

YAMAHA®

AUTHORIZED
PRODUCT MANUAL

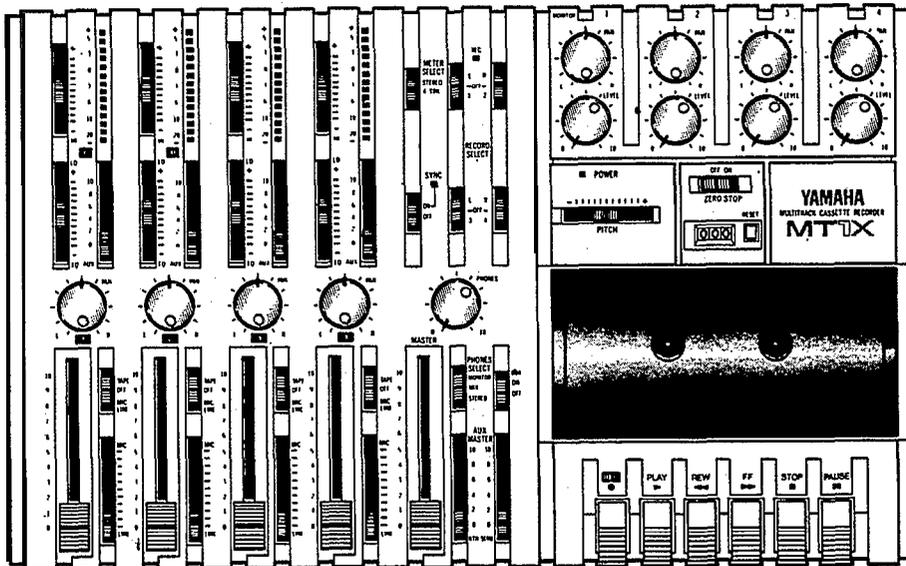
MTX
MULTITRACK CASSETTE RECORDER

YAMAHA

MULTITRACK CASSETTE RECORDER



OPERATING MANUAL



Congratulations on your choice of the New Yamaha MT1X Multitrack Cassette Recorder. The MT1X is a compact multitrack recorder with a recording mixer, and is equipped with numerous versatile functions. Using conventional cassette tapes, the MT1X makes it easy for you to produce high quality multitrack recordings. Besides use as a multitrack recorder, the MT1X can also be used as a PA mixer for small performances, as well as for editing soundtracks for videos.

To take full advantage of the outstanding array of features, and for years of trouble-free operation, we urge you to thoroughly read this operating manual. After reading, keep it in a handy place for reference.

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BEFORE OPERATION

■ PLEASE NOTE THE FOLLOWING PRECAUTIONS:

- **ABOUT CASSETTE TAPE**

This unit is designed to be used only with Chrome-position tape, and will not work properly with Ferrichrome tape formulations. CrO₂ tape (Bias: HIGH; EQ: 70μs) should be used. Also, the use of C-120 tapes is not recommended because they exhibit poorer performance, and can be the cause of equipment failure.
- **ABOUT dbx**

In order to get proper sound reproduction, set the dbx switch ON when playing back tapes recorded with dbx on, and keep it OFF when playing back tapes recorded without dbx.

*dbx and the dbx mark are trademarks of dbx incorporated.

*The dbx system has been manufactured under license of dbx Incorporated.
- **USING THE AC ADAPTOR**

Please use the AC adaptor supplied with this unit. Other AC adaptors may vary in plug dimensions, polarity, or output voltage, and their use with this unit could cause damage.
- **CAUTIONS FOR THE AC ADAPTOR**

Do not plug or unplug the AC adaptor with wet hands -- you could receive a very dangerous shock.

To avoid shorts or cord breakage, do not pull the plug out of the AC outlet by pulling on the cord. Be sure to grasp the plug itself and pull it out. When leaving home for an extended period of time, or when the unit will not be used for a long time, unplug the AC adaptor.
- **NOTE:** The AC adaptor has been designed for use with 120V or 220-240V AC, and must not be used in areas with different voltage.
- **PRECAUTION AGAINST LIGHTNING**

In the event of lightning or electrical storms, unplug the AC adaptor as soon as possible to avoid potential damage.
- **DO NOT OPEN THE CABINET**

To avoid electrical shock or damage to the unit, do not open the cabinet and tamper with the parts or circuits inside.
- **CONNECTING OTHER EQUIPMENT**

Make sure the power switch is OFF and the input fader is all the way down when connecting other equipment.
- **MOVING THE UNIT**

To prevent shorts or breakage, make sure all connection cords have been removed from the unit before moving it.
- **CLEANING THE CABINET**

Do not clean the unit with benzene or other powerful solvents, and avoid the use of aerosol insecticides near the unit. Clean the unit only with a soft, dry cloth.

FCC CERTIFICATION (USA)

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna.
Relocate the computer with respect to the receiver.
Move the computer away from the receiver.
Plug the computer into a different outlet so that computer and receiver are on different branch circuits.
If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:
"How to identify, and Resolve Radio-TV interference problems".
This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

■ **THE DIFFERENCE BETWEEN TRACKS AND CHANNELS**

The words “track” and “channel” are often confused. In order to properly operate this unit, it is necessary to understand the meanings of these terms.

TRACK:

The “band” on the tape itself where a certain signal is recorded. The tape inside a cassette has four different tracks, enabling the recording of four distinct signals. For conventional recordings, there are two tracks (stereo left and right) on each side of the tape.

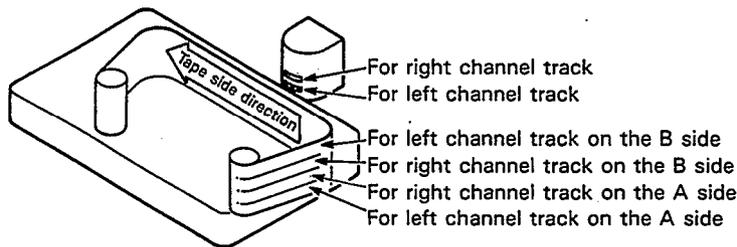
CHANNEL:

The route of a signal input or output. In the input side, this unit has four INPUT channels and two AUX channels. The output side consists of one stereo channel (made up of two mono channels) and an AUX channel.

■ **WHAT IS A MULTITRACK CASSETTE RECORDER?**

The difference between the MT1X multitrack cassette recorder and a conventional stereo cassette deck is shown below.

CONVENTIONAL STEREO CASSETTE DECK

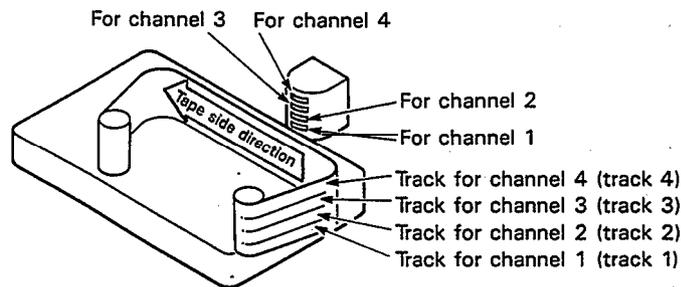


The diagram shows how a conventional stereo cassette deck records and plays back music. The four tracks on a cassette tape represent the left and right (for stereo) sound for each side of the tape. The MT1X uses these four tracks for single-direction recording and playback on only one side of a cassette tape.

Conventional stereo cassette recorders always record and play back in the same mode, with the tape side (direction) determining which two tracks will be used. These recorders do not allow separate selection of tracks for recording and playback.

Multitrack recorders, however, allow you to record or playback tracks separately as you choose. This enables a greater degree of recording and playback freedom not possible with conventional cassette recorders.

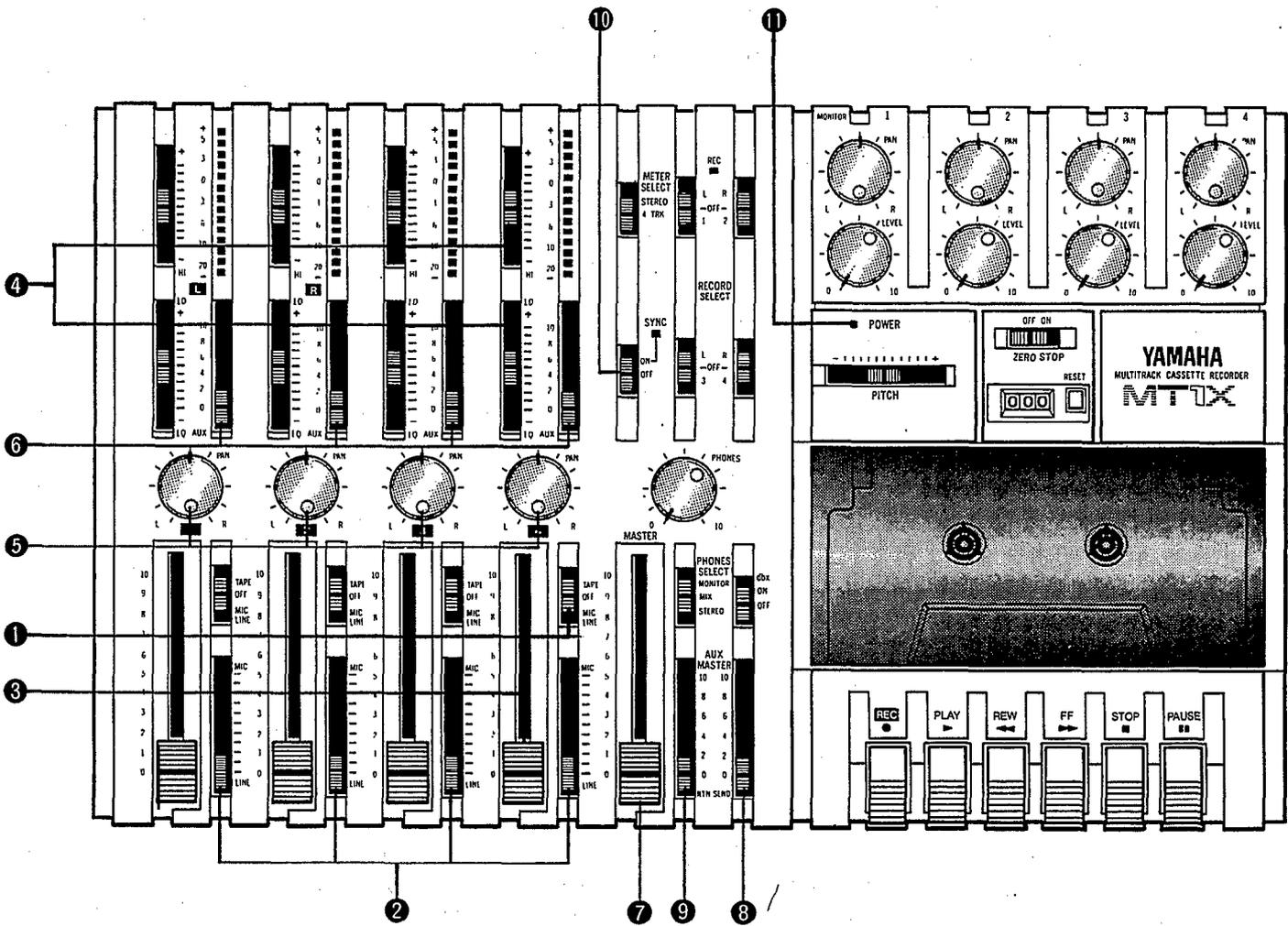
MT1X MULTITRACK CASSETTE RECORDER



THE CONTROLS AND THEIR FUNCTIONS

This section explains the names and functions of all the knobs, sliders, and switches for the mixer, recorder, meter/monitor, and connector sections. Familiarize yourself with them in order to take full advantage of the MT1X's versatile functions.

MIXER SECTION



1 INPUT SELECTOR SWITCHES

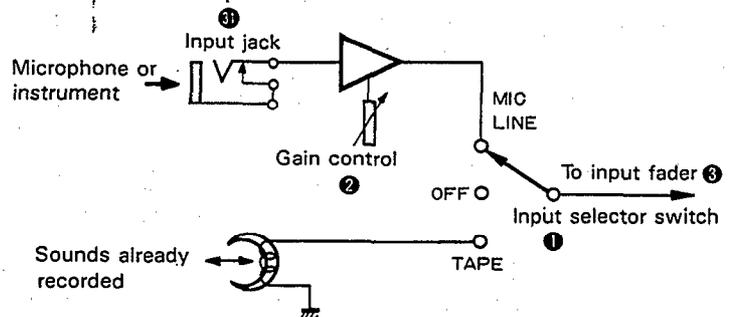
These three-position switches are provided for each channel. Position them according to the operation to be performed.

MIC/LINE: Set this switch to the proper position when the output of a microphone, keyboard instrument, or electric guitar is connected to the input jack (3) on the front panel.

OFF: Be sure to set the switch to this position when the channel is not being used, or when you don't want to playback material already recorded on the track. Although sliding the input fader (4) to the "O" position will stop the signal, it's a good idea to also set the switch to OFF.

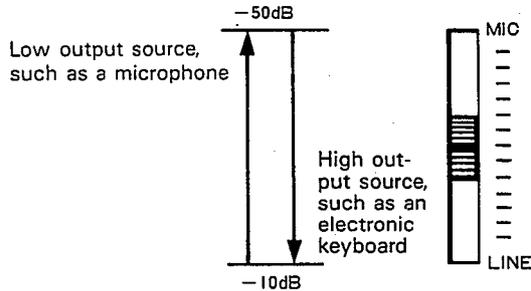
TAPE:

Set the switch to this position to playback material which has already been recorded on this channel. Channels 1—4 correspond to tracks 1—4 on the tape.



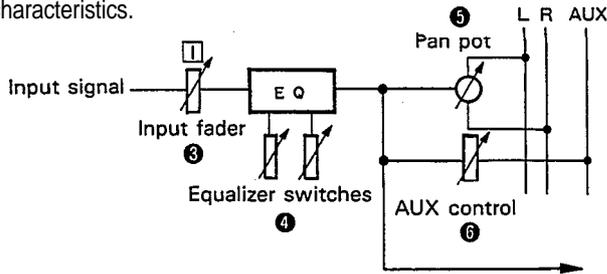
2 GAIN CONTROLS

The controls adjust the input level of the channel to match the output level of a microphone or instrument connected to input jack 31. Control from -10dB to -50db is possible. Adjust the output level of the microphone or instrument as outlined in its instruction booklet.



3 INPUT FADERS

These controls adjust the volume of the signal input, and send it to the 4 equalizer. Each control is used for setting the sound level of its channel when mixing it with the signals of other channels. Position "7" on the scale is considered ideal for the lowest noise and distortion characteristics.



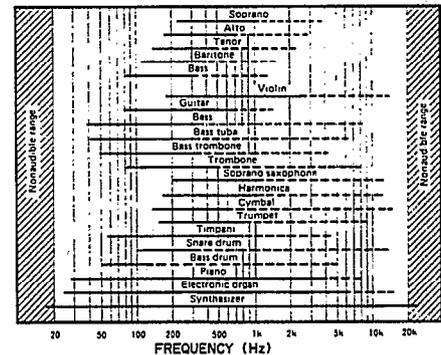
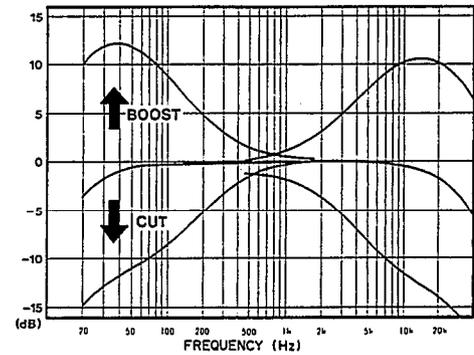
Be sure to set the control to "O" for channels not being used.

4 EQUALIZER CONTROLS

These controls are used to adjust the tonal characteristics of the input signal, or the channel output during playback of previously recorded material. The LO (low) controls adjust the frequencies centering around 100Hz, while the HI (high) controls adjust the frequencies centering around 10KHz, with a 10dB boost or cut range for both controls. Use of these equalizer controls will help you to get the type of sound you desire, and allow you to bring the sound "forward", "clean up" unclear sounds, and "push down" sounds at annoying frequencies.

In order to properly use these equalizers, it's important to understand the frequency response characteristics of various musical instruments. This is particularly true when trying to "change" the sound of a certain instrument, because you should know that instrument's harmonic sound components as well. For example, the normal frequency range of a bass drum is between 50Hz and 150Hz. To bring out this sound so you can feel it better, the LO (low) control (which centers on the 100Hz frequency band) can be moved up a little. But the harmonic sound components are around 10KHz, so the HI (high) control should also be moved up a little to achieve the proper sound profile of the bass drum.

SOUND CHARACTERISTICS OF THE EQUALIZER AND VARIOUS MUSICAL INSTRUMENTS

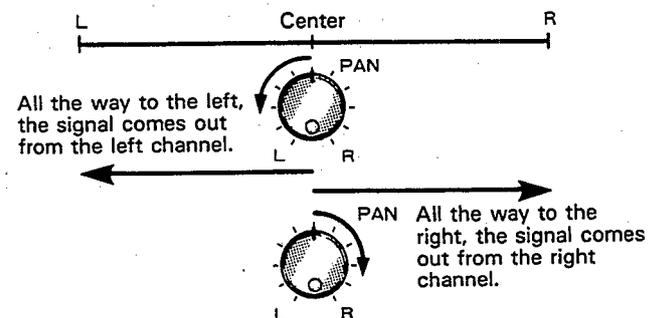


-----Normal frequency --- Harmonic sound components

If accurate and comprehensive sound equalization is required, connect a graphic equalizer or a parametric equalizer between the sound source and the input jack. When recording material that you will intend to "ping-pong" (see "Ping-ponging" on page 25), later, give the input somewhat of a high boost with the Hi control to help preserve the high frequency response when the track is re-recorded.

5 PAN (PAN POT) CONTROLS

After volume level and equalizing, the input signal is sent to these controls. During mixdown (see "Mixdown" on page 31), each control helps determine the acoustic "position" of the signal in regards to the stereo field. Turning the control all the way to the left puts the signal all the way over to the left side of the stereo soundspace; turning the control to the right sends the signal towards the right. At dead center, the signal comes out equally from the left and right channels.

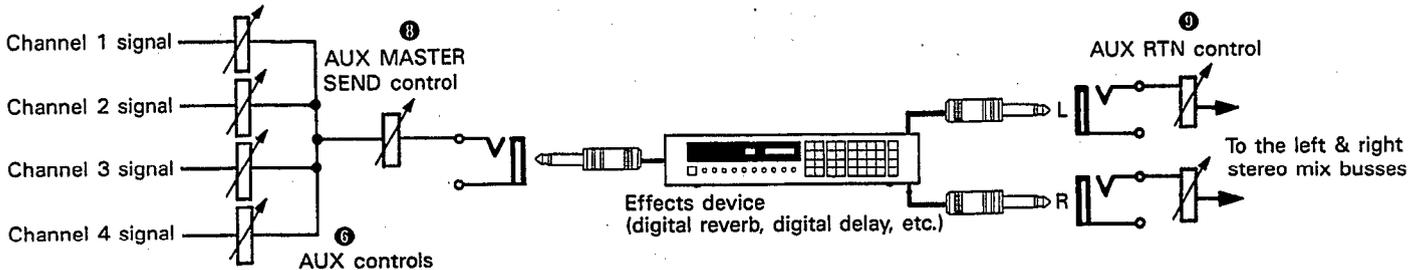


These controls are also useful in ping-ponging (see "Ping-ponging" on page 25).

