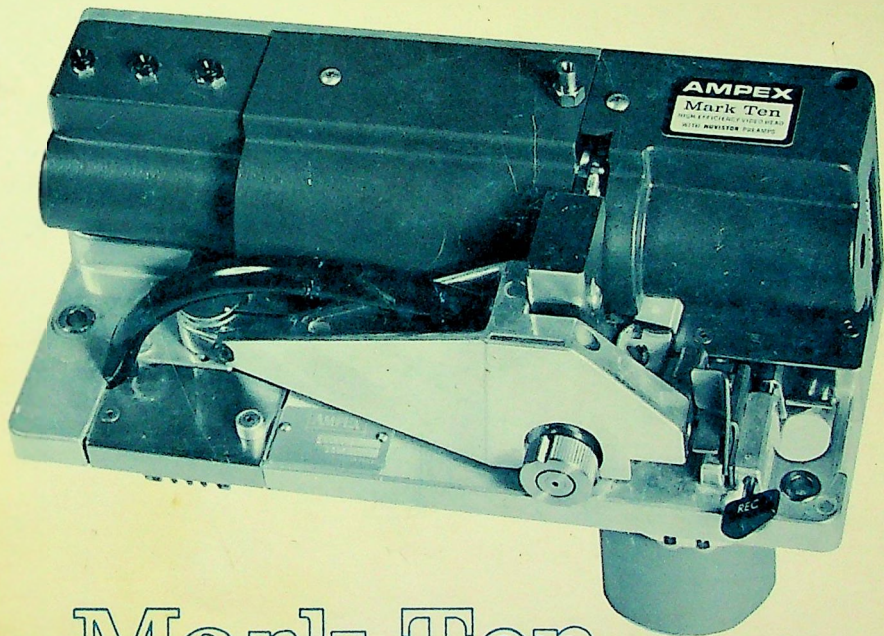


AMPEX



Mark Ten

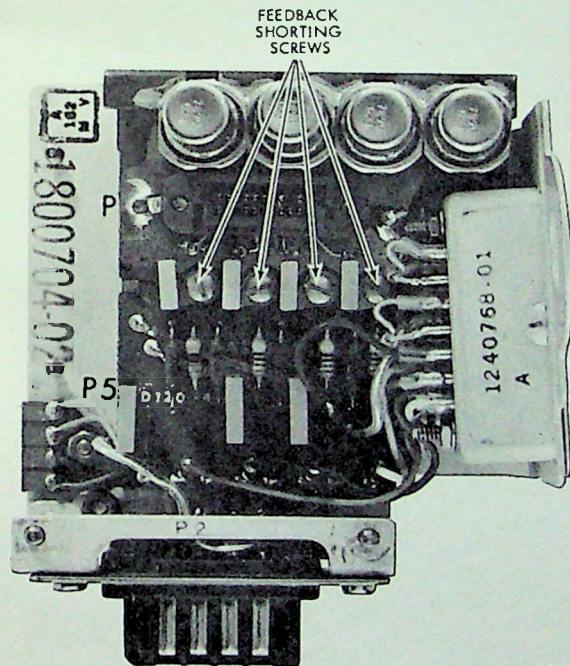
HIGH-EFFICIENCY VIDEO HEAD ASSEMBLY
INSTRUCTIONS FOR INSTALLATION AND USE

INSTRUCTION MANUAL 1809956-01

NOTICE

EXCESSIVE GAIN CORRECTIVE PROCEDURE

NUVISTOR PREAMPLIFIER (GOLD LABEL) EQUIPPED MARK TEN VIDEO HEAD ASSEMBLIES



The output of the Mark Ten Video Head is considerably more than the output of the previous Mark Four. As the heads wear, the output of the preamplifiers will increase to the point where the RF Switcher output display on the "A" scope will exceed the scope limits. When this condition occurs, perform the following steps:

- Loosen the four preamplifier module fastening screws (see *Figure 3*) and carefully remove the preamplifier module.
- Locate the four shorting screws on the preamplifier module (see figure on this notice) and using a small screw driver turn the four shorting screws one full turn counterclockwise.
- Replace the preamplifier module using care in aligning the connector with the receptacle. Gently press the module into position and secure with the fastening screws.

