mode. If this precaution is not heeded, the pinch roller will remain pressed against the capstan and if held in this condition for long hours, it can deform the pinch roller rubber.

SECTION 2. CONTROLS, INDICATORS & CONNECTORS

Input Channels 1 – 4

1. INPUT FADER

This fader controls the signal level from either of three sources; MIC 1 & 2 (19), LINE A ~ D (20) or TAPE 1 ~ 4 (18).

2. INPUT SELECTOR

In the *up* or INPUT position, this channel receives signal from the corresponding input jack, mic or line; in the *down* or TRK position, this channel receives the playback signal of the corresponding track from the recorder.

3. EQUALIZERS

The hinge point for the HI tone control is 10 kHz; the hinge point for the LO tone control is 150 Hz. Both controls are shelving type equalizers and their range is ± 15 dB.

4. BUSS SELECTOR

In the *up* or MIX position, the signal from this channel will be fed to the stereo buss, and imaging is dependent upon the setting of the PAN CONTROL (5). In the *down* or DIRECT position, the signal from this channel will be fed directly to the corresponding track of the recorder, by-passing the stereo buss and, of course, the PAN CONTROL (5).

5. STEREO PAN CONTROL

When the BUSS SELECTOR (4) is in the *up* or MIX position, this Pan control will place the signal from this channel anywhere within the stereo panorama.

6. AUX SELECTOR

This button functions as a Input (Source)/Tape (Track) selector for the mono auxiliary buss. In the *up* or SOURCE position the signal present is from the input, post EQ and fader. In the *down* or TRK position the signal present is tape playback from the corresponding track of the recorder.

7. AUX LEVEL CONTROL

This pot is an independent level control for the mono mix present at the AUX jack (6). Source/tape status is determined by the AUX SELECTOR (6). Monitor status is determined by the Monitor Selector (9).

8. METER SELECTOR

In the *up* or MIXER position the stereo buss is displayed under the L and R meter designations. In the *down* or RECORDER position each track is displayed above its corresponding number.

9. MONITOR SELECT

The same signal is present at the MON OUT jacks (15) and PHONES jack (12). Normally, you'll choose either the STEREO buss or the AUX buss by pressing the corresponding button, but you can hear both simultaneously by pressing both buttons. The PHONES level control is for the headphones only.

10. MASTER STEREO OUTPUT FADER

This is the master stereo buss fader. It sets the overall output level of the mixed stereo signals being assigned to the recorder, as well as a master fader for the signals from the 160 to the mixdown deck. It also regulates the signals from the BUSS IN jacks (13). The STEREO OUT does not need to be up using "DIRECT" assign.

11. BARGRAPH METERS

Four LED bargraph meters correspond to the four tracks of the recorder, source or tape. Additionally, the two designated L and R can be switched (8) to read the stereo buss, source or tape.

12. PHONES

Stereo headphone jack for monitoring has an independent level control (8) (8~40 Ω).

13. BUSS IN

Input jacks L & R to the stereo buss before the OUTPUT FADER (10).

14. AUX OUT

Mono output of the auxiliary buss.

15. MON OUT

Stereo outputs L & R for monitoring. Signal status is determined by the MONITOR SELECTOR buttons (9).

Note: The overall level of the monitor system is set by the external amplifier controls. Use good speakers so that you can really hear what you're doing.

16. STEREO OUT

These are the main line outputs, L & R to be connected to the input of the Mixdown deck.

17. SYNC IN

This is a priority line input directly to track 4 of the recorder. When the output of an FSK unit, sequencer, or any sync pulse is connected to this jack, it will override any other signal(s) routed to track 4. For Sync out, use TAPE OUT 4 (18).

18. TAPE OUT

These four line out jacks correspond to the four tracks of the recorder and the signals here are direct playback outputs from the recorder.

19. MIC INPUTS

Two phone jacks (1 & 2) for -50 dBV standard microphones, *low* level guitars, keyboards, synths, etc. Input 1 feeds channels A and C simultaneously and Input 2 feeds channels B and D simultaneously — *unless* a line input is occupied. The line inputs have priority. If all four line inputs are occupied, neither mic input will function.

Note: This dual channel feed offers interesting creative possibilities (see Page 7), but is not required operation. One microphone assigned to one track is easily accomplished, e.g., MIC IN 1 to Track 1 via Channel A.

20. LINE INPUTS

Four phone jacks (A ~ D) for -10 dBV standard line level sources. There are two important aspects to the operation of these jacks:

1. They take priority over the MIC inputs. Thus if you have a mic connected to MIC 2, and a synth connected to LINE IN B, the mic signal will appear only on input Channel D.
2. Line Inputs A and B have a dual function. When a mono plug is connected, they function as normal line inputs. When a stereo plug is connected, they function as Accessory Send/Receive jacks for the mic inputs. See Page 11 for details and note that *ring* is for Send and *tip* is for Receive.

21. RECORD TRACK SELECTORS

The up position is safe; the down position is record ready, indicated by the LED. When the RECORD button (22) and PLAY button (24) are then engaged, recording is in progress. Alternatively, if the transport is first placed in the record mode, engaging these selector buttons has the effect of punching-in and -out. For the stereo buss, tracks 1 & 3 are assigned to L, tracks 2 & 4 to R.

22. RECORD BUTTON AND LED INDICATOR

The effect of pressing the record button will vary, depending upon the status of other controls. There are three main operations:

(a) LEVEL SET. With the recorder in the STOP mode, press the RECORD button and its LED will blink in green. By alternately touching the record button the track(s) selected for (ready) record will change from input to playback and back again. To set levels you need to be in input, as indicated by a flashing record light.

When you play back a track that's been selected for ready record, if you punch-in (go into record), the recorder will also go to input. When you come out of record, it will automatically return to playback. If you started the input/playback sequence in input then that track will remain in input throughout the punch-in/punch-out sequence.

Sometimes someone will record something, rewind, and hit play and hear nothing because the track just recorded is still in input (Or they forgot to push the record button). To return to playback touch the record button or release the record assign button.

Engage the RECORD TRACK SELECTORS (21) for the track(s) you wish to record, and use the Fader (1) controls to set proper levels before you begin recording.

(b) NORMAL RECORDING. After setting proper levels as indicated above, simply press RECORD and PLAY simultaneously. All blinking LEDs (indicating Record READY status) now change to On in red (indicating Recording In Progress).

(c) PUNCH-IN RECORDING. There are three ways to accomplish Punch-In recording manually. First, depress the RECORD TRACK SELECTOR button(s) for the channel(s) you wish to record on, press PLAY and when you reach the punch-in point, press PLAY and RECORD simultaneously. The second way to manually punch-in is to release all RECORD TRACK SELECTOR buttons (21) and press RECORD and PLAY simultaneously. The RECORD LED will remain On in green, indicating Record READY, as the transport enters PLAY. At the Punch-In spot, press the appropriate RECORD TRACK SELECTOR button(s) and the monitor function instantly changes to input as you enter the RECORD mode. ALL LEDs remain On in red.

A third way to punch in is with the optional Remote Foot Control, Model 8051. Simply depress the appropriate RECORD TRACK SELECT button(s), place the transport in PLAY, and use the Remote Foot Control Switch to Punch-In and -Out.

23. STOP BUTTON

Cancels any previously selected transport command and stops tape travel. Press again to open the cassette door.

24. PLAY BUTTON>

Advances tape to the take-up reel (from left to right) at a constant speed of 3-3/4 ips (9.5 cm/sec), plus or minus any effect of the PITCH CONTROL (29), if engaged. For cueing, first engage PLAY, then either fast wind control.

25. FAST FORWARD BUTTON>>

Cancels any previously selected transport command and tape begins spooling to the take-up reel (from left to right) at high speed.

26. REWIND BUTTON<<

Cancels any previously selected transport command and tape begins spooling to the supply reel (from right to left) at high speed.

27. RECORD LED

Indicates the various modes and record status; see RECORD button (22) for details.

28. TAPE INDEX COUNTER WITH ZERO STOP AND RESET

A 3-digit counter indicates relative tape position. Pressing the adjacent RESET button sets the display at 000. Pressing the ZERO STOP button programs the deck to stop at 000 in the PLAY mode, but not the RECORD mode.

