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TDR-2400
Double Auto Reverse Cassette Deck
with Remote Control, Dolby B/C NR and Dolby HX Pro
Owner's Manual

CARVER



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 of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

Safety Instructions

1. Read Instructions — All the safety and operation instructions should be read before the Carver Component is operated.

2. Retain Instructions — The safety and operating instructions should be kept for future reference.

3. Heed Warnings — All warnings on the Component and in these operating instructions should be followed.

4. Follow Instructions — All operating and other instructions should be followed.

5. Water and Moisture — The Component should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.

6. Ventilation — The Component should be situated so that its location or position does not interfere with its proper ventilation. For example, the Component should not be situated on a bed, sofa, rug, or similar surface that may block any ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through ventilation openings.

7. Heat — The Component should be situated away from heat sources such as radiators, or other devices which produce heat.

8. Power Sources — The Component should be connected to a power supply only of the type described in these operation instructions or as marked on the Component.

9. Power Cord Protection — Power-supply cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit the Component.

10. Cleaning — The Component should be cleaned only as recommended in this manual.

11. Non-use Periods — The power cord of the Component should be unplugged from the outlet when unused for a long period of time.

12. Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the Component.

13. Damage Requiring Service — The Component should be serviced only by qualified service personnel when:

A. The power-supply cord or the plug has been damaged; or

B. Objects have fallen, or liquid has spilled into the Component; or

C. The Component has been exposed to rain; or

D. The Component does not appear to operate normally or exhibits a marked change in performance; or

E. The Component has been dropped, or its cabinet damaged.

14. Servicing — The user should not attempt to service the Component beyond those means described in this operating manual. All other servicing should be referred to qualified service personnel.

PORTABLE CART WARNING



Carts and stands - The Component should be used only with a cart or stand that is recommended by the manufacturer.

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

15. To prevent electric shock, do not use this polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Pour prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans laisser aucune partie à découvert.

16. Grounding or Polarization - Precautions should be taken so that the grounding or polarization means of the Component is not defeated.

17. Internal/External Voltage Selectors — Internal or external line voltage selector switches, if any, should only be reset and re-equipped with a proper plug for alternate voltage by a qualified service technician. See an Authorized Carver Dealer for more information.

18. Attachment Plugs for Alternate Line Voltage (Dual voltage models only)— See your Authorized Carver Dealer for information on the attachment plug for alternate voltage use. This pertains to dual-voltage units only.

This apparatus does not exceed the Class A/Class B (whichever is applicable) limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

ATTENTION – Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de class A/de class B (selon le cas) prescrites dans le règlement sur le brouillage radioélectrique édicté par les ministere des communications du Canada.

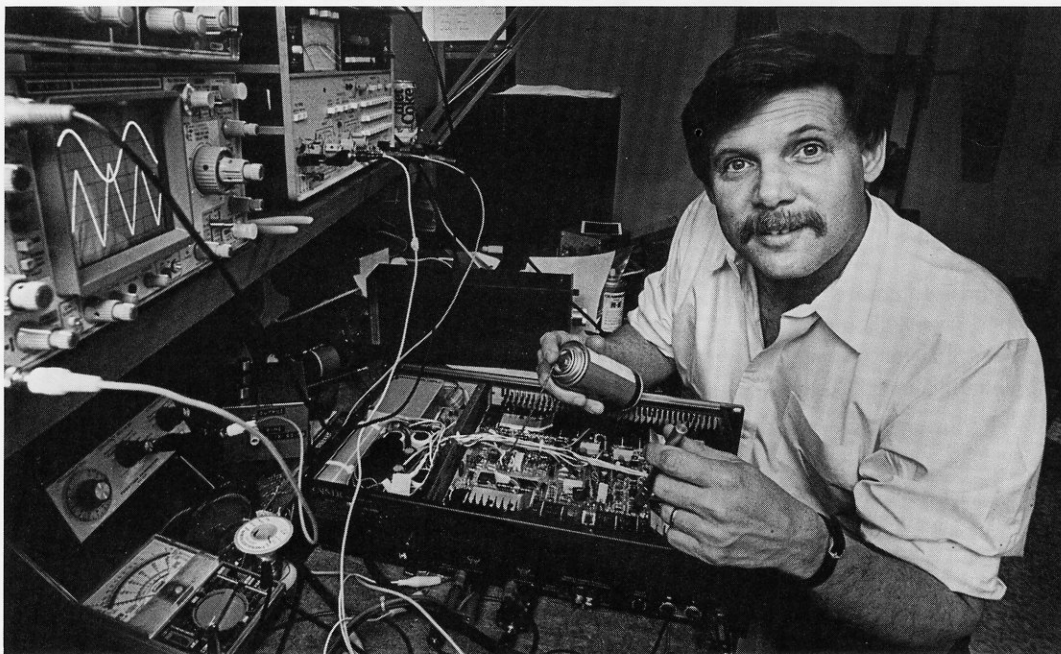
WARNING – To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.

Dolby Noise Reduction and HX Pro Headroom Extension manufactured under license from Dolby Laboratories Licensing Corporation. HX Pro originated by Bang and Olufsen. "Dolby", the double-D symbol and "HX PRO" are trademarks of Dolby Laboratories Licensing Corporation.

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Introduction



A Message From Bob Carver

Congratulations on purchasing a Carver TDR-2400 Remote Control Stereo Dubbing Deck. We believe its sophisticated engineering and meticulous craftsmanship will provide you with many years of listening enjoyment.

Because it is a "double auto-reverse" deck, you can copy both sides of a tape automatically, or enjoy up to 3 hours of uninterrupted music.

Your TDR-2400 features the Dolby B & C Noise Reduction System for optimum noise reduction during recording and playback. In addition, Dolby HX PRO™ assures a metal-tape-like performance with even LH formulation tapes by extending the TDR-2400's potential high end frequency response in both normal and high speed dubbing modes. It also substantially expands the high-frequency

dynamic range. Amorphous heads also significantly boost playback performance.

The TDR-2400 features MPX filtering, high-speed dubbing, automatic music search (PSS) and remote control for added performance and convenience.

To get the most from your TDR-2400, be sure to read all safety, installation, and operating information that follows in this manual.

Again, let me thank you for choosing Carver. I am proud to present to you the best in craftsmanship and design found in the TDR-2400.

Robert W. Carver, Chairman
CARVER CORPORATION

1. Unpacking and Placement

Unpacking

Carefully unpack your TDR-2400 and keep the original carton and packing materials for moving, shipment, or long-term storage.

Upon opening the box, please check for any visible sign of damage that did not appear on the outside of the box. If you do encounter what appears to be concealed damage, please consult your Carver Dealer before proceeding to further unpack or install the unit.

Important Paperwork

Make sure to save your sales receipt. It is extremely important to establish the duration of your Limited Warranty, and for insurance purposes.

Next, make a note of the serial number which is located on the back of the TDR-2400. Record it in the space provided below for convenient reference.

