

Nortronics
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YOUR LOCAL DEALER

MAGNETIC TAPE HEADS

1. INTRODUCTION.

1-1. The following instructions will tell you how to correctly install and adjust your new NORTRONICS RECORD/PLAY (R/P) or RECORD ONLY tape head. If the instructions are followed, there should be no problem in making an installation which is capable of equalling or exceeding the original performance of the recorder.

2. EXAMINING ORIGINAL R/P HEAD.

2-1. If the new head is to replace an existing R/P head, do not remove the original head until a preliminary examination has been made. After removing head cover plates and whatever else might be necessary to completely expose the heads, carefully study the original arrangement before attempting to remove the head or any wires. If there is any doubt as to

which is the erase head and which is the R/P head, thread a reel of tape on the recorder and put the machine in the PLAY mode. The first head the tape passes over after leaving the supply reel is the erase head. The second head the tape passes over is the R/P head. If the recorder uses three or more heads, consult the instruction manual or other information pertaining to the recorder to determine the function of the various heads. In the usual 3-head arrangement, the first head the tape passes over is the erase head, the second is the record head, and the third is the play-back head.

2-2. If the new head is a replacement for a 2-track monophonic or 4-track stereophonic R/P head, place the recorder so the transport is in a HORIZONTAL position. This will serve as a reference point. Looking squarely at the FACE of the heads, observe whether the erase head is on the right or left side of the R/P head. Jot down this information. The reason for this is to determine which portion of the tape should cover the pole piece(s) of the R/P head. This procedure is not necessary for 2-track stereo or Full Track R/P heads as they both cover the full width of the tape.

2-3. Erase Head on RIGHT Side of R/P Head. If the R/P head is a 2-track mono type then the pole piece should be even with the bottom edge of the tape. If the R/P head is a 4-track stereo type then the pole piece closest to the transport plate should be even with the bottom edge of the tape.

2-4. Erase Head on LEFT Side of R/P Head. If the R/P head is a 2-track mono type then the pole piece should be even with the top edge of the tape. If the R/P head is a 4-track stereo type then the pole piece furthest from the transport plate should be even with the top edge of the tape.

3. CHECKING WIRING OF ORIGINAL R/P HEAD.

3-1. No Mount Monophonic Heads. A mono head will have only two wires: a ground wire and a "hot" wire. It is not necessary to determine which is which since there is no polarity to the NORTRONICS monophonic heads.

3-2. No Mount Stereophonic Heads. A stereo head will have four wires: a ground wire and a "hot" wire for each of the two channels. In this case, the function of the wires must be known before they are disconnected from the original head to assure proper phasing of the two channels and to make certain the wires for each channel are connected properly when the new head is installed. It would be a good idea to make a sketch of the original wiring arrangement that shows (1) the color of each wire, (2) which wires are for the upper and lower channels of the head, (3) the location of the wires on the pins of the original head, and (4) which are the ground wires for each channel. Follow each wire to determine if it is grounded or not. Those not grounded are the "hot" wires. In most cases the wires for each channel will be paired; that is, the ground and "hot" wires will be either twisted together or in the form of a shielded cable. If the wires are not paired in any manner and it is impossible to tell which "hot" wire is paired with which ground wire, a VOM, Ohmmeter, or VTVM with resistance ranges may be used to identify the ground wire for each channel. Proceed as follows: Be certain the line cord supplying power to the recorder is NOT plugged in. Put the machine in the RECORD mode. If there is a Mono 1, Mono 2, Stereo Record selector switch, set it for Stereo Record. The VOM, Ohmmeter, or VTVM should be set to read "ohms" on the X1 scale. Fasten a lead from the meter to one of the wires on the rear of the R/P head and touch the other meter lead to a bare metal spot on the transport of the recorder. Note the meter reading for that particular wire on your sketch. Repeat this procedure with the three remaining wires on the rear of the R/P head, noting on your sketch each time the resistance reading obtained. The two lowest resistance readings are the ground wires for the stereo R/P head. In most cases, the ground wires will give a zero reading, indicating no resistance between the ground wire and the transport of the recorder.