29. PITCH CONTROL

This control can vary tape speed $\pm 12\%$. CCW rotation decreases tape speed; CW rotation increases tape speed. There is a click-stop OFF position in the center. You can use this control to compensate for tuning irregularities as well as for creative effects.

30. CASSETTE WELL AND COVER

A transparent, curved plastic cover protects the cassette during operation. Open the door by pressing the STOP button twice, and insert or remove the cassette manually.

NOTE: Use ONLY C-60s or C-90s, High Bias, 70 μ sec EQ — Maxell UD-XL, TDK-SA or equivalent.

31. DOLBY NR

This highly effective C-type noise reduction system is normally left on (button down), except during calibration and alignment.

32. POWER

On-Off Switch.

33. AC ADAPTER

Connect *only* the Fostex AD-12, included with the Model 160, or the Fostex 8070 here. Do not use any other AC Adapter.

34. PUNCH IN/OUT

1/4" Phone jack for connecting Fostex Model 8051, Optional Remote Control Foot Switch.

SECTION 3. BASIC OPERATION

For purpose of demonstration, let's assume a single musician working alone with a drum machine, synth and bass guitar. Plus a pretty good idea of how everything should sound together.

The standard procedure is as follows:

- I. Initial recording (drum machine)
- II. Overdubs (bass, synth 1, synth 2)
- III. Mixing (four tracks to stereo)

Here is a step-by-step explanation:

I. INITIAL RECORDING

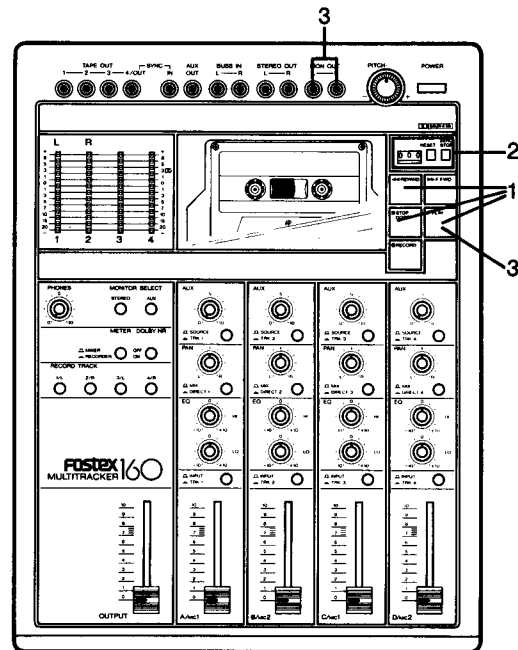
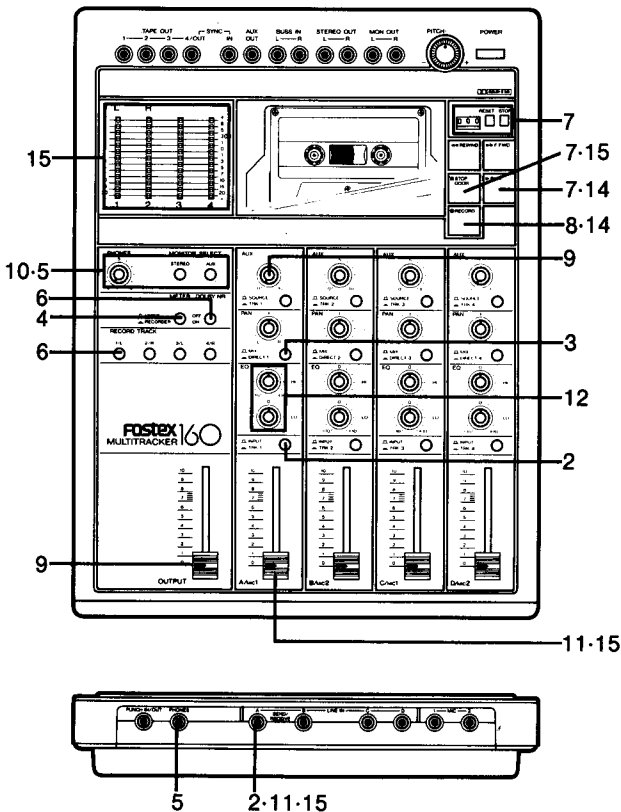
1. Start by "zeroing" all controls. Set all faders, knobs and controls to their off or neutral positions. Each adjustment you make from this point on should be purposeful.
2. Connect the output of the drum machine to Line in A and select Input, the Up position.
3. Select BUSS SELECT to DIRECT, Down position.
4. Set the Meter Select Button to the Down/RECORDER position.
5. Select AUX for the MONITOR/PHONES Assignment, and plug in a set of headphones.
6. Select Track 1 of the Record Track Selectors, and switch the Dolby circuits On.
7. Insert a cassette, press PLAY for 5 ~ 6 sec (leader tape), then STOP and press the Reset button.

8. Now press RECORD to go to input. Now start the drum machine.
9. AUX select, select TRK 1, Down position, and AUX control to about 6.
10. Monitor selector AUX, Down, Phones level to about 6. (Once record levels are set you may want to read just the relative levels of the AUX 1 ~ 4 control to create the desired balance. The PHONES level control controls the overall loudness.)
11. Slowly advance Input Fader A and adjust the Headphone Level Control. Just set a relative level reference at this point.
12. Books have been written about equalization. Now it's your turn. You get to decide how much is enough with the EQ controls. You will notice the adjusting these controls affects the level, so you may have to readjust the Input Fader.
13. Cue the drum machine.
14. Press REC and PLAY > simultaneously, then start the drum machine.
15. Adjust level as necessary with the Input Fader so that the loudest portions of the piece register +1 ~ +5 on the meter, averaging zero, and when the recording is completed, press STOP.

PLAYING BACK THE BASIC TRACK

Before you do anything, disengage the RECORD TRACK Selector.

1. Press REWIND << and cue the tape to the precise beginning with the PLAY and STOP buttons.
2. Now press both the RESET and the ZERO STOP buttons; in the future, the tape will automatically stop at this 000 position.



- Now simply press PLAY and the drum machine part will be displayed on the meter and heard through the headphones. If you wish to connect an external amplifier and speakers, use the MON OUT jacks to feed the amp.

Suggestion: Sometimes the multitrack recording process can get out of hand when you try to keep everything inside your head. Note pads and track sheets (see sample on Page 17) make this process a whole lot easier.

II. OVERDUBS

Overdubbing, or Sync Recording, is the primary benefit of multitrack recording. You may have an occasional need to record all 4 tracks simultaneously, but the standard multi-track procedure is to record one or two tracks at a time. This way, you can concentrate on each component part, literally building a song.

- Zero all controls.
- In overdubbing the bass guitar, let's mic the bass amp and plug the microphone output into MIC IN 2.
- Set Channel B's INPUT SELECTOR to INPUT, Up.
- Set Channel B's BUSS SELECTOR to TRK 2, Down.
- Set Channel B's AUX SELECTOR to TRK 2, Down, and raise AUX control to about 6 or 7.
- Set MONITOR SELECT to AUX and METER SELECT to RECORDER, Down.
- Press Dolby On, and the Record Track Selector for Track 2.
- Press RECORD once and set the Input level control for the proper record level of the bass amp, and set the PHONES level control so you can hear yourself in the headphones.
- You'll want to rehearse with the recorded drum part, so press PLAY and adjust first the EQ, then the Input fader for Channel B while monitoring the signal level on meter number 2. This is the track you're going to record, so set it's level first.
- Now adjust AUX CONTROLS for Channels A and B until you have the relative balance you want between bass guitar and drum machine, then use the PHONES control for the overall level in the headphones.
- When you're ready to make the overdub, cue the tape and press PLAY > and RECORD simultaneously.

Don't be surprised if the first overdub takes some time, especially if this recording technique is a bit unfamiliar to you.