6 AUX CONTROLS

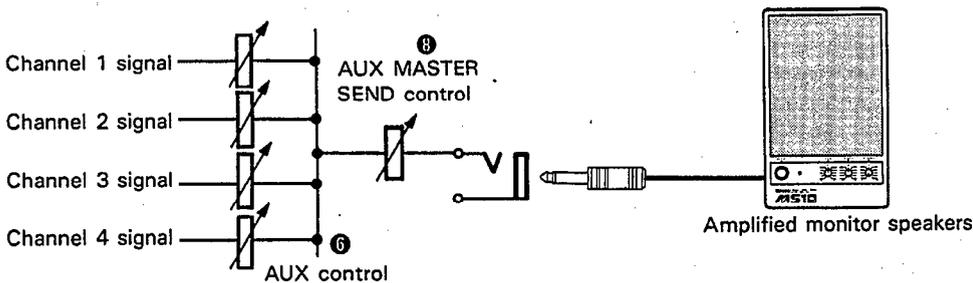
The MT1X is equipped with an AUX SEND jack ⑧ and two (left and right) AUX RETURN jacks ⑨. When special acoustic effects are desired on a certain channel, reverbs or delay effects can be connected between these jacks to provide only the desired effect to the desired channel. Amplified monitor speakers can also be connected to the AUX SEND jack. Each AUX control adjusts the sources connected to the AUX SEND jack in the following manner.

• CONNECTING AN EFFECTOR



Raise the AUX control ⑥ of the channel which requires effects. At the same time, make sure that the AUX controls for the other channels are adjusted for proper balance. The effected signal, with all the channel signals mixed in, flows in the following manner: AUX MASTER SEND control ⑧ → effects device → AUX RTN ⑨. At the end, the sounds are mixed by the stereo mix buss.

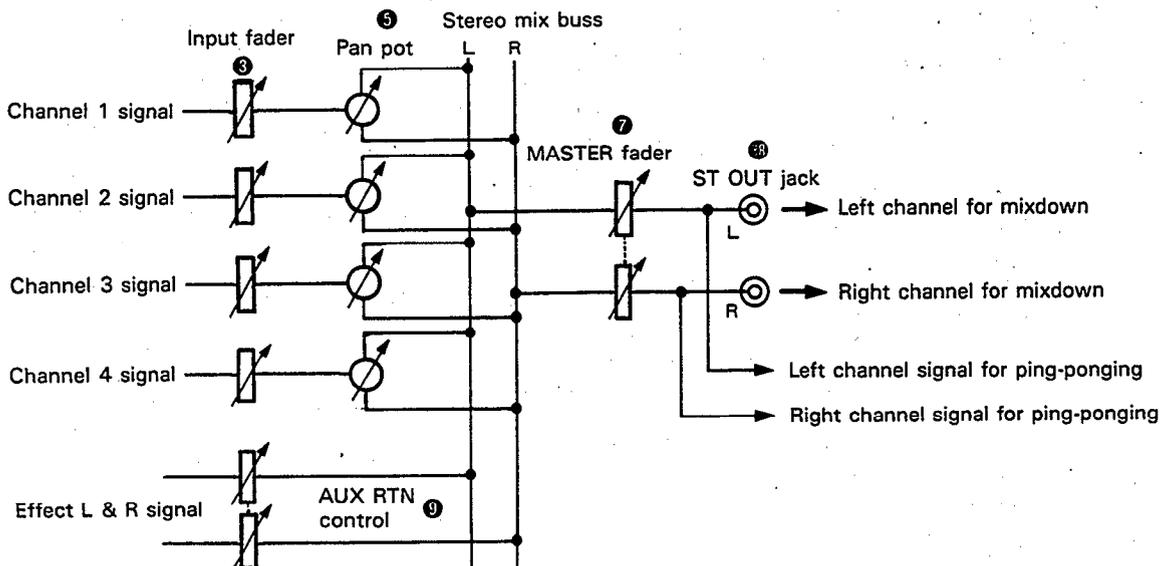
•CONNECTING MONITOR SPEAKERS



Performers or sound mixers can control the level balance of the four channels (instruments) with the AUX controls ⑥, with the total output level adjusted by the AUX MASTER SEND control ⑧.

7 MASTER FADER

This controls the level of all the input faders, as well as the final level of the effected signal of the AUX RTN control ⑨ and the sound mixed through the stereo mix buss. The output level of the ST OUT jack ⑩ (the recording level at mixdown) and the recording level during ping-ponging are also adjusted with this control.



Set the control input faders at "7" for best results.

8 AUX MASTER SEND CONTROL

This control adjusts the level of the effect-mixed signals from each channel (adjusted by each AUX control 6) as well as the AUX signal for monitoring use. The final output is through the AUX SEND jack 39.

9 AUX RETURN CONTROL

This control adjusts the input level of effects or sub-mixers connected to the AUX RTN jack 40. The level of effect in relation to the sound can be set with this control.

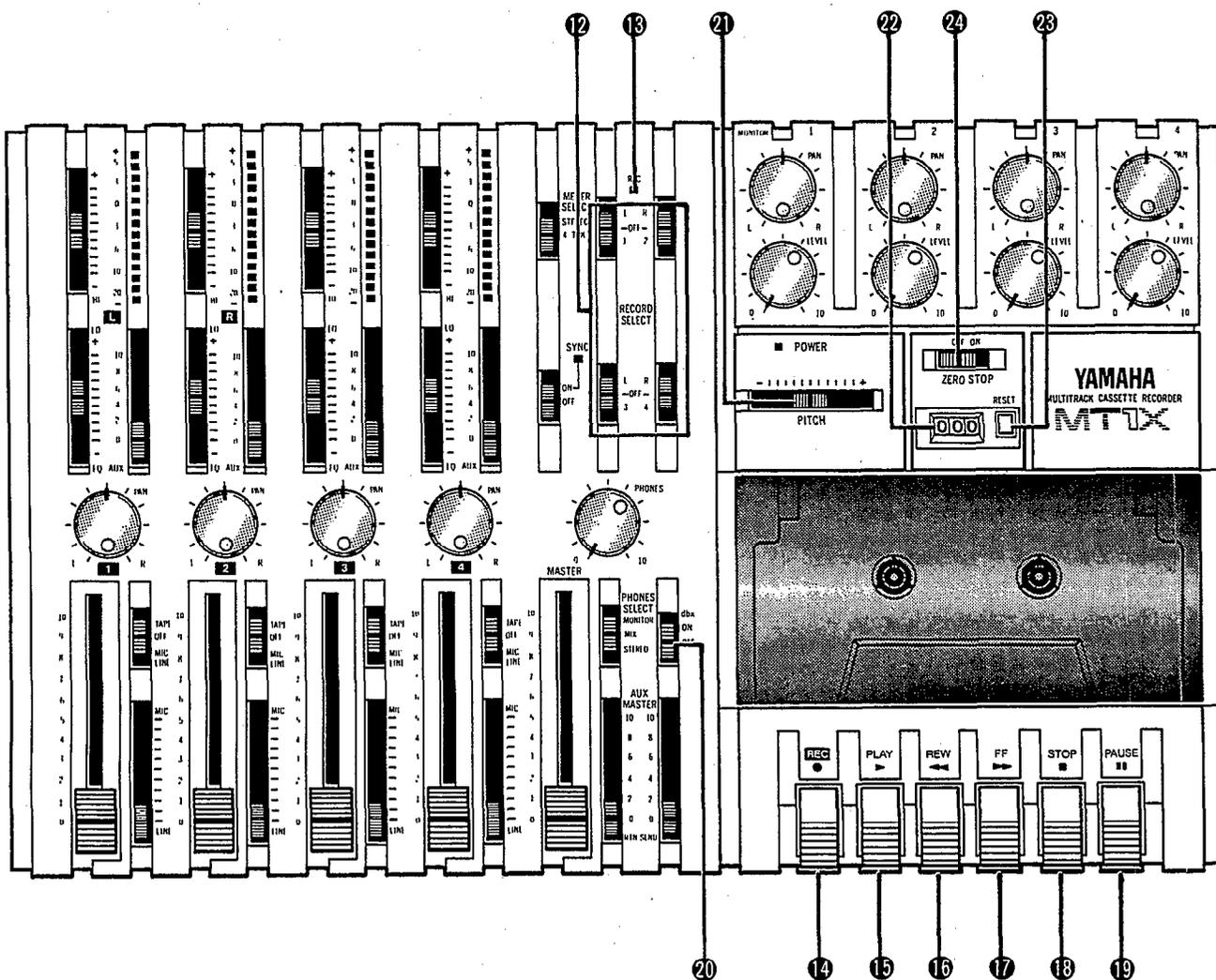
10 SYNC SWITCH

Normally left in the "OFF" position, this switch should be turned "ON" if this unit is to be used for synchronized operation with MIDI products like synthesizers and rhythm machines. Synchro operation is explained in the section on Sync jack 36 or in the Sync-Recording section on page 33.

11 Power Indicator

This indicator lights when the power switch 34 on the rear panel is turned on.

RECORDER SECTION



12 RECORD SELECT SWITCHES

These switches are used to choose the signal to be recorded. The upper left switch is for track 1, the upper right switch is for track 2, the lower left switch is for track 3, and the lower right switch is for track 4.

When the track is not to be recording, set the corresponding switch to the OFF position. Switch ON only those switches corresponding to the tracks which are to record. The panel indications for "L" and "R" correspond to the stereo left and right signals, whereas "1", "2", "3" and "4" correspond to the signal from the 1, 2, 3, and 4 input channels. Those signals are recorded on their respective track when the switches are in position.

NOTE: Tracks 1 and 3 cannot be recorded on the right stereo signal, and tracks 2 and 4 cannot be recorded on the left stereo signal.

13 REC INDICATOR

Recording status is indicated in the following three ways:

No indication:

All tracks 1—4 are not recording.

Flashing:

All tracks 1—4 are in recording standby mode. By pushing only the REC switch 14, the tape is put into the recording standby mode.

Indication ON:

All tracks 1—4 are recording, or in the REC pause mode. To resume recording during REC pause, press the PAUSE switch 19.

14 REC SWITCH

When this switch is pressed, the PLAY switch 15 also moves, and the unit goes into the recording mode. However, if the RECORD SELECT switches for all tracks 1—4 are switched OFF, nothing will be recorded.

NOTE: When the REC switch is pressed down, noise occurs which is recorded on the tape. In order to prevent this, we recommended the use of the PAUSE switch 19. Press the PAUSE switch first, then press the REC switch. To start recording, press the PAUSE switch again to shift out of the REC pause mode and into the recording mode.

15 PLAY SWITCH

Press this switch for playback. However, if the input selector switch (1) of a track is not in the TAPE position, the sound will not be heard on the stereo buss.

16 REW SWITCH (REWIND)

Use this switch to rewind the tape. Pressing it when the MT1X is in the PLAY mode enables you to hear the sound of the tape while it rewinds. This feature is useful for finding the beginning of a song or other recorded material.

17 FF SWITCH (FAST FORWARD)

Use this switch to quickly advance the tape forward. Pressing it when the MT1X is in the PLAY mode enables you to hear the sound of the tape while it is moved forward. This feature is useful for cueing up the start of a subsequent song or other recorded material on the tape.

18 STOP SWITCH

Press this to stop tape run.

19 PAUSE SWITCH

Press this switch to momentarily stop playback or recording in progress. Press it again to restart.

20 dbx SWITCH

Ordinary cassette tapes don't have sufficient dynamic range (the level difference between the softest sounds and the loudest peaks) to adequately record highly dynamic music. If the dbx switch is put "ON" during recording, highly dynamic music signals can be adequately handled, while the hiss noise inherent to cassette tapes is kept down below the range of human hearing. If the dbx switch is kept "ON" during recording, it must also be kept "ON" during playback.

21 PITCH CONTROL

During recording or playback, this control can be used to vary the tape running speed from +10% to -10%. The pitch of voices or musical instruments also varies in proportion to tape speed.

Under normal conditions, the control should be in the center position. When overdubbing (playing back a recorded passage while recording new material on a different track) the pitch of the previously recorded material can be altered to match the new material if necessary. This feature can also be used to obtain certain special effects during recording.

22 TAPE COUNTER

This displays the amount of tape run.

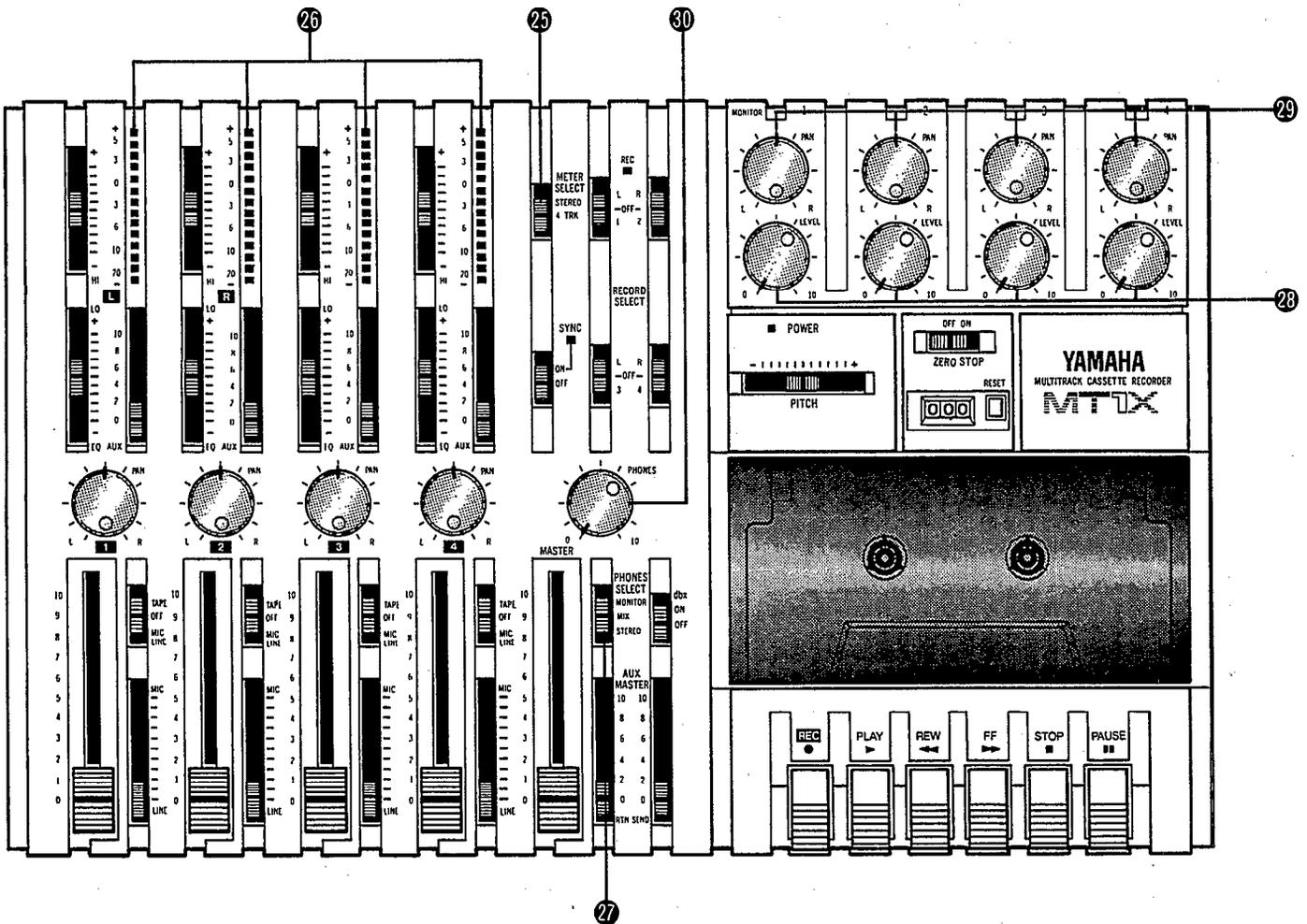
23 RESET SWITCH

Press this switch to reset the tape counter to "000". Pressing this switch at the start of recording, or at the beginning of a song, makes it easy to cue up the selection from the start.

24 ZERO STOP SWITCH

If this switch is set "ON" during rewinding, the tape will stop when the tape counter reaches "999". During multitrack recording, this feature is convenient for repeated playback or recording operations after rewind.

METER AND MONITOR SECTION



25 METER SELECT SWITCH

This switch is used to select the signal for level indication by the Peak Level Meters 26.

STEREO Position:

The level of the signal output through the ST OUT jacks 35 is indicated. The meter on the far left shows the level of the Left channel of the stereo signal, while the second meter from the left shows the level of the Right channel. Setting to this position during ping-ponging or mixdown operations enables easy reading of the recording level.

4 TRK Position:

Set the switch in this position to display the level of each track. Starting from the far left, each meter corresponds to tracks 1—4. During playback, the playback level is displayed; during recording, the recording level is displayed. Setting the switch to this position during overdubbing enables easy reading of the recording level.

26 PEAK LEVEL METERS

There are 14 LED indicators in each meter which show a range from -20dB to +5dB. During recording, setting levels high (but below the point where the recording becomes distorted) will ensure the greatest dynamic range with the lowest possible noise. An ideal point is when the LED indicators for 0dB and above flash occasionally.

During stereo signal level indication, the actual specified output from the ST OUT jacks 36 is -10dB (at a 50K ohm load) when the LED indicators start to flash at 0dB.

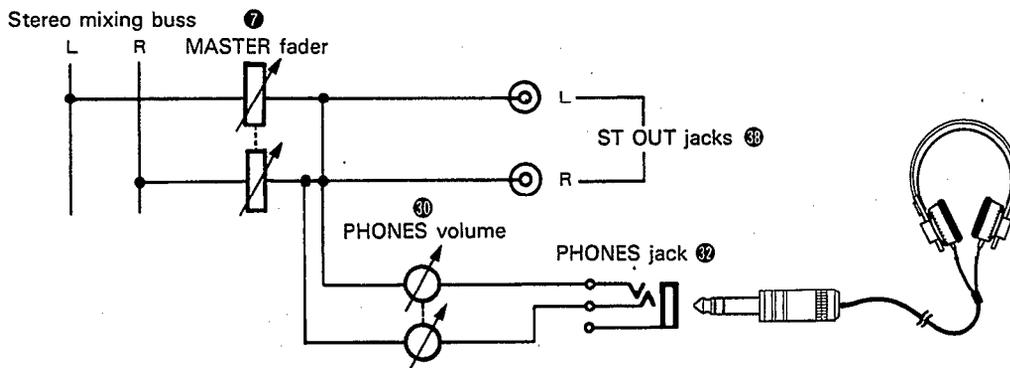
27 PHONES SELECT SWITCH

You can plug a set of headphones into the PHONES jack 32, on the front panel to monitor the sound. This switch is used to select the signal to be monitored. Control the volume level with the PHONES volume control 30.

STEREO Position:

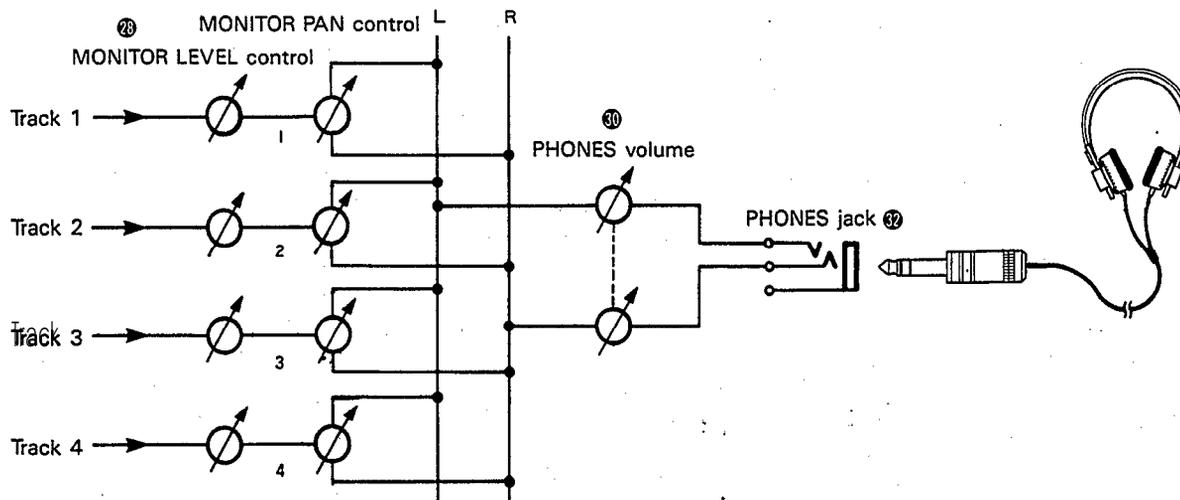
Put the switch in this position to monitor the signal output through the ST OUT jacks 38. The Left and Right channels of the stereo signal will be heard through the headphones.

