

RECORDER-REPRODUCERS KS-12055, L4 AND L6 REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the KS-12055, L4 and L6 recorder-reproducers used initially for machine intercept in the No. 6A announcement system and for weather announcing service in the No. 3A announcement system.

1.02 This section is reissued to cover KS-12055, L6 recorder-reproducers equipped with precision gears, to revise the list of materials, and to revise the procedure for the operate requirement. Detailed reasons for reissue will be found at the end of the section.

1.03 The KS-12055, L4 or L6 recorder-reproducer (hereinafter referred to as the L4 or L6 machine) consists essentially of a motor-driven drum on the surface of which is mounted a plastic or synthetic rubber recording band, 1-1/2 inches wide, impregnated with a magnetic recording medium. A single magnetic record head is provided for recording a message on the recording band and reproducing it. As the drum rotates, the record head is moved across the surface of the recording band by a cam and gear mechanism. A manual gear selector is provided to change the time interval available for recording a message by changing the rate at which the head moves across the band. A second motor pulley is also provided for further changing the message time interval by changing the speed of rotation of the drum. An erase coil carrying 115-volt, 60-cycle ac is provided for erasing the message when moved close to the band by a dc operated rotary solenoid. The recorder-reproducer is designed to operate with a suitable amplifier mounted as associated equipment.

1.04 L4 and L6 machines are identical except for features which were introduced to reduce flutter in the recorded output. These features were: first, the KS-12055, L20 drum and, later, precision gears in the gear box. L4 ma-

chines had neither of these features. L6 machines with serial numbers through 1143 had the L20 drum, whereas L6 machines with serial numbers 1144 and higher have the precision gears. Subsequent to manufacture, some L4 machines may have been equipped with L20 drums, and any machine returned for repair in recent years may have been equipped with precision gears. In any case, the requirements contained in this section apply to all machines except where specific reference is made to machines equipped with the L20 drum.

1.05 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 listed herein.

1.06 *Asterisk(*)*: Requirements are marked with an asterisk when to check for them would necessitate dismantling or dismounting of 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 its performance indicates that such a check is advisable.

1.07 *Make Busy*: Before checking the requirements or doing any work on a recorder-reproducer, remove it from service in accordance with approved procedures.

1.08 *Relay Requirements*: The apparatus requirements and adjusting procedures for the S1 and S3 relays are covered in the section for KS-15538 and KS-15756 relays.

1.09 Covers

(a) The covers of the machine should be mounted in place at all times except when removal is necessary for the performance of maintenance operations.

(b) The front cover of the machine should be mounted with the ventilation holes in the lower left corner.

1.10 Manual Rotation of Drum: In checking several requirements covered in this section, it is necessary to rotate the drum manually. To do this, first start the motor. Then set the gear selector in position 2 if this is specified in the requirement. If position 2 is not specified, the gear selector may be in any of the three numbered positions. Stop the motor and remove the driving belt. The drum can then be rotated manually.

1.11 The outermost position of the record head is that position where the head is farthest from the mounting plate.

1.12 The innermost position of the record head is that position where the head is closest to the mounting plate.

1.13 Neutral Positions of Gear Selector: The neutral positions (N) of the gear selector are those positions in which the traverse cam and the associated switching cams are inoperative. With the gear in a neutral position, the record head will ride on the surface of the drum in the position in which the traverse cam holds it.

1.14 The normal position of contact springs in the head-shortening record and the cut-through spring assemblies is that position assumed by the springs when the stud on the associated operating spring is not in contact with the cam. Contacts which are closed under this condition are referred to as normally closed contacts, and contacts which are open, as normally open contacts.

1.15 The operated position of contact springs in the head-shortening record and the cut-through spring assemblies is that position assumed by the springs when the stud on the associated operating spring is in contact with the highest part of the cam.

1.16 One drop of KS-16326, L1 oil, for the purpose of this section, is the amount of oil discharged from the nozzle of a No. 486A oilcan when the sides are depressed until a drop is released.

2. REQUIREMENTS

General

2.01 Cleaning

(a) **Cut-Through and Head-Shorting Record Contacts:** The contacts shall be cleaned when necessary in accordance with Section → 069-386-801.

(b) **Record Head:** The record head pole piece shall be free of dirt and hard particles of wax.

To check, lift the head to its highest position and observe the surface of the pole piece. Poor quality of reproduction may be an indication of wax on the pole piece.

(c) Other parts shall be cleaned when necessary in accordance with approved procedures.

2.02 Lubrication

(a) The following parts shall be lubricated with KS-16326, L1 oil as covered below.

(1) Fig. 1(A) and 2(A) — Three drops to each motor bearing.

(2) Fig. 1(B) and 2(B) — Three drops to each motor mount pivot bearing, applied between the collars and the motor rail.

(3) Fig. 1(C) and (D) — One drop each to the erase magnet guide rod bearing and the erase magnet connecting rod bearing.

(4) Fig. 2(C) — The oil level in the oil cup of the gear box shall be maintained within 1/4 to 3/8 inch from the top of the cup.

(5) Fig. 3(A) and (B) — One drop to each traverse arm pivot bearing.

(6) Fig. 3(C) — One drop to the pivot bearing of the head lifter arm between the plate and arm.

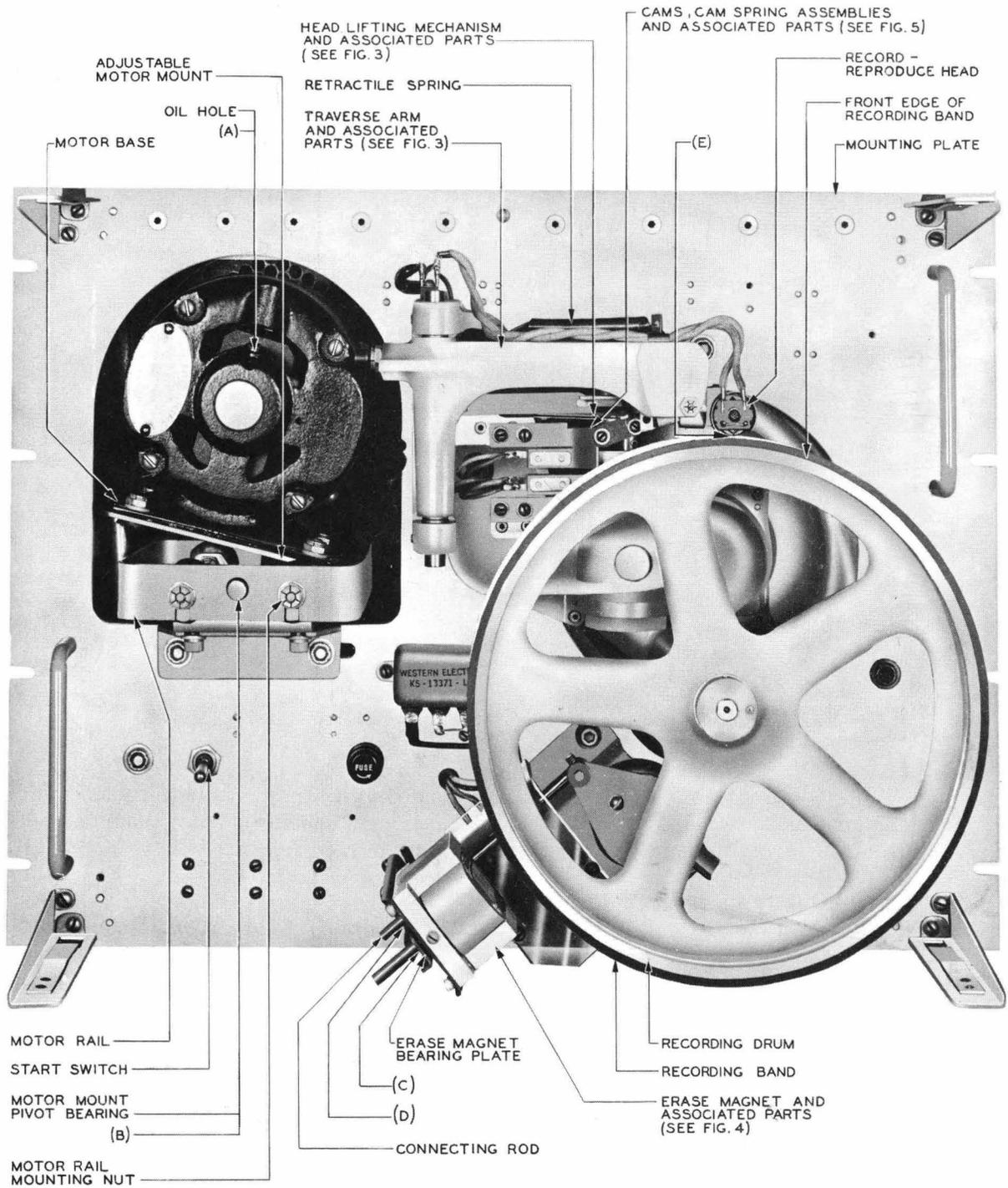


Fig. 1 - KS-12055, L4 and L6 Recorder-Reproducers - Front View (L4 shown)

