marantz

Model 5420
Stereo
Cassette Deck

Handbook of Instructions

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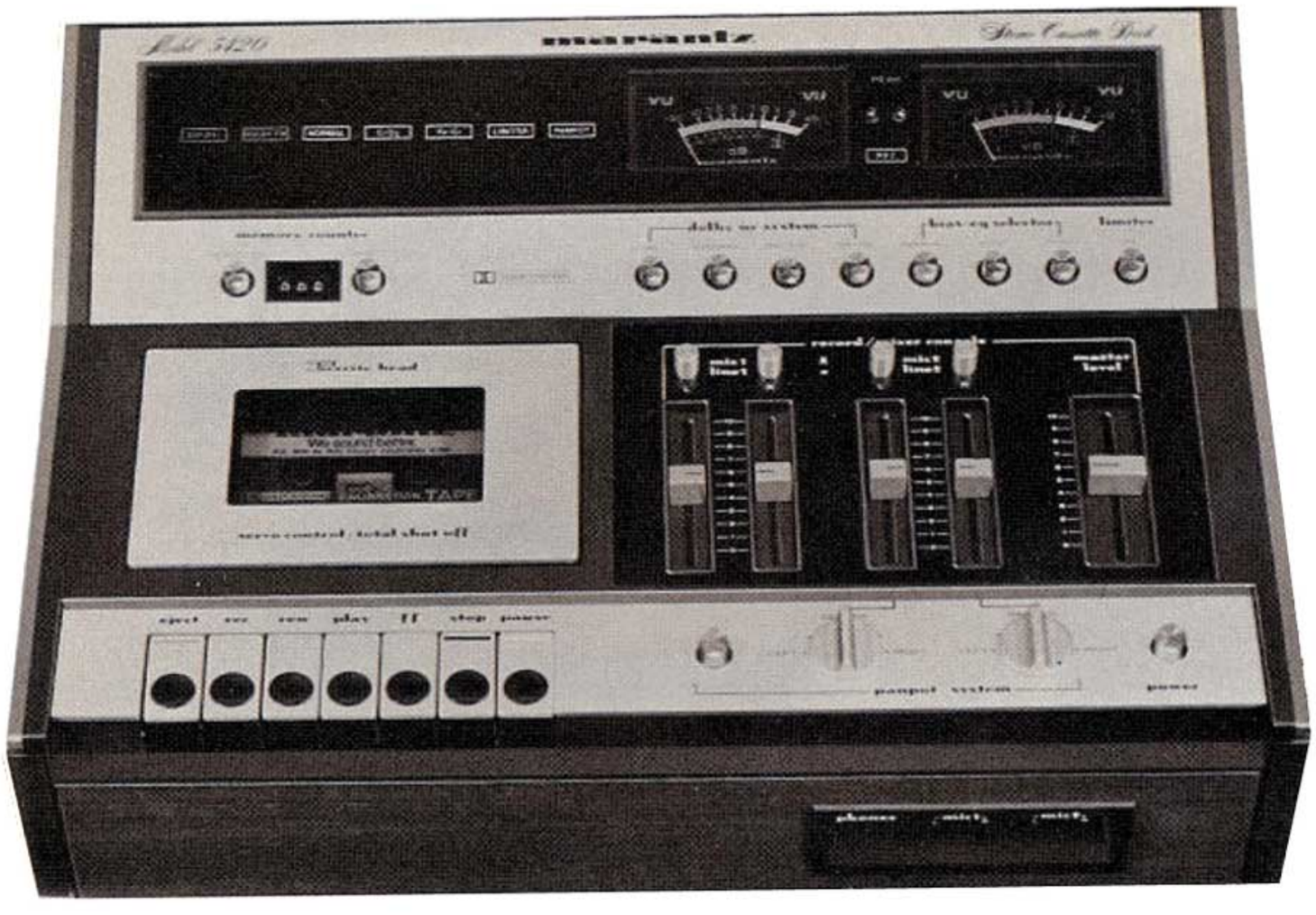

marantz®

Model 5420
Stereo
Cassette Deck

MARANTZ CO., INC. 20525 NORDHOFF STREET, CHATSWORTH, CALIFORNIA 91311
A WHOLLY-OWNED SUBSIDIARY OF SUPERSCOPE INC., CHATSWORTH, CALIFORNIA 91311

ENGLISH TEXT

FOREWORD

To obtain maximum performance and enjoyment from the Model 5420 Stereo Cassette Deck, please study these instructions carefully. Do not plug in or connect this cassette deck until you have read and complied with this handbook of instructions.

This is a universal handbook designed to provide instructions in English, French, and German for all Marantz products sold worldwide.

Your Marantz product has been specially prepared to comply with the household power and safety requirements that exist in your locale. Please check the alphabetical suffix following the serial number of your Marantz product. Refer to the following table to note the differences that exist between your unit and the unit pictured and described in this manual.

A – Operating Voltage: 240 V AC.
C – Operating Voltage: 120 V AC. Unit cannot be converted to operate on other voltages.
E – Operating Voltage: 220 V AC.
N – Operating Voltage: 220 V AC.
P – Operating Voltage: 120 V AC.

Should it become necessary to convert this unit to a different operating voltage, please note that a proper fuse must be substituted for the one currently in the unit.

FOR WARRANTY INFORMATION, CONTACT YOUR LOCAL MARANTZ DISTRIBUTOR.

AFTER UNPACKING

It is advisable to retain all original packing material to prevent damage should you wish to transport or ship the Model 5420 (refer to page 16 for repacking and shipping instructions). Be careful that you do not inadvertently throw away or lose the parts packed with the unit.

Please inspect your Stereo Cassette Deck carefully for any signs of shipping damage. Our very strict quality control and professional pride ensure that each Model 5420 left the factory in perfect condition. If the unit is damaged or fails to operate, immediately notify your dealer. If the unit was shipped to you directly, notify the transportation company without delay. Only you, the consignee, may institute a claim against the carrier for shipping damage. Save the carton and all packing material as evidence of damage for their inspection. If necessary, contact your dealer or, as a last resort, your Marantz importing agent, who will fully cooperate under such circumstances.

ABOUT YOUR MODEL 5420

In choosing the Marantz Model 5420, you have chosen more than just a stereo cassette deck. You have chosen a four-channel input active mixer with panpots, a Dolby Noise Reduction System, and a rugged, reliable, cassette recorder with ferrite heads, all built in a single unit. Even though they share a common chassis, these three building blocks retain the flexibility of separate components. The mixer section and/or the Dolby System can be used on external equipment, such as a reel-to-reel tape deck or public address system, independently of cassette operation. The 5420 also has the circuitry necessary to decode DOLBY FM broadcasts, and special bias and equalization to record on Chromium Dioxide and Ferri-Chrome low noise cassette tapes.

Along with features and versatility, the Model 5420 reflects Marantz' state-of-the-art technology.

The Marantz Company is a wholly-owned subsidiary of Superscope, Incorporated, whose legacy of experience with cassette and reel-to-reel tape decks is unexcelled in the audio industry. Your Model 5420 is thereby assured of providing continuous high-quality performance and long operating life.

QUICK REFERENCE INDEX

Figure 1 shows the location of the main controls and switches on the Model 5420. Listed by each feature is the number of the page where a description about the feature appears.

Before proceeding with connecting your new tape deck, take a few moments to acquaint yourself with some of the features and terminology you will encounter in this book.

