

RECORDER
KS-19125 L3
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the KS-19125 L3 recorder (Fig. 1) used for digital recording of automatic message accounting (AMA) data in central offices.

1.02 The KS-19125 L3 recorder is a 2-speed, 9-track magnetic tape transport designed to operate from a power source of 208-volt 3-phase 60-Hz alternating current and +24, -48, and -72 volt direct current. The tape transport is equipped with reel hold-down knobs which are designed to accommodate 10-1/2 inch diameter tape reels having hubs specified by USASI (United States American Standards Institute) standard X3.14.

1.03 Reference shall be made to Section 020-010-711 covering general requirements and definitions for additional information necessary for the proper application of the requirements described in Part 2.

1.04 The requirements in Part 2 are given in the recommended sequence for a complete mechanical check of the recorder. The procedures in Part 3 are numbered to correspond with the requirements in Part 2. Reference should be made to Part 3 when it is necessary to make adjustments.

1.05 Asterisk (*): Requirements are marked with an asterisk when to check for them would necessitate dismantling or dismounting apparatus or would affect the adjustment involved or other adjustments. No check need be made for these requirements unless the apparatus or part is made accessible for other reasons or unless its performance indicates that such a check is advisable.

1.06 A drop of oil, for the purpose of this section, is the amount of oil discharged from the nozzle of the 486A oil can where the sides of the can are depressed once and held depressed until a drop is released from the nozzle.

1.07 A film of lubricant compound or antiseize compound, for the purpose of this section, is the amount of compound deposited on the surface of a part after being brushed lightly with the R-2966 brush which has been fully dipped into the compound, rotated several times, and the end of the brush scraped against the edge of the container to remove excess compound extending from the end of the brush.

1.08 The time during which the recorder is out of service should be as brief as possible to prevent possible loss of AMA data if the operating recorder should break down. However, the call processing equipment can store call data for a period of about 5 to 25 minutes depending upon traffic. This time will normally allow the recorder being serviced to be put back in operation without loss of AMA data.

1.09 Magnetic recording tape shall be removed from the recorder prior to performing maintenance operations. Tape containing AMA information must be identified, labeled, placed in a reel container, and stored. (See Section 034-360-301.)

1.10 Before any adjustment, lubrication, or cleaning operation is performed, electrical power must be disconnected from the recorder. If power is required to perform checking and adjusting operations, place the recorder in the manual control condition and restore power to the recorder in accordance with local instructions.

1.11 Upon completion of maintenance work and before returning the recorder to AMA service, the attendant shall request a system diagnosis of the recorder. The request for AMA diagnosis and system acknowledgment shall be in accordance with information given in the applicable input and output message manuals listing teletypewriter (TTY) messages that can be transmitted or received on the maintenance TTY.

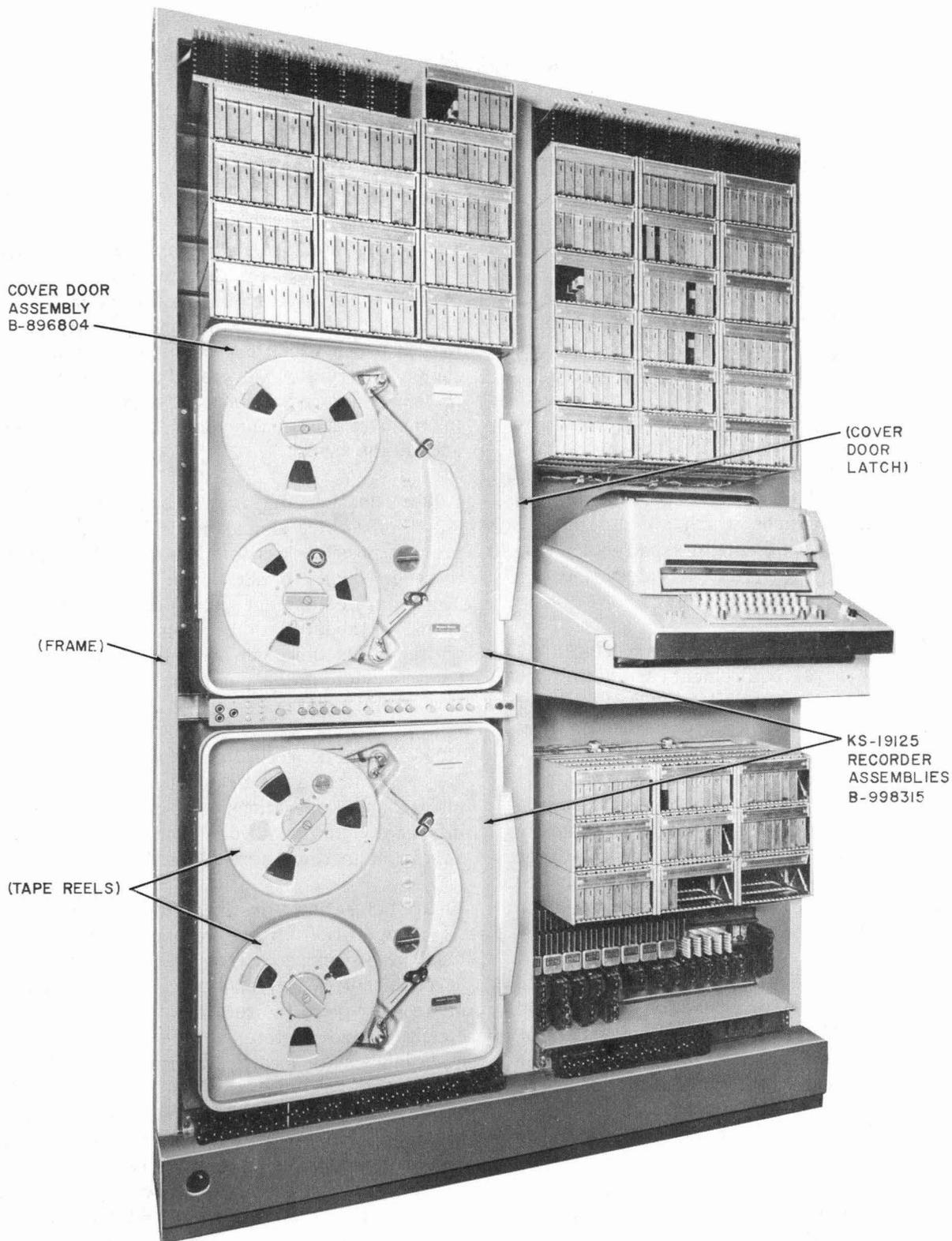


Fig. 1—KS-19125 L3 Recorder

2. REQUIREMENTS

2.01 Cleaning

(a) **General:** The recorder should be given a general cleaning once a week. The equipment enclosure, front and rear, and the face of tape transport shall be kept free of oil, grease, and dust.

(b) **Tape Path:** The heads (Fig. 2), rotating and stationary guides, pinch roller, and capstan shall be *free of tape oxide, dust, and all other foreign material.*

Note: It is important that the tape path be cleaned each time the tape is changed.