After a few attempts, suppose you decide to add a compressor/limiter. Here's how to patch one in:

- First, adjust the average record level before plugging any outboard gear into the SEND/RECEIVE jack. This will keep you from overdriving the microphone pre-amp before the signal would go into the piece of signal processing.
- Connect a stereo lead from LINE IN B of the Model 160 to the compressor/limiter (you may need clip leads

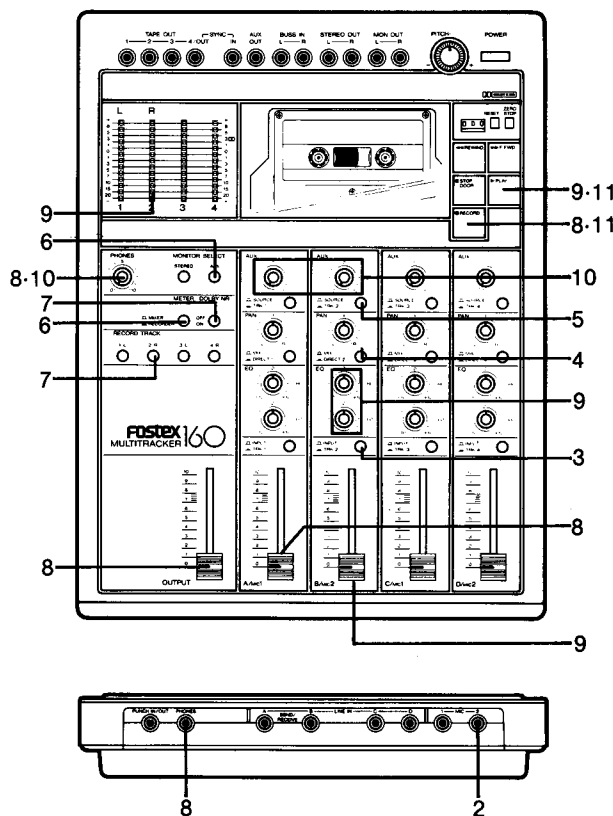
- to connect the *ring* to input and the *tip* to output).
- Adjust the gain with the Channel B Input Fader and the compressor/limiter's gain controls.

Make the next overdubs in the same manner, switching INPUT SELECTORS to INPUT for tracks to be recorded, using the AUX buss in TRK, Down, for an independent mix (CUE) for the headphones.

BE SURE TO TAKE OUT OF RECORD THOSE TRACKS YOU WISH TO SAVE

Scheduling the sequence of the tracks to be recorded is often the key to a successful recording. There are no hard rules, only guidelines. A rhythm part is generally the first to be recorded because it serves as a common reference for all other parts. Background vocals/fills are usually next because they can be combined and bounced, thereby leaving room for still more parts. Leads and solos are typically the last parts to be recorded, so that they are first generation recordings on the multitrack master tape.

When you have three tracks recorded, it's time for decisions. How many more parts to record? What are the best sub-groups for combining tracks? You may want to turn to Ping-pong Recording, Section 6, to see what your options are.



III. MIXING

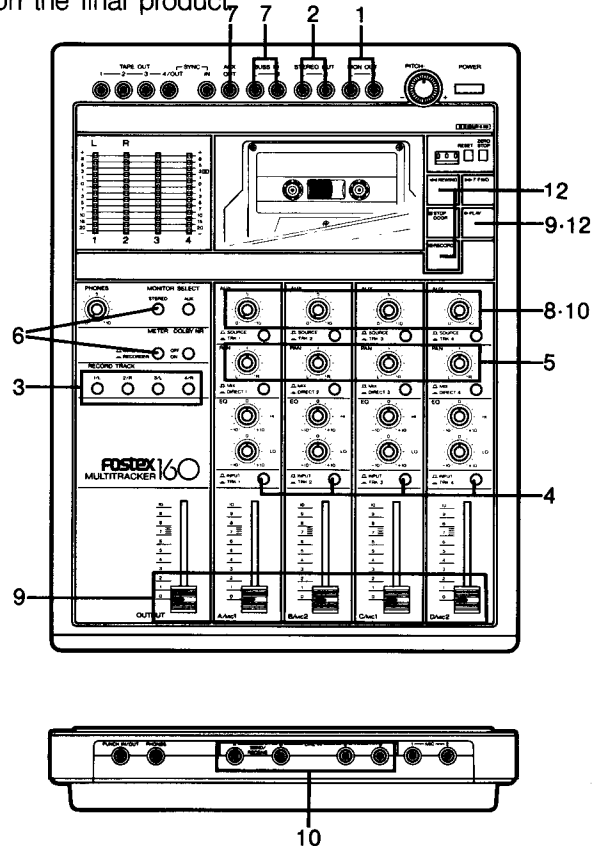
When the multitrack master tape has been completed, give your ears a rest before going on to the next step in the process, the mixdown. Some producers believe that mixing is a craft, others maintain that it's an art. Nobody thinks it's easy. Mixing requires intense concentration and the patience to listen over and over until all the elements are blended the best they can be.

The following example is a typical mixdown set-up with the Model 160.

1. Zero all controls and connect the MON OUT jacks to a stereo amp which drives two speakers. You're going to be making value judgments about improving what you hear, so use the best speakers you can buy, borrow or beg.
2. Connect the STEREO OUT leads to your mixdown recorder.
3. Release all RECORD TRACK Selectors.
4. Select the TRK position (down) on all four INPUT Selectors.
5. Select the MIX position (up) on all four Pan Selectors.
6. Set the MONITOR SELECT to STEREO, Down, (monitor selector AUX, Up) and the METER SELECT to MIXER, Up.
7. Connect any signal processors (such as a reverb) to AUX OUT. Connect the return leads to BUSS IN. (If effect has a single mono output, use a Y cord to connect the single output to both BUSS INs. If the effect has a stereo output, then left will go to BUSS IN left, and right will go to BUSS IN right. The output volume controls on the effect will adjust the amount of effect returning to the stereo mix.)
8. AUX SELECT to source, Up, so that signal which is sent to the effect will follow the chosen EQ, and level settings of the individual channel faders.
9. Press PLAY > and set a relative balance among the four tracks with the Input Faders; set the overall output level with the Master Fader into the shaded grey area.
10. Adjust AUX SEND 1 ~ 4 for the desired amount of signal which is to go to the signal processor (for instance

reverb). (If you want more effect on the vocals on track 4, turn up AUX SEND for channel 4, if you don't want any effect on the Bass on track 1, don't turn up any on AUX SEND for channel 1, etc.)

11. Adjust the monitor levels as necessary and adjust the input level controls of the mixdown recorder.
12. Cue the tape and record a minute or so of a trial mix for the purpose of checking the system level balance.
13. You'll probably make several mixes before you decide on the final product.



SECTION 4. STEREO RECORDING

There was a time when the term, "stereo," had only one meaning. Purists will insist that nothing has changed since, that the term should be reserved for only those events recorded/reproduced with two sound sources. Realists are more relaxed with the application of the term, and use it to refer to a variety of stereo-like program sources, each valid in its own right.

True Stereo. Two microphones only during recording, carefully placed and recorded in real time, and two reciprocal channels of playback.

Multi-Mono. Different monophonic sources are recorded individually, at various times, mixed into sub-groups, then re-mixed within a simulated stereo sound spectrum; Pan Controls determine left-to-right placement, artificial (out-board) reverb determines front-to-back position.

Example 1. True Stereo.

1. Connect a pair of microphones to MIC IN 1 & 2. For best results, they should be matched microphones. Set the INPUT SELECTORS to Input (Up). Set the BUSS SELECT to MIX (Up) and set STEREO PAN Channel A to the left, and Channel B to the right. Then set the MONITOR SELECT to Stereo, the METER SELECT to Recorder, the DOLBY SWITCH to On and engage RECORD TRACK SELECT 1 and 2.
2. Now set the OUTPUT FADER between 7~ 8, and the INPUT FADERS, the EQ CONTROLS for Channels A and B as you have the band rehearse. (Press

RECORD ONCE for this level set.)

- Ask them to play the part or parts that are the loudest. Depending on the program material, you may have to "ride gain," that is, continually adjust the INPUT faders, in order to avoid distortion. But be careful not to make sudden, drastic changes in working these controls, or you may destroy the feel of the music. You may have to re-position the microphones during the level set.

NOTE: The headphone amplifier in the Model 160 is not large enough for multiple headphone feeds. Connect the MON OUT jacks to an external power amplifier and use it to drive the multiple sets of headphones.

- When the band is ready and you're ready, cue the tape, set the ZERO STOP, and press RECORD and PLAY simultaneously. Only when you are rolling in the record mode do you tell the leader to begin the "slate" ("One, two, ready, play.")