Model 5420 Stereo Cassette Deck
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Tape Counter with Memory
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Indicator Lights

Dolby Noise Reduction System
Basic Dolby Process, page 11.
On cassette, page 11.
On FM broadcasts, page 11.
On external tape recorder, page 11.
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Limiter
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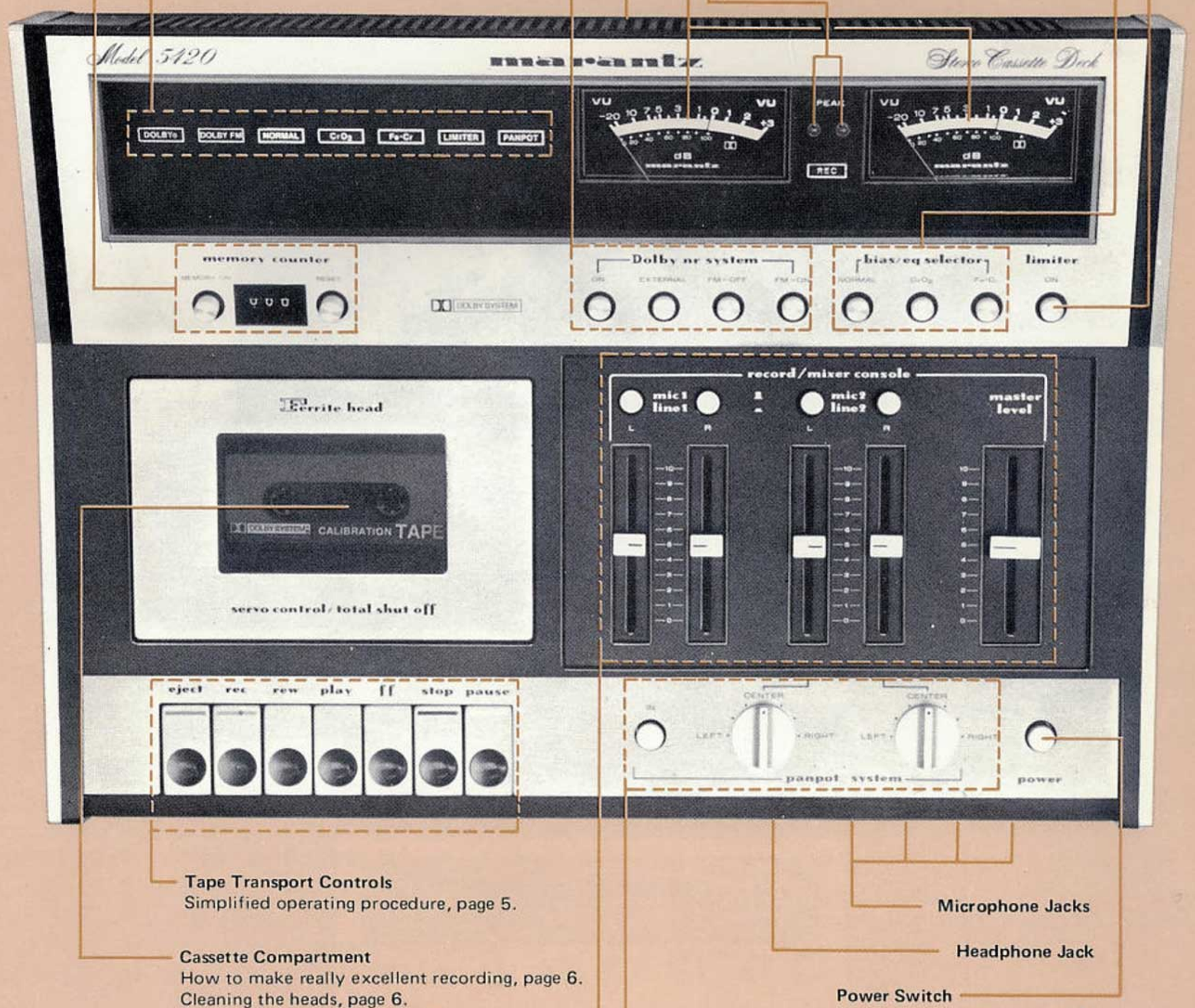
Bias/Equalization Selector
See page 5.

Large VU Meters

Peak Indicators
How to set proper recording levels, page 9.



Tape Transport Controls
Simplified operating procedure, page 5.

Cassette Compartment
How to make really excellent recording, page 6.
Cleaning the heads, page 6.
How to remove the lid, page 7.

Microphone Jacks

Headphone Jack

Power Switch
AC power connection, page 4.

Panpot System
How to use when making cassettes, page 10.
How to use with external equipment, page 10.

Record/Mixer Console
How to use when making cassettes, page 9.
How to use with external equipment, page 10.

Figure 1. Main Controls and Switches

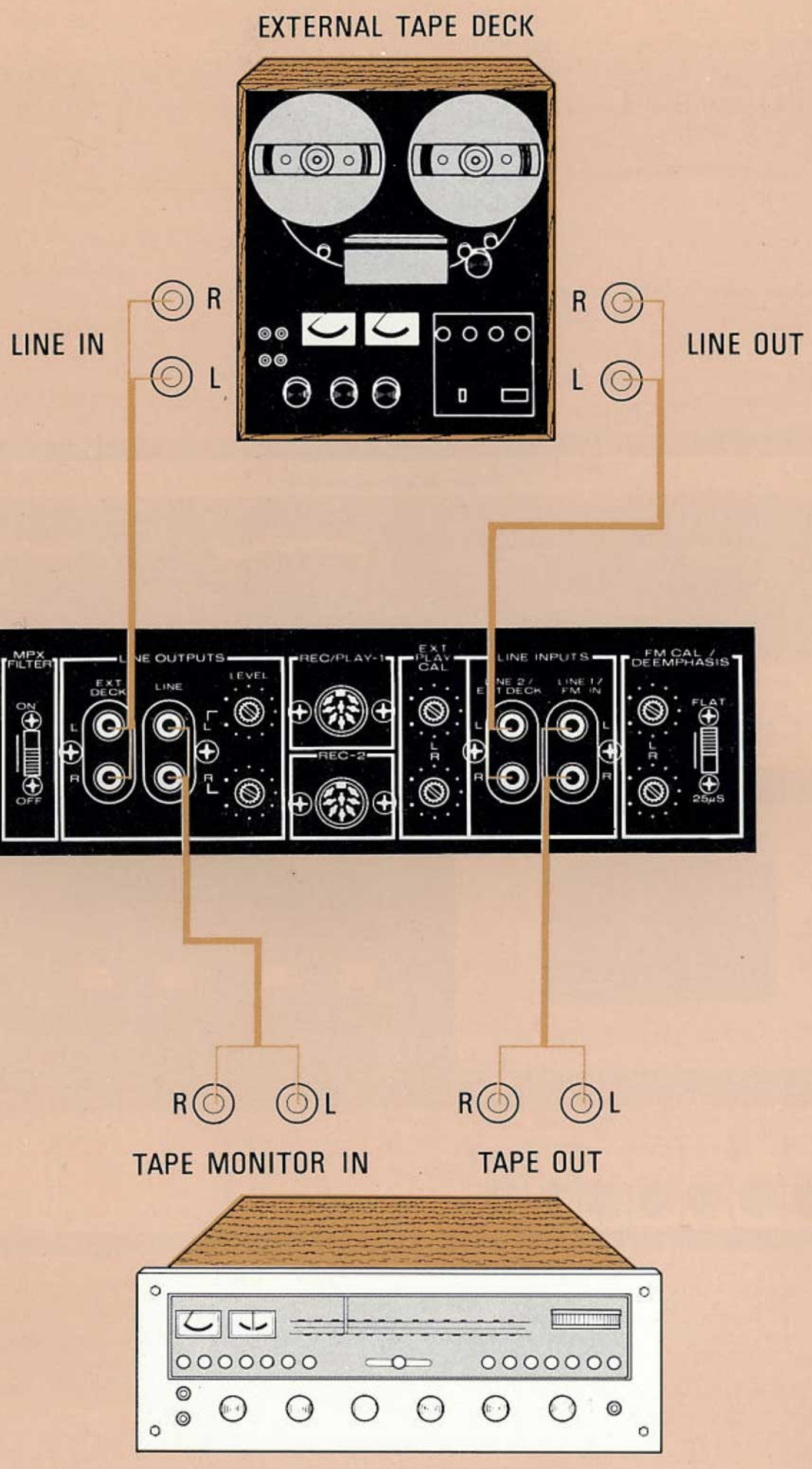


Figure 2. Rear Panel Connection Diagram

CONNECTING THE MODEL 5420

REAR PANEL SIGNAL CONNECTIONS

Figure 2 shows the location of the input and output jacks on the rear panel. These jacks are for "permanent" connections. Front panel jacks and their use will be discussed later.

All connections to the rear panel should be made with the power to the entire system turned off. The rear panel signal connections are arranged in stereo pairs. All signal connections should be made with shielded audio cables. To avoid confusion, connect one cable at a time between the 5420 and the other components of your system. This is the safest way to avoid cross-connecting channels or confusing signal source outputs with inputs. When connecting audio cables, insert the connectors completely into the jacks. Loose connections may cause hum and noise.

The **DOLBY NR SYSTEM** and the **RECORD/MIXER CONSOLE** in the Model 5420 can be used on external equipment independently of cassette operation. For example, if you already own a reel-to-reel tape deck without a Dolby circuit, you can use the Dolby circuit in the Model 5420 to improve the recording quality of your reel-to-reel machine. The Model 5420 is specifically designed to perform this function through a convenient pushbutton switching network. First, however, it is necessary to reconnect your equipment in the set-up procedures outlined in the following section. Once the initial connections between the external deck, 5420, and receiver have been made, future use of the 5420's Dolby and mixer on external equipment will be made far more convenient. If your additional tape deck or recorder is currently connected to the rear panel of your receiver, disconnect it completely. The following section will explain how to connect the Model 5420 into your audio system and how to reconnect your existing tape deck.