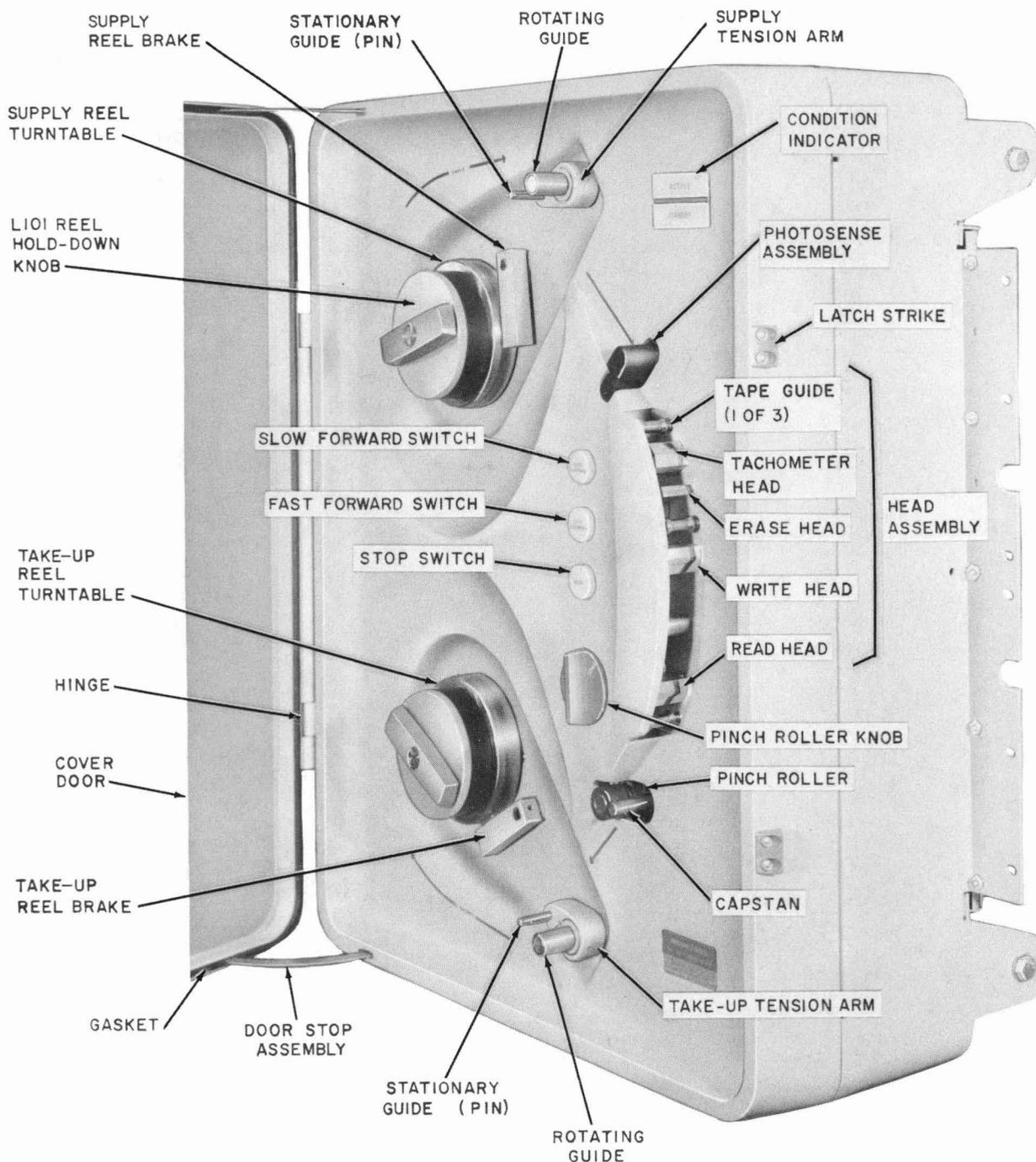


Fig. 2—KS-19125 L3 Recorder—Front View With Door Open

(c) **Cover Door:** The cover door shall be free of finger marks and **dust** which may be attracted by static electricity.

(d) **Finish:** All painted surfaces shall be free of oil, grease, and dirt. Oil and grease should be removed from the surface as soon as practical to prevent discoloration of the finish.

(e) **Reel Turntable Brake Surface:** The brake surface of the turntable (Fig. 3) and the brake material shall be kept free of dust, oil, and grease.

Note: The brake surface and brake material should not be touched except with a clean cloth and approved cleaning solution.

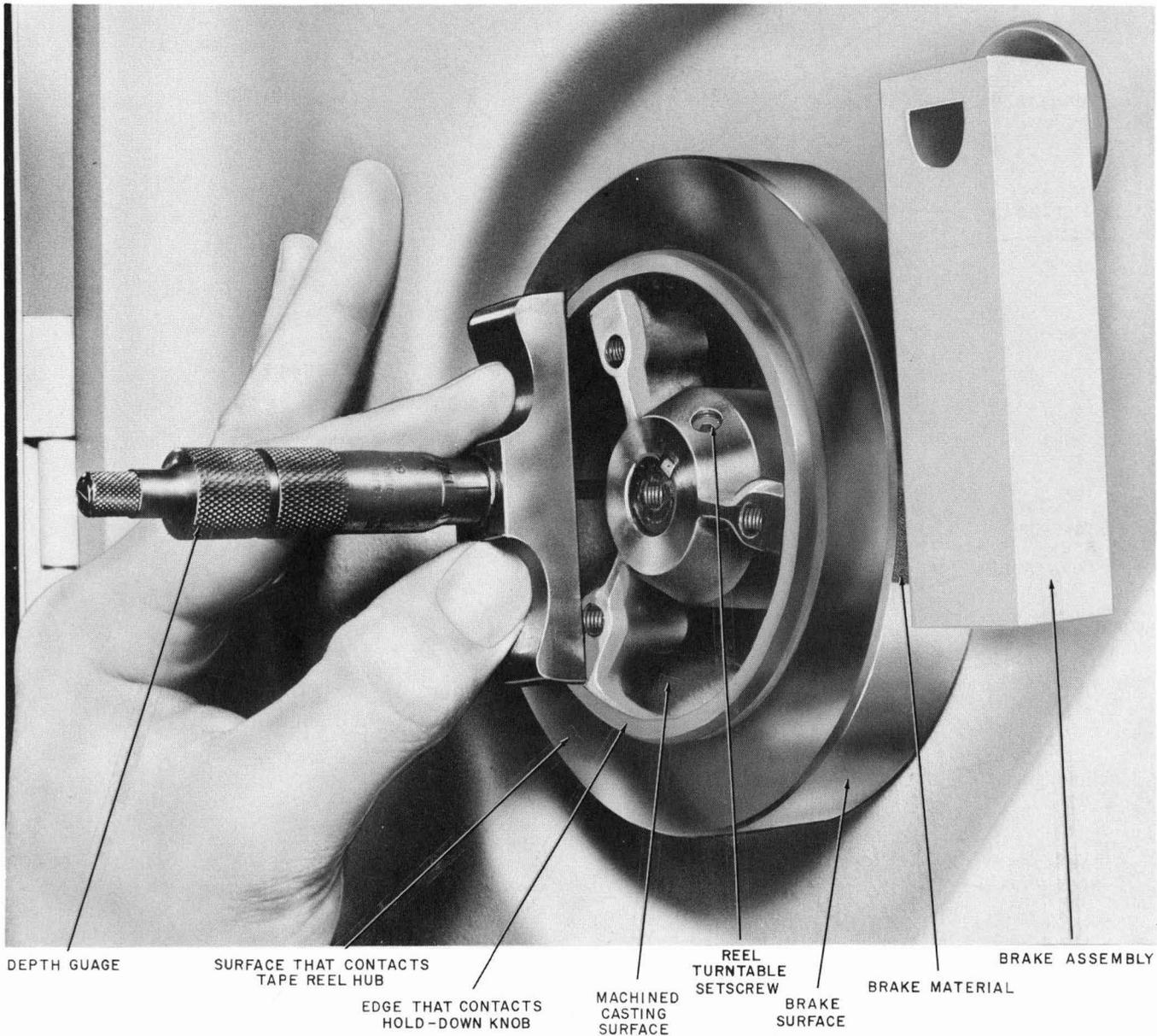


Fig. 3—Reel Turntable Showing Height Measurement

2.02 Lubrication

(a) **Rotating Guides and Pinch Roller:** The rotating guides on the tension arms (Fig. 2) and the pinch roller contain ball bearings which require no lubrication service during their lifetime.

(b) **Motors:** The drive motor (Fig. 4) and the reel motor contain ball bearings which require no lubrication service.

(c) **Pinch Roller Knob and Pinch Roller Assembly:** The cam surface (Fig. 4) of the pinch roller knob which rubs against the pinch roller assembly should be lubricated at

least once every six months with a film of No. 6 Dow compound lubricant.

