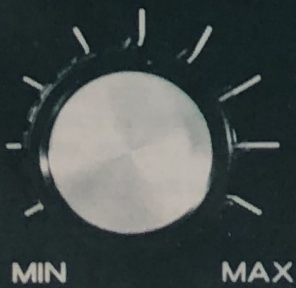


TEAC[®]

INSTRUCTION MANUAL

AN-60 Noise Reduction Unit

REC LEVEL



MIN

MAX

L
R



MIN

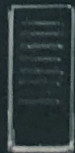
MAX

MODE DOLBY TONE
NR

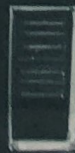
REC

IN

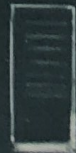
IN



PLAY



OUT



OUT



METER

L



R

PLAY CAL



L

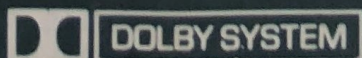


R

TEAC

AN-60

NOISE REDUCTION UNIT



Your new **TEAC** Noise Reduction Unit has been manufactured under the strictest quality control procedures. Each unit has been thoroughly tested at the factory. Should any damage have occurred during transit, or should you have any doubts about its performance, contact your dealer as soon as possible.

IT IS VERY IMPORTANT THAT YOU READ AND UNDERSTAND THIS MANUAL BEFORE PLACING THE AN-60 IN OPERATION

LIMITATION: The TEAC model AN-60 makes available the many benefits of the Dolby Noise Reduction System to the owner of any good tape recorder. However, because, of the design principle, the Dolby Noise Reduction System will not perform properly with a few types of tape recorders. These include:

1. Tape recorders having an AGC type automatic volume level control on either recording or playback.
2. Tape recorders with a built-in amplifier and speakers when not used with a separate amplifier speaker system.
3. Tape recorders which have incompatible Record and Equalization Levels. Other recording systems should be very satisfactory. However, if the recorder uses the "limiter" recording system, the limiter must be turned off. On all decks with Tone controls, set the tone control to the center, or "flat" position.

SERVICE

Should the equipment need repair, contact the dealer where it was purchased, or the Authorized TEAC Service Center nearest you.

- 1) The Warranty period is described on the enclosed warranty card. Read the card for complete details.
- 2) For repairs after expiration of the warranty period a service charge will be made in addition to the price of repair parts.
- 3) If only repair parts are required, place your order with your dealer or the nearest Authorized Service Center. Complete, up-to-date listing of Service Centers is available by writing to the nearest address printed on the back of this manual.


NOTE

Although the AN-60 may still be under the warranty period, you may be charged for repairs made necessary by abuse, damage, or improper operation.

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

* This product is manufactured under licence from Dolby Laboratories, Inc.
* "Dolby", "Dolbyized" and the Double D  are trade marks of Dolby Laboratories, Inc.

The Dolby noise reduction system

The Dolby Noise Reduction System is not a totally new development in electronics for it has been used in principle by the major recording studios for many years. It is new, however, to the field of home entertainment, so there are probably many who will ask you, "Why Dolby?" To assist you, and introduce your new AN-60 to you, we would like to discuss the Dolby principle.

A major problem in home tape recording has been the noise and hiss inherent in the tape and added during the recording process. Many kinds of noise exist to plague the serious music lover but the most apparent and persistent type has been the tape hiss formerly considered an inevitable factor in magnetic recording. Hiss was particularly heard during pianissimo or low level passages where it can cover or even distort the delicate passages. It was always present even on recordings made with the best available tape on the most sophisticated equipment without Dolby. Now the Dolby Noise Reduction System totally eliminates tape noise and hiss as a limiting factor in the production of quality recordings. With the TEAC AN-60 added to your present system, your recordings will have a wider dynamic range, and a new clarity and brilliance, without any audio loss through filtering. Low level passages are reproduced in all their original beauty, and tonal nuances formerly covered by the noise mask will be heard for the first time.

Another advantage you will have with your AN-60 will be increased tape economy. The primary reason for using higher recording speeds in the past was to reduce tape noise and hiss, as well as to provide increased frequency response. With the Dolby System, tape hiss is electronically reduced in amplitude so that it no longer limits tape quality. You will discover that the recordings made at slow tape speeds with the AN-60 will equal or surpass those made in the past at higher speeds without it. By recording at lower speeds, your tape costs are halved.

The low tape speed advantage is most apparent with cassettes. Not only do cassettes have the slower speed of 1-7/8 ips, but the tape oxide coating is thinner which increases the problem of hiss. Now, with Dolby, true open reel quality can be obtained with a cassette recorder for the first time. Also, many prerecorded cassettes are now being Dolby encoded, such as from LONDON RECORDS and CBS.

Numerous FM broadcasting companies are now transmitting Dolby encoded FM broadcasts. This type of broadcasting will become increasingly popular in the immediate future. The TEAC AN-60 will provide reception of Dolby encoded FM broadcasts when connected between your tuner and amplifier.

The Dolby System is not a high-cut filter. Other so-called noise reduction systems operate by filtering out a portion of the high frequency spectrum during playback, thus some loss of the audio spectrum is inevitable. The Dolby principle is to reduce the noise amplitude in relation to the desired signal strength, so there is no filtering action in the circuit used for the recording/playback process. The original program material is unchanged; only the noise and hiss are affected. However, the Dolby system will not eliminate noise present in the original program source.

The TEAC AN-60 is designed for versatility and broad applicability. It may be used with virtually any tape recorder provided there is a separate amplifier employed. It can be easily connected to your existing audio center.

There are no restrictions on the type of tape that may be used providing your tape deck is capable. The Dolby process is equally effective with conventional, chromium dioxide, low noise/high output, or high energy tape.

As you may notice when you begin applying the instructions in this manual, we have not been very specific in describing recording techniques to use with your new AN-60. The specifics are limited to the setting of the Dolby levels for recording and playback. Do not be alarmed by this, for the AN-60 is a very tolerant Noise Reduction Unit that is designed for use with most of the tape recording systems in use today. (See the inside front cover for limitations). Because of the wide variety of tape decks, it would be impossible to describe the exact steps required for each. Therefore, we urge you to apply your experience and use the owners manual for your particular amplifier and tape deck in conjunction with this manual to obtain the best results. With the AN-60 added to your system, you do not really change your recording procedures. Rather you are encoding your tapes during recording and decoding them during playback with a system that will remove the tape noise and hiss.

After the initial installation, you will have a few additional steps to perform. They may seem complicated and difficult at first. After they have been performed a few times, they will be as automatic as any other routine you perform, such as shifting gears in an automobile. The pleasure returned in increased listening enjoyment will be well worth the first couple of hours you spend learning the new steps. Experiment with your equipment. Find the easiest method of adding the calibration steps into your routine. Once you have determined the proper settings of your controls, they can be marked with a felt tip pen for quick reference each time you begin.

Location of the AN-60 in your layout.

The AN-60 will be your recording input level control center now, so it is important that you position it in about the same position the input controls of your tape deck were previously located, if possible. This will give you the easiest access for adjusting the input with your AN-60. The tape deck and the AN-60 should be as close together as your layout will permit.

Type of tape

You will now be making quality recordings that sound much better than before, utilizing the full capability of your recorder and amplifier. The tapes should match this capability to enjoy the full benefits of noise reduction. Avoid the bargain brands and the cheap unmarked tapes available from your discount houses. If your deck is capable of the higher recording biases needed by some of the new low noise/high output tapes, they will further enhance your recording. However, they are not needed to obtain very significant reduction in tape noise which you will have with the AN-60.