LINE 1/FM IN LINE INPUTS

These jacks are the primary line inputs for the Model 5420, and will accept signals from any line level source.

They are also the inputs for the DOLBY FM circuitry in the Model 5420. Therefore, these jacks should be connected to the set of tape output jacks on your receiver, which will supply signals from FM and other audio sources. If you own an audio system comprised of separate components, connect the **LINE 1/FM IN** jacks of the Model 5420 to the tape output jacks of your preamplifier.

LINE OUTPUTS AND OUTPUT LEVEL CONTROLS

The **LINE** outputs are the primary outputs of the Model 5420. Connect the **LINE** outputs to the tape monitor input jacks of your receiver.
Do not connect the Model 5420 to the auxiliary inputs of your receiver.

The **LEVEL** controls located next to the **LINE** outputs determine the volume output of each channel. They operate the same as a volume control, and can be turned with a screwdriver. The purpose of these adjustments is to match the output level of the Model 5420 to the input sensitivity of the tape monitor circuits in your receiver. When the **LEVEL** controls are properly adjusted, the volume through your speakers will remain constant as the tape monitor is switched in and out. Of course, you can't make these adjustments until the system is set up, so for the present time, the **LEVEL** controls should be set approximately one quarter turn above the minimum volume setting.

Now that the Model 5420 is connected to your receiver, connect your additional (external) tape deck as follows:

EXT DECK OUTPUT JACK

The **EXT DECK** output jacks supply audio signals from the Model 5420 directly to the external tape deck's line inputs. Connect as shown in Figure 2. The **EXT DECK** output jacks are not affected by the output **LEVEL** controls.

LINE 2/EXT DECK LINE INPUT JACKS

Like the **LINE 1** inputs, the **LINE 2/EXT DECK** jacks accept signals from any line level source. They are designed to route the output from an external tape deck through the Dolby circuitry in the Model 5420. Connect the line outputs from the external tape recorder directly to the **LINE 2/EXT DECK** jacks on the Model 5420 (see Figure 2).

DIN JACKS

The **REC-1/PLAY** and **REC-2** jacks are DIN-type recorder jacks which permit the use of European five wire recorder cables to connect similarly-equipped components. The **REC-1/PLAY** jack duplicates the function of the **LINE 1/FM IN** and **LINE OUTPUTS** jacks, and may be connected to your preamplifier. The **REC-2** jack duplicates the function of the **LINE 2/EXT DECK** and **EXT DECK** jacks and may be connected to your external tape recorder.

AC POWER SOURCE CONNECTION

With the **POWER** switch set to the OFF (out) position, plug the AC line cord into an AC outlet providing the proper voltage.

CAUTION: DO NOT PLUG THE MODEL 5420 INTO A DC OUTLET, AS SERIOUS DAMAGE WILL OCCUR.

If your receiver has a switched AC outlet on its rear panel, you may find it convenient to plug the Model 5420 into that outlet.

Now that you have connected your Model 5420 to your

receiver and external tape recorder, you are doubtlessly eager to try it out. So, the following section will outline a simplified operating procedure to follow so you can begin recording and listening to your new Stereo Cassette Deck immediately. After becoming familiar with the Stereo Cassette Deck, you may take full advantage of its many features and operating versatility.

OPERATING INSTRUCTIONS

First, set the controls and switches on the Model 5420 as follows:

POWER Switch	OFF (out)
PANPOT Switch	OFF (out)
TAPE TRANSPORT Controls	STOPPED
DOLBY NR SYSTEM Switches	
ON Switch	OFF (out)
EXTERNAL Switch	OFF (out)
FM-OFF Switch	(in)
FM-ON Switch	(out)
BIAS/EQ SELECTOR Switches	Depress button that matches kind of tape used.
LIMITER	OFF (out)
RECORD/MIXER CONSOLE Controls	
All **LEVEL** Controls	Minimum ("0")
All **MIC/LINE** Selectors	**LINE** (in)

After setting the controls and switches, record on a blank cassette as follows:

1. Depress the **POWER** switch. The meters will illuminate, indicating the unit's power is on. If they don't, check to make sure the power cord is plugged in. Turn on the source equipment (receiver, turntable, etc.)
2. Before inserting the cassette, take up the slack of the tape to prevent it from becoming entangled around the capstan. Twist the tape hub inside the cassette with your fingernail or with a pencil.
3. Depress the **EJECT** button fully to open the cassette compartment and raise the cassette holder.
4. Insert the cassette with the desired side for recording up. Close the lid.

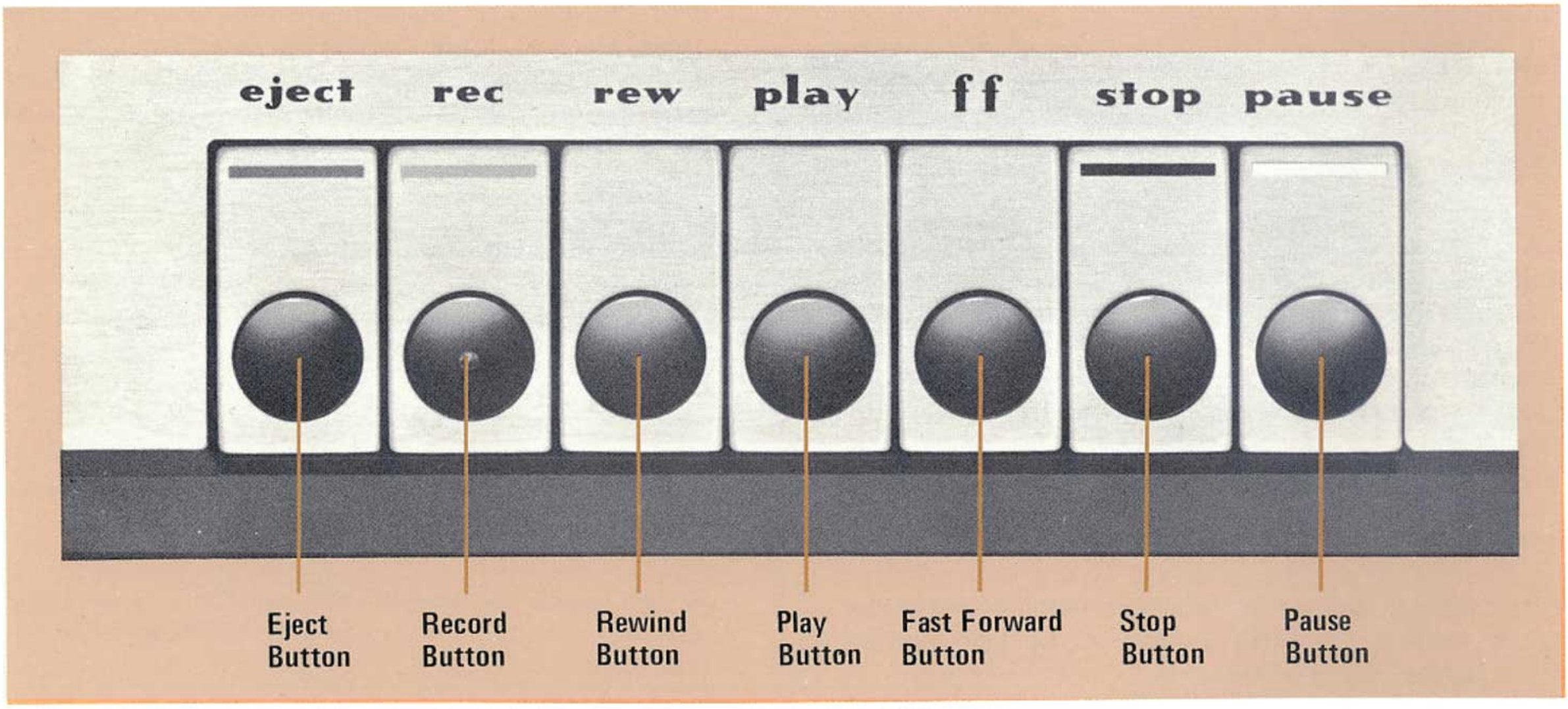


Figure 3. Tape Transport Controls

NOTE: The cassette can only be inserted if the cassette holder is raised.

