REPRODUCE ALIGNMENT

High Frequency Equalization

One method for adjusting high frequency response is to utilize a flux loop. This is a device which will induce constant flux into the head when placed in contact with the head and fed a constant voltage from a signal generator. In the absence of equalization the reproduce electronics will produce a flat response from a constant flux signal.

When high frequency equalization is added, the response will rise with increasing frequency. In the absence of a flux loop a standard alignment tape may be used to set high frequency equalization. However, when using the standard tape the results will vary with the condition and accuracy of the tape.

Three controls are associated with the reproduce high frequency equalization: the low speed high frequency equalizer, the high speed high frequency equalizer and the head resonance control. The high frequency equalizers (Figure 1-3) set the turnover frequency established by NAB or IEC (CCIR) standard. This frequency is expressed in microseconds. For example at 15 in/s NAB specifies that the high frequency equalization is 50 microseconds. This gives a 6 dB per octave rising characteristic with a transition frequency (3 dB point) of 3183 Hz (the turnover frequency being the reciprocal of $2\pi RC$). The head resonance control affects both speeds equally and is used to make a compromise compensation for the loss due to a finite reproduce head gap length. It does this by changing the frequency where the head resonates with the input capacity. This resonance produces a rise above the curve generated by the high frequency equalizer. This control is located on the reproduce plug-in module. When turned clockwise viewed from the front it raises the resonant frequency and reduces the gap loss compensation.

Initial Test Steps. Connect the equipment and set controls as specified in steps 1 through 7 which follow.

1. Connect the flux loop to the signal generator and clip it on to the reproduce head.

2. Set the signal generator to deliver a maximum output 500-Hz signal.

3. Connect a VTVM, set to the −10 dBm scale, to the output receptacle.

4. Set the SAFE and REPRO pushbuttons.

5. Set the REPRODUCE LEVEL control to approximately 5.

6. Set the speed switch for the 7-1/2 in/s speed (15 in/s for 15-30 in/s machines).

7. Turn on equipment power.

NOTE

Be sure that the signal generator maintains a constant output voltage for output frequencies of 500 Hz to 15 kHz.

Final Test Steps. If equalization is simply being verified or trimmed, proceed with steps 8 through 11. If equalization is suspected to be completely wrong, omit steps 8 through 11 and complete steps 8A through 14A.

8. With the VTVM set on the −10 dBm scale, adjust the reproduce level control and/or the signal generator to produce the 500-Hz reading in Table 5-7 that agrees with the equalization being verified. The dB readings in Table 5-7 should be interpreted as dB with respect to a −10 dBm reference.

9. Switch to 5 kHz and check that response agrees with Table 5-7, and if necessary adjust the HI FREQ equalizer that corresponds with the SPEED switch setting (high or low).

10. Switch to 15 kHz and adjust head resonance control (R32) if necessary. This adjustment is most easily accomplished with the reproduce module plugged into an extender board.

11. Change to the other speed pair and repeat steps 8 and 9.

Table 5-7. High-Frequency Equalization Response

OPERATION	FREQ.	3-3/4 NAB 90 μS	7-1/2 IEC 70 μS	7-1/2 NAB 50 μS	15 NAB 50 μS	15 IEC 35 μS	30 AES 17.5 μS
Set Level	500	+0.35 dB	+0.2 dB	+0.1 dB	+0.1 dB	+0.05 dB	0 dB
Adjust High Frequency Equalization	5,000	+9.5 dB	+7.7 dB	+5.4 dB	+5.4 dB	+3.4 dB	–
	10,000	–	–	–	–	–	+3.5 dB
Adjust Head (R32) Resonance for 3-3/4 – 7-1/2 Recorder	15,000	–	+19 dB[1]	+16 dB[1]	–	–	–
Adjust Head (R32) Resonance for 7-1/2 – 15 Recorder	15,000	–	+18 dB[1]	+15 dB[1]	–	–	–
Adjust Head (R32) Resonance for 15 – 30 Recorder	15,000	–	–	–	+14.5 dB[1]	+11.5 dB[1]	–

[1] Because of variation in head inductance, it may not be possible to reach these center values. Set as close as possible to these readings.

Complete the following steps in place of steps 8 through 11 when equalization appears to be completely wrong.

8A. When starting from unknown equalizer adjustments, begin by turning both low and high speed frequency equalizers to the extreme counterclockwise position. Set SPEED switch in position providing 7-1/2 in/s (15 in/s for 15-30-in/s machines).

9A. With the VTVM set on the −10 dBm scale adjust the reproduce level and/or signal generator to give exactly −10 dBm.

10A. Switch to 5 kHz and adjust the appropriate high frequency equalizer to give the reading in Table 5-7.

11A. Before adjusting head resonance, change to the other speed pair. Set 500 Hz to exactly −10 dBm. Switch to 5 kHz and set the other high frequency equalizer for the appropriate reading in Table 5-7.

12A. Return SPEED switch to original speed setting. Set signal generator output frequency to 500 Hz and adjust the REPRODUCE LEVEL control for the appropriate (Table 5-7) reading.

