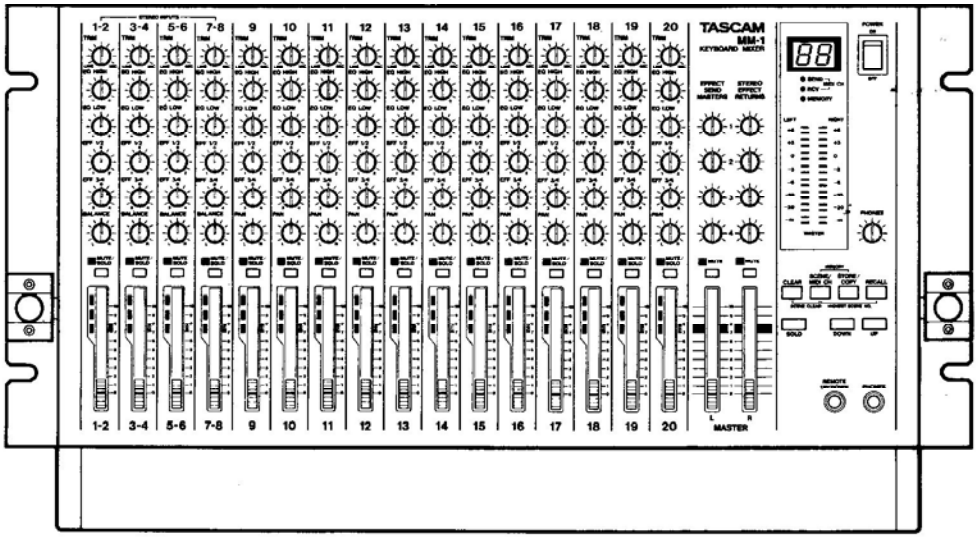
TASCAM

TEAC Professional Division

MM-1

Keyboard Mixer



OWNER'S MANUAL

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The guarantee provided for the MM-1 Keyboard Mixer has several restrictions. The MM-1 Mixer will perform properly only if it is adjusted properly and we guarantee that such adjustment is possible. Setup is not covered by the Warranty. If your attempts at internal adjustment are unsuccessful, we will charge you for re-adjustments.

Mixing for sound reinforcement, recording or other audio endeavours is an art as well as a science. As a result, your finished product may be judged more by artistic criteria than technical performance. Art is the province of the artist and TASCAM can make no guarantee that the MM-1 Mixer, by itself, will assure the quality of the work you produce.

Your skill as a technician and your abilities as an artist will be significant factors in the results that you achieve.

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

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

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

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

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

Introduction

The TASCAM MM-1 Keyboard Mixer is a 20 input stereo output mixer designed primarily for electronic music applications. It can be used to mix live performances, or as a submixer to a larger recording system. The first four sets of controls have stereo inputs for use with drum machines and stereo keyboards. The MM-1 has four effect sends and four stereo returns, so it can be connected to four stereo effect devices. A MIDI-addressable muting system allows you to turn channels on and off on command, either from the top panel or from an external MIDI device. A SOLO feature makes it easy to concentrate on one input at a time.

Each channel has 2 band EQ, and because each channel has 40 dB of gain in the preamp and a trim control, low-level sources – even microphones and pickups – can be connected to the MM-1. Extensive metering allows you to avoid distortion before it can start. Each input has a direct output jack for connection to external submixers or directly to a recorder. The MM-1's unique physical design allows it to be used either as a tabletop console or in a rack mount, with the ability to be tilted out from the rack so it can be seen easily on stage.

This Manual

To get the most out of your MM-1, please take the time to read through this manual. If you're familiar with mixers you could use the unit on your own without a problem, but some time spent now will keep you from overlooking some of the features that make the MM-1 a more creative tool. You may discover some new tricks you haven't tried before.

First, we'll give some basic information about mixing and the sub-systems of the MM-1. Second, we will show some example hook-ups that cover most common systems. Third, we'll cover the MIDI applications for the MM-1, and finally the "Features and Controls" section is the reference dictionary that describes each control, jack, or indicator on the MM-1 in detail.

The Mixer's Place in a System

A mixer is just one part of a complete system. It must be connected to:

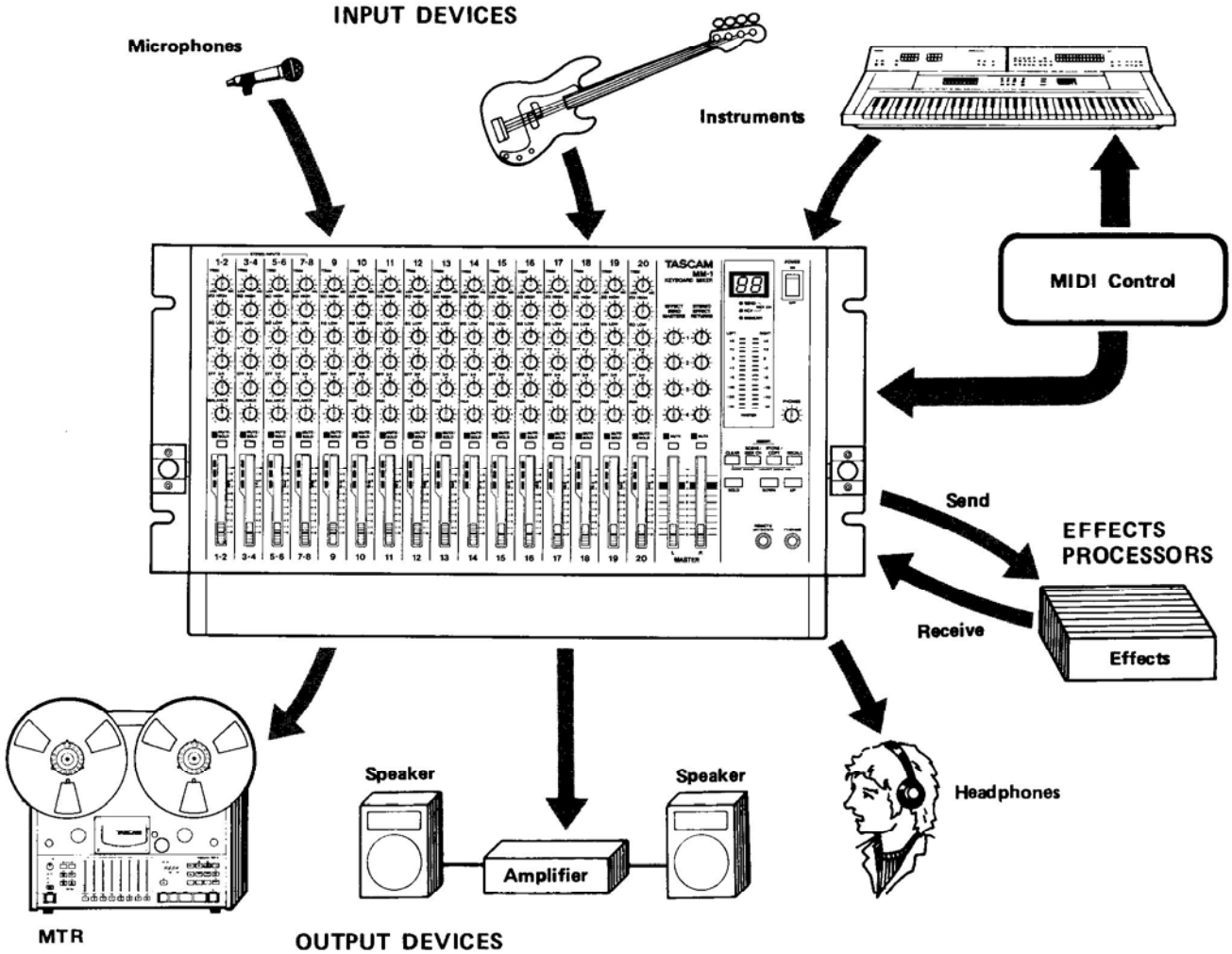
INPUT DEVICES such as microphones, synthesizers, pickups, turntables or tape decks;

EFFECTS DEVICES such as digital reverbs, delays, flangers, chorus, and harmonizers;

OUTPUT DEVICES such as a power amplifier hooked to speakers, or a pair of headphones.

In addition to the above elements common to all mixers, the MM-1 adds:

MIDI CONTROLLERS, typically MIDI synthesizers or sequencers, which can send instructions to the MM-1 to mute channels either individually or in groups called "scenes." The MM-1 can also send commands TO a MIDI device if desired.



Understanding What a Mixer Does

A mixer is the traffic control center of an audio system. It takes multiple inputs, processes them for level and tone, and sends them to multiple outputs. It will help you if you keep in mind that there are only 3 types of controls on a mixer:

Where from
Where to } Some controls do both of these at once
How much }

The MM-1 can be divided into several submixers, each of which has its own input controls, master controls, and output jacks. You work the controls to set *where* signal goes to and *how much* of it goes there.

Understanding the MM-1

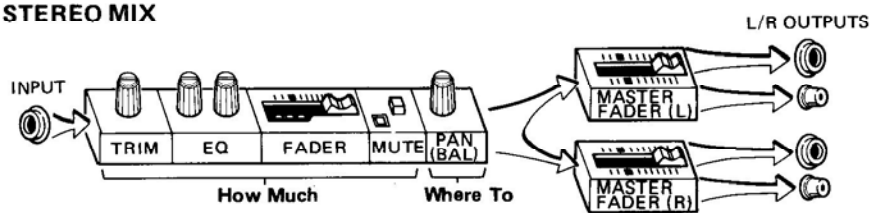
Stereo Mix: The most important mix in the MM-1 is the L/R STEREO MIX. It receives signals from multiple input jacks and routes them through the input channels to the left and right stereo mix busses. These busses are like pipelines that run across the mixer collecting signals from each channel. The mix busses connect to the master faders left and right, which control how loud the overall signal is at the output connectors on the rear panel. You use patch cords to connect this main stereo mix output to an external power amplifier, or a tape recorder.

Effect Mixes: Four additional submixes in the MM-1 are called EFFECT MIXES. They tap their signals from the middle of the main mix, just after the channel mute and fader (which is called "post fader"). From that point on, though, they behave as separate mixers, with their own "how much" and "where to" controls. Each of the four effect mixes has its own mix buss, effect send master control, and output jack for connection to external effect devices you may have.

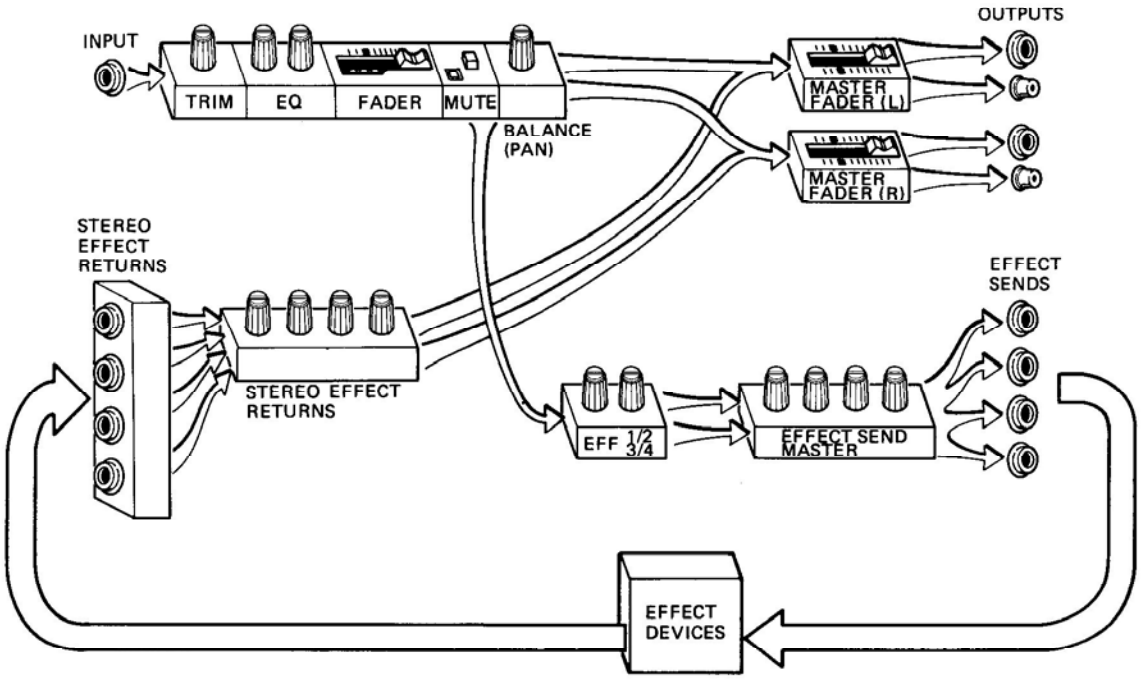
In-line processing: Let's assume you have a digital delay, reverb, or another signal processor that you want to use on some instruments. If you want to use the effect only on one instrument, the easiest thing to do might be to plug the output of your instrument directly into the effect device input. Then the signal flows through the effect, which you then connect to an input of the MM-1. This is called "in-line processing."

Send-return processing: But what if you want to use that effect device on more than one instrument at a time? An EFFECT MIX of the MM-1 is able to combine the signals from many channels to an EFFECT OUT jack. This output is then plugged into your reverb unit, and the reverb's outputs are connected to an EFFECT RETURN jack on the back panel, which "returns" the signal that was sent out back into the main mix. This is called "send-receive processing."

MAIN STEREO MIX



EFFECTS SEND/RETURN

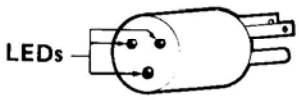


Other things you need before starting

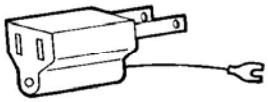
There are a few things you will need in order to hook up the MM-1. Read through the hookup examples to get an idea of what you will need for your particular setup.

AC Power: You'll need some outlets, obviously. Try not to use outlets that are on the same circuit as air conditioners and old refrigerators. These things may introduce noise to your system. Place the main body of the PS-M1 power supply in a place where it will not fall or strain the connection on either end. Also make sure it is not placed on a piece of audio gear where it may induce hum. Connect the low-voltage cable to the mixer first (there is a slot to help you find the right alignment).

Keep all your instruments and other audio equipment plugged into the same circuit (but not the same plug) if possible. Have some three prong to two prong ground lift AC adapters on hand; you may need them for some of your other equipment if a hum or ground loop develops. AC outlet testers are handy to have around and can be bought at electronics or home improvement stores.



Outlet Tester



AC Adapter

Cables: Use low capacitance, high RF-resistant cables to connect the inputs and outputs of the mixer to instruments and amplifiers. Cables should be as short as is possible to do the job. It's also a good idea to use plastic cable ties to bundle together only those cables that do similar jobs: audio input in one bunch, outputs in another etc. You will need a variety of cables including:

Quarter-Inch Phone Shielded Cables: Use these to connect inputs to the MM-1, and (in most cases) to feed the stereo amplifier and effect devices. Make sure that you're not accidentally using unshielded cables such as those used for speaker wire.

Quarter-Inch Stereo (TRS) to 2-Mono "Insert" or "Stereo Splitter" cables: If you want to take advantage of the Stereo Effect Returns, you will need one of these for each stereo effect you have. The TASCAM PW-2Y or PW-4Y cables are expressly designed for this purpose. It has a 1/4" tip-ring-sleeve plug (like that on stereo headphones) on one end, with a three-conductor cable that splits into two 2-conductor cables (tip feeding one, ring feeding the other). It looks like a "Y" cable on the outside, but instead of feeding the same signal to two places, it has two completely different paths that only share a common shield wire.

RCA/Phono Cables: If you are using the MM-1 in a recording setup, you will need some of these. You may need RCA-to-quarter adapters if you want to feed input sources (such as tape decks or certain effect devices) to the MM-1.

Instruments: Almost any type of electronic signal can be connected to the MM-1. The impedance is not important; the output level is what matters. If a device has an XLR jack, you will need an adapter to connect it to the 1/4" jacks of the MM-1. Check the owner's manual of the instrument to see if it is safe to unbalance the output by tying either pin 2 or 3 to pin 1 of the XLR. Another way to adapt an XLR to 1/4" is with a "Line Matching Transformer". This is a little more expensive, but in some applications is quieter than using a plain adapter since it keeps the line balanced and provides additional voltage gain.

Headphones: These must be stereo headphones. Never use monophonic headphones with the MM-1.

Unfortunately, we can't cover every possible equipment system. But the following examples cover the majority of situations. Read through each one, and you should have enough information to get started. Your TASCAM dealer can offer you more detailed advice. MIDI control hookups are covered later in the MIDI section; this just covers standard audio operation. All connections should be made with the power off.