5. Play the audio signal source (phono, tuner, etc.) with the tape monitor switch on the receiver in the "source" position.
6. Press the **RESET** button on the tape **COUNTER** to reference the beginning of the recording.
7. Place the Model 5420 in the record mode: Depress the record **(REC)** and **PLAY** buttons simultaneously. The **REC** light between the VU meters will illuminate.

NOTE: The smoothest way to engage the record mode is to depress the REC button first. Then, while holding it down, depress the PLAY button.

8. Slide the **MASTER LEVEL** control to its maximum setting **(10)**. All other controls should be set at zero.
9. Gradually increase the left and right **LINE LEVEL** controls while watching the VU meters. Adjust the level controls so that the loudest passages of the program deflect the pointers of the meters as fully as possible with minimum triggering of the **PEAK** level indicators (light emitting diodes).
10. Set the tape monitor switch on the receiver to the "tape" position.

NOTE: If the volume level changes when the tape monitor is switched in, adjust the output LEVEL controls on the rear panel of the 5420. The volume level should remain constant as the tape monitor is switched in and out.

11. When finished recording, reduce the **MASTER LEVEL** control to zero and press the **STOP** button.
12. Rewind the tape by depressing the rewind **(REW)** button. Stop the tape when the **COUNTER** registers zero, or use the MEMORY feature (see page 9).
13. Play back the tape by pressing the **PLAY** button.

The Model 5420 is now playing back the tape you just recorded. The following section will explain how to add more sophistication to your recording technique.

MAKING OPTIMUM CASSETTE RECORDINGS

The Model 5420 Stereo Cassette Deck, augmented by its built-in Dolby Noise Reduction System, is capable of making really excellent recordings. But the quality of recording can also be negatively influenced by some other very important factors. Inferior tape, poorly maintained heads, and improperly set recording levels can spoil your recordings. So that you can realize the full potential of your investment in the Model 5420, the following section will explain a few techniques of skillful recording.

THE TYPE AND BRAND OF TAPE YOU USE

In cassette recording, the type and brand of cassette you use has the greatest influence on the quality of your recordings. Therefore, buy the best cassettes you can. Your Marantz dealer will assist you in selecting a nationally recognized name brand of low-noise, clean-running tape. For best results, use a 60 or 90 minute cassette.

Chromium Dioxide (CrO_2) and Ferri-Chrome (Fe-Cr) tapes provide better fidelity than normal tape. When using these kinds of tape, depress the appropriate **BIAS/EQ SELECTOR** pushswitch on the 5420 to provide the correct bias and equalization to suit the characteristics of the tape.

CLEAN AND DEMAGNETIZED HEADS

The RECORD/PLAYBACK and ERASE heads are the most important parts of the stereo cassette deck. After tape rubs against the heads during record and playback, brown oxide deposits from the tape accumulate on the heads, guides, and pinch roller. Even the best cassette tapes will shed some particles of oxide. The accumulation of this oxide will cause loss of high frequency response, loss of sound volume, intermittent sound drop-out and unsatisfactory results when recording or erasing tape. If your Model 5420 exhibits any of the preceding symptoms, immediately clean the heads. if the oxide is allowed to build up, it may cause the heads to wear out prematurely, causing permanent damage. Therefore, the heads must be kept clean.

The rubber pinch roller on the cassette mechanism provides a simple, visual indication of when to clean the heads. If you can see a stripe of brown oxide around the perimeter of the pinch roller, it is time to clean the entire tape path.

To clean the tape path, use cotton swabs and denatured alcohol (available at any pharmacy).
Please note that common "rubbing alcohol" should not be used because it has a high water content.
Clean the tape heads, capstan, guides, pinch roller – everywhere the tape touches – until no more oxide can be picked up on a clean cotton swab.

The experienced audiophile keeps a bottle of denatured alcohol and a package of cotton swabs next to his cassette

deck and he gives the tape path a thorough cleaning at the beginning of every usage as a matter of habit. This is an excellent practice for assuring cleanliness and the best possible recording conditions. It requires only a minute to do.

Tape heads and guides also become magnetized after a period of use. When this occurs they cause excessive noise and can even partially erase the tape. The tape heads and guides should be demagnetized periodically (about every nine hours of playing time) with a demagnetizer. Instructions are enclosed with the demagnetizer.

CAUTION: BEFORE USING THE DEMAGNETIZER, TURN OFF THE POWER TO THE MODEL 5420.

To gain access to the heads for cleaning and demagnetization,

1. Turn off the power.
2. Depress the **EJECT** button and remove the cassette.
3. Remove the lid to the cassette compartment. To remove the lid, leave it open and gently press down on the left and right corners of the lid near the hinges (see Figure 4). While holding down, pull toward you slightly, then swing it backward, away from you.
4. Reach inside the cassette compartment and push the cassette holder down.
5. Push the **PLAY** button. The heads and pinch roller will protrude into the cassette compartment. The head surfaces may now be inspected.
6. After cleaning and demagnetizing, press the **STOP** button.
7. Replace the lid to the cassette compartment. Insert the hinges as far as they will go with the lid surface straight up and down. Swing the lid toward you about 45 degrees. Push down on the rear corners of the lid while gently pushing against the hinges. When the lid is properly installed it will close and open freely.
8. Depress the **EJECT** button fully to lift the cassette holder.

PROPER RECORDING LEVELS

One of the beauties of music is its dynamic range, in other words, the contrast of very soft to very loud passages. To capture this contrast on tape requires that the recording levels be set so that the loudest passages you intend to record don't saturate the tape and cause distortion. Yet, the recording levels should't be set too low, because the soft passages would simply disappear in the residual noise.

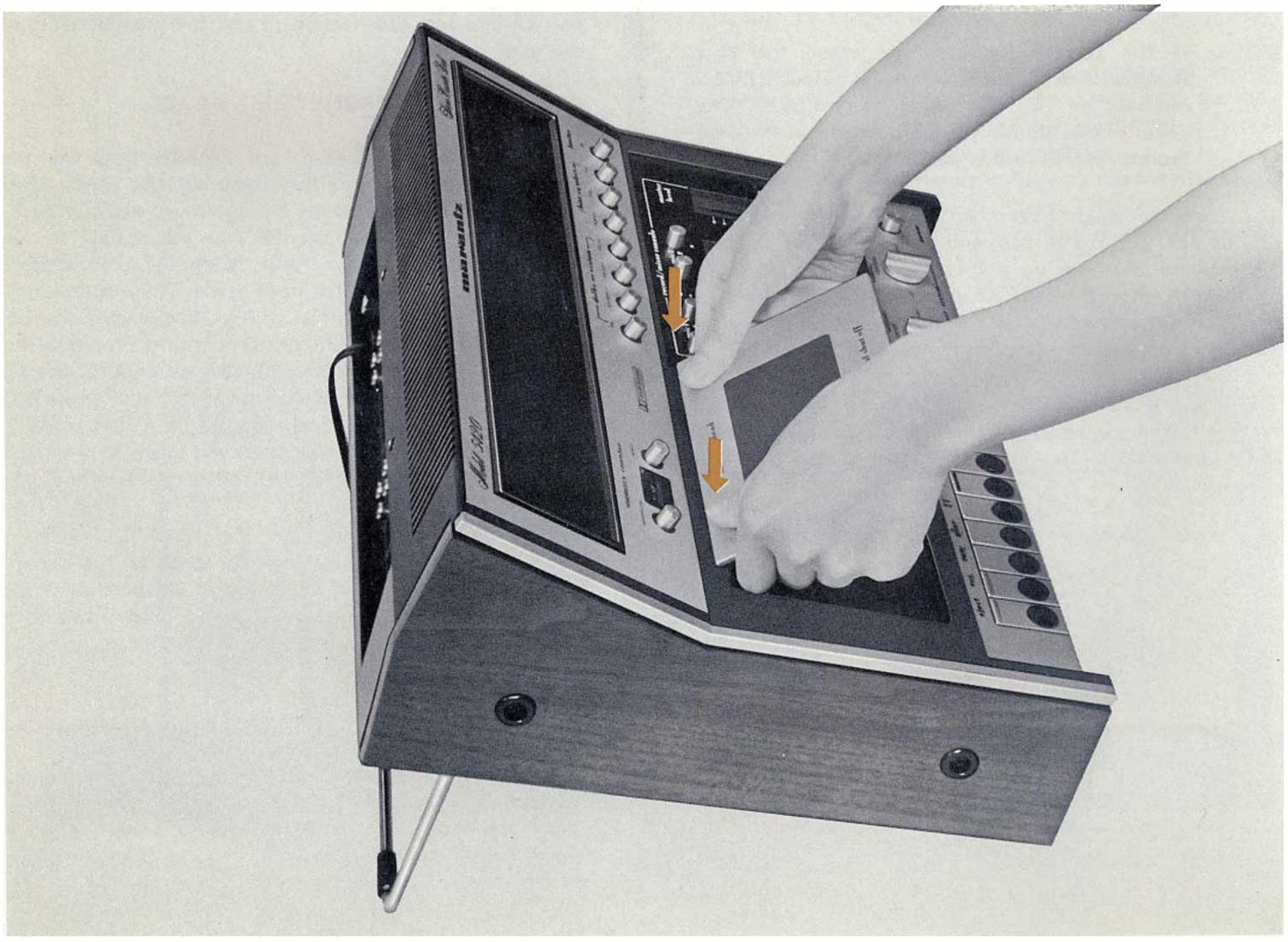


Figure 4. Cassette Compartment Lid Removal

The proper technique is to anticipate the loudest section of the music you want to record and set the recording levels using the VU meters as a guide before any recording actually takes place.