13A. Switch to 5 kHz and retrim the high frequency equalizer if necessary. This procedure is required because there is some interaction between the high speed and low speed equalizers.

14A. Switch to 15 kHz and adjust the head resonance control for the appropriate (Table 5-7) reading.

Reproduce Head Azimuth

It is recommended that the reproduce head azimuth be adjusted at 7-1/2 in/s for 3-3/4–7-1/2 or 7-1/2–15-in/s machines and at 15 in/s for 15–30-in/s machines. This adjustment may be made using the equipment VU meters. It is made by

adjusting the left-hand nut at the top of the reproduce head (see Figure 5-9).

CAUTION

DO NOT ADJUST ANY OF THE OTHER NUTS ON THE HEAD ASSEMBLY.

1. Remove the head cover by loosening captive screw on its angled back.

2. Apply power. Thread an appropriate standard alignment tape on the transport. Set the speed and reel size switches accordingly.

3. Set the pushbuttons at SAFE and REPRO. Connect head sets or a monitor amplifier speaker to the head phone jack or the output receptacle so the voice announcements on the tape can be heard.

4. Start the tape in the reproduce mode and adjust the reproduce level control for a 0 VU meter reading on the 700-Hz tone.

5. On the 15-kHz tone, adjust the reproduce head azimuth adjustment nut (not the screw) for a maximum reading on the VU meters. On multi-channel equipment if all heads do not peak at the same setting, adjust for optimum output of all the heads.

NOTE

If the azimuth is far out of adjustment, minor peaks will appear on each side of the correct setting. Correct adjustment results in an output markedly higher than the minor peaks.

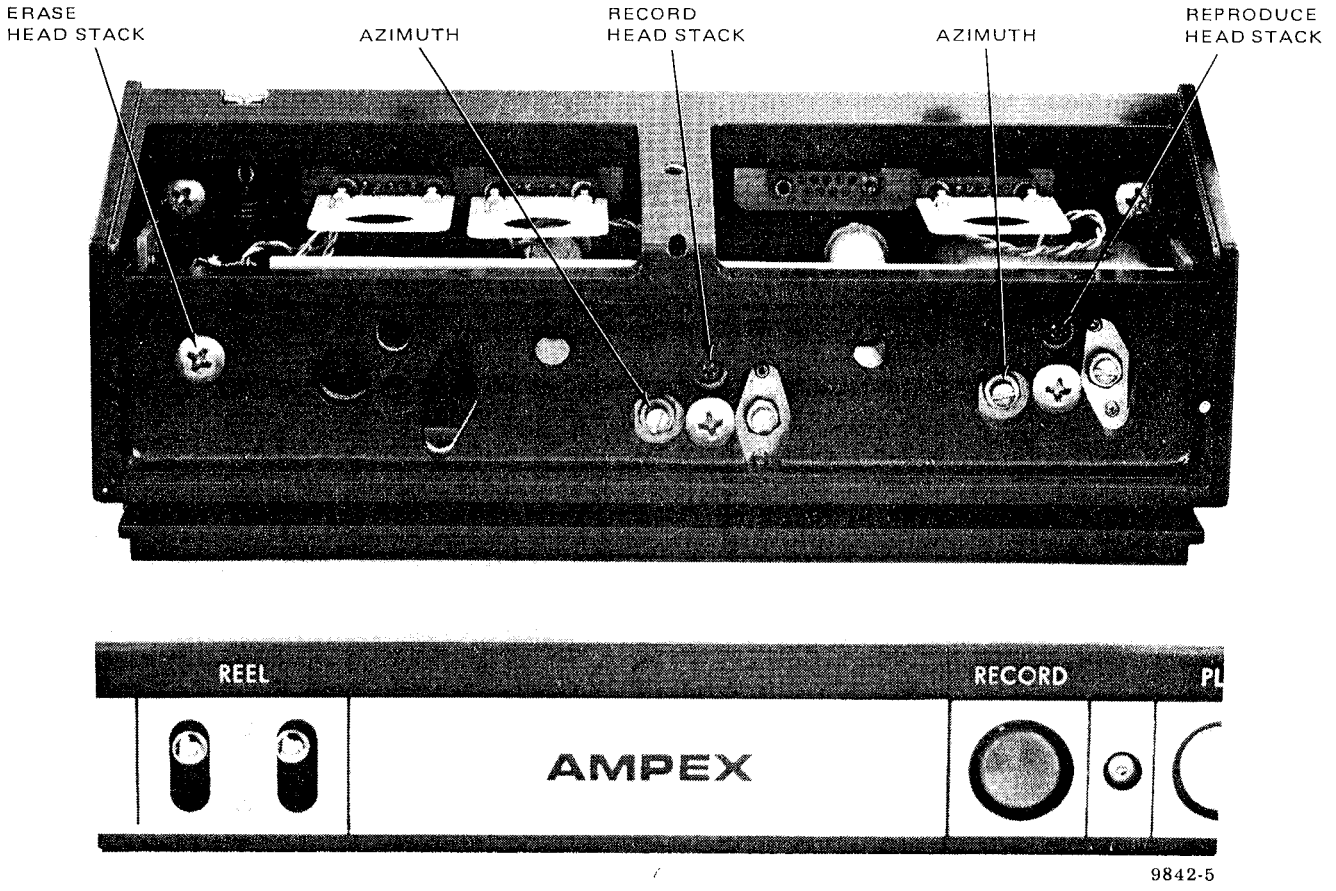

Figure 5-9. Head Azimuth Adjustments

Reproduce Standard Tape Response

If the reproduce equalization has been adjusted with a flux loop, the standard tape response is a double check on this adjustment. If the standard tape plays back within ±1 dB of the 700-Hz reference tone in the 2.5-kHz to 10-kHz region and ±2 dB 12 kHz to 15 kHz, the previous adjustments are probably adequate. If it does not meet these requirements, look for the problem area:

1. Bad alignment tape.
2. Dirty heads.
3. Improper tape wrap on head (racking). Head gap not centered in the tape contact area.
4. Reproduce high frequency equalizers set improperly.

If the standard tape is to be used for reproduce equalizer adjustment, the reproduce high frequency equalizer should be adjusted on the 5-kHz or 7.5-kHz tone for flat response. Then rewind to the 15-kHz tone and adjust the head resonance control for desired 15-kHz response remembering that the head resonance affects both speeds equally. For example, if the 15-kHz response at 7-1/2 in/s is adjusted to 0, thus compensating for all gap loss, the response at 15-kHz 15 in/s (where the gap loss will be less) may be +1-1/2 to +2 dB above the 700-Hz reference.

NOTE

Many test tapes are recorded full track. When reproduced by a half-track or multi-track head, the fringing effect produces invalid response at frequencies below 700 Hz. This effect, which results in high indications in the lower frequencies, does not occur when tapes are recorded and reproduced with heads of the same configuration. Do not adjust the low frequency reproduce equalizers for flat response from a full track standard tape.

Operating Level Adjustment

This adjustment is made with the operating level 700-Hz signal from the standard alignment tape. It is important that this adjustment be accurate since it affects signal to noise ratio, distortion, and tape saturation level. On Ampex standard alignment tapes this level is 185 nWb/m and is the first tone for 15 in/s and 30 in/s tapes, the last tone for 7-1/2 in/s and 3-3/4 in/s tapes. It is suggested that operating level be set at the speed at which the equipment will usually run. If used equally, set at 15 in/s (7-1/2 in/s for 7-1/2–3-3/4 recorders). The adjustment is made with the reproduce calibrate potentiometer when the REPRODUCE LEVEL control is in the calibrate (CAL) position.

Adjusting for a 185 nWb/m Operating Level

Reproduce the 185 nWb/m 700-Hz operating level tone from the alignment tape. With the REPRODUCE LEVEL control in the CAL position, adjust the reproduce potentiometer (Table 3-2) for a 0 reading on the VU meter or a +4 or +8 dBm reading on the VTVM depending upon the line level selected.

Adjusting for a 260 nWb/m Operating Level

Reproduce the 185 nWb/m 700-Hz operating level tone from the alignment tape. With the REPRODUCE LEVEL control in the CAL position, adjust the reproduce calibrate potentiometer for a −3 reading on the VU meter or a +1 dBm reading on the VTVM if a +4 dBm line level is used, or +5 dBm reading if a +8 dBm line level is used.

NOTE

If an alignment tape with a 200 nWb/m operating level is used, add 0.7 dB to the readings called out above. For example, if the VU meter reading with a 185 nWb/m signal should be −3, it should be set to −2.3 with a 200 nWb/m signal.

Sel-Sync Level Adjustment

While reproducing the operating level signal, press the SYNC button. Adjust the sync calibration potentiometer (Table 3-2) for the same VU meter reading that the reproduce position indicates.

RECORD ALIGNMENT

Erase Peaking

The erase peaking consists of adjusting the erase adjust capacitor C40 (ERASE PEAK in Figure 1-3), and the slugs of coils T3 and T4 to produce the maximum erase voltage. An extender card is needed for adjustment of T3 and T4. The coils need adjustment if the bias frequency changes. For example, if a bias module were changed to another recorder, the slugs should be tuned. If the bias module is changed to another channel, only the erase adjust capacitor requires tuning to match it to the head. Proceed as follows:

1. Install the bias module on the extender card.

2. Press the BIAS pushbutton on the channel being adjusted (the remaining channels should be in SAFE).

3. With no input signal applied to the recorder, start the tape in record mode.

4. Adjust the bias calibrate potentiometer to provide an "on scale" reading of the VU meter. The bias reading on the VU meter changes when an extender card is used.

5. Adjust the erase adjust capacitor for maximum VU meter reading, then adjust the slugs on the coils. Since the three adjustments interact slightly, repeat the adjustment until the maximum reading is obtained.

6. If the bias amplifier is equipped with bias balance potentiometer R92, adjust R92 for minimum noise. An alternate method of adjustment of R92 is as follows.

   a. Connect an ASA "A" weighted filter (Figure 5-3) to the OUTPUT connector.

   b. Connect a VTVM to the filter output.

   c. Adjust R92 for minimum reading on the VTVM.

NOTE

For both methods of adjustment of R92, if a noise null cannot be found within range of the control, demagnetize the heads and readjust capacitor C40 and coils T3 and T4.