When setting to this position during ping-ponging or mixdown operations, the mixed signal of all the instruments can be monitored.



MONITOR Position:

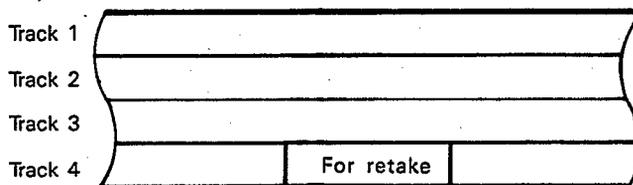
This position is for monitoring the signal of each track. You can freely monitor while mixing the sound of each track during recording or playback. Using the MONITOR LEVEL Controls 28 and the MONITOR PAN Controls 29, set the desired level and position for each track.



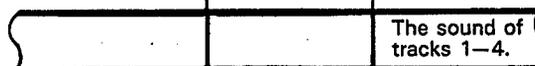
MIX Position:

This position allows you to simultaneously monitor both the sound heard in the STEREO position and the sound heard in the MONITOR position. Setting to this position during punch-in/punch-out operations will enable the type of monitoring shown below. (Refer to "Punch-in/Punch-out" on page 27).

For example, when adding in instruments or vocals in the following way:



Setting to this position during punch-in/punch-out operations enables this type of monitoring:



The sound of tracks 1-4 plus the sound of the material to be added.

Tracks 1-3 plus the sound of the material added.

28 MONITOR LEVEL CONTROLS

When setting the PHONES SELECT Switch 27 to the MONITOR position, these level controls are used for each track to achieve a level balance for easy monitoring. Use these controls freely and independently to maintain a desired level balance during overdubbing operations, when the addition of a new signal changes the volume.

29 MONITOR PAN CONTROLS

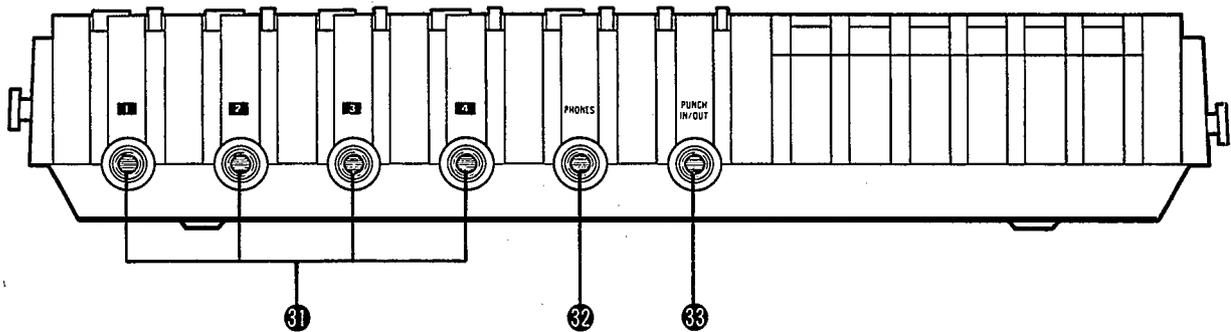
When setting the PHONES SELECT Switch 27 to the MONITOR position, use these pan controls for each track to achieve the desired stereo positioning for each track. Use these controls freely and independently to maintain the desired stereo position balance during overdubbing operations, when the addition of a new signal changes the stereo image.

30 PHONES CONTROL

This control adjusts the volume of the headphones (See page 9).

CONNECTOR SECTION

FRONT PANEL



31 INPUT JACKS

These four jacks are for the connection of microphones or electric and electronic instruments. With a high input impedance of 10K ohms, and a specified input level range of -10dB to -50dB, a wide variety of instruments and microphones can be used.

When directly connecting an electric guitar, the use of a special electric guitar preamp to increase the input level will assure recordings of better sound quality.

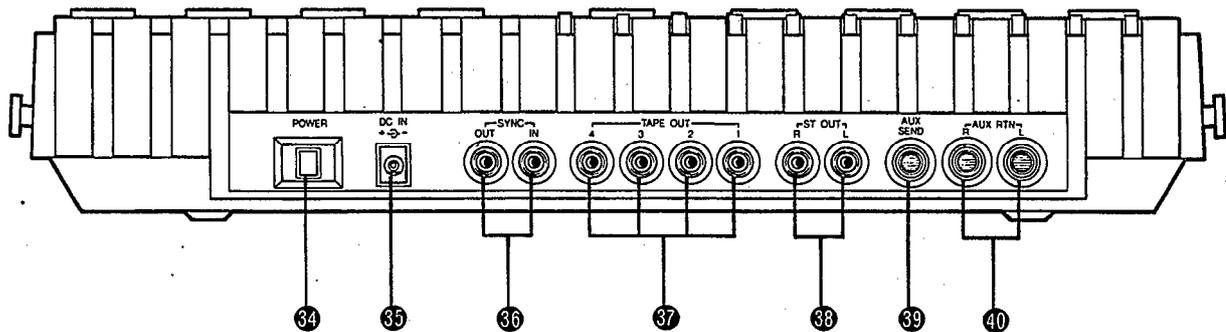
32 PHONES JACK

Plug a set of headphones into this jack for monitoring. Please use headphones rated from 8—0 ohms for best results.

33 PUNCH IN/OUT JACK

By connecting the optional FS-1 footswitch to this jack, you can control punch-in/punch-out operations. by foot.

REAR PANEL



34 POWER SWITCH

This switch turns on the MT1X. When switching the unit on or off, make sure that the Input Faders **3** and the AUX RTN Control **9** are at the “0” position.

35 DC IN JACK

Connect the supplied AC adaptor to this terminal. To prevent damage, use only the AC adaptor supplied with this unit.

36 SYNC IN/SYNC OUT JACKS

These jacks are used during synchronized operation with MIDI-equipped instruments. Use the optional YMC10 MIDI Converter to connect the instruments through these jacks, and set the SYNC switch on the mixer section to “ON”. For a detailed explanation, refer to “Sync-Recording” on page 33.

37 TAPE OUT JACKS

These jacks directly output the signal of each track. During playback, the signals of the tracks being played are output. During recording, the signals of the tracks being recorded are output. Since the output levels cannot be adjusted, set the volume by adjusting the output levels on the instruments themselves. These jacks can be conveniently used in the following ways:

- Another 4-track recorder can be connected for direct dubbing of all four channels.
- An external mixer can be connected for mixdown.

38 ST OUT JACKS

The mixed signals of each channel (and each track) are output in stereo signal through these jacks. Since these jacks output the final mix, a stereo cassette deck can be connected. These jacks can also be used as follows.

- The MT1X can be used as a sub-mixer, with the output sent to a main mixer through this jack.
- A stereo amplifier or powered monitor speakers can be connected through this jack.

39 AUX SEND JACK

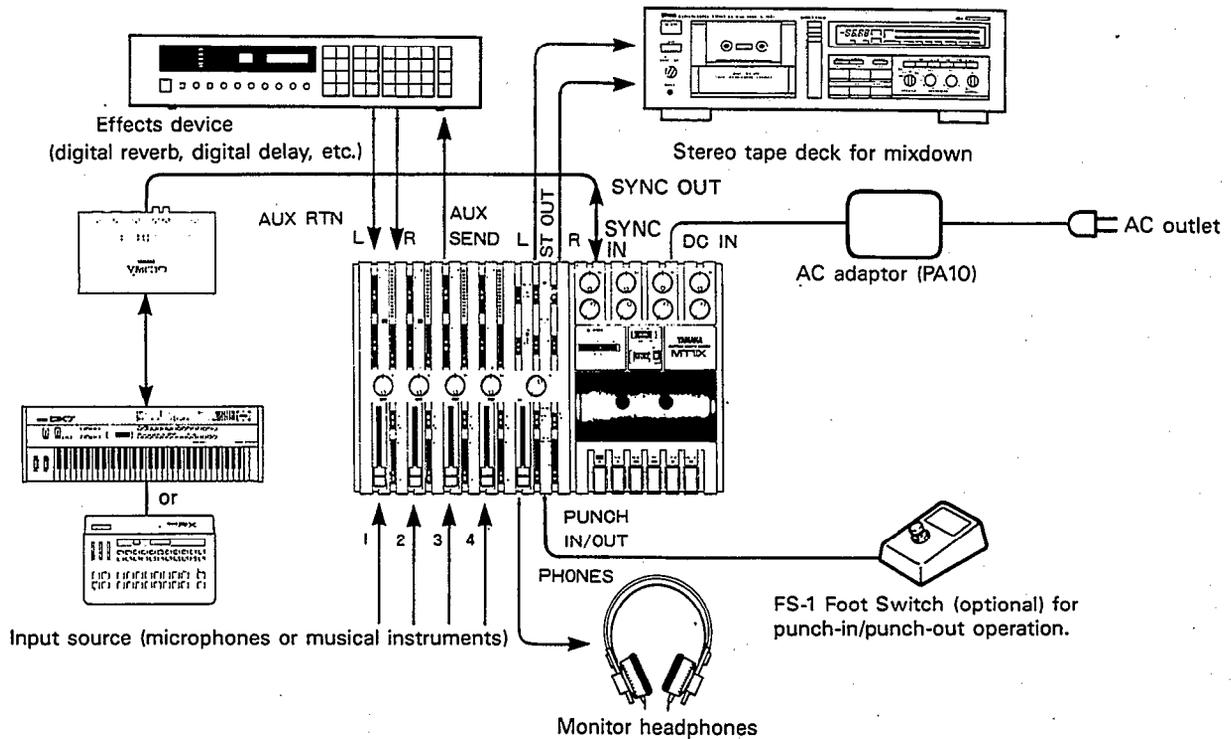
This jack outputs the mixed signal from the Aux bus, and is used as an output terminal for the connection of an effects device. This can also be used as an additional monitor output.

40 AUX RTN JACKS

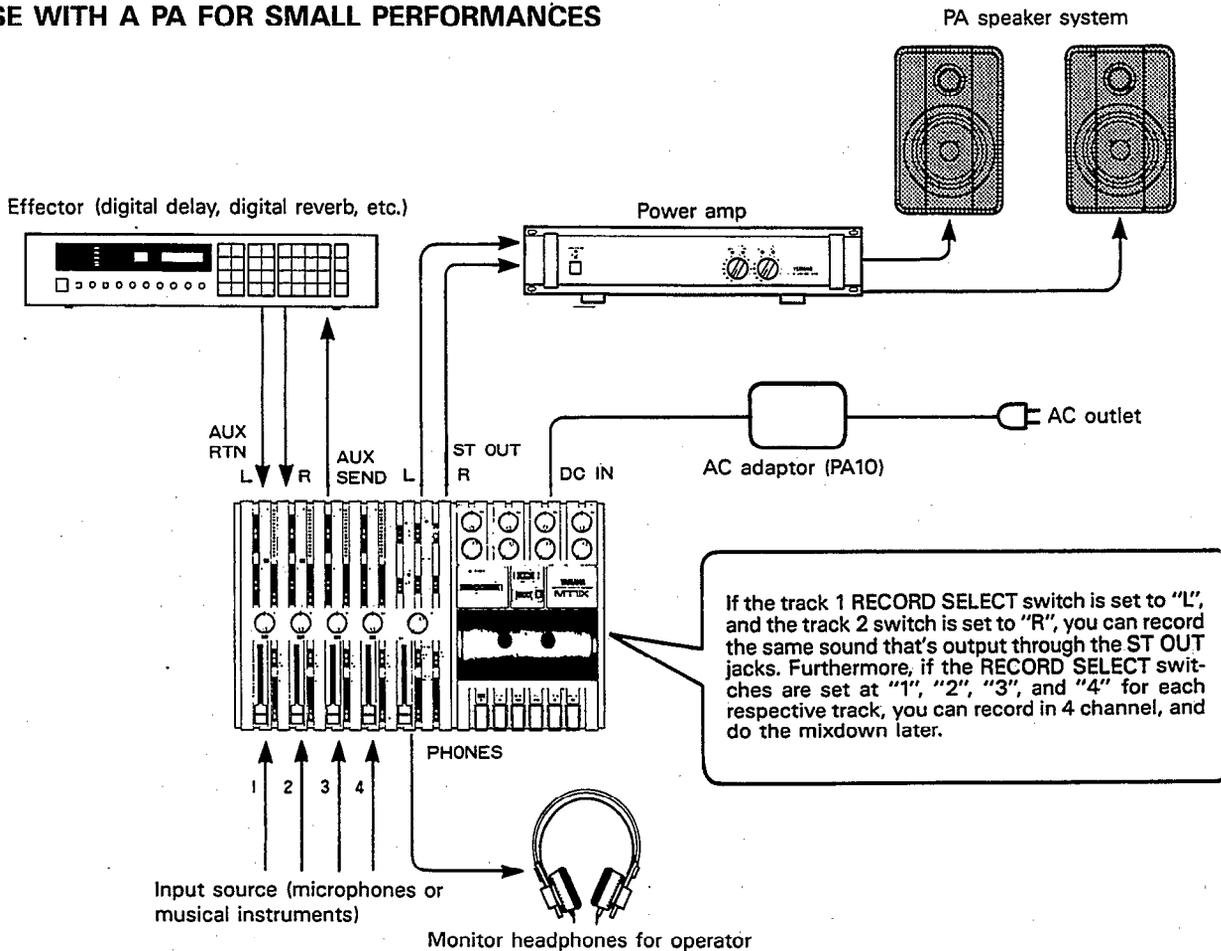
These jacks are used to input the signal from an effects device back into the MT1X. As well, the mixed output from an external mixer can be connected to these jacks. Please note that if only a single plug is inserted into either one of these jacks, the signal will be sent to both Left and Right channels. This is useful if the effects device being used is mono.

CONNECTION EXAMPLES

■ BASIC CONNECTION LAYOUT FOR MULTITRACK RECORDING



■ USE WITH A PA FOR SMALL PERFORMANCES



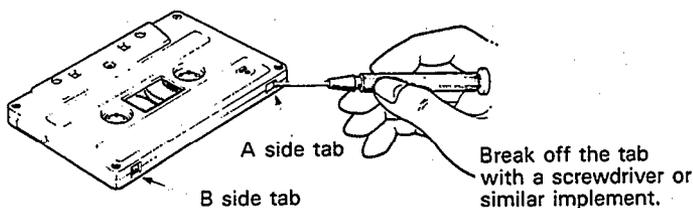
ABOUT CASSETTE TAPES

This unit is designed to be used only with Chrome-position tape, and will not work properly with Ferri-chrome tape formulations. CrO₂ tape (Bias: HIGH; EQ: 70µs) should be used. Also, the use of C-120 tapes is not recommended because they exhibit poorer performance, and can be the cause of equipment failure.

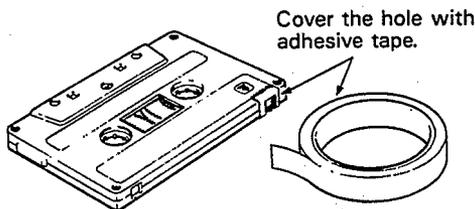
● Preventing accidental erasure of recordings

To keep from inadvertently erasing a prized recording, all cassette tapes have record protection tabs along the top edge of the cassette shell. If this tab is broken out using a screwdriver or any other appropriate implement, it will not be possible to record on the corresponding side of the tape. This will protect your recordings from accidental erasure. For 4-track recording, it's necessary to break out the tabs for both the A and B sides of the tape. When you'd like to record over a tape with the tabs broken out, just cover the holes (where the tabs were) with tape.

● PREVENTING ACCIDENTAL TAPE ERASURE:



● Recording over a tape with the tabs broken out



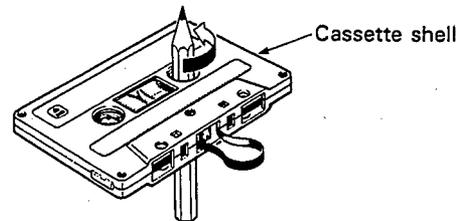
● Playing tapes recorded on other cassette recorders

When playing Normal-position tapes, or tapes encoded with Dolby B noise reduction the MT1X, the following steps are advised:

- 1) **Playing Normal-position tapes** — move the HI equalizer fader in the " + " direction to boost the high frequencies until the sound is satisfactory.
- 2) **Playing tapes encoded with Dolby B NR**— put the dbx switch in the "OFF" position, and move the HI equalizer fader in the " - " direction to reduce the high frequencies until the sound is satisfactory.

● Taking up tape slack

If the tape is used when it is slack, or some portion of the tape is out of the cassette shell, there is a risk it may become tangled around the capstan or pinchroller. In order to correct this, insert a pencil or ballpoint pen into the center of one reel, and rotate to take up loose tape slack.



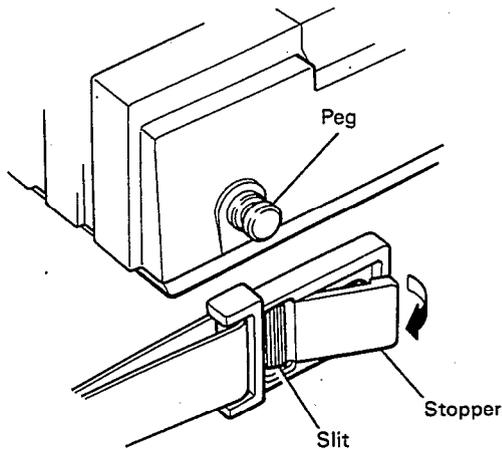
● Storing cassette tapes

To prevent tape slack, fit a stopper into the tape or keep tapes in their cases. Do not store tapes in direct sunlight, or in places with high heat or humidity, as this may damage the tapes. Also, keep the tapes away from magnetic fields, such as near televisions or speakers, because the recordings can be erased or sonically altered to some degree.

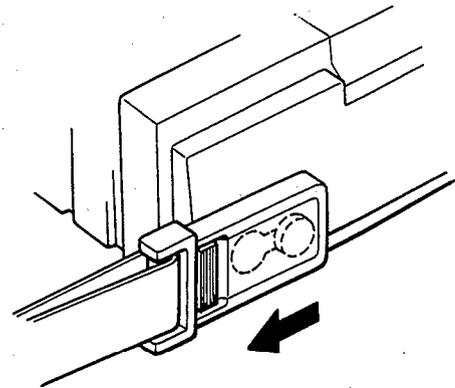
ATTACHING THE STRAP

The MT1X can be easily carried with the supplied carrying strap. Here's how to attach it.

- ① Push on the slit to open the stopper, and hang it on the peg.



- ② Slide the strap to the desired position and lock the stopper in place.

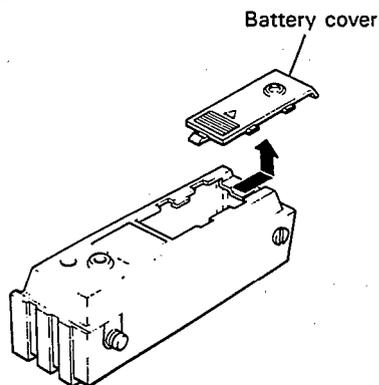


WHEN USING THE BATTERY PACK

With the optional PA11 Battery Pack, the MT1X can be operated by batteries in places where there is no AC outlet available. Here's how to set it up.

• PUTTING IN THE BATTERIES

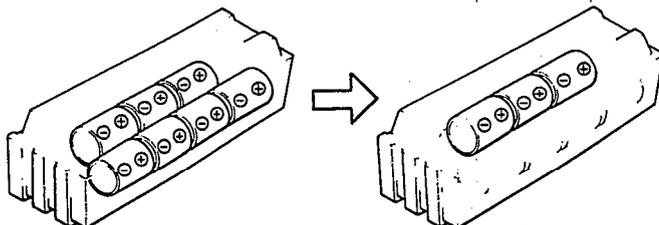
- ① Slide off the battery cover on the bottom of the battery pack.