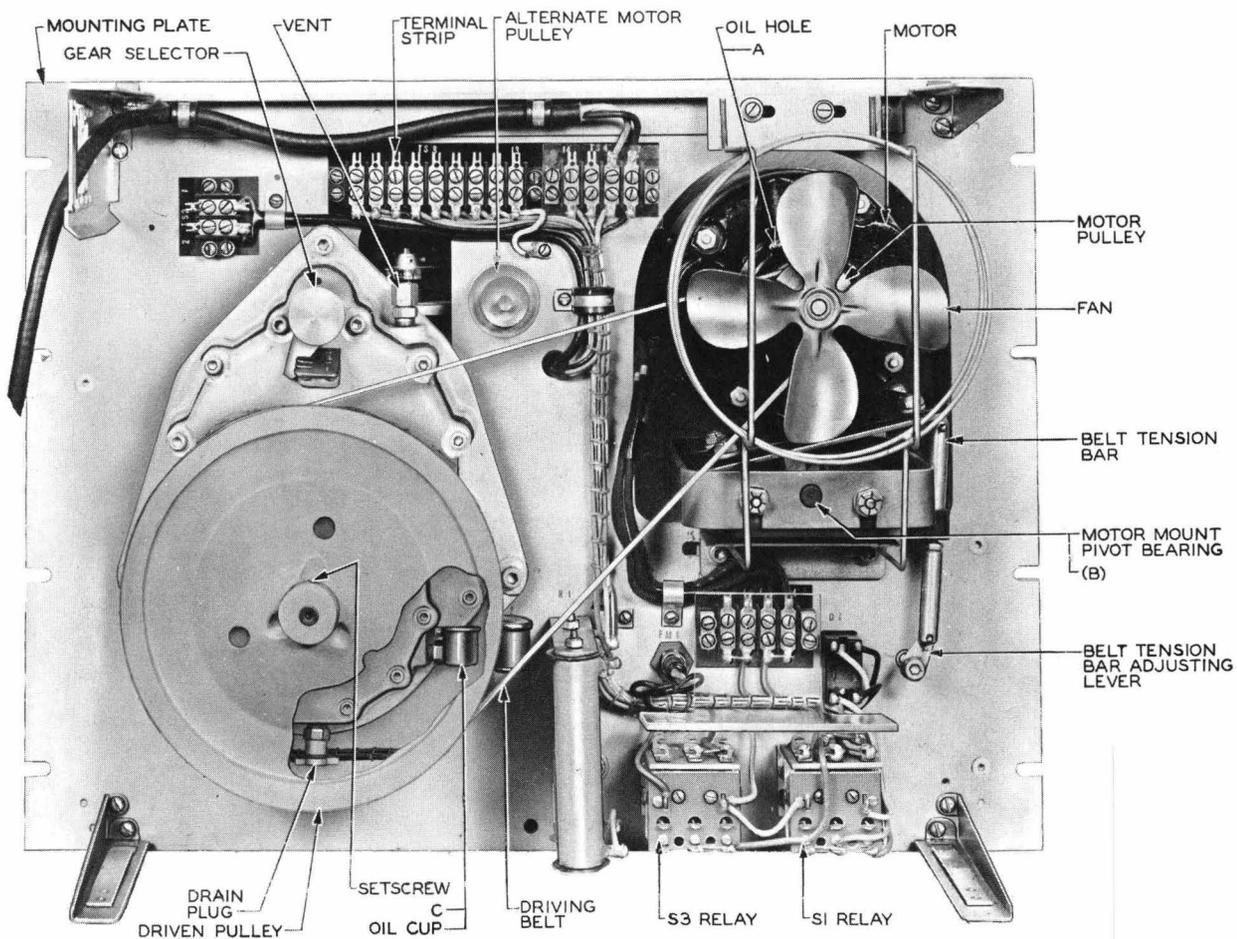


Fig. 2 — KS-12055, L4 and L6 Recorder-Reproducers — Rear View (L4 shown)

- (7) Fig. 4(A) — One drop to the connecting rod divided between the collars at each side of the armature plate.
- (8) Fig. 4(B) — One drop to the roller of the Micro Switch.
- (9) Fig. 4(C) — One drop to each ball of the rotary solenoid armature.

Caution: When lubricating machines equipped with the KS-12055, L20 drum, exercise care to keep the oil from the outside or inside of the hub of the drum.

(b) **Recommended Lubrication Intervals:** Before being placed in operation, the machine shall be lubricated as specified. Thereafter, the machine shall be lubricated at intervals of 6 months. This interval may be ex-

tended if periodic inspections have indicated that local conditions are such as to insure that the requirements will be met during the extended interval.

2.03 Record of Lubrication: During the period of installation, a record shall be kept by date of the lubrication of the machine, and this record shall be turned over to the telephone company with the equipment.

2.04 Centering of Recording Band on Drum: The recording band shall be centrally located on the drum.

Gauge by eye.

2.05 Drum Setscrew Clearance (Machines Equipped With KS-12055, L20 Drum Only): With the machine at rest and the record

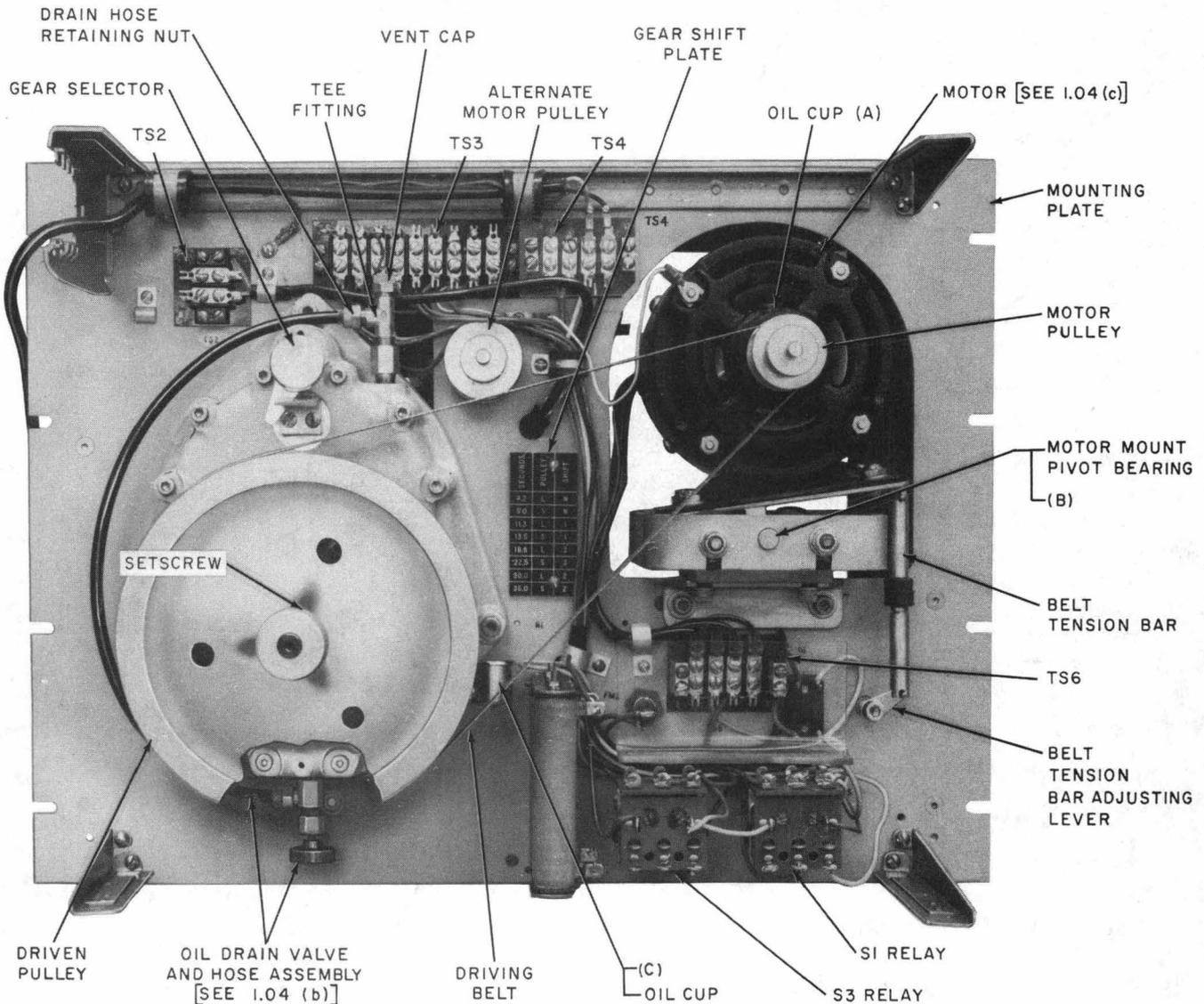


Fig. 2—KS-12055 L4 and L6 Recorder-Reproducers—Rear View With Cover Removed (L6 Machine Shown Equipped with Oil Drain Valve and Hose Assembly)

Note: Some machines in the field are equipped with motors having ball bearings that require no lubrication service in the field. In such cases, the motor housing is not equipped with oil cups.

- (b) **Motor Mount Pivot Bearings—Fig. 1(B) and 2(B):** Three drops of KS-16326 L1 oil to each motor mount pivot bearing to prevent wear and squeaks.
- (c) **Erase Magnet Rod Bearings—Fig. 1(C) and (D):** One drop of KS-16326 L1 oil to

the erase magnet guide rod bearing and one drop to the connecting rod bearing.

- (d) **Traverse Arm Pivot Bearing—Fig. 3(A) and (B):** One drop of KS-16326 L1 oil to each traverse arm pivot bearing.
- (e) **Head Lifter Arm Bearing—Fig. 3(C):** One drop of KS-16326 L1 oil to the pivot bearing of the head lifter arm between the plate and arm.