If, for example, you are recording from a phonograph record, you should at the outset find the loudest section of the record. To set the recording levels on the 5420, insert the cassette, depress the **PAUSE** button and then place the Model 5420 in the record mode. This technique allows the recording level to be checked and adjusted without actually recording anything on the tape. Once the levels are set for the loudest portion of the music, leave them where they are. Start the phonograph record over at the beginning and release the **PAUSE** button to commence recording.

NOTE: Most cassette manufacturers splice a few inches of clear leader tape to the beginning and end of the magnetic recording tape. The leader tape cannot be recorded, and it usually takes about six seconds to pass by the heads when the tape is played from the beginning.

When taking up the slack in the cassette before inserting it for recording, advance the tape so that the spliced area of the tape is just ready to pass the recording head (see Figure 5). By knowing exactly where the recordable tape begins, you can assure that the beginning of the program will be recorded.

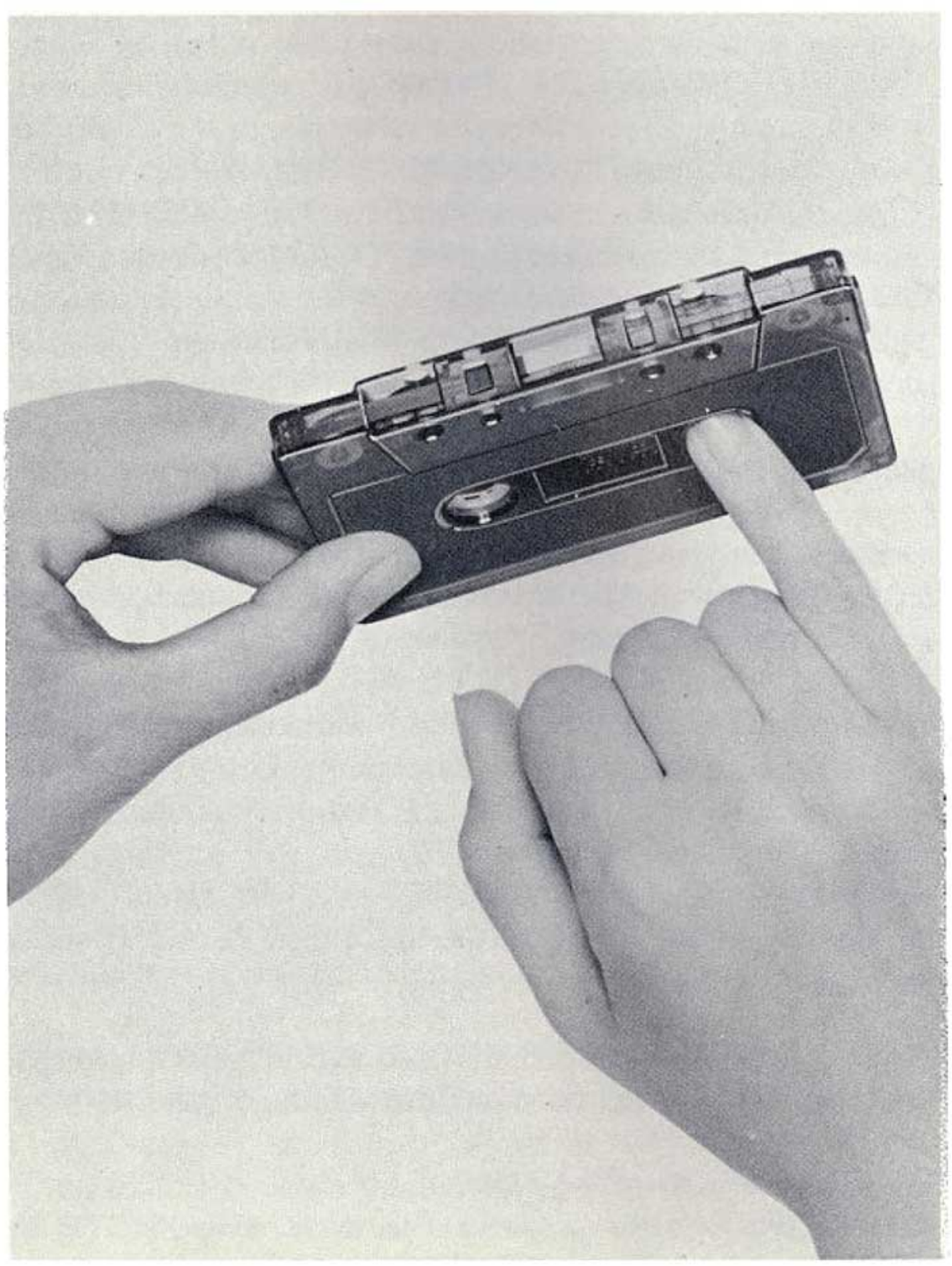


Figure 5. Cassette Preparation

FRONT PANEL FEATURES

VU METERS AND PEAK INDICATORS

Two large VU meters in the Model 5420 monitor the relative recording and playback level of each channel. All meters are "time sensitive" devices. In other words, it takes a short amount of time for the meter to respond to a quickly applied signal. Even though the meter needle and other moving parts are very lightweight, they still have some inertia and are relatively sluggish when compared to the instantaneous nature of audio peaks. The meters, then, indicate an average value reading with which to monitor the average level and balance of the two channels.

The Model 5420 is also equipped with separate left and right channel **PEAK** indicators which, when used in conjunction with the VU meters, are a valuable aid to proper recording level adjustment. The **PEAK** indicators, unlike the meters, react instantaneously to audio transients during recording. Each indicator illuminates if an audio transient strong enough to cause tape saturation (distortion) occurs. If the **PEAK** indicators flash repeatedly, the recording level should be reduced.

PEAK LIMITER

The peak **LIMITER**, when in use, automatically reduces the record level during sudden volume surges. By preventing the peak recording level from exceeding 0 VU, the peak **LIMITER** minimizes distortion.

The **LIMITER** is not the same as an A.L.C. (Automatic Level Control) circuit; it is designed rather as a safeguard against high input signals that you had not anticipated when you adjusted the record levels initially. The **LIMITER** is also advantageous when recording sources such as radio programs or live music whose peak volume levels are sometimes unpredictable.

If the recording levels were set much too high and the **LIMITER** were activated, it would tend to "compress" the dynamic range of the music. In other words, not only the peaks, but all loud passages would be reduced in volume. Therefore, the recording levels should be set before the **LIMITER** is turned on.

PHONES JACK

This jack accepts headphones utilizing a standard three conductor phone plug. It is internally connected to the output circuitry to provide adequate sound level with popular low impedance stereo headphones. Two or more sets of headphones may be used with the aid of "Y" connectors (available at your dealer). However, output level will drop as additional headphones are added.

FOLD-OUT LEG

Underneath the Model 5420 is a hinged fold-out leg. When it is folded out, the Model 5420 will sit at an angle, allowing the meters to be easily seen from across the room. This also makes the controls easier to operate when the 5420 is placed on a bookshelf.

MEMORY COUNTER

The **MEMORY COUNTER** is used for precise program relocation, whether at the beginning of the side or far into the recorded tape.

1. Locate a desired starting point and depress the **RESET** button to register this starting point. ("000" shown on the Tape Counter).
2. Depress the **MEMORY ON** button.
3. Play (or record) the tape.
4. Depress the rewind (**REW**) button to rewind the tape. The tape motion stops and the rewind button releases automatically when the original starting point is reached. Actually, the tape stops at "999", one count before "000" to avoid missing the starting point of the program.