7. Stop the tape.

8. Press SAFE.

9. Reinstall the bias module and proceed to the next channel.

NOTE

The adjustment of erase adjust capacitor C40 is quite broad but does affect second-harmonic distortion. Usually any spot on the peak produces acceptable second-harmonic distortion. If the absolute minimum second-harmonic distortion is desired, C40 can be trimmed while measuring distortion. This distortion measurement should be made after the remaining steps in the record alignment are completed.

Bias Adjustment

The selection of bias point is an individual decision; some users prefer peak biasing, some overbiasing, or other bias setting. Two bias adjustment procedures will be described; peak biasing at a long wavelength (15 mils), and overbiasing at a medium wavelength (1.5 mils). The overbiasing procedure provides a more precise setting and is recommended when using Ampex 406 high-output, low-noise tape. Biasing should be done at the tape speed commonly used. If both are used equally, adjust at 15 in/s (7-1/2 in/s for 3-3/4–7-1/2 machines).

Long-Wavelength Peak Biasing. Proceed as follows:

1. Adjust the signal generator to 2,000 Hz at 30 in/s, 1,000 Hz at 15 in/s, 500 Hz at 7-1/2 in/s or 250 Hz at 3-3/4 in/s.

2. Select READY and REPRO.

3. Set REPRODUCE LEVEL control to CAL.

4. Start the tape in the record mode.

5. Adjust the RECORD LEVEL control for an on-scale reading of the VU meter.

6. Adjust the BIAS ADJ (Figure 1-3) for maximum reading on the VU meter.

Medium-Wavelength Overbiasing. Proceed as follows:

1. Adjust the signal generator to 20 kHz at 30 in/s, 10 kHz at 15 in/s, 5 kHz at 7-1/2 in/s, or 2.5 kHz at 3-3/4 in/s.

2. Select READY and REPRO.

3. Set REPRODUCE LEVEL control to CAL.

4. Start the tape in the record mode.

NOTE

This adjustment can be made at operating level at 15 in/s and 30 in/s but should be made at least 10 dB below operating level at 3-3/4 and 7-1/2 in/s.

5. Adjust the RECORD LEVEL control for an on-scale reading of the VU meter.

6. Adjust the BIAS ADJ for maximum reading on the VU meter.

7. Since the azimuth must be in approximate alignment to provide a signal at the 1-1/2 mil wavelength, it may be necessary to make a preliminary azimuth adjustment at this time. Place a nut-driver on the left-hand nut of the record head (Figure 5-9) and adjust for a maximum reading on the VU meter.

8. At the 15 and 30 in/s speed, adjust the RECORD LEVEL control for a VU meter reading of +1. Check that this is still the maximum reading point by turning the bias adjust control, then overbias 1-1/2 dB by turning the control clockwise until the VU meter reads −1/2.

9. When adjusting at 3-3/4 or 7-1/2 in/s, after adjusting the bias adjust and record head azimuth for a maximum reading (steps 6 and 7), adjust the RECORD LEVEL so that the VU meter reads between the 20% mark and −10 VU.

   a. Adjust the REPRODUCE LEVEL control so the VU meter reads +1.

   b. Check that this is still the maximum reading point by turning the BIAS ADJ control, then overbias 1-1/2 dB by turning BIAS ADJ clockwise until the VU meter reads −1/2.

NOTE

When using Ampex 406 tape, 1-1/2 dB overbias at 1.5-mil wavelength falls within the range of peak bias at 15-mil wavelength.

Bias Metering Calibration

Immediately after adjusting the bias (see preceding paragraph) and while still recording, press the BIAS pushbutton. Adjust the bias calibration potentiometer so that the VU meter indicates 0.

Record Head Azimuth

This adjustment is similar to the reproduce head adjustment except that it is made while simultaneously recording and reproducing a short wavelength signal. This procedure ensures that the azimuth of both heads coincide. Proceed as follows.

1. Use a 15-kHz signal generator output at 7-1/2 in/s or a 25-kHz signal at 15 in/s.

2. Use pushbuttons to select READY and REPRO.

3. Set REPRODUCE LEVEL control to CAL.

4. Start the tape in the RECORD mode.

5. Adjust the RECORD LEVEL control for a VU meter reading near the 20% mark.

6. Adjust the REPRODUCE LEVEL control so that the VU meter indicates between 0 and −5.

7. Adjust the record head azimuth nut (not the screw) shown in Figure 5-9 for a maximum reading on the VU meters. On multichannel equipment, if all heads do not peak at the same setting, adjust for optimum output of all the heads.

Record High Frequency Equalization

This adjustment can be made at operating level for 15 or 30 in/s, but should be made at least 14 dB below operating level for 3-3/4 and 7-1/2 in/s. Proceed as follows:

1. Select READY and REPRO.

2. Set REPRODUCE LEVEL control to CAL.

3. Set signal generator output frequency to 700 Hz.

4. Start the tape in the record mode.

5. For 15 or 30 in/s speeds, adjust the RECORD LEVEL control so the VU meter indicates 0.

5a. For 3-3/4 or 7-1/2 in/s speeds, adjust the RECORD LEVEL control so that the VU meter indicator is at the 20% mark. Adjust the REPRODUCE LEVEL control so the VU meter indicates 0.