Turning screws counterclockwise removes a short circuit across a portion of the nuvistor cathode resistance. This will reduce the gain of the preamplifier.

DESCRIPTION

The Mark Ten Video Head Assembly incorporates major design refinements which result in a high-efficiency video head having markedly improved signal-to-noise ratio and an appreciably longer head life. It is available with either ball bearings or air bearings, and with either 10-mil or 5-mil head tips. (5-mil tips are required for operation at 7.5 ips.)

The assembly includes a plug-in module available in any of three configurations:

- a. trimmer (blue label)
- b. transistor preamplifier (red label)
- c. nuvistor preamplifier (gold label)

The air bearing-equipped head assembly will accept any one of the three modules listed above. The ball bearing-equipped assembly is recommended for use only with the trimmer module.

INSTALLATION

MOUNTING THE MARK TEN HEAD ASSEMBLY. The head assembly is mounted on the top plate using the following procedure:

- a. Push in the REC-PLAY lever, turn it clockwise to the REC position, and release it. (See *Figure 1*.)
- b. Disable the drum motor power supply. Position the head assembly so as to align both of the connector plugs (see *Figure 2*) with their mating receptacles.

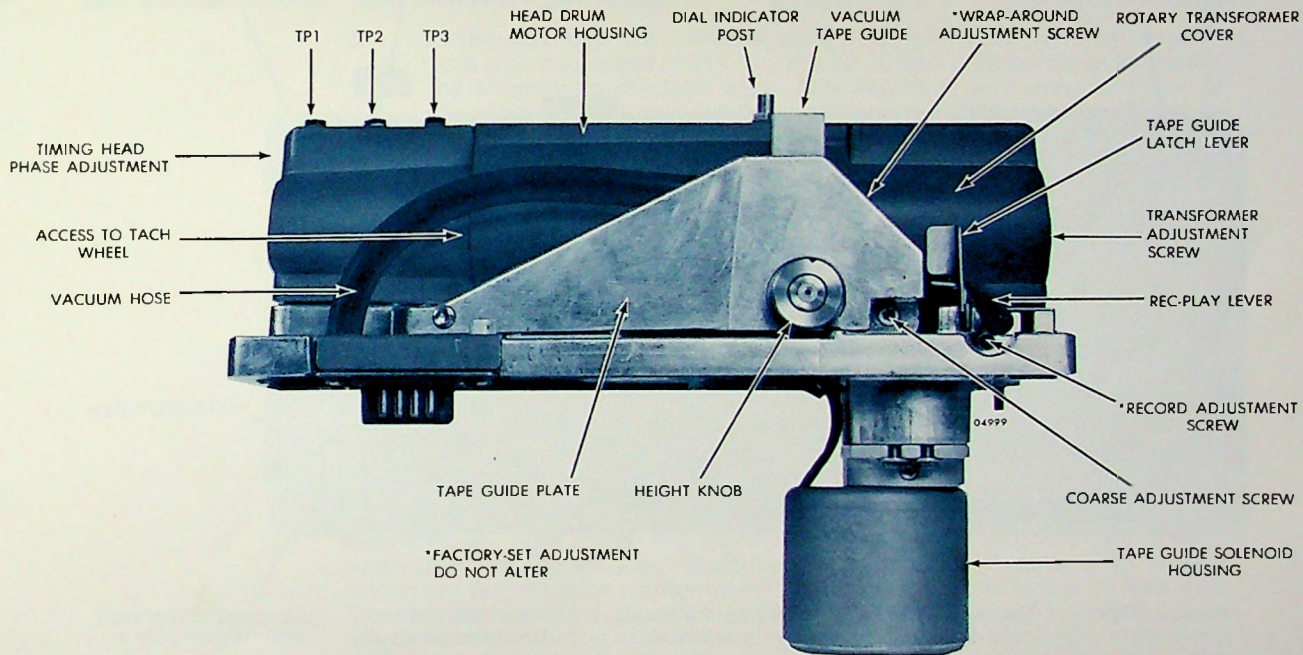


Figure 1. Mark Ten Video Head Assembly—Identification of Principal Elements and Adjustments