TOTAL SHUT OFF

The TOTAL SHUT OFF feature will automatically disengage the tape transport when the end of the tape is reached in any transport mode (play, rewind, etc.). The TOTAL SHUT OFF feature will also activate if the tape should jam.

RECORD/MIXER CONSOLE

The **RECORD/MIXER CONSOLE** mixes four separate inputs into a stereo output which can be recorded by the Model 5420 or applied to external equipment.

The **RECORD/MIXER CONSOLE** consists of four independently selectable input channels, four straight-line level controls, and a stereo **MASTER LEVEL** control. Each input channel can select between a MIC or LINE input signal by means of a **MIC/LINE** pushswitch. When the pushswitch is released, the input channel receives signals from its corresponding **MIC** input on the front panel.

NOTE: When microphones are selected for recording, do not monitor through speakers, as this will cause howling (acoustic feedback) which could damage your audio equipment. Use headphones for monitoring.

The level of the selected source for each input channel is controlled by a straight-line level control, or "slider." The four input sliders combine their audio signals in a stereo mix in the proportions chosen by you, the recordist. They assign the audio inputs to the left and right stereo outputs of the mixer as indicated by the letters **L** and **R** above each slider slot.

Printed between each pair of input sliders are the numbers **0** through **10**. These numbers provide reference points at which to set the sliders if you wish to duplicate a particular mixer setting. This reference is especially useful during live recording, where the levels may have to be altered as the music progresses and then reset to their original positions for a second take.

The **MASTER LEVEL** slider adjusts the total stereo output level of the **RECORD/MIXER CONSOLE**. Its purpose is to control the audio level of the entire mixture of the four input channels without changing the input slider positions and without affecting their proportionate audio levels. If, for instance, the four input levels are mixed in the exact proportions you want, but the VU meters register too high a reading, reduce the **MASTER LEVEL** accordingly.

The **MASTER LEVEL** slider can be used to "fade out" or "fade in". For example, when making a cassette recording of a phonograph record, you may wish to fade out the music gradually just before the end of the tape is reached. This way, you will avoid the abrupt cut-off of sound that occurs during playback when the cassette runs out of tape. Likewise, the music could be "faded in" at the beginning of the cassette.

Another technique called "cross-fading" involves reducing the levels of one stereo source while simultaneously increasing the level of another. The **MASTER LEVEL** in this case remains stationary. This technique maintains the sound level when changing from one sound source to another. Experimentation and practice will reveal other mixing techniques.

PANPOT SYSTEM

The Model 5420 has two panpots. Each panpot is like the stereo balance control on your receiver. It shifts the sound from one side of the stereo image to the other. In the case of the Model 5420, the panpot assigns a monophonic audio source to be placed in an existing stereo image — either left, right or anywhere in between.

To activate the **PANPOT SYSTEM**, depress the **PANPOTS** pushswitch (IN). For normal stereo recording, leave the **PANPOTS** switch out. When the pushswitch is in, the signal sources connected to the **LINE 2/EXT DECK** input jacks (or **MIC 2, L** and **R**) become pannable. Instead of being assigned exclusively to the left and right outputs of the mixer, these two sources can now be independently placed anywhere in the stereo image.

For example, to add narration while recording a stereo cassette, connect the narrator's microphone to the **MIC 2 L** (or **R**) jack. The program to be narrated should be applied to the **LINE 1 INPUT** jacks. Use the **PANPOT SYSTEM** to place the microphone in the **CENTER** of the stereo image. When played, the narration will be heard from both loudspeakers.

The panpot can be moved while the recording is taking place. This will give the illusion that the narrator is moving across from one speaker to the other.

USING THE MIXER AND PANPOTS WITH EXTERNAL EQUIPMENT

The **RECORD/MIXER CONSOLE** and the **PANPOT SYSTEM** can be used with a reel-to-reel recorder, or with a public address sytem, or with any other external equipment independently of cassette operation.

All the mixing and panning controls are used exactly the same as when recording a cassette. The exception, of course, is that a cassette is not recorded.

The external equipment to which the mixture is applied may be connected to either set of output jacks.

To activate the **RECORD/MIXER CONSOLE**, first the **REC** button must be depressed. However, this button cannot be depressed unless the record interlock device inside the cassette compartment is pushed back by either an inserted cassette or by hand. The easiest method is to insert a cassette. Then, push the **PAUSE** button and place the Model 5420 in the record mode. As long as the tape doesn't move, it won't be recorded.

NOTE: If the external equipment is connected to the LINE 2 output jacks, it is only necessary to press the REC button to apply the mixer.

Next, in the **DOLBY NR SYSTEM** switch group, push the **EXTERNAL** button.
If you wish to record a cassette at the same time, place the tape transport mechanism in the record mode completely by depressing both the **REC** and **PLAY** pushbuttons simultaneously.

NOTE: When using the MIXER and PANPOTS to record on an external tape deck, the input level controls should be adjusted so that its VU meters will register the same readings as the VU meters on the 5420. Then, it is only necessary to watch the meters on the 5420 to set proper recording levels while mixing. An accurate method for matching the levels of the two machines is explained in the Dolby Calibration section. See page 11.

DOLBY SYSTEM

BASIC DOLBY PROCESS

The Dolby system increases the level of low volume mid- and high-frequency signals during recording and reduces the level of these signals by an identical amount during playback. As a result, the playback signal is identical to the original source signal, but the level of background noise generated by the tape recorder is greatly reduced. A Dolbyized FM broadcast is subjected to the first phase of the noise reduction process before being transmitted. When these signals pass through the Dolby playback circuitry, the mid- and high-frequency noise is greatly reduced.

The Dolby Noise Reduction System in the Model 5420 can be used for recording, or for playing back Dolbyized cassettes. The very same Dolby circuitry can be used with an external tape recorder not having its own Dolby System.

The following section will explain how to operate the Dolby Noise Reduction System in the 5420 to process cassettes, FM broadcasts, and external sources.

CASSETTES

The Dolby Noise Reduction circuit in the Model 5420 is designed for maximum convenience when recording or playing back a cassette. The calibration levels have been internally preset at the factory, so the only adjustment to make is that for recording level.

The procedure for Dolby recording and playback is identical to that for non-Dolby except that the **DOLBY NR SYSTEM ON** pushswitch is depressed after the recording levels are set.

DOLBY FM BROADCASTS

Dolbyized FM broadcasts contain Dolbyized audio information to which a special pre-emphasis is applied for the purpose of improving the noise reduction process. The pre-emphasis time constant (25 μS) is different from that used with non-Dolbyized broadcasts. To properly recover the original program material, a complementary time constant at the receiver is required. A 25 microsecond FM de-emphasis circuit is built into the Marantz Model 112, 125, and 150 stereo FM tuners and should be activated when recording or listening to Dolby FM broadcasts through your Model 5420. If your present tuner does not have such a circuit, set the **FM DE-EMPHASIS** switch on the rear panel of the Model 5420 to **25 μS** to activate the corrective network.

NOTE: If you are using the de-emphasis circuit built into the tuner, leave the FM DE-EMPHASIS switch on the Model 5420 at "FLAT". Do not use both de-emphasis circuits simultaneously.

To listen to a Dolbyized FM broadcast, proceed as follows:

1. The tuner or receiver should be connected to the **LINE 1/FM IN** jacks – never to the **LINE 2/EXT DECK** jacks.
2. Apply the proper de-emphasis as outlined above.
3. Depress the **DOLBY NR SYSTEM "ON"** pushswitch.
4. Depress the **FM-ON** pushswitch.

NOTE: The RECORD/MIXER CONSOLE becomes ineffective when the FM-ON pushswitch is depressed.

5. With a cassette inserted, depress only the **REC** button on the tape transport. Do not depress the **PLAY** pushbutton unless you want to simultaneously record the FM program on cassette.
6. The Dolby FM calibration levels have been preadjusted at the factory and should not normally need to be readjusted when used with the Marantz tuners and receivers equipped with "DOLBY FM" pushswitches. However, when used with receivers or tuners not so equipped, FM calibration will be required. For this purpose, **FM CAL** controls are provided on the rear panel. The controls should be adjusted so that the Dolby reference tone transmitted by the FM station at the beginning of a Dolby broadcast registers DD on the VU meters. Once the levels are set, they do not need to be readjusted unless a different tuner or receiver is connected.

The decoded Dolby FM program can be monitored through the amplifier system. If you are recording a cassette at the same time, the cassette will be Dolby encoded to obtain the maximum effect from the noise reduction process. Likewise, a Dolby-encoded recording of the FM broadcast can be made on the reel-to-reel deck connected to the **EXT DECK OUTPUT** jacks, provided the record calibration procedure has first been performed on the reel-to-reel deck. See "CALIBRATION", page 11.