(d) **Hinges:** The front cover door hinge (Fig. 2), the rear door hinges (Fig. 5), and the relay inspection panel hinge require oiling at intervals to prevent wear and squeaks. Any excess oil should be removed immediately to prevent spotting of equipment finish.

(e) **Latches and Door Stops:** The latch strikes (Fig. 2) and the door stop assemblies use materials which require no lubrication.

2.03 Demagnetization: The head assembly is demagnetized by the manufacturer and should require no further attention.

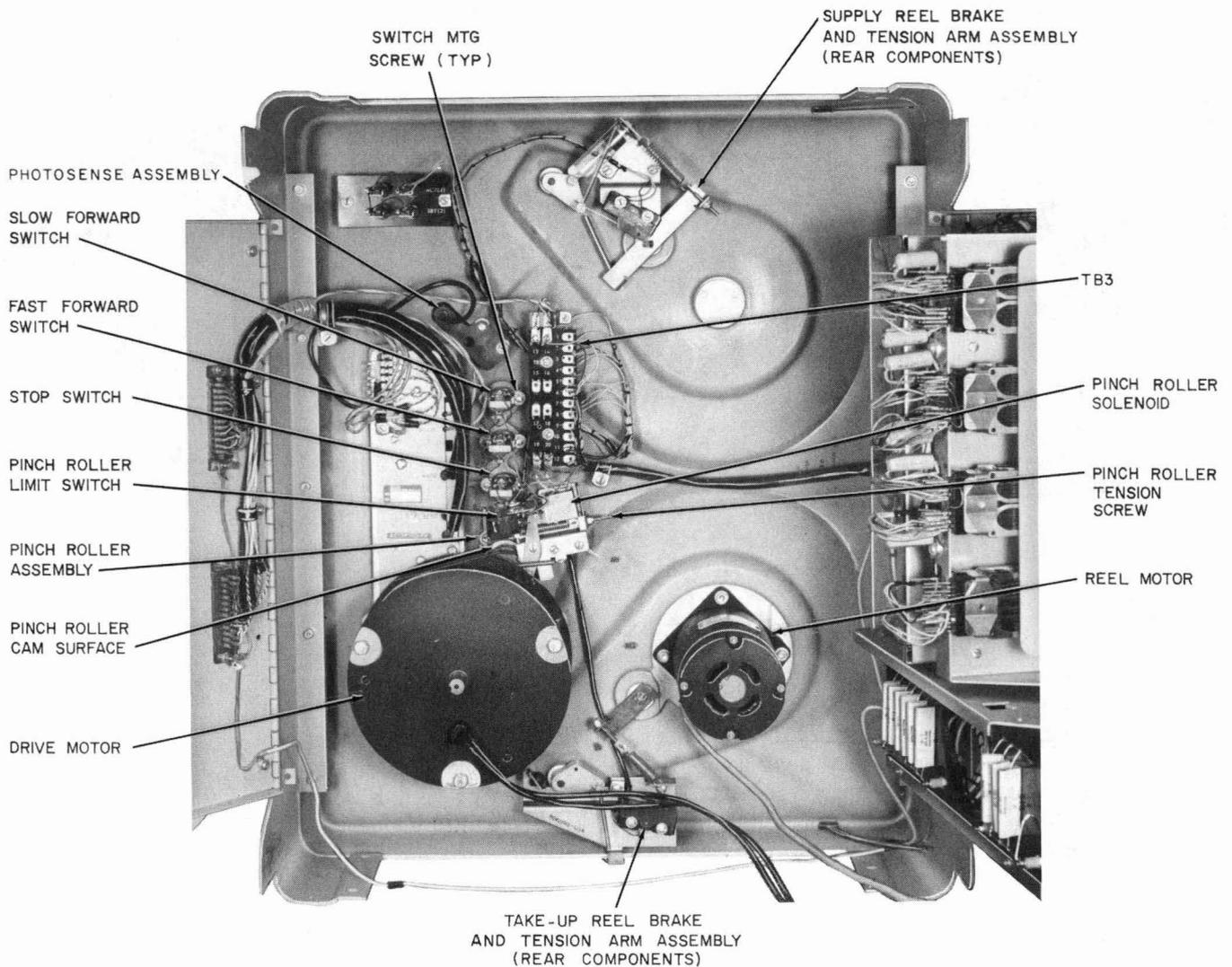


Fig. 4—KS-19125 L3 Recorder—Rear View

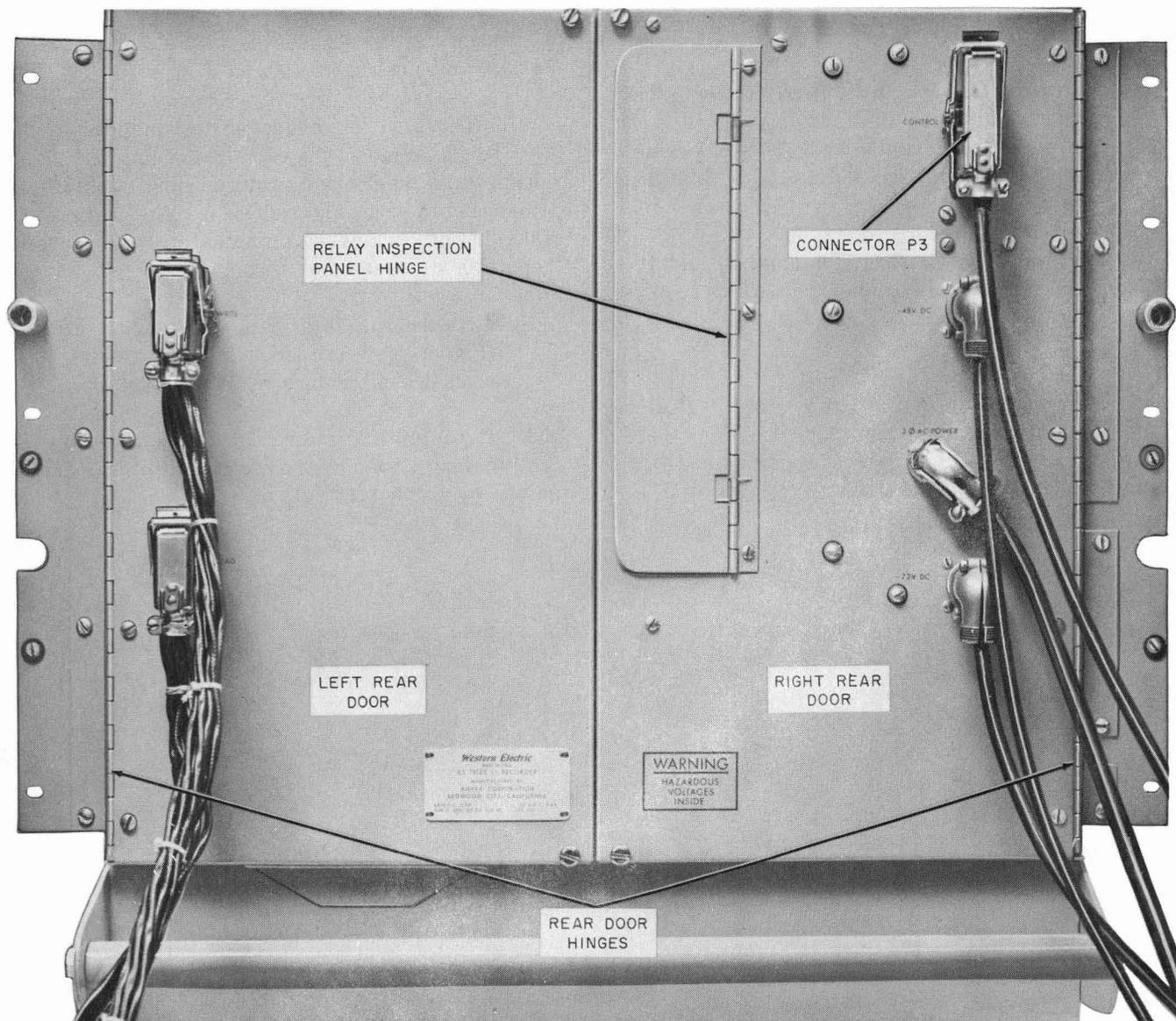


Fig. 5—Rear View of Recorder with Doors Closed

2.04 Head Assembly: The four magnetic heads of the assembly are aligned by the manufacturer and require no adjustment. Defective or excessively worn heads can cause unsatisfactory operation of the equipment. The tape guides shall keep the tape centered between the conical sections and shall not be worn so that the tape rides up on the conical sections.

