CLUTCHES — REED SPRING TYPE
UP DRIVES WITHOUT RELEASE SPRINGS
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers 1C, 1D, 2B, 3C, 3D and 8-, 9-, 10-, and 11-type panel reed spring type clutches that are not equipped with release springs but are adjusted with the rack free to travel, and associated racks.

1.02 This section is reissued to revise the list of tools, gauges, materials, and test apparatus, to replace the 149A and 150A gauges with 149B and 150B gauges, respectively, to revise the method of remounting clutches, and to revise Fig. 16 and 17.

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 listed herein.

1.04 ***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 such a check is advisable.

1.05 ***Fully Operate:*** A clutch is said to fully operate, if, when current is connected to a winding, the associated armature assumes a position so that:

(a) ***Up Drive:*** The nonmagnetic plate touches the core of the front magnet.

(b) ***Down Drive:*** The nonmagnetic plate touches the core of the front magnet.

(c) ***Trip Magnet:*** The nonfreezing disc on the armature farthest from the fulcrum touches its associated magnet core.

1.06 ***Operate:*** A clutch is said to operate if, when current is connected to a winding, the associated armature assumes a position so that:

(a) ***Up Drive:*** The nonmagnetic plate either touches, or is less than 0.005 inch away from the core of the front magnet and a gap exists between the tip of the reed spring adjusting screw and the roller arm.

(b) ***Down Drive:*** The armature moves until the nonmagnetic plate either touches, or is less than 0.005 inch away from the core of the front magnet, a gap exists between the tip of the reed spring adjusting screw and the roller arm, and the pawl is removed from the rack.

1.07 ***Nonoperate:*** A clutch is said to nonoperate if, when current is connected to a winding, the associated armature assumes a position so that:

(a) ***Up Drive:*** The nonmagnetic plate is 0.005 inch or more away from the core of the front magnet. The brush rod may or may not travel and a gap may or may not exist between the tip of the reed spring adjusting screw and the roller arm.

(b) ***Down Drive:*** The nonmagnetic plate is 0.005 inch or more away from the core of the front magnet. The brush rod may or may not travel and a gap may or may not exist between the tip of the reed spring adjusting screw and the roller arm.

1.08 ***Remove Pawl:*** A clutch is said to remove the pawl if, when current is connected to its associated down drive winding, the rack travels downward and the pawl tooth clears the rack in all positions. The armature may or may not touch the magnet core and a gap may or may not exist between the reed spring adjusting screw and the roller arm.

1.09 ***Trial:*** A trial for the purpose of this section consists of the application of a specified current for approximately 1/2 second.

1.10 ***Gauge Divisions:*** Requirements calling for the use of the 150B screw gap gauge are given in terms of divisions on the head of the calibrated adjusting screw of the gauge. Each division of the gauge corresponds to approximately 0.001 inch movement of the roller arm with respect to the up or down drive armature. However, due to deflection of the clutch parts or to other variables, no attempt shall be made to check the actual dimensions by other means.

1.11 ***Sender Selector Type Line Finders:*** If, in checking or readjusting clutches on sender selector type line finders, it is necessary to raise and keep the brush rod off normal, consult the circuit drawing for information as to the necessary relays which must be blocked to prevent circuit reactions, and to prevent the down drive armature from operating.

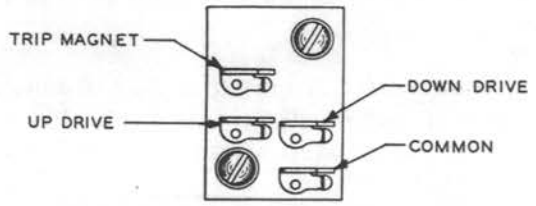

Fig. 1 – Terminals of 1-Type Clutch

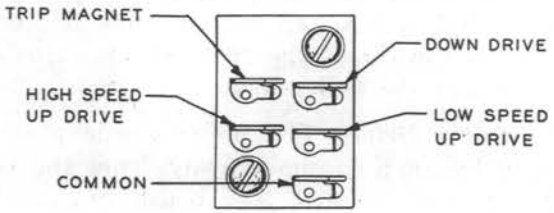

Fig. 2 – Terminals of 2-Type Clutch

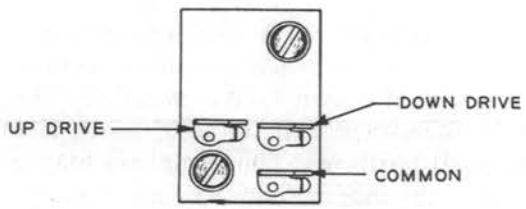

Fig. 3 – Terminals of 3-Type Clutch

1.12 After checking or readjusting a clutch where it is necessary to disturb the wiring to the clutch, make a check of the terminal block wiring for loose connections or broken wires and correct as necessary.