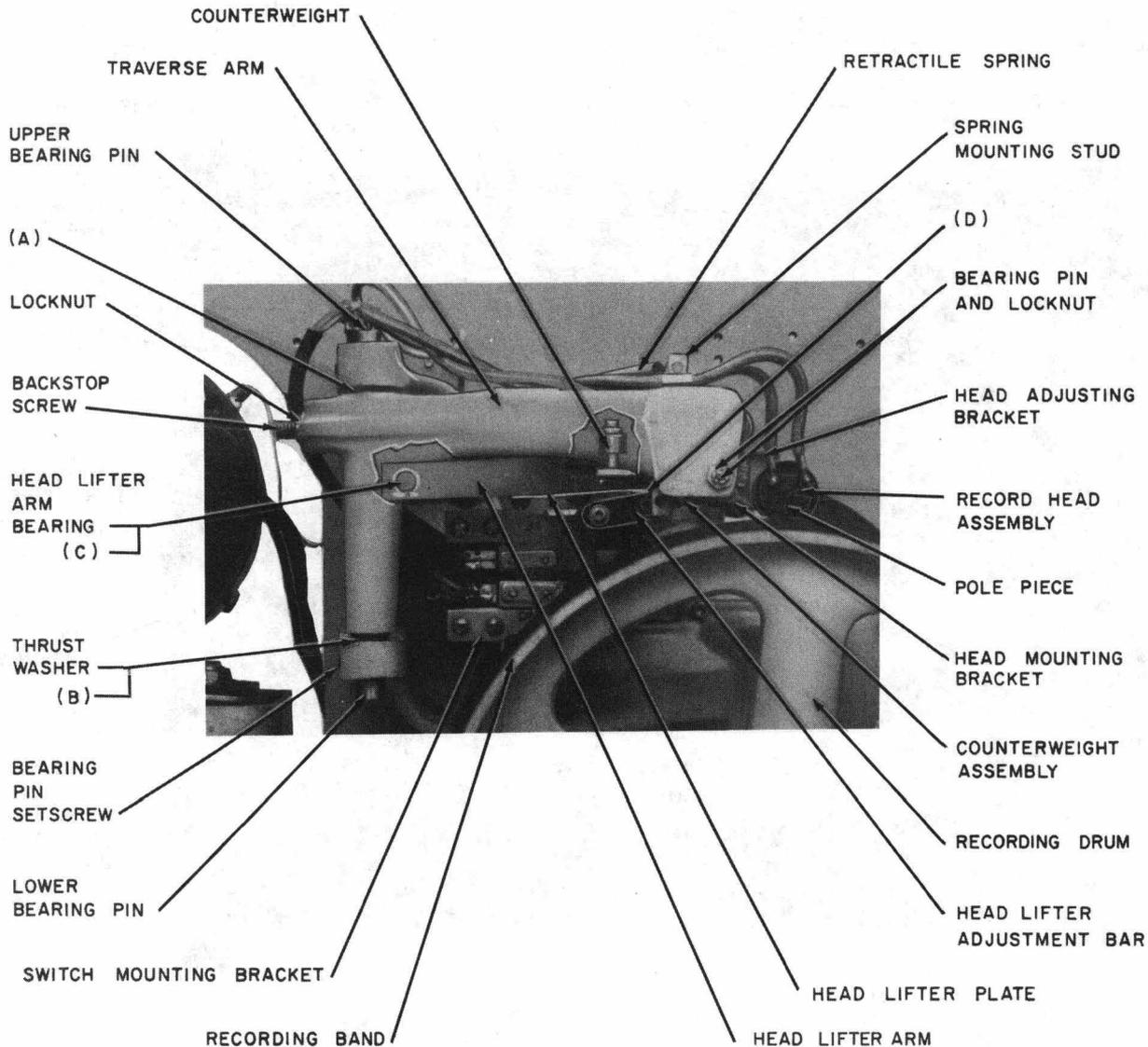


Fig. 3—Traverse Arm, Record Head, and Associated Parts

(f) **Connecting Rod Collars—Fig. 4(A):** One drop of KS-16326 L1 oil, evenly distributed between the two collars, at surface areas making contact with the rotary solenoid armature plate.

(g) **Rotary Solenoid Armature—Fig. 4(B):** One drop of KS-16326 L1 oil to each ball of the armature.

(h) **Gear Case—Fig. 2(C):** Lubrication oil in the gear case shall be drained, flushed, and then refilled with KS-16326 L1 oil at least **once every six months**. Dirty oil in the gear case

may cause variations in recording drum speed, resulting in flutter in the reproduction. The oil level in the oil cup of the gear case shall be maintained within 1/4 to 3/8 inch from the top of the cup. Gauge by eye. When checking, allow sufficient time (approximately 1/2 hour) after the machine has been stopped for the oil to reach its true level in the cup.

(i) **Recording Band—Fig. 1:** On machines not equipped with a recording band wiper-lubrication assembly, SF-1147 silicone fluid lubricant shall be applied to the recording band at least once a month in accordance with 3.01(c). The band

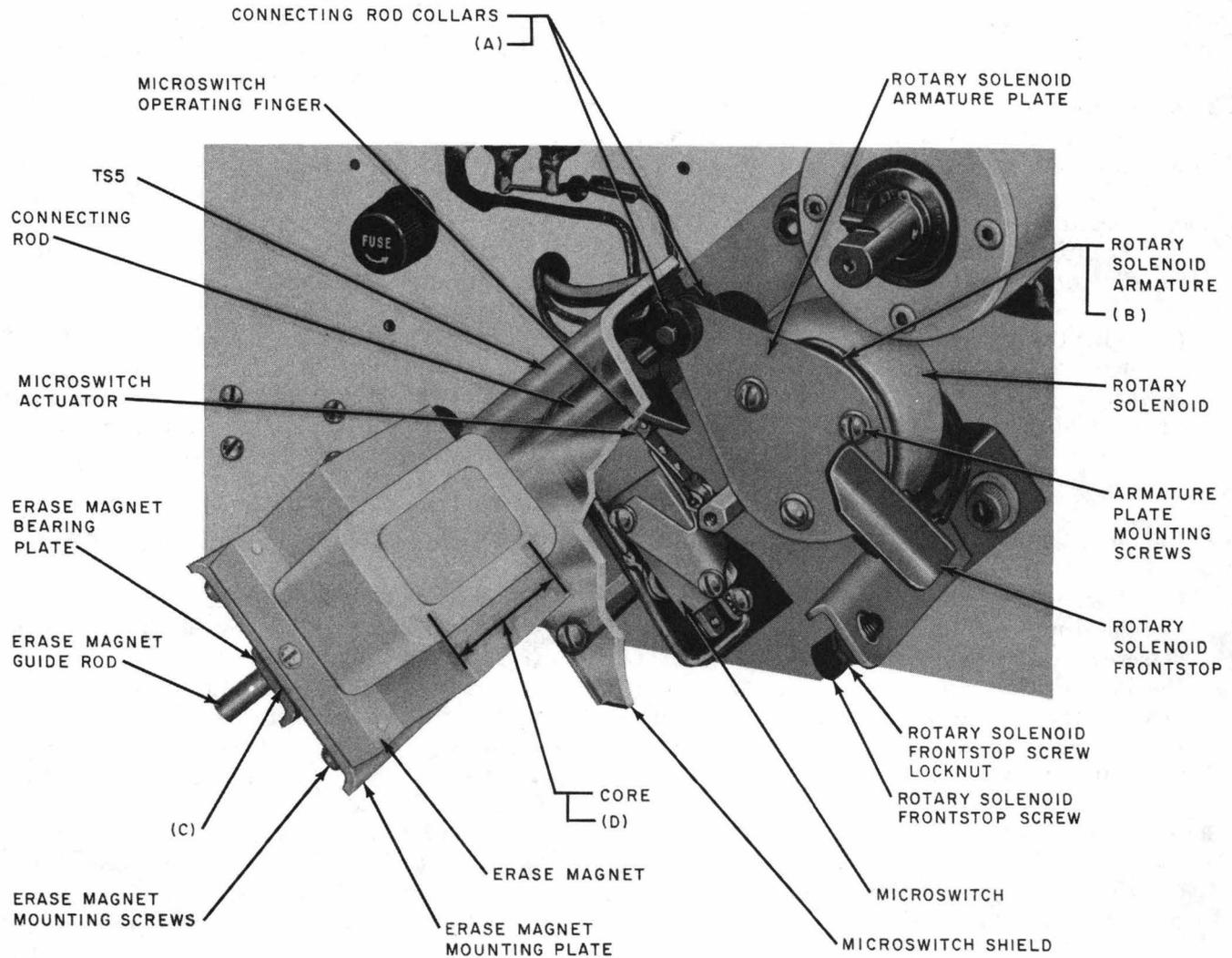


Fig. 4—Erase Magnet, Rotary Solenoid, and Associated Parts

shall be sufficiently lubricated when the entire surface area is uniformly wet and shiny. Periodic manual lubrication of recording bands is not required on machines equipped with a recording band wiper-lubrication assembly. The felt wiping pad [Fig. 1(F)] and the silicone fluid in the reservoir (slide) on the wiper assembly should be inspected once monthly to ensure that the fluid is free of visible contamination. Proper positioning of the wiper assembly shall be maintained so that the felt wiping pad fits snugly with *light pressure* against the magnetic recording band. Ensure that no metallic portion of the wiper assembly comes in contact with the recording band. When the drum is rotating, silicone fluid shall be uniformly distributed over the entire

recording surface. The felt wiping pad shall be replaced when excessive wear is evident or whenever the recording band is replaced. One tablespoonful of SF-1147 silicone fluid should be added to the wiper reservoir every two months if required. Do not add fluid if the recording band is being sufficiently lubricated and if upon inspection the felt pad is adequately saturated with the fluid.