***2.05 Reel Turntable Alignment:** The distance between the edge of the reel turntable (Fig. 3) which contacts the hold-down knob and the machined casting surface surrounding the turntable shaft shall be 0.969 ± 0.005 inch. This dimension provides alignment of tape with the tape

guides of the head assembly. To check this requirement, perform the following.

- (1) While holding hold-down bar (Fig. 6), use the 5-inch E screwdriver to remove special left-hand threaded screw. (Turn screw clockwise.) Take care not to mar the slotted area of the screw.
- (2) Unscrew hold-down bar by turning it counterclockwise and remove bar from stud.
- (3) Remove thrust bearing, two washers, and hold-down cap from stud.

(4) Using the 4-inch E screwdriver, remove three screws and lockwashers securing hold-down base to reel turntable and remove hold-down base, ring, and stud.

Caution: Do not disassemble hold-down base and stud unless necessary. If further disassembly is required, refer to Section 034-360-801.

(5) Using the micrometer depth gauge (Fig. 3), check requirement by measuring from hold-down knob edge of reel turntable to machined surface of casting.

(6) Using the 4-inch E screwdriver, reinstall hold-down base (Fig. 6) and ring assembly on turntable (Fig. 7) with three screws and external tooth lockwashers.

(7) Refer to Fig. 6 and install hold-down cap, two washers, and thrust bearing. Using a clean KS-2423 cloth moistened with Freon (TF grade), remove old antiseize compound from threads of stud. Apply KS-19094 L1 antiseize compound to approximately five threads nearest the end of the stud. Then thread hold-down bar onto stud, taking care that washers and thrust bearing are in proper alignment before tightening.

(8) Apply Loctite E sealant to threads of special left-hand threaded flathead screw. Install screw by threading it counterclockwise into the end of the stud while holding the hold-down bar. Take care not to mar the slotted area of the screw, and tighten to a torque of 18 to 20 inch-pounds using the APCO Mossberg torque screwdriver fitted with a 3/8-inch screwdriver bit. To measure counterclockwise torque, set screwdriver to torque desired and rotate handle counterclockwise to zero.

2.06 Braking Torque for Supply and Take-Up Reel Turntables

(a) With turntable turning slowly clockwise, tension shall measure within the following limits:

Supply—Min 275 to Max 325 grams

Take-Up—Min 175 to Max 225 grams

(b) Correct adjustment and cleanness of brakes are essential for smooth tape motion (without throwing loops and jerking tape). Readjustment to above values shall be made where necessary. To check this requirement, proceed as follows.

(1) Wrap one end of a 3-foot piece of string three or more turns in a clockwise direction

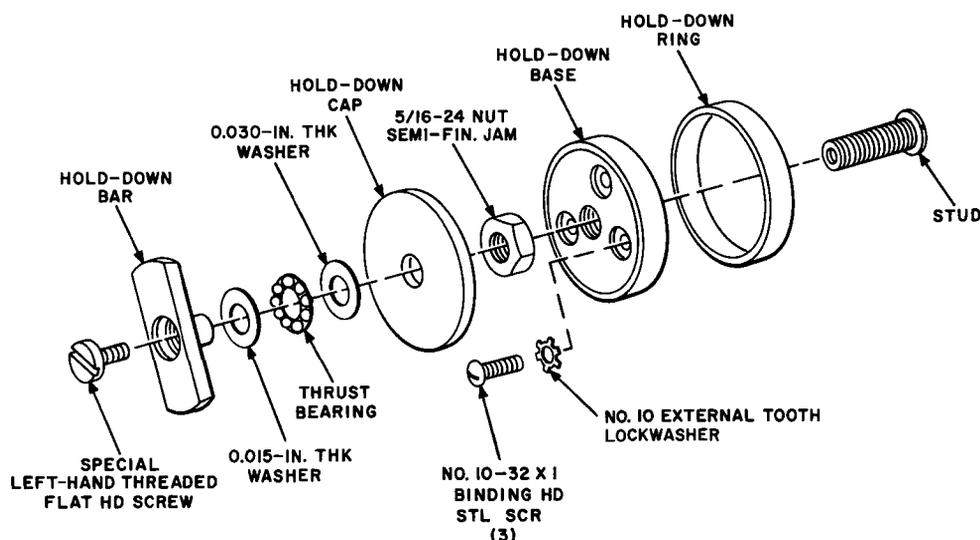


Fig. 6—KS-19125, L101 Reel Hold-Down Knob—Exploded View

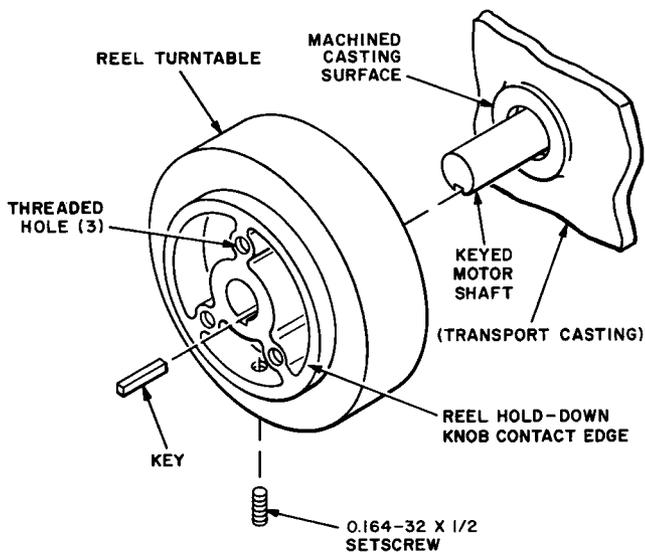


Fig. 7—Reel Turntable and Mounting Details—Typical

around the rubber ring of the hold-down knob as shown in Fig. 8.

(2) With the 79B gauge attached to a loop in the other end of the string, hold the gauge in a horizontal position and pull in a direction in line with the wraps of string on the turntable.

(3) Pull smoothly and steadily with a braking surface velocity of 2 to 5 inches per second as gauged by eye. With the reel turning smoothly, observe the gauge reading.

2.07 Pinch Roller and Limit Switch

(a) The pinch roller (Fig. 2) shall produce a force of 15 pounds ± 0.5 pound against the capstan with pinch roller knob in the RUN position. To check this requirement, proceed as follows.

- (1) Operate the pinch roller knob to LOAD position.
- (2) Form a tape loop by folding a 1-foot piece of magnetic tape lengthwise and tying the ends.
- (3) Place the tape loop between the capstan and pinch roller with the loop to the left (Fig. 9).

(4) Place a second short piece of tape between the tape loop and the capstan.

(5) Operate the pinch roller knob to RUN position, securing both tapes.

(6) With the R-2481 spring balance attached to the tape loop, pull in a direction to pull the roller away from the capstan with a force of 14-1/2 pounds.

(7) The short piece of tape shall still be held by the force of the pinch roller against the capstan. Increase the force by 1 pound and the short piece of tape should be freed.

(b) The pinch roller limit switch (Fig. 10) shall operate when the pinch roller knob is placed in the RUN position and shall release when the knob is placed in the LOAD position.