3-3. Rear Mount Heads. The instructions given above for checking the original wiring on No Mount R/P heads can be used for Rear Mount heads with this exception: Since the wires come from inside the head and it is not possible to see which wire is connected to which pin on the head, trace

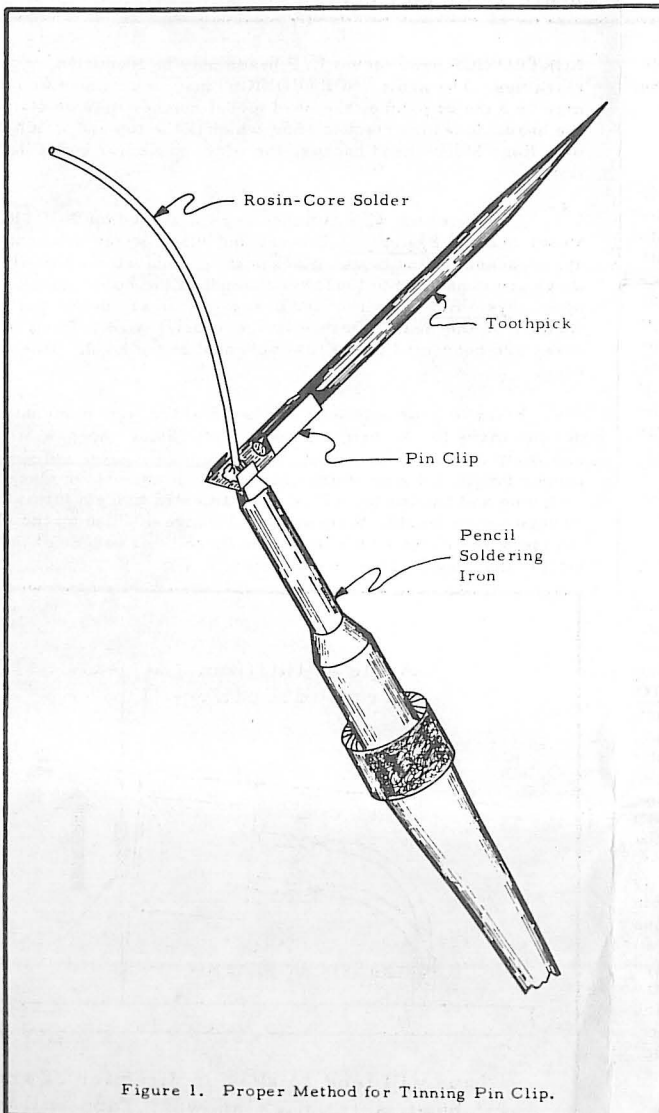


Figure 1. Proper Method for Tinning Pin Clip.

(over)