Tape speed

Higher tape speeds were recommended "before Dolby" to reduce tape hiss which accompanied lower tape speeds. Now that Dolby has eliminated this problem we suggest you try the 3-3/4 speed with your Dolby unit. If your deck has an adequate frequency response, you may find this lower speed to be most satisfactory. For live recordings, however, the higher speed will give better results, although the problem there is not entirely one of tape hiss and can not be resolved by the Dolby Noise Reduction System. Copies from that live recording can be made at the lower speeds and played back very satisfactorily. (See the "Recording Instruction" section for copying Dolby-encoded tapes)

General points to remember

1. The AN-60 must have a fixed reference level from which to operate. Once the calibration levels are set, it is very important that they do not be changed, for that will upset the Dolby affect during the remainder of the recording. Re-calibration is necessary when:
 - a. You change the brand and type of tape from that used in the previous calibration;
 - b. You use a different tape recorder;
 - c. The level controls on the deck or the calibration controls on the AN-60 have been changed since the last calibration;
 - d. You have any doubts about the calibration, or there has been a long period of time since the last calibration.
2. The circuitry inside the case has been very carefully aligned at the factory. Only TEAC authorized service centers have the equipment, experience and technical data required for re-alignment of the internal adjustments. Therefore, do not open the case or touch any components inside.
3. Like most electronic equipment today, the AN-60 requires proper ventilation for proper operation. Do not place it directly upon the tape deck, amplifier, or any other heat producing equipment. Try to operate it only at or below the standard room temperature to avoid damage to the delicate circuit boards. If there is a significant difference in temperature from when the AN-60 was last calibrated, re-calibrate it at the new temperature. Avoid placing it in direct sunlight.

Changing the power line setting

The AC power source voltage to this equipment can be changed to either 100, 117, 200, 220 or 240 volts. It is set at the voltage indicated on the tag and outside of the carton before shipment from the factory but can be changed to one of the other voltages mentioned above. To reset the voltage, unscrew the fuse in the center of the voltage selector plug, pull out the plug and reinsert it so that your local voltage shows in the cutout, reinsert fuse.

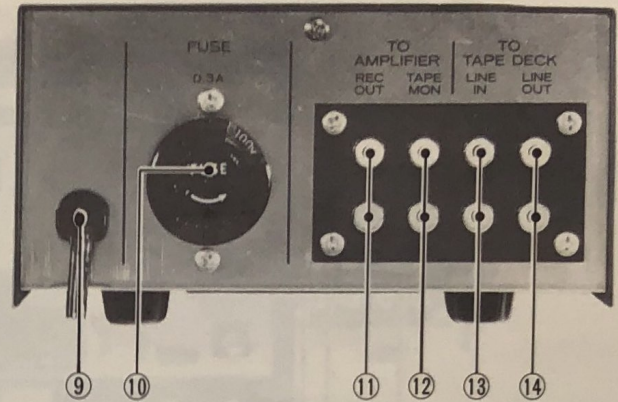
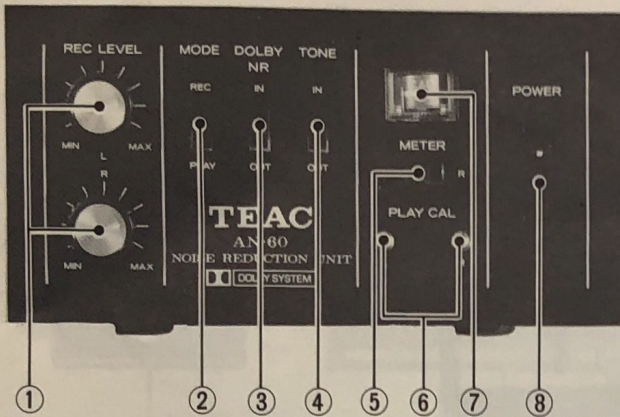
* US Model is 117 V only.

Notes about the connections to the right

Note 1: These connections are standard. See the appropriate sections for connection changes.

Note 2: The term "(normally)" used to the right refers to when the AN-60 is being used in the Standard Connections. Also the type of signal depends upon whether the DOLBY NR switch is IN or OUT and differs between Dolby-encoded and non-Dolby-encoded source material.

Controls and Connections



① REC LEVEL

Used during recording to adjust the recording input level to the tape recorder. Replaces the input controls on the recorder. These controls have no effect during playback.

② MODE -- REC/PLAY

This switch must be in the REC position during recording and PLAY during playback to select the proper circuitry.

③ DOLBY NR -- IN/OUT

Controls the Dolby Noise Reduction circuitry so that non-Dolby-encoded materials may be played without disconnecting the AN-60. Always place IN when making or playing back a Dolby-encoded tape.

④ TONE- IN/OUT

Initiates the Dolby Standard Level tone used to calibrate the tape recorder's input level controls. Keep in the OUT position except when needed for Recording Calibration.

⑤ METER -- L/R

Selects which channel is displayed on the CAL meter, left or right.

⑥ PLAY CAL -- L/R

Use a screwdriver to set these controls for playback level calibration. (See the PLAYBACK CALIBRATION section)

⑦ CAL meter

Used during calibration for recording and playback level setting.

⑧ POWER switch and light

The light to the left of the word POWER will illuminate when AC power is applied by pushing in the top of the switch.

⑨ FUSE

A spare fuse is provided. If the fuse blows, replace it. If the second fuse also blows, take the unit to a TEAC Authorized Service Center for maintenance. On some models, this fuse is also the power line setting device. (See CHANGING THE POWER LINE SETTING on page 2 for details.)

⑩ TO AMPLIFIER -- REC OUT

Connect these terminals to the amplifier's Recorder Outputs (Note 1). They receive the (normally) non-Dolby-encoded signals from the selected sources (Note 2).

⑪ TO AMPLIFIER -- TAPE MONITOR

Connect these terminals to the amplifier's Tape Monitor or Recorder Input terminals (Note 1). They return the (normally) Dolby-decoded signal to the amplifier for monitoring or playback (Note 2).

⑫ TO TAPE DECK -- LINE IN

Connect these terminals to the tape deck's Line Input jacks (Note 1). They send the (normally) Dolby-encoded signal to the tape deck for recording (Note 2).