Model _____ TDR-2400 _____

Serial Number _____

Purchased at _____

Date _____

Finally, take a moment to fill out and return the Warranty Card that came with the TDR-2400 and return it to Carver.

Placement

For the best possible sound quality, follow these tips:

Avoid placing the TRD-2400 close to a TELEVISION SET.

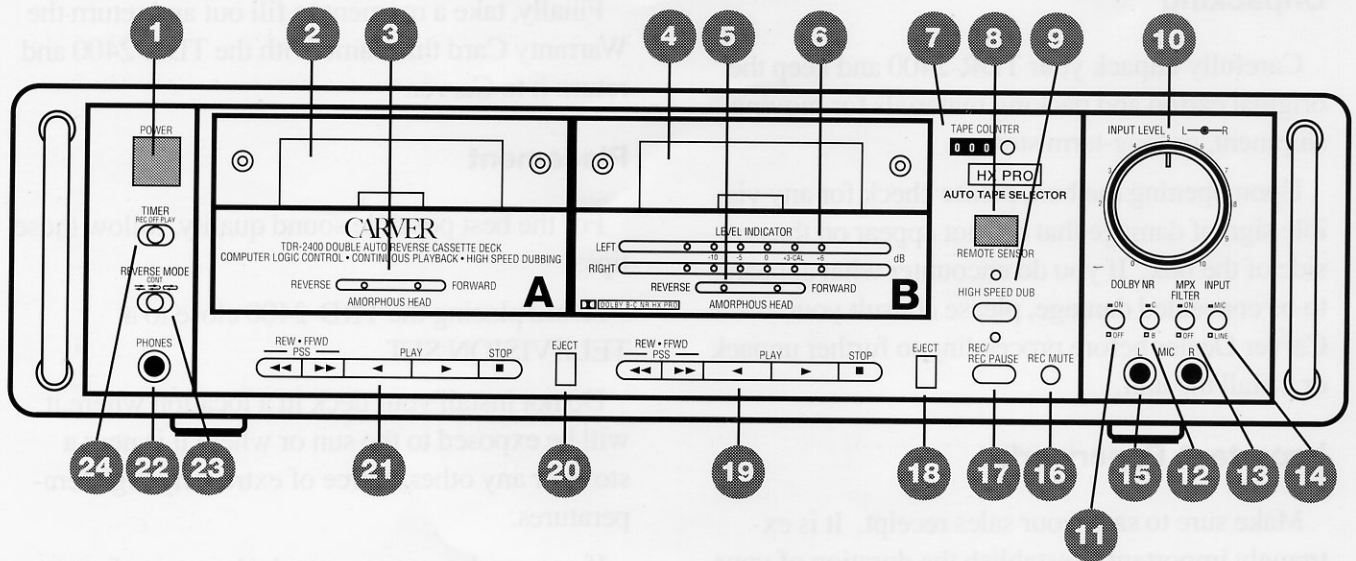
Do not install your deck in a location where it will be exposed to the sun or where it is near a stove or any other source of extremely high temperatures.

If you stack your cassette deck on top of an amplifier or tuner, it may be affected by hum. If this happens, change the installation location of the deck. A humming noise may also be generated if the cassette deck is placed near an electric fan or sewing machine.

Avoid installing the cassette deck in dusty or very humid locations.

2. Front Panel

Figure 1



Controls

If you've owned a dubbing deck before, you may not need to read this section. But we've designed it to give you some background into how each part of the TDR-2400 works, so unless you're super-impatient, read on...

The following is a brief description of the function of each TDR-2400 front panel button and control. See Figure 1.

- 1. POWER button.** Press this button to turn the TDR-2400 on and off.
- 2. TAPE-A "well".** From now on, we'll call the TDR-2400's two tape mechanisms Well A and Well B. Mostly because it's shorter than "Mechanism A"/"Mechanism B", and because "Tape A" and "Tape B" are used to refer to the tapes IN the two transports/mechanisms/wells.
- NOTE:** Well A is used for playback only.
- 3. WELL A TAPE DIRECTION indicator.** Well A plays back both sides of a tape without removing it. These lights tell you which direction the tape is going.
- 4. TAPE-B "well."** Tape B records and plays back in either direction.

- 5. WELL B TAPE DIRECTION indicator.** Well B records *and* plays back both sides of a tape without removing it. These lights tell you which direction the tape is moving.
- 6. PEAK RECORDING LEVEL INDICATORS** for Well B. Left and right LED arrays calibrated from "infinity" (no signal) to +6 dB. Generally, the overall signal should not regularly exceed +3 dB, with only occasional peaks lighting the +6 dB lights. (See Chapter 6 for information on using the meter array to help set recording levels correctly.)
- 7. TAPE COUNTER** gives a relative indication of how much of a tape in the B Well has elapsed, allowing you to mark and return to various spots — assuming you have reset the counter to 000 before playing a cassette.
- 8. REMOTE SENSOR.** This sensor receives signals from the TDR-2400's remote control unit. The remote control can be used up to 20 feet from your TDR-2400 and must be aimed in the tape deck's direction.
- 9. HIGH SPEED DUB button.** When pressed, this button lets you make copies from the A well to the B well at 2X normal speed. Normally it would

take 90 minutes to make a copy of a C-90 tape. If the HIGH SPEED DUB button is pushed, the LED lights and a copy is made at TWICE the normal speed, i.e. a C-90 copies in 45 minutes. Depending on the quality of the initial recording and the type of tape the copy is being made on, there may be a slight reduction in quality during HIGH SPEED dubbing. This is discussed farther on.

10. INPUT LEVEL Control. Turn this control to adjust the input level going onto tape during the recording process. Turn the control toward MAX to increase the level; toward MIN to decrease the level.

NOTE: This is also the recording input BALANCE CONTROL. The knob is split into two parts which can be rotated independently of each other. The front ring controls INPUT LEVEL for the right channel, the rear ring for the left. Generally you can just rotate the whole knob, but sometimes you'll encounter an input source (especially records) which has a stronger signal in one channel than the other. At these times, the INPUT LEVEL knob can be "split" to adjust the two channels so that they balance.

11. DOLBY NR ON/OFF button is used in conjunction with #12 (DOLBY NR B/C selector switch).

12. DOLBY NR B/C button. Use this switch to select DOLBY B or DOLBY C noise reduction during recording and playback (for more information, see Chapter 6.) If the DOLBY NR ON/OFF switch is in the OFF position, neither noise reduction circuit is selected.

When ON, Dolby B or C noise reduction provide significant reduction of tape hiss. Dolby B is available on just about all quality car decks, portables, etc, and has helped make cassette tape a truly high fidelity medium.