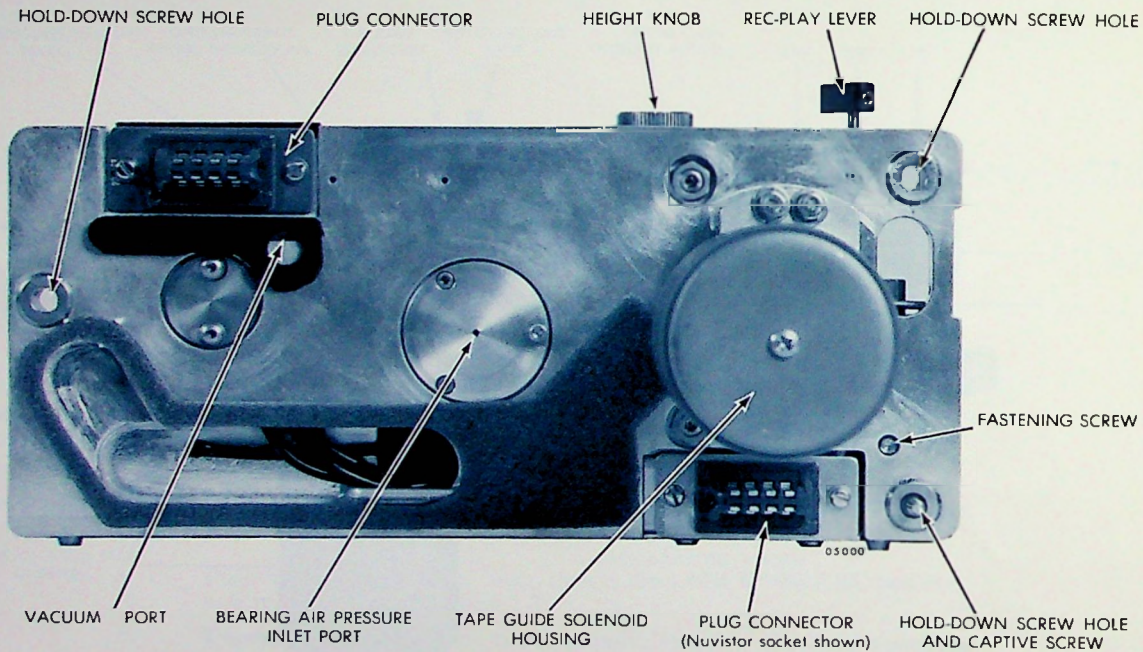


Figure 2. Bottom View of the Mark Ten Video Head Assembly

- c. Secure the assembly to the top plate with the three holddown screws provided. See *Figure 2* to identify the location of the holddown screw bushings.
- d. If the assembly is air bearing-equipped, determine that the air pressure is at its normal level (60 pounds). Insert a finger tip in the opening adjacent to the tach wheel (see *Figure 1*) and spin the rotor. If the rotor does not spin freely, an adjustment of the clearance between the rotor and the stator of the rotary transformer may be required.

NOTE

In the VR-2000 system, any change of the rotary transformer adjustment necessitates trimming the Q COMP and FREQ COMP settings shown on the voltage card insert.

- e. Clearance between the rotor and stator of the rotary transformer is adjusted by means of the slotted-head screw accessible through the round hole in the right end of the transformer cover. While manually turning the rotor, turn the slotted-head screw slowly counterclockwise until a drag is just perceptible, then turn it clockwise until the drum rotates freely. Finally, turn the screw clockwise an additional 1/16 turn (22-1/2 degrees). Reactivate the drum motor power supply.