6. Change the signal generator output frequency to 7 kHz.

7. As a preliminary setting, adjust the appropriate low or high speed record equalizer so that the VU meter indicates 0.

8. Check the response above and below 7 kHz and trim the record equalizer for the response desired. If the desired response cannot be obtained, the reason may be:

   a. Heads are dirty.

   b. Improper tape wrap on head (racking). Head gap not centered in the tape contact area.

   c. Attempting to adjust 3-3/4 or 7-1/2 in/s response at operating level.

   d. Forgetting to place the reproduce level in the CAL position when adjusting record level.

   e. Bias set incorrectly. The bias adjustment can be used to improve response. However, remember that compensating for record deficiencies by underbiasing increases distortion.

Before repeating the Record High Frequency Equalization adjustments at the other tape speed, proceed with the Reproduce Low Frequency Equalization procedure given below. Then perform the High Frequency and Low Frequency Equalization procedures at the other tape speed.

Reproduce Low Frequency Equalization

This adjustment is made while simultaneously recording and reproducing to avoid fringing effects present if the adjustment is made with a full track standard tape. Proceed as follows:

1. Using the 700-Hz reference level noted during record high frequency equalization, sweep the signal generator frequency slowly from 700 Hz down to 30 Hz (note the magnitude of the peaks and dips).

2. Adjust the appropriate low or high speed reproduce low frequency equalizer for the flattest possible response. This is done by adjusting the head "bump" excursions for an equal magnitude above or below the 700-Hz reference level.

Input Calibration Adjustment

Adjust the input calibration as follows:

1. Select READY and REPRO.

2. Set RECORD LEVEL and REPRODUCE LEVEL controls to CAL.

3. Set signal generator frequency to 700 Hz and output level at +4 or +8 dBm, depending upon the line level used.

4. Start the tape in the record mode.

5. Adjust the input calibrate potentiometer (Table 3-2) for a 0 reading on the VU meter.

Record Calibrate Adjustment

After completing the Input Calibration Adjustment procedure above, proceed as follows:

1. Press the INPUT pushbutton.

2. Adjust the RECORD calibrate adjustment on the record plug-in module for a 0 indication on the VU meter.

SERVO GAIN ADJUSTMENT

NOTE

This adjustment should be made only when a major component of the servo system is changed. If 1200-Hz carrier whine is audible, reduce servo gain (turn R19 clockwise).

Proceed as follows:

1. Put the capstan servo PWA on extender board 4050695.

2. Attach a scope probe to test point number 2 of the capstan servo PWA.

3. Put recorder in PLAY.

4. Adjust R19 on capstan servo PWA for minimum signal jitter.

5. Remove extender board and re-install PWA.

HEAD MAINTENANCE

Head cleaning and demagnetizing was discussed in the *Preventive Maintenance* portion of this section, under headings *Cleaning* and *Demagnetizing*. Adjustment of head azimuth was discussed in the *Electronic Alignment* portion of this section, under the heading *Record Head Azimuth*. Changing the head assembly is explained in the Installation section (Section II), under the heading *Conversion*. The head and tape adjustment explanations follow. Head height is precisely set at the factory, therefore, height adjustment is seldom required except when a head stack is changed.

ADJUSTING HEAD HEIGHT

Record/Reproduce (All Except Two-Channel Four-Track)

Adjust head height as follows:

1. Remove the head housing cover by loosening the captive screw on the angled back surface.

2. Thread tape on transport, and initiate the play mode at the highest speed available.

3. Loosen the hex nut (Figure 5-10) approximately 1/4 turn.

4. Turn the two hex-socket setscrews (see Figure 5-10) clockwise the same number of turns, until the head laminations barely appear at the tape bottom edge. Keep relaxing

the hex nut and azimuth nut, as necessary to maintain tension and azimuth.

5. Carefully count the turns, while turning the two hex-socket setscrews counterclockwise (in exactly equal turns) until the head laminations barely appear above the tape top edge. Keep tightening the hex nut and azimuth nut as necessary to maintain tension and azimuth.

6. Turn the same two setscrews back (clockwise) half the number of turns counted in step 5. Again relax the hex-nut and azimuth nut as necessary to maintain tension and azimuth. Finally tighten the hex nut until it is snug.

7. Stop tape motion.

8. Check head azimuth and tape wrap. Check head azimuth as explained earlier in this section.

9. Replace head housing cover.

Record/Reproduce (Two-Channel Four-Track)

To set the height of a two-channel four-track record or reproduce head: repeat steps 1, 2, and 3, given in the paragraph above; then adjust the two hex-socket setscrews so that the mu-metal portion of the outermost head (head furthest from tape transport) is exactly even with the edge of the tape furthest from the tape transport.

Erase Heads

Erase head height is adjusted with shims (0.010, 0.002, 0.003, and 0.005 inch thick, Ampex Part Nos. 4350025-01, 4350025-02, 4350025-03, and 4350025-04 respectively). To change shims, the head must be removed by removing one cross-head screw (Figure 5-10).

