

# Tape Dubbing For Car Stereo

## *How to optimize home-dubbed tapes for the car stereo environment*

By Norman Eisenberg

**W**ith a car stereo cassette-tape system installed, you're ready to experience one of its big advantages—hearing the terrific sounds of your record library, dubbed to tape, while driving. You might think that all you have to do to copy your discs onto tape with your home cassette deck is simply a matter of putting the record on your turntable, popping a blank cassette into your deck, and pressing the record button. Though this carefree approach might work, there's a lot about stereo sound in a moving vehicle that requires some special attention if you want to get the most from your home dubbing efforts.

### *Consider The Environment*

Perhaps the most important factor to consider is the vast difference in noise

levels between those normally encountered in a home listening environment and those in a moving vehicle. A really quiet domestic environment might have an ambient (prevailing) noise level of about 35 dB (decibels). You can't expect to get this degree of quiet in any vehicle, not even the plushest, best-insulated luxury car with the windows rolled up, no heating or air conditioning on, the wipers turned off, and your vehicle maintaining an optimum cruising speed. In fact, the car's ambient noise level is almost certain to be greater than in a home environment if the same vehicle is standing still.

Of course, depending on the vehicle's design, traffic conditions, and the nature of the road, the interior ambient noise level (or "noise floor" as it's sometimes called) of a vehicle can be anywhere between 35 and 75 dB with the windows rolled up. Turning on the vehicle's heater or air conditioner adds about 10 dB to the fig-

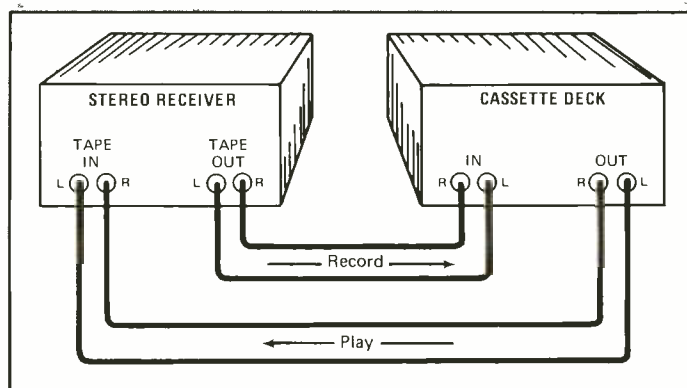
ure. And rolling down the windows while driving at a constant speed in light to moderate traffic adds another 15 dB to the noise figure.

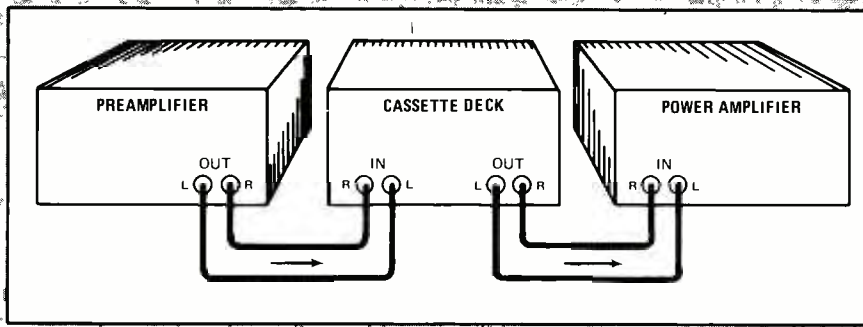
Whatever a given ambient noise level at the moment, expect it to increase whenever you accelerate, blow the vehicle's horn, or shift through the gears (with a manual transmission, of course).

The music reproduced by your car stereo system, then, must ride over the car's noise level of you wish to hear it with some reasonable clarity. Since every additional 3 dB of sound level involves a doubling of amplifier power (wattage), you can begin to understand why some of today's car stereo power ratings rival those of home music systems.

The 1 or 2 watts of power supplied by the old car radio could, of course, provide sound, but it is very limited in dynamic range, as well as frequency response. The attempt by manufacturers to give the driving public

*Normal hookup in the tape-monitor loop of a stereo receiver or integrated amplifier does not permit adjustments, since the signal to the cassette recorder comes before the tone controls. With this setup, you have to settle for what you can get.*





*In systems that have separate preamplifier outputs and power amplifier inputs, full adjustment is possible when the recorder is connected as shown here. Here, the signal into the recorder comes after the tone controls.*

something far better than the traditional car radio provides, not to mention the relatively modest efficiency of the better car speaker systems currently being sold, explains the greater power-output capability of today's car stereo sound systems. It also influences what you record at home to play through your car stereo tape player. It means that you must use somewhat higher recording levels than you might otherwise consider when recording for playing through your home stereo system.

### **Recording Procedure**

Higher recording levels means a little more than simply allowing your home cassette deck's meters or displays to hit higher marks. You want sound that's sufficiently loud to hear in the noisy vehicle environment. In addition, you want what you hear to be as clear and as distortion-free as possible. In recording terms, this means getting the softest passages in a given musical selection to ride just above the vehicle's noise floor. At the other extreme, you want the loudest passages to remain below the tape deck's own tape-saturation, clipping, and distortion ceiling.