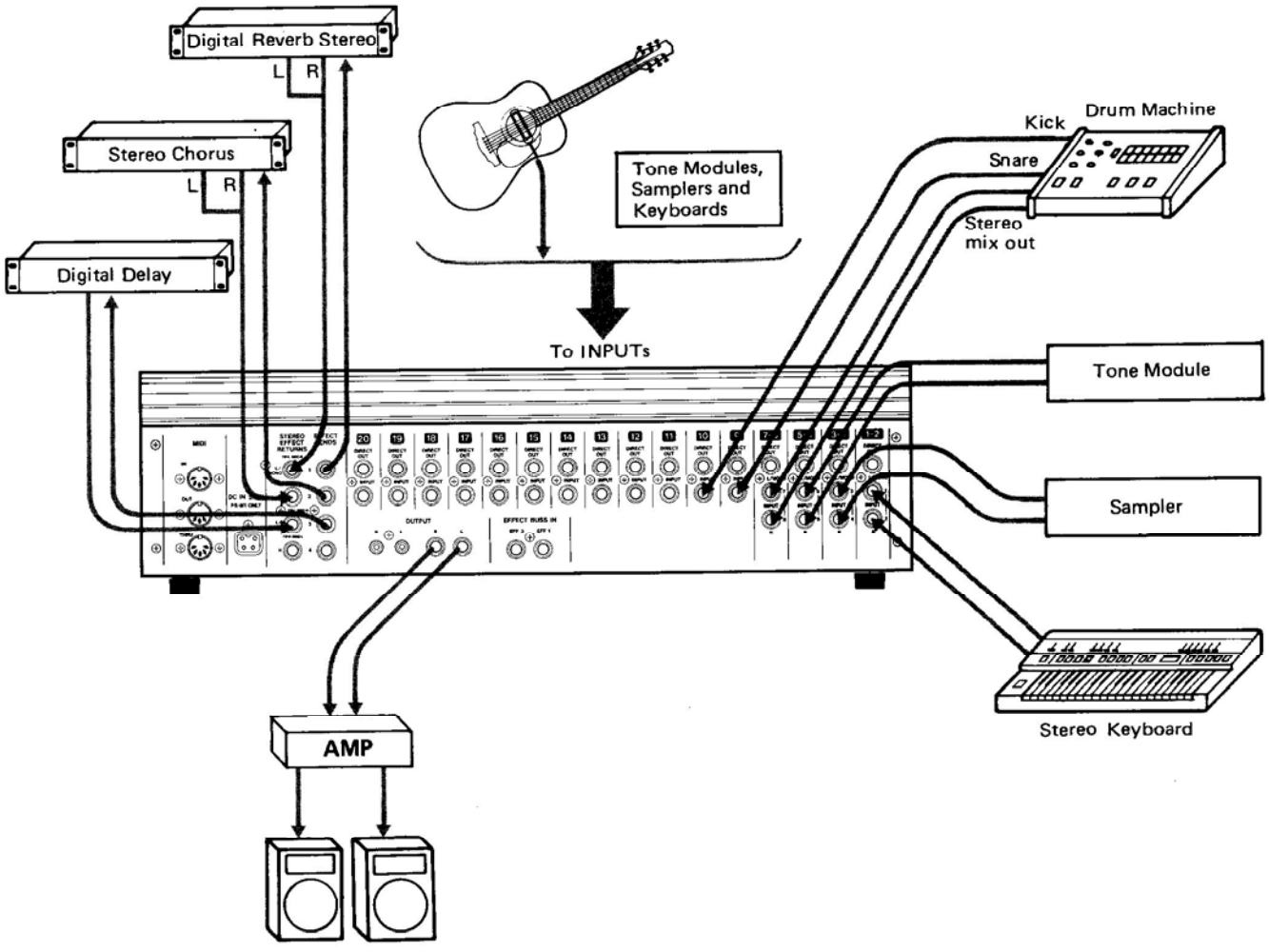
EXAMPLE 1: ONSTAGE MIX TO STEREO AMPLIFIER (LIVE)

The MM-1 is ideal for connecting many electronic music sources to an on-stage amplification system. In our example, we have a standard power amplifier (the type with no tone controls or mixer of its own) feeding a speaker system. Instrumentation includes a drum machine with a stereo output and several individual outs; stereo keyboards and samplers, an acoustic guitar with a piezo pickup, and several MIDI tone modules. There are three effects devices: a digital reverb with a stereo output, a stereo chorus unit, and a mono digital delay.

Points to Consider:

Choosing input channels: When you lay out your inputs, some choices are obvious, such as plugging stereo instruments into stereo channels. The stereo keyboard is connected to inputs 1/2 with two separate cables, the sampler connected to 3/4, and the stereo tone module to 5/6. The stereo output of the drum machine is saved for 7/8, so it is next to the snare and kick drum plugged into mono channels 9 and 10. The stereo channel balance controls are left in the center. If you have more stereo inputs, you can use pairs of mono channels panned hard left and hard right.

Choosing effect paths: How do you decide which effect unit to connect to each effect send of the MM-1? Each channel can access only two effects at any given time: if the send is turned to the left for Effect Send 1, no signal can go to Effect Send 2 (and the same is true for Effect Sends 3 & 4). In this example, we thought that the durms needed to have digital reverb and delay simultaneously at times. The guitar needed to have chorus and delay simultaneously. The two effects that weren't going to be used on one instrument simultaneously were chorus and reverb. So we connected Effect Send 1 to the reverb,



Effect Send 2 to the chorus, and Effect Send 3 to the delay. Effect Send 4 is left unused.

Choosing effect returns: There's no "rule" about it, but for the sake of clarity most people use the same number for the effect send and return — if Send 1 feeds a reverb, the reverb return is connected to Return 1 and so on.

In the example, the reverb and chorus are synthesized stereo output devices, and connect with two stereo 3-conductor splitter cables to Stereo Effect Returns 1 and 2. This means that when you bring up Stereo Effect Return 1, you will hear stereo reverb on the right and left side simultaneously. Turning up Effect Return 2 will give you stereo chorus, as well.

Since the digital delay is mono, it is connected to Return 3; but since it is not a stereo connector Return 3 only puts delay to the left side of the mix. To overcome this, the MM-1 has a special feature: when the Return 4 jack is left empty, a signal at Return 3 is "normalled" (internally patched) to Return 4 as well. This way the delay appears at both the 3 and 4 return controls on the front panel: 3 controls how much delay returns to the left side of the mix, and 4 how much goes to the right side. When the EFFECT RETURN 3 and 4 controls are set to the same level, delay will sound in the "center" of the mix. By varying the two controls, you can position the mono delay return anywhere in the mix from left to right.

See p. 23, "Mono-Stereo adapter" for wiring of a special cable that will allow you to have a centered mono return without using two effect returns to get it.

Choosing output jacks: The amplifier is connected to the 1/4" jacks because it has a nominal 1 volt input spec. Other amplifiers (notably guitar amps) might be better off if they are fed by the MM-1's RCA output jacks. You can experiment to see which is quietest and most distortion-free with your equipment. See p. 10, "Setting Output Levels."

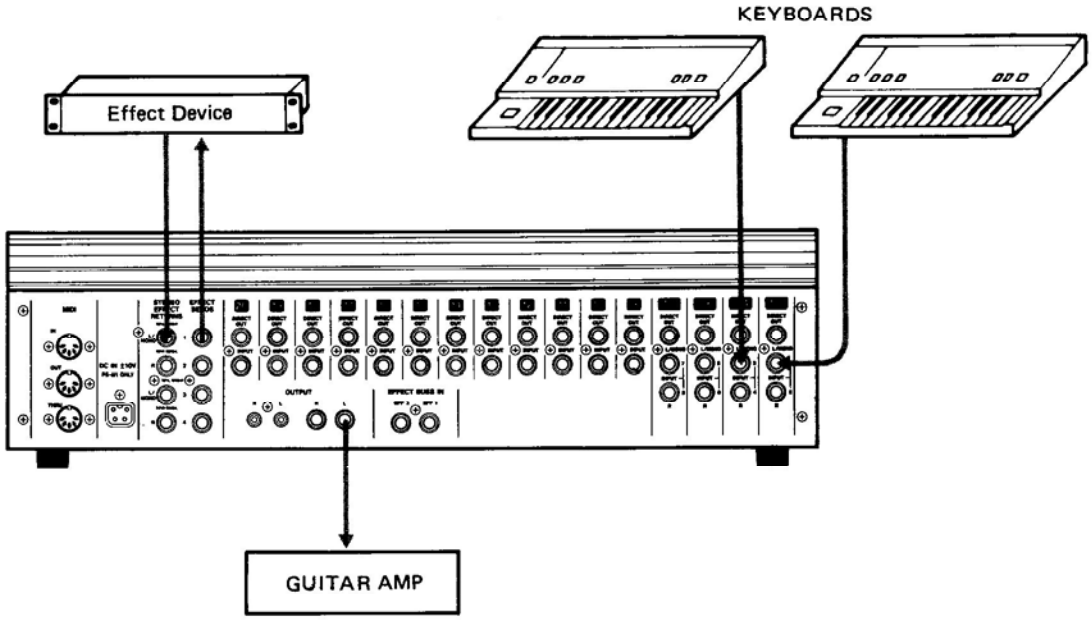
EXAMPLE 2: MONO SYSTEM USING A STANDARD GUITAR AMPLIFIER

In this example, we have fewer keyboards, no stereo inputs, and only one effect device, feeding to a standard guitar amplifier with its own controls.

Points to Consider:

Controls of the guitar amp: Set the tone controls of the guitar amp to their "flattest" position. You should use the tone controls on the MM-1 instead.

Experiment with your amp settings to get the best sound. The main worry is that the MM-1's combined outputs may be loud enough to make the preamplifier of the guitar amp distort. Try using the lower level (RCA phono) output jack of the MM-1 if this happens. If there is a master gain control on the guitar amp, it should be full up. Better still, some amplifiers have a "Power Amp In" jack that bypasses the tone controls and preamp of the guitar amp altogether: plug into it, if you have it. See p. 10, "Setting Output Levels."



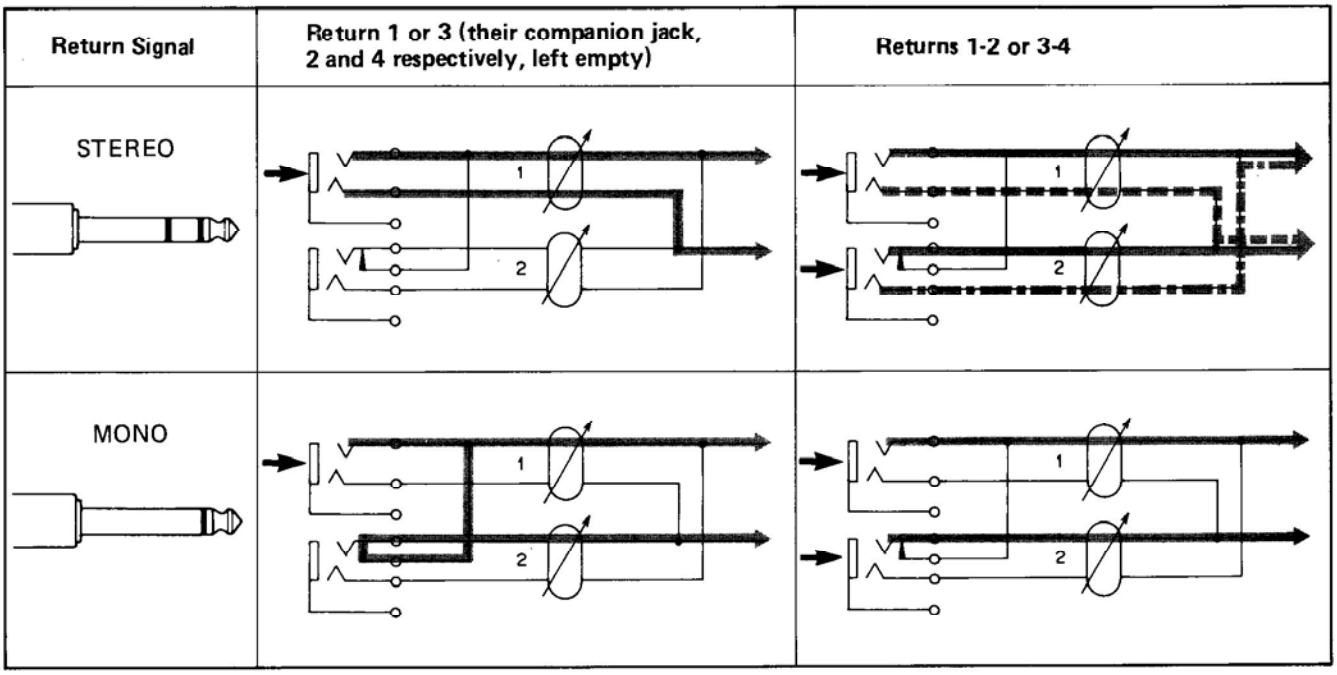
How to use a stereo mixer in a mono system: Choose one side for the amp feed. Do not "Y-CORD" the left and right outputs of the MM-1 together or you will damage it. In our example we chose the left output to feed the amp. Keep in mind that the pan pots should all be centered (or turned full left). Instruments panned to the right may show on the right meter and be audible in the headphones, but they won't make it to the amp. Some people use the "unused" side to feed an extra monitor amp and speaker onstage.

Using the stereo input channels with mono instruments: Since the keyboards are mono, you can plug them into inputs 1, 3, 5, and 7. In this case, the stereo channels act the same way as the mono channels do: the BALANCE control acts like a PAN control. In this case, the MM-1 becomes a 16 input mixer.

Mono effect return: The single effects unit comes back to Stereo Effect Return 1. However, it isn't a stereo system or stereo effect unit. If you use a standard mono 1/4" cable to hook up the effect return, signal will go to the left side only when you turn up effect return #1. Since we have the guitar amp hooked up to the left side anyway, that's not a problem. Because of the "normalling" feature explained in Example 1 ("Choosing Effect Returns"), turning up Effect Return #2 will bring it to the right side, but this will have no effect (except in the headphones and on the meter).

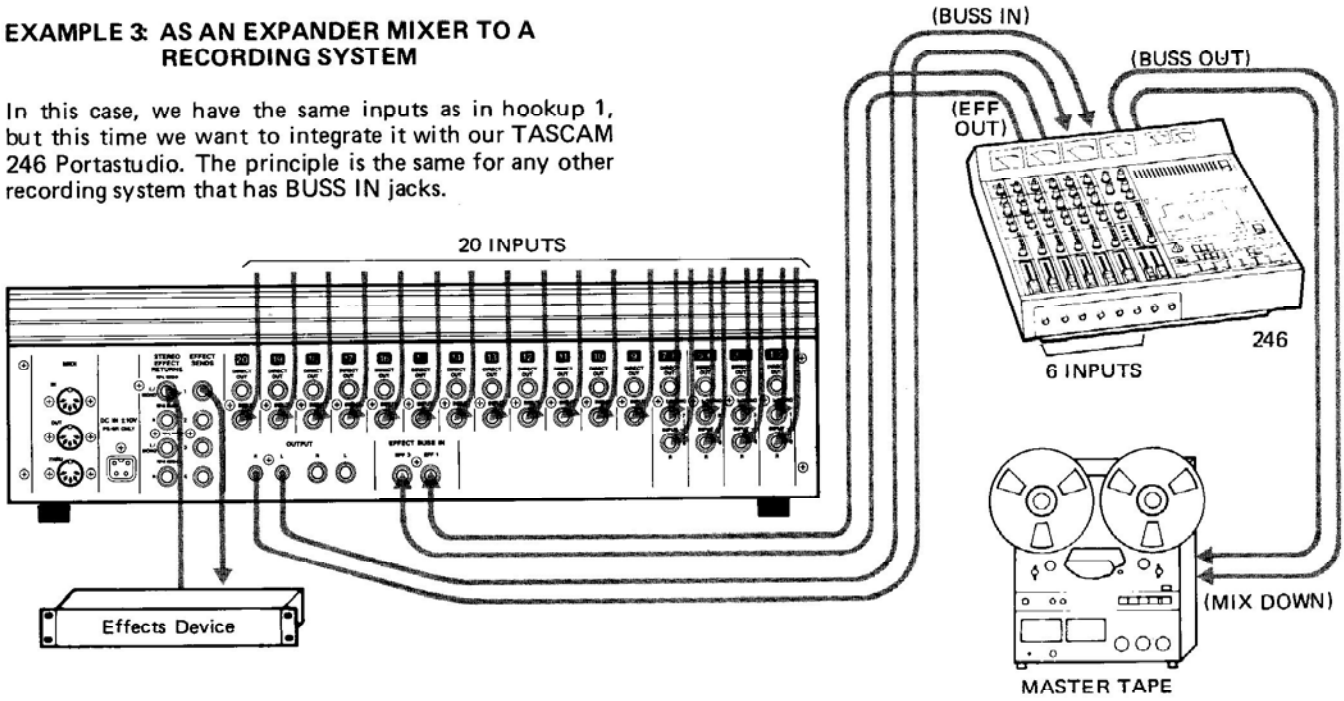
However, if you add another effect unit to this system, you should patch it into Stereo Effect Return 3, not Return 2 or 4. The "tip" of returns 1 and 3 feeds the left buss, and the tip of returns 2 and 4 feed the right side. So if you patch into Return 2, the effect will go to the right side, which isn't connected to the amp, and you won't hear it (except in the headphones).