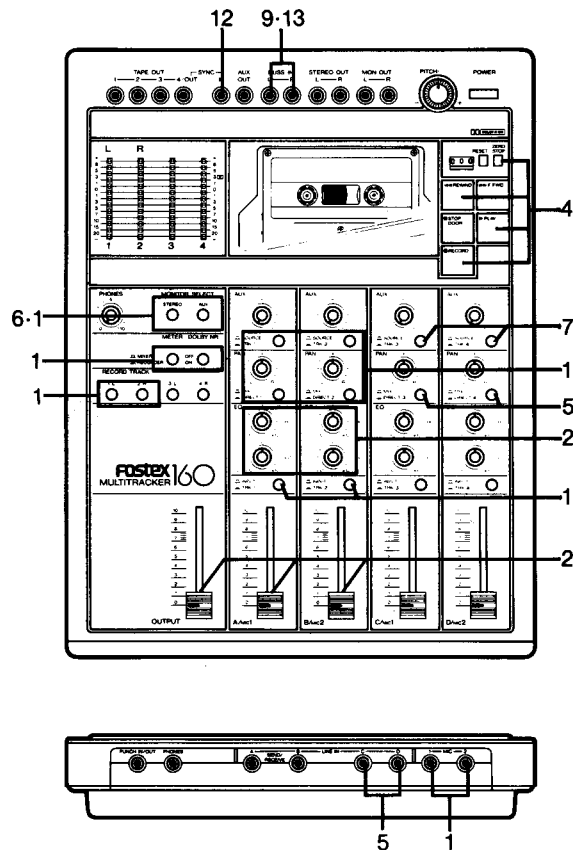
Example 2. Stereo Plus.

- Use the set up in the previous example, but take advantage of the 4-track capabilities of the Model 160, and use LINE INPUTS 3 and 4 for direct feeds from guitar, keyboard, synth, etc. DIRECT 3 & 4, Down.
- MONITOR SELECT, STEREO, and AUX, both Down.
- AUX select for Channels C & D set to SOURCE, Up.
- AUX Control from Channel C & D should be blended with the stereo balance to get the desired monitor mix.
- You can also take advantage of the Buss inputs and connect other instruments or an outboard stereo submix, like drums, directly.
- The basic idea here is to capture the overall stereo sound of the band with two well-placed microphones, and then highlight important instruments with additional live level feeds, knowing that the 4-track tape will later be remixed to stereo.
- Obviously, you can also overdub additional parts (like lead vocal) after the basic stereo recording has been made.

Example 3. Multi-Mono

In this example, the technology is still fairly expensive. But what with progress, not to mention a little help from friends, the following set-up is becoming more and more popular.

- Record a sequencer and/or drum machine clock pulse control signal on Track 4 using the SYNC INPUT. If necessary, use an FSK Interface unit like the Fostex TS-15, so that the sync data is made "readable" by the recorder. (Unlike broad band compander noise reduction systems, ie-DBX, etc, it is not necessary to defeat the Dolby C noise reduction, which is built into the 160, in order to accurately record and playback code.
- Use this control track to trigger a sequencer which, in turn, synchronizes playback from MIDI instruments. Use a small line mixer like the Fostex 2050 to control multiple instrument outputs. These signals are then mixed to stereo with the 2050's output being connected to BUSS IN L,R. tape recorder tracks can be saved for guitar and vocals. The stereo output of the MIDI controlled devices aren't recorded on the Multi-tracker, they play in sync to it. One of the main advantages of MIDI is the ability to have multiple instruments playing simultaneously and directly to the final mixdown recorder for first generation quality.
- To playback in stereo refer to mixdown.



MIXING MULTI-MONO WITHIN THE STEREO PANORAMA

Once you allow variations of the True Stereo Reference, all sorts of artistic possibilities present themselves. In a basic assembly, the Pan Control is used for Left-to-Right placement, and a reverb unit like the Fostex 3180 is used to re-create the Front-to-Back dimension.

With the Fostex M22RP Stereo Microphone, you can record the source in stereo, then later decode the signal from 180° spread all the way to mono, without any phase irregularities.

In more complex assemblies, different stereo references are mixed together. The drums, for example, might occupy the entire spread, so that the hi-hat or crash/ride cymbal is extreme Right, the lowest tom, extreme Left, kick drum

in the center. Another stereo reference — like a piano — might be mixed in between the stereo drum spread. The final sources — like lead vocal and lead solos — are usually placed near the center, and the bass is usually in the very center.

In some multitrack-mono assemblies, the actual stereo references are each a vast departure from the true reference, yet mixed as they are, they create yet another reference, valid in itself. If it simply sounds good to you, that's reason enough.

The best attitude to have these days is experimental, open-minded. What with the flexibility of the Model 160, the sky's the limit.

SECTION 5. PUNCH-IN RECORDING (INSERTS)

This technique is useful for correcting minor mistakes on a track, thus saving you the trouble of recording the whole part over again.

An insert is very much like an overdub in that you listen to previously recorded parts while recording a new part. The essential difference is that while an overdub is accomplished on an *adjacent* track, a punch-in is recorded over a portion of the *same* track.

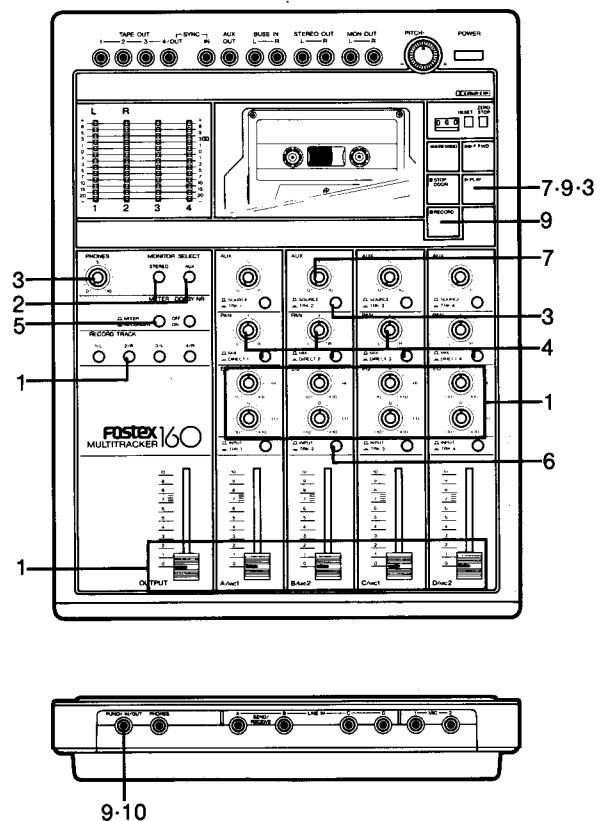
Timing is therefore critical. Wherever the insert occurs, previously recorded material will be erased. If you punch-in too soon or punch-out too late, you could wreck the very track you're trying to fix.

Your Model 160 is especially well-suited for punch-in recording because the monitor circuits allows you to listen to AUX (tape) and STEREO (input) simultaneously.

Here's a typical example: You've just finished a bass part on Track 2, and everything is perfect except for a bad note in the middle of the second chorus.

1. Leave the Master Output Fader, Input Level Controls and EQ controls where they were during the first recording because you don't want a level shift for the insert. In fact, you don't want anyone to know that there was an insert. Also leave the Record Track Select engaged for Track 2.
2. Select both AUX and STEREO for the Monitor/Phones.
3. Set the AUX Select to TRK 2 and adjust the level in the headphones. This cue signal is tape playback (the already recorded part). You'll need to hear this signal along with the input (source) in order to know when to punch-in.
4. Select MIX (Up) for the BUSS Select Control and rotate the PAN CONTROL to the center. Since you're only recording one track at a time the pan control can stay in the center. This will result in your new part remaining in the center and equally loud in both ears. If you were recording two tracks at a time it would then be necessary to set the pan control(s) to the appropriate left or right position.

5. Set the Meter Select Button to RECORDER.
6. INPUT Select button up for Input.
7. Now press PLAY and rehearse the punch-in, listening to both the prerecorded part along with the Input signal. If the mix in the headphones isn't to your liking, adjust it with the AUX CONTROL.