- ② Insert 10 "C" batteries as shown.

Put 7 on the bottom

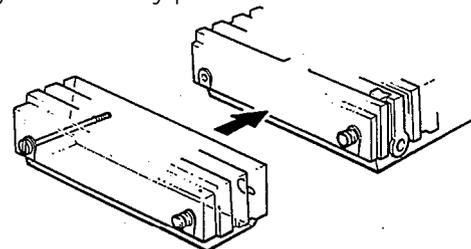
Then put 3 on top



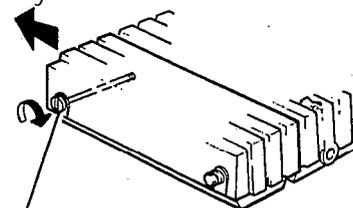
- ③ Replace the battery cover.

• ATTACHING THE BATTERY PACK

- ① Align the battery pack on the left side of the MT1X.



- ② Slide it on, and tighten the battery pack mounting screw with a coin or screwdriver. The battery pack is now firmly attached.



Tighten the battery pack mounting screw with a coin or screwdriver.

NOTES:

- When using the battery pack as a power supply, remove the AC adaptor.
- The battery pack can only supply power to the MT1X when it is properly attached.
- The MT1X was designed for indoor use. Avoid using it in areas of high heat or humidity, or in dusty places.
- If the battery pack isn't going to be used for an extended period of time, remove the batteries inside.
- Battery life: about 2 hours during 2 channel recording with a headphone output of 10mW + 10mW.

MULTITRACK RECORDING TECHNIQUES

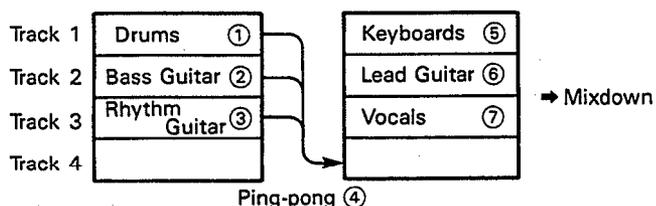
Before you try to attempt a multitrack recording on your own, it's absolutely essential that you understand the function of all the controls, switches, and connectors in each section. In addition, you should spend an adequate amount of time to familiarize yourself with the block diagram on page 35. It may appear hard to understand at first, but after carefully looking it over, you'll find that it's not only easy to follow, but quite useful in understanding the various signal flows involved in using the CMX1. The numbers on the block diagram for the controls, switches, and connectors correspond to those used in the section titled "The Controls, and Their Functions".

■ ONE EXAMPLE OF A MULTITRACK RECORDING PROCESS

Multitrack recording is usually used to record a rhythm section, with overdubbing and ping-ponging operations assisting in mixing the parts of the various musicians in the proper balance. Finally, the tape is mixed down to produce a stereo master tape.

These are the steps in our example:

- ① Record the drums on track 1
- ② Record the bass on track 2
- ③ Record the rhythm guitar on track 3
- ④ Ping-ponging tracks 1 — 3 onto track 4 (freeing tracks 1—3)
- ⑤ Record the keyboards on track 1
- ⑥ Record the lead guitar on track 2
- ⑦ Record the vocals on track 3
- ⑧ Mixdown tracks 1—4 to produce a stereo master tape



■ BEFORE RECORDING RECORDING LEVEL

In making a good recording, the most important step is setting the ideal recording level. If the level is too low, the recording will contain a lot of noise and hiss; if the level is too high, the recording will sound distorted and unclear. Set the recording level at a fairly high level, but not so high as to result in any noticeable distortion. The CMX1 is equipped with peak level meters which show the level of each track, as well as the level of the stereo output signal. Use these meters to help you set the ideal recording level, because the human ear has difficulty in detecting distortion immediately. If the level meters "peak out" (show the maximum reading) in a

mere instant, it's not a problem. However, if they're peaking out for more than a second or two, then distortion may become a problem. It's also important to remember that distortion at lower frequencies is less apparent than distortion at higher frequencies.

dbx SYSTEM

Keep the dbx switch "ON" to expand dynamic range and to reduce inherent tape noise.

STEREO POSITIONING

It's important to think about the acoustic "position" of all the instruments well before you start your multitrack recording. You should take into account a certain amount of noise caused by ping-ponging and mixdowns planned for later on.

Here's one example of acoustic positioning. Set the bass drum and the snare drum center, with the tomtoms and high hat set off to either side to bring out the "stereo" effect. The bass and other "heavy" instruments should be in the center, with the keyboards to the left and the guitar to the right. Solo instruments and voices should span both right and left. Solo instruments with a stereo output can have their left channel connected to a delay machine, while the right channel is recorded directly. You can probably think of many other different ways to "arrange" the soundstage.

EQUALIZATION AND EFFECT PROCESSING

Equalization and effect processing are usually added at the ping-pong and mixdown stages. In multitrack recording, these types of signal processing can be decided on later, and employed to any degree necessary. However, the MT1X is limited in the number of effects which can be used during mixdown, so it's best to use them during the initial recording stages.

Monitoring

In addition to circuits for signal recording, this unit also features a separate monitor circuit to allow the performer to monitor the levels and positioning of the recording in progress through a pair of headphones. In this case, set the PHONES SELECT switch to the "MONITOR" position. Adjust the volume level and stereo positioning of each track with its MONITOR LEVEL and MONITOR PAN controls.

In addition, powered monitor speakers can be directly connected to the ST OUT jacks or the AUX SEND jack, though this makes it impossible to use these jacks for external recording or effects. Using speakers during recording off lines presents no problems, but when microphones are used, feedback can result when the microphone picks up sound from the speakers. In this case, monitoring through headphones becomes absolutely necessary.

■ MULTITRACK RECORDING

PLAN YOUR RECORDING

A clear plan is essential before you begin multitrack recording. If you begin cold, without regard to all the steps involved, you may "record yourself into a corner" by running out of available empty tracks, missing the chance to add effects at the proper points, losing control over the final stereo positioning of the instruments, and creating the need for more ping-pong and mixdown recording operations than really necessary. Although you can perform ping-pong and mixdown operations without limit, a certain amount of noise and sound degradation results during these operations. It's best to hold ping-ponging down to 1 or 2 operations in order to achieve good sound quality.

So before you start, plan your recording carefully — what order the parts will be recorded in, what instruments will go on which tracks, how and when effects will be used, when recorded tracks will be ping-ponged, and what sort of end result is desired. The recording process of the example we will explain in this section is illustrated on page 16.

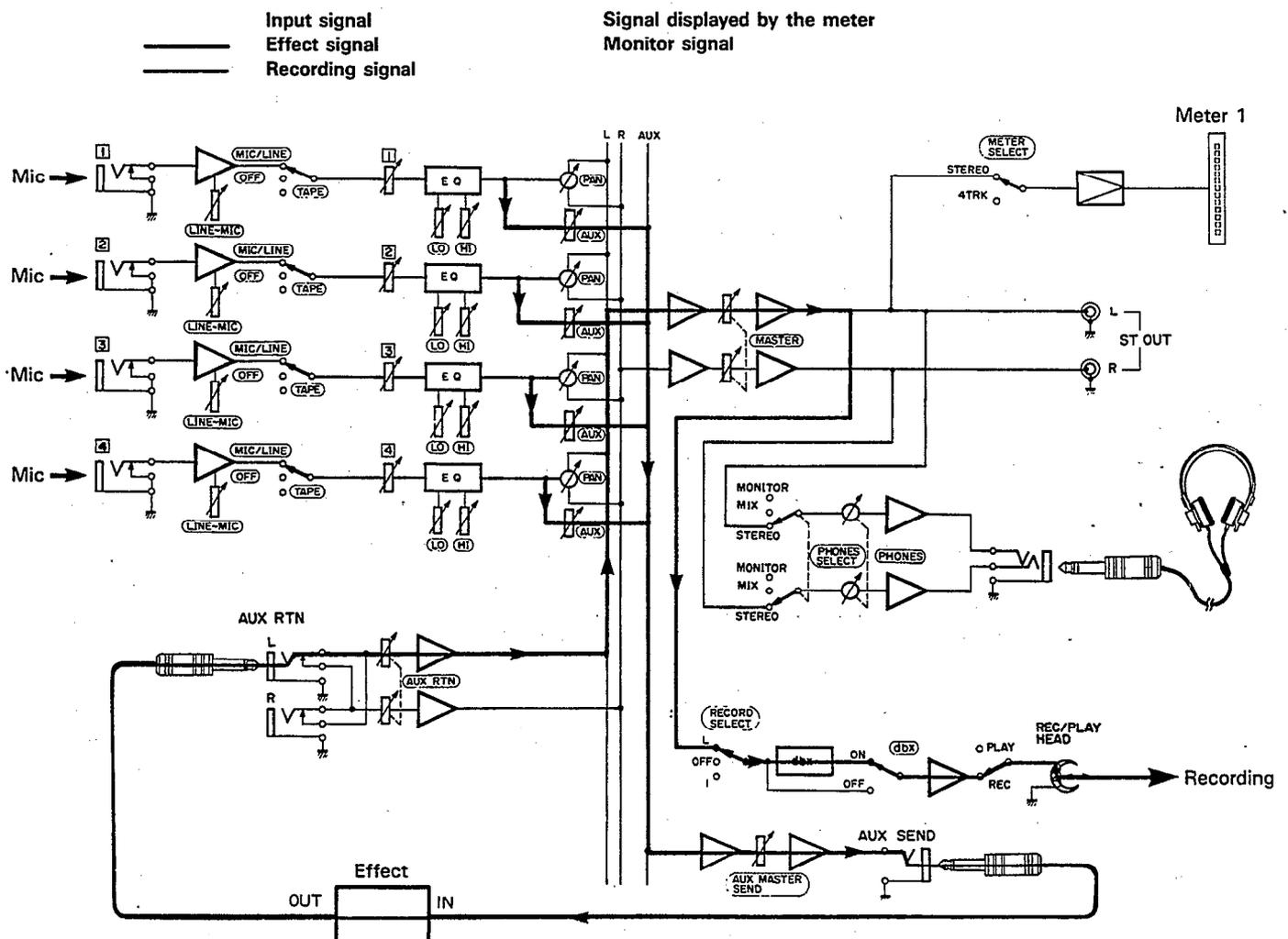
RECORDING THE DRUMS

The drums will be recorded on track 1. In recent years, drum machines and rhythm machines have made an appearance, with Yamaha coming out with the high-performance RX11, RX15, and RX21 Digital Rhythm Programmers. However, for this example we will be recording a conventional set of drums. Though many will be recording with electronic drums, the basic approach is the same.

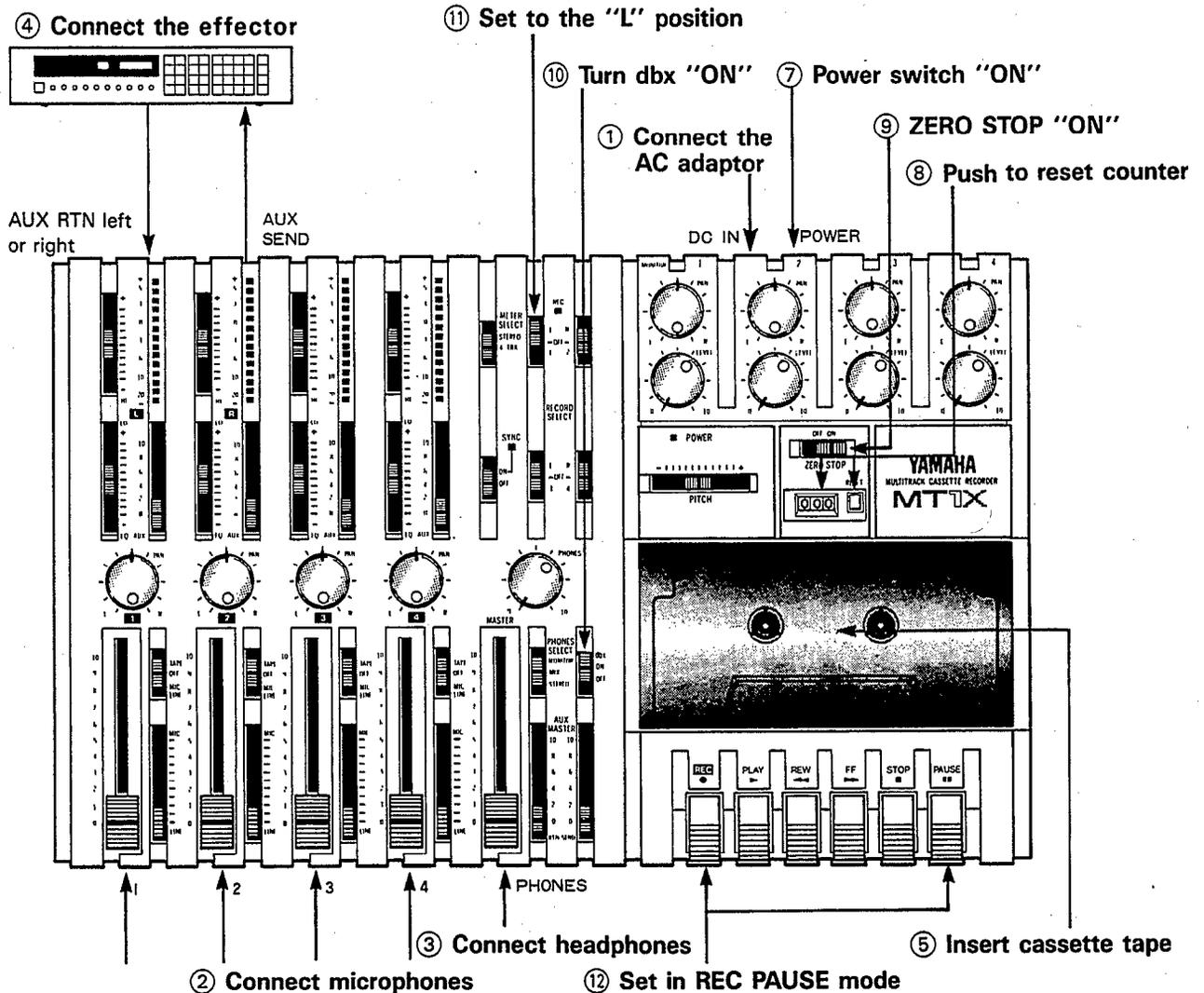
The MT1X has four input jacks, enabling the setting up of the four microphones for recording, as shown in the diagram. Through the MT1X's mixing section, the sounds recorded by these microphones are mixed down onto track 1.

YAMAHA's REV7 Digital Reverberator can be used for reverb effects. It also features echo and delay programs as well as gate reverb and even kick drum programs enabling you to freely obtain various effects to suit each individual song.

— Signal route when recording drums —



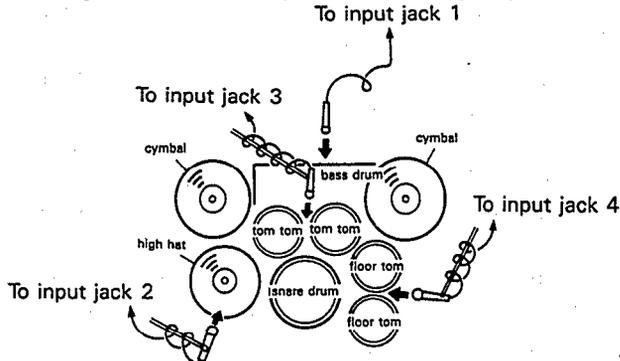
— Drum Recording Procedure —



*Explanation diagram for steps ① to ⑤ & ⑦ to ⑪

1. Connections

- ① Plug the AC adaptor into an AC outlet, and insert the small round plug into the DC IN jack.
- ② Plug the four microphones into input jacks 1-4.



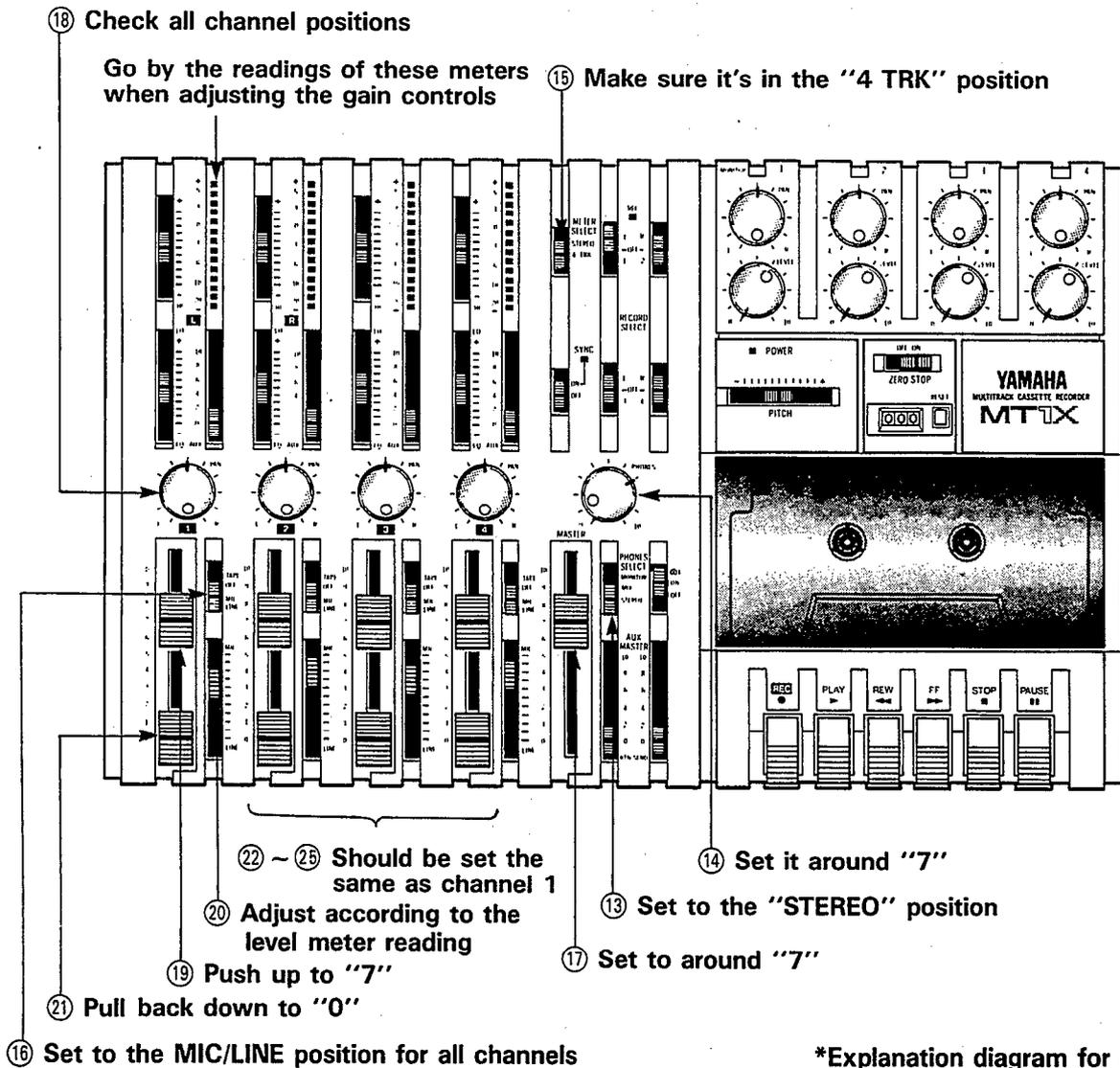
- ③ Plug a pair of monitor headphones (rated 8-40 ohms) into the PHONES jack.
- ④ When using an effect, connect it between the AUX SEND jack (input) and either of the AUX RTN jacks (output).