2.08 Pinch Roller Lock Solenoid: The pinch roller lock solenoid (Fig. 10) shall operate smoothly and produce positive locking of the pinch roller knob in the RUN position during remote control of equipment. To check the requirement, proceed as follows.

- (1) Condition recorder for manual control of operation.
- (2) Turn pinch roller knob to RUN position.
- (3) At the rear of recorder (Fig. 4), connect W1AB cord between TB3-19 and TB3-11 (ground).
- (4) The pinch roller lock solenoid shall operate and the pinch roller knob shall be locked in the RUN position.
- (5) Remove the jumper cord from TB3.

2.09 FAST FORWARD, SLOW FORWARD, and STOP Switches: The local control switches shall operate smoothly and shall cause the correct equipment response. Operation of the SLOW FORWARD switch (Fig. 2) shall cause the tape to be driven over the head assembly at nominal recording speed. Operation of the FAST FORWARD switch provides a relatively fast speed for running the tape from the supply reel to the take-up reel. Operation of the STOP switch during

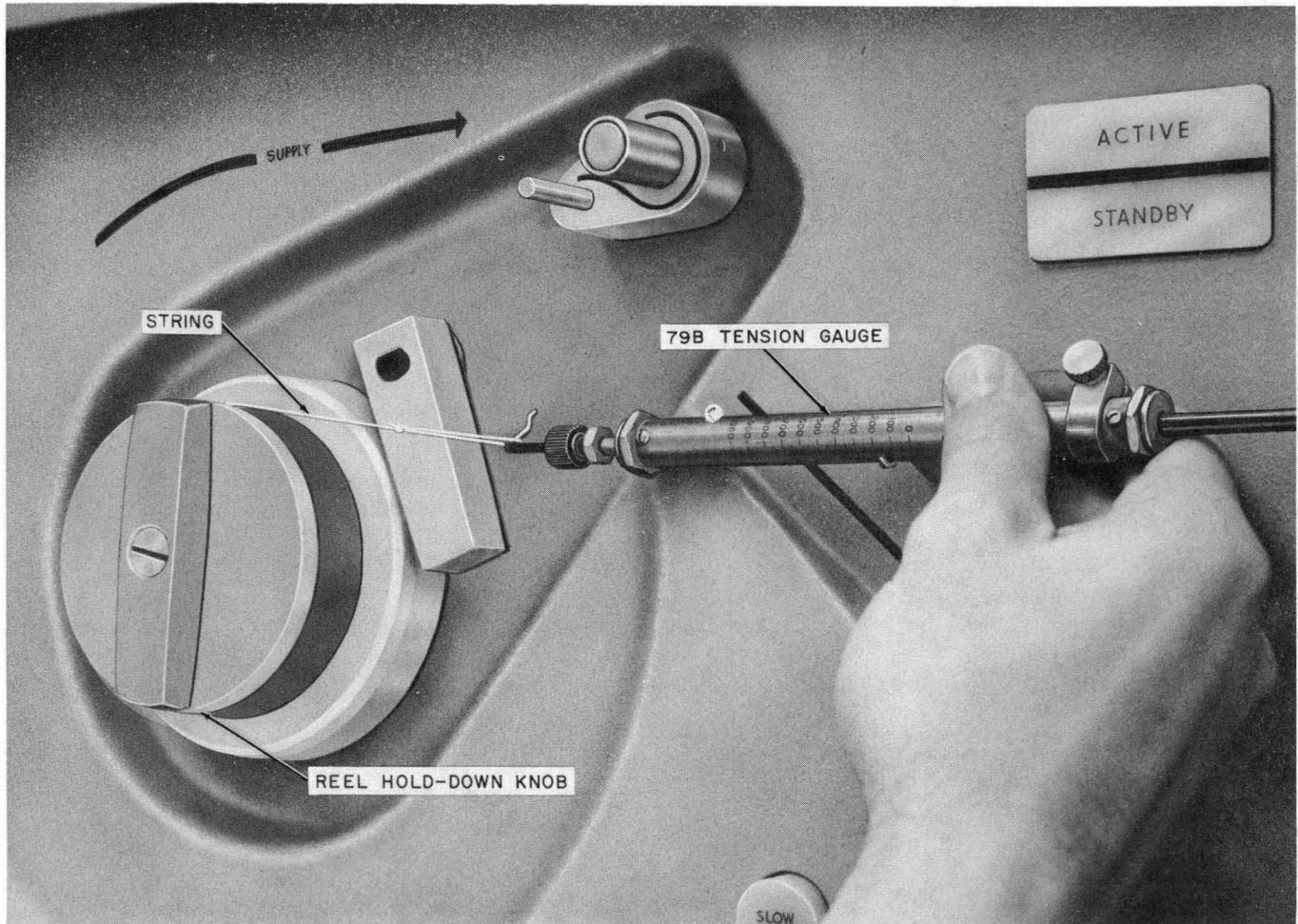


Fig. 8—Measurement of Breaking Torque—Typical

either tape speed, slow forward or fast forward, causes the tape motion to stop. Check the operation and requirement of control switches by performing the following.

- (1) With the recorder conditioned for manual operation and with a spare tape installed on the recorder, turn the pinch roller knob to RUN position.
- (2) Operate the SLOW FORWARD, FAST FORWARD, and STOP switches to check their smoothness of operation and observe for correct response of the tape transport.
- (3) With the equipment operating in either speed, the stopping of the supply reel, take-up reel, and pinch roller shall be smooth and shall

appear to coincide with the operation of the STOP switch.

- (4) Rapid, alternating operation of the SLOW FORWARD and STOP switches shall not cause tape loops large enough to allow tension arms to operate either tape-break switch.

2.10 End-of-Tape Photosense Assembly: The photosense assembly shall sense beginning-of-tape (BOT) and end-of-tape (EOT) reflective markers (Fig. 11) located on the back (uncoated side) of the magnetic recording tape.

2.11 Condition Indicator: Both lamps of the STANDBY section of the condition indicator (Fig. 2) shall light during the standby condition as determined by the remote equipment. Both lamps