- In our example, the bad note occurs in the second chorus. A good operating technique would be to find the beginning of the second chorus, plan to punch-in there, and plan to punch-out at the end of that chorus. Re-doing a coherent section is usually much easier than trying to replace a note or two. Plus, if the insert is timed to coincide with major downbeats, any minor timing deviations will be masked.
- You're now ready to record the insert. At the appropriate time, press RECORD and PLAY simultaneously. If your hands will be busy playing the bass, the Model 160 is equipped with a Remote jack which accepts the optional Model 8051, a foot operated remote control punch-in/out unit.
- Punch-out can also be accomplished by simply stopping the tape, or pushing 8051 again.

Note: The assignment of a direct button will override the assignment of the stereo Buss to a particular track. For instance; you can't assign the left buss to track 3, if channel 3 buss assign is down to direct.

CREATIVE USE OF 'DEAD AIR'

"Dead Air" is a radio term for a broadcast signal which contains no audio. In recording, it means a blank section on the tape. If you have a separate track for solo instruments, for example, there will probably be sections like choruses where solo instruments aren't playing.

Use the Punch-in recording technique to make use of this space by doubling the melody line, adding a counterpoint rhythm, or recording other creative ideas.

Remember that there are three methods of Punching-in/-out on the Model 160. The first method is described above. In this example we'll describe the second method.

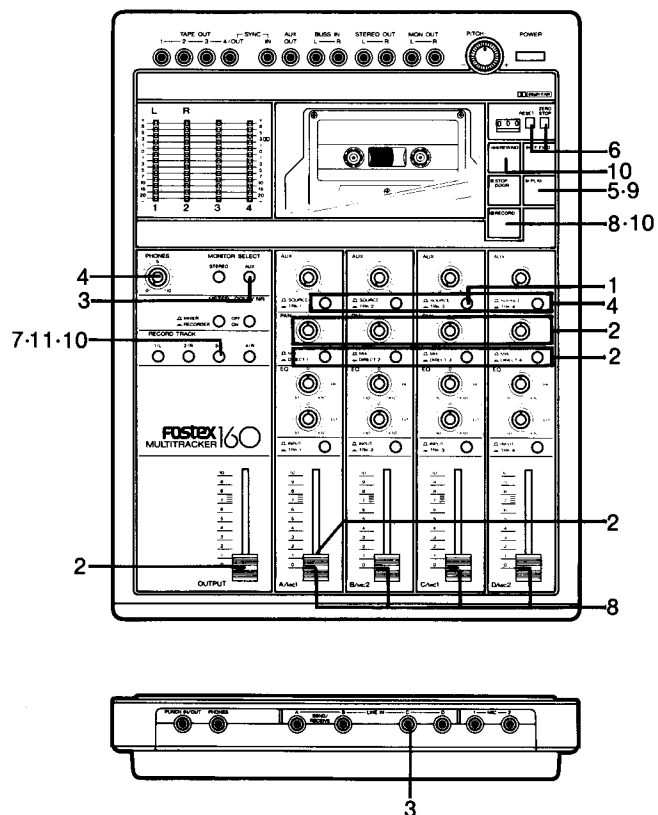
Let's suppose you've used Track 3 as your solo/lead instrument track, and that there are two primary blank sections on that track of the tape.

- If you are recording from just one sound source (for instance a monophonic synthesier or a lead vocal) plug it in to MIC 2, or LINE IN C (Depending on mic or line signal), BUSS SELECT to DIRECT TRK 3, down.
- Or if you are mixing more than one sound source together to a single track (for instance two different MIDI sound modules are being used to create a "Total" sound). Then plug in all the different signals into LINE IN A ~ D (Or LINE IN C ~ D, along with MIC IN 1 ~ 2). BUSS SELECT MIX, Up, all channels. Set all the PAN CONTROLS to the left (Left goes to 1&3, Right goes to 2&4). Raise MASTER STEREO OUTPUT, to shaded grey area.
- Select MONITOR SELECT AUX only, Down.
- All AUX SELECTOR on each Channel to TRK 1 ~ 4, Down.
- Touch PLAY and by adjusting the AUX LEVEL CONTROL(s) get a monitor mix of the four tracks that are already on tape.
- Play the tape until your about 10 or 15 seconds before

you want to make you punch, and stop the tape. You may want to RESET the counter and turn on the ZERO STOP at this point, which will make it easier to return to this point repeatedly.

- Select RECORD TRACK SELECTOR 3, Down.
- Touch RECORD until INPUT/RECORD light is flashing (indicating that track 3 is in input). Raise individual CHANNEL FADER(s) until you have the desired EQ, effects, recording level, and the creative balance of the various sources (if you are mixing several sounds). (A suggestion: You might want to check the recorded levels of what's already on track 3 so that the new part will be at about the right level in a rough mix of the entire program.)
- Touch PLAY. Tracks 1, 2, & 4 will now play. Rehearse new part along with existing tracks when the part comes up. (RECORD INDICATOR should still be flashing thus indicating track 3 is still in input.)
- When you get to the end of the new part, while still in play, touch the RECORD button *only*. (Repeat *ONLY* the record button.) By touching the record button Track 3 will return to play Mode. As you continue to play the tape, make note of the counter number where the instrument that's already on track 3 re-enters. Rewind to the beginning of the section and listen again to a playback of track three to find out how much time you have between when the instrument on track 3 ends and when you can begin recording the new part.

Note: You would be well-advised to make this insert recording shorter than the blank section, because the punch-out operation here depends on the tape counter. And the tape counter is a relative reference only. Split second timing cues require more sophisticated equipment such as the Fostex 4050 Autolocator.



11. Now That you know where you need to be in and out of record rehearse the part along with the track (Touch RECORD to go to input, as before) until you're ready to "Go For It".
12. When ready to punch in use one of the three approaches earlier mentioned in the manual. Rewind tape to cue point, touch RECORD button so that RECORD/INPUT LED indicator is not flashing, which indicates that track 3 will be in playback when you touch play.
13. Touch PLAY. You'll hear all the tracks including that which is already on track 3. When you hear that what is on track 3 has passed (And before the new parts entrance) go into record. The record light will go on, and track 3 will automatically go to input so that you will hear the new part you are recording. Then come out of record.
14. Touch REWIND, then touch PLAY, and listen to what you've got.

The approach just outlined uses the AUX BUSS as what engineers describe as an "In Line" monitoring system. The AUX controls are mixing the tape recorders playback output. In order to hear a signal that is being assigned to a particular track it is necessary to have that track go to input so that you can hear the signal that is going to and then through the recorder. Input or playback is chosen by alternately touching the RECORD button.

SECTION 6. PLUS ONE PING PONG RECORDING

Example one:

The four tracks will quickly become full when a complicated multi-track recording is made. In the following, a method of producing open tracks by "ping pong" recording (also known as "bouncing") will be explained.

When ping pong recording, a number of previously recorded tracks are mixed and recorded on an open track of the same tape. After the "ping pong" is completed, the sounds on the individual tracks are no longer required, and new sounds can be recorded over them. This technique is indispensable, especially in cassette multitracks which have just four tracks.

With the Model 160, another live sound can be added to the previously recorded tracks that are being "ping ponged" (Let's call this ping pong plus one.)

When ping pong plus one is used TRK 1, 2, 3, + one, equaling 4 can be recorded on TRK 4; then TRK 1,2, + one equaling 3 on to TRK 3; TRK 1 + one equaling 2 on TRK 2; and then one more overdub on TRK 1. Thus ten performances can be recorded on the four tracks by ping pong recording. ($4+3+2+1=10$).

1. To add another performance while tracks 1, 2, and 3 are ping ponged to TRK 4. First, INPUT selector for channels A ~ C are all set to TRK(s), Down. The "plus one" instrument is plugged into LINE IN D or MIC 2, and channel 4's INPUT SELECTOR to INPUT, Up.
2. Then the DIRECT/MIX buss selectors are all set to MIX, Up. This sends the sound on tracks 1 ~ 3 and the "plus one" to the stereo mix buss. Raise MASTER STEREO OUTPUT FADER to the shaded grey area.
3. Since the R channel of the stereo mix buss can be assigned to either of the even tracks (TRK 2 or 4) the PAN knobs for channels 1 ~ 4 should be set to full R (CW).