Here's a diagram that explains the stereo/mono returns:

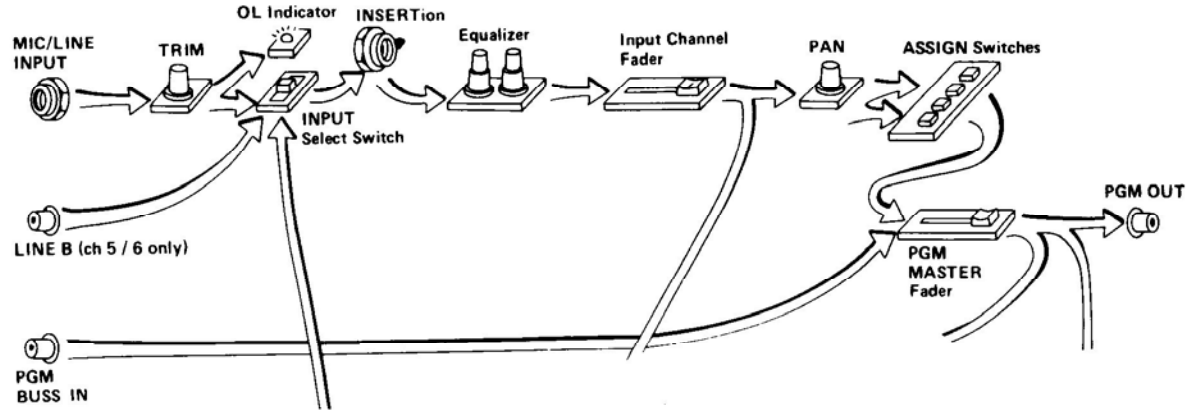


EXAMPLE 3: AS AN EXPANDER MIXER TO A RECORDING SYSTEM

In this case, we have the same inputs as in hookup 1, but this time we want to integrate it with our TASCAM 246 Portastudio. The principle is the same for any other recording system that has BUSS IN jacks.



Buss In Signal Flow (246 Portastudio)



The RCA/Phono outputs of the MM-1 connect to the PGM/GRP BUSS IN 1 and 2 of the Portastudio. This makes the MM-1 part of the first two busses of the Portastudio: the output signal can be recorded directly onto tracks 1 and 2, with no controls on the Portastudio but the PGM MASTERS having any effect. At mixdown time, when PGM BUSS OUT 1 and 2 feed a two track recorder, you have the six inputs of the 246 added to the 20 inputs of the MM-1, for a 26-channel mixdown.

Points to Consider:

Choosing the buss to patch into: The 246 is a 4 buss mixer; the MM-1 only has 2. Other consoles have 8 or even 16 mix busses.

*If you want to record the instruments onto tape from the MM-1, you have to patch the MM-1 onto the buss of the track you're recording on.

*If you are running a MIDI Sync setup with "virtual tracks" (i.e., a sequencer-run backing track) that you *don't* want to record onto tape, you must patch the MM-1 into a buss that has already been recorded on, or that you won't use for a while. For example, after you've recorded the MIDI sync tone on track 4 of the 246, you can use PGM BUSS IN 4 for the MM-1, since that buss won't be used again. Repatch the MM-1 to Buss In 1 & 2 for final mixdown.

Tying the effect busses together: Since the Portastudio has 2 effect sends, you can either keep them separate (in which case you hook up some effect devices to the 246, and others to the MM-1), or tie them together as we did in the example. Take the EFF 1 and 2 OUT of the Portastudio, and plug it into the EFF BUSS IN 1 and 3 of the MM-1. By doing this, the two effect systems are linked, with the effect devices hooked up only to the MM-1, but "hearing" the sends from the 246. In this case, the Portastudio's effect system becomes an "expander" to the MM-1's. Set the Effect Masters of the Portastudio to their nominal (2 o'clock) position.

Setting Input Levels:

Now that you've hooked up the MM-1, it's time to set the levels of your equipment. This is critical for getting the best sound: the best mixer in the world will sound noisy if its gains are set incorrectly. The goal is to get as "hot" a signal going as possible, without distorting the mixer itself.

1. Turn the level controls on your instrument (don't forget expression pedals) all the way up.

2. Turn the INPUT FADER and MASTER FADER controls on the MM-1 all the way down, or mute the channels.

3. Play the instrument, watching the LEVEL LEDS for that channel. Although you'll hear no sound, the green LED on the channel input meter should go on as you play.

4. Turn the TRIM control so that the yellow LED is on while you're playing. You may have to adjust the trims again for different patches, etc., and if you increase the EQ settings.

You may choose to increase it so that on the loudest peaks, the red LED flashes occasionally. (When the red LED comes on, you have only 3 dB before the mixer electronics will clip or distort). Setting the trim of each channel this way will give you the best signal-to-noise ratio. On the other hand, lower trim settings give you more headroom, so the MM-1 won't distort if you boost the EQ or if the instrument suddenly gets louder. When all the channels are playing at once, you may need to lower the trims still more.

Setting Output Levels:

5. Turn the volume control(s) of your power amplifier all the way down.

6. Now, unmute the channels and bring all the CHANNEL FADERS to their nominal positions (the shaded area between 7 and 8).

7. While playing, slowly bring up the L/R MASTER FADERS until the L/R meters read +6 on the loudest peaks, and the average is around 0 VU (the dividing line between the green and red section of the meter).

8. While playing, slowly bring up the volume controls on your power amp. Adjust the mix on the channel faders, making sure that you increase or decrease the L/R MASTERS so that the MM-1 meters read a strong level. Increase the power amp volume control until you get the level you want.

This is the best way to get the best signal-to-noise ratio from your system. In most cases: keep everyting as "hot" as possible, and set the power amp controls to low sensitivity to get the overall level you want. If you make the mistake of running the faders of the MM-1 at a low level, and leaving the power amp wide open, all you are doing is amplifiying the residual noise of the mixer.

In some cases (such as Example #2 above, into a guitar amp), the MM-1 output could be too loud for the amplifier it's connected to, causing its input stage to distort. In this case, feed the power amp from the phono (RCA) outputs; they are 10 dB softer than the 1/4" phone outputs (about half as loud).

Clipping Output Level: The MM-1 has a maximum output from the phone jacks of +13 dBu (3.5 volts). Most power amps deliver their rated power with an input of 0 dBV (1 volt) or less; and usually you don't run your power amp at full output all the time. If the volume controls of your power amplifier are marked with attenuation numbers, try setting them to the "-20 dB" position to start. This means that even when the MM-1 is putting out 3.5 volts, the amp will only "hear" 1 volt. The MM-1 operates at the level farthest from the noise floor, and your amp runs at its nominal operating level. CAUTION: it is possible to blow speakers or damage the amplifier itself if the system is overdriven. Use care when setting levels, making connections, and turning the system on.

Setting Levels: To Effect Devices

Effect devices are typically the noisiest elements of a system, but with proper level setting you won't hear the noise. Again, the principle is to have as loud a signal as possible going into the effect device, and turn down the effect *return* level when you want less effect.

Most effect devices have some kind of input meter — sometimes a single LED that changes color to red when the distortion point is reached. They may or may not have their own input and output level controls; sometimes there is a level switch. You have to set these properly to get the best signal-to-noise ratio from your system.

1. Go through the "Setting Input Levels" and "Setting Output Levels" procedures to set the trim and fader levels of the mixer properly if you haven't already.

2. Set the EFF 1/2 and EFF 3/4 controls in the channels to their maximum settings (full clockwise for Effect 2 and Effect 4, full counter-clockwise for Effect 1 and Effect 3).

3. Set the EFFECT SEND MASTERS to the "2 o'clock" position.

4. While playing the instruments, slowly increase the input control of the effect unit. Stop when the effect device's meter or clip light warns of distortion.

If the effect unit has an input level switch (for example "+4/-20"), set it to the -20 dB (most sensitive) position. Change it to +4 (least sensitive) only if you can't get a non-clipping level by slightly turning down the EFFECT SEND MASTER of the MM-1.

Setting Levels: From Effect Devices

Now that we know your effect device is exercising its full dynamic range — the input signal is not buried in the noise floor, or clipping the device — we can set the output level of the effect device (if it has one). Here, noise is less of a problem: we're aiming for maximum control.

1. Make sure that any "mix" or "balance" controls on the effect unit are set to "full effect" or "wet", so that no "dry" (unprocessed) signal comes to the effect returns.

2. Set the STEREO EFFECT RETURN controls of the MM-1 to the "2 o'clock" position.

3. While playing the instruments, slowly increase the output control of the effect device until you hear the "wettest" mix you're likely to use. This is a matter of taste.

If the effect unit has an output switch (for example "+4/-20"), set it to the +4 dB (loudest) position. Change it to -20 (lower level) only if you have to turn the STEREO EFFECT RETURN control down to a very low level ("9 o'clock") to get the effect mix you want.

In most cases, you don't have to worry about distorting the effect return circuit of the MM-1. It's more important to set the output level of the effects device so that you can use the whole range of the RETURN controls. If you tend to have trouble getting the mix you want because you can only use the lower quarter of the RETURN pots, reduce the output level of your effect unit so that you can get the level you want at the "12 o'clock" position of the STEREO EFFECT RETURNS.

You'll have to experiment to find the correct balance between input and output level setting for your particular unit, but keep in mind the principle of "hot send, attenuated return". Noise is present in almost every signal processor; the trick is not to amplify it.

Stereo returns without the TRS cable: If you don't have access to the stereo TRS splitter cable for stereo returns, you may use two mono cables, with the left side going to Return 1 (or 3) and the right side going to Return 2 (or 4). This gives you only 2 stereo returns, however.

Stereo returns with the TRS cable but the next jack empty: If you are using stereo effect returns, and the other jack of a pair (1-2 or 3-4) is empty, *make sure that the "empty" return level is turned all the way down,* or it will tend to pull the mix to one side, and make it more monophonic (diagram, p. 8). For more information on stereo cables, etc., see pp. 22-23, "Stereo Effect Return Jacks".

MUTES AND SCENE MEMORIES

The MM-1 has a feature usually found only on much more expensive consoles: Mute Automation. This allows you to turn many different channels on and off simultaneously at the touch of one button.

For example, you may have a rack of synthesizers that isn't used on one particular song, just an acoustic piano. You can set up a SCENE, a "snapshot" setting which mutes all the synthesizers, leaving only the piano mic on. This way, the hiss and output noise of the synthesizers doesn't get in the way, but you leave the volume settings alone. What's more, you can go from scene to scene by external MIDI Program Change commands.

There are 99 scenes in the MM-1, each of which can hold a "snapshot" of the mute switches. Other settings (volume, effects send, EQ) are *not* automated, and aren't reset when you change scenes.

Storing a Scene in Memory

1. First, find an "empty" scene, one that has no mutes stored in it. An easy way is to hold RECALL and press SCENE, which will bring you to the "highest scene number" currently stored in memory. Then press UP and RECALL.

2. Press the MUTE buttons you want. The scene number will start to flash, showing that the front panel settings are different from what's in the original scene.

3. Press STORE. The MEMORY LED will light under the meter, showing that the current mutes have been put into a "memory buffer". You can't press any more mutes while this LED is on. If for some reason the scene number chosen in step 1 isn't right for you, you can press UP or DOWN to go to another scene for final storage.

4. Hold STORE and press SCENE. The MEMORY LED disappears, and you have now written the mute settings into the MM-1's permanent memory.

See p. 20, "Scene/MIDI Ch" and p. 21, "Store/Copy", for more details on features of these keys.

Recalling Scenes:
Using the front panel controls:

1. Press UP or DOWN. The scene number will flash, showing you that the scene hasn't been recalled yet.

2. When you find the number you want, press RECALL. The mutes will instantly change to the settings of that scene.

Using the REMOTE UP/DOWN footpedal:

The optional RC-60P pedal can be connected to the REMOTE UP/DOWN jack on the front panel. When pressed, it has the same effect as pressing UP or DOWN and then RECALL.

MIDI Features:
Any method of recalling a scene memory will also send a MIDI Program Change command to the MM-1's MIDI OUT jack, if the MIDI TRANSMIT CH number is not set to "off". For more information, see p. 13, "Controlling Mutes with Note Messages".

To Clear a Scene: If you want to clear all mute settings from a scene, hold CLEAR and press SCENE.

To Copy a Scene from One Number to Another:
Especially if you are using MIDI patch change commands, you may want to have a series of scenes that have the same settings.

1. Go to the scene you want to copy, and press RECALL.

2. Press STORE/COPY. The MEMORY (red) LED will light.
3. Go to the scene number you want to replace.
4. Press RECALL if you want to check the contents of the scene that will be replaced. The scene number will be solid. Press RECALL again to see the contents of the memory buffer, and the scene number will blink.
5. Press STORE/COPY and SCENE/MIDI simultaneously. The scene number will light solid, and the MEMORY LED will go out.

At any time during this operation, you can press CLEAR to return to the original scene and leave MEMORY mode.

USING SOLO

Solo is a feature that allows you to concentrate on just one input at a time without changing any other mixer settings. It basically says, "mute everyting except the channel I push."

1. Press the SOLO key. "SL" will flash in the number display showing "solo ready" mode.

2. Press any MUTE/SOLO key. All other channel mutes except that one will go on, and the "SL" will turn solid. In this mode, any channel's key will "solo" that channel.

If you want to hear another channel, first silence the current solo channel by pressing that channel's SOLO key again. Or leave that key on, the way you can "solo" two channels or more.

3. To leave SOLO mode, press the Master SOLO key. The mute settings will return to whatever scene you were in before soloing.

USING MIDI FEATURES OF THE MM-1

There are a number of ways to use MIDI with the MM-1. You don't have to use any of them, if you don't want to. But you should be aware of the possibilities. You can:

*Use an "UP/DOWN" footpedal to issue Program Change Commands to your MIDI instruments from the MM-1

*Send Program Change commands from a MIDI keyboard or other controller to change scene numbers of the MM-1

*Use note commands from a keyboard or sequencer to individually mute and unmute the channels of the MM-1

*Set the MIDI channel of the MM-1 so it will send and receive commands on any MIDI channel.

TRANSMITTING MIDI PROGRAM CHANGE COMMANDS FROM THE MM-1

Hookup

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

2. (Optional) Connect the RC-60P footswitch to the REMOTE UP/DOWN jack of the MM-1. (Otherwise, you may use the UP or DOWN keys directly on the MM-1).

Setting the MIDI Send Channel

3. Press the SCENE/MIDI CH key so the MIDI SEND LED lights, and the number display will show the current MIDI send channel: 1-16, or off.

4. Find out what MIDI channel your instrument is receiving on (the default setting is usually channel 1). Check the owner's manual for your instrument if you don't know how.

5. Using the UP and DOWN keys, set the MIDI channel of the MM-1 to the channel of your instrument.

6. Press the SCENE/MIDI CH key. The number display will go back to showing the scene number, and the MIDI LED will go out.

Check Operation

7. Press the footswitch, or press the UP/DOWN then RECALL keys. Your instrument should change programs at the same time the MM-1 changes scenes.

Note about Program Numbers

The MIDI spec calls for 128 different program change commands, 00 through 127. The MM-1 can transmit and receive 00 through 98. Each instrument interprets the Program Change command in its own way; for example, a Roland synthesizer receiving an "00" command may go to its patch "A-1"; a Yamaha synthesizer receiving a "33" command may go to its patch "Cartridge 01". Many synthesizers have only 64 patches; they may ignore patch commands above 64. Experiment with your setup and read your owner's manuals to take best advantage of the patch change feature.

CHANGING SCENES VIA EXTERNAL MIDI COMMANDS

Just as we used the MM-1 to send commands to the synthesizer, a synthesizer can send commands to the MM-1 to recall scenes.

Hookup

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

Setting the MIDI Receive Channel

2. Press the SCENE/MIDI CH key so the MIDI RCV LED lights, and the number display will show the current MIDI receive channel: 1-16, "on" (omni mode, where the MM-1 will respond to any Program Change Command regardless of channel), or "of" (off, which makes the MM-1 ignore all MIDI messages).

3. Find out what MIDI channel your instrument is transmitting on (the default setting is usually channel 1). Check the owner's manual for your instrument if you don't know how.

4. Using the UP and DOWN keys, set the MIDI channel of the MM-1 to the channel of your instrument.

5. Press the SCENE/MIDI CH key again. The number display will go back to showing the scene number, and the MIDI LED will go out.

Check Operation

6. Press the program change key on your instrument. Your instrument should change programs at the same time the MM-1 changes scenes. (See "Note about Program Numbers", p. 12).

CONTROLLING MUTES WITH NOTE MESSAGES

In addition to changing from scene to scene, the MM-1 makes it possible to mute individual input channels with MIDI note commands. To experiment with this, you must have a velocity-sensitive keyboard capable of sending notes C1 through F2.

1. Go through the "Changing scenes via external MIDI commands" procedure above for hookup and channel setting.

2. Press the SCENE/MIDI CH key so that the display is in one of the MIDI CH modes (SEND or RCV LED lit), with the MIDI channel showing in the display.

3. Hold STORE/COPY down. "on" or "of" will blink. This shows the on/off status of the note muting feature. Press UP to turn the feature on.

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

5. On the keyboard, hit C1 hard. The MM-1 channel 1 mute should go on.

6. Press C1 softly, and the mute should go off. This procedure should work for each note going up the scale (C#1 will turn on mute #2, etc.)