Now, advances in the manufacture of tapes and tape decks, along with the increased demands of today's high dynamic range recordings, have led to the development of an even better noise reduction

system: Dolby C. It's a two-stage processor that utilizes circuitry similar to Dolby B, but with separate processing for low and high level signals. It achieves an additional 10dB of noise reduction at middle and high frequencies, while extending the working frequency range approximately two octaves lower than Dolby B — all the way to 100 Hz. The system also incorporates special spectral skewing and anti-saturation networks, to guard against audible side effects of the encoding/decoding process. The net result is 20dB of noise reduction across the spectrum — for practical purposes, the elimination of audible noise. Reproduction quality is truly spectacular.

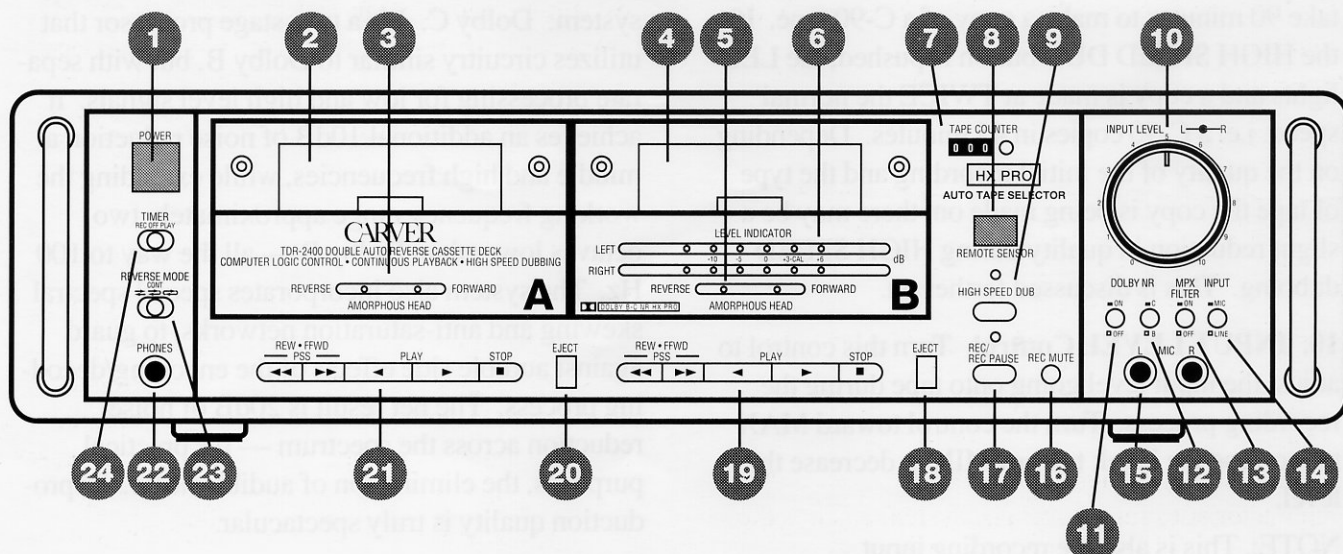
13. MPX FILTER Button. For use ONLY when taping FM broadcasts and using Dolby B or C noise reduction (See the explanation in Chapter 6).

14. INPUT. Switches between external microphone (MIC) and "LINE", a not very descriptive term which means other stereo components such as a CD player, FM tuner or turntable.

15. STEREO MICROPHONE inputs. The TDR-2400 can be used for live recordings through any high-impedance stereo microphone. Consult your dealer for appropriate microphone types.

16. RECord MUTE (Well B). During recording or record-pause modes, it can be pressed to leave a blank (silent) section. When you press and release the button in one touch, a 4-second blank portion will be made on the tape. This is intended to help the TDR-2400 or many car stereo decks to "find" the beginning of a song. After four seconds of silence, the TDR-2400 unit will then go to RECord-PAUSE mode. Press the REC/REC PAUSE or PLAY button to restart recording on the tape. When you press and hold in the button, a blank portion lasting as long as you hold it in will be made.

17. REC, REC/PAUSE (Well B). Press this button to engage RECORD mode. The deck is now in "RECord-PAUSE mode" and will not actually start recording until you hit PLAY. Then the tape



moves, actual recording occurs and the indicator above lights up.

18. & 20. EJECT (same for Well A and Well B). Opens the tape mechanism door unless the deck is in PLAY or RECORD modes.

19. & 21. DECK TRANSPORT CONTROL FUNCTIONS & INDICATORS (same for Well A and Well B).

REW Press this button to rewind the tape.

FF Press this button to transport the tape forward at high speed.

PSS REW and FF also activate the TDR-2400's Program Search System which lets you skip or repeat a song which is separated by at least 4 seconds of silence. See page 12 for details of PSS operation.

PLAY Note that because the TDR-2400 is an auto-reverse deck, there are TWO play buttons for each cassette well, one with a left direction arrow and one with a right. Which one you use will depend on which side of the tape you want to play. If you've previously owned a deck that just went in one direction, you may keep wanting to take the tape out and turn it over. Two PLAY buttons do the same thing. You select the side of the tape you

want to hear depending on which one you press.

STOP Press this button to stop the tape.

22. HEADPHONE MONITOR JACK. Any standard stereo headphones may be plugged in here. The output level may vary slightly depending on the impedance and efficiency of the particular headphone model.

23. REVERSE MODE. The TDR-2400's two tape transports can be set to operate in three different ways:



One-way. Only one side of a tape is recorded (or played) before the deck stops. To play or record the other side, you must press another transport button.



Continuous tape. Plays/records Side 1, then Side 2. If only one tape is loaded, and play/record starts with Side 2, play/record will stop at the end of side 2. In playback if there are tapes in both A&B wells, the sequence is Tape A, Side 1&2; then Tape B Side 1&2, then back to Tape A, continuously until you press STOP.



Repeat. Plays Side 1 then Side 2, then Side 1 again and so forth repeatedly until you press STOP. This mode is not operable during recording. If you select it, recording will revert to

1-cycle recording so that the tape does not continuously re-record. Repeat mode's usual purpose is for background music and/or wild parties.

24. TIMER SWITCH. IMPORTANT: Leave this switch in the OFF position unless you are using the TDR-2400 with an external AC timer. Use of a timer is covered in Chapter 6.

Features You'll Appreciate But Don't See

DOLBY HX PRO. Although not indicated by front panel switches, the TDR-2400 has Dolby HX PRO circuitry, which improves high-frequency characteristics response. The system ensures the most suitable value of bias by calculating the recording signal and the recording bias current as a whole. A metal-tape-like performance is attained even with LH tapes, because the frequency response is kept flat at all times by stabilizing

dynamic frequency characteristics. DOLBY HX PRO also substantially expands high-frequency dynamic range.

The system functions automatically when the deck is in recording mode. The dynamic sound improvements recorded with this deck can be played back and enjoyed on other home cassette decks, car tape decks and portables.