⑬ TO TAPE DECK -- LINE OUT

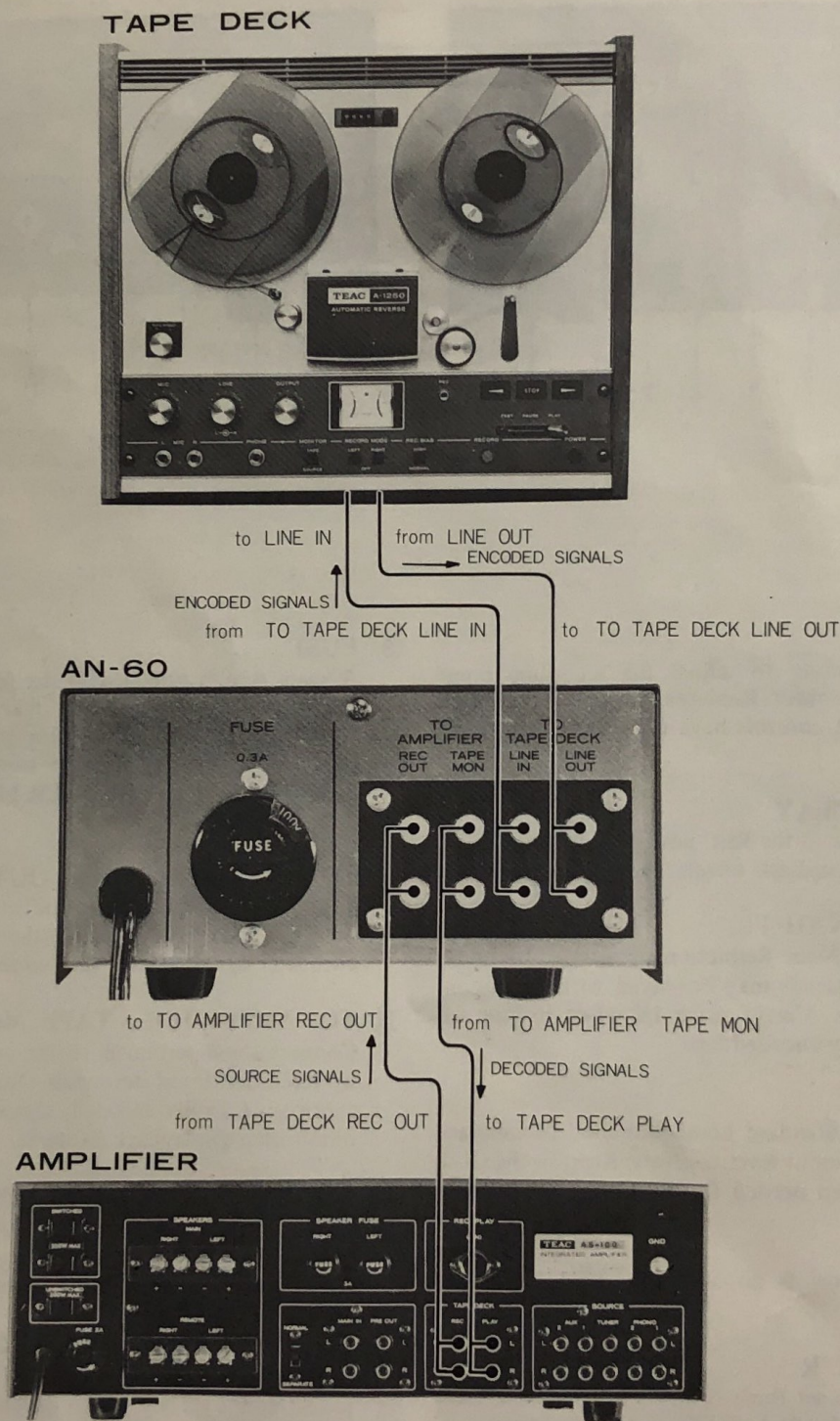
Connect these terminals to the Tape Deck's Line Output jacks (Note 1). They return the (normally) Dolby-encoded signal from the tape deck to the AN-60 for de-coding (Note 2).

⑭ Power Cord

Do NOT connect this cord until you have read the entire manual and have verified that the power requirements match your local house current.

Connecting the AN-60 to your audio system

STANDARD CONNECTIONS



Connect pin-jack cables between the tape deck, noise reduction unit and amplifier as shown above. These are the Standard Connections.

NOTE: If there is a DIN cord between your tape deck and amplifier, disconnect it and use only the pin-jack cords as shown above. Do not use DIN cords for they will bypass the Dolby Noise Reduction Unit and create squeals or hum.

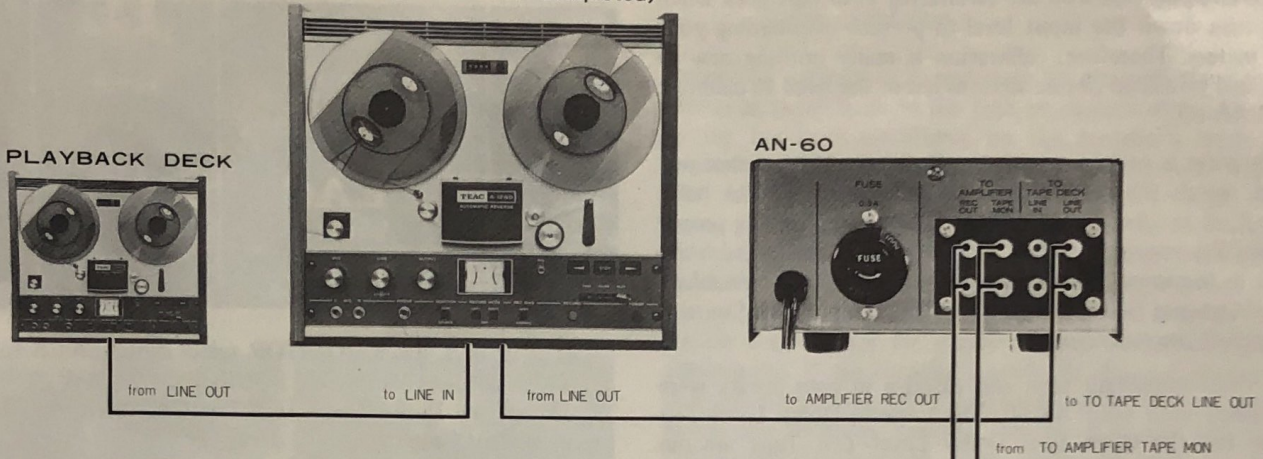
Dolby-encoded to Dolby-encoded tape copying

Note: For instructions, see page 10.

RECORDING DECK
(Recording Calibration completed)

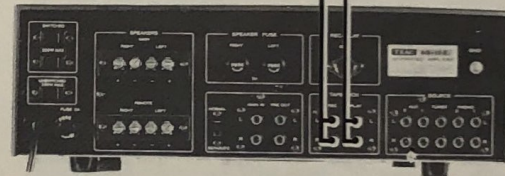
PLAYBACK DECK

AN-60



1. Connect the Playback Deck's LINE OUT pinjack to the Recording Deck's LINE IN pinjack.
2. Connect the Recording Deck's LINE OUT to the AN-60's pinjack labeled TO TAPE DECK-LINE OUT.
3. Other connections are illustrated.
4. The AN-60 and the AMPLIFIER are not required unless simultaneous de-coded listening is desired.

AMPLIFIER

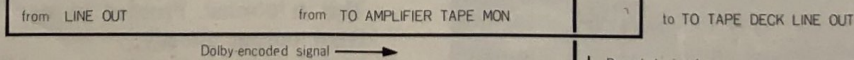
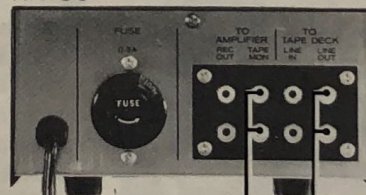
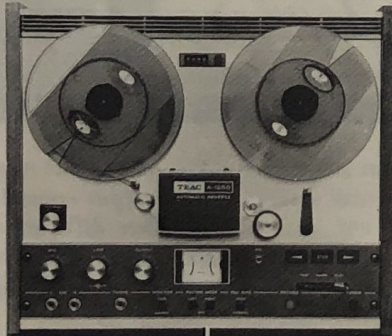


Dolby-encoded to Non-Dolby-encoded tape copying

Note: For instructions, see page 10.

PLAYBACK DECK
(Playback Calibration completed)

AN-60



Dolby encoded signal →

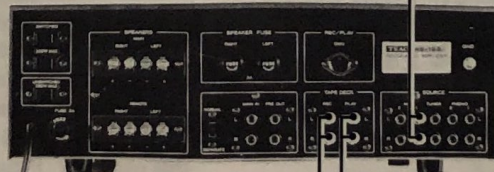
Decoded signal

to AUX

(Alternate)

AMPLIFIER

RECORDING DECK



from TAPE DECK REC OUT

to TAPE DECK PLAY

from LINE OUT

to LINE IN

NOTE:

Amplifier connections are not required unless simultaneous listening is desired.