The vacuum tape guide will have been set at the standard position as determined on the standard machine at the factory. Variations of system tolerances may require readjustment of height and penetration to establish the standard position in other systems. The procedures described below are recommended after initial installation of the head assembly, after reinstallation of the head assembly on another system, or at any time the adjustment has been disturbed. To adjust for recording in conformance with practice RP11 of the SMPTE standards, perform the following procedures:

- a. Press in the REC-PLAY lever, turn it clockwise to the REC position, and release it.
- b. Reproduce a standard test tape and adjust the coarse adjustment screw (see *Figure 1*) in small increments until skewing is eliminated.

NOTE

If more than normal force is required to turn the coarse adjustment screw, slightly loosen its locking screw. To gain access to the locking screw, pull and hold the tape guide latch lever while opening the vacuum tape guide. The locking screw is adjacent to the guide latch pin at the lower right side of the vacuum tape guide arm. After the adjustment of the coarse adjustment screw has been completed, retighten the locking screw to a torque of 14 inch-pounds.

- c. Adjust the HEIGHT knob to eliminate scalloping.

INTERCHANGING MODULES. The Mark Ten Head Assembly may be equipped with any of the plug-in modules previously described. Interchange of modules is accomplished by the following procedure:

- a. Unfasten the three holddown screws and remove the head assembly from the top plate.
- b. Unfasten the four preamplifier retaining screws (see *Figure 3*).
- c. Grasp the wire handle and pull the module straight out of the assembly.
- d. Position the new module, align the connector carefully with the receptacle, and press the module gently into its seated position. Secure the module in place with the four captive screws.
- e. Reinstall the assembly.

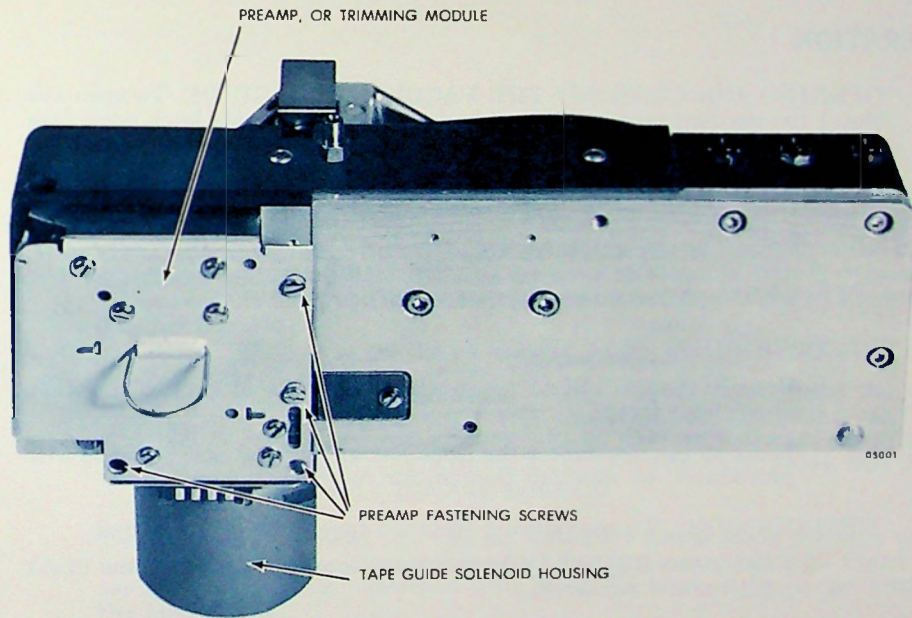


Figure 3. Rear of Mark Ten Video Head Assembly

OPERATION

OPENING (OR CLOSING) THE VACUUM TAPE GUIDE. To open (or close) the vacuum tape guide, *pull and hold* the tape guide latch lever (see *Figure 1*); while holding the latch lever, ease the guide into the fully open (or fully closed) position; then release the latch lever.