AUTOMATIC TAPE SELECT (both wells). Different formulations of tape such as "Normal", CrO2 (also known as Type II) and Metal require different amounts of tape bias and equalization for proper frequency balance. The TDR-2400 automatically selects the bias and equalization settings corresponding to the type of tape used. The unit chooses the tape setting according to the shape of special slots on the back edge of the cassette. IMPORTANT: See the note on Page 13. The tape MUST have the proper slot coding.

3. Rear Panel and Connections

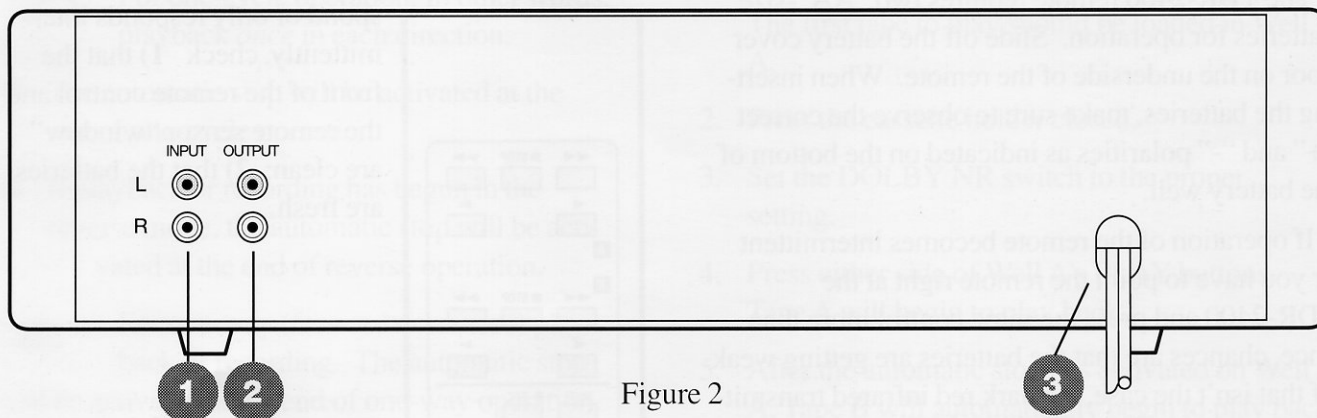


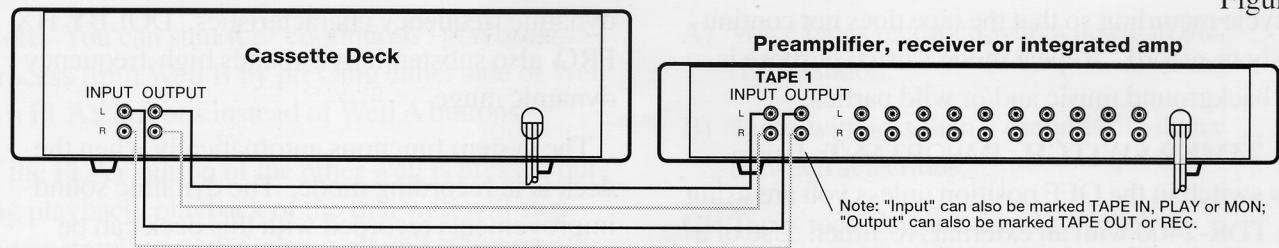
Figure 2

NOTE: Be sure all power to the unit is off before making connections. Refer to Figure 3 for an example of how to hook the TDR-2400 to a receiver or preamplifier.

1. IN (REC) sockets. These receive the sound from the sound source (tuner, stereo amplifier, etc.)

which you want to record. Use stereo connection cables to hook them to the TAPE REC (or LINE OUT) jacks on your preamplifier, integrated amplifier or receiver through which you want to record. Make sure that "Left goes to Left and Right goes to Right".

Figure 3



2. OUT (PLAY) sockets. These send out the playback signal from the TDR-2400. Use stereo connection cables to hook them to the TAPE PLAY (or LINE IN or AUX IN) jacks on the preamplifier, integrated amplifier or receiver.

3. AC LINE CORD. Connect the line cord to a 120 VAC wall outlet or to a convenience outlet on your amplifier.

4. Remote Control

All transport functions of the TDR-2400 are replicated on a wireless handheld remote control. Also included are REC MUTE (marked MUTE) and REC/REC PAUSE (marked REC).

Batteries

The TDR-2400 remote requires two "AA"-size batteries for operation. Slide off the battery cover door on the underside of the remote. When inserting the batteries, make sure to observe the correct "+" and "-" polarities as indicated on the bottom of the battery well.

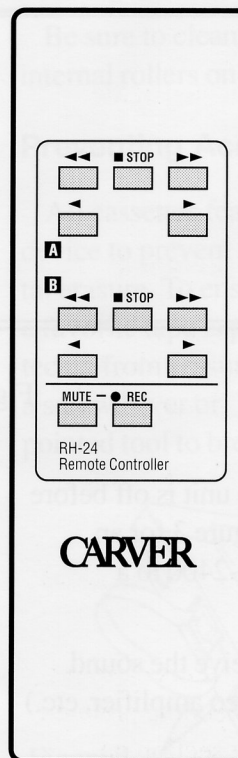
If operation of the remote becomes intermittent or you have to point the remote right at the TDR-2400 and press the same control more than once, chances are that the batteries are getting weak (if that isn't the case, the dark red infrared transmitter on the end of the remote may be dirty).

WARNING: If you don't use the TDR-2400 remote for long periods of time, or just put the batteries in to see how it worked and decided to operate it manually in the future, REMOVE THE BATTERIES. They are *not* housebroken and, if left unattended for a long time, can corrode and potentially damage the remote control unit and surrounding area.

Operating Range

The TDR-2400's remote control operates anywhere within a 30° angle of the remote sensor on the front of the deck and from up to 20 feet away. If you are within 20 feet of the TDR-2400, within a 30° angle, and yet the deck suddenly fails to re-

spond or only responds intermittently, check **1)** that the front of the remote control and the remote sensor "window" are clean; **2)** that the batteries are fresh.




5. Playback


Considering the popularity (and increased quality) of pre-recorded cassettes, we've chosen to start with playback rather than recording. Even if you are very familiar with cassette deck operation, read the following sections carefully since the TDR-2400 has some special features not found on single-well decks.

Turning On the TDR-2400

If the AC line cord that extends from the rear panel is connected to an appropriate outlet, the TDR-2400 will turn on when you press the POWER button. Turn the TDR-2400 off by releasing the same button.


A Quick Review of REVERSE MODE Switch Positions

 For continuous playback (Well A). At this position, playback of BOTH sides of the tape will continue until the STOP button is pressed.

 For one-cycle operation. In other words, playback *once* in each direction.

■ The automatic stop will be activated at the end of one-cycle operation.

■ If playback or recording has begun in the reverse mode, the automatic stop will be activated at the end of reverse operation.

 For one-way (forward or reverse) playback or recording. The automatic stop will be activated at the end of one-way operation.