1.13 ***All requirements*** shall be met with the cork rolls revolving and with the brush rod free to travel when the clutch is operated.

1.14 ***Carrying Case for Small Clutch Gauges and Tools:*** The KS-8349 carrying case should be used to protect the screw gap and armature location gauges and may also be used for other small tools and gauges used on clutches.

1.15 ***Gear Case and Bearing Box Stops:*** If gear case and bearing box stops are to be installed on the frame and the associated clutches are to be readjusted, the stops should be installed before readjusting the clutches.

1.16 ***Terminal Designations:*** The terminal designations of 1-, 2-, and 3-type clutches are shown in Fig. 1, 2, and 3, respectively. On 8-, 9-, 10-, and 11-type clutches, the terminal designations appear on the terminal block.

1.17 Requirements for rack tongue tension and position, rack coupling pin engagement, clearance between trip armature extension and rack and clearance between trip armature extension and multiple brush frame are covered in the division 026 section covering the type of elevator apparatus involved.

1.18 ***Make-Busy Information:*** Before making any of the inspections or readjustments covered in this section, make the circuit busy in the approved manner.

2. REQUIREMENTS

REQUIREMENT FOR RACKS

2.01 ***Bow of Rack:*** Fig. 4(A) — With the rack held vertically, any bow in the entire length of the rack shall not exceed

For line finder racks — 1/4 inch
For all other racks — 5/16 inch

Gauge by eye.

2.02 ***Slipping of Rack:*** There shall be no perceptible slip between the rack and cork roll when the up drive magnet of the clutch is fully operated and the normal number of brushes are tripped.

Gauge by eye.

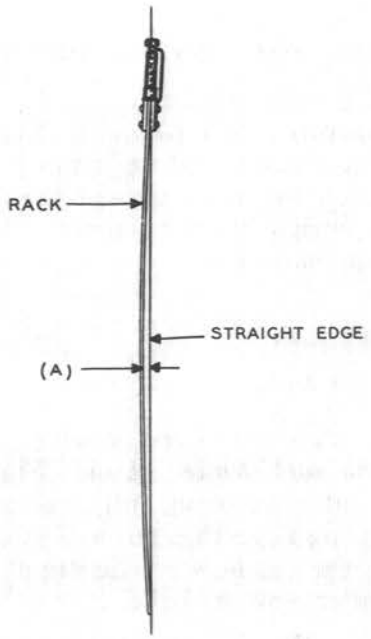

Fig. 4 – Bow of Rack

GENERAL CLUTCH REQUIREMENTS

2.03 ***Clutch Location***

(a) There shall be a clearance between adjacent clutches.

Gauge by eye.

(b) Fig. 5(A)

Test: The clearance between the top locating plate and the top of the clutch frame on the side nearest the plate shall be

Max 0.010 inch

Gauge by eye.

Readjust: The clutch shall fit snugly in a vertical direction against the top locating plate. If the top of the side of the clutch frame rests against the plate, this requirement is met.

Gauge by eye.

*(c) The vertical alignment of the clutch shall be such that, with the rack uncoupled from the brush rod as covered in 3.006, the mean of the sideways swing of the rack top, when it is at the upper limit of its travel, shall not be more than 1/16 inch away from the centerline of the brush rod.

Gauge by eye.

2.04 ***Clutch Retaining Spring Tension:*** Fig. 5(B) — The clutch retaining spring shall have sufficient tension to hold at least one of the clutch mounting ears firmly against the front of the slot in the clutch locating plate.

Gauge by eye and by feel.

2.05 ***Clearance Between Frontstops and Armatures:*** Fig. 6(A) — On all clutches having frontstops, the stop shall clear the up or down drive armature when the armature is in the fully operated position.