For optimum playback in a car stereo system, you'll have to exercise more care when recording than you would for making a tape for playback through only your home cassette deck. To begin with, the better a

given cassette deck, especially in terms of headroom and distortion, the better the chance of obtaining satisfying results when recording tapes for use in vehicles. Also of importance is the choice of tape type.

Assuming your home cassette deck has controls (or pushbuttons) for allowing you to optimize bias and equalization, high-bias cassette tapes are preferred over standard low-bias ferric-oxide tapes. If you use metal-particle tape, you can expect up to 8 dB greater headroom in the highs and perhaps 2 or 3 dB more headroom in the midrange in a good-quality cassette deck. Interestingly, many TV commercials are made to sound louder than the normal programs because the midrange has been slightly boosted during recording, not because someone in the studio has boosted the overall signal level. This trick actually makes the audio louder while keeping within the legal modulation limits of the broadcast signal.

You can do essentially what the sound engineers do for TV commercials for your tapes, though you'll have to arrive at the desired results by trial and error. Begin by making the best tape you possibly can, writing down the level settings used and the minimum and maximum swings of the signal meters or displays. Most instructions for recording on tape tell you to keep the recording level indicators below the 0-dB mark. This is a

good general rule to follow when recording for playback in a home listening room, but the 0-dB mark is not sacrosanct. Occasional excursions beyond the 0-dB mark, into the +dB range, are permitted for brief loud passages. With a good-quality recorder and good grade of tape, such occasional violations will likely produce no audible distortion on playback when recording your on-the-road tapes.

Play the tape in your car, listening for passages that sound too weak or too loud. Then go back with the same tape and rerecord the same selection, this time adjusting recording levels accordingly. Write down the new recording levels used. You may have to repeat this procedure several times before arriving at the optimum recording levels.

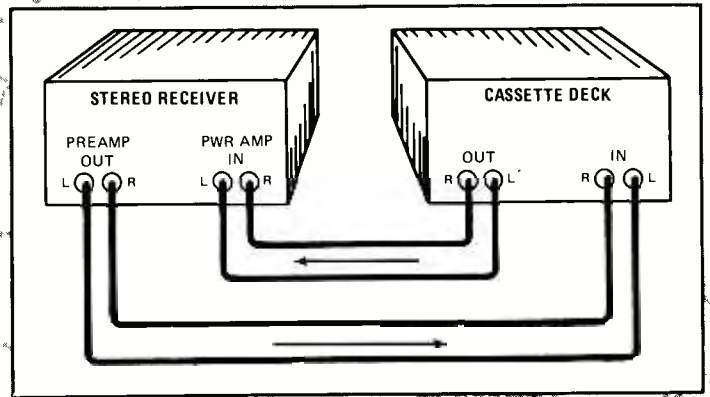
If you're recording a series of short selections, you may have to go through this procedure for each selection, unless you can hit on an average for the whole group that produces results that satisfy your listening tastes. This procedure may involve a lot of work, but it's worth the effort if you end up with the best-sounding home-recorded tapes you can find anywhere.

### **Other Considerations**

There's no problem in playing back a high-bias or metal tape in a car stereo system that lacks a tape selector switch. Bias is an important consideration only in the recording process—not on playback. So, if you have a metal tape, feel free to play it in any car stereo cassette player.

With regard to equalization, you have only two variations: 120  $\mu$ s (microsecond) that applies to all low-noise ferric-oxide tapes, and 70  $\mu$ s that is used for all other types of tape, including metal. Most recent-vintage car cassette players feature a switch that permits you to select the equalization required for different tape formulations. But even if your player

*Some receivers and integrated amplifiers offer pre-amplifier output and power amplifier input jacks that give almost as much adjustment latitude as is possible in separate-component stereo sound systems. That is, the system's tone controls can be used to tailor the sound while dubbing.*



doesn't, you can approximate the 70- $\mu$ s equalization by cutting back on the treble control during playback.

Cassette size, in terms of playing time, also has a bearing on results obtained. Avoid using a C-120 (120-minute) cassette. The long playing time of these cassettes is obtained with thinner tape that lacks the capabilities and durability of the thicker tape used in C-90 and C-60 cassettes. It also places more of a strain on the motors and transports of both your home and car tape decks.

If you use C-120 cassettes, you run the risk of a number of mechanical problems. Among these are speed irregularities, jamming of the tape, and tape snarling. From a practical point of view, then, the best size cassette to use in your car tape player is the shortest length required for accommodating a given program. Better decks will do fine with C-90 cassettes, but you'll probably be even better off with C-60 cassettes.

One of the things you'll have to take into account when recording for playback in a car cassette deck is program selection timing. You'll have to time your dubbing to avoid an unpleasant break in the music at the point where the tape runs out in one direction and reverses itself. You really have to plan your program carefully, noting timings of individual selections or movements, the lat-

ter when dubbing a long symphony or concerto. Also, choose some appropriate selection to go with the main piece you're dubbing, just in case you have to fill a portion of the tape. Long stretches of blank tape running in your car stereo can be annoying and distracting.