EXTERNAL TAPE RECORDER

Like the **MIXER CONSOLE** and **PANPOT SYSTEM**, the Dolby system in the Model 5420 can be used as a Dolby encoder or decoder for an external tape deck not equipped with its own Dolby circuits. Because of the dissimilar playback level characteristics of various tape recorders, **EXT PLAY CAL** controls are provided on the Model 5420. The **EXT PLAY CAL** controls determine the input sensitivity of the Dolby circuit, when playing back a Dolbyized program from the external unit.

It is necessary to adjust the input and output level controls of the external tape deck and the rear panel **EXT PLAY CAL** controls on the Model 5420 when using the Dolby system. The following section will outline calibration, recording and playback procedures.

CALIBRATION

If you haven't already done so, obtain a Dolby System Calibration Tape Cassette from your Marantz dealer. The tape is prerecorded with a 400 Hz tone at the specified Dolby level and is used for setting the input and output levels of your external tape deck and the **EXT PLAY CAL**

levels on your Model 5420. Use and store the calibration tape carefully to avoid accidental erasure. For example, do not store the calibration tape on top of your power amplifier, because the magnetic fields produced by the transformer in the amplifier could partially erase the tape. (The same holds true for any cassette tape!) The external tape recorder should be connected directly to the rear panel as outlined in "CONNECTING THE MODEL 5420," page 4.

FOR RECORDERS WITH THREE HEADS

Set the TAPE MONITOR SWITCH on your receiver to "TAPE".

NOTE: **The Dolby System cannot be used on an external deck having an A.L.C. (Automatic Level Control system). The external deck must have adjustable record level controls.**

1. Depress the **DOLBY NR SYSTEM "ON"** pushswitch.
2. Depress the **FM-OFF** pushswitch.
3. Release the **EXTERNAL** pushswitch to the out ("internal") position.
4. Depress the **NORMAL BIAS/EQ** pushswitch.
5. Load the Dolby Calibration cassette into the Model 5420 and play it. The VU meters will register DO (±1 dB).
6. Turn on the external tape deck. Thread the tape to be recorded.
7. Set the monitor switches on the external deck to "Source", and in Record Mode, adjust the VU meters on the external deck register "0".
8. Set the Monitor switches to "tape," and begin recording. Adjust the output levels so that the VU meters register DO. After the output levels are set, record about 30 seconds of the tone. Stop the tape on both tape decks.
9. Proceed to "FOR ALL RECORDERS".

NOTE: **The above procedure for calibration may not necessarily be compatible with the Dolby NR circuits in different recorders or systems. For universal compatibility, Marantz offers a standard reel-to-reel alignment tape which is available at your local Marantz dealer.**

To calibrate the output level controls of your external tape deck using the reel-to-reel calibration tape,

1. Play back the calibration tape on the external tape deck (do not perform steps 7 through 9 above), adjusting playback level controls to provide "0" VU on external deck. Remove calibration tape.
2. Load the external deck with blank tape and place in record mode with its monitor switch set to "tape".
3. With signal from the 5420 as in step 5 above, adjust record level controls of external deck for "0" VU on its VU meters.
4. Record approximately 30 seconds of the tone, and stop both decks.
5. Proceed to "FOR ALL RECORDERS".

FOR RECORDERS WITH TWO HEADS

1. Follow steps 1–6 of "FOR RECORDERS WITH THREE HEADS".
2. Place the external deck in record mode, and adjust its record level controls for a VU meter indication of 0 VU. Record about 30 seconds of the tone.
3. Rewind and play back the tape you just recorded.
4. Observe the VU meters again. If they register 0 VU, proceed to "FOR ALL RECORDERS."
5. If the meters indicate other than 0 VU, readjustment of the record level controls is necessary, as follows. The object is to adjust the external deck's record level controls so the playback level achieved indicates 0 VU.
   A. If the meter indication is more than 0 VU, repeat steps 2 through 5, but decrease the record level in step 2 to slightly below 0 VU.
   B. If the meter indication is less than 0 VU, repeat steps 2 through 5, but increase the record level in step 2 to slightly above 0 VU.

FOR ALL RECORDERS

1. Rewind and remove the Dolby Calibration cassette from the Model 5420.
2. Depress the **EXTERNAL** pushswitch on the 5420.
3. Rewind the tape on the external deck to the beginning of the tone recording, and play it back.
4. With a screwdriver, adjust the left and right **EXT PLAY CAL** controls on the rear panel of the Model 5420 so that the VU meters register DO. Calibration is complete.

IMPORTANT: **After the correct calibration level has been achieved on the VU meters, DO NOT change the external recorder's record or playback level controls or the 5420's EXT PLAY CAL controls. Doing so will necessitate repeating the Dolby calibration procedure.**

HOW OFTEN CALIBRATION IS NECESSARY

It is necessary to check the Dolby playback calibration to suit each source being played. When recording on tape, recalibrating the entire system is required whenever a change in tape speed has been made or whenever a different type or brand of tape is used.

You may wish to record about 30 seconds of the 400 Hz tone onto the beginning of every tape that will be used for Dolby-processed recording on your external deck. By using this method, you can check (and, if necessary, adjust) the **EXT PLAY CAL** settings without having to fumble with a separate alignment tape.

Since the calibration is extremely stable and should not have to be repeated (except to periodically check it), we suggest that you mark the settings of your tape recorder's output level controls with a felt-tipped pen. Doing so will enable you to easily reset the controls if they are inadvertently moved.

RECORDING

To record with Dolby on your external tape deck, proceed as follows:

1. Depress the **REC** button on the 5420. (Remember that a cassette must be inserted before the button will go down.)
2. Depress the **DOLBY NR SYSTEM "ON"** pushswitch.
3. Depress the **FM-OFF** pushswitch.
4. Depress the **EXTERNAL** pushswitch.
5. To set the recording levels, use the controls on the **RECORD/MIXER CONSOLE** and the VU meters on the 5420. As stated before, do not change the positions of the level controls on the external deck.
6. Input signals can be Dolby recorded through all the input terminals (**MIC 1/LINE 1, MIC 2/LINE 2**). The **PANPOT SYSTEM** may also be used.

CAUTION: **If the output of the external tape recorder is connected to the LINE 2/EXT DECK jacks, either reduce the LINE 2 sliders on the RECORD/MIXER CONSOLE to 0, or switch the MIC/LINE 2 selectors to MIC. Otherwise, the external tape deck will be forced to record its own output, causing feedback oscillations.**

It is possible to record with Dolby on both the Model 5420 and the external tape deck simultaneously. In step 1 of the "RECORDING" procedures, above, simply place the Model 5420 in the record mode.

It is possible to copy a Dolby encoded cassette tape on your external deck so that the external copy is also Dolbyized. Proceed as follows:

1. Depress the **DOLBY NR SYSTEM "ON"** switch.
2. Depress the **FM-ON** pushswitch.
3. **Release the EXTERNAL pushswitch.**
4. Play the cassette and record on the external deck.

This procedure allows simultaneous listening to the decoded cassette via the 5420 **LINE OUTPUT** jacks.

PLAYING

To play back a Dolbyized tape from an external tape deck, proceed as follows:

1. Press the **STOP** button on the Model 5420's tape transport to release the **REC** button.
2. Depress the **DOLBY NR SYSTEM "ON"** pushswitch.
3. Depress the **EXTERNAL** pushswitch.
4. Depress the **FM-OFF** pushswitch.
5. Play the tape on the external deck.

MULTIPLEX FILTER

The rear panel **MPX FILTER** switch activates a high filter which is specially designed to block the high frequency multiplex pilot and subcarrier signals which are present in stereo FM broadcasts. Although these pilot and subcarrier signals are outside the human hearing range, they can inhibit the action of the noise reduction circuit when making Dolby encoded recordings of standard FM stereo broadcasts.

Normally, it is the job of the tuner or receiver to filter out these undesired signals. Most high quality turner sections already provide sufficient (40 dB) pilot and subcarrier rejection. In fact, **with all Marantz tuners and receivers, use of the MPX FILTER is unnecessary.** However, to ensure correct operation of the noise reduction circuitry when used with other brands of tuners that may not have sufficient pilot and subcarrier rejection, the **MPX FILTER** is provided.

If you are using a non-Marantz tuner, and if the Dolby circuit seems to have no effect when recording from FM stereo, then activate the **MPX FILTER**. The filter will then block the high frequency interference and allow the Dolby circuitry to operate as designed.