2. Getting ready

- ⑤ Lift open the cassette door and insert a chrome position (CrO₂) tape. Bias: HIGH, Eq: 70us.
- ⑥ Return all the switches and controls to their normal positions, referring to the control panel illustration on pages 4-9.
- ⑦ Turn the power switches on for the effect and microphones, and then turn the MT1X "ON". The POWER indicator will light.

3. Setting up the recorder section

- ⑧ Press the RESET switch to return the counter to "000".
- ⑨ Turn "ON" the ZERO STOP switch.
- ⑩ Turn "ON" the dbx switch.
- ⑪ Set the RECORD SELECT switch 1 to the "L" position. This is to record the Left stereo signal onto track 1. The REC indicator will begin flashing.



4. Setting the monitor and meter sections

- 13 Set the PHONES SELECT switch to the "STEREO" position.
- 14 Set the PHONES volume to around "7".
- 15 Make sure the METER SELECT switch is in the "4 TRK" position.

5. Adjusting the input level

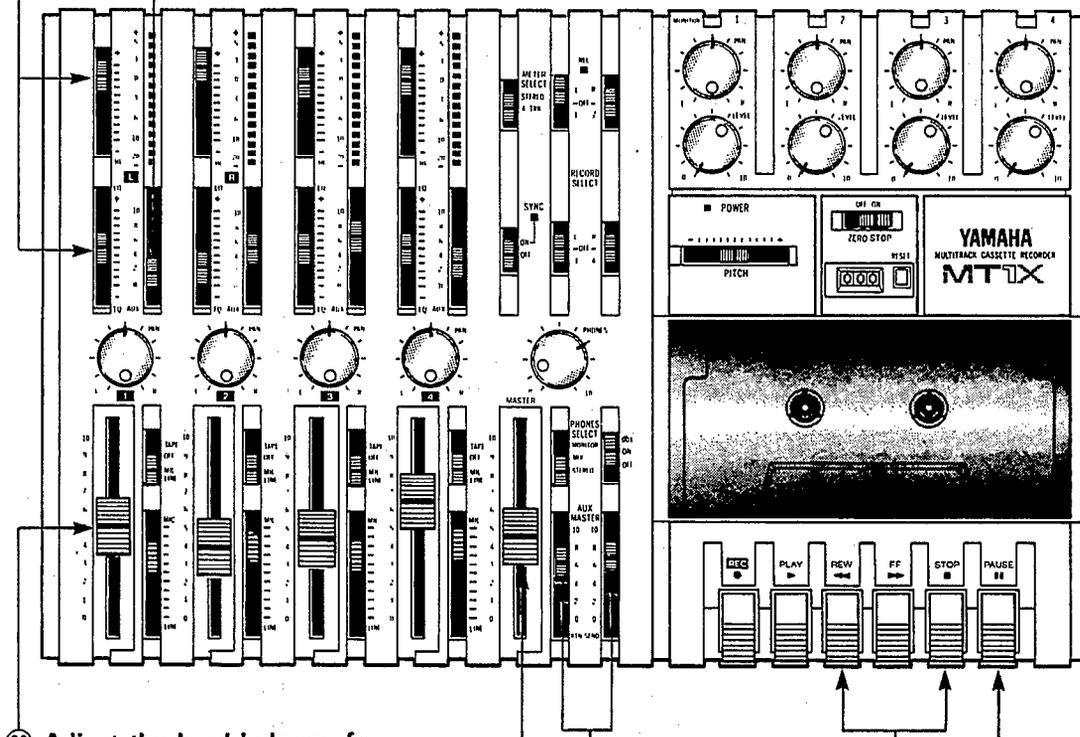
- 16 Set all of the input switches to the MIC/LINE position.
- 17 Set the MASTER fader to "7".
- 18 Set the PAN controls for all channels between the center and the extreme "L" position, as shown.



- 19 Push the input fader for channel 1 up to "7".
- 20 When the drums start playing, slide the gain control for channel 1 towards the "MIC", direction, stopping when the "+3" indicator on the far left level meter flashes occasionally on the sound peaks.
- 21 Pull the input fader for channel 1 back down to "0".
- The proper input level for channel 1 is now set.-
- 22 Set the input fader for channel 2 to "7".
- 23 While the drums are being played, slide the gain control for channel 2 towards the "MIC" direction, stopping when the "+3" indicator on the far left level meter flashes occasionally on the sound peaks.
- 24 Pull the input fader for channel 2 back down to "0".
- The proper input level for channel 2 is now set.-
- 25 Set the input levels for channels 3 and 4 the same way.

27 Set the equalizers to the desired positions for each channel

28 Adjust the effect level for each channel



26 Adjust the level balance for each channel

30 Adjust the recording level

29 Adjust the overall balance of effect signal level to input signal

32 Operate these controls after the musician stops playing

31 Push this switch to START RECORDING

*Explanation diagram for steps 26 to 28 and 30 to 32.

6. Adjusting level balance and equalization characteristics

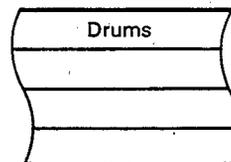
- 26 Adjust channel faders 1 ~4 to achieve the desired recording level balance.
- 27 Adjust the equalizers for 1~4 to obtain the desired sound character for each individual channel. (If you're thinking of ping-ponging these tracks afterwards, it's a good idea to add a little boost on the HIGH EQ because high frequencies can be slightly diminished during the ping-pong re-recording process).
- 28 Set the effect level for each channel with the AUX controls. Then, adjust the overall mix of effect signal to input signal with the AUX MASTER SEND control.
- 29 If necessary, go over steps 26 to 28 several times until everything is just right.
- 30 Adjust the master recording level with the MASTER fader, setting it at the point where the "+3" indicator on the far left level meter flashes occasionally on the sound peaks.

7. Recording

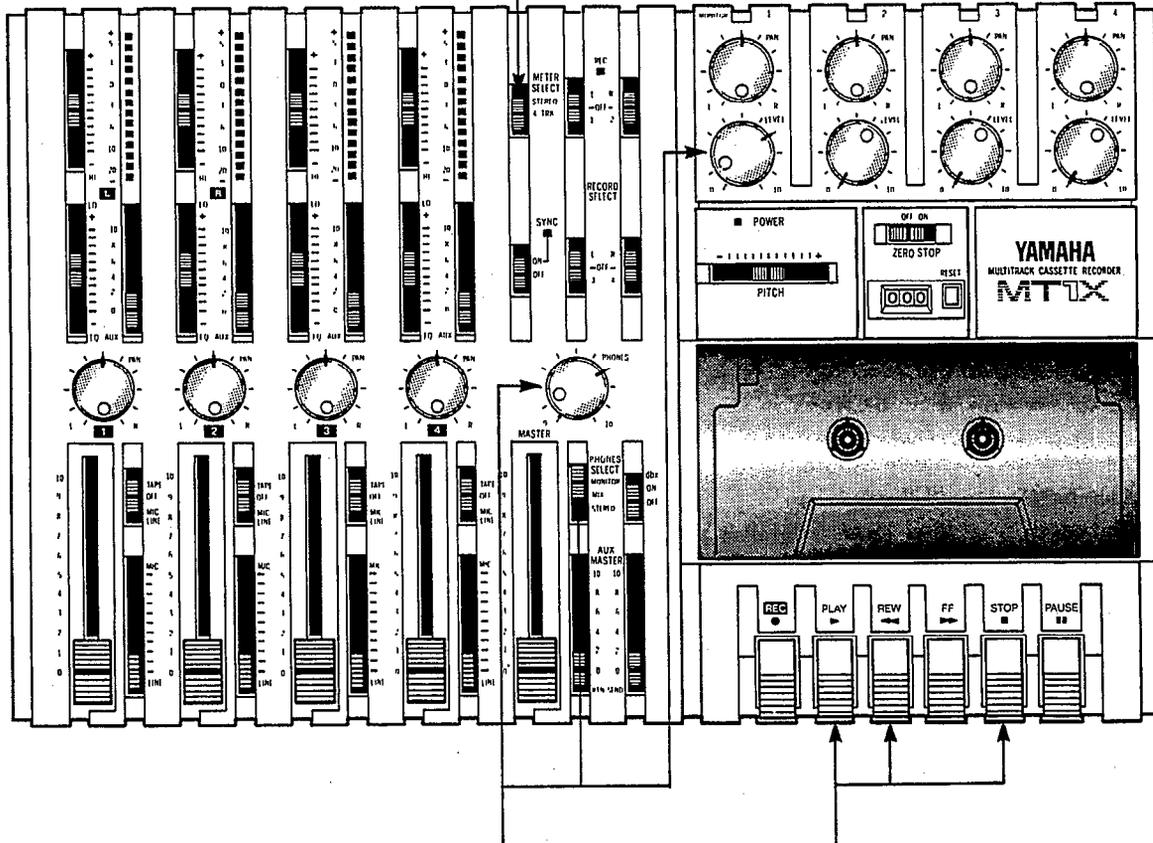
- 31 Push the PAUSE switch to start recording. Just before the musician starts playing, be sure to "count" out loud to help you get the timing right on the other tracks during overdubbing later on.
- 32 When the music sequence is over, press the STOP switch to stop the recording. Then, press the REW switch, and the tape will rewind to a point just before the beginning → "999" on the tape counter → and stop.

— Drum Recording Completed —

Track 1
Track 2
Track 3
Track 4



③⑤ Make sure this switch is in the "4 TRK" position.



③④ Set this so you can monitor track 1. ③⑥ Press to check the recording on track 1, then rewind.

*Explanation diagram of steps ③④ to ③⑥

8. Post recording check

- ③③ Return all switches and controls to their normal positions.
- ③④ Set the PHONES SELECT switch to the "MONITOR" position, turn MONITOR LEVEL control 1 to "7": then turn the PHONES volume control to about "7".
- ③⑤ Make sure the METER SELECT switch is set to "4 TRK".
- ③⑥ Press the PLAY switch, and check the sound recorded on track 1 by headphones, and by looking at the level meter.

At this point, if the track is recorded properly and there doesn't seem to be any problems, press the REW switch and reset all the knobs and controls to their normal positions. Now it's time to record the bass. If the recording is not to your satisfaction, you can re-record the whole track. Or you can use the "punch-in/punch-out" technique to record over a certain spot on the tape. It's explained on page 27.

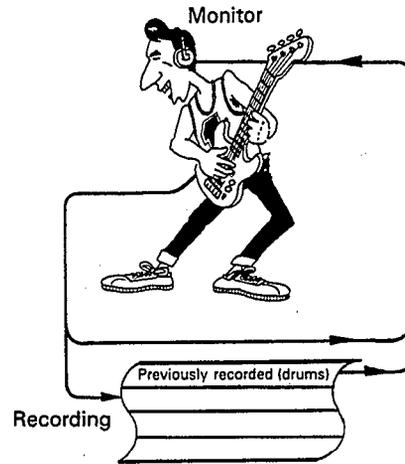
RECORDING THE BASS GUITAR BY OVERDUBBING

Overdubbing is the playing back previously recorded tracks while recording a new instrument on a different track. With this technique, it's possible for one musician to play many different instrumental parts on a single recording. If you're multitalented, multitrack overdubbing can clone you into your own group.

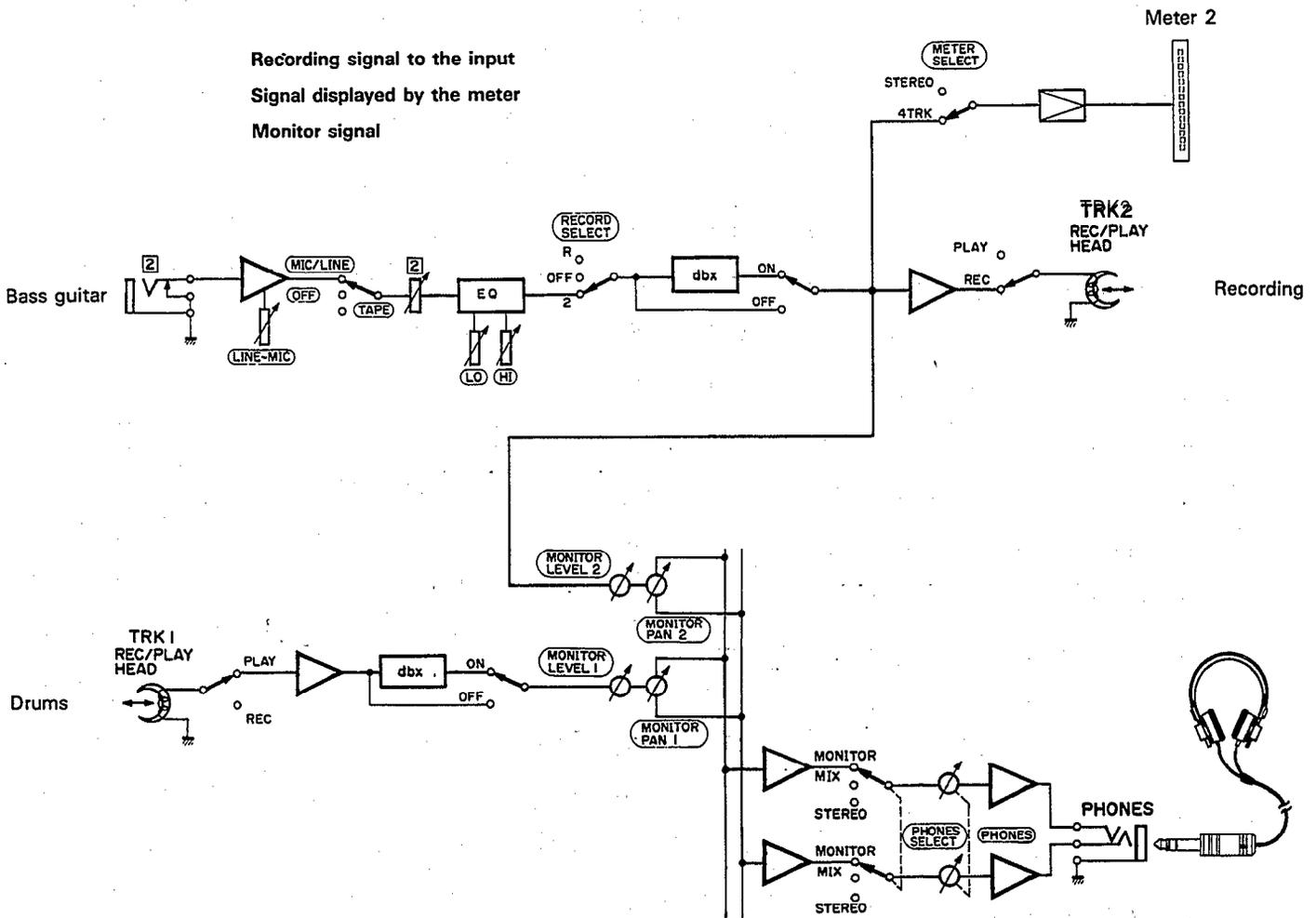
Now, we're going to record a bass guitar on track 2 to synch with, or match, with the drum part already recorded on track 1. There are two ways to record the bass: place a microphone in front of the bass amp, or run a direct line from the bass into the recorder.

If you're after a really clear recording, direct line recording is the way to go. If you're using an effect of some sort, you'll want to run a noise gate thru the final stage of the effect. This is true with all electrified musical instruments.

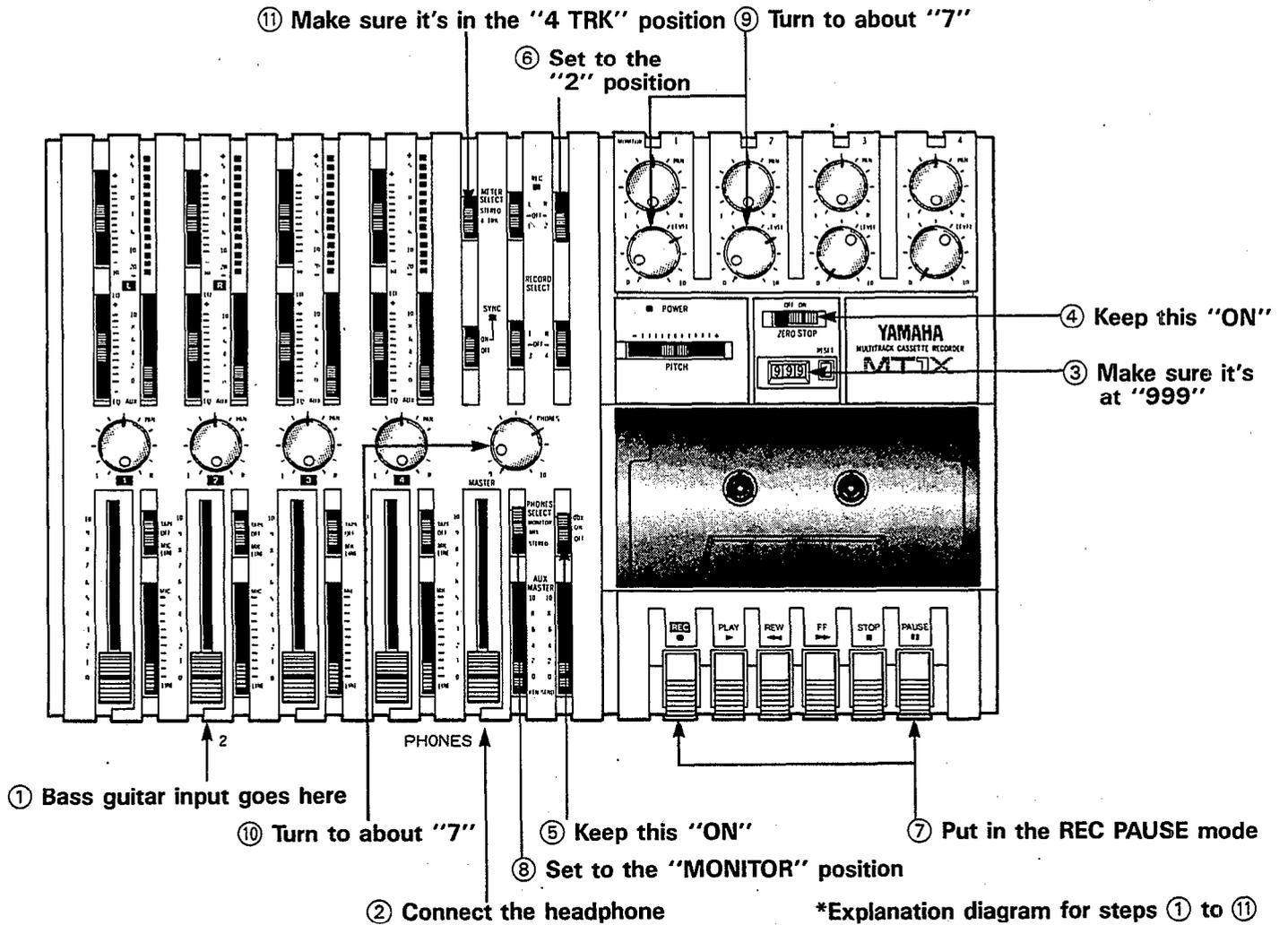
Another idea is to use the Yamaha GC2020 comp/limiter. In addition to the compressor and limiter functions, the noise gate function can prove to be very convenient.



— Signal Path when Recording the Bass Guitar —

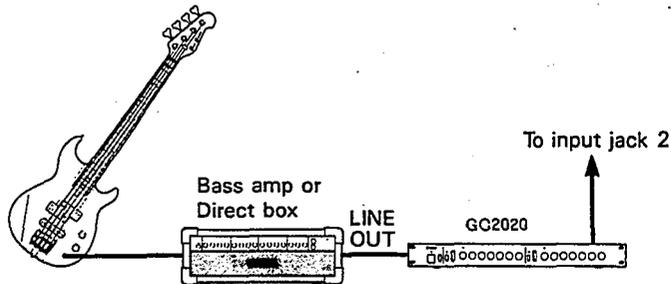


— Bass guitar recording procedure —



1. Connections

- ① Connect everything through input jack 2 as follows. If the GC2020 is being used, connect it between the amplifier and input jack 2. When not using a bass amp, the use of a direct box is recommended.