2.03 Record of Lubrication: During the period of installation, a record shall be kept by date of the lubrication of the machine, and this record shall be turned over to the telephone company with the equipment. Thereafter, a record of

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lubrication shall be kept in accordance with local procedure.

2.04 Centering of Recording Band on Drum:

The recording band shall be centrally located on the drum. Gauge by eye.

2.05 Drum Setscrew Clearance on Machines Equipped With KS-12055 L20 Drum Only (Not Shown)

- (a) With the machine at rest and the record head resting on the recording band, both setscrews in the hub of the drum shall clear the sides of their respective clearance holes by

Min 1/32 inch

Gauge by eye.

- (b) To check the requirement, manually move the drum counterclockwise until one of the setscrews comes into contact with the side of the hole in the hub. Release the drum and observe the clearance between the setscrews and the sides of their respective holes when the drum comes to rest.

Record Head and Associated Parts

2.06 Freedom of Movement of Counterweight and Head Assemblies

- (a) The counterweight and head assemblies shall move freely on their bearings, but the head mounting bracket endplay [Fig. 5(A) and 6] shall not exceed 0.005 inch.

- (b) To check this requirement, raise the head assembly about 1/4 inch and observe whether the head drops onto the recording band without hesitation. Then raise the counterweight assembly and observe whether it moves freely. Move the assemblies from side to side by hand. Slight endplay should be felt; however, the tip of a 92U gauge shall not go between the bearing surfaces of the bearing pin sleeve and the bearing pin locknut.

2.07 Record Bias and Record Level: Good quality recordings require adequate 20/23 kilohertz (kHz) bias and recording signal levels at the record head during the recording cycle. The

1000-Hz tone jacks, test jacks, and operating keys located on the test frame control panel may be used in verification of this requirement by performing the following.

- (1) Start the machine by operation of the applicable MB- key at the frame control panel.

- (2) Using a 3P15A patching cord, connect the 1000-Hz -60 dB jack to the TR- jack for the machine under test. Operate the VOL IND key. The volume unit (VU) scale of the volume indicator should indicate 0. It may be necessary to readjust the REPRODUCE gain control of the associated amplifier to obtain this indication. Restore VOL IND key to normal.

- (3) Remove the patching cord connected in (2).

- (4) Using the 3P15A patching cord, connect the 1000-Hz -24 dB jack to the TI- jack or the TEST REC- jack (whichever is provided) for the machine under test. Erase the previous recording by operating the appropriate ER- key for one complete revolution of the drum; then release the ER- key. Operate the VOL IND key. Hold operated the REC- key while observing the VU scale of the volume indicator which should indicate -4 dB. It may be necessary to readjust the RECORD gain control to obtain this indication. Restore the VOL IND key to normal.

- (5) Connect a 403B vacuum tube voltmeter (VTVM) in accordance with Test 1 in Table A.

- (6) Hold operated the applicable REC- key while observing the VTVM which will indicate the record head bias voltage. Meter indication shall be in accordance with Table A.

- (7) Remove the oscillator tube or card (SD-99723-01) from the associated amplifier and connect the VTVM in accordance with Test 2 in Table A.

- (8) Hold operated the REC- key while observing the VTVM. Voltage indications for the 1000-Hz tone at the record head should be within the levels shown in Table A.

- (9) Restore the oscillator tube or card.

To check, rotate the drum manually (see 1.10) until the REC- lamp is just extinguished. Then attempt to insert the gauge between the normally open contacts. The requirement is met if the gauge enters.

2.22 Clearance Between Cam and Stud on Operating Spring: The clearance between the stud on the operating spring and the lowest part of the cam shall be

Min 0.015 inch
Max 0.020 inch

Use the No. 92E and 92G gauges.

2.23 Contact Break and Contact Make of Head-Shorting Record Spring Assembly: With the gear selector in position 2 the following requirements shall be met.

(a) The normally closed contacts shall break within 1/4 turn of the recording drum before the record head has reached the outermost position.

Gauge by eye as described in (c).

(b) The normally closed contacts shall close within 1/4 turn of the recording drum after the record head has reached the innermost position.

Gauge by eye as described in (c).

(c) Rotate the recording drum clockwise manually (see 1.10) until the record head reaches the outermost position. Check this position by noting the movement of the outer edge of the shield with respect to the outer edge of the recording band. Place a pencil mark on the edge of the drum opposite the record head magnetic gap with the head in its outermost position. Rotate the drum counterclockwise slightly more than 1/4 turn. Observe that the REC- lamp on the test panel lights. Then, again rotate the drum clockwise. Observe when the REC- lamp is extinguished with reference to the position of the drum as gauged by the pencil mark on the drum. Rotate the drum clockwise until the

head has reached its innermost position. Place a second pencil mark on the edge of the drum opposite the head magnetic gap when the head has reached its innermost position. Continue to rotate the drum clockwise. Observe when the REC- lamp lights with reference to the position of the drum as gauged by the second pencil mark on the drum. Erase all pencil marks after these checks have been made.

2.24 Sequence Between Contacts of Head-Shorting Record and Cut-Through Springs: With the recording drum turned clockwise manually (see 1.10), the cut-through spring contacts shall make at the same time as or just before the normally closed contacts of the head-shortening record springs break.

Gauge by eye.

To check the requirement, connect one lead of the No. 510C test lamp to terminal 5 of TS3 of the machine. Connect the other lead of the test lamp to 48-volt battery. Rotate the recording drum clockwise manually (see 1.10) until the record head approaches its outermost position. Observe that the test lamp (on the cut-through contacts) lights at the same time or just before the REC- lamp on the test panel is extinguished.

Motor

2.25 Freedom of Movement of Adjustable Motor Mount: Fig. 1(B) and 2(B) — The adjustable motor mount shall move freely on its bearings.

Gauge by eye and feel.

2.26 Driving Belt Tension: When the belt drives the recording drum with the record head resting on the surface of the recording band, the belt shall not slip or bounce.

Gauge by eye.

2.27 Pulley and Driving Belt Alignment

(a) The driving belt shall ride approximately in the center of the driven pulley.

Gauge by eye.

(b) The driving belt shall clear the flanges of the driving pulley.

Gauge by eye.

2.28 Recording Drum Speed: The recording drum shall make ten complete revolutions in

Min 48 seconds } with small driving pulley,
Max 52 seconds } stamped S

Min 40 seconds } with large driving pulley,
Max 44 seconds } stamped L

Use the KS-3008 stop watch.

To check the speed of the recording drum, start the motor. Observe the time required for the drum to complete ten revolutions.

Operate Requirement

2.29 Operate Requirement

(a) A recording made on the machine at any recording drum speed shall be clearly reproduced at the same speed, free from extraneous sounds.

Gauge by ear.

To check this requirement, make a record and listen to the reproduction.

(b) The erase magnet shall completely erase any message recorded on the recording band.

Gauge by ear, using a receiver or head telephone set.

To check this requirement, connect the 1000-cycle -24 jack to the TST REC- jack (No. 3A announcement system) or the TI- jack (No. 6A announcement system), using the No. 3P15A cord. After 30 seconds, operate the ER- key for the machine and hold it operated for one complete cycle of the drum. Release the ER- key. Then operate the associated REC- key and hold it operated as long as the REC- lamp is lighted. Then release the REC- key.

Again operate the ER- key and hold it operated for one complete revolution of the drum. Plug the receiver or head telephone set associated with the equipment into the MON- jack (No. 3A announcement system) or A- and B- jacks (No. 6A announcement system). Listen for the tone as long as the record lamp is lighted. No tone should be audible.

3. ADJUSTING PROCEDURES

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

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
245	3/8- and 7/16-Inch Open Double-End Flat Wrench
376A	Dental Mirror
418A	5/16- and 7/32-Inch Open Double-End Flat Wrench
486A	Oilcan
505A	Spring Adjuster
506A	Spring Adjuster
510C	Test Lamp [equipped with No. 561A tool (straight tip) and W2BL (48V) cord]
R-2485	5/32-Inch Allen Socket Screw Wrench
R-2670	3/32-Inch Allen Socket Screw Wrench
R-2671	1/8-Inch Allen Socket Screw Wrench
R-2812	3/16-Inch Allen Socket Screw Wrench
R-2958	5/64-Inch Allen Socket Screw Wrench
R-2959	1/16-Inch Allen Socket Screw Wrench

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
R-2961	0.050-Inch Allen Socket Screw Wrench
—	Medicine Dropper
—	1/2-Pint Oiler, Gem Division, Plews Oiler Co No. 1706 (or equivalent)
—	Long-Nose Pliers
—	3-Inch C Screwdriver
—	4-Inch E Screwdriver
—	No. 555E Jeweler's Screwdriver, L. S. Starrett Company
GAUGES	
70D	50-0-50 Gram Gauge
79C	0-200 Gram Push-Pull Tension Gauge
92E	0.015-Inch Nonmagnetic Offset Thickness Gauge
92G	0.020-Inch Nonmagnetic Offset Thickness Gauge
92T	0.005-Inch Nonmagnetic Offset Thickness Gauge
KS-3008	Stopwatch
MATERIALS	
KS-2423	Cloth
KS-7860	Petroleum Spirits
KS-16326, L1	Oil
KS-16328, L2	Cleaner-Lubricant
—	General Electric SF-96-500 Silicone Fluid, Silicone Products Dept, General Electric Co (or equivalent) (1/2-pint cans as required)
—	Linen Thread
TEST APPARATUS	
3P15A	Cord (one P3K cord, 6 feet long, equipped with two No. 310 plugs)
—	Operator Telephone Set

General**3.01 Cleaning** (Reqt 2.01)

(1) Clean the head-shorting record and cut-through spring contacts in accordance with the section covering cleaning of relay contacts.