PLAYING A SINGLE CASSETTE (using just Well A or Well B)

1. Press the EJECT button to the right of cassette Well A to open the holder.

NOTE: Before inserting the cassette, check to see if the tape is slack. Slack tape can become jammed in the mechanism or break. See the section on


Handling Tapes later in this chapter.

2. Insert the cassette with the exposed section of the tape pointing downwards.
3. Press the cassette holder closed.
4. Set the DOLBY NR switch to the proper setting.
5. Set the REVERSE MODE to the desired setting.
6. Press the PLAY button under Well A or B.

NOTE: To change the direction of tape travel during playback, press the opposite side of PLAY button under the appropriate Well.

PLAYING TWO TAPES ONE AFTER THE OTHER (using both Well A and Well B)

You can enjoy up to 3 hours of un-repeated music by loading already-recorded C-90 tapes into both the TDR-2400's cassette mechanisms. You can also just set the deck to repeat the sametapes for as long as you want.

1. Set the REVERSE MODE switch to . The first tape to play should be loaded in Well A.
2. Press the cassette holder closed.
3. Set the DOLBY NR switch to the proper setting.
4. Press either side of Well A's PLAY buttons. Tape A will begin to play back.
5. After the automatic stop has activated on Well A, Tape B will automatically begin to play back from the forward direction. When the end of the tape is reached on Well B, Tape B will change to reverse playback.
6. After the automatic stop has activated on Well B, Tape A will automatically begin to play back from the forward direction. Tape A and Tape B will play back alternately until the STOP button is pressed.

Note: You can start the “continuous” playback process from Well B by pressing either side of Well B’s PLAY buttons instead of Well A buttons.

If the PLAY button of the other well is pressed during playback, playback of the first well will stop automatically and the other well will subsequently start playback (this is starting to sound like a legal document. What we *really* mean is, if you’re playing a tape in Well A and you hit the PLAY button on Well B, Well A will stop and Well B will begin).

SINGLE-PLAY — SKIPPING OR REPEATING A SONG WITH PSS

The TDR-2400’s Program Search System lets you skip ahead or repeat a song that’s already played. PSS lets the TDR-2400 play selected passages of music automatically, utilizing a blank tape section between each selection to activate the switching.

To skip a music selection that has started playing:

1. Press the FFWD button (during forward playback) or REW button (during reverse playback). The tape will run at high speed. At the start of the next passage of music, the unit will change to playback mode instantly.

To repeat a music selection that has just been playing:

1. Press the REW button (during forward playback) or FFWD button (during reverse playback). The tape will run at high speed. At the beginning of the music selection that has just been playing, the unit will change to playback mode instantly.

Note: PSS functions by detecting a blank tape section between selections. It has to be AT LEAST 4 seconds long. The system will work correctly with virtually any commercially pre-recorded music cassette. However, some tapes that you record yourself may cause incorrect operation, for example:

- A) Voice tapes recorded with a pause in the conversation.
- B) Tapes with less than 4 seconds of silence between selections.
- C) Tapes recorded at a very low level.
- D) Tapes with noise recorded on the blank spaces between selections (as from a very scratchy record, wind noise from a microphone, etc.).
- E) Placing the unit on a television set may make PSS function incorrectly because the circuit is affected by signals radiated from a television set.

Handling cassette tapes

Before you begin playing a tape, always check to make sure the tape is not slack. If it is, the tape may become jammed in the mechanism. Use a pencil to wind the tape and take up the slack as shown in Figure 4 below.

Store your recorded cassettes in their plastic cases. Keep them away from dust, heat, humidity and magnetic fields.

Be sure to clean the TDR-2400’s heads and internal rollers on a regular basis.

Preventing Accidental Erasure

All cassettes feature a safety device to prevent accidental erasure. To ensure that a favorite tape is protected from erasure, use a screwdriver or pointed tool to break

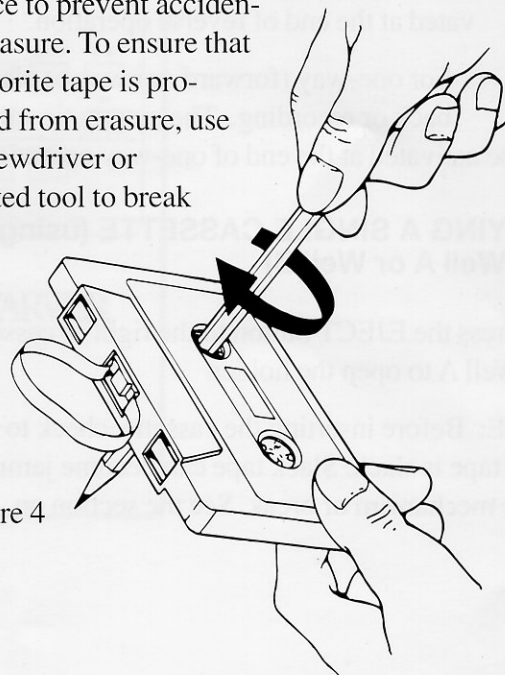


Figure 4

off the plastic tabs at the corners of the cassette. Once the tabs are removed, the RECORD mode cannot be engaged, thus preventing the tape from being erased.

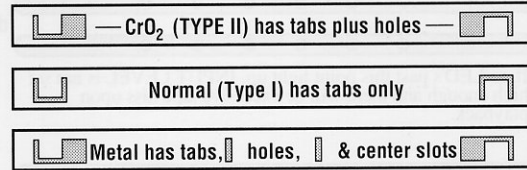
To re-use a protected cassette:

Cover the tab openings with pieces of cellophane or electrical tape. Be sure not to cover the tape formula detection slot when covering the tab openings.

CrO₂ Tape Slots

In order for the TDR-2400's Auto Tape Select to operate properly, CrO₂ (Type II) tapes must have

slots in the back that look like this:



If they don't, playback sound will be harsh and distortion during recording may result.

Safety Lock Mechanism

The cassette deck is provided with a safety lock mechanism which renders the operating buttons inoperative if they are depressed when the cassette holder is open.

6. Recording

Important Considerations

TAPE. There is no cheap miracle tape. If you want a high quality recording or dub, you need to invest in a quality tape formulation. That doesn't necessarily mean buying the most expensive tape you can find, but unless you're copying spoken lecture material or other non-musical sources, avoid the temptation to buy budget bags of no-name tapes.

Every twelve to eighteen months, both *Stereo Review* and *Audio* magazines publish exhaustive comparisons of virtually every significant tape brand and formulation on the market. If you don't subscribe, both of these publications are usually in public libraries.

NOISE REDUCTION. Quite frankly, there isn't really any reason NOT to use at least Dolby B noise reduction. All pre-recorded cassette tapes have used it for years, regardless of whether playback decks had Dolby NR or not.

Dolby C is a different story. You should not make a recording/copy in Dolby C unless you're sure the playback deck also has Dolby C.

Using TDR-2400's LED Meters

The two LED (light emitting diode) displays on the panel front are your "window" on what's going on between the tape and the incoming music.