4. Set METER SELECT to RECORDER, Down. Assign RECORD TRACK 4, Down. Switch on AUX button only of the MONITOR SELECTOR and the AUX SOURCE/TRACK SELECTOR for channel 4 to TRK 4, Down. (In this example it is important to monitor *only* track 4. If the other three AUX CONTROL were left on, you would be hearing an AUX mix balance independant of what you were mixing to track four.) So set the other three AUX LEVEL CONTROL to zero, and the AUX LEVEL CONTROL for TRK 4 to between 6 ~ 7.
5. Depress the RECORD button and set TRK 4 to input monitor mode as indicated by a flashing record/input LED. Depress the play button and adjust for desired balance, EQ, etc between tracks 1 ~ 3 and the new live sound. Approach doing this "ping pong" much as you would a final mixdown since once the "ping pong" has been made, and you have begun to record over tracks 1 ~ 3, you will not be able to go back and remix the balance of the sounds you combined on track 4. Rehearse until you are confident that the blend is what you want.
6. When you have finished rehearsing, simultaneously press the RECORD and PLAY buttons and go into record. After you have completed the "bounce", playback through AUX LEVEL CONTROL TRK 4 and (absolutely, positively) verify that everything on TRK 4 is satisfactory, ie-the balance is right, there are no drop outs, etc.
7. Now, since the sounds on TRK 1 ~ 3 are no longer needed you can record over them while listening to what you have combined on TRK 4.

Example Two:

Many times when you do a bounce you will want to add various amounts of reverb (or other effect) to the tracks that you are combining.

For instance; Track one has drums, two has bass, and three has a guitar part recorded on it. When these tracks are mixed to track four, you would want to put some reverb on the drums, probably more on the guitar, and no reverb on the bass. If you don't add them when you do the bounce, (and the effects were not added as the tracks were recorded), when you do the final mixdown you will have to add the same amount of reverb (or whatever) to everything that's been combined on track four. You will not be able to put reverb on the drums, while keeping the bass reverb free. So the reverb should be added while bouncing. The procedure for doing this is very similar to that followed during mixdown.

1. Once again let's assume there are three tracks (1 ~ 3) already recorded and you may or may not want to add an additional live sound source. Select the TRK position, down, on the first three INPUT selectors. (If there is to be a "Plus one" sound, channel 4 INPUT to INPUT, Up.)
2. Set the MONITOR SELECTOR to STEREO, (Down), and AUX off (Up). In order to get an accurate idea of exactly what is going to be combined on to a single track, in this case track 4, you will be listening to a single speaker, the right one in this case.
3. Connect AUX OUT to the input of the reverb (or whatever). Connect the output of the reverb (or whatever) to BUSS IN. You can connect up both BUSS INs if the processor has a stereo output but only the right input will be necessary since we are only going to record the right buss on to track 4.
4. ALL AUX SELECTORS to SOURCE, Up.
5. ALL BUSS SELECTORS to MIX, Up. STEREO PAN CONTROLS to the right (CW).
6. Raise MASTER STEREO LEVEL CONTROL to between 7 ~ 8. Assign RECORD TRACK 4, Down.
7. Play tape and get a balance between the tracks already recorded, and any new sounds. Adjust levels with INPUT FADER, set tone with EQUALIZERS, and turn up the AUX SEND CONTROL for those channels that you want to add reverb (or whatever). The Reverb's output level control is used to adjust how much of the reverbs output is added to the overall "Dry" (unprocessed) signal.
8. When you've got all your cues down, and the mix is ready, return to the top of the tape and push PLAY and RECORD simultaneously.

In order to playback what you have on track four you will have to change several button settings. If you decide to redo the mix you will have to return all of these buttons to the setting just described in example 2.

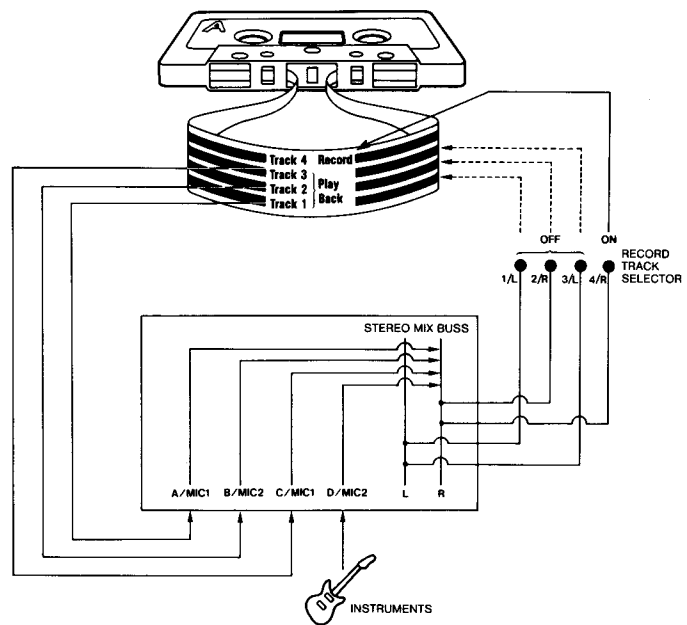
9. INPUT SELECTOR 1 ~ 3 to INPUT, Up. INPUT SELECTOR 4 can remain in INPUT, Up. MONITOR SELECTOR STEREO off, Up, AUX on, Down. And AUX SELECTOR 4 to TRK 4, Down.

10. The playback from track four will be heard through AUX LEVEL CONTROL 4. To hear the playback either louder (or softer) adjust the HEADPHONE LEVEL CONTROL (or softer) adjust the HEADPHONE LEVEL CONTROL. Do not adjust AUX LEVEL CONTROL 4, or you will have to readjust it when it is used as a reverb send if you decide to redo the ping pong or "bounce."
11. To redo the mix (and reverse step 9 of example 2) INPUT SELECTOR 1 ~ 3 to TRK, Down. AUX SELECTOR 4 to SOURCE, Up. MONITOR SELECT Turn off AUX, Up, and turn on STEREO, Down. If none of your other setting were changed you should be ready to try another "bounce"

NOTE: Even though you may not be adding an additional sound when ping ponging, be sure to set channel D/MIC2 DIRECT/MIX buss selector to MIX. If it is set to DIRECT 4, the R channel signal in the stereo buss cannot be sent to TRK 4.

ADVICE: Theoretically, any number of multiple recordings are possible by repeatedly ping ponging tracks together, but actually, noise will increase, and clarity decrease every time a ping pong is done. The practical number of times you can ping pong a track is about two or three bounces.

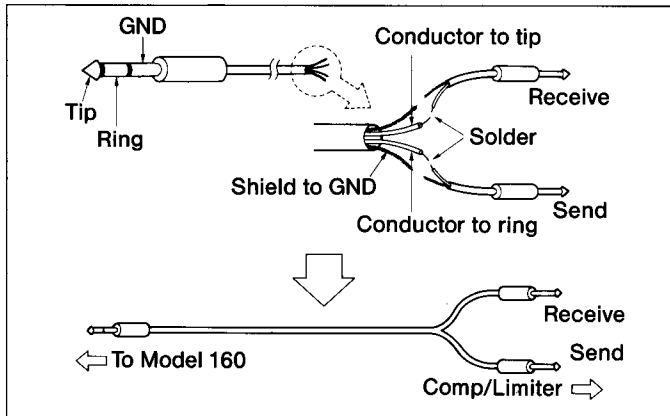
The plus one ping pong recording signal flow of the above example is shown below.



SECTION 7. INTERFACE SUGGESTIONS

There is no "right" way to hook-up the Model 160. It all depends on what you want to do with what you have on hand. But perhaps we can save you some grief with the following general suggestions:

- Equipment with pin jack connectors (Hi-Fi standard) will interface easily with the Model 160.
- Equipment with phone jack connectors (music standard) will also interface easily with the Model 160, but adapters/adaptor cables may be necessary.
- Equipment with XLR-type three-pin connectors (studio/broadcast standard) will not interface easily with the Model 160; typically, they require outboard converters like the Fostex 5030 for proper interface.