Gauge by eye.

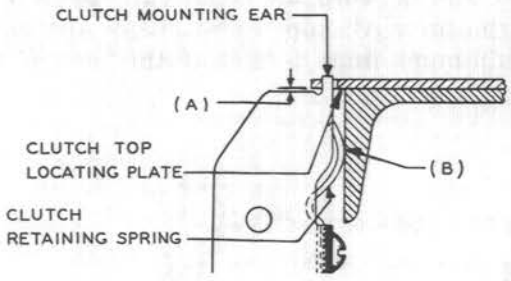

Fig. 5 – Clutch Location

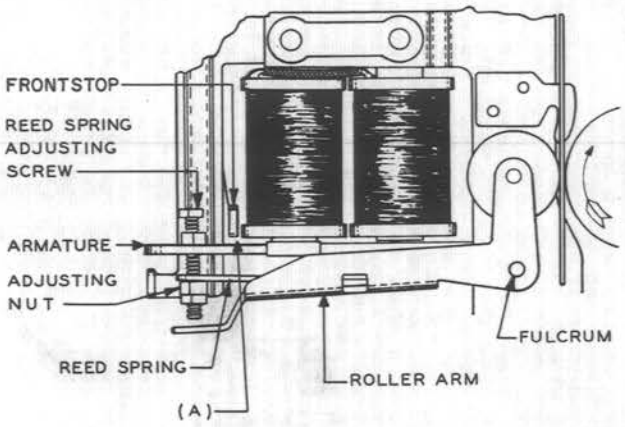

Fig. 6 – Clearance Between Frontstop and Armature

REQUIREMENTS FOR TRIP MAGNET

2.06 ***Clearance Between Bent Portion of Trip Armature and Magnet Core:*** Fig. 7(A) — The clearance between the bent portion of the trip armature and the magnet core with the armature in the operated position shall be

Min 0.028 inch
Max 0.052 inch

Operate the armature manually and use the 81 gauge.

2.07 ***Clearance Between Nonfreezing Disc on Trip Armature and Core Nearer Fulcrum:*** Fig. 7(B) — With the trip armature fully operated electrically, the clearance between the nonfreezing disc on the trip armature and the core nearer the fulcrum shall be

Min — Shall not touch
Max — 0.010 inch

Use the KS-6909 gauge.

To check the minimum clearance, insert the 0.0015-inch blade of the KS-6909 gauge between the disc and the core and electrically operate the trip armature. Attempt to withdraw the gauge. The minimum limit is met if this gauge does not bind.

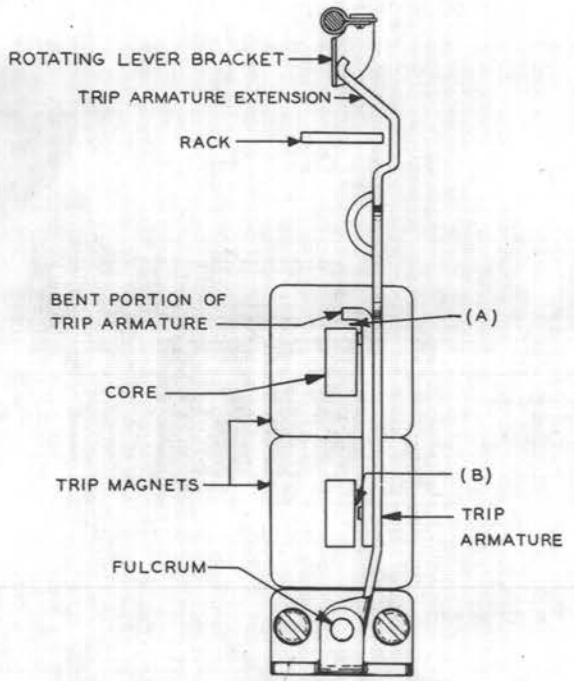

Fig. 7 – Trip Magnets and Associated Parts

2.08 ***Trip Magnet Electrical Requirements:*** The trip armature shall fully operate and rotate the trip rod on

Max 0.200 ampere

Where two trip magnets are wired in parallel, the trip armature shall fully operate on

Max 0.400 ampere

REQUIREMENTS FOR HIGH AND LOW SPEED UP DRIVES

2.09 ***Unoperated Core Gap:*** Fig. 8(A) — With the armature resting against the backstop the gap between the core of the front magnet and the edge of the nonmagnetic plate nearer the fulcrum shall be

Min 0.082 inch
Max 0.092 inch

Use the 119A gauge.