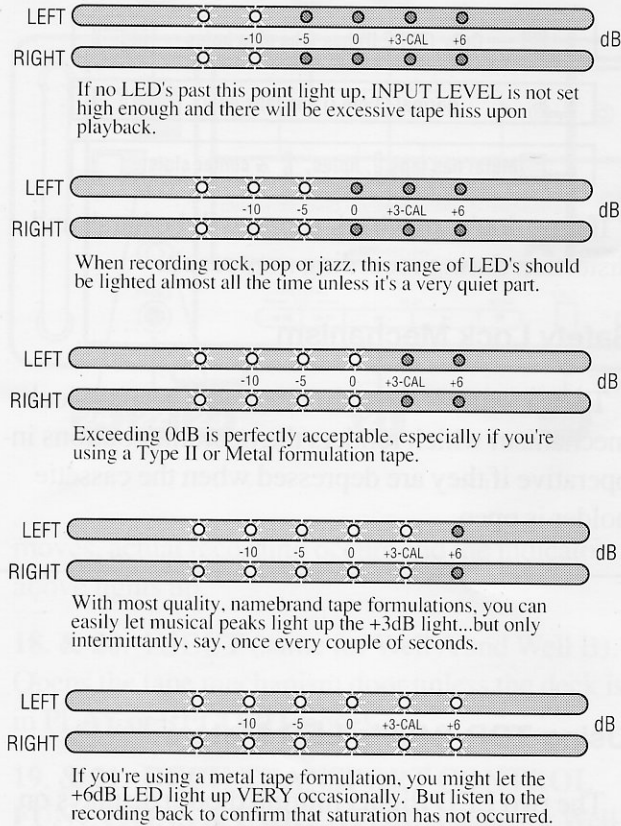
In general, while making tapes, the LED "meters" should be regularly reaching and exceeding the 0dB mark during musical recording. If levels are lower than 0, you're not recording your tape as "hot" as it could be and are sacrificing some signal-to-noise ratio (see Fig. 5 on the next page).

On the other hand, if the display shows VERY occasional peaks as high as +6, audible distortion probably won't happen unless you're using a really cheap brand of tape.

"Special Effects"

- If the INPUT LEVEL control is turned gradually toward MAX or MIN during recording, fade-in or fade-out effects can be obtained.
- Sometimes, you encounter a source which simply doesn't seem to be balanced between right and left channel. One LED array is read-

Figure 5



ing -5 and the other is reading 0. Now this may be intentional for a short while — maybe the producer has panned one instrument more to the left and that instrument is soloing. But if this sort of imbalance continues, it means that the recording source is simply “off” and you should compensate for it. While it is most often encountered with records (cartridges can get out of balance easily), many CD's also have predominances of one channel over the other. Here is where the INPUT LEVEL's split left/right capabilities are used. If you do adjust the left and right levels independently of each other, make doubly sure to return them to normal after that particular recording session.

Too hot, too cold and just right

Compared to live music, tape has a fairly narrow range of dynamics (loud and soft) and frequency response. The object is to coax the most performance possible out of a given tape formulation while

staying within its limitations.

Recording at relatively low levels (-10VU peaks for example) ensures wide dynamic range and wide frequency response. But it also means you have to turn up the volume more on playback, amplifying the background tape noise. If the music becomes quiet, the hiss is audible no matter what kind of noise reduction you've used.

So the solution is to record “hotter”, that is, put more signal down onto the tape. This is fine up to a point. But a tape is considered “too hot” when it cannot handle the intensity of signal being recorded on it. When this happens, saturation occurs. To hear what saturation sounds like, keep turning up the INPUT LEVEL knob while making a tape. At some point during playback, you'll start hearing terrible distortion until the music become un-recognizable. That's saturation. That same thing happens at lower levels during momentary peaks.

And that's why many home recordists compensate the other way. They're so scared of even a millisecond of saturation that they record at far too low a level. That results in excess noise.

Ultimately, you're trying to achieve a “happy medium”. That happy medium is going to be a combination of your choice in tape (more expensive tape can be recorded “hotter”), your taste in music (rock saturates tapes faster than classical music; classical music often demands a wider dynamic range), what you're recording from (CD's have more dynamics than FM or records) and how good your ears are (older folks don't hear hiss as much as younger ones). If you like the quality of the tapes you're making and you've followed the instructions in this section, then it's handled and you can start enjoying the music, not fussing over the recording process any more.

Getting the Legal Mandatories Out of the Way

The recording of radio programs, records, tapes, CD's, etc. is permissible only insofar as copyright or other rights of third parties are not thereby

infringed. Therefore, when we discuss taping a CD or an FM broadcast, we're only offering these as theoretical suggestions.

Making a Recording from an Outside Source Such as a CD, FM Station, etc.

1. Insert a cassette in Well B. If using a Type II (CrO₂) cassette, make sure it has slots that look like the ones shown near the top of Page 13.
2. Set the DOLBY NR and REVERSE MODE switches. If you're taping a live concert off the air or something, there's no reason not to set the REVERSE MODE switch to 1-cycle (➡), so that the TDR-2400 can record both sides one right after the other. On the other hand, if you're trying to split up the contents of a compact disc so it will fit on both sides of a tape, using 1-way mode (↔) makes good sense.
3. Set the INPUT button. Most likely to LINE; use MIC only if you're making a live recording with microphones plugged in the front of the TDR-2400.
4. If you're taping off FM and using Dolby B or C, press in the MPX FILTER button.
5. Press the REC PAUSE button (the deck is now in REC PAUSE mode). The LED above the button should light up. In addition, one of Well B's tape direction indicator buttons blink (either LEFT or RIGHT). That's the side of the tape which will be recorded first. If you want to change to the opposite direction (and side of tape), press the opposite side of Well B's PLAY button. The selected direction indicator will blink.
6. (Optional) Set the TAPE COUNTER to 000.
7. Activate your musical source such as a CD player or turntable.
8. Adjust the recording levels and the balance of the right and left TDR-2400 channels with the INPUT LEVEL control. Follow our guidelines which suggest an average level of about 0dB to +3dB, with occasional peaks above that.
9. Either press one of Well B's PLAY buttons or press REC PAUSE again to begin recording.
 - When the end of the tape has been reached, automatic stop or auto-reverse will be activated (depending on the REVERSE MODE selection).
 - Press STOP to end recording at any time.
 - Press REC PAUSE to temporarily stop recording. Press it again to begin recording again.
 - Press REC MUTE to add silence to the tape. Pushing it once adds a 4-second blank space (the corresponding LED will blink). If you hold the button down, a blank portion lasting as long as you keep it pushed in will be added to the tape. After that, Well B will go into REC PAUSE. Just push REC PAUSE again to resume taping.
 - If a cassette without a safety tab is inserted, the deck cannot enter recording mode.
 - If the opposite side of Well B's PLAY button is pressed during recording, recording will stop and the unit will go to REC PAUSE mode.
 - If the PLAY button of Well A is pressed during the record-pause mode, the unit will go to dubbing mode.