Caution: Before using the KS-16328, L2 cleaner-lubricant as covered in (2) and (3) below, thoroughly shake its container. Do not permit the cleaner-lubricant to come in contact with any part of the machine other than the part being cleaned.

(2) Clean the record head as follows.

(a) Lift the head from the recording band and place a clean, dry KS-2423 cloth over the top of the band below the head assembly.

(b) Wipe the pole pieces with a KS-2423 cloth slightly moistened with KS-16328, L2 cleaner-lubricant. Then wipe the pole pieces with a clean, dry KS-2423 cloth. Make sure that the pole pieces are thoroughly dry before allowing them to come in contact with the recording band.

(c) After cleaning, inspect the head for any spread, pitting, or excessive wear of the laminations using the No. 510C test lamp with the No. 561A straight tip. If the laminations show evidence of spreading or pitting or if the length of the worn surface on the laminations exceeds 7/32 inch, replace the head.

(d) Remove the cloth from the band and restore the head to the band.

(3) Clean the recording band as follows.

(a) Lift the record head from the band.

(b) Fold a clean, dry KS-2423 cloth into a pad. Remove loose dirt from the band by holding the pad lightly against the band to the right of the record head with the drum rotating.

(c) Slightly moisten another clean pad with the KS-16328, L2 cleaner-lubricant and hold the pad lightly against the rotating band.

(d) Wipe the band with a clean, dry KS-2423 cloth. Repeat the cleaning operation if necessary. After cleaning, apply a thin film of the Silicone Fluid to the surface of the band using a clean KS-2423 cloth.

(e) Restore the record head to the recording band.

(4) Clean the surfaces of the driving and driven pulleys on which the belt rides using a KS-2423 cloth moistened with KS-7860 petroleum spirits. To do this, remove the driving belt, clean the pulleys, and remount the belt.

(5) Clean other parts with a clean, dry KS-2423 cloth.

3.02 *Lubrication* (Reqt 2.02)

(1) Before lubricating, clean the surfaces to be oiled, if accessible, using a KS-2423 cloth moistened with KS-7860 petroleum spirits. Apply the proper amount of oil, using the No. 486A oilcan. In the case of the Micro Switch roller, rotate the roller to distribute the oil evenly.

3.03 *Record of Lubrication* (Reqt 2.03) (no procedure)

3.04 *Centering of Recording Band on Drum* (Reqt 2.04)

(1) To shift the band on the drum, raise the record head from the band. Shift the band by hand as required.

Caution: When handling the band, make sure that the hands are free of dirt and grease and that they come into contact with the top surface of the band as little as possible.

3.05 *Drum Setscrew Clearance (Machines Equipped With KS-12055, L20 Drum Only)* (Reqt 2.05)

(1) If the requirement is not met, replace the drum unless failure to meet the requirement is caused by bent setscrews. Check whether the setscrews are bent by removing them with the R-2958 wrench. If the setscrews are bent, replace them and recheck the requirement.

Record Head and Associated Parts

3.06 *Freedom of Movement of Counterweight and Head Assemblies* (Reqt 2.06)

(1) If the endplay is not satisfactory, hold and bearing pin nut with the No. 418A wrench and turn the bearing pin in or out, as required, with the jeweler's screwdriver.

(2) If the endplay is satisfactory and there is bind at the bearings, manually raise the record head from the band. Loosen the setscrews in the hub of the drum. Use the R-2958 wrench for L6 machines and for L4 machines equipped with the L20 drum; otherwise, use the R-2670 wrench. Draw the drum forward carefully until it is free of the shaft and lay it on a clean surface. Hold a cloth under the head mounting bracket and flush out the bearings with KS-7860 petroleum spirits applied with a medicine dropper. Allow the parts to dry and then lubricate the bearing of the mounting bracket with one drop of KS-16326, L1 oil using the No. 486A oilcan. Remove excess oil with a KS-2423 cloth.

(3) After lubricating the bracket bearings, remount the drum on the shaft carefully so that the slot on the drum engages the pin on the shaft, rotating the shaft if necessary. Push the drum as far as possible to the rear until the hub of the drum bears against the snap ring on the shaft. Tighten the setscrews securely. Restore the head to the surface of the band.

3.07 *Pressure of Record Head Against Recording Band* (Reqt 2.07)

(1) To change the pressure of the record head against the recording band, loosen the counterweight mounting screw with the R-2958 wrench. Shift the counterweight to-

ward the head to increase the pressure and away from the head to decrease the pressure. Tighten the mounting screw securely.

Erase Mechanism

3.08 Freedom of Movement of Solenoid and Erase Magnet Parts (Reqt 2.08)

(1) If the erase magnet guide and connecting rods do not move freely in the erase magnet bearing plate, clean and lubricate these parts.

(2) If there is still bind, clean and lubricate the connecting rod at the connecting rod collars. If this does not clear the trouble, loosen the connecting rod collar setscrews with the R-2958 wrench and shift the connecting rod slightly. Make sure that the connecting rod moves freely in the solenoid armature plate and that the collars do not bind on the plate. Tighten the setscrews securely.

(3) If the rotary solenoid does not move freely on its bearings, lubricate the bearing as covered in requirement 2.02.

3.09 Clearance Between Erase Magnet Mounting Plate and Bearing Plate (Reqt 2.09)

(1) To adjust for the clearance between the erase magnet mounting plate and the bearing plate, loosen the setscrew in the Micro Switch operating finger using the R-2958 wrench, and rotate the finger until it is clear of the Micro Switch actuator. Temporarily tighten the setscrew.

(2) Loosen the erase magnet mounting plate setscrew, using the R-2959 wrench. Rotate the armature plate of the rotary solenoid counterclockwise by hand as far as it will go. Slide the erase magnet mounting plate on the connecting rod, as required, to obtain the proper clearance between the mounting plate and the bearing plate. Then securely tighten the erase magnet mounting plate setscrew.

(3) Rotate the Micro Switch operating finger on the connecting rod until it is in position to engage the Micro Switch actuator. Then position the finger on the actuator to meet requirement 2.10.

3.10 Position of Micro Switch Operating Finger (Reqt 2.10)

(1) If the requirement is not met, loosen the setscrew in the operating finger using the R-2958 wrench. Operate the rotary solenoid manually and slowly release it. Position the operating finger on the connecting rod so that the requirement is met. Note that the operating finger fully engages the Micro Switch actuator. Tighten the setscrews securely.

3.11 Clearance Between Erase Magnet and Recording Band (Reqt 2.11)

(1) If the requirement is not met, adjust the rotary solenoid frontstop screw, as required, using the R-2485 wrench.

3.12 Centering of Erase Magnet With Respect to Recording Band (Reqt 2.12)

(1) If the erase magnet core is not properly centered on the drum, loosen the erase magnet mounting screws with the 4-inch E screwdriver and shift the erase magnet on its mounting plate as required. Tighten the mounting screws securely.

Traverse Mechanism

3.13 Traverse Arm Play (Reqt 2.13)

(1) If the play of the traverse arm is not satisfactory, loosen the bearing pin setscrew in the upper support casting with the R-2961 wrench. Shift the bearing pin, as required, to provide vertical play. Tighten the setscrew securely.

3.14 Position of Traverse Arm (Reqt 2.14)

(1) If the requirement is not met, loosen the traverse arm backstop screw locknut with the No. 245 wrench. Turn the screw as required with the R-2812 wrench. Tighten the locknut securely.

3.15 Retractable Spring Tension (Reqt 2.15)

(1) If the tension of the retractile spring is not satisfactory, replace the spring.

Record Head Lifter Mechanism

3.16 Freedom of Movement of Head Lifter Arm
(Reqt 2.16)

- (1) If the head lifter arm does not move freely on its bearings, lubricate the bearings as covered in requirement 2.02.

3.17 Raising and Lowering of Record Head
(Reqt 2.17)

- (1) The distance that the record head is lifted above the recording band is determined by the relation between the head lifter adjustment bar and the head lifter plate. To change this relation, loosen the bar clamping screws with the 4-inch E screwdriver and shift the bar, as required. Securely tighten the screws.

- (2) The point in the traverse motion of the record head at which the head is raised from or lowered to the recording band is determined by the relative angular position of the head lifter and traverse cams on the shaft. If the head is not lifted from or lowered to the recording band at the required point, proceed as follows. Loosen the head lifter cam setscrews with the R-2959 wrench, and rotate the cam on the shaft as required, taking care not to raise the cam from the snap ring. Tighten the setscrews securely and recheck the requirement.

Cut-Through and Head-Shorting Record Spring Assemblies

3.18 Contact Alignment (Reqt 2.18)

3.19 Contact Separation (Reqt 2.19)

3.20 Contact Follow (Reqt 2.20)

3.21 Contact Sequence (Reqt 2.21)

- (1) Before adjusting the springs in these assemblies, remove the drum as described in 3.06(2).