Except for four-track 1/4-inch erase heads, shim the head until the ferrite portion of the outermost head (head furthest from tape transport) is just visible at the outermost edge of the tape. Add shims until the similar portion of the bottom head is barely visible below the tape bottom edge. Then

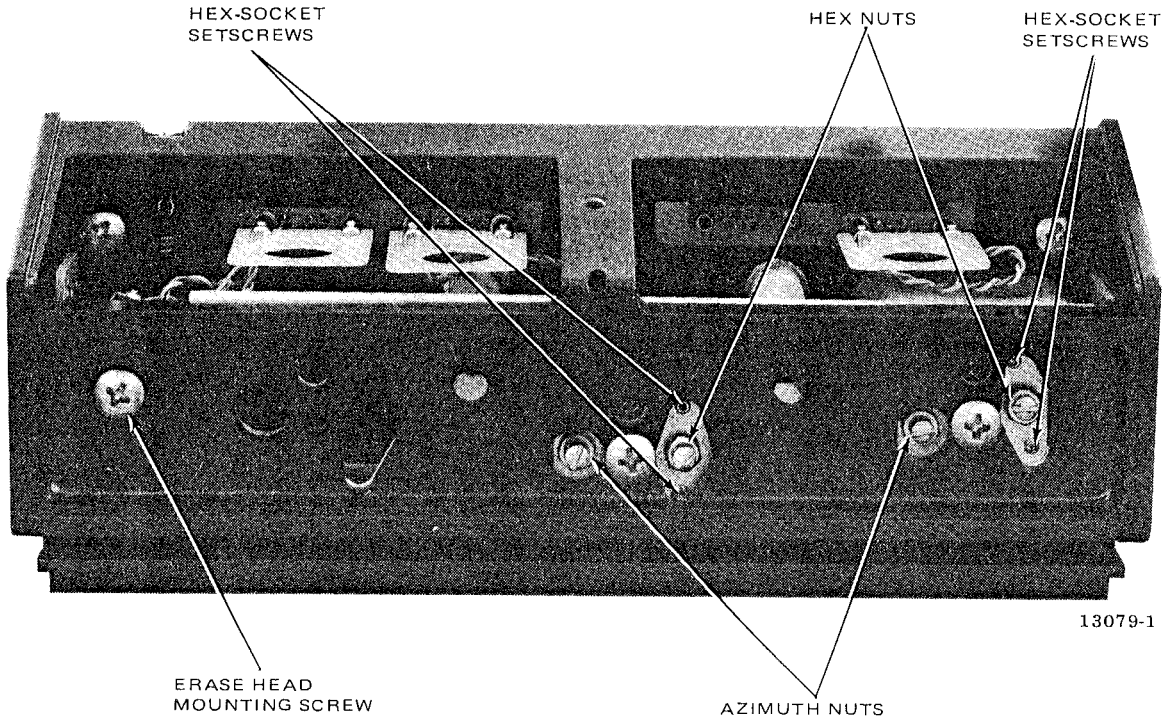

Figure 5-10. Head Height Adjustments

remove exactly half the shim thickness that was needed to move the head stack from the top to the bottom of the tape.

Adjust four-track 1/4-inch erase head height to dimension shown on drawing 4020355.

ADJUSTING TAPE WRAP AND ZENITH

The head gap must be centered in the tape contact area, and the tape must contact the head top and bottom equally.

To check tape wrap (racking) and head zenith (perpendicularity), lightly cover the head face with grease pencil or crayon. Thread tape on transport, initiate the high speed play mode, and stop it after ten seconds. Lift the tape from the head; the head area visibly cleaned by the tape should be centered on the head gap (this checks tape wrap). The head tape-contact area should also be equally clean at the top and bottom (this checks head zenith).

If tape wrap adjustment is indicated, remove the head housing cover by loosening the captive screw on the angled back surface. Loosen the large cross-head screw (Figure 5-11). Adjacent to the large cross-head mounting screw there is a smaller cross-head screw in a hole. Loosen the small cross-head screw, and carefully use a screwdriver to pry at the side of the aluminum plate (through which the head stack mounting screws protrude) in the required direction. Check that the shield can is aligned with the head gate shield, then tighten the screws. Recheck the tape wrap per the preceding paragraph. Repeat the process until the tape wrap is correct. The erase head is adjusted for tape wrap by loosening the mounting screw, rotating the head as required, and tightening the screw.