Playback calibration

Calibration is something ordinarily associated with servicing electronics equipment, so you may have never realized that you are "calibrating" each time you operate any of your audio components. You are calibrating your tape deck when you turn down the input level to prevent overloading your VU meters. Therefore, calibration is really nothing new to you, and you need not be anxious about the need to calibrate your AN-60.

Calibration is necessary with the Dolby System because you must match the record and playback halves of the noise reduction process. Simply stated, you are finding the proper setting for your controls so that the sound you record is the same as the sound you play back. Actually, you are establishing the proper Dolby level so that playback will be a "mirror-image" of the recording.

The most important tape and cassette in your library were furnished with your AN-60. The Cassette Dolby Level Test Tape and the Open Reel Dolby Level Test Tape are the reference your AN-60 needs for matching itself to your tape or cassette deck. Treat them with respect! They represent the Standard Dolby Level which is used with all products and recorded tapes using the Dolby System. Keep them away from all strong magnetic fields such as those from transformers, head and bulk de-magnetizers, and speaker magnets. Keep them in a cool, dry place and remember that they are your key to accurate calibration. Playback calibration need be done only once (upon initial installation) provided that:

1. only one brand and type of tape is always used;
2. the same tape deck is always used;
3. the tape deck output controls are not changed.

Number (3.) above can be remedied by marking the calibrated settings with a felt tip pen, then returning to those calibrated positions if the controls have been moved. Settings will be different for different tapes and decks, so when changing them, always re-calibrate. Calibration should also be re-accomplished periodically as a check, monthly or bi-monthly, but you will generally find that the settings will be constant with your AN-60.

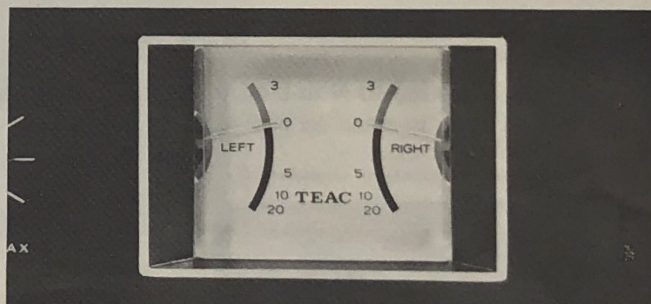
Calibration consists of two stages. The first stage (steps 1 thru 6) establish a fixed audio level from your deck so that the Dolby unit will have a Standard Input Level from which to operate. The remaining steps calibrate the AN-60 for the Standard Dolby Level as played back from the Dolby Level Test Tapes.

NOTE: There is a wide variety of tape decks and cassette decks in use today, so if the steps do not identify the specific controls of your deck, or if your deck does not have certain controls or switches, just read on and do what you can. Remember that basically we are establishing a fixed audio level on the deck output, then using that to calibrate the AN-60. Ensure that the tape heads are clean before proceeding.

1. On the AN-60, set the DOLBY switch to IN. Rotate the L and R PLAY CAL controls CCW (fully counter-clockwise.)



2. If your deck has a MONITOR select switch, set it to the TAPE position (other than SOURCE).
3. Thread the Dolby Level Test Tape (or insert the Dolby Level Test Cassette) on the deck.
4. Apply power to the AN-60, the tape or cassette deck, and the amplifier.
5. Start the deck in forward play. (Open reel decks use your regular operating speed.)
6. Using the Output Level controls on the tape deck, adjust for a 0 VU (bottom of the red line) setting on the deck's VU meters. Mark this setting with a felt tip pen and do not change it.



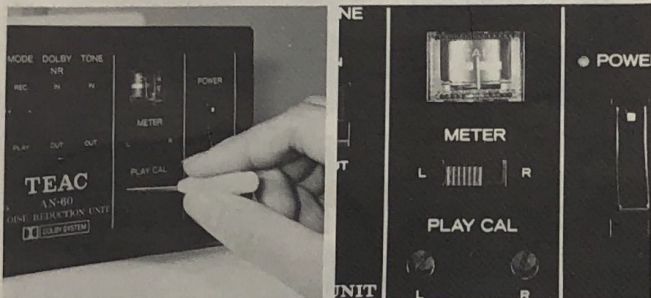
This is impossible on some decks. The VU meters may not reach 0 VU or they may scale out. The output control may have no effect. If any of these or other difficulties are encountered, the following sub-steps apply. If everything is normal through step 6 (above) then skip the following and proceed to step 7 (next page.)

- a. If there is no output control on your deck, the VU meters may be reading low or they may be pegging to the right. This is normal. Proceed to step 7, for your deck has a fixed output already.
- b. If there is no indication on the VU meters, set the output control for approximately 2/3 clockwise position or the normal playback setting and mark it. Proceed to step 7.
- c. If there is an indication on the VU meters, but the output control has no effect upon the reading, then set the control to the position you usually use, such as 2/3 clockwise. Mark it with a felt tip pen and leave it there. The meters may be reading low or pegging to the right, but that is not important since you cannot control them. The tape decks with Sound-On-Sound or Echo features are often in this category. Proceed to step 7.
- d. If the record and playback level controls are the same control, set for 0 VU (if possible) mark with a felt tip pen, and always return to this setting when you finish recording.

Recording calibration

NOTE: The standard output level has now been established on the tape deck. Do not change this setting without again completely re-calibrating for playback. If the controls have been well marked with a felt-tip pen you can simulate recalibration by returning the controls the marked position.

7. On the AN-60, set the METER switch to the L (left) position. Using a small screwdriver, adjust the L (left) PLAYCAL setting for the CAL position on the meter. The CAL position on the meter is the gap in the silver line below the letter A in CAL. If your tape recorder was unable to obtain a 0 dB reading on its VU meters, it may be necessary to try a different setting of the output control on the deck).



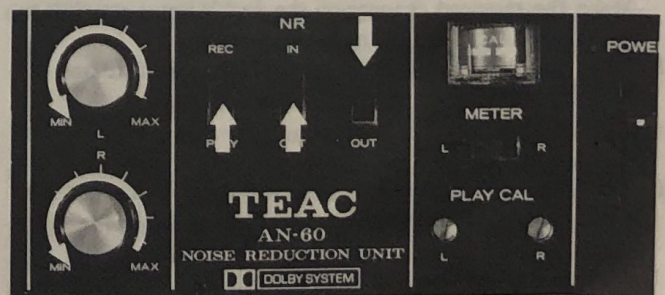
8. Repeat step 7 with the METER switch in the R (right) position and using the R (right) PLAY CAL setting.
9. Remove the test tape and put it in a safe, non-magnetic place.
10. Playback Calibration is now complete. Proceed directly to the RECORDING CALIBRATION section, for a change in the Playback Calibration may require a change in the Recording Calibration.

NOTE: Before beginning the Recording Calibration you should complete the Playback Calibration. All tape heads must be clean and all connections correctly performed. The amplifier need not be connected during calibration.

Recording calibration is necessary to establish the standard reference input level on the tape or cassette deck. After this setting has been established on the recorder's input level controls, all recording input adjustments are made with the REC LEVEL controls on the AN-60. In other words, we are fixing the Standard Dolby Input Level on the recorder's input controls. The AN-60 has a built-in 400 Hz stable audio oscillator with a Dolby Standard output which is used to set the recorder's input levels. The REC LEVEL controls on the AN-60 then replace the deck's controls for recording level adjustments. If the recorder's levels are changed after calibration, your recording will not be based on the Dolby Standard Level, the dynamic balance will be lost, and the Dolby Process will be defeated. This calibration must always be performed for and with the same type of tape with which you will be recording.