In most applications, you will not use a keyboard to mute the MM-1. Instead, you will "play" the mute keys of the MM-1 and record the note commands it generates into a track of a MIDI sequencer. The Note On command is followed very quickly by a Note Off command; if you hook the MIDI OUT of the MM-1 to a keyboard, you may be able to hear the short notes that result when you press a MUTE/SOLO key.

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

MIDI MUTE AUTOMATION FEATURES

Mute Automation means that you can turn the mutes of the MM-1 on and off automatically at certain points in a sequence or recording. With it, you can make sharp cut-offs or drop-ins of any signals going through the mixer. You can lower the overall output noise of a mix by muting channels that aren't being used during particular passages. This is done by connecting a MIDI sequencer to the MIDI input of the MM-1, and issuing MIDI instructions from the sequencer that tell the MM-1 to turn channels on or off at certain points in the song.

Two Ways to Automatically Mute

When you want to use the mute automation features of the MM-1, you have to decide which of two methods (or combination of methods) you're going to use for the MM-1 to receive instructions from the sequencer.

Program Change Mutes is similar to the method you use when you press UP or DOWN and RECALL on the faceplate of the MM-1, or press the UP/DOWN footswitch. You set up a series of scenes, each one with the mute setup you want. These scenes can be recalled via a MIDI Program Change command, the same command that tells a synthesizer to change from one "patch" or voice setting to another. Unlike UP or DOWN, MIDI commands are numbered, so you can change the setting of the MM-1 from any scene to another (for example, from 04 to 27) directly. By inserting Program Change messages into your sequence that are on the same MIDI channel as the MM-1, the sequencer will control the scenes, recalling them as a series of "snapshots".

Dynamic Automation doesn't use scenes. Instead, it is possible via MIDI Note On/Off messages to turn channels of the MM-1 on and off individually. Instead of moving from "patch to patch", it's as if you were playing the mute keys like the keys of a synthesizer – individually.

The Steps to MIDI Automation

To use MIDI automation, there are a few things you have to do first.

1. Set the MIDI channels the MM-1 will send and receive on. This must be different from any other instruments on the system. (See p. 12, "Setting the MIDI Send Channel" and "Setting the MIDI Receive Channel".) Usually, you will set both send and receive to the same channel.

2. If you are using SCENE automation, you need to set up the scenes according to your plan and make a list of which scenes mute which inputs.

3. You must record the sequence that will control the MM-1, either by "playing" the UP, DOWN, RECALL and MUTE switches into a sequencer track, or by using the editing features of your sequencer to insert Program Change and Note commands manually into a sequence.

4. The final stage is playing back the MIDI information into the MM-1, from the sequencer.

See pp. 28-29 for Quick Reference Tables that summarize the MIDI features of the MM-1.

SAFETY INSTRUCTIONS

CAUTION:

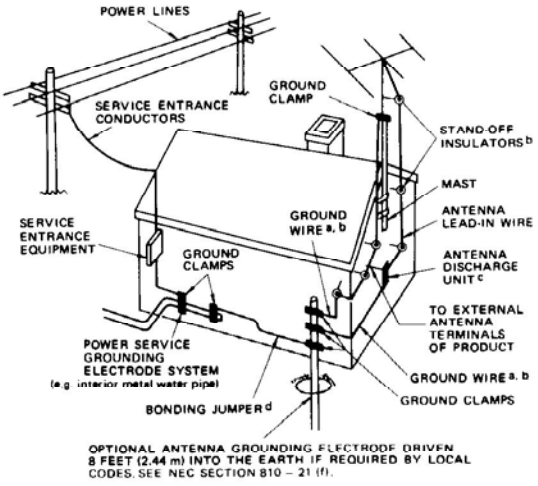
- **Read all of these instructions.**
- **Save these instructions for later use.**
- **Follow all warnings and instructions marked on the audio equipment.**

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

6A. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

7. **Wall or Ceiling Mounting** – The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. **Ventilation** – The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or, placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. **Heat** – The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.
10. **Power Sources** – The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. **Grounding or Polarization** – The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
12. **Power-Cord Protection** – Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
13. **Cleaning** – The appliance should be cleaned only as recommended by the manufacturer.
14. **Power Lines** – An outdoor antenna should be located away from power lines.
15. **Outdoor Antenna Grounding** – If an outside antenna is connected to the receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70 – 1984, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode. See Figure below.

EXAMPLE OF ANTENNA GROUNDING ACCORDING TO NATIONAL ELECTRICAL CODE INSTRUCTIONS CONTAINED IN ARTICLE 810 – "RADIO AND TELEVISION EQUIPMENT"



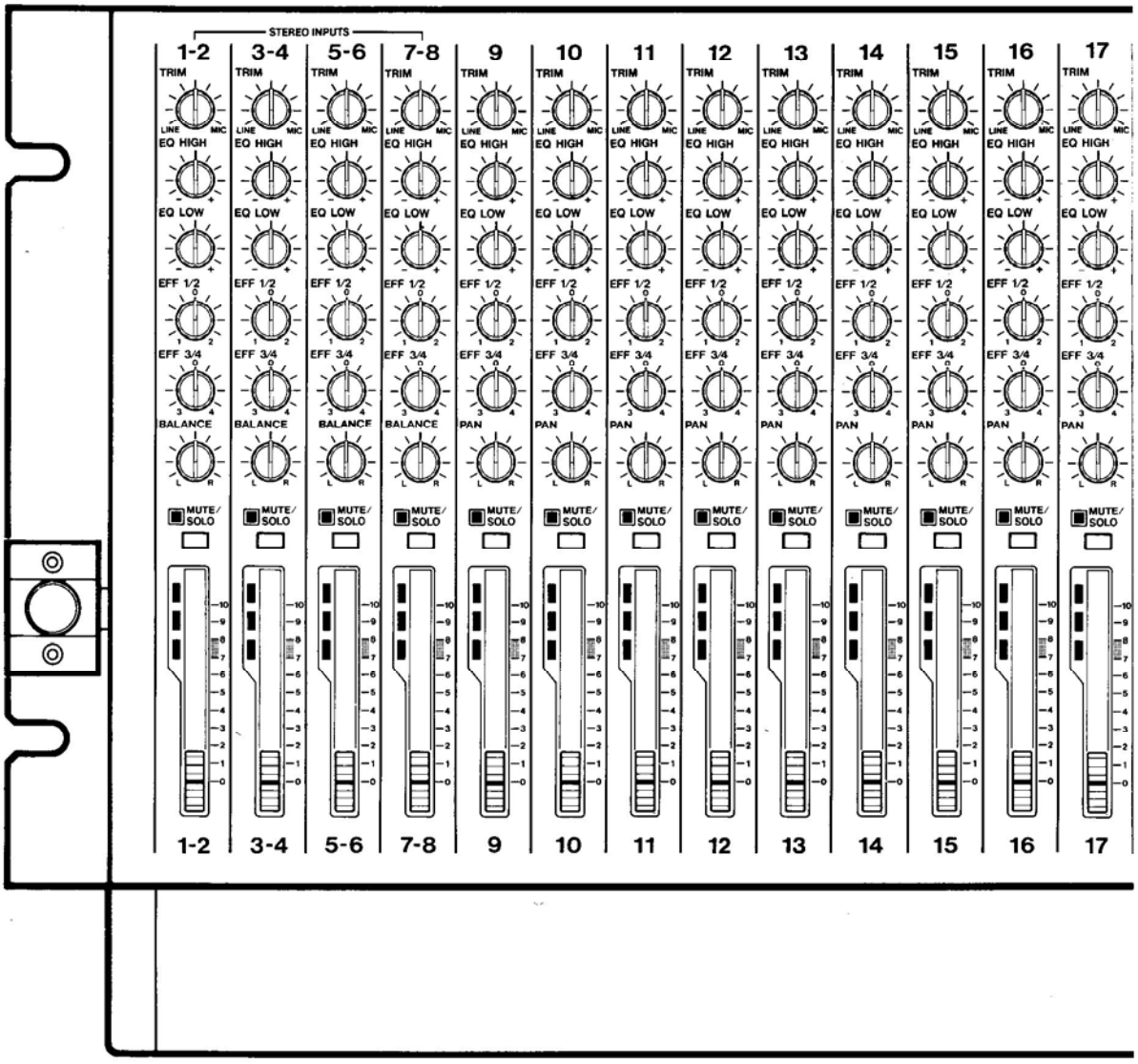
a. Use No. 10 AWG (5.3 mm²) copper, No. 8 AWG (8.4 mm²) aluminum, No. 17 AWG (1.0 mm²) copper-clad steel or bronze wire, or larger, as a ground wire.

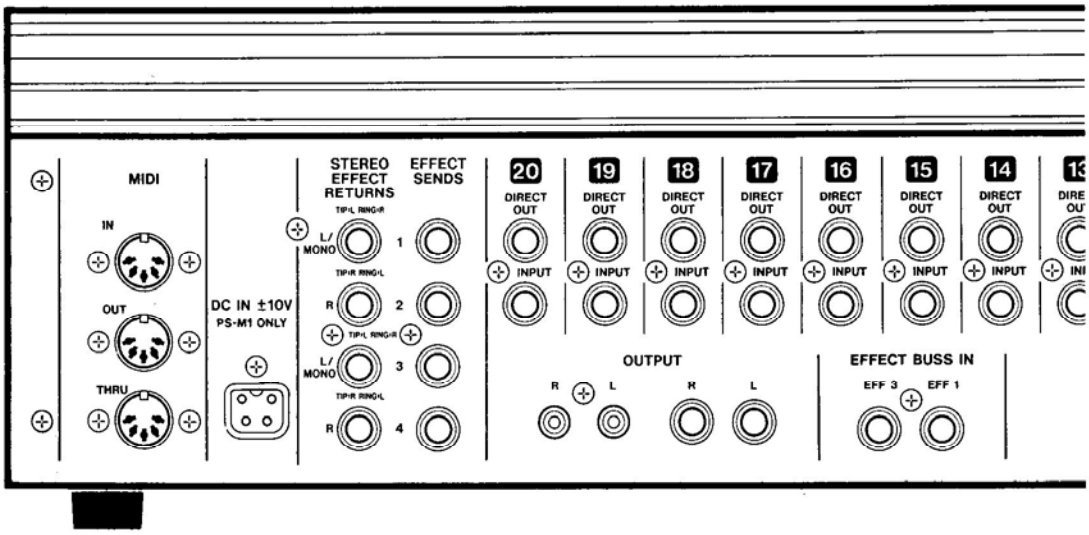
b. Secure antenna lead-in and ground wires to house with stand-off insulators spaced from 4 feet (1.22 m) to 6 feet (1.83 m) apart.

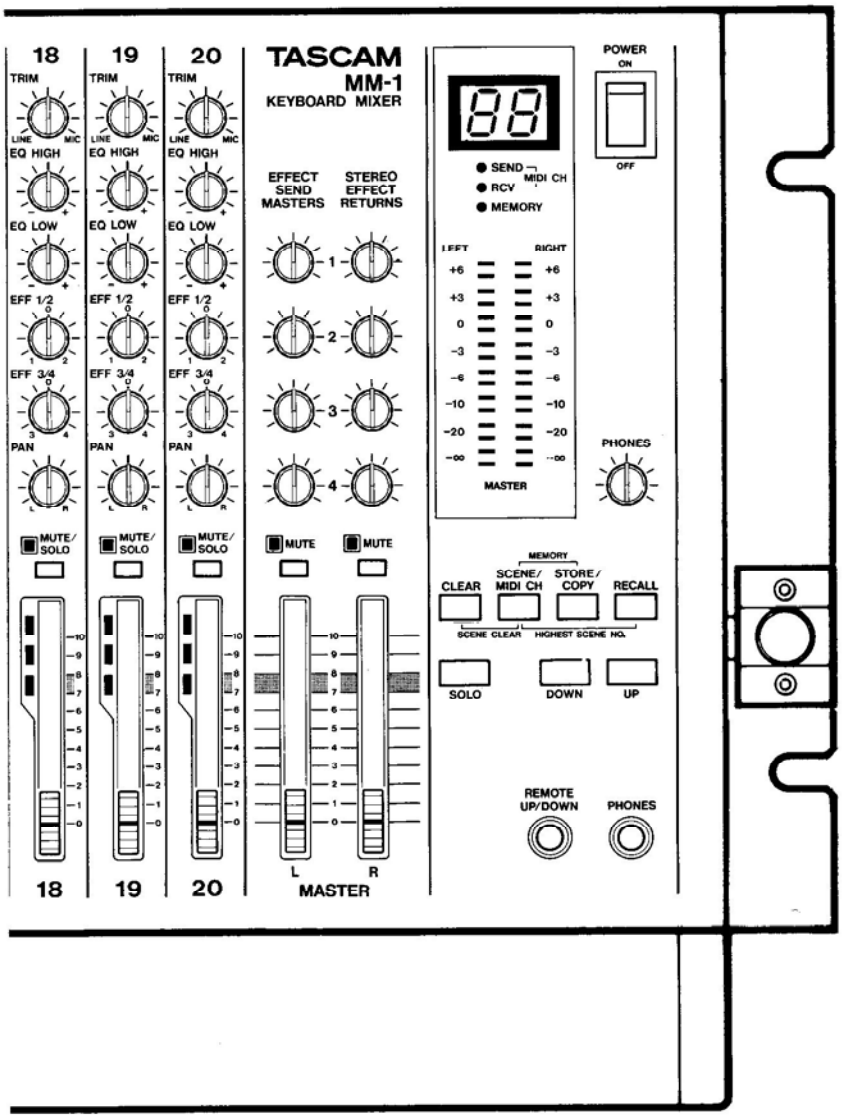
c. C mount antenna discharge unit as close as possible to where lead-in enters house.

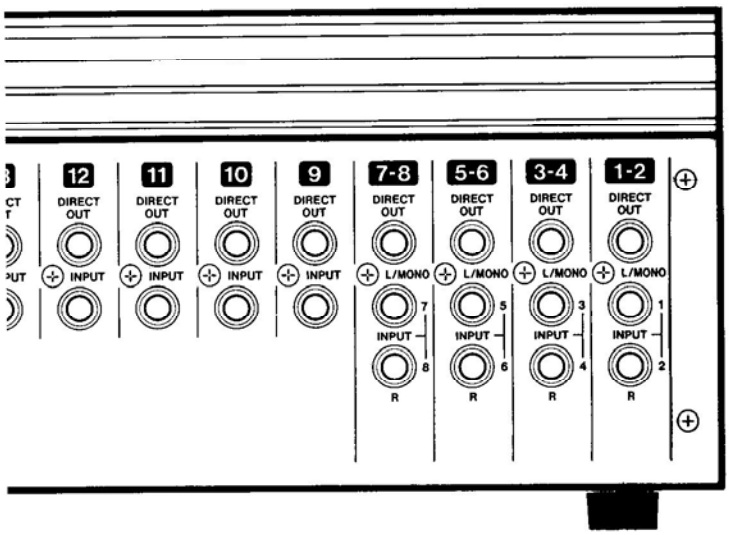
d. Use jumper wire not smaller than No. 6 AWG (13.3 mm²) copper, or the equivalent, when a separate antenna-grounding electrode is used. See NEC Section 810-21(j).

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


STEREO INPUTS
1-2
3-4
5-6
7-8
9
10
11
12
13
14
15
16
17
TRIM
LINE
MIC
EQ HIGH
EQ LOW
EFF 1/2
EFF 3/4
BALANCE
PAN
MUTE/
SOLO


MIDI
IN
OUT
THRU
DC IN ±10V
PS-M1 ONLY
STEREO
EFFECT
RETURNS
EFFECT
SENDS
L/
MONO
R
TIP=L RING=R
TIP=R RING=L
20
19
18
17
16
15
14
DIRECT
OUT
INPUT
OUTPUT
EFFECT BUSS IN
EFF 3
EFF 1

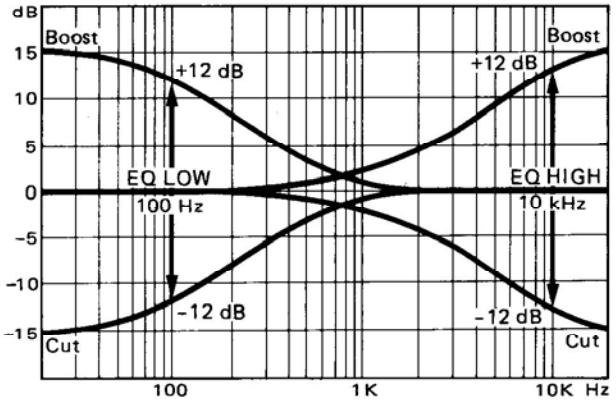

18
19
20
TRIM
LINE
MIC
EQ HIGH
EQ LOW
EFF 1/2
EFF 3/4
PAN
MUTE/
SOLO
TASCAM
MM-1
KEYBOARD MIXER
EFFECT
SEND
MASTERS
STEREO
EFFECT
RETURNS
MUTE
SEND
RCV
MEMORY
MIDI CH
LEFT
RIGHT
+6
+3
0
-3
-6
-10
-20
-∞
MASTER
POWER
ON
OFF
PHONES
MEMORY
CLEAR
SCENE/
MIDI CH
STORE/
COPY
RECALL
SCENE CLEAR
HIGHEST SCENE NO.
SOLO
DOWN
UP
REMOTE
UP/DOWN
PHONES
L
R
MASTER


12
11
10
9
7-8
5-6
3-4
1-2
DIRECT
OUT
INPUT
L/MONO
7
8
5
6
3
4
1
2
R

FRONT PANEL

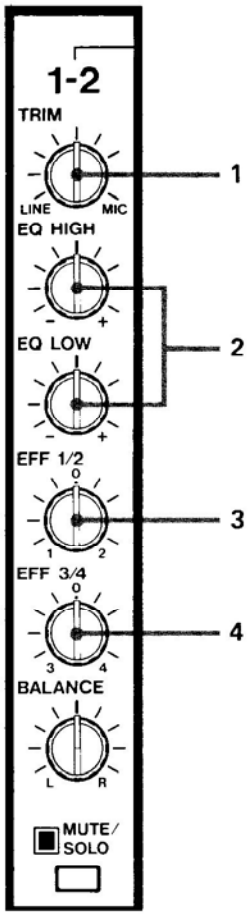
1. TRIM: This sets how much preamplification level there is on the INPUT. On stereo input channels, TRIM sets the level of both left and right inputs. The TRIM should be set high enough to amplify the input above the noise floor of the electronics, but not so high that it distorts the sound of the mixer. When the TRIM is turned all the way to the left ("LINE" position), the MM-1 preamp doesn't add any gain to the signal. Use this setting for signals that are already preamplified, such as most synthesizers. When TRIM is turned full clockwise ("MIC" position), the signal at the INPUT jack is amplified 40 dB, allowing you to plug an unbalanced microphone or other low-level signal into the INPUT jacks. The proper TRIM setting for any kind of input can be set with the help of the channel level LEDs. See p. 10, "Setting Input Levels". After the level has been set with the TRIM control, signal goes to the equalizer.