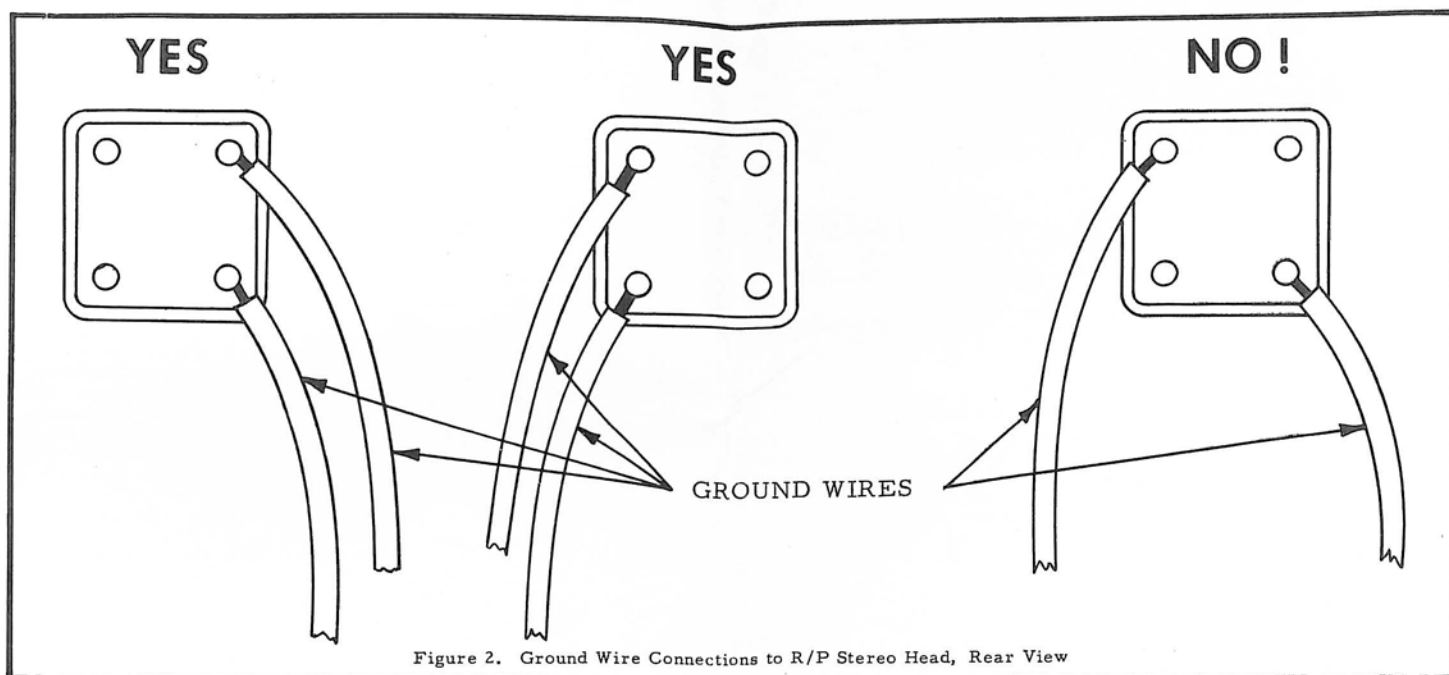


Figure 2. Ground Wire Connections to R/P Stereo Head, Rear View

these wires to the terminal strip, plug, or whatever type of connector the wires are soldered to and make your sketch. Do not overlook jotting down the color of each wire.

4. REMOVING ORIGINAL R/P HEAD.

4-1. After making the above notations, the R/P head can be removed. The wires originally connected to a No Mount head may be re-used if sufficient length exists to solder pin clips to them and slide the pin clips onto the terminal pins of the new head. Otherwise, the wires supplied with your new NORTRONICS head should be used. If the original wires are soldered to clips which are then pressed onto the pins of the head, carefully slide the clips from the pins with long-nose pliers. If these clips have also been soldered to the pins of the head, cut the wires from the clips if they are long enough for re-use. Handle these wires with care, as they are usually quite fine and cannot stand much flexing or strain. If the original head is a Rear Mount type, unsolder the wires from the connector they are soldered to as the wires coming from inside the new Rear Mount head must be soldered in their place.

4-2. Remove the old No Mount or Rear Mount R/P head from the recorder and install the new head in its place.