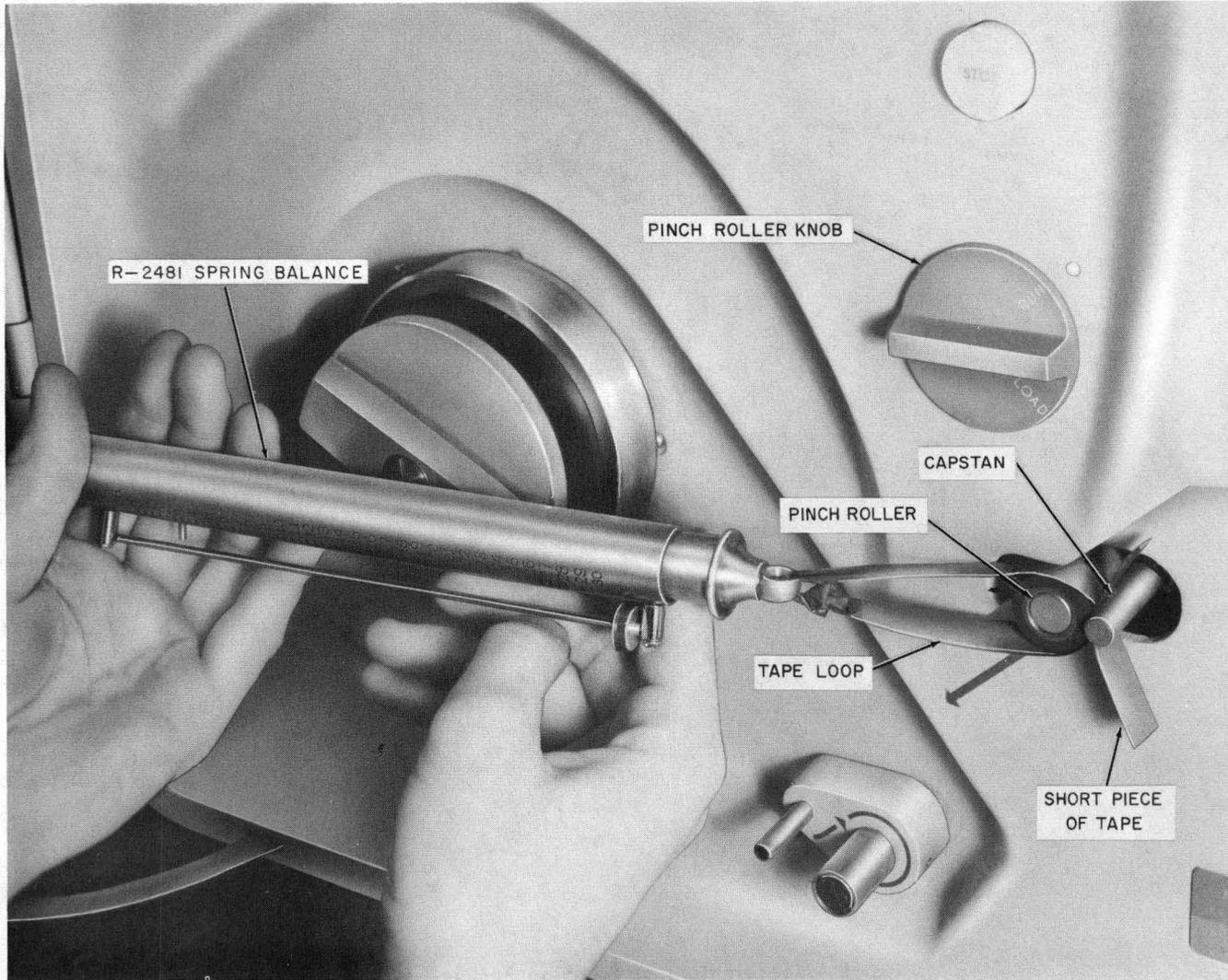


Fig. 9—Set-Up for Checking Pinch Roller Pressure—Typical

of the ACTIVE section of the condition indicator shall light during the active condition. In manual control for local operation, neither section shall be lighted.

2.12 Front Cover Door: The gasket of the front cover door shall be in contact with the recorder casting at all points when the door is fully latched.

2.13 Rear Doors: A uniform spacing of about 1/16 inch shall exist between the edges of

the two rear doors (Fig. 5) when they are closed. Gauge by eye.

2.14 Relays: Relay contacts shall meet the requirements of Section 069-306-801.

Warning: Hazardous voltage (208 volts 3-phase 60-Hz ac) is supplied to recorder. Electrical power must be disconnected before performing any maintenance operations on relays.