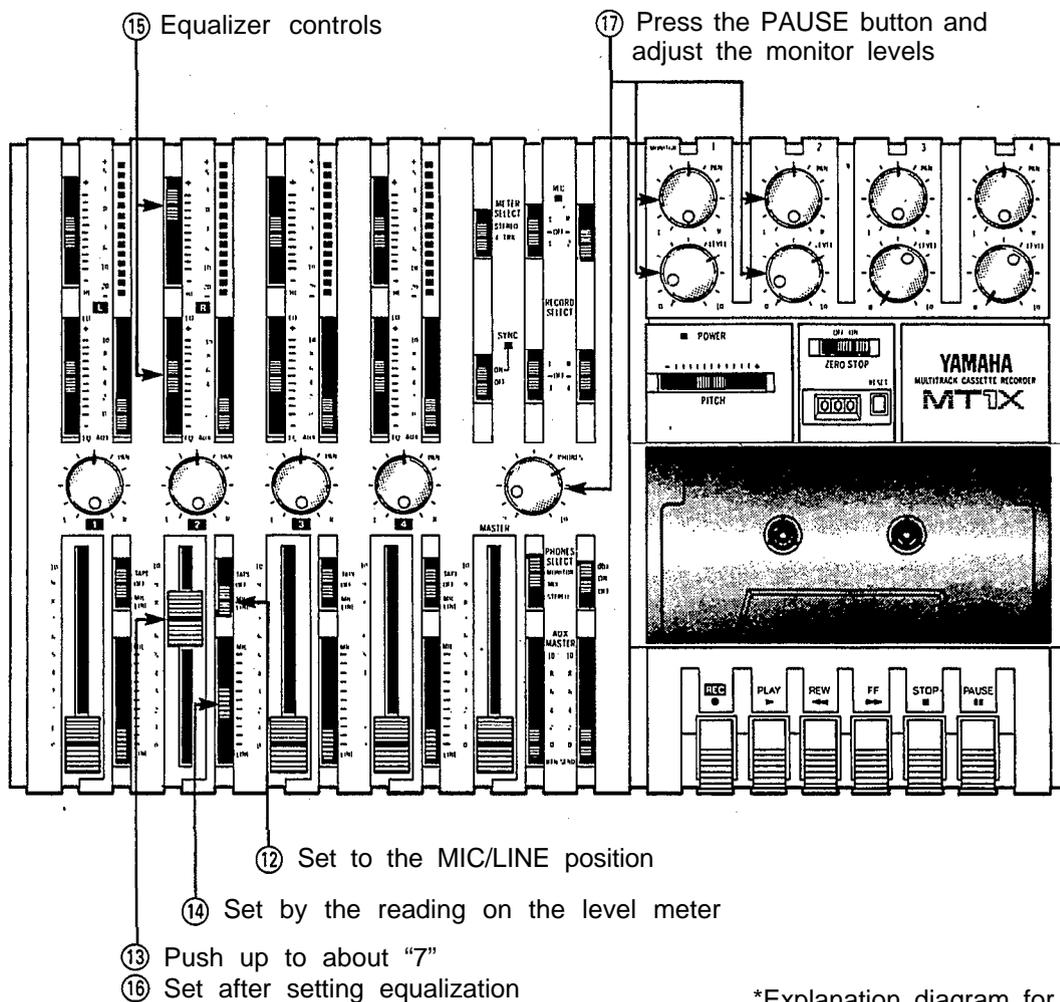
- ② Connect the monitor headphones. Until the mix-down process, only use headphones and avoid using monitor speakers. (This also goes for the rest of the steps.)

2. Setting the recorder

- ③ Make sure the tape has been rewound to the "999" point on the counter. (This also goes for the rest of the steps.)
- ④ Keep the ZERO STOP switch "ON" until mixdown. (This also goes for the rest of the steps.)
- ⑤ Keep the dbx switch "ON" until mixdown. (This also goes for the rest of the steps.)
- ⑥ Set the RECORD SELECT position to "2", the REC indicator will flash to show that the bass guitar connected to input jack 2 will be recorded on track 2.
- ⑦ Press the pause switch to start the recording. The REC indicator will light up completely.

3. Setting the monitor and meter sections

- ⑧ Set the PHONES SELECT switch to the "MONITOR" position.
- ⑨ Turn MONITOR LEVEL controls 1 and 2 to about "7":
- ⑩ Set the PHONES volume level to about "7".
- ⑪ Make sure the METER SELECT switch is in the "4 TRK" position.



*Explanation diagram for steps ⑫ to ⑰

4. Adjusting the Input level

- ⑫ Set the input selector switch to the MIC/LINE position.
- ⑬ Push input fader 2 up to about "7".
- ⑭ Start playing the bass guitar, and slide gain control 2 towards the "MIC" direction, stopping when the "+3" indicator on the level meter second from the left flashes occasionally on the sound peaks.

5. Adjusting the recording level and sound characteristics

- ⑮ Operate the equalizer controls for channel 2 to get the desired tone. (If you plan to ping-pong this track later, boost up the treble a little bit with the HIGH EQ control.)
- ⑯ Use input fader 2 to adjust the recording level according to the reading on the meter second from the left.

6. Adjusting the monitor sound

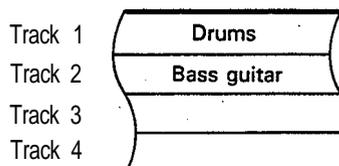
- ⑰ Press the PAUSE switch to start the tape, and set the sound balance of the bass guitar and drums. If necessary, control the combined volume level with the PHONES volume control. Now, using MONITOR PAN controls 1 and 2, decide the left/right stereo positioning of the two tracks. (During this, the bass guitar will be recorded on track 2.)

- ⑱ After you have adjusted the monitor levels and pans to your satisfaction, rewind the tape and set the recorder into the REC PAUSE mode.

7. Recording

- ⑲ Press the PAUSE switch to start recording. While monitoring through headphones, the bass player should play along in synchrony with the drum track.
- ⑳ When the musical segment is over, stop and rewind the tape.

— Bass Guitar Recording completed —



8. Post recording check

- ㉑ Just press the play switch to check to see that the track was recorded properly.
- ㉒ Set all switches and controls back to their normal positions.

RECORDING THE RHYTHM GUITAR

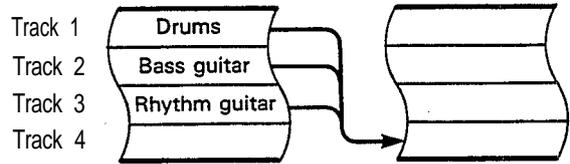
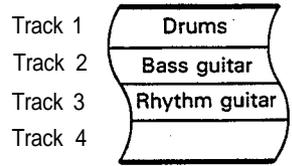
Record the rhythm guitar on track 3 to sync with the drums on track 1 and the bass guitar on track 2. Recording preparations and operations are the same as when recording the bass guitar. If effects are being used, connect them just before the input jack.

PING-PONG < PING-PONG RECORDING >

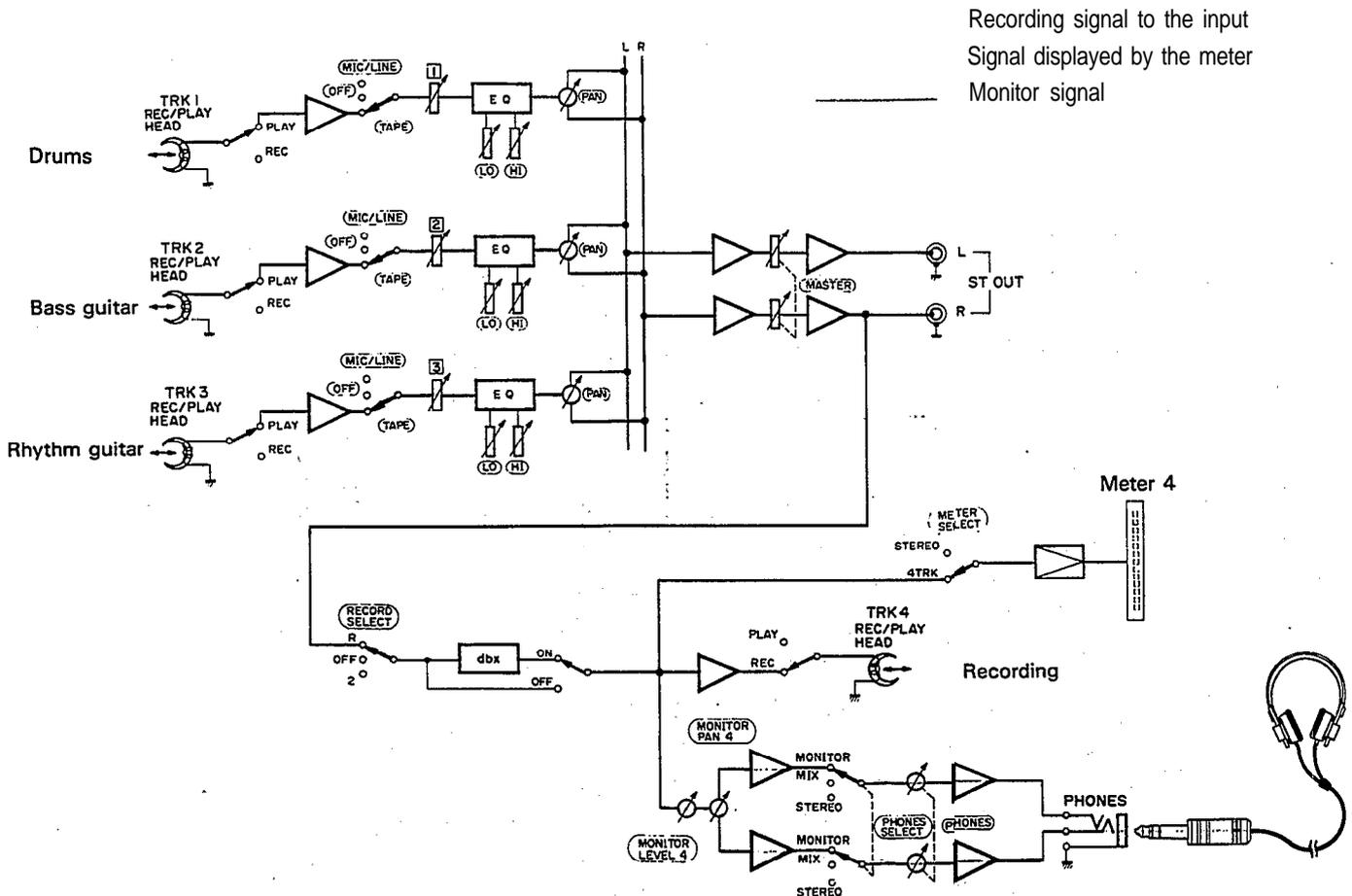
After the rhythm section has been recorded on tracks 1 — 3, only track 4 remains as an empty, spare track. Since there are three more parts to be recorded, more tracks will be needed.

The ping-pong technique (sometimes called bouncing, or track transfer, or collapsing tracks) shown here allows you to re-record these three tracks onto one track, thus freeing up tracks for other recording operations. You can also add other new parts during the ping-pong process. As long as there are empty tracks, you can ping-pong from one or more tracks to another as many times as you like.

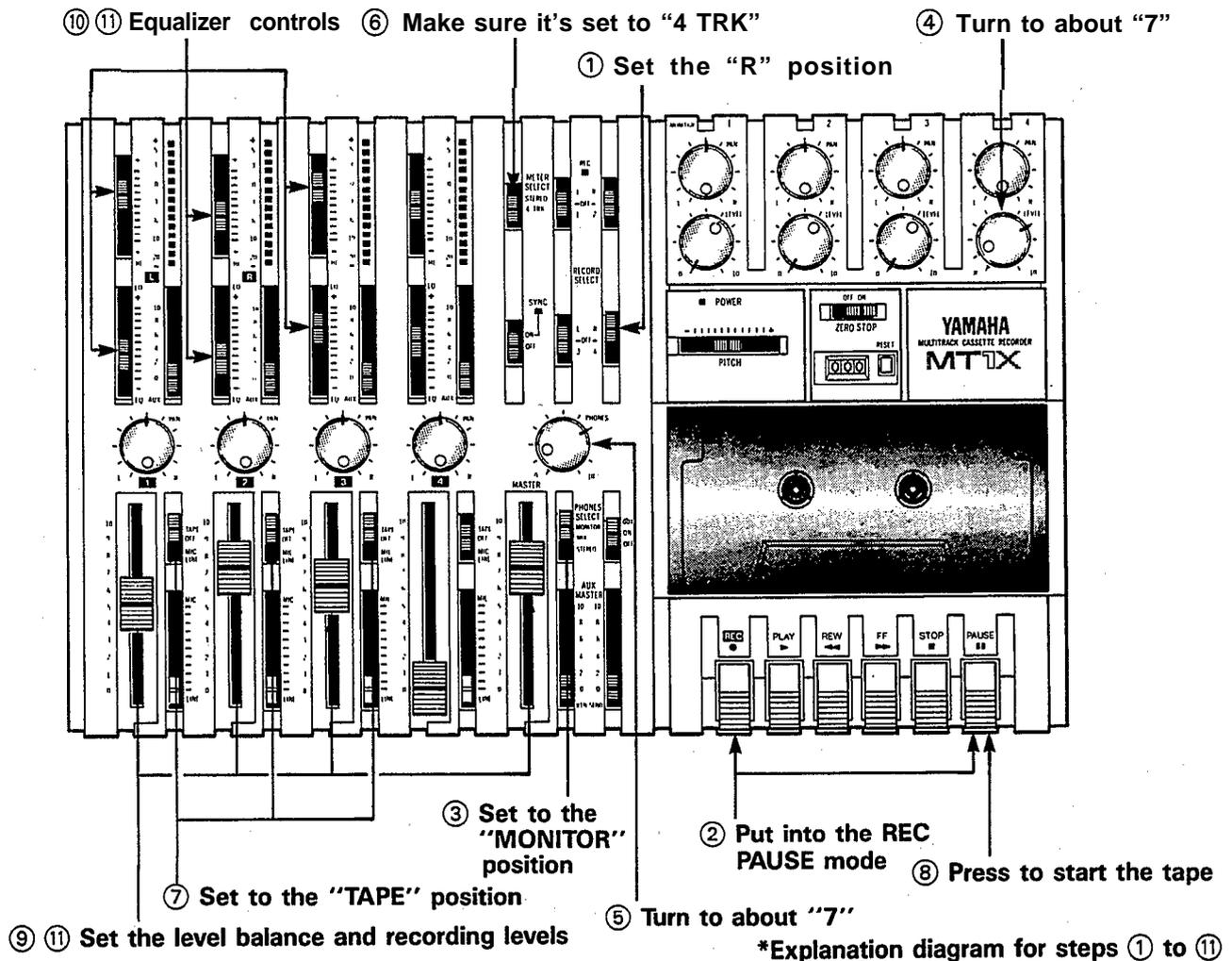
However, each time a track is ping-ponged onto another track, some degradation in sound quality occurs. Most noticeable is a loss of high frequency sounds, or "treble". Therefore, it's best to plan for only 1 or 2 ping-pong operations to preserve the sound quality of the instruments you record. Now, let's get started.



— Signal Path during Ping-pong Recording —



— Ping-pong Recording Procedure —



1. Setting the recorder

- ① Set the RECORD SELECT switch to the "R" position to mix the sound of the drums, bass guitar, and rhythm guitar through the stereo buss. The REC indicator will flash.
- ② Press the PAUSE switch, then the REC switch to put the recorder into the REC PAUSE mode. The REC indicator will light.

2. Setting the monitor and meter sections

- ③ Set the PHONES SELECT switch to the "MONITOR" position to monitor the sound recorded onto track 4.
- ④ Turn the MONITOR LEVEL 4 control to about "7".
- ⑤ Turn the PHONES volume control to about "7".
- ⑥ Make sure the METER SELECT switch is set to "4 TRK":

3. Adjusting the level balance and sound characteristics

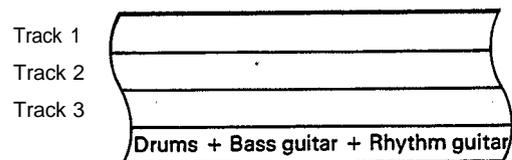
- ⑦ Set input selector switches 1 — 3 to the "TAPE" position.
- ⑧ Press the PAUSE switch to start the tape.
- ⑨ Adjust the input balance of each track with the input faders 1 through 3. Set the overall level with the MASTER fader. Use the level meter on the far right as the reference.

- ⑩ Set the equalizer controls for each, channel, 1—3, to get the desired tone for each instrument. AFTER PING-PONGING IT WILL BE IMPOSSIBLE TO CHANGE THE TONE OR LEVEL BALANCE FOR EACH INSTRUMENT SEPARATELY.
- ⑪ If necessary, repeat steps ⑨ ⑩ as many times as you like until everything sounds right.
- ⑫ Rewind the tape, and reset to the REC PAUSE mode.

4. Recording

- ⑬ Push the PAUSE switch to start recording.
- ⑭ When ping-pong recording is finished, rewind the tape.

— Ping-pong Recording Completed —



5. Post recording check

- ⑮ Just press the PLAY switch to check if everything was recorded properly.
- ⑯ Return all switches and controls to their normal positions, and rewind the tape. Next, we will record the keyboards.

RECORDING THE KEYBOARDS BY OVERDUBBING

Now that the recording of the drums on track 1 has been ping-ponged onto track 4, this track is free for recording the keyboards.

RECORDING THE LEAD GUITAR BY OVERDUBBING

Just like with the keyboards, the lead guitar can be recorded on track 2. Both the keyboards and the lead guitar can be positioned Left and Right with the PAN controls during mixdown. Since delay and chorus effects will be added separately in stereo during mixdown, distortion and compression effects added in mono should be done during this stage.

RECORDING THE VOCALS BY OVERDUBBING

Vocals will be recorded on track 3. Just like with the drums, vocal recording should be monitored through the headphones.

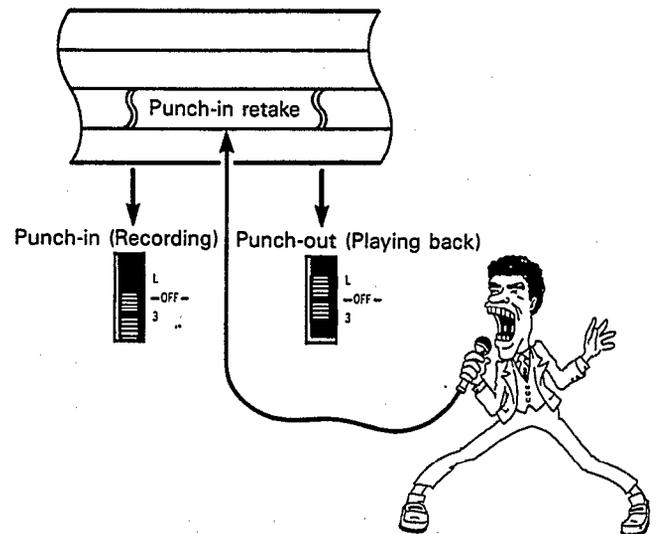
PUNCH-IN/PUNCH-OUT

Now let's explain the punch-in/punch-out technique. Mastering it will allow you to re-record even the smallest segment on a track without disturbing the rest of the track, or the other tracks.

When all the tracks are playing back, press the REC switch to start the tape, "punch in" at the starting point of the section to be redone (set the RECORD SELECT switch of the track to be redone to the REC position for the new recording), and then "punch out" (return the RECORD SELECT switch of the track to the "OFF" position). With this technique, it's also possible to insert a lead solo into an empty section of the vocal track. However, this sort of operation requires a blank section of tape on a track.