5. CONNECTING WIRES TO NEW R/P HEAD.

5-1. **No Mount Heads.** If new wires are required due to the original wires being too short for re-use, these wires should be installed at this point. Regardless of whether the original wires are being re-used or new wires have been installed, you must use pin clips to connect the wires to the terminal pins of the head. **DO NOT SOLDER THE WIRES DIRECTLY TO THE HEAD TERMINAL PINS!** A certain amount of care is required when soldering wires to the pin clips to prevent flux and solder from flowing into the portion of the pin clip that grips the head terminal pin. One method that works quite well is to slide the pin clip over the end of a toothpick. Tilt the toothpick down to prevent flux and solder from flowing into the gripping portion of the clip. Tin the end of the clip (see Figure 1), then tin the end of the wire to be connected to it. Lay the tinned wire over the tinned end of the clip and touch the iron to the bottom of the clip end. Leave the iron in contact with the clip just long enough for the solder to melt and flow around the end of the wire, making a good joint. The pin clips are connected to the head by sliding them onto the head terminal pins with long-nose pliers. On all NORTRONICS stereo heads, the top two pins of the head are for the upper channel and the bottom two pins are for the lower channel. Refer to your notations or sketch of the wire designations and connect the pin clips to the correct terminals on the head. Make certain before actually connecting the pin clips that you have the ground wires for both channels on the **SAME SIDE** of the head. Refer to Figure 2. If this connection is not made properly, the two channels will be out of phase with each other.

5-2. **Rear Mount Heads.** The wires coming from inside the new Rear Mount head must be soldered to the same connector used by the original wires. No pin clips are required. Before soldering these wires it is necessary to identify the **TOP** of the Rear Mount head. The top of all

NORTRONICS Rear Mount R/P heads may be identified by one of several markings. The name "NORTRONICS" may be stamped or labeled, there may be a dot of paint or the head model number may be stamped on top of the head. It is important to know which is the top and which is the bottom of a Rear Mount head because the wires are color coded for identification.

5-3. Two different wire color codings are used on NORTRONICS Rear Mount heads. **System 1:** The red and black wires are connected to the upper channel of the head. Black is the ground wire. The white and black wires are connected to the lower channel of the head. Black is the ground wire. **System 2:** The red and orange wires are connected to the upper channel of the head. Orange is the ground wire. The yellow and blue wires are connected to the lower channel of the head. Blue is the ground wire.

5-4. Refer to your notations or sketch of the wire designations and solder the wires to the original connector. Since the new wires are considerably longer than actually needed in most cases, cut the wires to the proper length but give yourself a sufficient amount of slack to allow for stripping and tinning the wires, plus an extra margin for safety to insure adequate wire length. Strip and tin the wires. Push up the shield covering the wires about 1 or 2 inches so there is no danger of the shield contacting the tinned wires or connector.