CAUTION

WHEN OPENING OR CLOSING THE VACUUM TAPE GUIDE, DO IT GENTLY TO AVOID CAUSING A MISALIGNMENT OF THE MECHANISM AT EITHER LIMIT OF TRAVEL.

RECORDING. To record, proceed as follows:

- a. Press-in the REC-PLAY lever, turn it clockwise to the REC position, and release it.
- b. Refer to the manual for the basic recorder system and continue with procedures, as specified therein, for recording operations.

REPRODUCING. To reproduce a recorded tape, proceed as follows:

- a. Press-in the REC-PLAY lever, turn it counterclockwise to the PLAY position, and release it.
- b. Refer to the manual for the basic recorder system and continue with procedures as specified therein, for reproduction.

MAINTENANCE

The only maintenance normally required by the Mark Ten is that the video heads and all other tape contacting surfaces of the tape transport be kept scrupulously clean. The recommended cleaning agent is *Freon TF (Ampex part number 050-104).

CAUTION

DO NOT USE FREON TF TO CLEAN THE PINCH ROLLER ASSOCIATED WITH THE CAPSTAN. INSTEAD USE METHYL ALCOHOL ONLY. FREON TF IS SAFE FOR THE CLEANING OF ALL METALLIC SURFACES ALONG THE TAPE PATH, BUT WILL SEVERELY DAMAGE RUBBER.

To clean the video head tips and all stationary heads along the tape path, use a cotton-tipped applicator moistened (but not saturated) with Freon TF; use a soft clean cloth moistened with Freon TF to clean the larger areas of the tape guides.

*Freon TF is a Trademark of Dupont De Nemours E I and Co.

MISCELLANEOUS ADJUSTMENTS. The procedures which follow are to be performed only as required.

ADJUSTING THE TRIMMING MODULE. The trimming module (blue label) includes a trimming capacitor for each head channel. Each capacitor is preset at the factory for identical resonant frequencies among the four channels under conditions of average input circuit capacitance. Because input capacitances vary among head channels and among different recorder systems, the operator may prefer to trim the presettings. Access to the adjustment screws of the trimming capacitors is gained by removal of the small cover plate at the right end of the assembly.

ADJUSTING HEAD QUADRATURE. The precise location of the head tips in quadrature is established at the factory. In the event a correction of the position of any of the head tips becomes necessary, perform the following procedure:

CAUTION

DURING THE FOLLOWING OPERATIONS, BE VERY CAREFUL TO AVOID THE INADVERTENT APPLICATION OF POWER TO THE HEAD DRUM MOTOR. TO DO SO MAY SERIOUSLY DAMAGE THE HEAD DRUM ASSEMBLY.

- a. Remove the head assembly from the top plate and remove its plug-in module.
- b. Remove the rotary transformer cover by loosening and removing the slotted-head screw on the top of the cover, and the fastening screw shown in *Figure 2*.

- c. Remount the plug-in module in the head assembly, and reinstall the assembly on the top plate.
- d. If the assembly is air bearing-equipped, determine that bearing air pressure is normal (60 pounds).
- e. Slightly loosen the holddown screw associated with the head tip that is to be moved.
- f. The head tip position is adjusted by means of the tapered setscrew that is adjacent to the tip. To advance the timing, turn the setscrew clockwise; to retard the timing, turn it counterclockwise. One full turn of the screw changes the timing approximately 0.3 microseconds.
- g. Tighten the holddown screw (loosened in step *e*) to a torque of 4 inch-pounds (or 4.6 cm-kg).
- h. Repeat step *a*. Remount the rotary transformer cover as it was prior to step *b*. Then repeat step *c*.

ADJUSTING DRUM MOTOR POWER VOLTAGE (VR-1000 SERIES ONLY). For this adjustment procedure, please refer to the following Field Engineering Bulletins:

For vacuum tube-type motor power amplifiers—Bulletin Number G505-1

For solid-state motor power amplifiers———Bulletin Number G410-3

The output transistors of the solid-state motor power amplifiers should be 2N2528, Ampex part number 014-571.