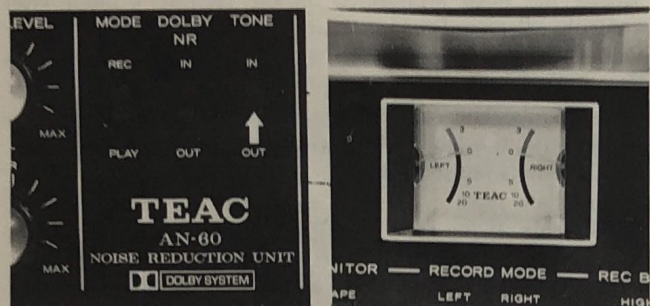
The actual calibration procedure is basically simple: you record the tone from the AN-60 onto the tape, then play it back. The reading on the calibration meter will be the CAL reading when the tape or cassette deck has the proper setting of its input level controls. As you calibrate the recording levels you will be alternately recording and then playing back. Using the Index Counter on your deck will simplify the procedure. Most importantly, you must remember to place the MODE switch on the AN-60 in the REC position during recording; conversely, the MODE switch must be in PLAY while you are playing back to check the new METER readings.

1. Position the controls on the AN-60 as follows:
 - REC LEVEL = fully CCW (counter-clockwise)
 - MODE switch = REC
 - DOLBY NR = IN
 - METER switch = L or R (not needed during recording)
 - POWER switch = on
 - TONE switch = OUT until the recorder begins recording



2. The tape or cassette recorder should have a reel of the same tape with which you will be recording threaded on or placed in it. Set:
 - Index counter = 000
 - Power switch = on
 - Tape speed = same as anticipated in future recordings
 - Bias switch (if applicable) = to match the tape
 - Pause control = On to provide ease of operation, but not required.

- Place the TONE switch IN and start recording the 400 Hz tone from the AN-60. For this initial setting, set the Recorder's Line Input controls so that the deck's VU meters read 0 dB. This will only be a starting reference point from which to make the final adjustments. Record approximately 10 to 15 seconds after the input controls have been stabilized with a 0 dB reading on the VU meters.



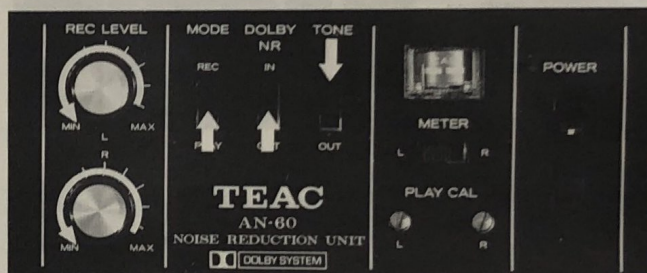
NOTE: If your deck has a single, combined control for both line input and line output, you will be departing from the Playback Calibrated position. If the control is properly marked with a felt tip pen, you can easily return to the calibrated position for playback without having to recalibrate completely.

- Stop the tape deck. Place the TONE switch in the OUT position. Rewind the tape to 000 on the index counters.
- Place the AN-60 MODE switch to the PLAY position. If your deck has a monitor switch, place it in the Tape position. (If your deck has a combined Record and Playback level control, make a temporary mark of the setting, and return it to the calibrated Playback setting.)
- During playback of the recorded tone, use the METER switch to read the Left and Right channels. You want to determine how much increase or decrease in input to the channels will provide a CAL reading on the AN-60's meter. The chance of them reading CAL on the first recording is very slight.
- Stop the deck and re-set the index counter to 000. Make the required changes on the deck's input controls to bring the CAL meter to the CAL position.
- Place the MODE switch on the AN-60 to REC. Place the TONE switch IN.
- Record the 400 Hz tone again for approximately 10 seconds.
- Repeat steps 4 through 10 until the CAL meter indicates CAL position in the center of the scale between the silver lines.
- Mark the recording input levels now set on the deck's input controls. Do not move these controls without returning them to their calibrated settings or recalibrating before you begin to make Dolby recordings. Recording calibration is now completed.

3-Head Tape Decks: An Alternative Calibration Procedure.

Three-head decks have separate record and playback heads. Three-head function decks are included in this category because although they have only 2 heads, their erase head is combined with the record head which leaves the playback head separate. These two types of decks are able to monitor the recorded signal from the tape during recording. This monitored signal is sent to the AN-60. Most quality open reel decks have this tape monitor capability. If you have any doubts about whether your deck is two-head or three-head, use the two head calibration procedure above. It is completely satisfactory although slightly more difficult.

- Position the controls on the AN-60 as follows:
 REC LEVEL = fully CCW (Counter-clockwise)
 MODE switch = REC
 DOLBY NR = IN
 METER switch = L
 POWER switch = on
 TONE switch = OUT until the deck begins recording

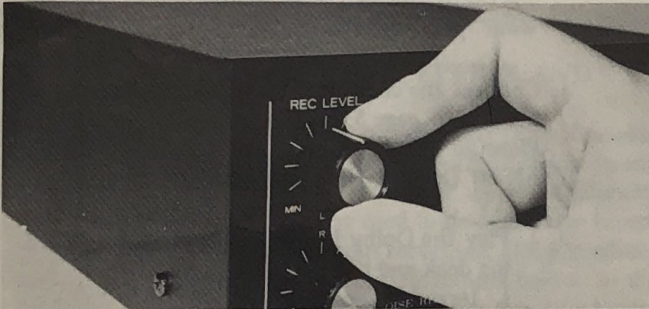


- The tape deck should be threaded with a reel of the same type of tape with which you will be recording. Place the controls on the deck as follows:
 Power switch = On
 Tape speed = same as in anticipated recording sessions
 Bias and equalization = to match the tape
 Monitor switch = tape
 Input level controls = CCW until calibration begins
- Start the deck in the forward record mode.
- Place the TONE switch IN
- Adjust the Left Input Level control on the deck while observing the CAL meter on the AN-60. Calibrate the Left Input so that the meter indicates the CAL position.
- Repeat step 5 for the right channel after changing the METER switch to R. Mark both input controls with a felt tip pen.

Recording instruction

Your basic recording procedures have not been changed by the incorporation of the Dolby Noise Reduction System. In essence, you have added a step which will encode your tapes so that, after de-coding, they will be free of tape hiss during playback. If you have cleaned your tape heads and performed the recording and playback calibration, you are almost ready to make your first Dolby-encoded tape. Before you start, carefully read and follow the appropriate sections to ensure that you are following the new procedures correctly. Three basic practices should always be remembered:

1) Always adjust your recording input level with the REC LEVEL controls on the AN-60.



- 2) Use the VU meters on the tape deck for setting input levels. (The meter on the AN-60 is only to be used for calibration.)
- 3) Never change the setting of a calibrated control except during calibration.

If your amplifier has sufficient connections and switching for the various possible recording situations, you can use the Standard Connections for almost all of your recording. Such an amplifier would be considered your audio control center. However, it is not necessary to use any amplifier except when recording from phonograph records or microphones.

A. Recording from FM Broadcasts

This section is concerned with recording only. For simultaneous recording and listening, see the section "FM Broadcast Reception" in this manual.

Many FM broadcasting stations are now transmitting Dolby-encoded programs. When you are recording such a broadcast, refer to the 2nd part of this section.