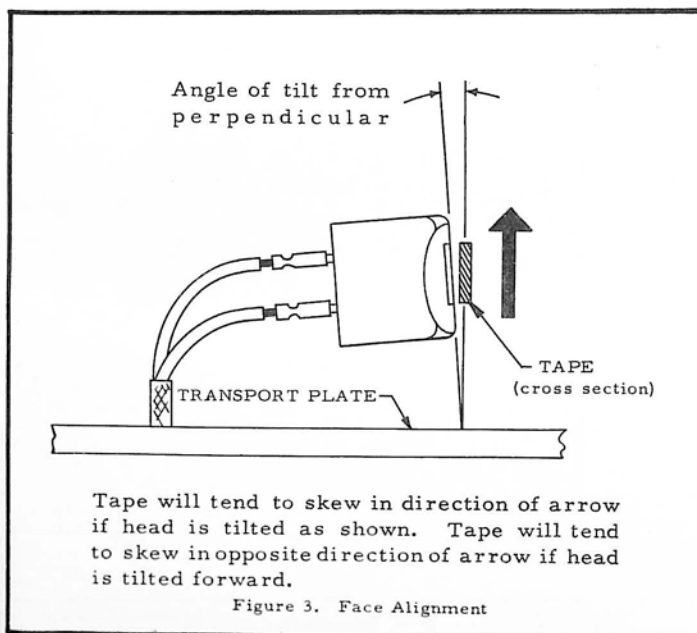


Figure 3. Face Alignment

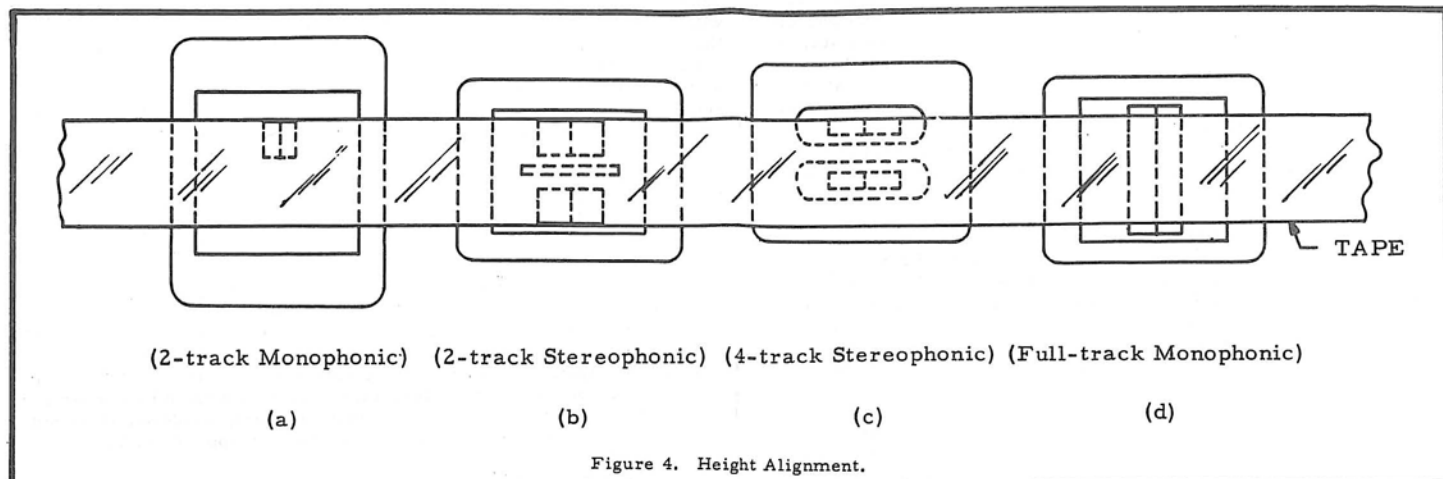


Figure 4. Height Alignment.

6. HEAD ADJUSTMENTS.

6-1. There are three adjustments which must be made to the new head in order for it to operate properly once it is installed on the recorder. These adjustment instructions apply to BOTH No Mount and Rear Mount R/P heads.

6-2. **Face Alignment.** The face of the head should not be tilted forward or backward. If the head is tilted, the tape will tend to ride up or down on the head face in operation, depending on the angle of tilt. Refer to Figure 3. Check the FACE alignment by threading a reel of tape on the recorder and putting the machine in the PLAY mode. Observe the action of the tape. It should move in a straight line across the face of the heads with no tendency to wander up or down. If it does wander, the FACE alignment must be adjusted so the tape travels in a straight path across the face of the head. Since there are numerous ways in which this adjustment can be made, refer to the recorder literature and adjust the FACE alignment of the head by whatever means the machine provides. In some older machines there is no provision for making this adjustment. Leave the tape on the recorder.

6-3. **Height Alignment.** The height of the head must be adjusted so the pole piece(s) are covered by the proper portion of the tape. If this is not done, a weak signal and cross-talk from other tracks may result. This is particularly critical in the 4-track stereo R/P heads.

6-4. ALL NORTRONICS R/P HEADS EXCEPT THE FULL TRACK TYPE should be aligned for HEIGHT so the top edge of the tape is even with the top edge of the pole piece. Refer to Figure 4. Obviously, if your head installation is the type where the pole piece is covered by the bottom part of the tape, then the pole piece edge should be even with the bottom edge of the tape. Make this adjustment visually, using whatever means the recorder provides. Be very careful to avoid changing the FACE alignment made previously. Check your adjustment by putting the recorder in the PLAY mode and observing the action of the tape. Check first to make certain the FACE alignment has not been disturbed. If the recorder has a pressure pad to hold the tape against the face of the head, it may be necessary to hold it back to see if the pole piece is even with the proper edge of the tape. If so, the HEIGHT alignment is correct.