2.10 ***Gap Between Reed Spring Adjusting Screw and Roller Arm:*** Fig. 9(A) — With the clutch up drive fully operated, when the reed spring adjusting screw is closest to the roller arm, the gap between the tip of the screw and the roller arm shall be

Test — Min 17 divisions
— Max 38 divisions
Readjust — Min 22 divisions
— Max 26 divisions

Use the 150B screw gap gauge.

2.11 ***Up Drive Electrical Requirements***

(a) ***Operate:*** The clutch up drive shall operate each of six consecutive trials (see 1.09) on

Test — Max 0.320 ampere
Readjust — Max 0.300 ampere

Use the 149B armature location gauge.

(b) ***Nonoperate:*** The clutch up drive shall nonoperate at least one in six trials on

Test — Min 0.260 ampere
Readjust — Min 0.280 ampere

Use the 149B armature location gauge.

Check (a) and (b) at a time when no other brush rods on the same side of the frame are being driven upward. That is, if another clutch up drive operates as a trial is being applied, repeat that trial.

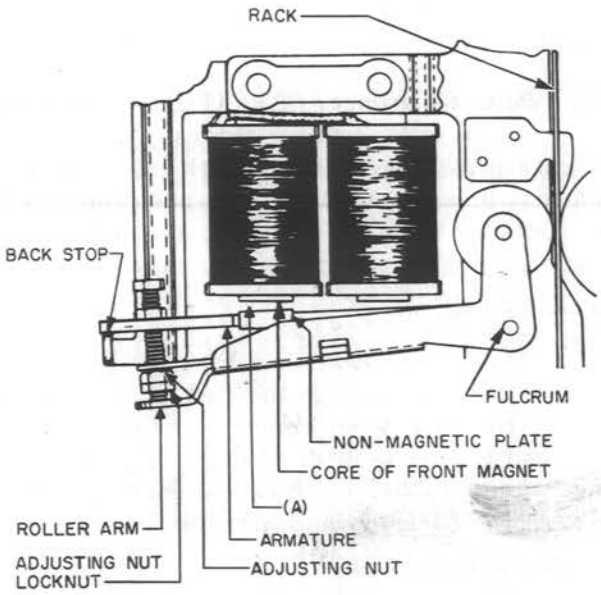

Fig. 8 – Up Drive Armature in Normal Position

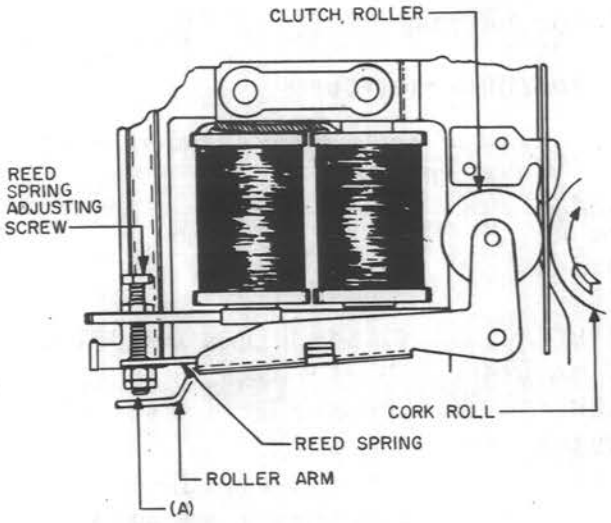

Fig. 9 – Up Drive Armature Fully Operated

2.12 ***Reed Spring Tension:*** Fig. 9(A) — With the armature resting against the backstop, the gap, if any, between the tip of the reed spring adjusting screw and the roller arm shall not exceed 0.015 inch with the following tension applied to the roller arm just behind the adjusting nut locknut.

	TRANSLATOR AND LINE FINDER CLUTCHES	ALL OTHER CLUTCHES
Test —	1650 grams	1450 grams
Readjust —	1700 grams	1550 grams

Use the 92E and 93B gauges.