- (2) **Contact Alignment:** To change the contact alignment, remove the spring assembly mounting screws with the 4-inch E screwdriver and remove the spring assembly. Take care not to damage the leads. Loosen the spring assembly clamping screws with the

screwdriver and shift the springs, as required. Tighten the spring assembly clamping screws securely and remount the spring assembly.

- (3) **Cut-Through Spring Assembly:** To change the contact follow and contact separation proceed as follows. Adjust the operating spring if necessary, using the No. 506A spring adjuster so that the spring is approximately straight and rests against the stop spring. Adjust the fixed spring with the spring adjuster, as required, to give the proper contact separation and follow. Apply the spring adjuster as close to the insulators as possible and avoid excess bending of the springs.

- (4) **Head-Shorting Record Spring Assembly:** To change the contact follow, contact separation, and contact sequence proceed as follows.

- (a) Loosen the spring assembly mounting screws with the 4-inch E screwdriver and tilt the front of the spring assembly downward until a No. 505A or 506A spring adjuster can be inserted over the springs from above. Temporarily tighten the mounting screws, making sure that the stud on the operating spring still overlaps the edge of the cam sufficiently to be operated by the cam.

- (b) Adjust the operating spring, if necessary, with the No. 506A spring adjuster so that the spring is approximately straight and rests against the stop spring. Adjust the other springs, as required, using the No. 505A adjuster for the spring nearest the cam and the No. 506A adjuster for the other springs. Apply the spring adjuster to the springs as close to the insulators as possible. Avoid excess bending of the springs.

- (c) Loosen the spring assembly mounting screws using the 4-inch E screwdriver and shift the spring assembly so that the stud on the operating spring is centrally located with respect to the cam. Tighten the mounting screws securely.

- (5) Mount the drum as described in 3.06(3).

Min 48 seconds } with small driving pulley,
Max 52 seconds } stamped S

Min 40 seconds } with large driving pulley,
Max 44 seconds } stamped L

Use the KS-3008 stopwatch.

(b) To check the speed of the recording drum, start the motor. Observe the time required for the drum to complete ten revolutions.

Operating Requirement

2.32 The operating requirement for reproduction and erasing of a recording is as follows.

(a) *Reproduction of Recording*

(1) A recording made on the machine at any recording drum speed shall be clearly reproduced at the same speed, free from extraneous sounds. Gauge by ear.

(2) To check this requirement, make a recording and listen to the reproduction.

(b) *Erasing of Recording*

(1) The erase magnet shall completely erase any message recorded on the recording band. Gauge by ear, using a head telephone set.

(2) To check this requirement, connect the 3P15A patching cord between the 1000-Hz -24 dB jack and the TI- jack or the TEST REC- jack (whichever is provided). After 30 seconds, operate the ER- key for the machine and hold it operated for one complete revolution of the drum. Release the ER- key. Then hold operated the associated REC- key as long as the REC- lamp is lighted. Then release the REC- key. Again operate the ER- key and hold it operated for one complete revolution of the drum. Plug the receiver or head telephone set associated with the equipment into the A- and B- jacks or the MON- jack (whichever is provided). Listen for the tone as long as the record lamp is lighted. No tone should be audible.

3. ADJUSTING PROCEDURES

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

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
245	3/8- and 7/16-Inch open double-end flat wrench
376A	Dental mirror
418A	5/16- and 7/32-Inch open double-end flat wrench
486A	Oil can
505A	Spring adjuster
506A	Spring adjuster
510C	Test lamp [equipped with No. 561A tool (straight tip) and W2BL (48V) cord]
R-2485	5/32-Inch Allen socket screw wrench
R-2670	3/32-Inch Allen socket screw wrench
R-2671	1/8-Inch Allen Socket screw wrench
R-2812	3/16-Inch Allen socket screw wrench
R-2958	5/64-Inch Allen socket screw wrench
R-2959	1/16-Inch Allen socket screw wrench
R-2961	0.050-Inch Allen socket screw wrench
—	Medicine Dropper
—	1/2-Pint oiler, Gem Division, Plews Oiler Co. No. 1706 (or equivalent)
—	Long-nose pliers
—	4-Inch E screwdriver
—	555E Jeweler's screwdriver, L. S. Starrett Company
KS-14377 L5	Vacuum cleaner equipped with KS-14377 L30 flexible nozzle (or equivalent)

SECTION 034-350-701

GAUGES

70D	50-0-50 Gram gauge
79C	0-200 Gram push-pull tension gauge
92A	0.010-Inch nonmagnetic offset thickness gauge
92E	0.015-Inch nonmagnetic offset thickness gauge
92G	0.020-Inch nonmagnetic offset thickness gauge
92T	0.005-Inch nonmagnetic offset thickness gauge
92U	0.006-Inch nonmagnetic offset thickness gauge
KS-3008	Stopwatch

MATERIALS

KS-2423	Twill cloth
KS-7860	Petroleum spirits
KS-16326 L1	Oil
KS-16328 L2	Cleaner-lubricant
—	General Electric SF-1147 silicone fluid, (200 centistokes viscosity) Silicone Products Dept, General Electric Co.
—	EC-1711 Scotch Grip Rubber Adhesive, 3M Company

TEST APPARATUS

3P15A	Cord (one P3K cord, 6 feet long, equipped with two No. 310 plugs)
KS-14510 L1	Volt-Ohm-Milliammeter
—	Operator Telephone Set (Headset)
—	Vacuum tube voltmeter mode 403B, Hewlett Packard Co. (or equivalent)

3.01 Cleaning

(a) **General:** Use the KS-14377 L5 vacuum cleaner equipped with KS-14377 L30 small flexible rubber nozzle to remove any loose dust from the external and internal surfaces of the front and rear covers and from the surrounding equipment frame members. The glass panel in the front cover shall be cleaned with a water-dampened KS-2423 twill cloth. Follow by wiping with a clean, dry cloth. The mounting plate, motor, motor mount, terminal strips, cover supports, and gear case (Fig. 1 and 2) shall be cleaned with KS-2423 twill cloth lightly moistened with KS-7860 petroleum spirits.

(b) **Record-Reproduce Head:** To clean the record head, proceed as follows.

Caution: Before using the KS-16328 L2 cleaner-lubricant, thoroughly shake its container. Do not permit the cleaner-lubricant to come in contact with any part of the machine other than the part being cleaned.

(1) Lift the head from the recording band and place a clean, dry KS-2423 twill cloth over the top of the recording band below the head assembly.

(2) Wipe the pole piece (Fig. 3) with a KS-2423 twill cloth slightly moistened with KS-16328 L2 cleaner-lubricant. Then wipe the pole piece with a clean, dry KS-2423 twill cloth. Make sure that the pole piece is thoroughly dry before allowing it to come in contact with the recording band.

(3) After cleaning, inspect the head for any spread, pitting, or excessive wear of the laminations using the 510C test lamp with the 561A straight tip. If the laminations show evidence of spreading or pitting or if the length of the worn surface on the laminations exceeds 7/32 inch, replace the head.

(4) Remove the cloth from the recording band and restore the head to the band.

(c) **Recording Band:** Obstinate stains may be removed from the band with KS-16328 L2 cleaner-lubricant as described below. Also, the recording bands on new machines should be

(5) **Output Shows Traces of Previous Recording or Is Noisy:** This may be due to the following.

- (a) The recording band may be dirty. Clean the band as described in 3.01(3).
- (b) The erase coil may be misaligned with respect to the recording band so that not all of the previous message is erased. Check requirement 2.12 and readjust, if necessary, in accordance with 3.12.
- (c) The magnetic gap between the erase magnet and the recording band may be too large. Check requirement 2.11 and change the erase gap, as necessary, in accordance with 3.11.
- (d) The signal may have been recorded at too low a level and attempts made to compensate for this by adjusting the gain control. Since any noise which might have been recorded on the band would be amplified as well as the message, the noise might be out of proportion with respect to the message. Erase and again record a message at the proper level.

(6) **Output Shows Magnetic Noise:** (a relatively strong background hiss) — This may be due to the following.

- (a) There may be residual magnetism in the record head. Disconnect the leads from the record head using a soldering copper.

Caution: To avoid damaging the head while soldering, take care not to overheat the terminals on the head.

Loosen the head mounting nut with the fingers and remove the recording head from the mount. Operate the ER- key associated with the machine under test. This energizes the erase magnet. Hold the record head for 18 seconds near the erase head adjacent to the gap between the erase head and the recording band. Slowly remove the record head from the field of the erase head and release the ER- key. Reconnect and remount

the record head on its mounting and securely tighten the head mounting nut. Resolder the leads to the record head, taking care not to overheat the terminals. Position the head in accordance with Section 034-350-801.

(7) **Output Shows Excessive Hum:** This may be due to the following.

- (a) The equipment may be improperly grounded. Check the ground connections.
- (b) The record head may require replacement, or there may be an open circuit in the amplifier unit. Replace the head if the head is at fault.
- (c) There may be strong ac fields in the vicinity of the recorder-reproducer. If possible, turn off the adjacent equipment and note whether the hum disappears. Take whatever steps are necessary to remove the trouble. If the hum disappears when the adjacent equipment is turned off, refer the matter to the supervisor.

(8) **Output Shows Flutter:** (a quavering quality in the reproduction, sounding like a shaky voice) — This may be due to the following.