2. EQUALIZER: The two-band equalizer allows you to adjust the tonality of the signal going through each channel. It gets its signal from the TRIM, and sends it to the CHANNEL FADER and LEVEL LEDs. EQ HIGH is a treble shelving-type control with a hinge point of 10 kHz, which can boost or cut signals from 20 kHz down to 1 kHz. EQ LOW is a bass shelving control, with a hinge point of 100 Hz, that can affect signals from 20 Hz up to 500 Hz. EQ HIGH and LOW level controls work similarly to the controls on other audio equipment: turn to the right of center to boost, to the left of center to cut, or leave in the center for no effect (flat response). On stereo inputs, the EQ settings affect the right and left signals simultaneously, while keeping the signals separate.



3. EFF 1/2: This is a combination "where to" and "how much" control. It typically controls how much signal will go to one of two external effects devices, for example, a digital delay on EFF 1 and a reverb unit on EFF 2. It gets its signal from a point just after (post) the CHANNEL FADER and MUTE. It sends signal down either the EFF 1 or 2 busses to EFFECT SEND MASTERS 1 or 2.

Unlike other effect send controls you may have used, the OFF position of the EFF 1/2 knob is the center detent (12 o'clock). Turn to the right of center to send signal to EFF 2, or to the left of center to send signal to EFF 1. The farther you turn it either way, the louder it will be — if it's turned all the way to the left, it's at full volume to the EFFECTS 1 send.

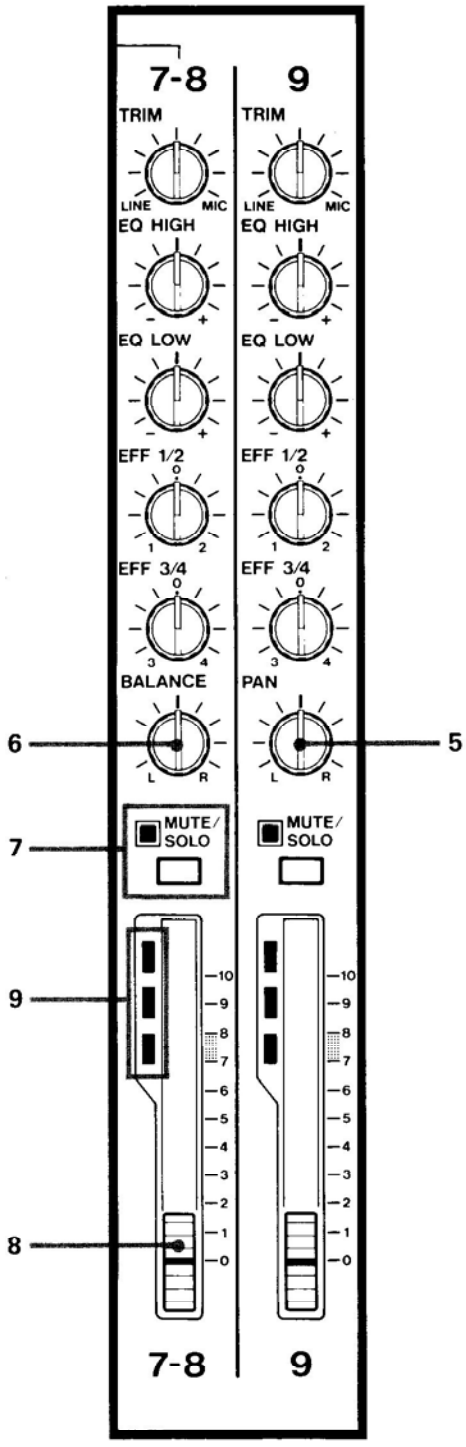


When you are first connecting your effects devices to the MM-1, you should decide what effects you might want to use simultaneously on the same channel, and make sure they're on separate controls. For example, if you think you might want to use a flanger and a reverb unit on a vocal at the same time, connect EFF SEND 1 to the flanger and EFF SEND 3 to the reverb. If you connected the reverb to EFF SEND 2, you couldn't send vocal signal to both flanger and reverb simultaneously.

In the stereo channels (1-8), the left and right inputs are summed to mono before they appear at the EFF 1/2 and EFF 3/4 controls, so both sides of a stereo instrument will be sent to the EFF SEND in mono.

4. EFF 3/4: This controls how much signal is sent to either EFFECT SEND MASTER 3 or EFFECT SEND MASTER 4. It is typically used to send a mix to another pair of external effects devices. It works the same way as EFF 1/2 above.

For more information on effect sends, see p. 4, "Effect Mixes", p. 6, "Choosing Effect Paths", and p. 10, "Setting Levels: To Effect Devices".



5. PAN (Ch. 9-20): This control allows you to create stereo mixes by sending the line input in continuously variable degrees anywhere to the left or right sides of the main mix. The PAN gets its signal from the CHANNEL FADER and sends it to the L/R MASTER FADERS along with other signals. A PAN control is a combination "where to/how much" control, in that it controls both the level and direction of a signal.

6. BALANCE (Ch. 1-8): On the stereo inputs, the BALANCE works similarly to the PAN control. It controls the relative level of the left and right signals. One signal (odd number input) goes to the left side, and the other (even number input) goes to the right at all times, as long as there are two inputs actually plugged in. If only the LEFT/MONO input is plugged in, the stereo feature is defeated, and BALANCE works just like PAN, sending the one input anywhere to the left or right of the mix.

7. MUTE/SOLO SWITCH and INDICATOR: This switch is an electronic on/off control. The red indicator lights when a channel is muted (turned off). The switch comes after the CHANNEL FADER and turns off signal to the DIRECT OUT, the EFF sends, and the MASTER L/R. In mute mode, press this switch to turn any channel off; press again to turn it back on.

When the MASTER SOLO switch is on (shown by "SL" in the number display), pressing any MUTE/SOLO switch "solos" that channel by automatically muting all the channels except the one you pressed.

MUTE is typically used when you want to silence a channel without disturbing its volume setting. All electronic instruments have hiss and noise to some degree, and if you're not using certain inputs for a while, using MUTE will make your sound cleaner. SOLO is typically used when you want to concentrate on one instrument – for example, you have 5 synthesizers mixed together for a sound, but want to hear just one of them so you can adjust it. Solo is also useful if you've lost track of what instrument is plugged into which channel of the MM-1.

MUTEs can be stored in presets called "scenes", so if there's a particular group of inputs you want to mute all at once, you can simply RECALL a scene, and not have to push each MUTE individually. See p. 11, "Mutes and Scene Memories", and p. 12, "Using Solo".

8. CHANNEL FADER: This linear slide fader varies the level feeding the PAN control and MASTER L/R faders, EFF 1/2 and EFF 3/4, and the DIRECT OUT jack. The fader is set for unity gain (level in=level out) in the middle of the shaded area between 7 and 8. See p. 10, "Setting Output Levels".

9. LEVEL LEDS: These are indicators to help you properly set the TRIM control and the output levels of your instruments. The green LED will light when low-level signals (32 dB below clipping) are present, to help you see what channel a given instrument is on. The yellow LED lights when the signal is at the proper level (10 dB below clipping). During normal playing, this light should be on most of the time. The red LED is an overload indicator, and goes on 3 dB before the signal is so loud it

will distort or "clip" the electronics of the MM-1. Occasional flashing of this light is OK, but if it's on constantly you should turn down the TRIM or the volume control on your instrument. Conversely, if only the green LED is on while you're playing, and you have to boost the CHANNEL FADER to get enough signal to the output, operation will be noisier than if you increased the TRIM to its proper level. Signal to the LEVEL LEDs is affected by the input device level, the TRIM, and the EQ, but not by the CHANNEL FADER or MUTE. See p. 10, "Setting Input Levels."

MASTER SECTION

10. EFFECT SEND MASTERS 1-4: These are the master volume controls for the four effect send mixes. They get their signal from the EFF 1/2 and EFF 3/4 controls in the channels to their left. The signal then goes to the EFFECT SEND output jacks on the back panel. Adjust the EFF SEND MASTERS until you have the correct level feeding your external effects device. See p. 10, "Setting Levels: To Effect Devices".

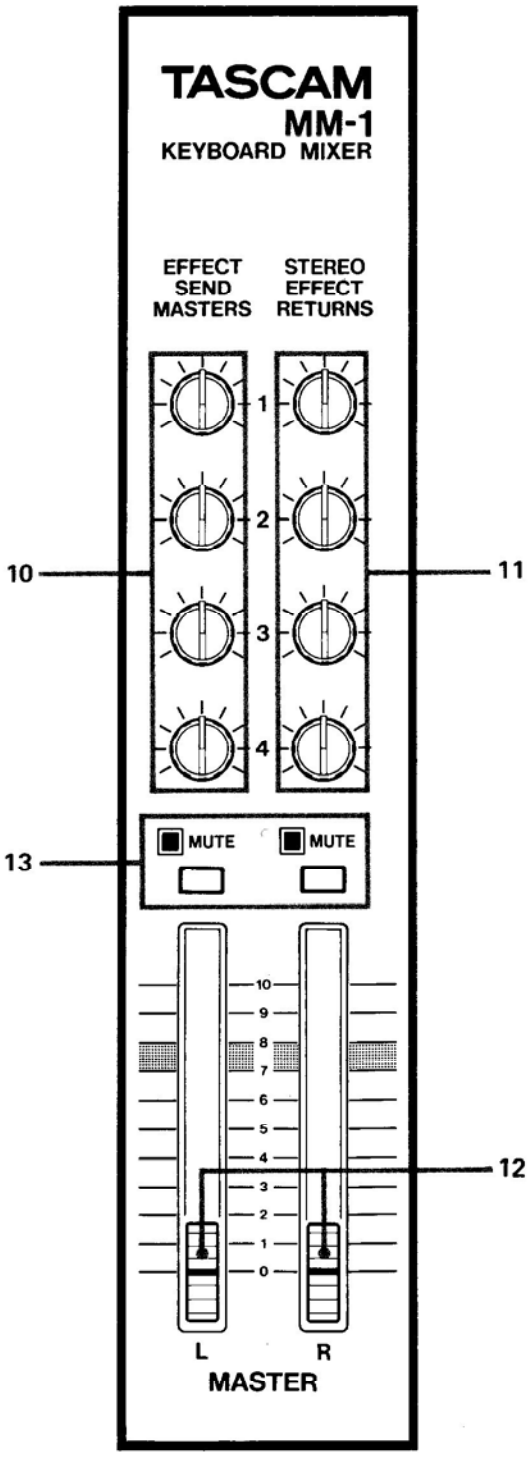
11. STEREO EFFECT RETURNS 1-4: These control how much signal from the four EFFECT RETURN JACKS is mixed onto the L/R stereo buss and then the L/R MASTER FADER. The EFFECT RETURNS control how much signal goes IN to the MM-1, coming back from the effect device, as compared to the EFFECT SENDS, which control how much goes OUT of the MM-1 to an external effect device (such as a reverb unit). The unity gain point of the effect return controls is the "12 o'clock" position.

A special feature of the MM-1's EFFECT RETURN system is that it is capable of receiving 4 stereo returns, which on conventional designs would require 8 effects returns. Each EFFECT RETURN level control in fact sets the level of 2 signals, left and right, if you are using the special stereo plugs that can take advantage of it. See p. 5, "Quarter-Inch Stereo (TRS) to 2 Mono "Insert" or "Stereo Splitter" cables".

On the other hand, if you use mono effect returns, there is a way that you can "pan" them between the left and right sides of the mix. If a signal (for example, the output of a reverb) is plugged into return #1, but there is nothing plugged into return #2, the reverb signal will go to both EFFECT RETURN 1 and EFFECT RETURN 2 controls. In this "mono" mode, EFFECT RETURN 1 controls how loud the reverb will be on the left side, and EFFECT RETURN 2 how loud it will be on the right side. You can vary the two controls to send signal anywhere between the two groups, similar to using a pan pot. EFFECT RETURNS 3 and 4 work the same way.

For more information on effect returns, see p. 7, "Choosing Effect Returns", p. 8, "Mono Effect Return", and pp. 11-12, "Setting Levels: From Effect Devices".

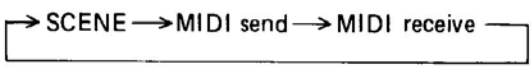
12. L/R MASTER FADERS: These faders adjust the output levels of the mixer. They get their signal from the left and right mix busses, which are fed by the channel PAN controls. They send signals to the four L/R OUTPUT jacks on the back panel, to the PHONES LEVEL control, and to the meters. These controls should be set to the proper level for the amplifier or recorder they are connected to. See p. 10, "Setting Output Levels".



13. L/R MASTER MUTES: These work the same way as the MUTE/SOLO keys in the channels, except they have no effect in SOLO mode. They turn the signal on or off to the stereo output and headphone jacks. The most common use is to silence your rig temporarily, for example during breaks.

MIDI/SCENE CONTROLS

14. SCENE/MIDI CH: This key rotates the two-digit number display between three modes: SCENE, MIDI CHannel SEND, and MIDI CH RECEIVE.



The SCENE mode is used most of the time; in this mode the scene number can be changed by UP and DOWN, external MIDI Program Change commands, or by the REMOTE UP/DOWN footswitch. The MIDI CH SEND and RCV LEDs are both off in this mode, and a standard 2-digit number (from 01 to 99) shows in the display.

Press the SCENE/MIDI CH key once to enter the MIDI CH SEND display mode. The green SEND LED will light, and a number from 1 to 16 or "of (off)" will show. Make your selection with the UP and DOWN keys to set the channel the MM-1 will transmit MIDI messages (Program Change and Note commands) on.

Press the SCENE/MIDI CH key again to enter the MIDI CH RCV display mode. This is used to change the MIDI channel the MM-1 receives commands on; this is also usually a "set it and forget it" function. The MM-1 is in RCV CH mode when the green RCV LED is lit, and a number from 1 to 16, or "on" or "of", is showing.

Holding STORE/COPY in either MIDI display mode (SEND or RCV LED on) will make "on" or "of" flash in the display. This is the "individual MIDI note muting" display mode; press UP to turn it on, and DOWN to turn it off. Note that this will have no effect if the MIDI RCV channel is set to "off".