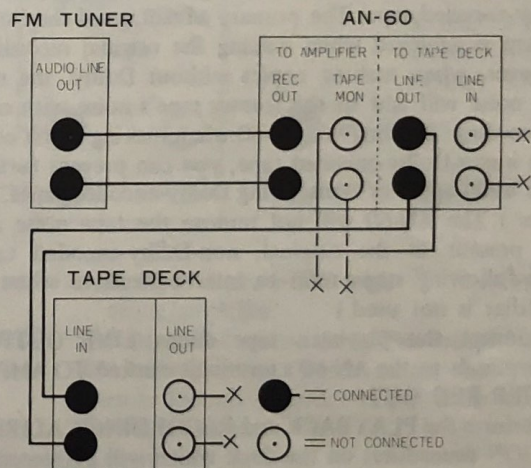
If you have performed the Playback and Recording calibration, and your components are connected according to the Standard Connections page in this manual, there are very few additional steps to perform. If you have an integrated amplifier-receivers or your tuner is connected to the amplifier:

- Place the AN-60 MODE switch in REC
- Place the DOLBY NR switch IN
- Keep the TONE switch OUT
- Have the POWER switch ON

Follow your normal recording procedures as outlined in the amplifier and recorder owners manuals, with the exception that all recording input levels are set with the AN-60s REC LEVEL controls.

For recording directly from the tuner, connect the components as illustrated below, and tune in the station using the tuning indicator on your tuner. For monitoring, place your tape recorders monitor switch to the Source position during tuning and recording. On some recorders, it may be necessary to be recording while you are tuning in order to hear the station. After tuning is complete, rewind the deck to the beginning of the tape. After making the connections as shown below and before tuning the receiver, set the controls as follows:

- On the AN-60, select REC MODE, DOLBY NR switch IN, TONE switch OUT, and POWER switch ON.
- Prepare the tape deck as outlined in its owner's manual
- Prepare the tuner as outlined in its owner's manual. During recording, make all input level adjustments with the AN-60's REC LEVEL controls.



Connections for FM broadcast recording with a separate FM Tuner.

CAUTION: Never connect the AN-60 directly to any speaker outlet terminals, for this would severely damage the delicate electronic components within the unit.

B. Recording from Phonograph Records

Your record albums will be recorded in almost the same manner as before. The AN-60 is connected as shown in the Standard Connections section, between the amplifier and the tape deck. Prepare your AN-60 in this manner:

- Place the MODE switch to the REC position;
- Place the DOLBY NR switch IN;
- Keep the TONE switch OUT;
- Place the POWER switch On.

Make all recording level adjustments with the REC LEVEL controls on the AN-60. Do not attempt to record directly from the turntable through the AN-60. Never connect the AN-60 directly to any speaker outlet terminals.

C. Live Recording with Microphones

As the AN-60 has no microphone pre-amplifier, you must do all live recording through an appropriate amplifier. This may be a specifically designed mic pre-amp, an integrated receiver/amplifier with microphone input jacks, or any suitable amplifier. The microphone jacks on the tape deck are NOT to be used. Any microphone connected to them would completely bypass the Dolby circuitry and the recording would not be Dolby-encoded. On the AN-60, place the switches as follows:

MODE = REC; DOLBY NR = IN TONE = OUT; POWER = On. Make all recording level adjustments with the REC LEVEL controls on the AN-60.

D. Recording from one tape deck to another.

* Non-Dolby-encoded to Dolby-encoded.

As mentioned in the introductory text to this manual, the AN-60 is not a filter. This point is important especially when making a Dolby-encoded tape from another, non-Dolby-encoded tape. The primary advantage of the Dolby System is achieved when making the original recording. However, when making copies without Dolby, the new tape noise will add to the former tape's noise with each re-recording. By using the AN-60 when making a first copy from a non-Dolby-encoded tape, you can prevent further noise build-up. (For transcribing Dolby-encoded tapes, see below.) The AN-60 will not remove the tape noise and hiss present in the original, non-Dolby-encoded tape. (The following steps refer to interconnections when an amplifier is not used.)

1. Connect the playback tape decks LINE OUTPUT terminals to the AN-60's terminals marked TO AMPLIFIER-REC OUT.
2. Perform the PLAYBACK and RECORDING CALIBRATION procedures on the deck which will be recording if not previously accomplished. Calibration is not performed on the playback deck which has the non-Dolby-encoded tape.
3. Copy the tape in the usual manner EXCEPT:
 - a. Have the DOLBY switch IN on the AN-60 and the MODE switch in REC.
 - b. Make all input level adjustments using the REC LEVEL controls on the AN-60. Do not adjust the previously calibrated level controls on the recording deck.
 - c. Place all MONITOR switches to the TAPE position. Use the monitor switch on the recording deck to compare tape and source.
4. Use the VU meters on the recording deck for observing the input level.
5. If your playback tape deck has a LINE OUTPUT level control, place it approximately at the center of its range to prevent distortion. This setting will be based upon your experience and the characteristics of your machine.
6. If simultaneous listening is desired, connect the Recording Deck's Line Output to your amplifier. The sound you hear will be Dolby-encoded, and it will sound somewhat brighter than normal. During Playback of the tape in the future it will sound proper because you will be de-coding the tape.

* Dolby-encoded to Dolby-encoded

Many decks (especially cassette decks) are now available with built-in Dolby circuitry. If either deck you use when copying Dolby-encoded tapes is equipped with Dolby circuitry, you must keep its Dolby switch OUT. As long as the deck's Dolby switch is OUT and you follow the procedures below, the copies you make will work equally well when played back on a standard deck with the separate Dolby System unit or on another deck with built-in Dolby System.

NOTE: If headsets are used on either deck, you will hear the Dolby-encoded signal, which will sound somewhat "brighter" than usual.

1. Connect the components as illustrated on the upper half of page 5.
2. Place all Monitor switches to the TAPE position, AN-60 DOLBY NR switch IN, MODE switch to PLAY.
3. a. Play the Dolby Level Test Tape on the recording deck and calibrate:
 - i. Its output controls for 0 VU.
 - ii. AN-60 PLAY CAL controls for a CAL reading for both channels.b. Play the Dolby Level Test Tape on the Playback deck and calibrate the record level of the recording deck as follows:
 - i. Adjust the recording deck's input controls until its meters read 0 VU.
 - ii. Record for about 10 seconds, rewind and replay.
 - iii. Check the replay level on the AN-60's CAL meter: if it is not at CAL, adjust the recording level to correct it and record another 10 seconds.
 - iv. Repeat section iii until the replay level is CAL.
4. Place the tape you wish to copy onto the Playback deck.
5. When recording, start the Recording deck before you begin the Playback deck to avoid losing any of the program.
6. Make all listening level adjustments with the amplifier output controls. You cannot change any level control on the decks without losing the Dolby Standard Level.

* Dolby-encoded to non-Dolby-encoded

Connect your components as illustrated in the lower illustration on page 5. If you do not want simultaneous listening, you may by-pass the amplifier by connecting the AN-60 to the recording deck as shown by the dotted line. In that case, there will be no connection to the recording deck's Output terminals.

The playback deck must be calibrated as described in the PLAYBACK CALIBRATION section of this manual. No calibration is needed on the Recording deck, for it will be receiving a non-Dolby-encoded program.

1. On the AN-60, place the DOLBY NR switch IN, the MODE switch to PLAY, and do not move the PLAY CAL controls after calibration.

Dolby FM broadcast reception and recording

2. Both tape decks must have the Monitor switches set for Tape.
3. After calibrating the Playback deck, do not change the Output controls.
4. If your Recording deck has a Pause control, you may use it to keep your deck in the recording mode while you set the Recording deck's Input Level controls for the best recording level. Then rewind the Dolby-encoded tape, release the Pause control and begin recording.
5. Always start the Recording deck before you begin the Playback deck. This will prevent any loss of the program.
7. Make all your listening level adjustments from the amplifier's speaker output controls.