- (a) There may be dirt or foreign material in the gear case. Drain, flush, and refill the gear case as follows. Place a suitable container under the drain plug and open the plug with the fingers. Drain the oil into the container. Close the drain plug. Using the 1/2-pint oiler, pour clean oil into the oil cup at the right of the gear box until the level is within 3/8 to 1/4 inch of the top of the cup. Run the machine for approximately 5 minutes. Again drain the gear box and refill it with clean oil. If repeated flushing does not reduce the flutter to an acceptable level, consideration should be given to returning the machine for repair.

Caution: Make sure that the 1/2-pint oiler is clean before using it to fill the gear case.

→ *Note:* A small amount of flutter is not considered objectionable. Do not return the machine for repair unless it is reasonably certain that an objectionable flutter condition is present. First recheck for conditions covered in 3.29(4) and (5).

→ (b) On machines equipped with an L20 drum, one or both of the setscrews in the hub of the drum may be touching the sides of their respective clearance holes. Check requirement 2.05 and, if necessary, replace the setscrews or drum as covered in 3.05.

REASONS FOR REISSUE

1. To add a paragraph covering L6 machines equipped with precision gears (1.04).
2. To revise the oil specified in the list of materials and elsewhere throughout the section (1.16, 2.02, 3.001, and 3.06).
3. To revise the requirement for the oil level in the gear box [2.02(a)(4)].
4. To delete a recommended interval for draining and refilling the gear box [2.02(b)].
5. To revise the procedure covering flutter for the operate requirement [3.29(8)].

FILE WITH :

034-350-701

Modification Kit 2A-KS-12068/KS-12055

Wiper Lubrication Assembly B-992085

Instructions for Installation

Installation

The KS-12068 & KS-12055 Recorder-Reproducers modified with Kit 2A, Wiper Lubrication Assembly are shown in the attached photographs.

For machines in service, remove the two bottom front cover supports P168220 from the Recorder-Reproducer panel. Retain the mounting screws and lockwashers for assembling the wiper lubrication assembly to the recorder-reproducer panel. (Refer to BSP's 034-351-701 and 034-351-801 for KS-12068 machines, and BSP's 034-350-701 and 034-350-801 for KS-12055 machines.)

For new machines, remove the four .164-32 x 5/16 screws and lockwashers from the packing container.

Before installing the wiper lubrication assembly, loosen the two adjustment screws (item 5 on B-992085) which secure the slide assembly (reservoir) in position on the wiper bracket assembly. Push the slide assembly toward the center of the bracket as far as the slotted mounting holes will permit.

Using the four mounting screws and lockwashers mount the wiper lubrication assembly to the Recorder-Reproducer panel. Use care to avoid striking any metallic part of the wiper lubrication assembly against the magnetic recording band.

Lubrication

Place one tablespoonful of silicone fluid (General Electric SF-96-500 or Dow-Corning 200 Fluid-500) in the bottom of the slide.

Adjust the slide so that the felt wiping pad (item 3 on B-992085) fits snugly with light pressure against the recording band. Ensure that no metallic portion of the wiper lubrication assembly comes in contact with the recording band.

Secure the slide by firmly tightening the two adjustment screws (item 5 on B-992085) in the end of the slide.

5-11
INSTALLED SUNDAY 4-18-71
WIPER PAD A LITTLE OFF CENTER, DOES NOT
WIPE ENTIRE FACE OF RECORDING BAND. WILL
CORRECT WHEN RECEIVING NEW PAD & ADHESIVE THAT
ARE ON ORDER.

LS.

Felt Wiping Pad

To replace the felt pad on the wiper lubrication assembly, proceed as follows:

1. Remove the wiper lubrication assembly by removing the four screws securing it to the Recorder-Reproducer panel.
2. Place the assembly on a clean flat surface and remove the two adjustment screws and the slide from the bracket.
3. Using a R-1060 putty knife, scrape the old felt pad off the slide. Then using a KS-2423 cloth moistened with KS-19578 L1 trichloroethane, thoroughly clean the slide to remove any remaining bits of felt, old adhesive, and silicone fluid.
4. Apply a thin coating of Plyobond adhesive to the mounting surface of a new pad and position the new pad on the mounting surface of the slide (item 2) as shown in B-992085. The end of the pad should just touch the deepest part of the slide.

Allow the adhesive to dry for at least 24 hours.

5. Using the two adjustment screws removed in (2), reinstall the slide on the bracket.
6. Remount the wiper lubrication assembly per installation instructions.

General

One tablespoonful of silicone fluid shall be added to the slide upon initial installation or pad replacement. Every two month interval thereafter, one tablespoonful shall be added if necessary. This can be determined by inspecting the magnetic recording band to see if the band has a uniform film of silicone fluid on it.

When the recording drum is rotating, silicone fluid shall be uniformly distributed over the entire recording surface of the magnetic recording band. The felt wiping pad shall be replaced when excessive wear is evident.

Parts List for Modification of Machines in Service and
Installation of New Machines

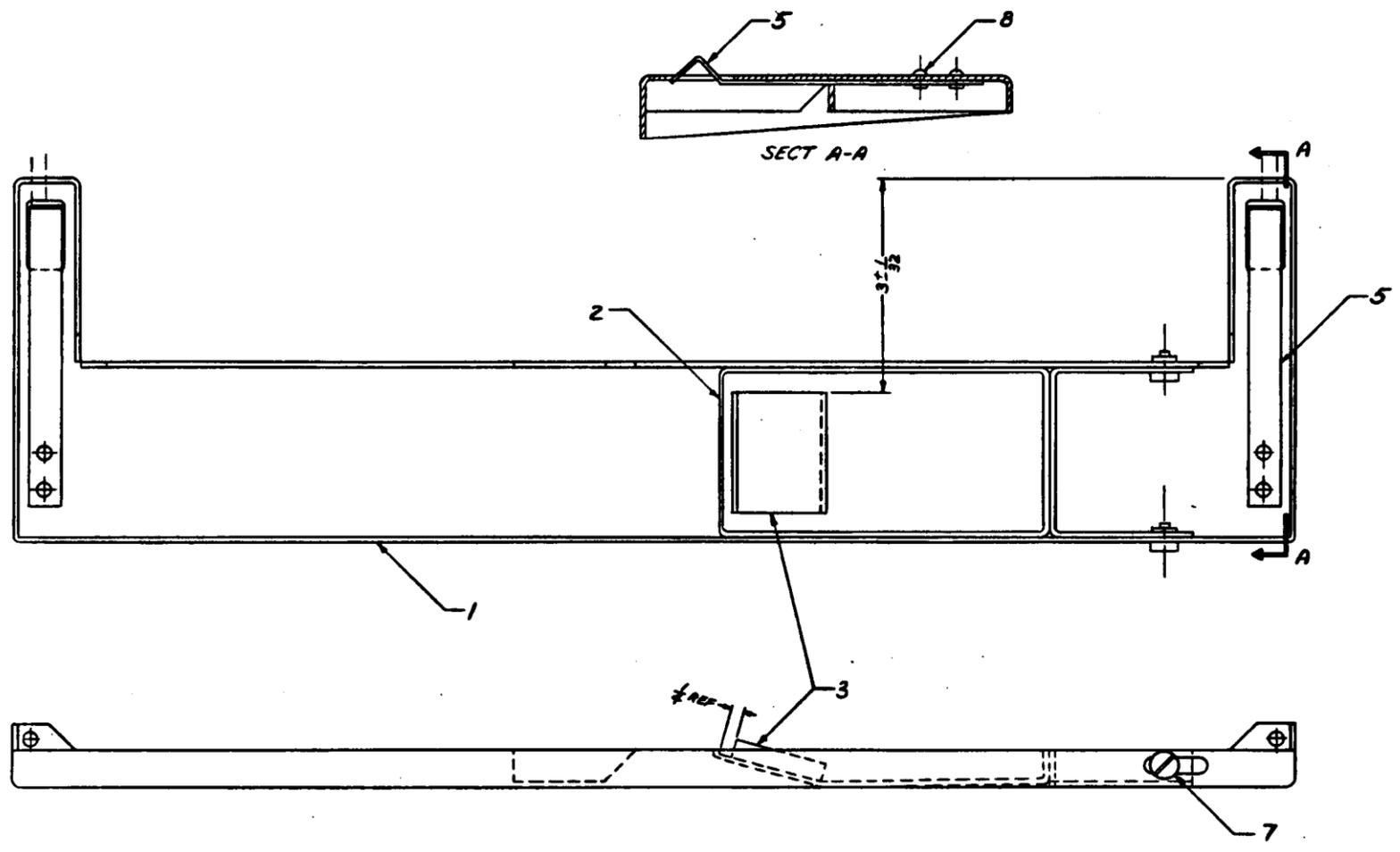
<u>Item No.</u>	<u>Quantity</u>	<u>Description</u>	<u>Part No.</u>
1	1	Wiper Bracket Ass.	B-992086
2	1	Slide Assembly	B-992087
3	1	Pad	B-992088
4	2	Spring	P-161053
5	2	Screw	10-32 x 0.38
6	4	Rivet	1/8
7	1	1/2 Pint Container of Silicone Fluid	Dow-Corning 200 Fluid-500 or GE SF-96-500
8	4	Screws	.164-32 x 5/16
9	4	Lockwashers	.164
10	1	Photograph, KS-12068 modified	
11	1	Photograph, KS-12055 modified	
12	1	Drawing B-992085, Wiper Lubrication Assembly	

NOTE: Items 1 through 6 comprise 1 wiper lubrication assembly,
B-992085.