TECHNICAL SPECIFICATIONS

Signal to Noise Ratio
- DOLBY NR OFF
  - with Fe-Cr or CrO_2 tape 50dB
  - with standard tape 48dB
- DOLBY NR ON improves S/N ratio by 10dB

Total Harmonic Distortion 2%

Frequency Response
- with Ferri-Chrome tape ..... 30 Hz to 17 kHz ± 3 dB
- with CrO_2 tape ..... 30 Hz to 16 kHz ± 3 dB
- with standard tape ..... 45 Hz to 14 kHz ± 3 dB

Wow and Flutter ..... 0.07% W.R.M.S.

Input Impedance
- Mic 10KΩ
- Line 68KΩ

Input Sensitivity
- Mic ..... 0.25mV (–70dB)
- Line ..... 70mV (–21dB)

Line Output Level ..... 900mV (+1dB)

Line Output Impedance 6KΩ

Headphones Output Impedance 8Ω

GENERAL

Power Requirements ..... 220V∿, 50Hz
(This unit can be converted by a qualified technician to operate on 110/120/240V∿, 50/60Hz.)

Power Consumption ..... 25 Watt

Dimensions:
- Width ..... 17-5/16 inches
- Height ..... 6-1/2 inches
- Depth ..... 12-3/4 inches

Weight:
- Model 5420 Only ..... 19 pounds
- Packed for Shipment ..... 24 pounds

MAINTENANCE

CLEANING

The satin gold anodized finish of the aluminum front panel and the smoked plexiglas window will last indefinitely with proper care and cleaning. NEVER use scouring pads, steel wool, scouring powders, or harsh chemical agents, such as lye solution. These will mar the finish. Clean with a soft, lint-free cloth or cotton swab slightly dampened with a mild solution of detergent and water.

IN CASE OF DIFFICULTY

If your set is not operating properly, check the following points:

1. Tape not running.
   - Improper connection of power cord.
   - **POWER** switch in **OFF** position.
   - Defective cassette.
2. Record button will not go down.
   - No cassette inserted.
   - No erasure prevention tab on cassette.
3. Tape runs but no sound.
   - Tape not recorded.
   - Improper or incorrect connection of amplifier or speaker.
   - Volume control of amplifier is in MIN position.
   - Amplifier select switch not in TAPE position.
   - **DOLBY NR SYSTEM** switch in **EXTERNAL** position.
4. Level meter is dead during recording (no recording).
   - **MIC/LINE** select switch not in correct position.
   - **DOLBY NR SYSTEM** switch in **FM-ON** position.
5. Distortion in sound.
   - Record level is too high.
6. Wow in sound
   - Tape head is dirty.
   - Pinch-roller (or capstan) is dirty.
   - Defective tape (warped or stretched tape).
   - Tape is not wound neatly or it is wound too tight.
   - Defective cassette with excessive tape drag.
7. Excessive noise.
   - Tape head requires demagnetization.
   - Defective tape.
8. Hum in sound.
   - Improper connection of shielded cable.
   - AC magnetic field from power transformer of external equipment is in close proximity to tape head.

REPAIRS

Only the most competent and qualified service technicians should be allowed to service the Model 5420. The Marantz Company and its factory-trained warranty station personnel have the knowledge and special equipment needed for repair and calibration of this precision instrument.

In the event of difficulty, refer to the list of Authorized Marantz Service Stations packed with the Model 5420 or write directly to the location listed below for the name and address of the Marantz authorized service station nearest your home or business. Please include the model and serial number of your unit together with a full description of what you feel is abnormal in its behavior.

Marantz Company, Inc.
National Service Dept.
P.O. Box 577
Chatsworth, CA 91311
U.S.A.

Superscope Canada, Ltd.
3710 Nashua Drive
Mississauga, Ontario
Canada L4V1M5

Superscope Europe, S.A.
Boite Postale 4
430 avenue Louise
1050 Bruxelles (Belgique)

Superscope GmbH
Max Planckstrasse 22
D-6079 Sprendlingen
West Deutschland

Marantz France
18, Rue de la Felicite
75017 Paris, France

REPACKING FOR SHIPMENT

Should it become necessary to repack your Model 5420 for shipment to the factory, to an authorized service station, or elsewhere, please observe the following precautions:

a. Pack the unit carefully, using the original material as shown in Figure 6.
   PLEASE NOTE that if you have discarded, lost, or damaged the packing material, new packing material may be obtained by writing to the **Marantz Technical Services Department.** The carton, its fillers, and packing instructions will be returned to you at a nominal charge.
b. Ship via a reputable carrier (do not use Parcel Post) and obtain a shipping receipt from the carrier.
c. Insure the unit for its full value.
d. Be sure to include your return address on the shipping label.

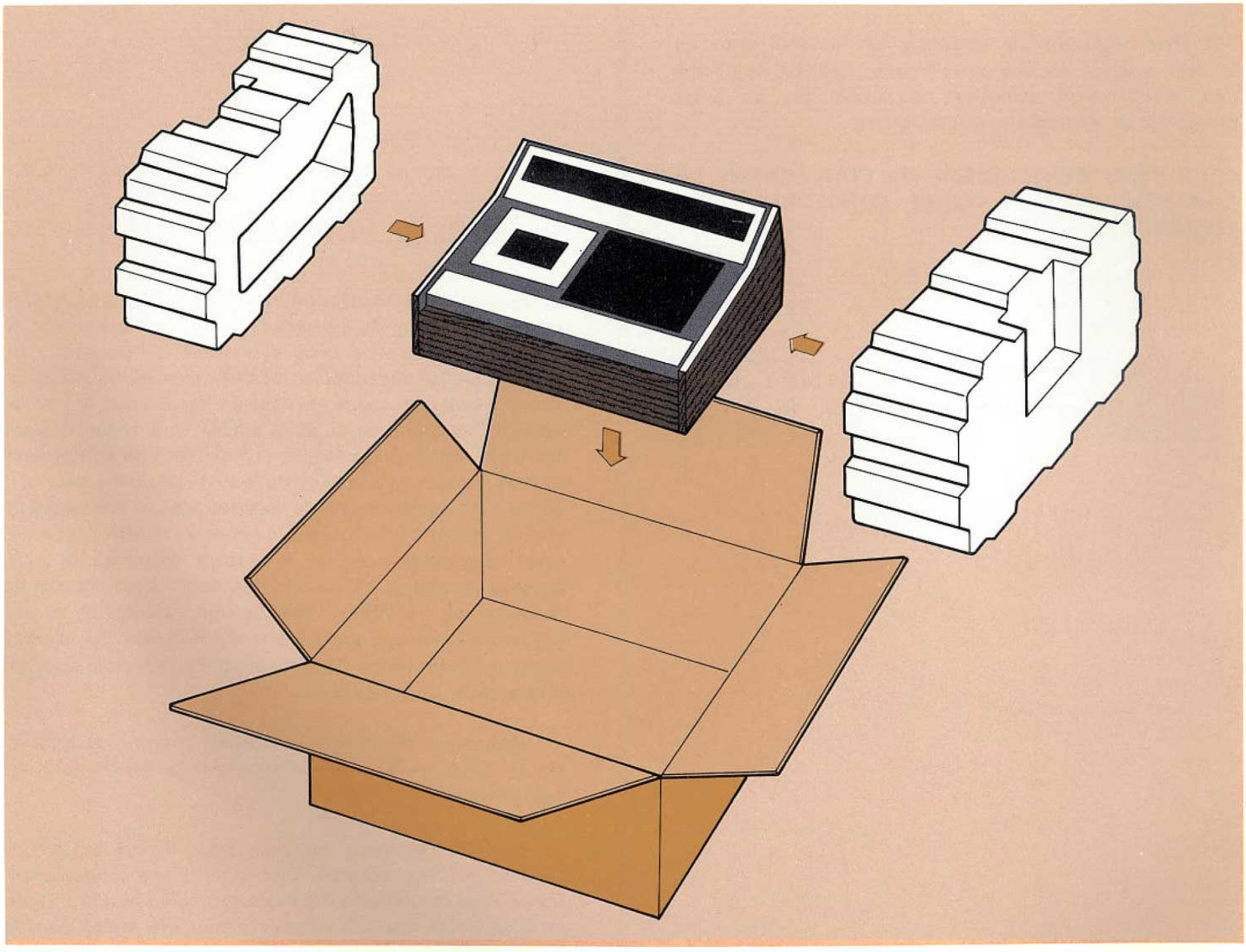


Figure 6. Packing Instructions