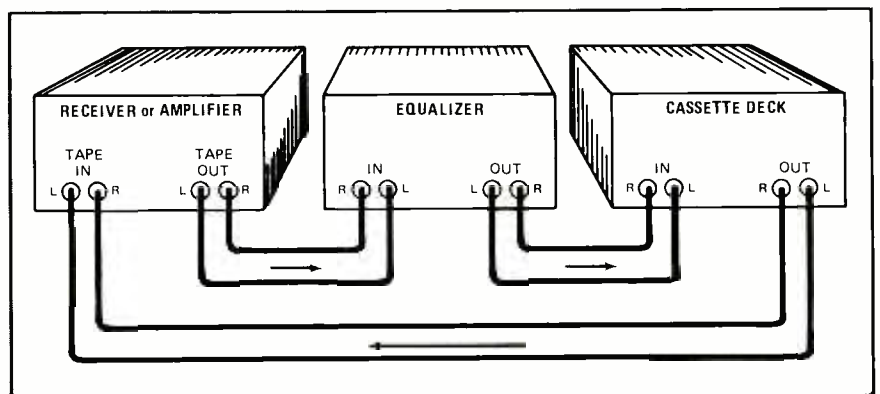
All the rules you've heard or read about cleaning your tape deck apply with greater emphasis for car tape players. Tape heads should be cleaned after eight to 10 hours of use. Cotton-tipped swabs, dipped in isopropyl alcohol will do nicely. If you cannot gain access to the heads, you can use any of the brand-name cassette tape cleaners on the market.

Degaussing need not be performed as often as you do head cleaning. A good interval to observe is to degauss after every 30 to 50 hours of play. A handheld electrical degausser is the recommended tool, but a degaussing cassette can serve as well in decks where the heads are inaccessible.

### ***Bending The Rules***

Some rules you may have read or heard regarding tape dubbing at home can be bent a little when rolling your own for playback in a car. For example, you may have heard that

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*Graphic equalizer permits widest possible tonal adjustments while dubbing when connected so that signal paths are as shown.*

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you should never change tonal balance when dubbing, the idea being to put a signal onto the tape that's as close as possible to the source in terms of frequency balance. For most home setups, in fact, if you connect a tape deck into the system in the normal manner, via the tape-loop jacks of your receiver or amplifier, it's impossible to modify the tonal balance, since these jacks come before the tone controls. (If your car stereo system has its own graphic equalizer, there's no need to modify the tonal balance of the recording, because you can make any tonal adjustments required during playback with the equalizer.)

If your car stereo system doesn't have a graphic equalizer or if, for any number of reasons, you want to deliberately modify the tonal balance of a given source when dubbing, you can do so only by taking the signal being taped from some point in your home system *after* the tone controls. Alternatively, you can feed the signal through an equalizer patched into the system *before* it enters the input jacks of the recorder.

If your home system has a separate preamplifier and power amplifier, reconnect your home tape deck so that its inputs are fed from the outputs of the preamp. The deck's outputs should then be connected to the inputs of the power amp.

In a home system built around an integrated amplifier or receiver, you can manage this hookup only if the integrated unit has a circuit-interrupt feature. If it does, it will have two pairs of jacks on the back labeled PREAMP OUT and POWER AMP IN. Remove the jumpers that connect between these pairs of jacks and use the now-accessible points for connecting your cassette deck into the system as described above.

In the extreme case, where you have no access whatsoever to the pre-amp outputs and power amp inputs,

you can still modify tonal balance for dubbing. You simply disconnect the input cables to the cassette deck and install your equalizer between the free ends of these cables and the inputs of the deck. Actually, this is the best and most professional way of doing the job. Some equalizers have a switch that lets you choose between equalizing for tape feed and equalizing for general playback.

The decision to use an equalizer, and to what extent, for either recording or playback of car tapes can be made only after trial-and-error dubbing and listening. A great deal depends on your driving situation, your vehicle and its interior acoustics, the type of music to which you listen most, the source(s) being copied for playback in your vehicle, etc.

Another professional touch you can add to your home-made tapes is to provide smooth and noiseless transitions between selections. If you're taping a source in its entirety, the transitions will have been taken care of for you by the sound engineer at the recording studio. On the other hand, if you're making up your own program from several different sources, the way to get the quiet transition is simply to use the PAUSE control on the recording deck as soon as the last note of what you're copying has died away. The PAUSE control stops the recording and the tape but leaves the deck ready for instant start-up when you release it.

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### *In Conclusion*

The technique for dubbing to tape for playback in a car stereo system requires more patience than you would exercise when recording for home playback. To obtain optimized recordings, you'll have to do some things you wouldn't ordinarily dream of for home listening. But if done properly, the resulting tapes will give you a feeling of genuine satisfaction.

**ME**