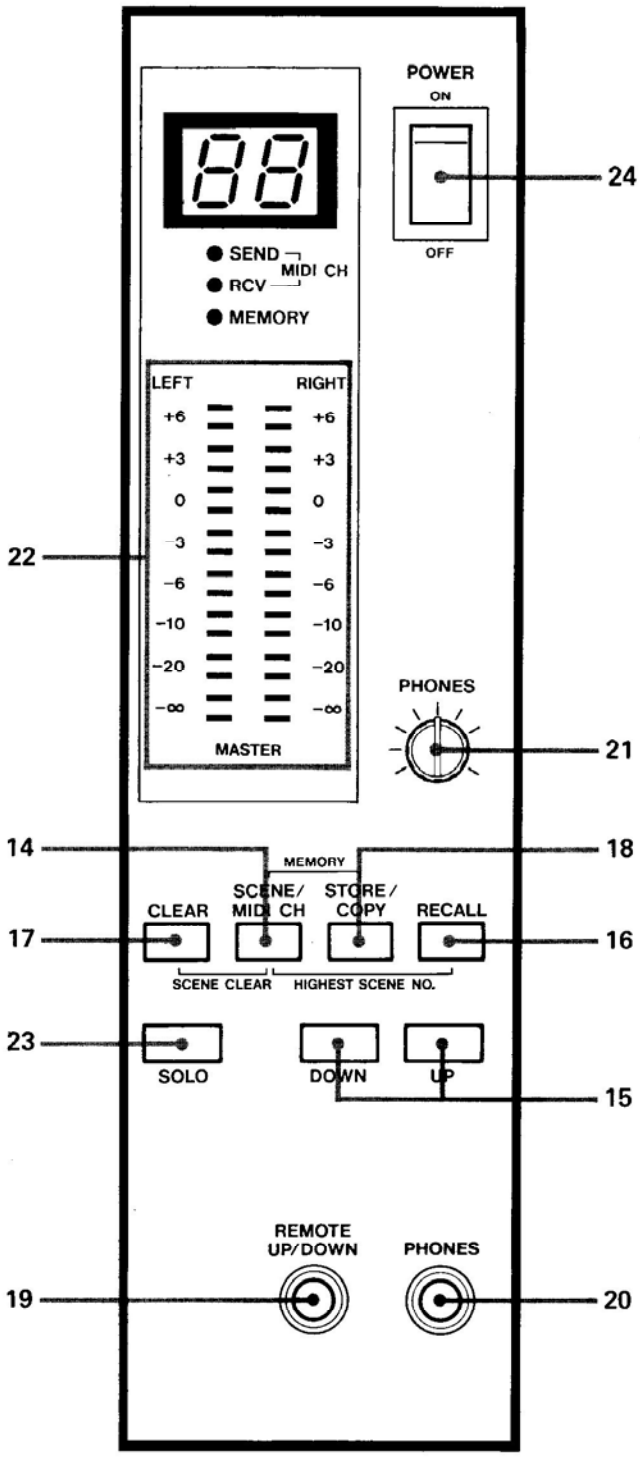
*Another clue that the MM-1 is in one of these MIDI modes is when the first digit of a number is half-high. See p. 22, "Number Display".

The MIDI CHannels mode is chosen when you want to prepare the MM-1 to change from one scene to another in response to external MIDI Program Change commands, which are transmitted on any of the sixteen MIDI channels. You can change the MIDI channel only with the UP or DOWN keys. In addition to the numbers 1-16 corresponding to the channels, there are two other choices: "on" and "oF". "ON" stands for omni mode; in this mode any Program Change commande received regardless of channel will change the scene number. Omni mode is useful when you're trouble-shooting a system, but not a likely choice for normal operation. "OF" stands for off, which is where you should set it if you don't want the MM-1 to send or respond to any Program Change or Note commands at all.

See p. 12, "Using MIDI Features of the MM-1" for more information.

Storage function of SCENE/MIDI: When the SCENE/MIDI key is pressed while holding STORE/COPY, the current scene contents will be replaced by the current mute settings. This STORE-SCENE is how you permanently save your edited scenes.

Clear function of SCENE/MIDI: When the SCENE/MIDI key is pressed while holding CLEAR, the scene will be erased with all mutes off.



"Highest Scene Stored" function of SCENE/MIDI: When you press SCENE/MIDI while holding RECALL, the MM-1 will jump to the highest number scene that has mutes stored in it.

See p. 11, "Mutes and Scene Memories"

15. UP and DOWN KEYS: Increases or decreases the current MIDI channel or SCENE number depending on the mode (see above). The numbers will scroll continuously if you hold the key down.

16. RECALL: Press this key to actually switch the MM-1 to the settings of a scene. When the scene number is blinking, the current mixer mute setting is different from the mute setting of the scene memory. Pressing RECALL switches all the mutes to what's in memory, which stops the scene number from blinking.

"Highest Scene Stored" function of RECALL: When you press SCENE/MIDI while holding RECALL, the MM-1 will jump to the highest number scene that has mutes stored in it. For example, if it jumps to scene 37, it means that scenes 38 and higher are empty and can be used to store new data.

"Compare" function of RECALL: When the red MEMORY LED is lit, the mixer mute settings showing are always those of the scene you have copied. After you press UP or DOWN to go to another scene number, you can press RECALL to change the MM-1 to the mute settings of the "destination" scene so you can make sure you're not overwriting a scene you want. Press RECALL again to switch the MM-1 back to the settings you originally copied. Pressing RECALL while MEMORY is lit allows you to compare the source (memory buffer) and destination scene settings. The scene number will flash when the destination scene is showing.

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

*Return the two-digit display to showing the current recalled scene number after browsing through some other ones, or accidentally hitting UP or DOWN

*Abort a STORE/COPY action – return to the original version of a scene. Press CLEAR the first time, and the MEMORY LED will go out and the mixer will switch to the original settings of the scene, and the scene number will blink. Press CLEAR again and the 2-digit display will return to the original scene number and stop blinking.

*Erase all mutes from a scene by holding CLEAR and pressing SCENE.

*Return the mute status to what is in memory.

*Clear all 99 scenes by holding CLEAR and turning POWER ON. All scenes will have no mutes; the MIDI SEND channel is set to 01, the MIDI RCV channel is set to OMNI ON, and the MIDI Note Muting feature is set to OFF.

18. STORE/COPY: Press this key to store the current mute settings into the memory buffer. The MEMORY LED will light, and the mute keys of the MM-1 will be "locked out". You can then use the UP and DOWN keys to go to any scene number, where you can permanently store the settings by pressing STORE while holding SCENE. This is how you store a particular mute setting to one of the 99 scene memory locations. Changes made with the MUTE keys are temporary; if you go to another scene and RECALL it, without first pressing STORE/COPY your changes will be lost forever. As long as the MEMORY LED is on the mute settings are stored in a temporary memory. Press RECALL again, and you'll see the temporary settings again.

Press CLEAR while the MEMORY LED is on to turn off the MEMORY LED indicator, and allow you to change mute settings. Press it again to return you to the original scene settings and number. See p. 11, "Mutes and Scene Memories".

Holding STORE/COPY while the display is in either MIDI CH mode will display the on/off status of individual channel muting via MIDI note commands.

19. REMOTE UP/DOWN JACK: Connect the TASCAM RC-60P pedal here for remote control of the scenes, UP or DOWN. Up and DOWN will also cause the MM-1 to transmit MIDI Program Change commands from its MIDI OUT jack. See p. 13, "Controlling Mutes with Note Messages."

20. PHONES JACK: Connect any stereo headphone (with a 1/4" stereo TRS 3 conductor plug) with an impedance of 8-600 ohms to this jack. Do not connect any mono 1/4" jack here; you will short out one side of the headphone amp and possibly damage it.

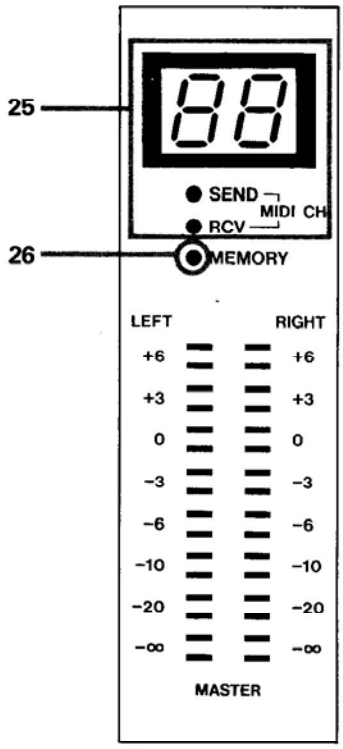
21. PHONES LEVEL: This controls the volume feeding the phones jack. The signal comes from the L/R MASTER controls and is cut off when the MASTER MUTE is on.

22. METER: This shows the output level of the MM-1. When this meter reads 0 VU (the first red LED), the output jacks on the back panel are putting out their reference level (0 dBu or .775 volt at the 1/4" phone jacks, and -10 dBV (.3 volt) at the phono (RCA) jacks). The meter gets its signal after the L/R MASTER and MUTE switches. The maximum output level of the MM-1 before it will distort is +13 dB over this reference, so even when the meter is at its peak (+6 dB) there is still headroom left in the mixer. See p. 10, "Setting Output Levels".

23. SOLO: Press this to switch the MM-1 from mute to solo mode and back again. In SOLO mode, the 2-digit display will flash "SL" indicating "solo ready mode". When you actually press a channel MUTE/SOLO key, the MM-1 will mute all the other channels except the one you pressed, and the "SL" display will turn solid. Press SOLO again to return to the standard mute mode, and see the scene number display.

The UP, DOWN and RECALL keys are inactive in solo mode. Note that SOLO works not only on the headphone feed, but the feed to the main outputs as well. See p. 12, "Using Solo".

24. POWER SWITCH: Turns power to the MM-1 on and off.



25. NUMBER DISPLAY and MIDI CH SEND/RCV LEDS: The two-digit number display normally shows the scene number. It will blink if the mutes on the front panel are different from the mutes in the scene memory. Press RECALL or STORE and SCENE to turn the blinking off.

If SOLO is on, the display will read "SL". It blinks to indicate "Solo ready mode" and is on solid in the actual solo mode.

If either of the green MIDI CH LEDs are on, the number display is showing the MIDI channel status. In a MIDI display, the first digit is half-height so it is easy to distinguish from SCENE displays. Allowable settings are 1-16, "on" (for "omni mode" in MIDI RCV, meaning the MM-1 will follow commands regardless of channel) and "of" (for "off", which disables the MIDI function). In either MIDI CH display, if you hold the STORE/COPY key down, the display will flash either "on" (meaning that MIDI note messages can control individual mutes) or "of" for off (meaning that only MIDI Program Change commands will affect the MM-1). See pp. 12-13, "Setting the MIDI Send and Receive Channels".

26. MEMORY INDICATOR LED: This will light after STORE is pressed to show that the temporary memory buffer is being used. Pressing the MUTE/SOLO keys will have no effect while this LED is lit. To restore normal operation and turn this indicator off, press CLEAR or STORE and SCENE.

BACK PANEL

27. MIDI JACKS: These jacks are for the connection of MIDI devices, typically master keyboards and synthesizers during live performance, or sequencers during recording. The applications of MIDI in the MM-1 are:

- *To transmit program changes to MIDI instruments, particularly with the UP/DOWN pedal in performance
- *To receive program changes from MIDI instruments, so different mute scenes can be recalled according to a particular "patch"
- *To send and receive "note on" commands which can turn individual mutes on and off, depending on the key number and velocity sent.

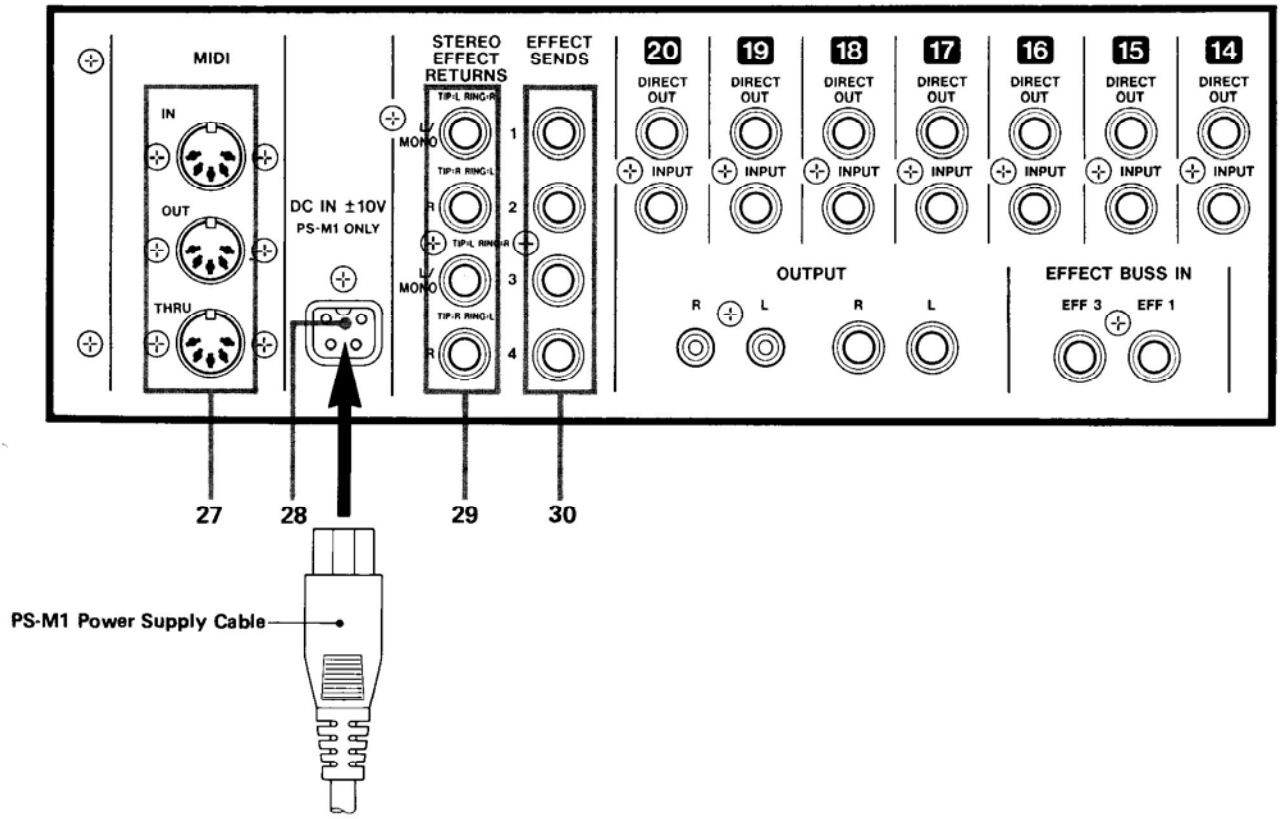
MIDI IN: This jack typically accepts the MIDI OUTPUT of a master keyboard or sequencer. Any input here will be "echoed" out the THRU jack. MIDI Program Change messages received at the MIDI IN jack will change the scenes of the MM-1, if they are on the same MIDI channel the MM-1 is set to receive on. See p. 12, "Changing Scenes via External MIDI Commands." MIDI Note messages of the proper note number and velocity can turn individual channel mutes on and off. See p. 13, "Controlling Mutes with Note Messages".

MIDI OUT: This jack transmits the only MIDI messages that the MM-1 can generate: Program Change, and a limited number of NOTE ON/NOTE OFF messages. When the UP or DOWN keys are followed by RECALL, or the optional REMOTE UP/DOWN footswitch is pressed, the MM-1 generates a MIDI Program Change command 00-98 in sequence. If you connect this jack to the MIDI IN of a unit that can respond to Program Change commands (such as a keyboard), the keyboard will change programs (or "patches") as you press UP or DOWN. When you press a channel MUTE key, a very short note message will be sent out. Each Mute key is assigned a different MIDI note, from C1 (#36) to F2 (#53) left to right on the mixer. The velocity when you turn the mute on is 96; when you turn it off it is 32. The gate time of these commands is so short that you can barely hear them if they're connected to a keyboard. See p. 13, "MIDI Mute Automation Features."

MIDI THRU: This jack passes along an exact copy of information received at the IN jack, so that (for example) the MIDI OUT of a master keyboard, which you are using to control the MM-1's scenes, can be passed along to a synth module.

28. DC IN +/- 10 V: This connector is for connection of the TASCAM PS-M1 power supply only, which has a special 4-prong plug that provides +10 volts on one pin and -10 volts on another with a maximum current draw of 1000 milliamps. Do not use any other power supply with the MM-1 mixer.

29. STEREO EFFECT RETURN JACKS 1-4: These jacks are the 3-conductor stereo (TRS) type, and connect directly to the STEREO EFFECT RETURN LEVEL knobs on the front panel. Typically, you connect the outputs of your effects devices to these RETURN JACKS, but they can be used for any line level input if desired. The input level expected by these jacks is -10 dBV (.3 volt), but they can accept a wide range of higher or lower levels.