To adjust the head zenith, loosen the hex nut and use the two hex-socket setscrews (also used for head height adjustment, see Figure 5-11). As the adjustment is being made, visually check the zenith by lining up the head (by viewing from the side) with the capstan or the scrape-flutter idler. Turn the outermost setscrew in and the innermost setscrew out, to move the stack bottom in (away from the tape). To move the bottom of the head out (toward the tape), reverse the procedure. Be sure both setscrews remain snug. When the zenith adjustment seems correct, recheck it with the

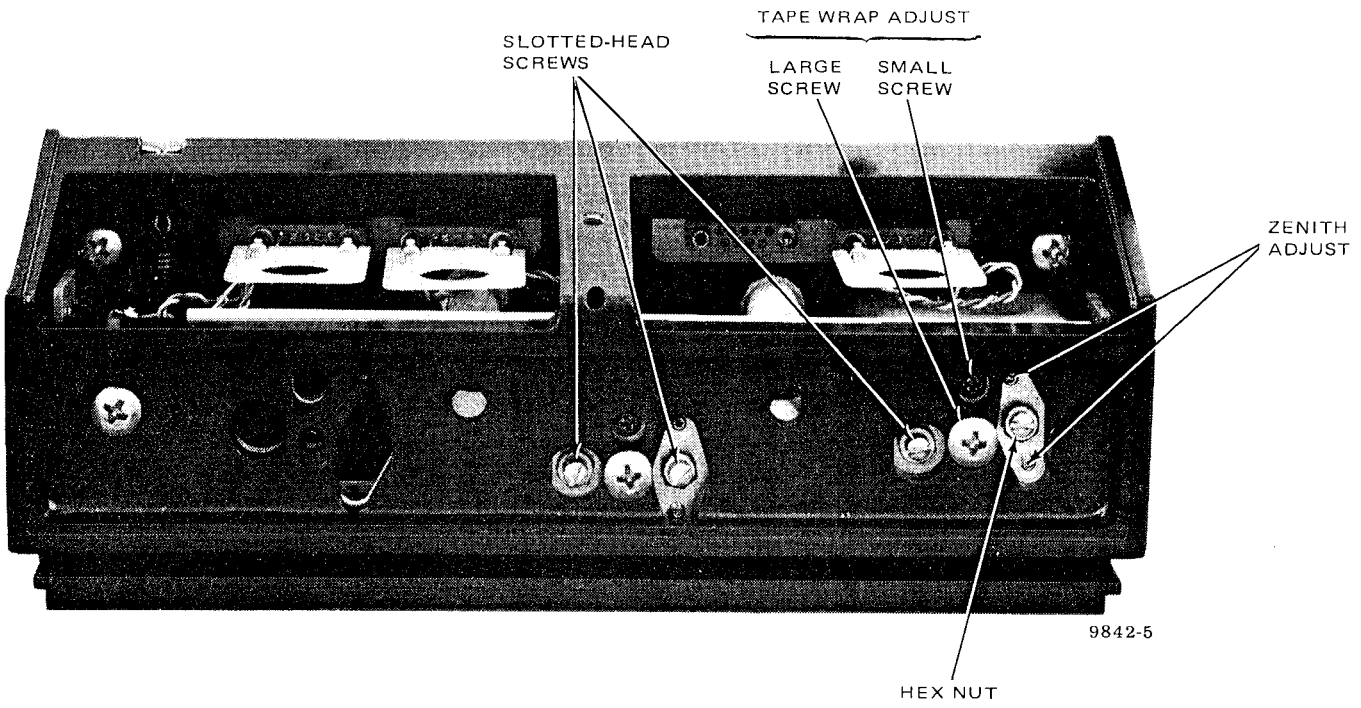

Figure 5-11. Tape Wrap and Zenith Adjustments

grease pencil method described above. Repeat the adjustment until the head zenith is correct (no zenith adjustment is required for the erase head).

Whenever head zenith or tape wrap is changed, check the head azimuth and height.

CHANGING HEAD STACKS

Record or Reproduce Stack

To change the record or reproduce head stack, proceed as follows:

1. Remove the complete head assembly. Head assembly drawings are provided in Section VI.

2. Remove the large cross-head screw (Figure 5-11) and then the shield can (containing the head stack).

3. If the replacement head stack is in a shield can, mount the shield can in position. Check (through the bottom of the casting) that the head stack shield can is aligned with the gate shield, and is parallel to the casting top front edge, then tighten the mounting screw.

4. If the head stack is not in a shield can, use a screwdriver to remove the two slot-head screws and the nuts (Figure 5-11) and remove the head stack from the shield can. Be careful not to lose the double-coil lockwasher. Remove head stack and two head springs from the shield can.

CAUTION

WHEN SOLDERING LEADS ON A HEAD STACK, USE A SMALL-WATTAGE PENCIL-TYPE SOLDERING IRON. EXCESSIVE HEAT CAN CAUSE IRREPARABLE INTERNAL DAMAGE TO THE HEAD STACK.

5. Unsolder the leads at the terminals of the old head stack and solder the leads to the terminals of the new head stack.

6. Turn the two hex-socket setscrews out until the ends are even with inside of the shield.

7. Obtain the two slot-head screws and the nuts removed in step 3. Turn the nuts tightly against the screw heads. Place the double-coil lockwasher over the end of the screw with the plain hex nut (the other screw has a self-locking nut).

8a. On heads for 1/4-inch tape, place the two head springs in the indentations in the top of the head stack. Slip the head stack into the shield can without displacing the springs.

8b. On heads for 1/2-inch tape, hold the shield can upside down, and place the two head springs in the indentation in the shield can (looking through the shield can open side, the indentations are at the right front and right rear). Without displacing the springs, slide the head stack (upside down) into the shield can.