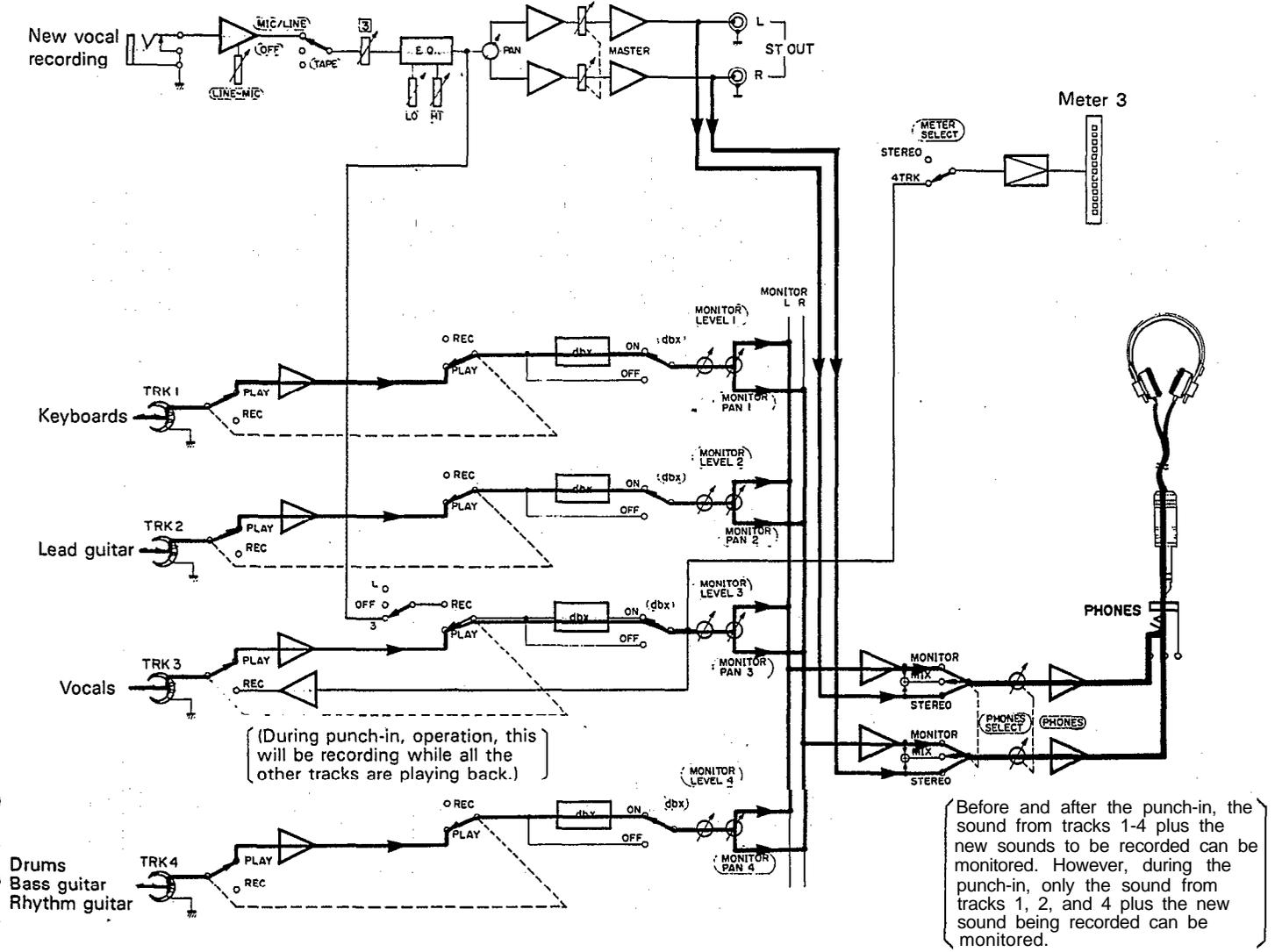
NOTE: The RECORD SELECT switches of the MT1X can be operated by the optional FS-1 Foot Switch. The RECORD SELECT switch for the track to be redone must be set, and then it can be the foot can be used to "punch in" and "punch out".

Let's show you how "punch-in/punch-out" works. As an example, we'll explain how to re-do a segment of the vocal recorded on track 3.

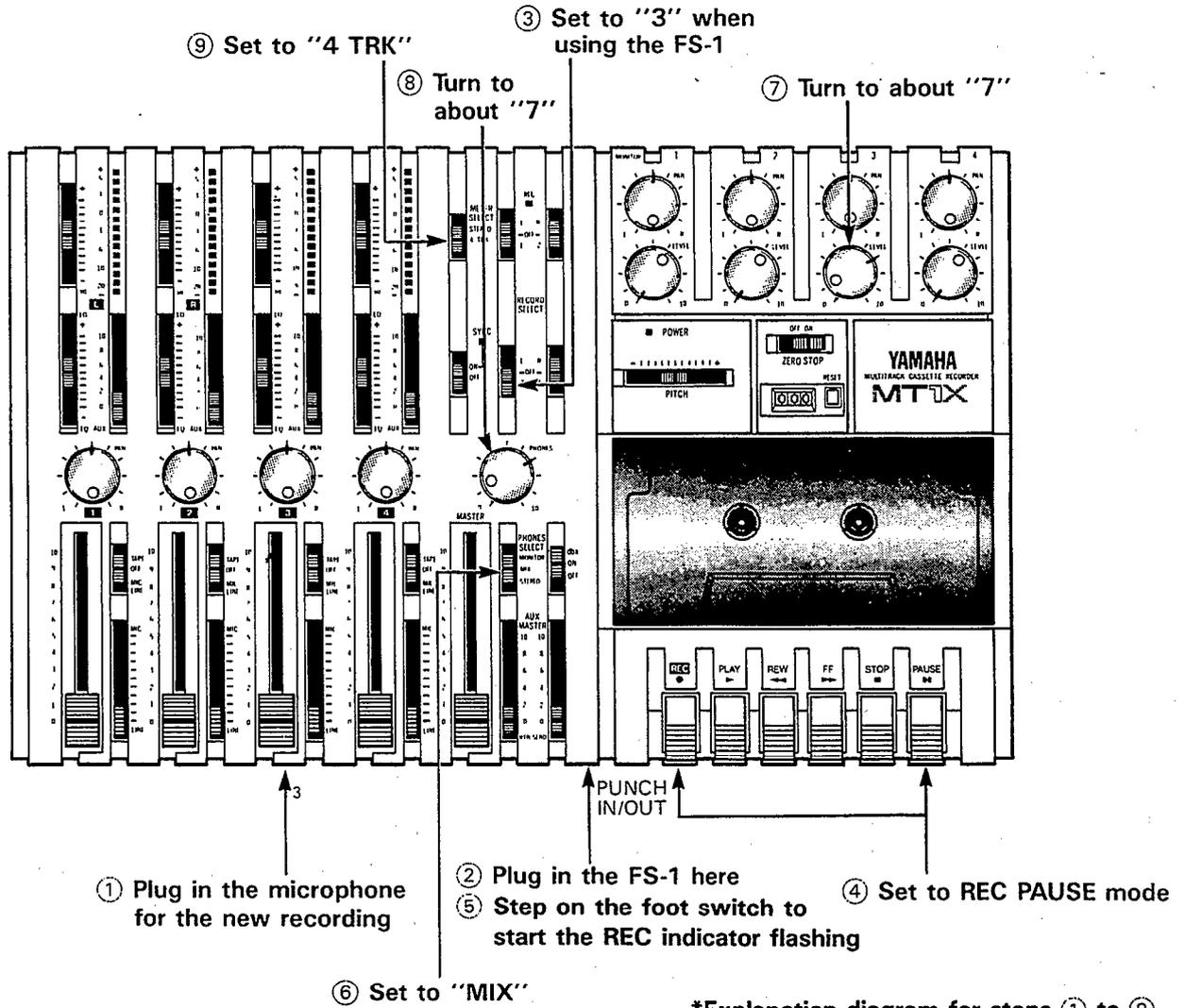


— Signal Path during Punch-in/Punch-out Operation —

- Input to recording of the new recording
- ===== Monitor signal of the new recording
- ===== Monitor signal of each track
- ===== Signal for meter display



— Punch-in/Punch-out Procedure —



1. Connections

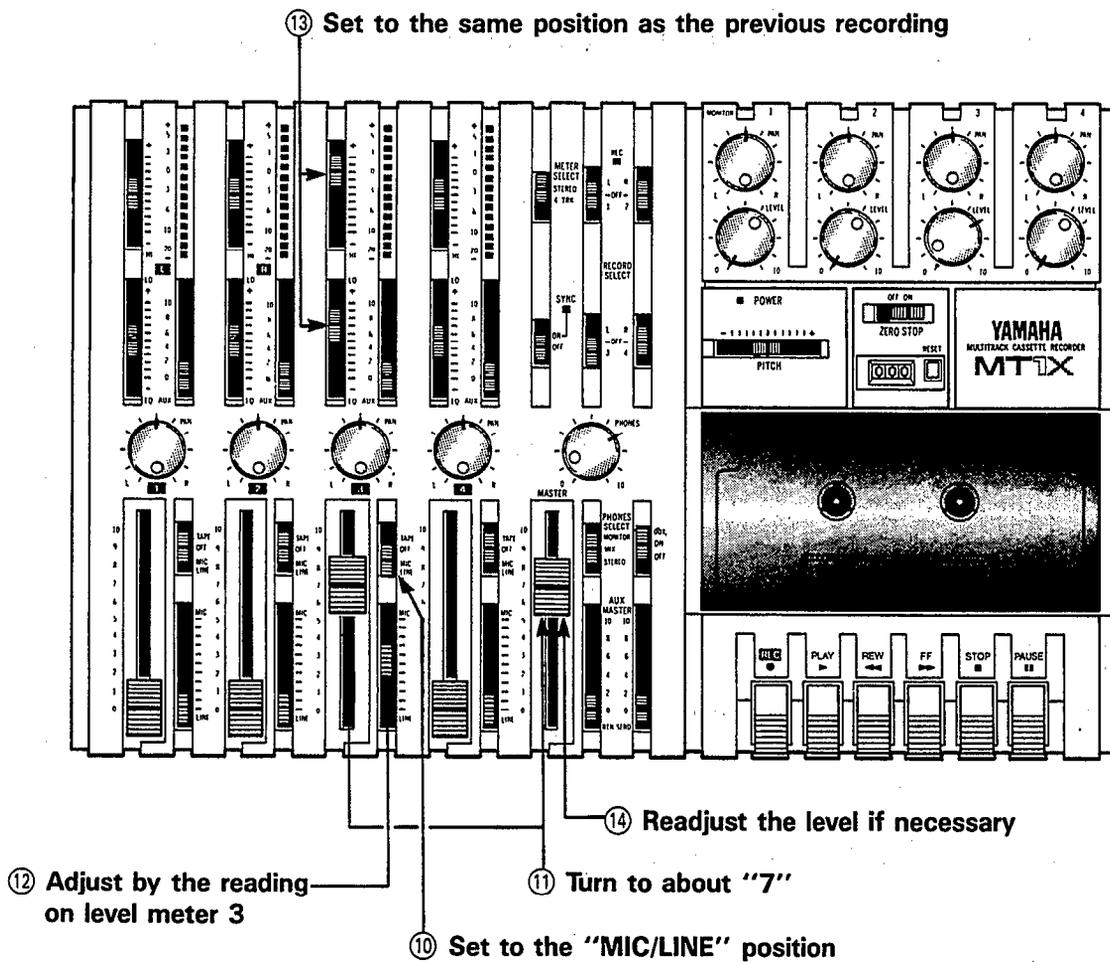
- ① Connect the vocal microphone through input jack 3.
- ② If the FS-1 Foot Switch is being used, connect it to the PUNCH IN/OUT jack.

2. Setting the recorder

- ③ If the FS-1 Foot Switch is connected, set RECORD SELECT switch 3 to the "3" position. The REC indicator will flash.
- ④ After pressing the PAUSE switch, press the REC switch. (If the FS-1 is being used, the unit is put into the REC PAUSE mode, and the REC indicator lights.)
- ⑤ If the FS-1 is connected, set its foot switch so that the REC indicator flashes.

3. Setting the monitor and meter sections

- ⑥ Set the PHONES SELECT switch to "MIX". (If it's not set to this position, you won't be able to monitor the new recording sound and the playback sound of tracks 1 — 4 during punch-in/punch-out operation.)
- ⑦ Turn the MONITOR LEVEL control to about "7".
- ⑧ Turn the PHONES volume to about "7".
- ⑨ Set the METER SELECT switch to "4 TRK".



*Explanation diagram for steps 10 to 14

4. Setting input levels

- 10 Set input select switch 3 to "MIC/LINE".
- 11 Set both input fader 3 and the MASTER fader to "7".
- 12 Slide gain control 3 in the "MIC" direction, stopping when the "+3" LED indicator on the level meter third from the left flashes occasionally on music peaks. (Setting the same as when the vocals were initially recorded is recommended.)

5. Adjusting the recording level and sound characteristics

- 13 Using the equalizer controls for channel 3, adjust for the desired sound characteristics. It's a good idea to set them where they were for the initial recording.
- 14 After setting the equalization, set the recording level, preferably at the same level as the initial recording.

6. Recording

- 15 Press the PAUSE switch to start the recording.
- 16 "Punch-in" when you reach the passage that must be redone by sliding the RECORD SELECT switch to the "3" position. When using the FS-1, press on the foot switch. In both cases, the REC indicator will light.

- 17 "Punch-out" when you have finished redoing the passage by sliding the RECORD SELECT switch to the "OFF" position. When using the FS-1, press on the foot switch again. In both cases, the REC indicator will begin flashing.

- 18 Rewind the tape.

— Punch-in/Punch-out Completed —

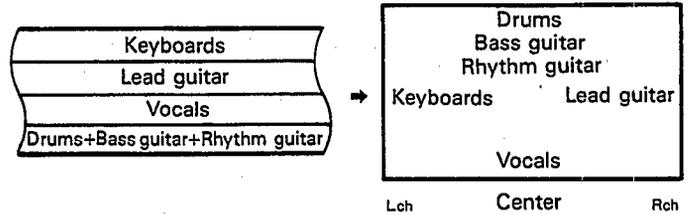
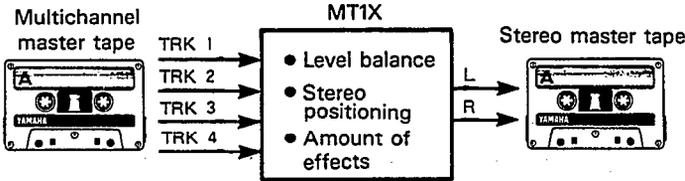
7. Post recording check

- 19 Press the PLAY switch to make sure the passage was redone correctly.
- 20 Return all controls and switches to their normal positions, and rewind the tape. We're now ready for mixdown recording.

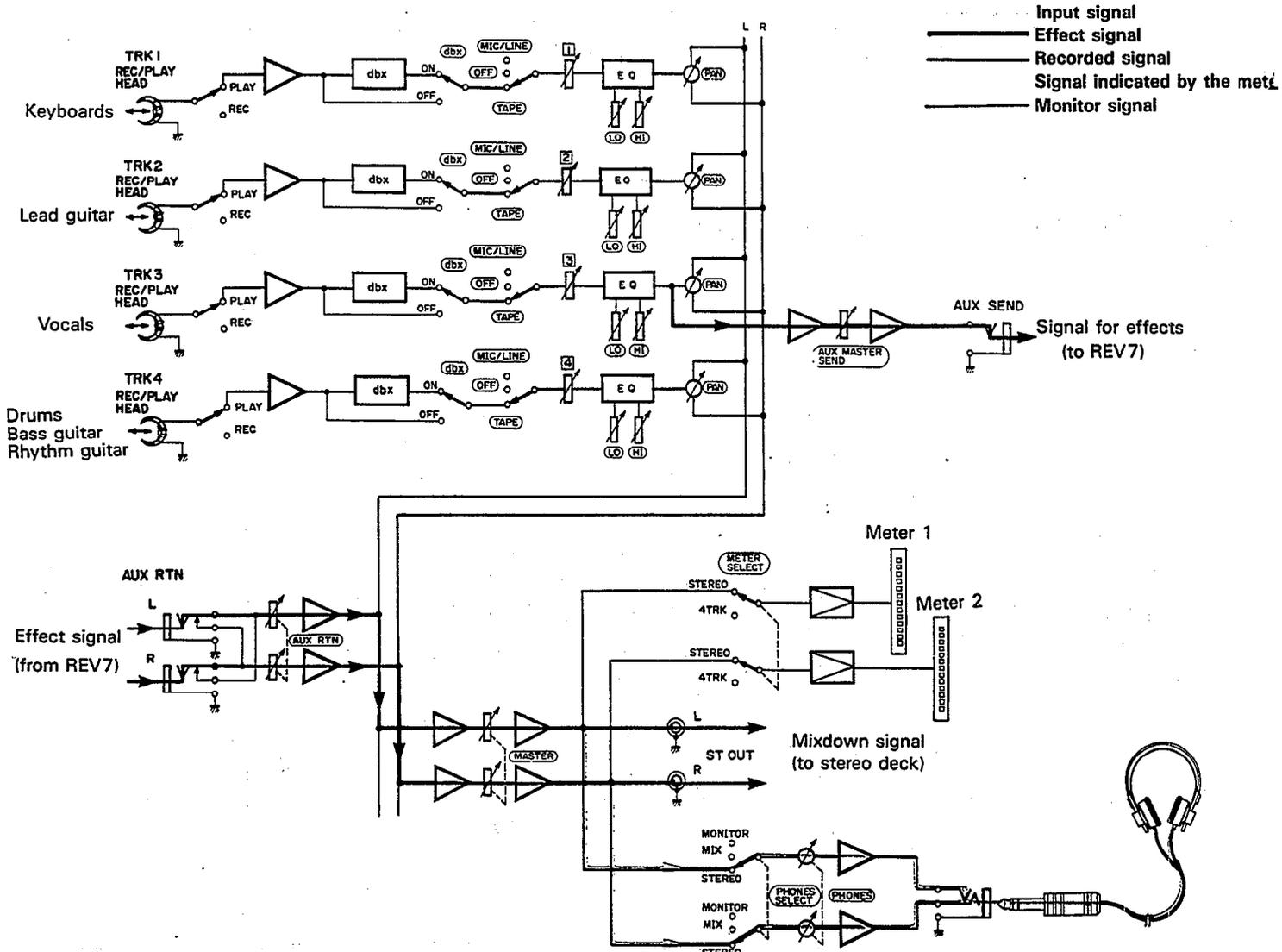
MIXDOWN (TRACKDOWN)

It's now time for the mixdown. Often called "trackdown" or "remix", mixdown is when all the four recorded tracks are mixed to achieve a certain sound balance in level, effects, and stereo positioning, and then recorded onto one side of a cassette tape in mono or stereo. This tape is the final "master".