ADJUSTING CONTROL TRACK HEAD POSITION. The position of the control track head is factory-set and normally will not require resetting. However if the original position has been disturbed, it may be restored by the following procedure:

- a. Slightly loosen the holddown screw that secures the control head bracket.
- b. Adjust the eccentric screw nearest the tape path to move the head upstream or downstream as necessary.
- c. Adjust the second eccentric screw to correct the placement of the recorded control track signal at the edge of the tape, as necessary.
- d. Tighten the holddown screw loosened in step *a*.

FACTORY SETTINGS. Several of the adjustment screws identified in *Figure 1* are factory-set by the use of special equipment and skills to establish precise relationships or conditions that are essential to the specified performance of the Mark Ten Video Head Assembly. A brief discussion of each follows.

- a. The wrap-around adjustment screw setting establishes a precise relationship between the video head drum and the vacuum tape guide. This setting should *not* be altered.
- b. The record adjustment screw setting establishes the conditions specified by practice RP 11 of the SMPTE standards for video recording. This setting should *not* be altered.

- c. The factory setting of the adjustment screw which controls timing head phase (see *Figure 1*) should *not* be altered if the Mark Ten is used for the recording and reproduction of video information.

TACHOMETER CIRCUIT TEST POINTS. For convenience, three test points have been provided for the measurement of tachometer circuit voltages. (See TP1, TP2, and TP3 identified in *Figure 1*.) Tachometer circuit voltages are measured between ground and test point by means of an oscilloscope. The measurements at TP1 and TP2 are made while the head drum is turning at its nominal rate of 240 rps (or 250 rps).

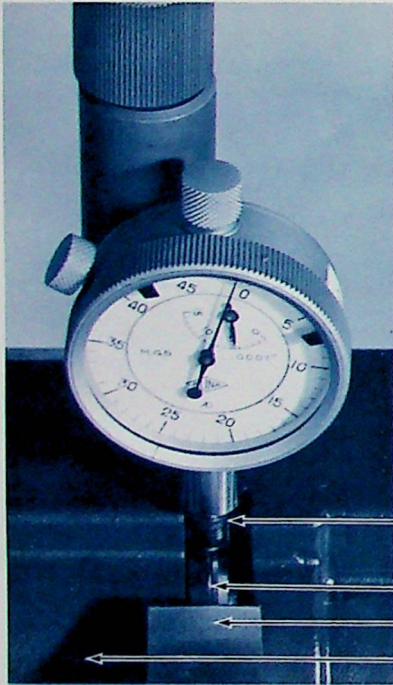
The timing head output is measured at TP1. The signal consists of alternate double and single pulses, each of which should be 5 volts peak-to-baseline, minimum.

The voltage applied to the drum tachometer transducer is measured at TP2. The level at TP2 should be 4 vdc, minimum.

When the head drum motor is turning, the signal at TP3 should be a square wave at the frequency of the drum motor power supply (i.e., 240 Hz or 250 Hz); when the motor is stopped, the signal at TP3 should be a dc voltage. Voltage at TP3 should indicate the following values:

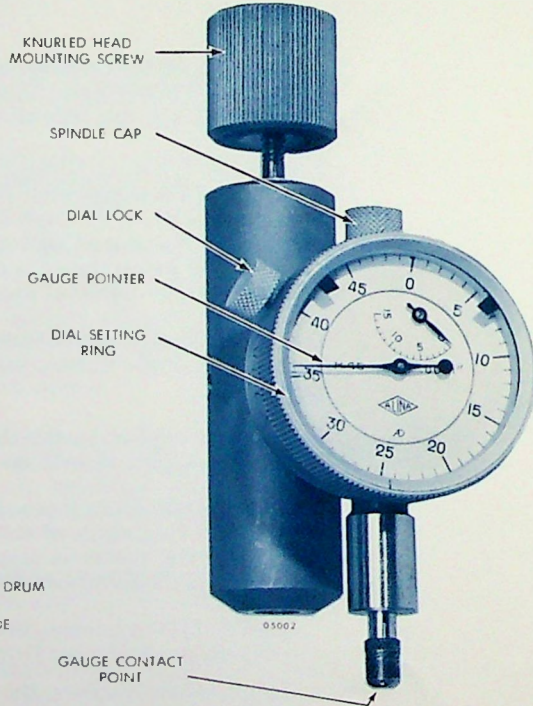
In VR-1100 systems, the square wave should be approximately 5 volts peak-to-peak (motor turning), or approximately 5 vdc (motor stopped).