DOLBY FM BROADCAST RECEPTION AND RECORDING

Many FM radio stations are now broadcasting Dolby-encoded programs on an experimental basis. Regular Dolby programming should soon be available for your increased listening enjoyment. Your AN-60 can be used to de-code these broadcasts with or without simultaneous recording. The procedures are different so follow the appropriate section below. At the beginning of the Dolby FM broadcast, there may be a Dolby Level Test Tone transmitted by the station. You will use that tone to make the final calibration of your components.

"Dolby encoded FM broadcasts are still in their infancy and have established no definite pattern in regards to where or how the Dolby Tone will or should be transmitted throughout the program. In otherwords, the explanation in this manual is made on the presumption that the Dolby Tone will be transmitted at the beginning of each encoded program, since this would be the most appropriate point in the program."

1. Dolby-encoded FM reception without simultaneous recording

- a. Connect the components as illustrated in diagram #1 or #2.
- b. On the AN-60, set the DOLBY NR switch IN, the MODE switch to PLAY, the TONE switch OUT.
- c. On the amplifier, establish Tape Monitor mode.
- d. On the tuner, tune in the station and then set the desired listening level with the amplifier.
- e. When the station begins transmitting the 400Hz Dolby Standard Level test tone, use it to calibrate the Left and Right PLAY CAL controls for the CAL reading on the AN-60 meter.

NOTE: If you tune in the broadcast after the tone has been transmitted, you may make a rough calibration of the AN-60 PLAY CAL controls that will give satisfactory listening. If the music sounds good with the standard calibration settings, keep the controls there this time provided that the CAL meter is not reading above the CAL level on the loudest passages. Otherwise, calibrate the L and R PLAY CAL controls so that the very loudest passages of the music remain below the CAL level on the meter. The needle should average in the center of the solid silver band during the program. Do not use this method

when recording simultaneously. An accurate calibration to the transmitted tone is essential for Dolby-encoded recording.

Diagram #1: Dolby-FM reception with tuner and separate amplifier.

NOTE: Labels on your equipment may be different. Consult your owner's manuals for identification of terminals.

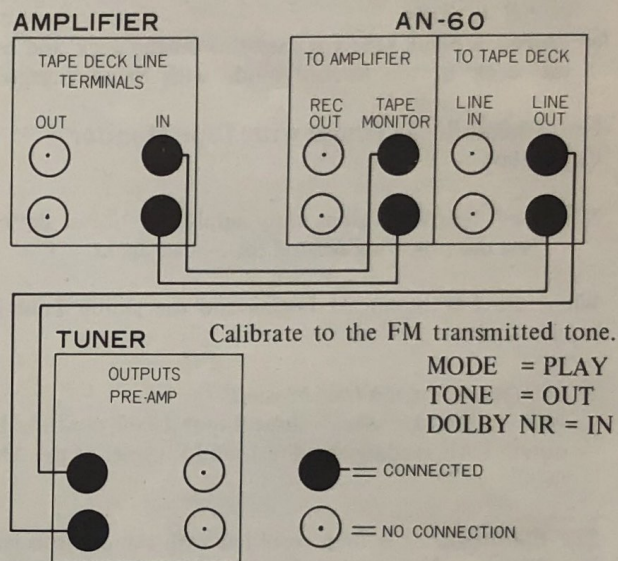
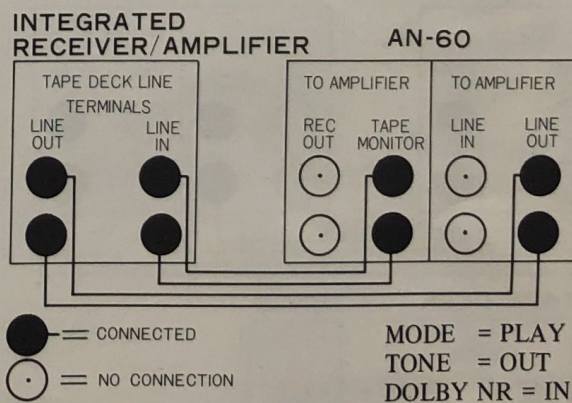


Diagram #2: Dolby-FM reception with an integrated receiver/amplifier.

NOTE: The integrated receiver/amplifier must have Tape Monitor capability, which means that you can listen to the tape recorder output while recording the FM broadcast.



AMP MODE: Tape Monitor with FM recording (You will simulate recording an FM broadcast with the AN-60 now replacing the tape deck.)

2. Simultaneous decoded FM listening with encoded recording

Connect the components as illustrated in Diagram #3 or #4. Make the following preparations several minutes before the start of the Dolby-encoded FM broadcast:

- a. Set all Tape/Source monitor switches to the Tape position.

- b. On the AN-60, set the DOLBY NR switch IN, the TONE switch OUT and the MODE switch to PLAY.
- c. Thread the Dolby Level Test Tape on the tape deck and adjust the tape deck Output Controls to obtain 0 VU on the deck's meters. Then, adjust the L and R PLAY CAL controls for CAL on the AN-60's meter.
- d. Temporarily set the tape deck Monitor switch to Source and tune in the desired FM station. After the station is tuned-in, immediately return the Monitor switch to Tape.
- e. Thread a blank tape (or cassette) on the deck and set the deck in the Record mode with Pause engaged.

• For 3-head decks (those with Tape Monitor Capacity)

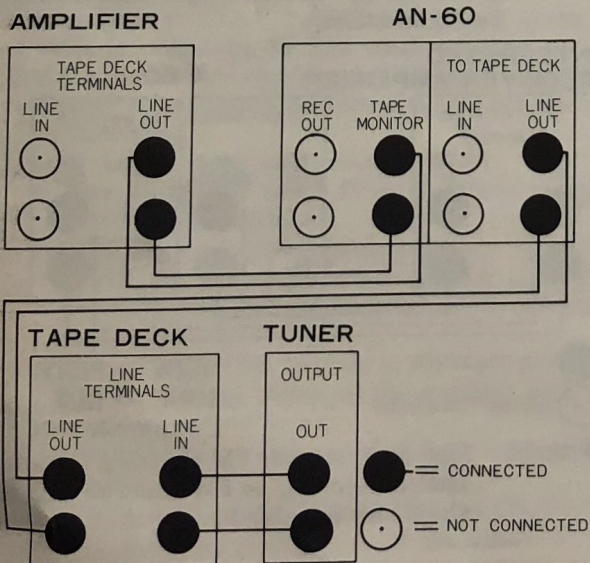
Note: The following steps only apply to 3-head decks. See the following section for 2-head decks.

When the FM broadcast begins and the Dolby Tone is transmitted:

- f. Start recording the transmission.
- g. Adjust the tape deck's Line Input Level controls to obtain CAL readings on the L and R meter of the AN-60.

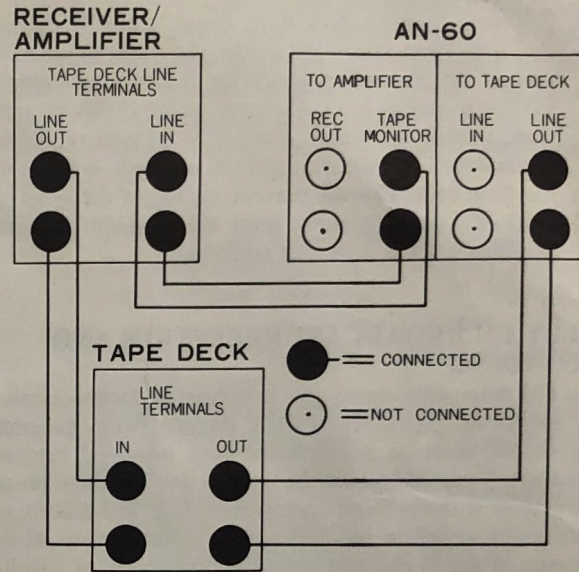
The FM broadcast is then recorded with the controls left as calibrated. Make all listening level changes with the amplifier speaker output controls.