Be Careful What You Copy

So that a pack of slick L.A. recording industry lawyers in pastel sports jackets don't hassle us, we're going to repeat the following: Please check the copyright laws relating to making tape recordings and copies from phonograph records, compact discs, CDV's, LaserDiscs, old gramophone cylinders, AM or FM radio broadcasts, strange sounds you get through your fillings...and *especially* pre-recorded tapes BEFORE making a copy via your TDR-2400. And now on to copying...

Copying a Tape (HIGH-SPEED DUBBING)

Dubbing a recorded tape onto another tape by using the built-in double deck mechanism is performed only one direction: From Well A (playback) to Well B (recording).

Unlike normal recording, no further adjustment of the INPUT LEVEL control is necessary during dubbing. The DOLBY NR switches also won't have any affect on the recording signal going to Well B. They DO have an effect on the out-going monitor signal during recording, however, so if you're monitoring the dubbing process of a Dolby NR-encoded tape, activate the appropriate buttons.

1. Insert a recorded cassette into Well A and a blank cassette into Well B. Make sure that the source and blank tapes are re-wound to their beginning and aren't slack.
2. Select the desired tape operation mode with the REVERSE MODE switch.

3. Press the HIGH SPEED DUB button to start dubbing at twice normal speed). The HIGH SPEED DUB indicator illuminates.

- Both the source and copy tapes will rewind to their beginnings before the tape is made.
- Well B starts recording from the forward direction. The REC/REC PAUSE indicator will flash.
- After you press HIGH SPEED DUB, an 8-second blank section is created to avoid the leader at the beginning. After that, Well A will start playback from the forward direction and dubbing will begin. During the process the REC PAUSE indicator will change from blinking to just on.
- If the blank target tape is shorter than the original, Well B will stop when it gets to the end of the second side of the target tape.
- If the original tape is shorter than the blank target tape, recording will stop when one or

both sides of the original have been played (depending on the REVERSE MODE switch setting).

- Don't turn off the unit during the dubbing operation, or the cassettes cannot be ejected. If the unit is turned off, turn on the unit once and eject the cassettes.

Copying a Tape (NORMAL SPEED DUBBING)

HIGH SPEED copies made on the TDR-2400 are of very good quality. Many people won't be able to tell the difference. However, technically, you can get a better quality copy if you make a dub in "real time". That is, at normal playback speed. Thus a 90-minute tape takes 90 minutes to copy. We suggest that you experiment by copying the same source tape onto two identical blank target cassettes — but use HIGH SPEED dubbing with one and NORMAL with the other. Because you have two playback wells, you can load both tapes and easily compare them by playing one and then the other. Be your own judge.

Generally, NORMAL speed dubbing would be used for a well-recorded music tape that was going to be listened to on a good home system. HIGH SPEED dubbing is better suited to making car tapes or copying, for example, a school lecture that had been taped on a portable. Be your own judge.

1. Load a blank tape of the right length into Well B.
2. Wind the original tape in Well A to its beginning or to a particular selection.
3. Press the REC/REC PAUSE button. (If you wish to start dubbing recording from the opposite direction, press the opposite side of PLAY button once).
4. Press the appropriate PLAY button of Well A to start dubbing.
5. To stop the dubbing operation, press either STOP button.

- When the automatic stop has activated on either Well A or Well B, the other will then stop.
- Don't turn off the unit during the dubbing operation, or the cassettes cannot be ejected. If the unit gets shut off accidentally, turn it back on and eject the cassettes.

General Recording Topics:

1. Using the DOLBY Noise Reduction System

The TDR-2400 is equipped with two Dolby NR systems: Dolby B NR, which is found on nearly all cassette decks, and Dolby C NR which achieves even better noise reduction. The Dolby C system is about 3 times as effective at reducing noise in the high range as Dolby B NR. It also extends high frequency response.

For playback, set the DOLBY NR switch to the same position (B or C) used for recording. Otherwise there can be a marked difference in the tonal quality of the playback with the sound being muffled or overly shrill.

Mark "Dolby B NR" or "Dolby C NR" on tapes recorded with Dolby NR so that you will know which setting to use during playback.

When recording on a tape which is to be used in a car stereo or a tape player without the Dolby NR system, set the Dolby NR switch to OFF.

NOTE: If you want a "brighter", "sharper" sound, you CAN encode a tape with Dolby B NR and play it back without. Frankly, some people actually prefer this. Dolby Labs will probably have a cow when they discover we mentioned this, but it's true: The resulting mis-equalization tends to compensate for poor tweeters in portables and road noise in cars quite well. Mind you, this is different from recording in Dolby C NR and playing back in Dolby B NR. We're talking about recording in Dolby NR and playing back with no Dolby noise reduction decoding.

2. Taping off FM: When to use the MPX Filter

FM broadcasts contain a high-frequency pilot signal at 19,000 Hz which, though inaudible in itself, can cause audible interference with the Dolby NR circuit. The result is a sort of oscillating sound which is very annoying. The MPX filter eliminates this problem.

The MPX switch should be turned ON if you are using Dolby B or C noise reduction while recording from an FM stereo tuner. All other musical sources should be recorded with the MPX filter in the OFF position.

3. Using a Timer

It is possible to use a timer to activate recording or playback. You could use your stereo system as a gigantic wake-up clock radio, or tape a radio program when you're not at home.

Special stereo timers are made by several of the large Japanese companies and can usually be special ordered through your dealer (even though we don't make one). However, you CAN use a simple timer such as the type which are used to turn lights on and off. Before using any sort of timer read and follow the instructions that come with it.

Timer operation works only with the TDR-2400's B Well. Recording or playback start only from the forward (left to right) direction.

CONNECTIONS FOR TIMER OPERATION

1. Connect an audio timer to an AC wall outlet.
2. Connect your FM tuner to an AC wall outlet (if you want to tape FM when you're not around)
3. Connect your preamp or integrated amp to an AC wall outlet.

TIMER RECORDING FROM THE TUNER

1. Turn on the amplifier, tuner and cassette deck.
2. Tune in the desired broadcast station to be recorded.

3. Set up the TDR-2400 by following steps 2 to 8 on page 15.
4. Preset the desired time on the timer. The TDR-2400 should now be off. Leave the amp and tuner on, however.
5. When the preset time is reached, the TDR-2400 will turn on and then automatically start recording. It will continue until the timer turns it off or it reaches the end of one tape side or the entire tape (depending on REVERSE MODE switch setting).

PLAYING BACK A TAPE WITH THE TIMER

1. Turn on the amplifier and cassette deck.
2. Wind the tape to the beginning of the portion to be played.
3. Set the TDR-2400 TIMER switch to PLAY.
4. Preset the time on the audio timer. The TDR-2400 should now be off. Leave the amp and tuner on, however.
5. When the preset time is reached, the TDR-2400 deck will automatically start playback. If there is a tape in both Well A and Well B, Well B has first priority.