REQUIREMENTS FOR DOWN DRIVES

2.13 ***Unoperated Core Gap:*** Fig. 10(A) — With the armature resting against the backstop, the gap between the core of the front magnet and the edge of the nonmagnetic plate nearer the fulcrum shall be

Min 0.068 inch
Max 0.088 inch

Use the 118A gauge.

2.14 ***Gap Between Reed Spring Adjusting Screw and Roller Arm:*** Fig. 11(A) — With the clutch down drive fully operated, when the reed spring adjusting screw is closest to the roller arm, the gap between the tip of the screw and the roller arm, shall be

Test — Min 8 divisions
— Max 34 divisions
Readjust — Min 19 divisions
— Max 25 divisions

Use the 150B screw gap gauge.

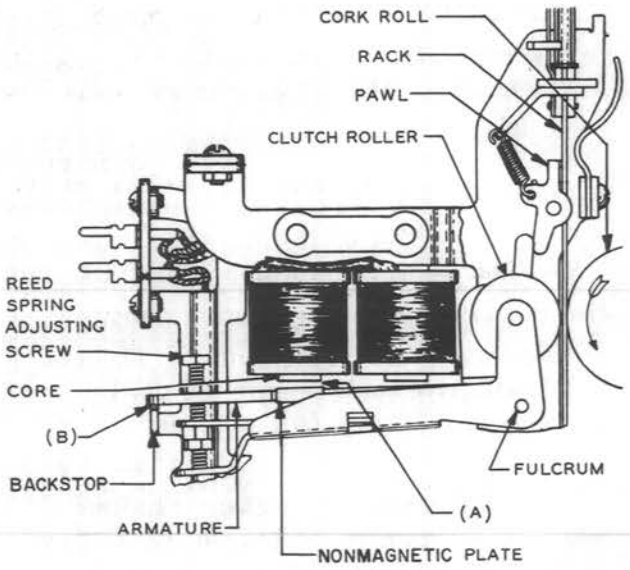

Fig. 10 – Down Drive Armature in Normal Position

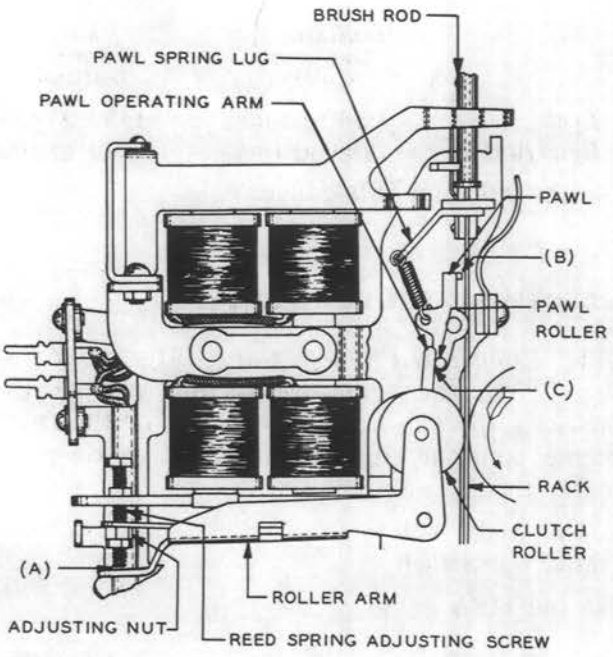

Fig. 11 – Down Drive Armature in Fully Operated Position

2.15 ***Down Drive Electrical Requirements***

(a) ***Operate:*** The clutch down drive shall operate each of six consecutive trials (see 1.09) on

	1C, 2B, 8A, AND 9A CLUTCHES	1D, 3C, 3D, 8B, 10A, 10B, 11A, AND 11B CLUTCHES
Test	— Max 0.215 amp	Max 0.245 amp
Readjust	— Max 0.170 amp	Max 0.210 amp

Use the 149B armature location gauge.

(b) ***Nonoperate:*** The clutch down drive shall nonoperate at least once in six trials (see 1.09) on

	1C, 2B, 8A, AND 9A CLUTCHES	1D, 3C, 3D, 8B, 10A, 10B, 11A, AND 11B CLUTCHES
Test	— Min 0.115 amp	Min 0.150 amp
Readjust	— Min 0.140 amp	Min 0.180 amp

Use the 149B armature location gauge.