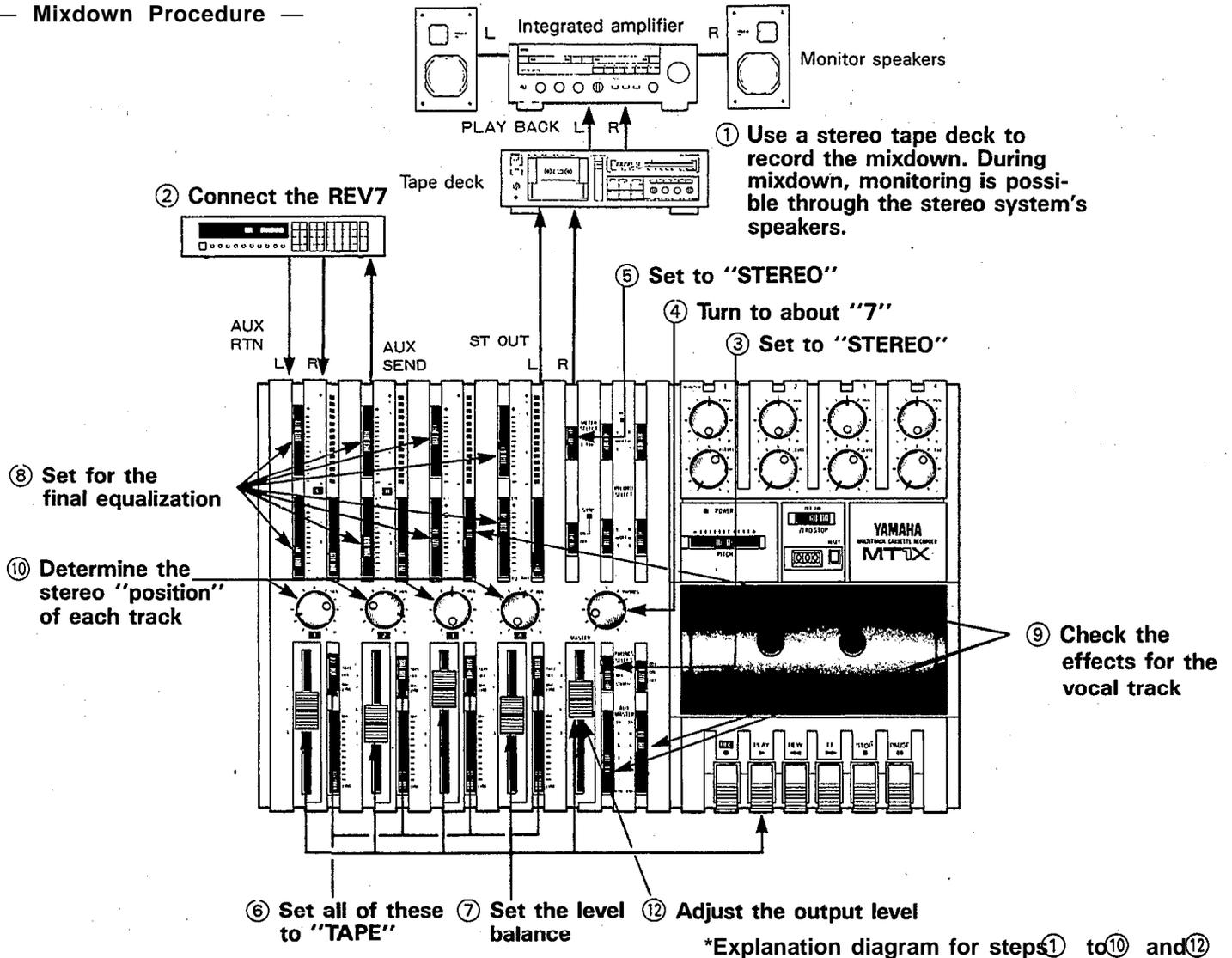
In this next step, the instruments are "put in their place" in the stereo sound field, and a slight amount of reverb will be added to the vocal track with the REV7.



— Signal Path During Mixdown —



— Mixdown Procedure —



*Explanation diagram for steps ① to ⑩ and ⑫

1. Connections

- ① Connect a stereo tape deck to the ST OUT jack, and insert a blank tape to record the final mix in stereo.
- ② Connect the REV7 Digital Reverberator through the AUX SEND jack and AUX RETURN jacks.

2. Setting the meter and monitor sections

- ③ Set the PHONES SELECT switch to "STEREO" in order to monitor the mixed down sound.
- ④ Turn the PHONES volume to about "7".
- ⑤ Set the METER SELECT switch to "STEREO" so that the level of the mixed down signal will be indicated.

3. Adjust the level balance and sound characteristics

- ⑥ Set all the input select switches 1 — 4 to "TAPE".
- ⑦ Press the PLAY switch to start the tape, and adjust the level balance of each track. Push the MASTER fader up to "7": and then set the level balance with each channel fader.
- ⑧ Adjust the sound characteristics for each track with the equalizer controls for channels 1 — 4.
- ⑨ Add the effects to the vocal track using the AUX 3, AUX MASTER SEND, and AUX RTN controls.

- ⑩ Determine the stereo positioning of the instruments recorded on each track using the PAN controls 1 — 4.
- ⑪ If necessary, repeat steps ⑦ through ⑩ until everything sounds right.
- ⑫ Watching level meters 1 and 2, use the MASTER fader to set the output level of the signal sent from the ST OUT jacks.
- ⑬ Watching the level meters of the stereo tape deck, set its proper recording level.
- ⑭ Rewind the tape.

4. Recording

- ⑮ Press the PLAY switch of the MT1X at the same time you start recording with the stereo tape deck.
- ⑯ After the recording is finished, play back the mixed down tape. How does it sound? You can keep repeating the mixdown process, varying the levels, equalizations, and effect level balance until you're fully satisfied with the results. When you make that "perfect" mix, congratulations. You've finished your stereo master.

— Mixdown Completed —

SYNC-RECORDING

For synchronized operation with MIDI instruments, the optional YMC10 MIDI converter enables synchro-operation of the CMX1 and MIDI instruments such as the RX11, RX15, and RX21 digital rhythm programmers and the QX1 and QX7 digital sequence recorders. In this section, we will explain synchro-recording using synchro-operation techniques.

● Merits of synchro-recording

Synchro-recording enables the use of digital sources such as rhythm programmers and sequencers during the first mixdown stages. Since these sources are recorded directly onto the master, it extracts the full sound quality, dynamic range, and superb S/N performance of these digital instruments.

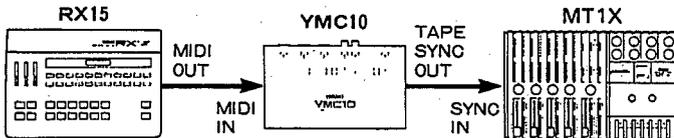
● Operating the tape sync

In order to work the tape sync, the MIDI synchronizing signal must be converted to an FSK (frequency shift keying) signal first. This is because MIDI transmits information at an extremely high maximum speed of 31.25 K baud per second.

Therefore, the use of analog instruments is impossible. By using the MIDI converter, the MIDI synchronizing signal is converted to an FSK signal that analog instruments can handle.

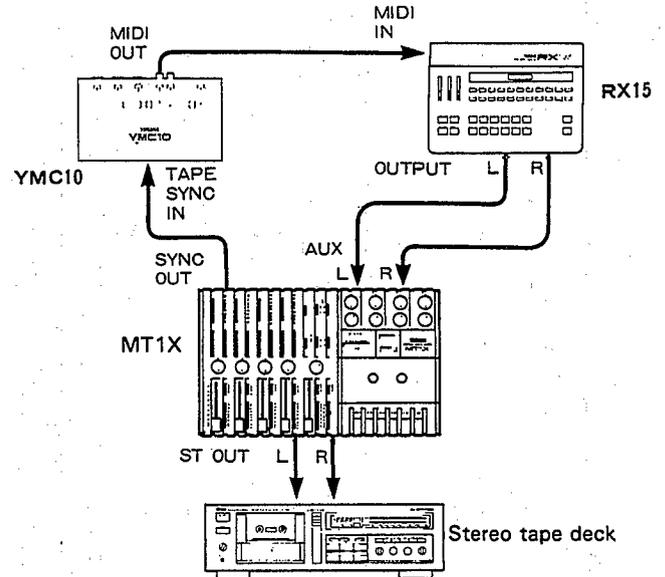
● An example of synchro-recording using the RX 15 rhythm programmer

- ① Set the RX15 to create the desired rhythm effects.
- ② Connect the RX15 in the following manner.



- ③ After putting the MT1X into the REC PAUSE mode, turn the SYNC switch "ON". In this condition, both the tape will start and the RX15 will start playing when the PAUSE switch is pressed. Here's how it works. The YMC 10 converts the MIDI synchronizing signal from the RX15 to FSK signal, which is recorded on track 1 of the MT1X.
- ④ In order to operate the RX15 by the FSK signal recorded on track 1, connect everything like this:

- ⑤ With the SYNC switch "ON", press the PLAY switch and the FSK signal recorded on track 1 is sent to the YMC10, which converts it to the MIDI synchronizing signal and outputs it to the RX15. In this way, track 1 of the MT1X operates the RX15. FOR THIS OPERATION, DON'T FORGET TO SET THE RX15 SYNC SWITCH TO "MIDI". Now, tracks 2-4 can be used for overdubbing.
- ⑥ Connect as shown below for mixdown.



- ⑦ Start the tape, mixdown the sound from tracks 2—4 and the RX15's drum sounds input through the AUX Left and Right jacks, and record it with a stereo tape deck.

EDITING VIDEO SOUNDTRACKS

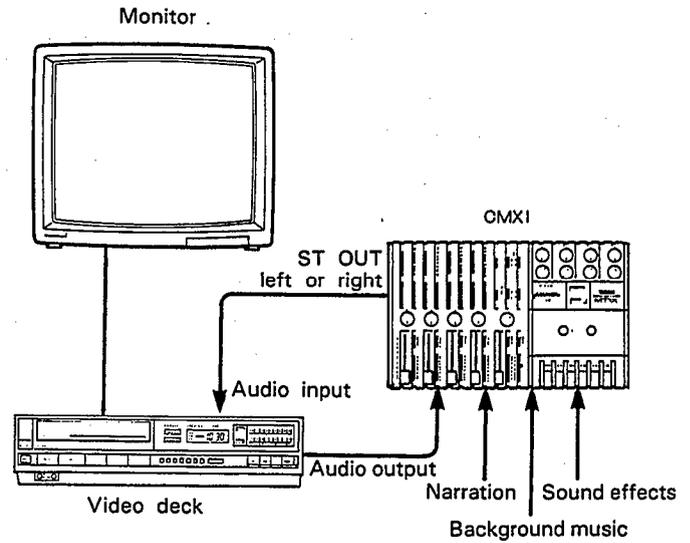
Most people will agree that the sound recorded by the video camera's microphone just isn't enough for a good music video.

Using the MT1X to edit down a good soundtrack for your video is a great idea, and will result in a video that sounds surprisingly professional. You'll find this capability useful to produce a promotional video for your group. In the following example, we'll show you how to make a soundtrack that includes the sound recorded by the video camera's microphone, narration, background music, and sound effects.

Editing Procedure

- ① Playback the video several times in order to create a good, tight scenario. If you're going to edit the video footage, do it first.
- ② Use track 1 to record the sound recorded by the video camera's microphone.
- ③ Track 2 is for recording the narration. While watching the video and monitoring track 1 with headphones, record the narration with a microphone.
- ④ Overdub the background music on track 3. If this music is in stereo, use tracks 3 and 4. If it's just mono, track 3 will suffice.
- ⑤ Sound effects can be recorded on track 4.
- ⑥ Mix down the sound from tracks 1-4 and record them on the video soundtrack using the video decks overdubbing function.

NOTE: This example is when editing the soundtrack of a monaural video deck with an overdubbing function.

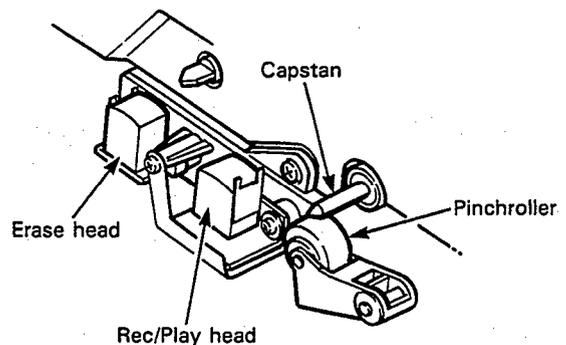


MAINTENANCE

As a good general rule, the tape heads, pinchroller and capstan should be cleaned before each recording, thus ensuring the best audio quality.

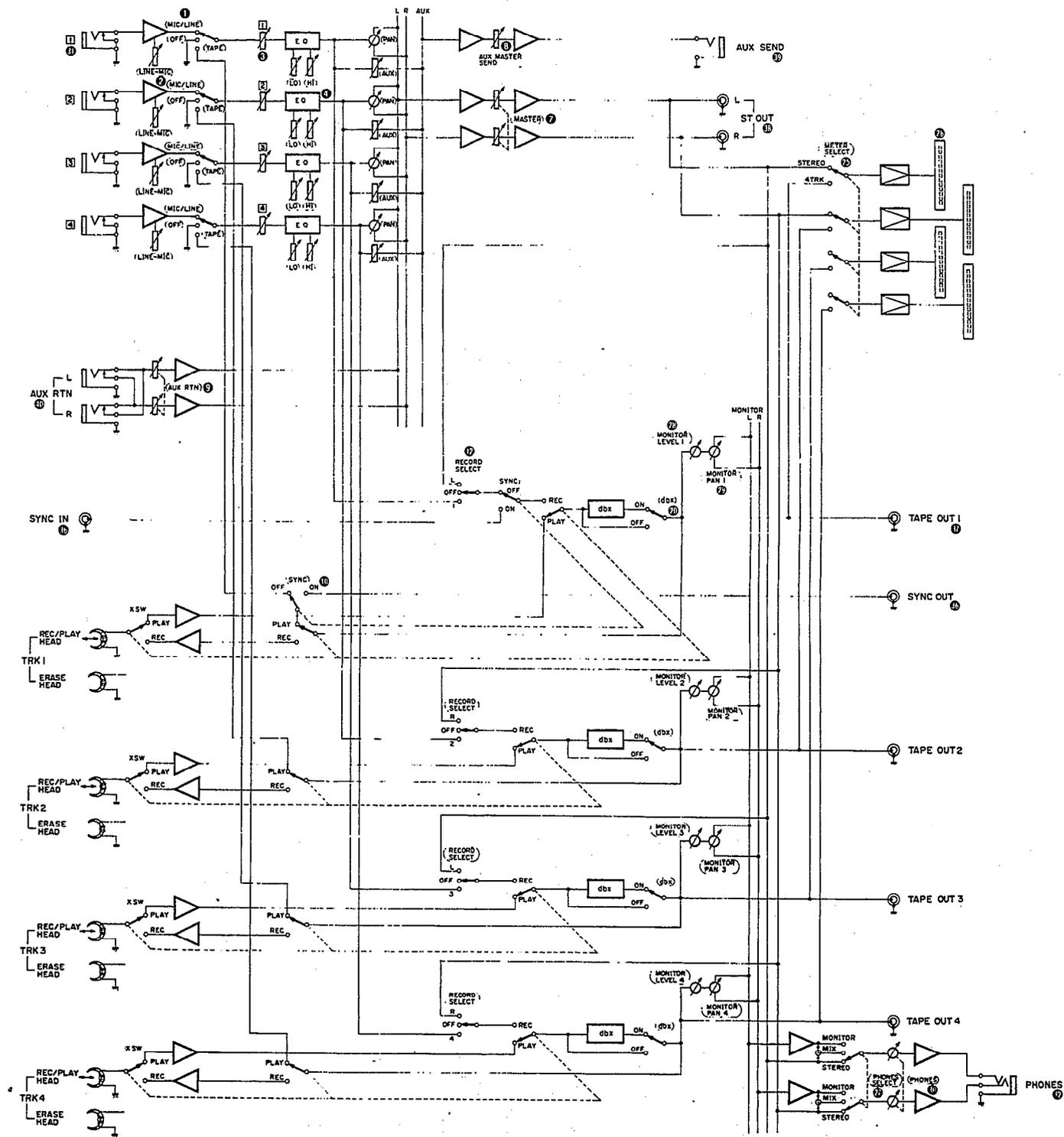
After the deck has been used for a period of time, the heads, pinchroller, and capstan will become dirty. This increases noise and uneven rotation, leading to a deterioration in sound quality. Therefore, periodic cleaning and demagnetization is a must to preserve optimal audio performance.

Use cotton swabs and alcohol or head cleaning fluid (available in most all audio stores) to clean the heads, capstan, and pinchroller. Keeping the heads clean is essential for good recordings. For demagnetization, use a quality head demagnetizer, and follow the instructions carefully.



It's important to keep all parts clean!

BLOCK DIAGRAM



NOTE: When the REC button is engaged, the panel switches can be used to individually order recording on only those channels with RECORD SELECT not switched "OFF".

SPECIFICATIONS

Model Description : multitrack cassette recorder

Mechanical Descriptions

Tape : standard cassette; CrO₂ tape only (EQ: 70μs)
Heads : hard permalloy 4-channel rec/play head
 ferrite 4-channel erase head

Tape speed : 4.75 cm/sec
Pitch control : +/- 10 %
Wow & flutter : 0.05% WRMS
Fast forward/rewind time : about 100 seconds (C-60 tape)
Motor : DC servo

Inputs & Outputs

INPUT 1—4 input impedance : 10k ohms
 rated input level : - 10dB to - 50dB (input fader in specified position)
 minimum input level : - 56dB (gain control MAX, input fader MAX)
 maximum input level : + 10dB (gain control MIN, headroom margin)

AUX RTN L/R input impedance : 10k ohms
 rated input level : -10dB

ST OUT L/R output impedance : 1k ohms
 rated impedance load : 10k ohms or over
 rated output level : - 10dB (at 50k ohms)

AUX SEND output impedance : 1k ohms
 rated impedance load : 10k ohms or over
 rated output level : - 10dB (at 50k ohms)

TAPE OUT 1—4 output impedance : 1k ohms
 rated impedance load : 10k ohms or over
 rated output level : - 10dB (at 50k ohms)

PHONES rated impedance load : 8-40 ohms
 maximum output level : 100mW + 100mW

Equalizer Characteristics HIGH : +/- 10dB (10kHz shelving)
 LOW : +/- 10dB (100Hz shelving)

Sound Specifications

Total frequency response : 40Hz—12.5kHz, +/- 3dB
Total signal to noise ratio : 85dB (dbx ON, IHF-A)
Total distortion : less than 1% (EIAJ, 315Hz)
Channel separation : better than 55dB (1 kHz)
Erasure ratio : better than 70dB

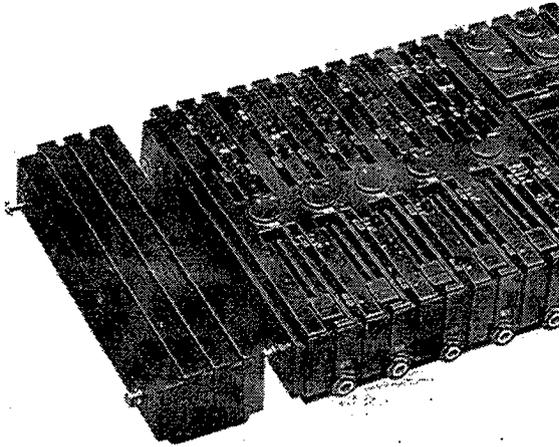
General

Power supply : supplied AC adaptor (DC 15V), PA11 battery pack ("C" x 10)
Power consumption : 14w
Dimensions (W x H x D) : 365mm x 26mm x 225mm (14-1/3" x 2-1/2" x 8-7/8")
Weight : 2.5 kg (5.5 lbs)
Supplied accessories : carrying strap, PA10 AC adaptor

- 0dB=0.775Vr.m.s.
- Specifications subject to change without notice.

INTRODUCTION TO THE ACCESSORIES

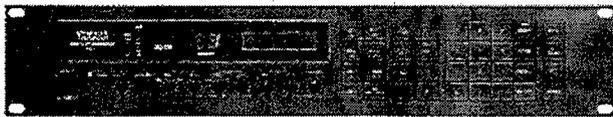
BATTERY PACK · PA11



CARRYING CASE · LC-CMX



DIGITAL REVERBERATOR · REV7



POWER AMPLIFIER · P2050



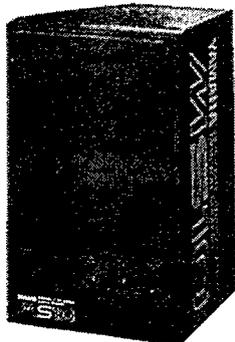
GRAPHIC EQUALIZER · GQ10131



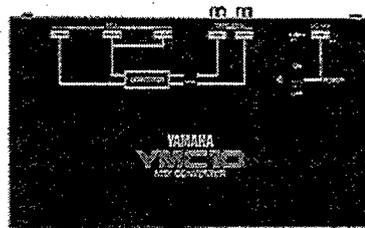
2-CHANNEL COMPRESSOR/LIMITER · GC2020



**POWERED MONITOR SPEAKER
· MS10**



MIDI CONVERTER · YMC10



FOOT SWITCH · FS-1



SERVICE

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

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