- Many better microphones, such as the Fostex RP Series, require mic input transformers like the Fostex 1030 for proper interface with the Model 160 particularly if the microphone wire is over 10 ~ 15 feet. This helps to reduce hum and radio interference (RF) in the microphone cable. A transformer input also raises the output of the microphone signal into the input. If you're setting right next to your equipment (under 10 feet) (and you don't live next to a radio transmitter) you can often use a simple adapter cable with a female 3-pin XLR on one end and a 1/4" phone plug on the other. The shield should be connected to both pin 1 and 2 of the XLR, and the hot lead (tip) of the 1/4" plug goes to pin 3. If the microphone does not have enough output then an input transformer will be necessary but many microphones will have enough out put (including the Fostex mics).
- Radio Shack and many electronics supply stores carry cables with a stereo phone plug on one end and pin jacks on the other. Be sure that the ring is send and that the tip is receive for proper use with the Accessory Send/Receive jacks of the Model 160.
- Most drum machines and sequencers made today have two ways of externally controlling their tempo so that they can be interconnected to each other and will run in sync to vocals, guitar and such that are recorded on a tape recorder.

The simplest approach is a recorded clock pulse (which is not the same as MIDI clock). Some drum machines (or whatever) generate a digital type square wave pulse. This type of data is difficult for any recorder to reproduce accurately. The leading edge of the wave gets slightly rounded so that when the signal goes back into the drum machine (etc) it doesn't recognize the (now Sloped) pulse so it loses beat. To eliminate

this problem many machines use what is called FSK (Frequency Shift Keying). FSK converts the digital clock inside the drum machine (etc) into one of two sinewave frequencies (1Khz or 2Khz) which is significantly easier for the recorder to reproduce. This is not a quirk of the 160, it is true for all tape recorders. If you have a drum machine (etc) that puts out a digital clock pulse you'll probably need a unit like the Fostex TS-15 which directly converts a digital clock to FSK, and (on playback) back again.

The second, more advanced approach uses SMPTE time code as a time reference to drive a (24 beat per quarter note) MIDI clock. The SMPTE code is a chain of warbling computer tones that can be read as hours, minutes, seconds, and fractions of seconds. When recorded on tape this SMPTE code gives each instant of tape a unique reference number.

A SMPTE to MIDI synchronizer will read time code on one track of the tape deck, and simultaneously put out the correct beat, MIDI start, and bar by bar accuracy with MIDI song position pointer. Song position pointer makes it possible to stop and start, and pick-up the drum machine (etc) program in the middle of the song. This last feature is impossible using either a digital or FSK clock which must be started from the beginning every time the drum machine or sequencer is stopped. SMPTE code is already widely used for interlocking audio decks to video decks, and is the key to video synchronization and editing but until recently was not used in conjunction with musical instruments. This sort of feature is available in the Fostex 4050 Autolocator which will work with all of the Fostex reel to reel recorders.

- Be careful in your use of "Y" adapters. Know what you're doing. Never connect outputs to outputs, for example.
- For best results in using the remote foot control function, use the Fostex Model 8051 Foot Switch.
- Fostex T-20 Headphones are excellent monitoring devices and are preferred by many studio musicians.
- Fostex 6301B Self-Powered Monitors are a great in-the-field reference. For superb stereo imaging during final mixdown, the Fostex RM Series are highly recommended.
- The cable you use may have an effect on the tapes you make. Use low capacitance cable such as the Fostex color-coded pairs, 8840-8842, multitrack bundles 8044-8048 and snakes, 8041-8043.
- Try to keep your AC lines away from mic cable, and keep small magnetic fields — speakers, guitar pick-ups, headphones, AC Adapters, Computer terminals, etc. — away from the recorder and tapes.
- An attempted connection which results in an impedance or level mis-match may require an additional unit for proper interface.

SECTION 8. ROUTINE MAINTENANCE

Common sense says to keep your Model 160 dry and clean, free of dust, to avoid shocks and extremes in temperature/humidity. What you may not know is that all tape recorders require routine cleaning. It's just a matter of physics: as the tape passes over the heads & guides, a little magnetism and some oxide are deposited.

After a short while, you will be able to see the oxide residue, but not the increased magnetism. Each requires its own cleaning procedure. Because if the build-up of oxide and magnetism is left unchecked, the recorder degenerates from impaired to permanently damaged.

Just a few minutes a day of routine cleaning will keep your Model 160 working in top operating condition, giving you all the sound you paid for. If you're using the 160 constantly you should clean the heads about every four hours, or any time it sounds like a track is playing back a little dull. (Probably funky heads)

Use Fostex Cleaners 9600 or isopropyl alcohol on the heads, guides and capstan shaft. Cotton swabs are great. Use Fostex 9600 or an equivalent rubber cleaner on the pinch roller. Never use isopropyl alcohol on rubber parts because they then might dry and crack.

Clean all parts indicated. Be careful with the heads. You don't want to scratch them.

After cleaning, allow the surfaces to dry before inserting a cassette. A canister of compressed air is a great way to keep the cassette compartment dust free.

To demagnetize (degauss) you need a unit like the Fostex HD-10. Follow the instructions that come with the unit. The following process is fairly standard:

1. Turn the Model 160 Off and remove any tape from the area.
2. Turn the demagnetizer on at a distance of three feet (one meter) from the Model 160.
3. Slowly bring the probe close to the head, begin moving the probe up and down. Slowly move to the next point in the tape path until you get to the end. The slowly pull the demagnetizer away from the path. When it is about three feet away you can turn it off. (To make maintenance a little easier gently pull up the head cover which is right above the heads and such. It can be popped on and off easily.

Do yourself a favor and set aside a time for cleaning and demagnetizing your Model 160. Do it every day — every four hours if you're really using it hard. With a schedule like this, you'll never have to spend more than a few minutes each time, and your Model 160 will always be ready to perform its best.

If schedules make you sad, then just remember to clean and demagnetize before any recording or mixing session.