CAUTION:

" ON THE KS-12055 THE ERASE MAGNET ASSEMBLY MUST CLEAR
THE WIPER LUBRICATION BRACKET WHEN INSTALLED AND MEET
THE REQUIREMENTS OF BSP-034-350-701 SECTIONS 2.12, 2.13, and
2.14."

NOTE:
 1. ITEM 3 ADHERED TO ITEM 2 BY APPLYING PLYBOND CEMENT OR AN APPROVED EQUIVALENT.



QTY	IDENTIFICATION NO.	DESCRIPTION	REF DESIG	DATE	BY
4		RIVETS 1/8			
2		SCREW 10-32 X 0.38			
2	P-161053	SPRING			
1	B-992088	PAD			
1	B-992087	SLIDE ASSY.			
1	B-992086	WIPER BRACKET ASSY.			

STOCK LIST

CS-12064 B-17065
 CS-12065
 USED ON DWG

WIPER LUBRICATION ASSEMBLY
 DRAW 1/1

WESTERN ELECTRIC CO. INC.
 BELL TELEPHONE LABORATORIES
 INCORPORATED

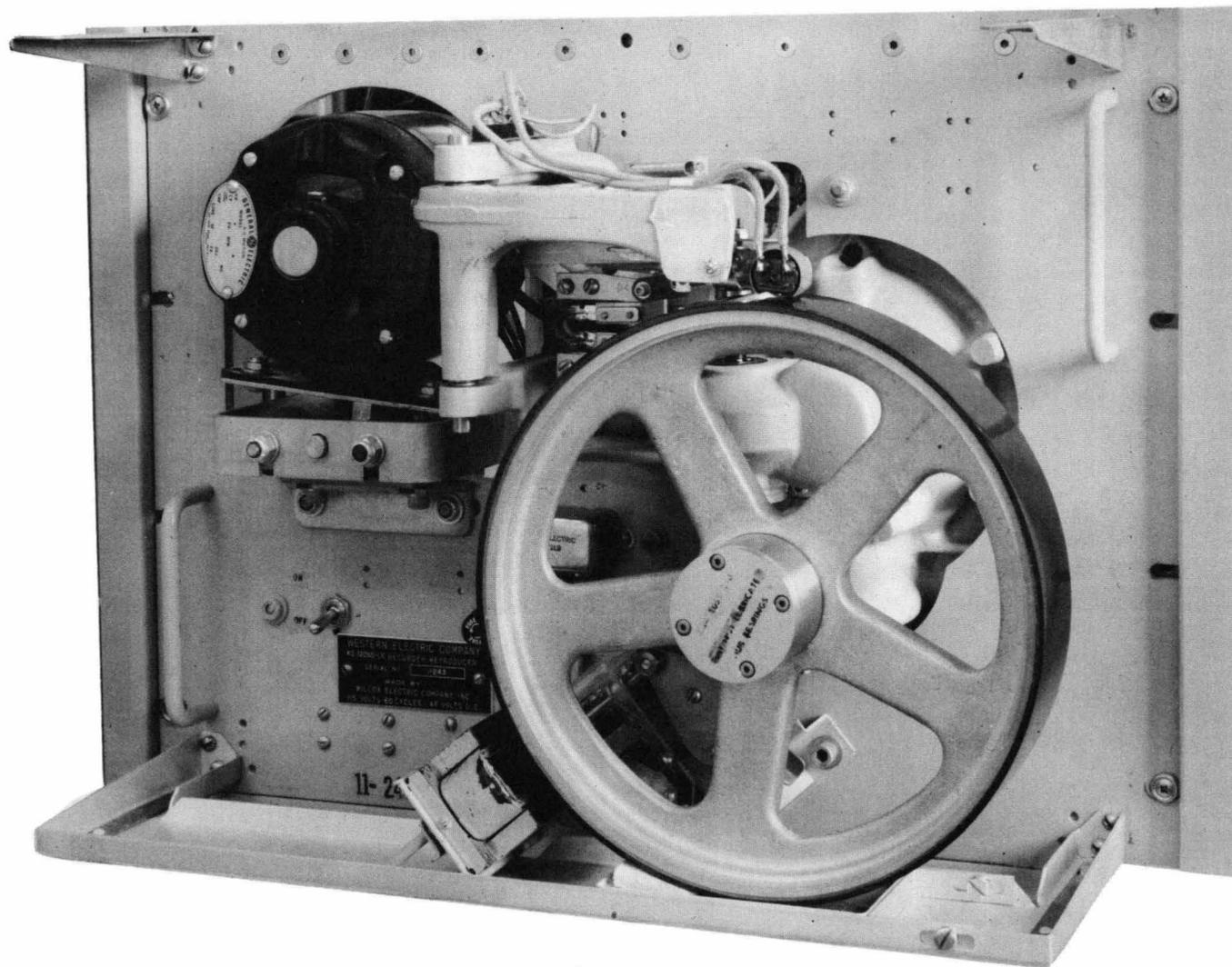
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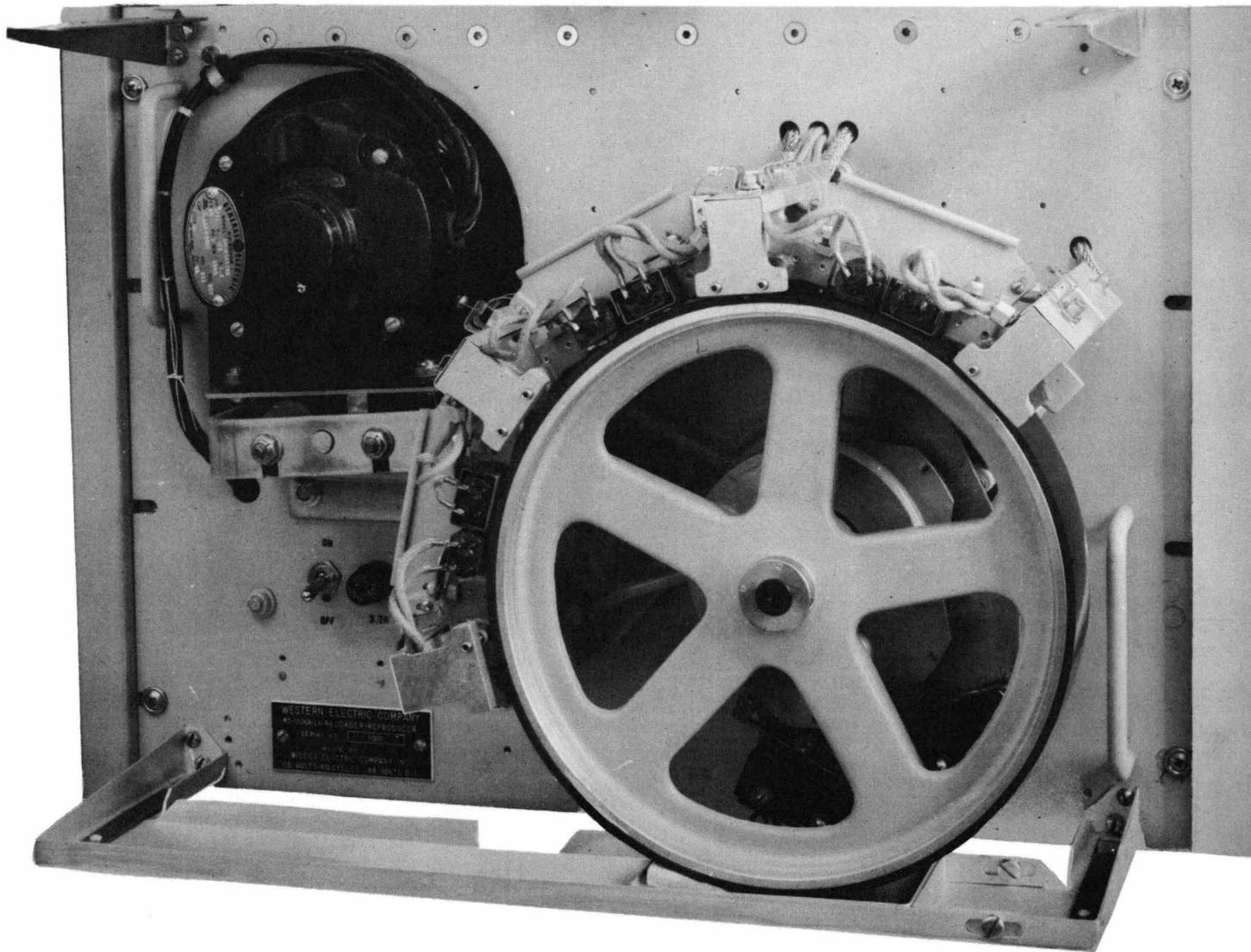
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B-992085

57



KS 12055 MODIFIED WITH KIT 2A



KS 12068 MODIFIED WITH KIT 2A

CAUTION: WHEN ADJUSTING THE SLIDE TRAY WITH THE FELT WIPING PAD BE SURE THAT THE PAD IS NOT FORCED AGAINST THE MAGNETIC BAND. IT SHOULD JUST REST AGAINST THE BAND WITH VERY LIGHT PRESSURE. PLACE THE FRONT COVER ONTO THE MACHINE AND VISUALLY INSPECT THE ASSEMBLY THROUGH THE COVER WINDOW TO SEE IF THE BRACKET HAS SHIFTED WHICH WOULD CAUSE INCREASED PRESSURE. RE-ADJUST THE SLIDE TRAY IF NECESSARY.