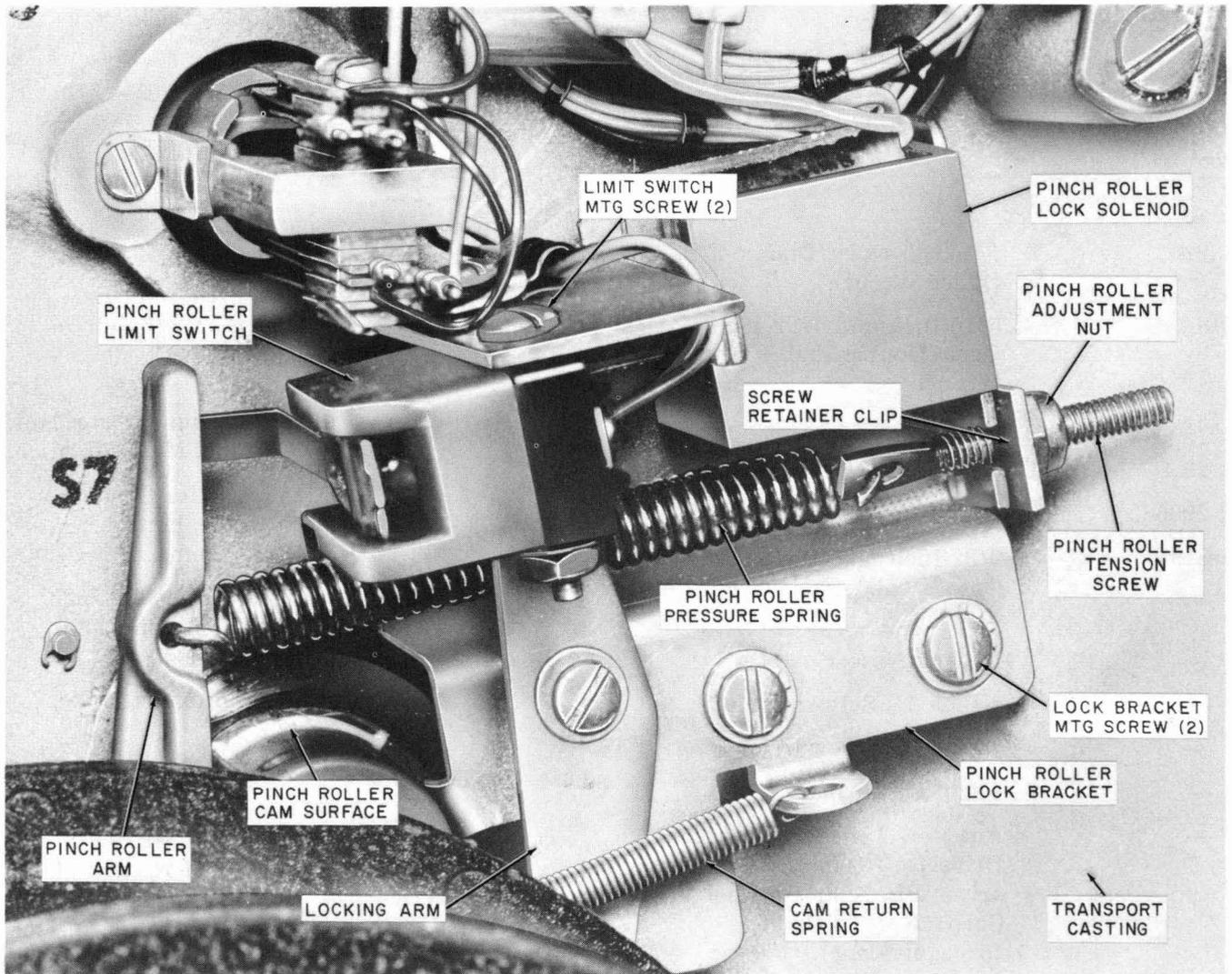


Fig. 10—Pinch Roller Limit Switch, Lock Solenoid, and Associated Parts

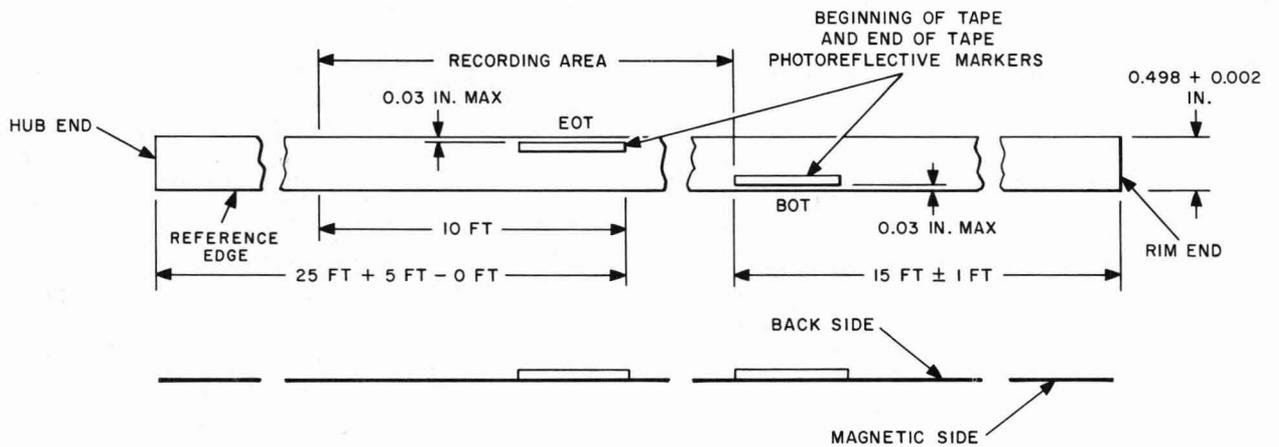


Fig. 11—Photorefective Marker Placement

3. PROCEDURES

3.001 *List of Tools, Gauges, Test Apparatus, and Materials*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
129B	1/4-Inch Open Double-End Offset Wrench
418A	5/16-Inch and 7/32-Inch Open Double-End Flat Wrench
486A	Oil Can
R-2958	5/64-Inch Allen Wrench
R-2966	Brush
R-3193	9/32-Inch and 11/32-Inch Open Double-End Flat Wrench
—	P Long-Nose Pliers
—	5-Inch E Screwdriver
—	4-Inch E Screwdriver
—	Vacuum Cleaner
—	Adapter, 1/4-Inch Square Drive to 3/8-Inch Screwdriver Bit, Snap-On Tool Corp., No. TMC-106A (or equivalent)
GAUGES	
79B	0-1000 Gram Push-Pull Tension Gauge
R-2481	0- to 30-Pound Spring Balance
R-2771	0- to 6-Pound Spring Balance
R-8550	6-Inch Steel Scale
—	Micrometer Depth Gauge (up to 1 inch in 0.001-inch divisions), Miller Falls No. 31 (or equivalent)
—	APCO Mossberg Torque Screwdriver, 0 to 50 Inch-Pounds, 1/4-Inch Square Drive (or equivalent)

CODE OR SPEC NO.

DESCRIPTION

TEST APPARATUS

W1AB

Cord (1-1/2 feet with alligator clip on each end)

MATERIALS

KS-2423

Cloth

KS-6232

Oil

KS-19094 L1

Antiseize Compound

—

Freon (TF Grade)

—

No. 6 Compound Lubricant, Dow Corning, Midland, Mich.

—

Sealant, Loctite Grade E, American Sealants, Hartford, Conn.

—

Recording Tape, 1/2-Inch (scraps 1 foot long and 3 inches long)

—

String (approximately 3 feet)

3.01 *Cleaning*

(1) **General Cleaning:** When necessary, use the vacuum cleaner to remove any loose dust from inside the front cover, on the face of recorder, and inside the rear portion of the recorder. Remove any remaining residue by wiping with a clean KS-2423 cloth moistened with Freon (TF grade). The Freon (TF grade) should be sprayed on the cloth rather than on the surface being cleaned. Follow by wiping with a clean, dry KS-2423 cloth.

(2) **Tape Path:** Components of the tape path shall be cleaned each time the tape is changed. Clean all surfaces touched by the tape using a clean KS-2423 cloth moistened with Freon (TF grade). These surfaces are the stationary pin and rotating guide surfaces on the supply and take-up tension arms (Fig. 2), the three tape guides and the four head faces on the head assembly, and the capstan. Remove all accumulations of tape oxide and dust. Only the surface of the heads contacted by the tape requires cleaning. Wipe all parts with a clean,

dry KS-2423 cloth. Do not touch any surface which tape contacts with fingers because body oils can contaminate tape.

(3) **Cover Door:** When the tape is changed or after servicing of the recorder, any dust attracted to the inside of the cover door glass should be removed with a water-dampened KS-2423 cloth.

(4) **Finish:** When any oil or grease gets on a painted surface of the recorder, it shall be removed with a KS-2423 cloth moistened with Freon (TF grade). Follow by wiping with a clean, dry KS-2423 cloth.

(5) **Reel Turntable Brake Surface:** The brake surface (Fig. 3) of the turntables and the brake pads must be completely free of all dust, oil, and grease (even the oil left by a finger print) if the torque applied by the brakes is to be uniform. Clean the brake surface and brake pads with a clean KS-2423 cloth moistened with Freon (TF grade). Wipe brake surfaces and pads with a clean, dry KS-2423 cloth.

Note: Cleaning may not remove all carbon discoloration or stain from turntable brake surface. This is not harmful, nor will it interfere with proper brake operation.

3.02 Lubrication

(1) **Pinch Roller Knob and Pinch Roller Assembly:** Position the pinch roller knob to LOAD position. Using the R-2966 brush, apply a film of No. 6 Dow compound lubricant to the cam surface on the rear section of the pinch roller knob at the point where it contacts the pinch roller assembly (Fig. 10). Operate the pinch roller knob between the LOAD and RUN positions several times to spread the lubricant.

(2) **Hinges:** Using 486A oil can, apply a drop of KS-6232 oil to each hinge joint of the cover door (Fig. 2). Remove any excess oil with a KS-2423 cloth. Operate the door back and forth to work the oil into the hinge. Repeat the procedure for each of the rear door hinges and the relay inspection panel hinge (Fig. 5).

3.03 Demagnetization: No procedure is required.

3.04 Head Assembly: No adjustment is permitted.

*3.05 Reel Turntable Alignment (Fig. 3 and 7)

(1) Remove reel hold-down knob assembly as described in 2.05(1) through (4).

(2) Using the micrometer depth gauge, determine if turntable needs to be raised or lowered.

(3) Use the R-2958 Allen wrench to loosen setscrew (Fig. 7) securing reel turntable on keyed motor shaft.

(4) Raise or lower turntable as required to meet clearance requirement, and tighten setscrew. Recheck clearance with depth gauge. Reassemble reel hold-down assembly as described in 2.05(6).

3.06 Braking Torque (Tension) for Supply and Take-Up Reel Turntables

(a) Supply Reel Turntable

(1) Using the R-3193 wrench, adjust the brake adjustment nut (Fig. 12) by rotating the nut clockwise if the tension is low and counterclockwise if the tension is high.

(2) Tension may be measured, roughly, from the rear of recorder by gauging the tension applied to the brake arm. Attach the hook of a R-2771 spring balance at the hole in the end of brake arm where the tension arm control spring is hooked. Pull spring balance vertically and adjust the brake adjustment nut until the brake arm just starts to move with a force of 2.5 pounds indicated on scale of spring balance.

(3) Perform brake tension test as described in 2.06 and, if necessary, make final readjustment on the brake adjustment nut to bring tension requirements within limits.

(b) Take-Up Reel Turntable

(1) Adjust the brake adjustment nut (Fig. 13) as described in (a)(1).

(2) Obtain rough measurement of brake tension as described in (a)(2), *except* that the

hook of the spring balance shall be hooked at the end of the brake arm and at a point directly below the brake adjustment nut (Fig. 13) and that the vertical pull required shall be 1.7 pounds.

- (3) Make final tension adjustment as described in (a)(3), except refer to Fig. 13 for view of brake components.

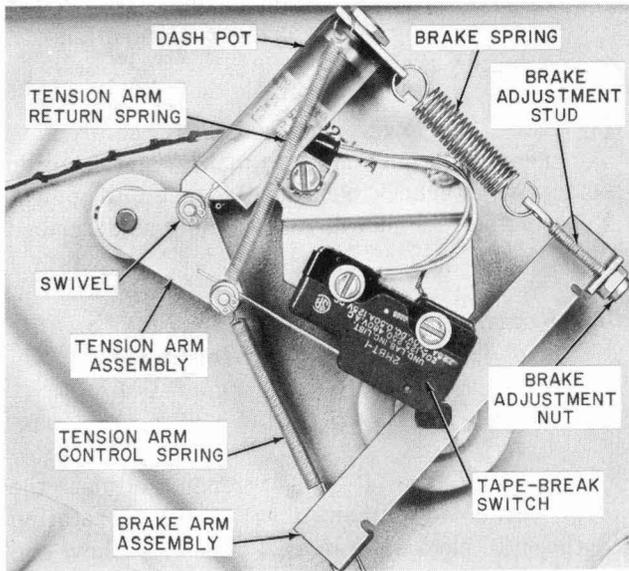


Fig. 12—Rear Components of Supply Brake and Tension Arm Assembly

3.07 Pinch Roller and Limit Switch

- (a) To adjust pinch roller pressure, proceed as follows.
- (1) Using the P long-nose pliers, grasp flat end of the pinch roller tension screw (Fig. 10) so that it does not rotate while the adjustment nut is being tightened or loosened.
 - (2) Using the R-3193 wrench, turn pinch roller adjustment nut clockwise to increase pinch roller pressure or counterclockwise to reduce pressure. One turn of the adjustment nut causes approximately 0.75-pound change in pinch roller pressure.
- (b) To adjust pinch roller limit switch, proceed as follows.