(c) ***Remove Pawl*** (Test Only): The clutch down drive shall remove the pawl each of six consecutive trials (see 1.09) on

1C, 2B, 8A, AND 9A CLUTCHES	1D, 3C, 3D, 8B, 10A, 10B, 11A, AND 11B CLUTCHES
Max 0.190 ampere	Max 0.225 ampere

Check (a), (b), and (c) at a time when no other brush rods on the same side of the frame are being driven downward. That is, if another clutch down drive operates as a trial is being applied, repeat that trial.

2.16 ***Pawl Clearance:*** Fig. 11(B) — With the clutch roller pressed against the rack and the rack pressed against the cork roll with just sufficient pressure to drive the rack down without slipping, the pawl shall not touch the rack in any vertical position the rack may assume.

Gauge by feel.

2.17 ***Pawl Engagement:*** Fig. 10(B) — The pawl shall engage the rack sufficiently to prevent the rack from slipping or dropping for any position the rack or clutch roller may assume when a 0.020-inch thickness gauge is placed between the backstop and armature.

Use the 80B gauge.

2.18** ***Pressure of Pawl Roller Against Pawl Operating Arm: Fig. 11(C) — The pressure of the pawl roller against the operating arm shall be

Min 55 grams
Max 100 grams

Use the 79C gauge.

3. ADJUSTING PROCEDURES

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

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
273	Adjuster
310B (2 required)	9/32-Inch Open Double-End Offset Wrench
325B	Adjuster
379A	Adjuster
467A	9/32-Inch Open Double-End Flat Wrench (see 3.002)
KS-6278 (as required)	Connecting Clips
KS-8097	5/8- and 7/16-Inch, 12-Point Offset Box Wrench
KS-8349	Carrying Case
KS-14250 L1	Flashlight (or the replaced flashlight equipped with KS-7742 bottom cap)
→KS-19053 L1 →	Screwdriver (or the replaced double-grip screwdriver)

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
R-1051	6-Inch Pillar File
R-1313	Fish Line
R-2512	Adjustable Wrench
—	3-Inch C Screwdriver (or the replaced 3-inch cabinet screwdriver)
—	4-Inch E Screwdriver (or the replaced 4-inch regular screwdriver)
—	7/16- and 1/2-Inch, 12-Point Box Offset Wrench, J. H. Williams & Co. No. 8725 Superwrench
—	FT10 Oil Stone, Behr Manning Co. (or equivalent)
GAUGES	
79C	0-200 Gram Push-Pull Tension Gauge
80B	0.010-, 0.020-, 0.030-Inch and 0.015-, 0.035-Inch Thickness Gauge
81	0.028- and 0.052-Inch Thickness Gauge
92E	0.015-Inch Thickness Gauge
93B	Gram Weights
118A	0.068- and 0.088-Inch Thickness Gauge
119A	0.082- and 0.092-Inch Double-End Thickness Gauge
149B	Armature Location Gauge (or the replaced 149A)
150B	Screw Gap Gauge (or the replaced 150A)
162B	Armature Location Gauge (or the replaced 162A)
KS-6909	Thickness Gauge Nest
MATERIALS	
KS-2423	Cloth
KS-7860	Petroleum Spirits

CODE OR SPEC NO.	DESCRIPTION
MATERIALS	
—	Spring Clothespin
P-173711	Magnet Clamping Clearance Screw [see 3.009(5)]
TEST APPARATUS	
35 Type	Test Set
KS-6522 (as required)	Dry Cells
— (2 required)	893 Cord, 6 Feet Long, Equipped With Two 360A Tools (1W13B cord)
— (3 required)	W2W Cord, 6 Feet Long, Equipped With one 310 Plug, one 360B Tool, and one 360C Tool (2W17A cord)

3.002 ***467A Wrench:*** In these procedures, the 310B wrench is specified for use on the clutch adjusting screws and adjusting nuts. In case the opening of the 310B wrench is too small to fit the screws or nuts, use the 467A wrench instead of the 310B wrench.