6-5. IN THE CASE OF THE FULL TRACK R/P HEAD, the pole piece is wider than the tape. This head should be aligned for HEIGHT so the pole piece extends an equal amount beyond the top and bottom edges of the tape. Remove the tape from the recorder.

6-6. **Azimuth Alignment.** Refer to Figure 5. The pole piece gap of the R/P head must be at right angles to the edge of the tape for maximum high frequency response from pre-recorded tapes and to assure compatibility between tapes made on one recorder and played on another. For professional AZIMUTH alignment, the NORTRONICS AT-100 Alignment Tape or other high quality tape specifically made for AZIMUTH alignment is required.

6-7. Before attempting AZIMUTH alignment, check to see what method is provided by the recorder for accomplishing this. There may be an offset screw or nut which is tightened or loosened to permit the head to be rocked from side-to-side, thus providing a wide latitude of adjustment for the gap of the head. In the case of Rear Mount heads, AZIMUTH alignment is usually accomplished by slightly loosening the nut holding the mounting stud of the head to its bracket and rotating the head with your fingers. Make certain when doing this that the HEIGHT alignment made previously is not changed.

6-8. After determining the method used to accomplish AZIMUTH align-

ment, thread the alignment tape on the recorder and set the tone control (if any) to maximum treble. If an oscilloscope, VOM, VTVM, or other voltmeter with AC ranges is not available, the head must be azimuthed by playing the tape and listening to it carefully while slowly rocking the head from side-to-side, using whatever means the recorder provides for doing this. The head is properly azimuthed when the constant-tone high frequency signals (7500 cps or 10,000 cps) recorded on the alignment tape sound the loudest and most brilliant. Because of the limited sensitivity of the human ear at high frequencies, the azimuth alignment tape and voltmeter method is the preferred professional approach. Should the recorder be equipped with a VU meter that can be switched to monitor the playback output, it may be used instead of the voltmeter. In this case, adjust the playback gain control until the VU meter reads approximately half scale while playing the alignment tape. Adjust the head until a maximum reading is indicated on the meter.

6-9. If a voltmeter is available, connect it across the playback amplifier output of the recorder. Play the alignment tape. Set the voltmeter on a range scale that will permit you to adjust the playback gain control until the voltmeter reads approximately half scale. Adjust the head until a maximum reading is indicated on the voltmeter. If necessary, either reduce the playback gain control as the voltmeter approaches full scale or switch the voltmeter to the next highest range.

6-10. If the recorder has separate heads for recording and playing back, it will be necessary to align AZIMUTH on both heads, regardless of which one is replaced. Since these recorders are generally of the professional or semi-professional type, only the azimuth alignment tape and voltmeter method will be discussed. Most recorders of this type also have separate record and playback amplifiers which allow the tape to be played back while being recorded. For this type of recorder, thread the azimuth alignment tape on the machine and connect the voltmeter to the playback amplifier output. Play the alignment tape. Adjust the playback gain control until the voltmeter reads approximately half scale, then adjust the playback head until a maximum reading is indicated on the voltmeter.

6-11. Remove the azimuth alignment tape from the recorder and replace it with a reel of blank tape. Connect an audio sine-wave signal generator to the recorder input and set the generator to 7500 cps. Make certain the

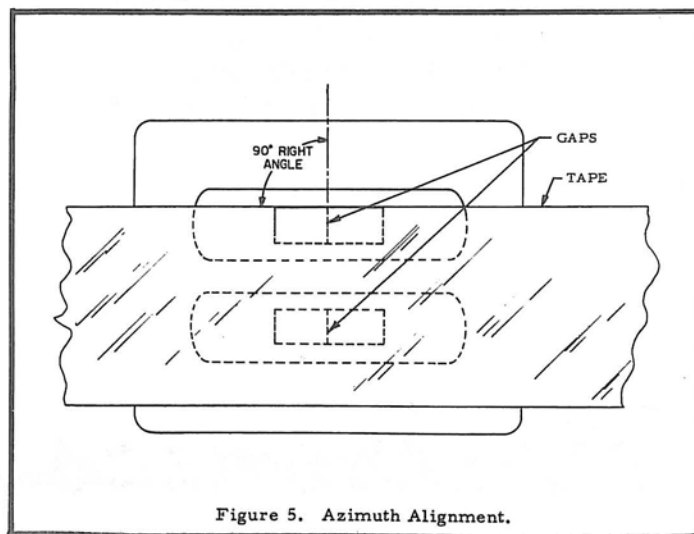


Figure 5. Azimuth Alignment.