Diagram #3: Simultaneous recording and listening to a Dolby-encoded FM broadcast using a tuner with a separate amplifier



- | | | |
|-----------|-------------|---------------------------------------|
| AMP MODE | | Tape Monitor |
| AN-60 | { DOLBY NR | IN |
| | { TONE | OUT |
| | { MODE | PLAY |
| | { Calibrate | See text |
| TAPE DECK | { Monitor | Tape |
| | { Calibrate | Input using FM transmitted tone |

Diagram #4: Simultaneous recording and listening to Dolby-encoded FM broadcasts using an integrated receiver/amplifier.



- | | | | |
|-----------|-------------|-------|------------------------|
| TAPE DECK | { Monitor | | Tape |
| | { Calibrate | | to FM transmitted tone |
| AN-60 | { DOLBY NR | | IN |
| | { MODE | | PLAY |
| | { TONE | | OUT |
| | { Calibrate | | See text |

NOTE: The integrated receiver/amplifier must have Tape Monitor capability, which means that you can listen to the tape recorder output while recording the FM broadcast.

• For 2 head decks

In this case, the calibration procedures from and after step f are different from those for 3 head decks. Follow the procedures below after completion of step e above.

- f' For the purpose of calibrating the tape deck and the AN-60, temporarily interconnect the terminal TO TAPE DECK - LINE IN of the AN-60 to the Line In terminal on the tape deck as shown in diagram #5.
- g' Release the Pause control or start the deck Recording.
- h' Temporarily place the AN-60 to the REC MODE, place the TONE switch IN, then make a temporary calibration of the deck's Line In controls for a 0 VU reading on the deck's VU meters. Reset the Index Counter for 000.
- i' Record about 10 seconds of tone on both channels and then rewind the tape back to 000 on the counter.
- j' Place the AN-60 in the PLAY MODE with the TONE switch OUT. Playback the tape and note the AN-60's L and R meter readings. If the reading is CAL, you may proceed to step k'.

If the reading is not CAL for either channel, repeat the procedures from step g' until a CAL reading is obtained after making any necessary adjustment in the tape deck's Line In controls. When a CAL reading is obtained during playback, mark the deck's VU meters

Playback instruction

Specifications

to indicate what VU level was necessary to obtain a CAL reading on the AN-60.

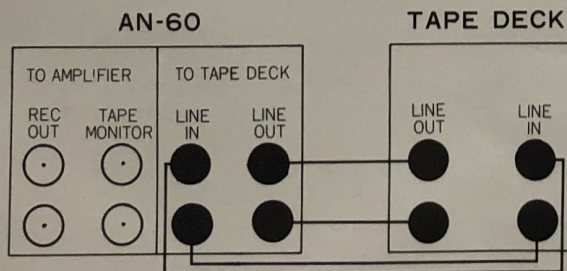
Example: Assuming your reading obtained in step j' is below the CAL level by a fair margin. Returning to steps g' and h', you adjust the deck's Line In controls for a +2VU reading on the deck's meters, rewind to 000, playback and the AN-60's meter now reads CAL. Then you would mark the glass at the +2 VU point on the meters for later reference (step m').

Note: For further calibration information, if you have difficulties, see the Recording Calibration Section.

- k' Disconnect the cables installed in step f' to return the system back to its original connections (either diagram #3 or #4).
- l' Return the AN-60 to the PLAY MODE with the TONE switch OUT. Rewind the tape and start the deck in the Record mode with Pause engaged.
- m' When the FM station begins broadcasting the Dolby Standard Level Test Tone, adjust the tape deck Line In controls to bring the deck's VU meters' readings to the points marked on the meter glass as instructed in step j'. The FM broadcast is then recorded without changing the level settings.

Make all listening level changes with the speaker output controls on the amplifier; do not change any other control for that will defeat the calibration.

Diagram #5: Temporary connections for calibrating the AN-60 and 2-head decks.



● = CONNECTED
○ = NOT CONNECTED

DOLBY NR = IN
MODE = REC/PLAY

TONE = IN/OUT
SEE TEXT

Playback instruction

Playback of Dolby-encoded tapes is similar to conventional playback with the following exceptions:

1. The AN-60 must be connected between your tape or cassette deck and the amplifier as described in STANDARD CONNECTIONS, page 4.
2. The DOLBY NR switch must be in the IN position.
3. The MODE switch must be in the PLAY position.
4. The PLAYBACK CALIBRATION must have been properly accomplished.

During playback, the AN-60 will de-code the tape and provide your amplifier with an audio signal free of tape noise and hiss. The quality of the sound, however, is totally dependent upon the care taken during the original recording and upon the quality of your deck and your amplifier/speaker system. There are a few other points to consider:

1. If your tape or cassette deck has a built-in Dolby Noise Reduction System, you need not disconnect the AN-60. You should, however, use the Dolby circuitry on the deck and, in this leave the AN-60's DOLBY NR switch OUT. There will not be any damage to the equipment with both Dolby switches IN, but the Dolby affect will be defeated and the tapes will sound flat.
2. Non-Dolby-encoded tapes will be played satisfactorily with the AN-60 connected. However, keep the DOLBY NR switch OUT or the tape may sound flat.
3. Dolby-encoded tapes will play reasonably well on systems without a Dolby Noise Reduction unit. They will sound somewhat brighter than normal and the tape noise will be present.
4. Provided that the calibration has been properly performed at every stage, tapes encoded on any Dolby Noise Reduction unit such as the AN-60, should work equally well when played back on any other Dolby circuitry available. Commercially available tapes already encoded for Dolby will work perfectly with the AN-60.
5. Always disconnect any DIN cord between the amplifier and the tape deck when the AN-60 is connected.

Specifications

Frequency Response	20 ~ 15,000 Hz ± 2 dB
Increased SN Ratio	10 dB at 10,000 Hz 5 dB at 1,000 Hz better than 6 dB overall (B weighting network)
Input Sensitivity	Line: 0.1 V
Input Impedance	Line: 35,000 ohms
Outputs	To tape deck input: 0.3 V Line : 0.58 V
Harmonic Distortion	below 0.5%
Multiplex Filter	better than -30 dB at 19k Hz
Channel Separation	better than 50 dB
Tone Oscillator	400 Hz
Power Requirements	100/117/200/220/240 V AC (US model is 117 V only) 50/60 Hz, 2.5W
Dimensions	3-3/8"(H) x 6-5/16"(W) x 10-9/16" (D) [86 (H) x 160 (W) x 268 (D) mm]
Weight	4-3/8 lbs, [2 kg]net

* Features and specifications subject to change without notice.

Standard Accessories

- * Dolby Level test tape (open reel)
- * Dolby Level test tape (cassette)
- * Input-output connection cord
- * Silicon cloth
- * Fuse
- * Screw driver

TEAC CORPORATION

TEAC CORPORATION OF AMERICA

TEAC EUROPE B.V.

TEAC HONGKONG LIMITED

SALES OFFICE: SHINJUKU BLDG., 1-8-1, NISHI-SHINJUKU, TOKYO PHONE: (03) 343-5151

7733 TELEGRAPH ROAD, MONTEBELLO, CALIFORNIA 90640 PHONE: (213) 726-0303

KABELWEG 45-47, AMSTERDAM-W. 2 NETHERLANDS PHONE: 020-821656

ROOM NO.1105 MELBOURNE PLAZA 33 QUEEN'S ROAD C, HONG KONG PHONE: 252027