7. Technical Information and Service Assistance

Specifications

Voltage

AC 120 V, 60 Hz

Power consumption

23 W

Frequency response

Metal tape: 40-16,000 Hz;

CrO₂ tape: 40-15,000 Hz;

Normal tape: 40-13,000 Hz

Signal-to-noise ratio

76 dB (Metal tape DOLBY-C NR ON)

Wow and flutter

0.08% (WRMS)

0.18% (According to DIN 45500)

Tape speed

4.8 cm/sec. (1-7/8 ips)

Recording system

AC bias (frequency 105 kHz)

Erase system

AC erase

Maximum input sensitivity

Line 100 mV/47 kOhms

Mic 0.5 mv/400 ohms to 10 kOhms

Standard output

Line: 0.4 V/2 ohms

Headphones 8 ohms

Suitable load impedance

over 47 K ohm.

Dimensions

5.5" H (including "feet", 5.25" without) x 19" W x 13.25" D (not including rack handles, 14" with rack handles) inches

Weight

12 lbs

Accessories

2 connection cords, remote control and two AA cells.

Specifications and external appearance are subject to change without notice due to product improvement.

Cleaning

You'll want to wipe off the TDR-2400's front panel and chassis from time-to-time with a soft, dry cloth. If you have something stubborn to remove, use a mild dish soap or detergent sparingly applied to a soft cloth; don't use alcohol, ammonia, or other strong solvents.

During use, the heads, capstan and pinch roller of both Well A and B pick up small particles of oxide dust from the tape. If these particles are permitted to accumulate, they can have a detrimental effect on both recording and playback performance.

We recommend that all exposed parts you can get to when the each cassette door is open be kept clean at all times. That includes the head, pinch rollers and anything else you can reach with a cotton swab.

To clean them, use a cotton swab soaked in isopropyl alcohol or a commercial tape head cleaning solvent. This can be a swab like the kind you get in a drugstore or special long-handled ones that are easier to get into the innards of the deck. Wipe the head and other surfaces 2 or 3 times a month to retain the best tonal quality — or if you are a really serious recorder, every time you make a recording, although that's getting a little carried away for most people.

There are also several head cleaning kits available from companies such as Alsop, TDK and Discwasher which use a special cleaning tape which you soak in solvent and "play" in the deck.

Demagnetization

Because tape heads impart a magnetic charge to tape and tape has its own magnetism, there is a possibility of the actual metal head eventually becoming magnetized, especially if you go directly from RECORD to STOP quite a bit while making a tape.

This can lead to partial erasure of already recorded tapes as they pass over the head as well as poor quality recordings.

Thus you often hear "knowledgeable" friends recommend demagnetiza-

tion. "Do not attempt this at home". Hand demagnetizers can do more harm than good when wielded by amateurs. If you persist, make sure the follow the directions VERY carefully or consider one of the new generation of battery-powered head demagnetizer that are shaped like tapes. They don't have as much power (and thus ability to de-magnetize the heads) so they should be used more often, but they can't cause any harm, either.

A better solution is to consult your dealer or authorized service center if you think your TDR-2400's heads are getting magnetized.

How can you tell? If you've used your TDR-2400 A LOT to make recordings, and stop and start while doing so, the Well B heads are probably going to start picking up their own magnetic field. To a lesser extent this is also the case with Well A's playback heads. Listen to some tapes made quite a while ago which sounded good when you make them. If a tape which used to sound "fresh", now seems to sound muffled, it's time for demagnetization..

Troubleshooting

If you're having trouble or suspect a problem, try some simple troubleshooting first. More likely than not, the problem lies elsewhere in the system not with the TDR-2400.

No sound.

1. TDR-2400 power is off. If the TDR-2400 is plugged into a preamp or integrated amp convenience outlet, make sure the outlet works.
2. Line cord is either disconnected or loosely connected.

No sound (power OK and on).

1. Check and thoroughly inspect the signal cables that run between the TDR-2400 and the rest of your stereo system. Make sure the connectors are firmly seated, and that no undue strain is being placed on the cable itself. If you can't locate the problem, try swapping the signal cable with a working cable from another part of your system. Take care NOT to swap input and output cables, however.
2. Verify that the preamplifier's or receiver's controls are set correctly. The TAPE MONITOR button or selector must be on to hear playback.
3. The tape is blank (happens more than you think). Confirm that the meters are moving which indicates signal on the tape. Sometimes one thinks that one is in RECORD mode when one isn't. That leads to playing back a blank tape and possible blue language.
4. You pressed the play button on the wrong well.
5. The tape only has music on one side and you pressed the PLAY button for the other side.

Transport controls don't work.

1. The TIMER switch is in the wrong position.
2. The erase tab on the back of the cassette has been removed.

Auto-reverse won't work.

1. The REVERSE MODE switch is set to the wrong position.

RECORD mode doesn't work right.

1. Tape is in the A Well instead of the B Well.
2. The erase tab on the back of the cassette has been removed.
3. The wrong PLAY button has been pushed after REC PAUSE was engaged, thus recording on the "wrong side" of the tape.

Hum and noise.

1. Defective signal cables.
2. Improper fit between signal cable plug and sockets.
3. Signal cables have been routed too closely to AC cables, power transformers, motors or TV sets.

4. The cassette deck may be oriented in such a way that it is picking up induced hum from internal AC wall wiring. Change component's position slightly.

5. The TDR-2400 may be located on top of an amplifier or tuner. Change the location of the deck.

Less-than-perfect sound.

1. Heads need to be cleaned.
2. Tape was recorded at too high a level (distortion) or too low a level (lots of noise).
3. Tape is defective.
4. Dolby Noise Reduction system was not engaged during recording and/or playback.

Remote control does not operate.

1. Batteries are dead or missing.
2. Remote is too far from or at too much of an angle from the remote sensor on the TDR-2400.
3. Remote sensor on TDR-2400 or transmitter panel on remote are dirty.

Weird whining when playing back something taped off FM

1. If you were using Dolby B or C noise reduction, the MPX button was not pushed in.

Service Assistance

We suggest that you read the LIMITED WARRANTY completely to fully understand what your service coverage constitutes and its duration. We recommend that you promptly complete and return the WARRANTY REGISTRATION CARD to make it easier for us to administer your LIMITED WARRANTY.

If your TDR-2400 should require service, we suggest you first contact the Dealer from whom you purchased it. Should the Dealer be unable to take care of your needs, you may contact the CARVER Service Department by phoning (206) 775-6245, or by writing CARVER CORPORATION, Service Department, P.O. Box 1237, Lynnwood, WA 98046. We will then direct you to the nearest in our national network of Authorized Warranty Service Centers, or give you detailed instructions on how to return the product to us for prompt action.

We wish you many hours of musical enjoyment. If you should have questions or comments, please write to us at the above address.

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