9. Insert the two slot-head screws through the plate and shield can, along with the azimuth nut, plain hex nut, and double-coil lockwasher. Engage the two screws in the head stack holes, and tighten them firmly.

10. Secure the head stack and shield can in the head assembly with the large cross-head screw removed in step 2. Check (through the bottom of the casting) that the head stack shield can is aligned with the gate shield, and is parallel to the casting top front edge; then tighten the mounting screw.

11. Turn-in the two hex-socket-head setscrews to lower the head stack, until head height is approximately correct.

12. Turn the two nuts on the slot-head screws down against the plate, and use the azimuth-adjusting nut (see Figure 5-9) to set the head azimuth to the approximate correct position.

13. Install head assembly on the transport and mate the connectors with the correct receptacles.

14. Check and adjust head height, tape wrap, zenith, and head azimuth.

Erase Head Stack

To change an erase head stack, remove the complete head assembly from the transport. Remove the large cross-head screw, then remove the erase head stack, spacer, and shims. Place the spacer and shims on the new assembly and mount them on the casting with the mounting screw. Check erase head height and tape wrap.

REPLACING HEAD TAPE GUIDES

If any of the three sapphire tape guides on the head assembly are replaced or become misadjusted, the tape guide must be properly positioned. A special tool (4930512-01 for 1/4-inch guides and 4930512-02 for 1/2-inch guides) is used to ensure the positioning accuracy required for proper tape guidance. Use of this special tool is illustrated and explained in Figure 5-12.

If the sapphire guide on the scrape flutter idler requires replacement or is loose, adjust the guide to the dimension shown in Figure 5-12 (use a vernier caliper for measurement).

TRANSPORT MAINTENANCE

The following paragraphs contain transport corrective maintenance, parts replacement, instructions and the special adjustment procedures required thereafter. Most of these procedures require removal of the console front panel.

SERVICING HINTS

Brake Bands

Glazed brake bands that are not contaminated with oil can sometimes be renovated by abrading them

SAPPHIRE GUIDE SET-UP

ARRANGE HEAD ASSEMBLY WITH TOOL 4930512-XX ON A FLAT SURFACE AS SHOWN BELOW.

1. LOOSEN BOTH 4-40 SCREWS.
2. PUSH THE TOOL FORWARD SLIGHTLY AND GENTLY UNTIL IT CONTACTS THE SAPPHIRE TAPE GUIDES ON BOTH UPPER AND LOWER EDGES.
3. TIGHTEN BOTH SCREWS.
4. PULL THE TOOL BACK OFF THE TAPE GUIDE, THEN PUSH IT FORWARD AGAIN GENTLY TO CHECK AND FEEL IF THE TAPE GUIDE HAS BEEN SET-UP TO THE PROPER LEVEL; IF NOT, REPEAT THE PROCEDURE.

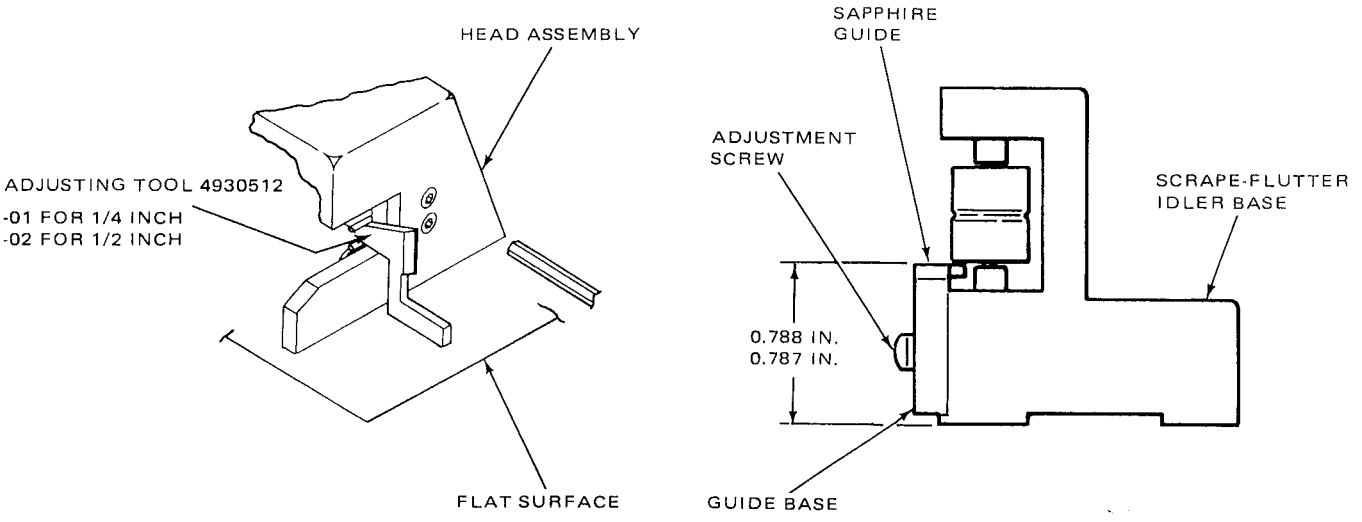

Figure 5-12. Sapphire Tape Guide Adjustment