In all other systems, the square wave should be approximately 10 volts peak-to-peak (motor turning), or approximately 10 vdc (motor stopped).



- ← GAUGE SPINDLE
- ← CHROME RIDGE ON DRUM
- ← VACUUM TAPE GUIDE
- ← DRUM MOTOR HOUSING

Figure 4a. Setup for Measurement of Tip Projection



- KNURLED HEAD MOUNTING SCREW
- SPINDLE CAP
- DIAL LOCK
- GAUGE POINTER
- DIAL SETTING RING
- GAUGE CONTACT POINT

Figure 4b. Gauge

RETURNING THE HEAD ASSEMBLY TO AMPEX FOR REFURBISHING. Just prior to the return of the assembly to Ampex for refurbishing or replacement, the tip projection should be measured and noted in the space provided on the Refurbishing form. This form must accompany the returned assembly.

Tip projection is the distance that the video head tips protrude above a reference surface on the video head drum. The reference surface is on the periphery of the drum adjacent to the trailing surface of video head number 1. Video head number 1 is identified by a yellow dot. AMPEX furnishes a special gauge for the measurement of tip projection. In use, this gauge is mounted on the video head assembly by means of a knurled screw (captive on the gauge assembly) which engages the dial indicator post identified in *Figure 1*. *Figure 4a* shows the gauge correctly mounted for the measurement.

Tip projection is measured in the following manner:

CAUTION

DURING THE PERFORMANCE OF THE FOLLOWING MEASUREMENT PROCEDURE, USE GREAT CARE TO AVOID CAUSING ANY MECHANICAL DAMAGE TO THE VIDEO HEAD TIPS.

- a. Disable the drum motor power supply.
- b. If the Mark Ten Assembly is air bearing-equipped, determine that normal bearing air pressure is supporting the air bearings.
- c. The tach wheel (see *Figure 1*) may be turned manually by extending a finger tip through the opening in the head drum motor housing marked in *Figure 1*. Turn the tach wheel and identify head tip number 1 (marked in yellow). Turn the tach wheel until head tip number 1 just enters the top of the vacuum tape guide.

- d. Mount the gauge, positioned as shown in *Figure 4a*. To do this, hold the gauge in position while engaging the captive knurled-head screw with the dial indicator post identified in *Figure 1*. Before tightening this screw, center the gauge spindle on the right hand edge of the chrome ridge, then tighten it just enough to hold the gauge firmly in position.
- e. Turn the drum *away* from the vacuum tape guide, until the tapered screw associated with head tip number 1 is under the gauge contact point (see *Figure 4b*). (This centers the gauge contact point on the reference surface defined above.)
- f. Turn the dial of the gauge to place the zero mark in line with the pointer.
- g. To determine the tip projection of head tip number 4, turn the drum *very slowly toward* the vacuum tape guide until the gauge pointer registers the maximum indication. Make note of the indication. (The gauge dial is calibrated in mils and tenths of a mil.) Continue around the drum, noting the maximum indication of each head tip.

NOTE

The tip projection data determined in step *g* should be entered on the Refurbishing form in the space provided.

- h. Continue to turn the head drum slowly (as in step *g*) until the contact point of the gauge spindle rests on the drum surface midway between head tips number 1 and 4, then carefully remove the gauge from the Mark Ten Assembly.
- i. Reactivate the drum motor power supply.