recorder is set for the 7.5 ips speed and that the machine is in the RECORD mode. Adjust the record level control to produce a low level record signal (about -7 to -10 VU if the level indicator is a VU meter, or with the magic eye indicator about 1/3 closed if this type of indicator is used). While monitoring the output of the playback amplifier with the voltmeter, adjust the RECORD head until a maximum reading is indicated on the voltmeter. Remember when doing this that there will be a slight delay from the time the adjustment is made until it is indicated on the voltmeter because of the time lag while the tape travels from the record to the playback head. This procedure will line up the gap of the record head with the previously aligned gap of the playback head.

6-12. Some recorders with separate record and playback heads use a combination record/playback amplifier with a switch to select Record or Play but do not permit both modes to be used simultaneously. For this type of recorder, align the AZIMUTH of the playback head as described above in Paragraph 6-10. When this has been done, turn off all power to the recorder. Remove the plugs connecting the record and playback heads to the electronics of the recorder and transpose them; that is, insert the plug for the record head into the playback head jack and the plug for the playback head into the record head jack. Turn on the power to the recorder. With the voltmeter connected to the output of the playback amplifier, play the azimuth alignment tape. Adjust the record head for maximum output on the voltmeter as already described. The gap of the record head is now lined up with the gap of the previously aligned playback head. Turn off the power to the recorder and re-connect the plugs for the record and playback heads as they were originally.

7. PRESSURE PAD INFORMATION.

7-1. If the recorder uses a pressure pad, it should be inspected periodically.

When a tape head is replaced on a recorder, the pressure pad usually needs replacement as well. Examine it carefully. Excess wear will cause the pad to bear unevenly against the face of the new head and this will reduce optimum performance from the recorder. In addition, even though the old pad may not be excessively worn, tape squeal will result if the felt is hardened or glazed by particles of oxide which have become embedded in it. If either of these conditions exist or the pad is otherwise in generally poor condition, it should be replaced.

7-2. The primary function of a pressure pad is to provide intimate contact between the gap in the head pole piece(s) and the oxide coating on the tape. The pad should cover the width of the tape from top to bottom and should rest squarely on the face of the head with the center of the pad as near to the center of the head as possible. The amount of tension exerted by the arm on which the pressure pad is mounted should be such that the pad holds the tape firmly but gently against the face of the head. It should not smash the tape against the head! If it does, excessive head wear, tape squeal and wow or flutter will result. Many complaints of low or no output, improper balance between channels of a stereo tape head, excessive wow and flutter, tape squeal, and rapid head wear are directly traceable to pressure pads which are worn, hardened or glazed, and improperly installed (location of pad, tension applied, etc.).

8. FINAL TESTING.

8-1. Make a final, over-all check of the installation by trying the machine in both the RECORD and PLAY modes. Replace the head cover plate and whatever else might have been removed from the recorder in the reverse order of their removal. This completes the installation of your new NORTRONICS R/P head.

ADDENDUM TO PARAGRAPH 5-3

Head No. 5752

Top Track: Black-White

Center Track: Black-Red

Bottom Track: Blue-Yellow

All other 3 channel heads in 5700 series

Top Track: Red-Orange

Center Track: Yellow-Blue

Bottom Track: White-Black

4 channel 5600 series heads

Track 1 (Top): Black-White

Track 2: Red-Orange

Track 3: Green-Brown

Track 4:(Bottom): Yellow-Blue

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