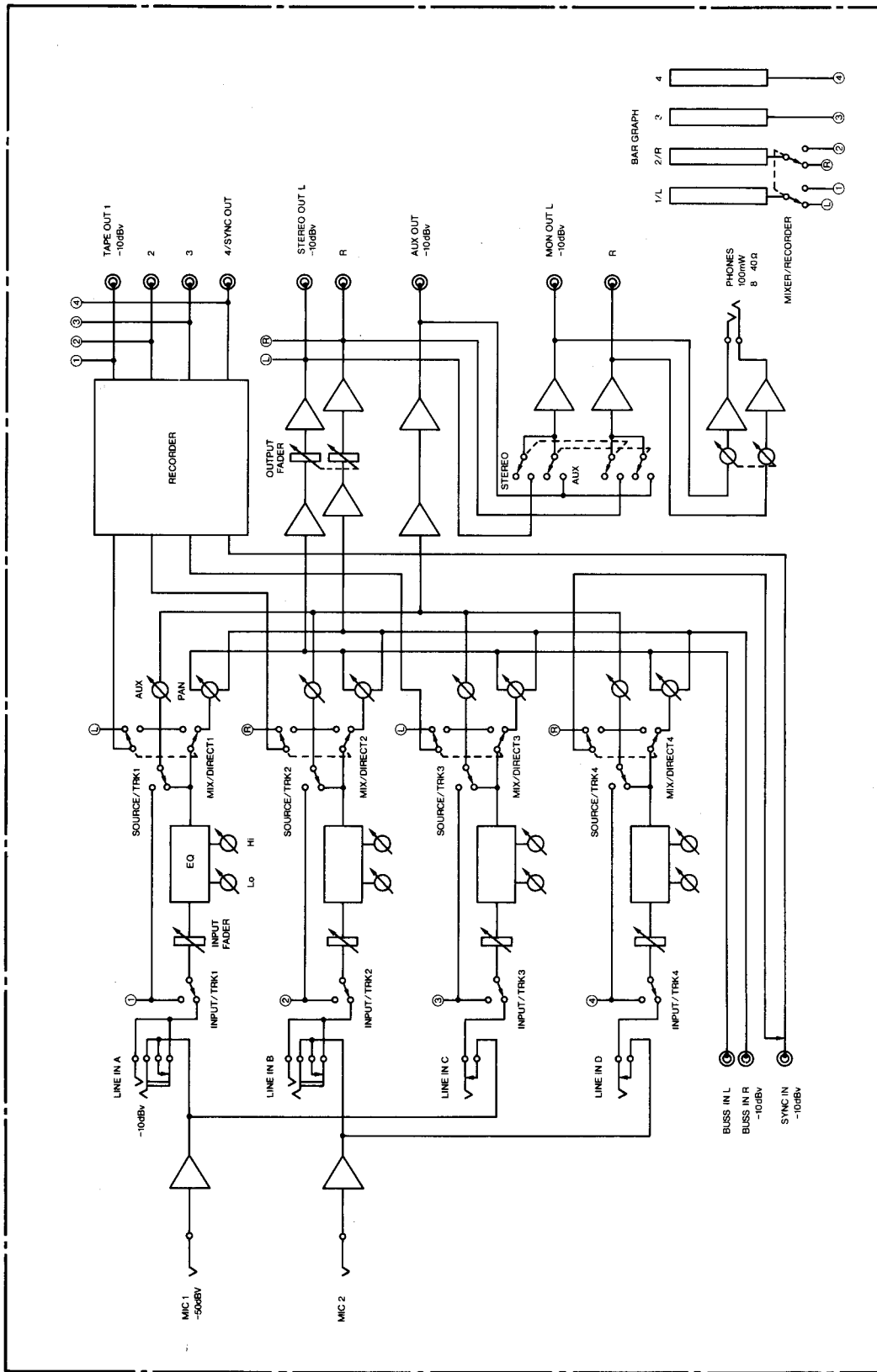
SAFETY INSTRUCTIONS

WARNING

"READ BEFORE OPERATING"

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. 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.
7. Heat — The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
8. 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.
9. 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.
10. Cleaning — The appliance should be cleaned only as recommended by the manufacturer.
11. Nonuse Periods — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
12. Object and Liquid Entry — Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
13. 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.
14. 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.

SECTION 10. BLOCK DIAGRAM



FOSTEX INFORMATION SERVICE

HELPFUL HOW TOs AND PRACTICAL GUIDES FOR MUSICIANS AND SONGWRITER

BASIC DISC MASTERING

Larry Boden \$10.95

Really detailed and technical, but clear. Lots of illustrations help make it easy to follow. 52 pages, 1981.

THE PLATINUM RAINBOW

*Bob Monaco &
James Riordan \$9.95*

Knowledgeable and enthusiastic. They share their enthusiasm and information so well that this recent 212 page book is used as a text in dozens of colleges, 1983.

BREAKIN*IN TO THE MUSIC BUSINESS

Alan H. Siegel \$8.95

Encouraging, optimistic, practical — one of the premier lawyers in the field helps you ask the right questions and get the right answers. Illustrations, 274 pages, 1983.

THE MODERN RHYMING DICTIONARY

Gene Lees \$14.95

Lees knows and loves lyrics; he's been writing and selling them for years. Lots of insights, plus a comprehensive rhyming dictionary which even includes a list of words for which there are no rhymes. 360 pages, 1981.

MAKING MUSIC

George Martin \$10.99

A definitive book, given worldwide praise for its comprehensiveness and clarity. Martin, of course was the first producer of the Beatles, 352 pages, 1983.

BUILDING A RECORDING STUDIO

Jeff Cooper \$30.00

All you want and need to know about acoustical design and engineering, and soundproofing — by the licensed architect whose clients include Warner Studios and George Lucas. 209 pages, more than 100 illustrations, 1984.

HOME RECORDING FOR MUSICIANS

*Craig Anderton
\$14.95*

Half technical, half general, all helpful. Anderton is a critic and enthusiast. Lots of illustrations; includes a demo record. Foreward by Brittain's George Martin. 182 pages, 1981.

HOW TO MAKE AND SELL YOUR OWN RECORD

*Diane Rapaport
\$12.95*

In 192 bright, breezy fact-studded pages, Ms. Rapaport gives your a solid handle on the critical business side of the music business. Lots of charts, tables, check sheets, lists of important addresses. 1984.

TAPE No.:	SONG/TITLE:	START DATE:	END DATE:	NOTE ALL PERFORMERS ON BACK OF THIS SHEET		
INITIAL TAKE & OVERDUBS						
REF. NO.	TAPE INDEX COUNT	PROGRAM ON EACH TRACK OF TAPE				COMMENTS/NOTES
		TRACK 1	TRACK 2	TRACK 3	TRACK 4	

TRANSFERS/TRACK COMBINATION						
REF. No.	INDEX COUNT	PROGRAM TRANSFERRED ONTO EACH TRACK OF TAPE				COMMENTS/NOTES
		TRACK 1	TRACK 2	TRACK 3	TRACK 4	

SETUP FOR REMIX TO STEREO (OR MONO)							
TRACK No.	CHAN. FADER	EQUAL		2 CHAN (1-2) PAN	EFFECTS PATCH AUX OUT	BUSS IN	COMMENTS
		H	L				
		○	○	○			
		○	○	○			
		○	○	○			
		○	○	○			

SECTION 10. SPECIFICATIONS

MIC INPUT (×2)	
Mic impedance	10 kΩ or less
Input impedance	40 kΩ
Nominal input level Mic:	-50 dBV (3 mV)
Min. input level	-56 dBV (1.5 mV)
Max. input level	-35 dBV (17.8 mV)
LINE IN (×4)	
Input impedance	10 kΩ
Nominal input level	-10 dBV (0.3 V)
Min. input level	-16 dBV (0.15 V)
Max. input level	+20 dBV (10 V)
BUSS IN (×2)	
Input impedance	20 kΩ
Nominal input level	-10 dBV (0.3 V)
Max. input level	+6 dBV (2 V)
STEREO OUT/MONITOR OUT/AUX	
Output load impedance	10 kΩ or more (5 kΩ minimum)
Nominal output level	-10 dBV (0.3 V)
Max. output level	+6 dBV (2 V)
TAPE OUT (×4)	
Output load impedance	10 kΩ or more
Nominal output level	-10 dBV (0.3 V)
Max. output level	+6 dBV (2 V)
HEADPHONE OUTPUT (stereo)	
Load impedance	8 Ω - 40 Ω
Maximum output	100 mW at 8 Ω - 40 Ω
EQUALIZER	
	150 Hz, ±15 dB
	10 kHz, ±15 dB
RECORDING TAPE	
	Compact cassette, C-60 or C-90.
	Use a gamma-ferric oxide tape that requires high bias level and 70 microsecond EQ (Maxell UD-XL-II, TDK SA or equivalent).
	4 track, one direction (Special format)
RECORD TRACKS	
RECORD/PLAYBACK CHANNELS	
	4 with Dolby NR C-type in encode mode throughout (encode/decode switchable).
NORMAL TAPE SPEED	
PITCH CONTROL	
	±15% of normal tape speed
RECORDING TIME	
	15 minutes for C-60
HEAD	
	4 channel erase (ferrite)
	4 channel record/playback (Permalloy)
MOTORS	
	One DC Servo
WOW AND FLUTTER	
	±0.1% peak (IEC/ANSI weighted) measured with flutter test tape.
FAST WIND TIME	
	100 seconds for C-60
FREQUENCY RESPONSE	
Mixer section	Mic: 20 Hz - 18 kHz
	Line: 20 Hz - 20 kHz
Recorder section	40 Hz - 14 kHz at 0 VU

T.H.D.	
Mixer section	0.05% at 1 kHz
Recorder section	2.0% at 1 kHz, 0 dB level (overall)
S/N	
Mixer section	One mic in overall 75 dB weighted 73 dB unweighted
	One line in overall 82 dB weighted 80 dB unweighted
Recorder section	70 dB weighted
	60 dB unweighted
	Referenced to 3% THD level
CROSSTALK	
Mixer section	60 dB at 1 kHz
Recorder section	40 dB at 1 kHz
ERASURE	70 dB at 1 kHz
POWER REQUIREMENTS	
	120 V AC, 60 Hz, 16 W
	220 V AC, 50 Hz, 16 W
	240 V AC, 50 Hz, 16 W
DIMENSIONS	
	80(H) × 295(W) × 390(D) mm
	[3-1/8(H) × 11-5/8(W) × 15-3/8(D)]
WEIGHT	
	Net 3.5 kg (7.7 lbs)

Specifications subject to change without notice.

**Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby" and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.*

Fostex

FOSTEX CORPORATION 560-3, Miyazawa-cho, Akishima, Tokyo, Japan

FOSTEX CORPORATION OF AMERICA 15431, Blackburn Ave., Norwalk, CA 90650, U.S.A.

© PRINTED IN JAPAN MAY 1987 8288 1511 00