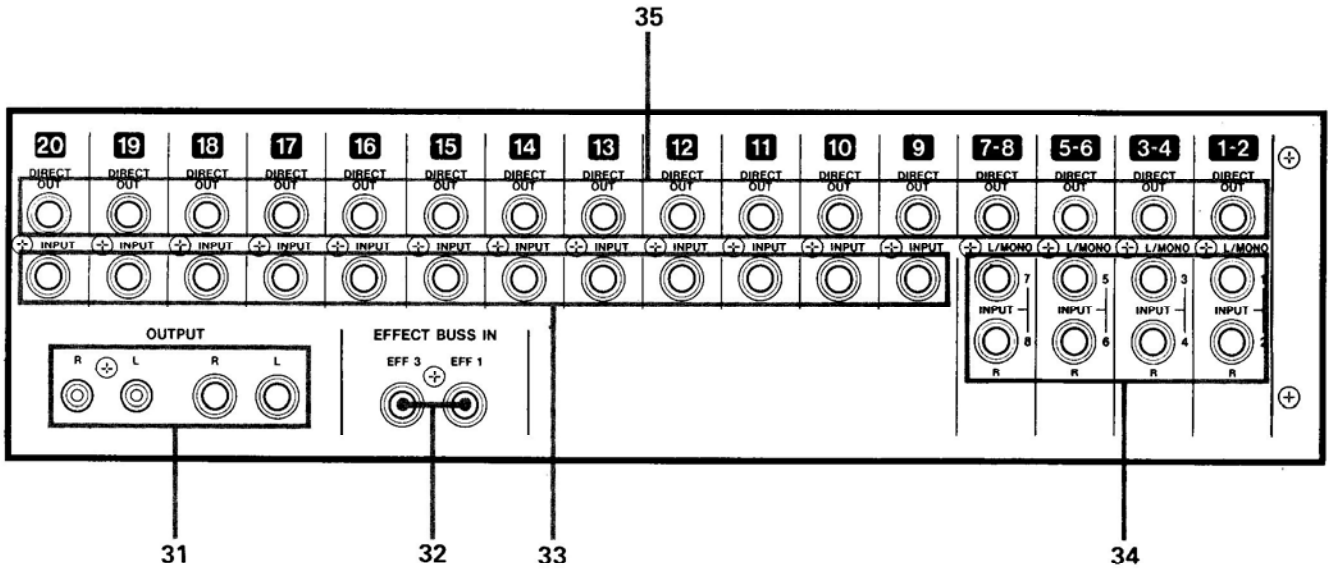
Stereo feature: When you use a cable that has a 1/4" stereo plug on one end connected to two different 1/4" mono plugs, each STEREO EFFECT RETURN jack can return both the left and right sides from a stereo effect unit. These cables (sometimes called "insert" or "stereo splitter" cables) connect the tip of the stereo plug to one cable, and the "ring" connector to the other cable, with all sharing a common ground ("sleeve" connector). The TASCAM PW-2Y or PW-4Y cables are expressly designed for this purpose.

Stereo with separate mono cables: The "tip" of STEREO EFFECT RETURNS 1 & 3 goes to the left side of the L/R MASTER mix, and the "ring" goes to the right. On returns 2 & 4, the feeds are reversed (Tip=R, Ring=L). This allows you to use standard mono cables (tip only) to connect stereo effects, if you've only got two effects devices. In this setup, EFFECT RETURN 1 and EFFECT RETURN 2 are both used by one stereo effect unit, with each control affecting the stereo balance.

Mono feature: If you have a mono-output device that you want to return to the center of the mix, connect it to STEREO EFFECT RETURN 1, making sure RETURN 2 is empty. In this condition, the signal will "normal" to both EFFECT RETURN 1 and 2 controls. Similarly, a signal patched into RETURN 3 "normals" to both the 3 & 4 LEVEL controls if there is no signal patched into RETURN 4. By adjusting the two controls separately, you can send signal in varying degrees to the left, right, or center of the mix similar to using a pan pot.

Note: If you're using a stereo return, but have nothing in its companion jack (for example, a PW-2Y in EFF RTN 1 but nothing in EFF RTN 2), make sure that the EFF RETURN 2 control is turned down all the way, otherwise the stereo picture will become more mono since EFF RETURN 2 will feed some of the left signal to the right side.

30. EFFECT SEND 1-4: The signals coming from the EFFECT SEND MASTERS are taken out from these jacks to a signal processor (reverb, delay, phaser, etc.) so that they can be enhanced in some way. After the signals are processed, they return to the MM-1's STEREO EFFECT RETURN jacks.



31. OUTPUT L and R JACKS: These jacks are the primary outputs of the stereo mixer. Signal comes to these jacks directly from the two MASTER FADERS. The only difference between the two sets of jacks is their output level. The 1/4" phone jacks have a nominal output level of 0 dBu (.775 volt when the meter reads "0 VU"). This is the proper level for most power amplifier inputs. The phono (RCA) jacks have a nominal output level of -10 dBV (.3 volt) for connection to tape recorders and the sub inputs of many other TASCAM mixers and Portastudios.

32. EFFECT BUSS IN 1 and 3: These jacks connect directly either to the EFF 1 or EFF 3 SEND buss. Signal goes from these jacks directly to the EFFECT SEND MASTER controls. They are like the "SUB IN" on many consoles, and allow you to connect an external mixer's effects output directly to the effects buss of the MM-1 so that the whole mixing system can share a single effects device. See p. 9, "Tying the Effect Busses Together".

EFFECT BUSS IN 1 and 3 allow you to use an external stereo mixer, such as the TASCAM M-1B, being fed by the MM-1's DIRECT OUTS so you can get four effect sends simultaneously from a channel. For details see p. 26, "Expanding Effects Sends with Direct Outs".

Important! Do not confuse these jacks with the effects returns. If you connect the output of an effects device to the same effects send that is feeding it, you will get the same effects send that is feeding it, you will get feedback and possibly damage your equipment.

33. INPUT 9-20: These 1/4" phone connectors will accept unbalanced signals from almost any type of device with an output level of -50 dBV to -10 dBV, including a microphone with an impedance of 150 to 10,000 ohms. Signal goes from this jack to the channel's TRIM control.

If you want to use balanced microphones in these inputs, you can use a simple XLR-to-1/4" adapter; alternatively use an in-line mic transformer if you need more gain or if unbalanced operation is noisy.

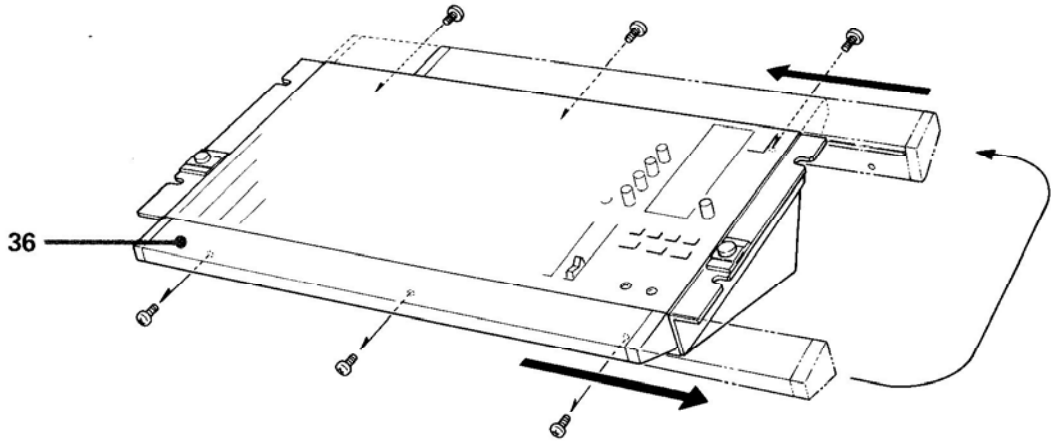
34. INPUT 1-8 (STEREO INPUTS): These jacks work the same way as the INPUTs on channels 9-20, but are intended for use with stereo instruments such as drum machines, synthesizers, samplers, or even playback devices such as CD players, phono preamps, and FM tuners. When both jacks in a stereo channel are plugged in, one goes to the left output, and the other to the right.

To use a stereo channel with a mono source, plug into the top INPUT jack only, leaving the bottom one empty. In this case the channel will work just like a mono channel, sending signal anywhere in the left-right panorama of the mix depending on the setting of the BALANCE control.

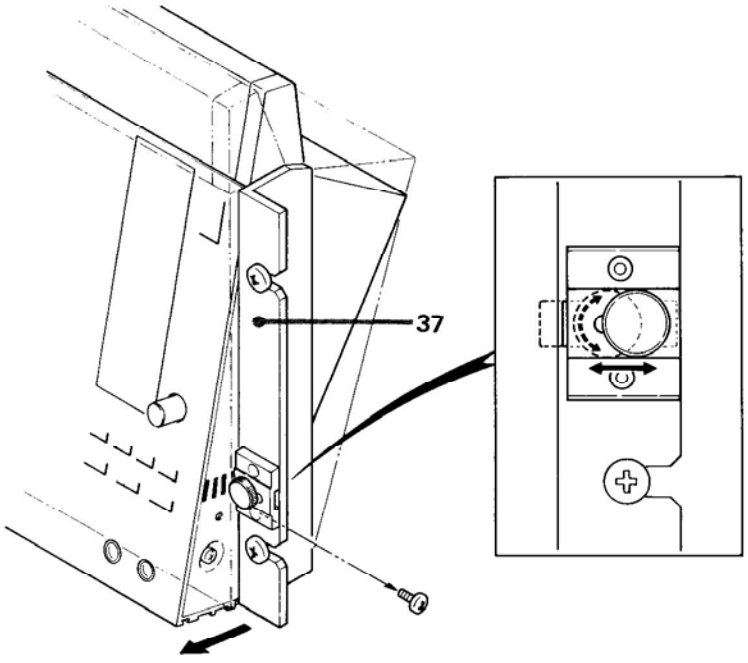
35. DIRECT OUT: Each channel's DIRECT OUT jack gets its signal from after the channel fader. It may be connected to an external mixer for an additional cue mix or effects send, or to a multitrack recorder. Connecting to this jack does not interrupt or change the signal flow through the MM-1 in any way. The DIRECT OUT jacks of the stereo channels are fed by a mono mix of both left and right inputs.

See p. 26, "Expanding Effects Sends with Direct Outs" and p. 27, "Multitrack Recordings."

36. RACK SPACER/PALM REST: The included rack spacer may be used at the top of the mixer to cover the gap needed to make room for the input and output connectors between the MM-1 and the unit above it in a rack. If the unit is mounted in a console, the rack spacer may be used as a palm rest at the bottom of the mixer. Simply unscrew the 3 Phillips head screws that hold it to either side, and attach it on the other.



37. ADJUSTABLE RACK EARS: When mounting in a vertical rack, you may use the "tilt out" adjustment of the rack ears. The unit can be shipped in its vertical position (flush), and tilted out to one of the 4 angles possible. On each side, unscrew the thumbscrew, slide the bar out of the slot on the MM-1. Tilt the unit out, slide the bars back in at the desired slot, and tighten the thumbscrews securely.
If you want you can further tilt the unit out so the unit's bottom edges rest on the slid out bars.

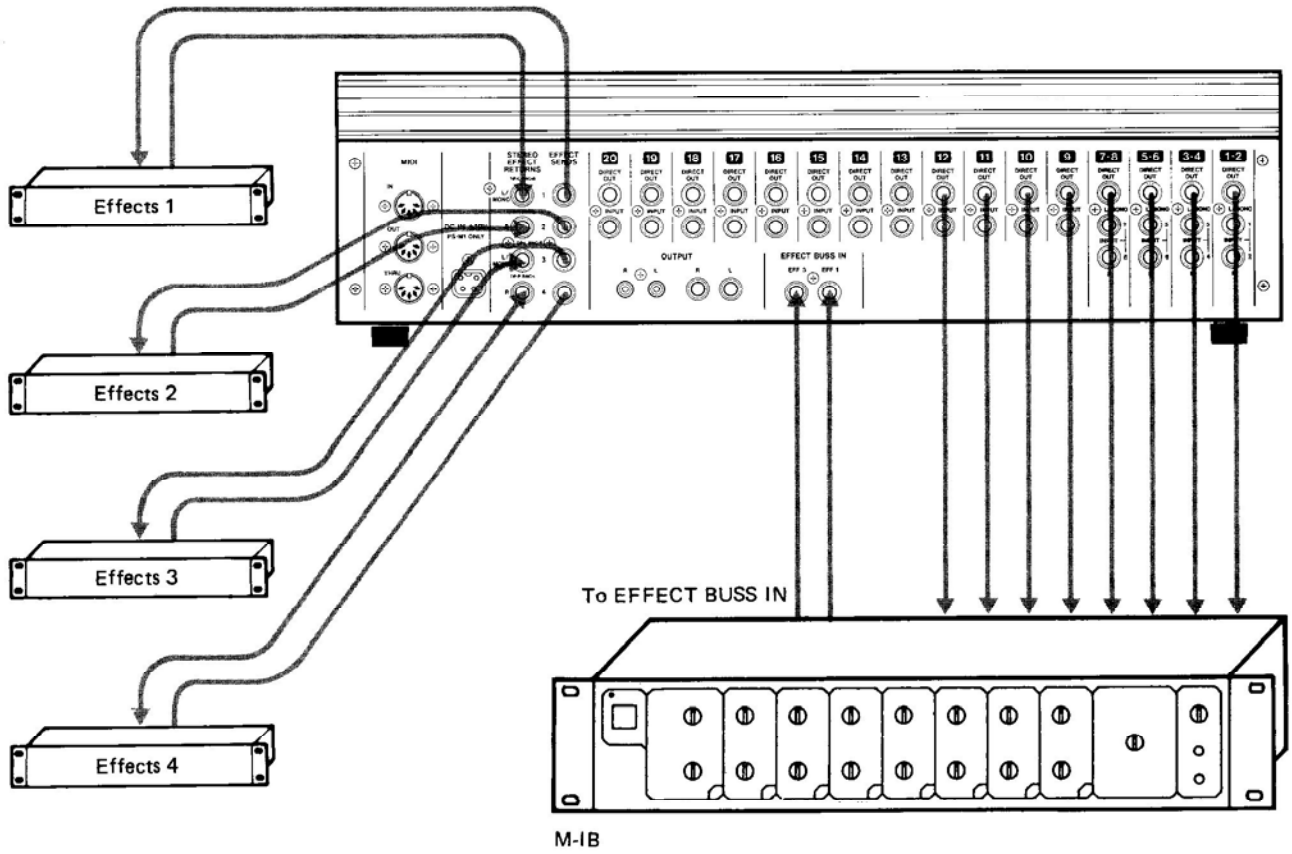


EXPANDING EFFECT SENDS WITH DIRECT OUTS

There may be some installations that require 4 adjustable effect sends simultaneously. This can be done easily by adding a TASCAM M-1B line mixer to the system, an 8 in, 2 out mixer that takes over the job of "Effects 1 and Effects 3" while the two controls of the MM-1 are used for Sends 2 and 4:

In this installation, the PAN controls of the M-1B adjust how much signal goes to Effect Send 1 and 3, along with the M-1's LEVEL control. The EFF 1/2 and 3/4 controls of the MM-1 are turned only to the right of center, to access the "even" effect sends.

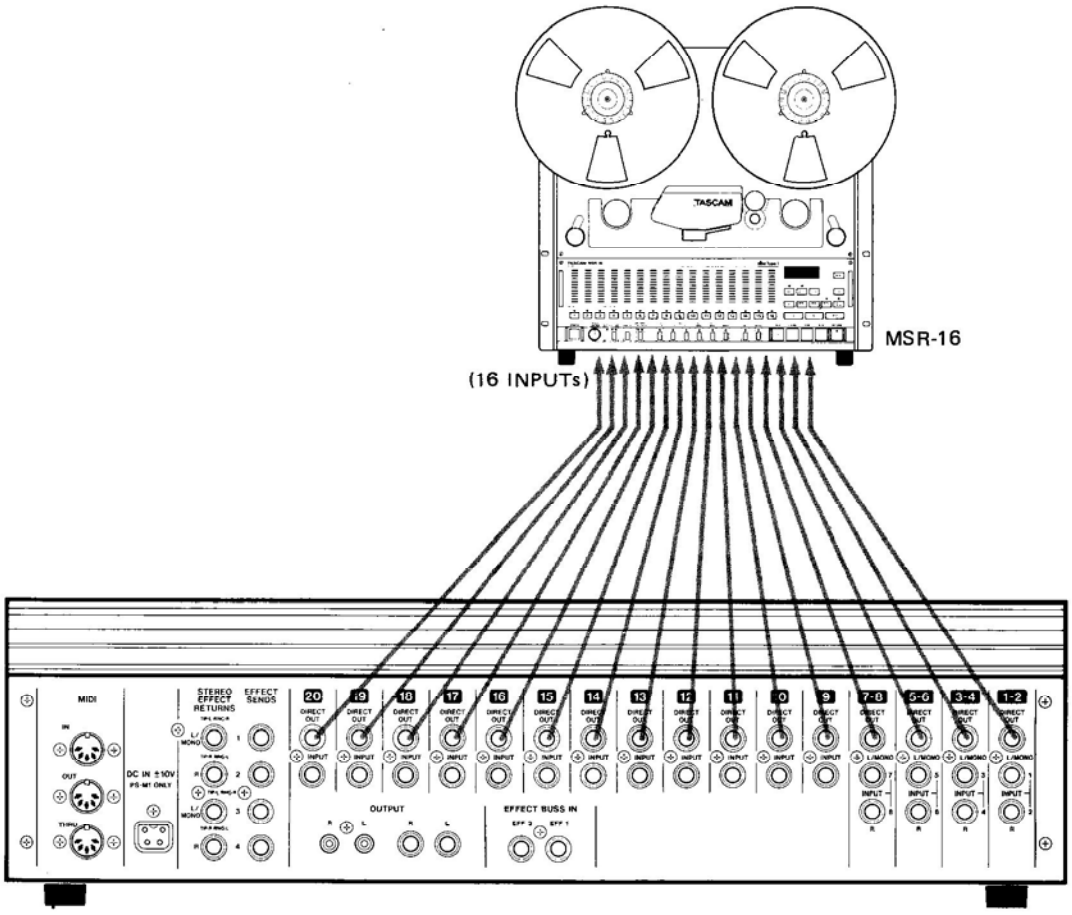
This is just an example of how the direct outs can be used. Other applications might include switchable audio patch bays, or larger mixers.