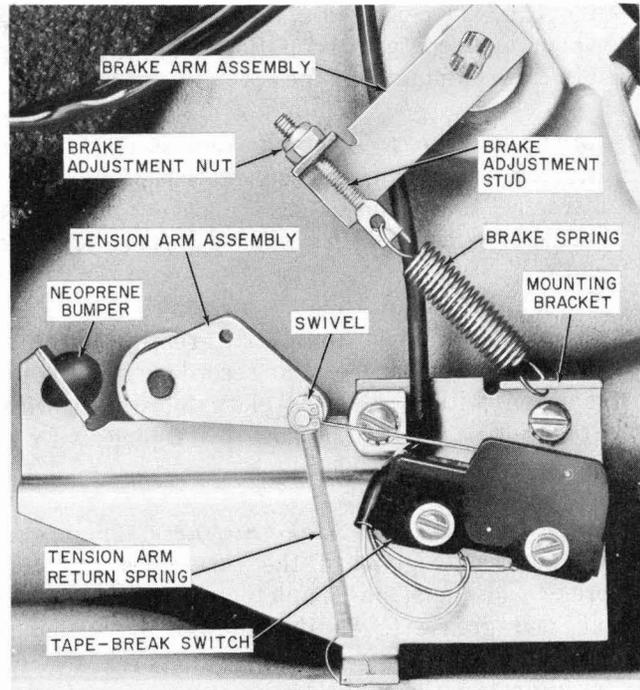


Fig. 13—Rear Components of Take-Up Brake and Tension Arm Assembly

- (1) If limit switch does not operate when pinch roller knob is turned to RUN position and does not release when knob is turned to LOAD position, loosen two screws which secure limit switch (Fig. 10) by using the 418A wrench and the 4-inch E screwdriver. Rotate switch on its mounting bracket until positioning is such that the proper switch functions occur in accordance with requirements of 2.07(b).

- (2) Tighten switch mounting screws and recheck switch operation.

3.08 Pinch Roller Lock Solenoid: If the lock solenoid (Fig. 10) fails to function in accordance with requirements, the condition may be due to one of the following causes and may be corrected as indicated.

- (a) **Interference or Misalignment:** With power off, perform an inspection of the lock solenoid, locking arm, and associated parts to determine if a binding condition exists between moving parts. Turn the pinch roller knob (Fig. 2) to the RUN position. Manually operate locking arm (Fig. 10) to the lock position several times and determine if the action of the locking arm

and solenoid plunger is smooth and free of interference. If manual operation of the mechanism indicates interference or misalignment, loosen the two screws which secure pinch roller lock bracket to the transport casting. Elongated mounting holes in the bracket permit slight repositioning of the assembly. Realign the assembly until positioning is such that interference is eliminated and the locking arm (manually operated) makes positive engagement with the pinch roller knob to mechanically lock the knob in the RUN position. Tighten the two mounting screws. Recheck requirement in 2.08.

(b) **Electrical Failure:** Make visual check for loose or broken leads between the pinch roller lock solenoid (Fig. 10) and lead terminations at TB3-19 and 20 (Fig. 4). Ascertain that proper power is being supplied to the tape transport by the AMA power source. If, after performing (a) and (b), the lock solenoid does not meet requirements, refer to Section 034-360-801 and replace the solenoid.

3.09 FAST FORWARD, SLOW FORWARD, and STOP Switches: If one or more control switches (Fig. 2 and 4) fail to function in accordance with the requirements, the condition may be due to one of the following causes and may be corrected as indicated.

(a) **No Response:** This may be due to a defect in the circuit, a loose connector, a foreign matter in the control switch, a faulty control switch, or a power source failure. Check for loose or broken electrical leads at S1, S2, and S3 switch terminations (Fig. 4). Make visual check at rear of control switches, inspecting for wire clippings, chips, solder, or other foreign matter which could cause a short circuit. Carefully vacuum rear components of switches. Check control and power cord connectors on right rear door (Fig. 5) to ensure positive engagement of connectors and receptacles. Ascertain that proper power is being supplied by the ac and dc power sources and that no blown fuse or tripped circuit breaker exists in the power source circuits. The control switches are 624D keys; the contacts of these keys, if dirty or misaligned, may cause failure of a switch circuit. Clean and burnish contacts in accordance with Section 069-386-801. Make adjustments of contact springs, if necessary, in accordance with Section 032-724-701.

(b) **Binding Switch:** This may be due to a pushbutton cap improperly installed or to a switch assembly not seated flush over the opening in transport casting. Make visual inspection from front of control switch to determine if the plastic pushbutton cap, when depressed, binds against the inside wall of opening in casting. If this is the case, remove the pushbutton cap (press-fit type). Inspect cap for visible defects such as cracks or an internal obstruction. Reinstall the cap on plunger of control switch, ensuring that the notch in cap aligns with projection on plunger of switch assembly. If the switch assembly continues to bind or fails to operate smoothly, use the 5-inch E screwdriver to loosen switch mounting screws (Fig. 4); reposition switch assembly in clearance hole through transport casting so that the pushbutton cap is centered within the hole and is not binding; tighten switch mounting screws and recheck switch operation.

3.10 End-of-Tape Photosense Assembly: If the requirements are not met, mechanically reposition the photosense assembly (Fig. 4) as follows.

- (1) Using the 4-inch E screwdriver, loosen (do not remove) the two screws securing the photosense assembly. Screws should be loose enough to permit slight repositioning of the assembly, but tight enough to hold the assembly in place while taking measurements as described in (3).
- (2) Mount and thread a reel of tape on the transport. Tension the tape by manually rotating the take-up reel in a clockwise direction.
- (3) Center the photosense assembly in the hole in the casting. Its position with respect to the narrow dimension of the hole may be centered by eye. In the long dimension, use the R-8550 steel scale to locate the lamp and photocell face of the assembly a reasonably accurate 1/8-inch from the back (non-oxide) side of the tensioned tape.
- (4) Tighten the upper mounting screw securely. When tightening the lower screw which is equipped with a cupped spring washer, the washer shall *not* be compressed solid.

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(5) Check requirement in 2.10. If the requirement is not met, refer to Section 034-360-801 and replace the photosense assembly.

3.11 Condition Indicator: No procedure is required.

3.12 Front Cover Door

(1) If the door gasket does not touch at all points, loosen screws holding cover door latch strike (Fig. 1) by using a R-2958 Allen wrench.

(2) Position strikes to cause gasket to seal, and tighten screws.

(3) If front cover door is difficult to unlatch,

loosen screws holding the door latch strikes; advance strikes, still maintaining full gasket engagement; and tighten screws.

3.13 Rear Doors: If clearance between rear doors is not correct, loosen hinge screws with a 4-inch E screwdriver and a 129B wrench, position doors correctly, and tighten hinge screws.

3.14 Relays: Recondition relay contacts, as required, in accordance with Section 069-306-801.

Warning: *Hazardous voltage (208-volts 3-phase 60-Hz ac) is supplied to recorder. Electrical power must be disconnected before performing any maintenance operations on relays.*