MULTITRACK RECORDING WITH DIRECT OUTS

On page 9, we showed how to use the MM-1 to feed the busses of a multitrack recording system. But what if you want to have more than 2 channels out of the MM-1? The DIRECT OUTS give you the flexibility to record each instrument on a separate track for later mixdown:

Keep in mind that the stereo input channels of the MM-1 are summed to mono before going to the direct outs, so you will not get the stereo effect from inputs 1-2, 3-4 etc. Split stereo pairs to separate inputs.



QUICK REFERENCE TABLES

These tables summarize operating procedures for some of the important features of the MM-1. More detailed instructions can be found under the paragraphs with the corresponding headings earlier in this manual.

STORING A SCENE IN MEMORY

Step	What	How	Display
①	Scene Memory Ready	SCENE/ MIDI CH Press (if the display is in MIDI CH)	01 (01 ~ 99)
②	Selection of Scene Number	DOWN UP Press	07 (Blinking)
③	Mute Setting	MUTE/ SOLO Press the buttons you want	07 (Blinking)
④	Store	SCENE/ MIDI CH STORE/ COPY Holding STORE press SCENE	07 (Solid)

COPYING A SCENE FROM ONE NUMBER TO ANOTHER

Step	What	How	Display
①	Selection of "Source" Scene Number	DOWN UP Press	03 (Blinking)
②	Recall	RECALL Press	03 (Solid)
③	Selection of "Destination" Scene Number	DOWN UP Press	06 (Blinking)
④	Copy	SCENE/ MIDI CH STORE/ COPY Holding STORE press SCENE	06 (Solid)

RECALLING SCENES

Step	What	How	Display
①	Selection of Scene Number	DOWN UP Press	01 (Blinking)
②	Recall	RECALL Press	01 (Solid)

* If you are using the RC-60P pedal you don't have to press RECALL.

RECALLING THE HIGHEST SCENE

Hold RECALL and press SCENE.

SETTING THE MIDI SEND CHANNEL

Step	What	How	Display and LED
①	Entering SEND Mode	SCENE/ MIDI CH Press to enter SEND mode.	02 ● SEND ○ RCV MIDI CH (01~16, OF)
②	Selection of SEND CH	DOWN UP Press 01~16→OF	13 ● SEND ○ RCV MIDI CH

SETTING THE RECEIVE CHANNEL

Step	What	How	Display and LED
①	Entering RCV Mode	SCENE/ MIDI CH Press to enter RCV mode.	01 ○ SEND ● RCV MIDI CH (ON, 01~16, OF)
②	Selection of RCV CH	DOWN UP Press ON→01~16→OF	05 ○ SEND ● RCV MIDI CH

CONTROLLING MUTES WITH NOTE ON/OFF MESSAGES

Step	What	How	Display and LED
①	MIDI RCV Mode	SCENE/ MIDI CH Press to enter RCV mode.	 (01~16,OF)
②	(To turn the feature on)	STORE/ COPY + UP Holding STORE press UP.	 (Blinking)
③	(To turn the feature off)	STORE/ COPY + DOWN Holding STORE press DOWN.	 (Blinking)

*To have the MM-1 send messages to a MIDI device, enter SEND mode in step 1.

NOTE FOR U.K. CUSTOMERS

U.K. Customers Only:

Due to the variety of plugs being used in the U.K., the provided PS-M1 power supply unit is equipped with no AC plug. Please request your dealer to install the correct plug to match the mains power outlet where your unit will be used as per these instructions.

IMPORTANT

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

BLUE: NEUTRAL
BROWN: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloures markings identifying the terminals of your plug, proceed as follows.

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

ADVARSEL:
Lithiumbatteri – Eksplosionsfare.
Udskiftning mä kun foretages af en sagkyndig, og som beskrevet i servicemanualen.

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das

TASCAM KEYBOARD-MIXER MM-1

(Gerät, Typ, Bezeichnung)

in Übereinstimmung mit den Bestimmungen der

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

(Amtsblattverfügung)

funk-entstört ist.

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

TEAC CORPORATION

Name des Herstellers/Importeurs

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

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

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

Specifications

ELECTRICAL CHARACTERISTICS

Input:	(1/4" Phone Jack x 20)	
Source Impedance:	Less than 10 kohms	
Input Impedance:	50 kohms	
Nominal Input Level:	-10 dBV (0.3 V) (TRIM "LINE") down to -50 dBV (3 mV) (TRIM "MIC")	
Maximum Input Level:	+12 dBV (4 V) (TRIM "LINE")	
Stereo Effect Return:	(1/4" Stereo Phone Jack x 4)	
Input Impedance:	5 kohms	
Nominal Input Level:	-10 dBV (0.3 V)	
Effect Buss In:	(1/4" Phone Jack x 2)	
Input Impedance:	22 kohms	
Nominal Input Level:	-10 dBV (0.3 V)	
Output:	(1/4" Phone Jack, L & R)	(RCA Jack, L & R)
Output Impedance:	220 ohms	480 ohms
Nominal Output Level:	0 dBu (0.8 V)	-10 dBV (0.3 V)
Maximum Output Level:	+13 dBu (3.5 V) (10 kohm load)	+3 dBV (1.4 V)
Direct Out:	(1/4" Phone Jack x 16)	
Output Impedance:	220 ohms	
Nominal Output Level:	-10 dBV (0.3 V)	
Maximum Output Level:	+11 dBV (3.5 V)	
Effect Send:	(1/4" Phone Jack x 4)	
Output Impedance:	220 ohms	
Nominal Output Level:	-10 dBV (0.3 V)	
Headphone Output:	(1/4" Stereo Phone Jack)	
Maximum Output Level	80 mW + 80 mW at 8 ohms	
Equalizer:		
Type:	Shelving	
Frequency:	10 kHz (High) 100 Hz (Low)	
Boost/Cut:	±12 dB (High) ±12 dB (Low)	
LED Indicator Level:		
Red (Over):	+9 dBV (3 dB below clipping)	
Yellow (Norm):	+2 dBV	
Green (Under):	-20 dBV	
Dimensions	(See drawing)	
Weight:	5 kg (11 lbs.)	

PERFORMANCE CHARACTERISTICS

Equivalent Input Noise:	UNWTD (20 – 20 kHz)/IHF A WTD 111 dB/118 dB
Signal-to-Noise Ratio:	UNWTD (20 – 20 kHz)/IHF A WTD
(Nominal Input Level):	
16 Mic – Output:	53 dB/60 dB
1 Mic – Output	63 dB/70 dB
16 Line – Output:	70 dB/77 dB
1 Line – Output:	70 dB/77 dB
Frequency Response (Nominal Level):	
Any Input to Any Output:	20 Hz – 20 kHz, +1/-2 dB

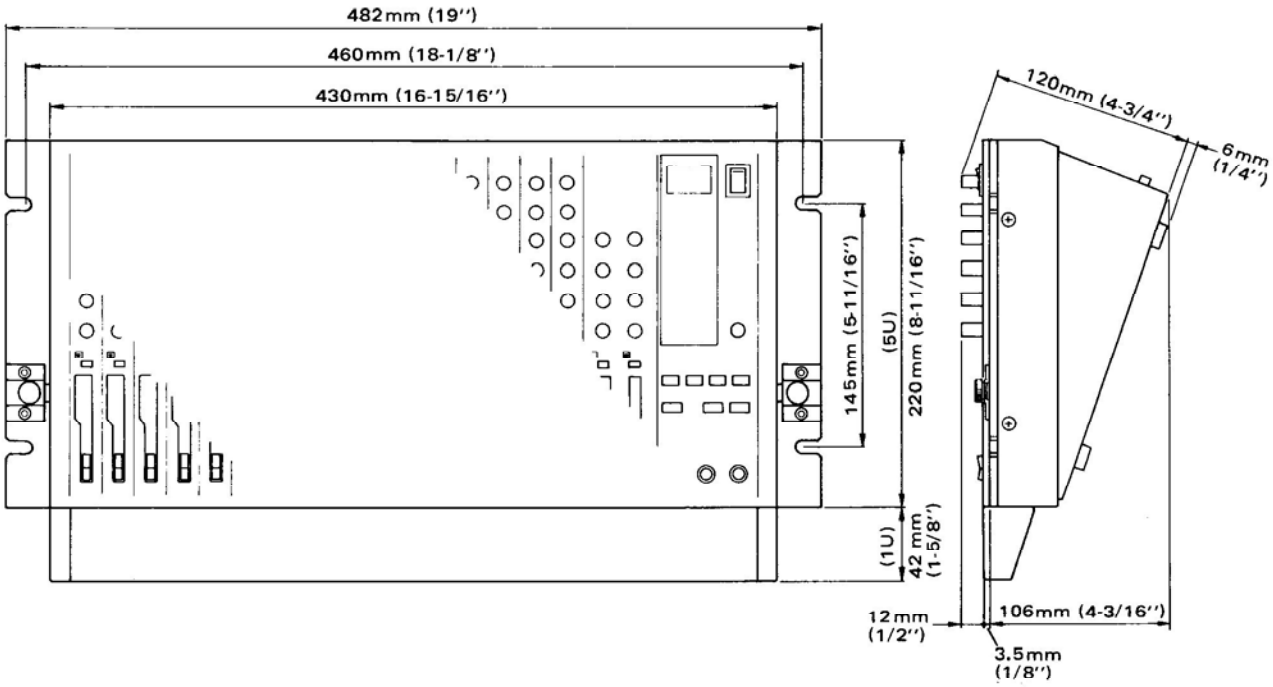
Total Harmonic Distortion (THD)

1 Mic to 1 Output	0.04 % (1 kHz)
1 Line to 1 Output	0.03 % (1 kHz)
Crosstalk (1 kHz):	60 dB*

*Value irrelevant to headphones

In these specifications, 0 dBV is referenced to 1.0 Volt and 0 dBu to 0.775 Volt. Actual voltage levels are also given in parentheses.

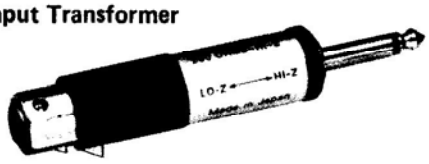
Changes in specifications and features may be made without notice or obligation.



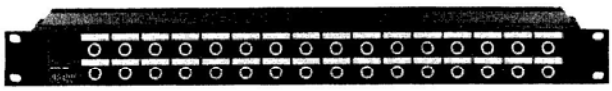
OPTIONAL ACCESSORIES

PA-4 Phono Amplifier

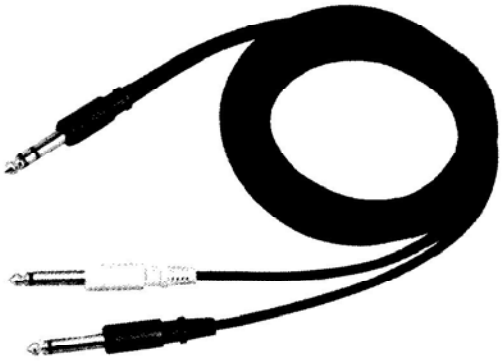
109B Input Transformer



PB-32 Series Patch Bay



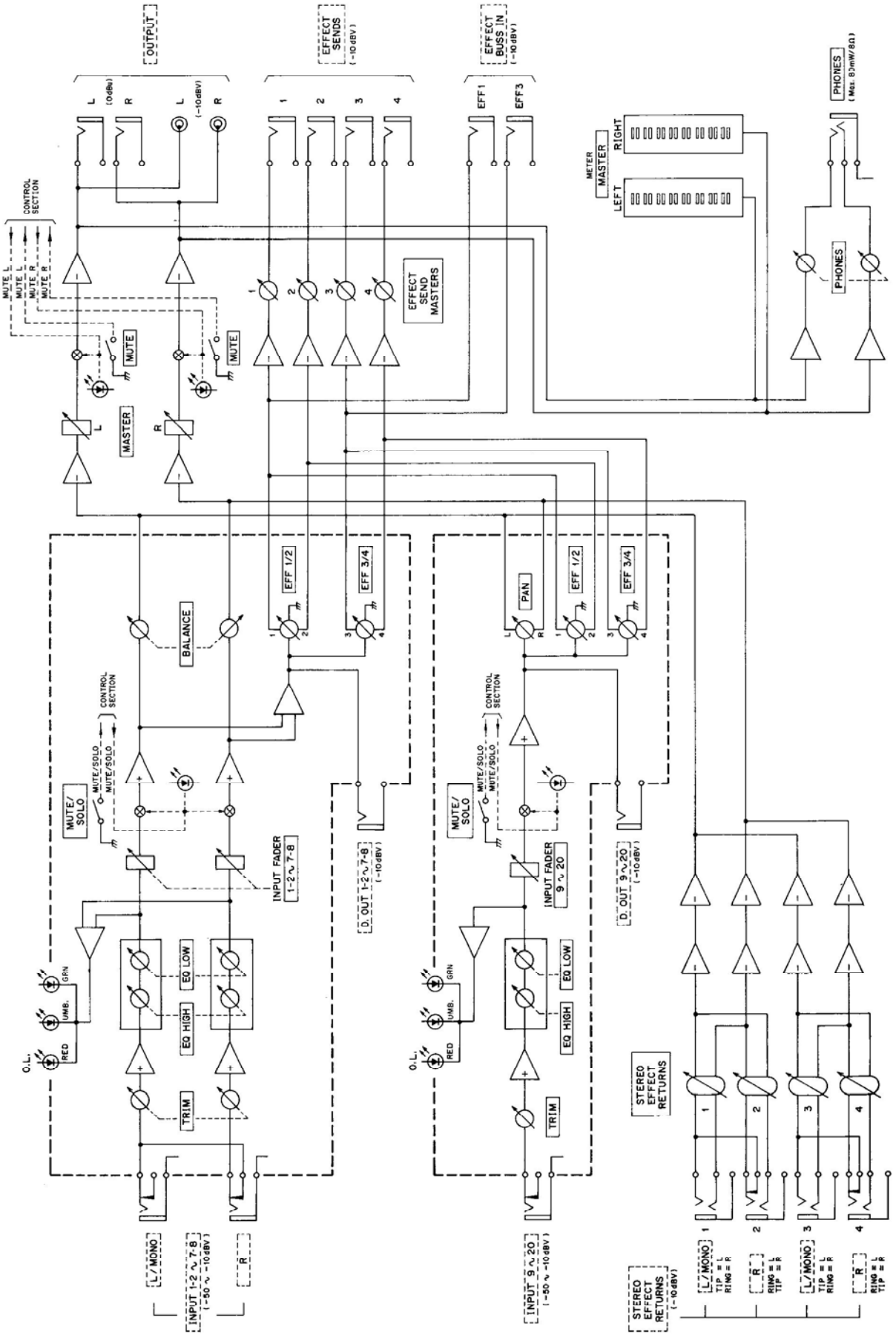
PW-2Y/PW-4Y Insertion Cable



RC-60P Remote Foot Switch

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

Block Diagram



Model MM-1 MIDI Implementation Chart

Date : 4/1, 1989
Version : 1.0

Function		Transmitted	Recognized	Remarks
Basic Channel	Default	1–16	1–16	memorized
	Changed	1–16	1–16	Trans. & Recog. Ch's separately selectable
Mode	Default	×	×	memorized
	Messages	×	×	OMNI On/Off
	Altered	~~~~~~~~~~	×	
Note Number	: True Voice	36–53	36–53	
		~~	×	
Velocity	Note ON	○ 9nH, v=32, 96	○ v=1 – 127	enable On/Off
	Note OFF	○ 9nH, v=00	×	memorized
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		×	×	
Control Change		×	×	
Prog Change	: True #	○	○	Scene No=1–99
		~~	00–98	(PGM No=0–98)
System Exclusive		×	×	
System Common	: Song Pos	×	×	
	: Song Sel	×	×	
	: Tune	×	×	
System Real Time	: Clock	×	×	
	: Commands	×	×	
Aux Mes-sages	: Local ON/OFF	×	×	
	: All Notes Off	×	×	
	: Active Sense	×	×	
	: Reset	×	×	
Notes				

Mode 1 : OMNI ON, POLY
Mode 2 : OMNI ON, MONO
Mode 3 : OMNI OFF, POLY
Mode 4 : OMNI OFF, MONO

○ : Yes
× : No

TASCAM
TEAC Professional Division

MM-1

TEAC CORPORATION	MAIN OFFICE: 3-7, Nakacho 3-chome, Musashino, Tokyo, Japan Phone (0422) 53-1111 SALES OFFICE: 15-30, Shimorenjaku 4-chome, Mitaka, Tokyo, Japan Phone (0422) 45-7741
TEAC AMERICA, INC.	7733 Telegraph Road, Montebello, California 90640 Phone: (213) 726-0303
TEAC UK LIMITED	5 Marlin House, Marlins Meadow, The Croxley Centre, Watford, Herts., WD1 8YA, U.K. Phone: 0923-225235
TEAC DEUTSCHLAND GmbH	Bahnstraße 12, 6200 Wiesbaden-Erbenheim, West Germany Tel.: 06121-71580
TEAC CANADA LTD.	340 Brunel Road Mississauga, Ontario L4Z 2C2, Canada Phone: 416-890-8008
TEAC AUSTRALIA PTY., LTD.	106 Bay Street, Port Melbourne Victoria 3207, Australia Phone: 646-1733

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