3.003 ***Method of Connecting 35-Type Test Set to Clutch Up and Down Drives***

Up Drives — Battery Connected to Common Terminal of Clutch

(1) Set all keys on the test set normal and slide all the rheostat sliders to the right. Insert the 310 plug of the 2W17A cord which is equipped with two KS-6278 connecting clips into the TEST T & R jack of the test set. Connect the black (ring) conductor to the up drive terminal of the clutch and connect the white (tip) conductor to ground.

(2) Insert the 310 plug of another 2W17A cord which is equipped with the KS-6278 connecting clip in the 360C tool end into the TEST EXT KEY 4W jack of the test set and connect the white (tip) conductor of this cord to the down drive terminal of the clutch. Operate the three knife switches designated 4 so as to engage the jaws designated 0 and

operate the BATT & GRD CO key. Move the sliders of the No. 4 rheostat to the extreme left. By this arrangement, No. 1, 2, and 3 telegraph keys can be used to apply current flow values to the up drive while the No. 4 key is used to operate the down drive in restoring the brush rod to normal.

(3) To obtain a given current flow value, such as the operate current, manually hold the up drive armature in its unoperated position. Operate the circuit closing lever associated with the No. 1 telegraph key and move the sliders of the No. 1 rheostat until the desired current flow value is obtained. To obtain a second current flow value such as the non-operate current, release the No. 1 telegraph key, operate the No. 2 key, and move the sliders of the No. 2 rheostat. To obtain a third current such as is required to fully operate the clutch up drive in requirement 2.10, operate the three knife switches designated 3 so as to engage the jaws designated 0 and move the sliders of the No. 3 rheostat to the extreme left. If the office voltage is near the minimum allowable, it may be necessary to connect one or more dry cells in series with the test set and the clutch up drive magnet in order to obtain some of the current flow values specified. When readjusting to the electrical values, check the current flow values frequently so as to insure that the temperature rise of the magnet caused by current flowing through it will not affect the resulting adjustment.

Up Drives — Ground Connected to Common Terminal of Clutch

(4) Connect the test set to the clutch up drive as covered in (1), connecting battery instead of ground to the white (tip) conductor of the cord plugged into the test set TEST T & R jack. Operate the REV key. Obtain the desired current flow values as in (3). It will be necessary to operate the down drive manually in order to restore the brush rod.

Down Drives

(5) In checking down drives, the connections are the same as covered in (1) to (4), inclusive, except that the connections to the up and down drive terminals are interchanged.

3.004 ***Checking Requirements With Brush Rod in Motion:*** To avoid damaging the cork rolls in checking requirements 2.10 and 2.11, where the check is made with the brush rod in motion, take care not to keep the clutch energized after the brush rod reaches its limit of travel.

3.005 ***Method of Removing Rack:*** Raise the brush rod a few terminals. Uncouple the brush rod from the rack by inserting the blade of the 3-inch C screwdriver between the rack tongue and brush rod as shown in Fig. 12 and turning the screwdriver just enough to disengage the tongue from the brush rod.

Caution: Insert the blade of the screwdriver just below the horizontal portion of the lip of the rack tongue so as to affect the tension of the rack tongue as little as possible.

Lift the brush rod away from the rack with the other hand. The rod now has no means of support, so it will be necessary to hold it in place with a spring clothespin just above a bearing plate as shown in Fig. 13. Lift the rack out from behind the clutch.

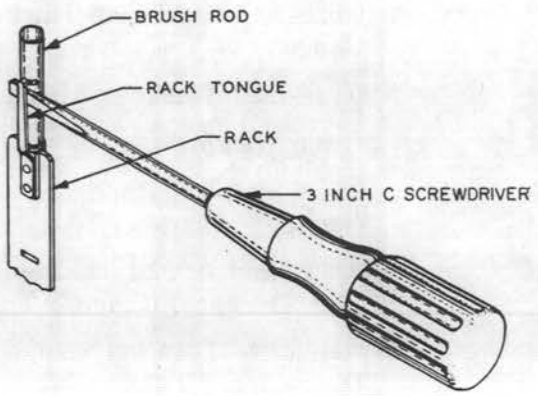

Fig. 12 – Method of Uncoupling Rack From Brush Rod

3.006 ***Method of Removing Clutch:*** Remove the fuse which supplies current to the clutch. Uncouple the rack from the brush rod as covered in 3.005. Loosen the clutch mounting →screw with the KS-19053 L1 screwdriver. Where the clutch mounting screw will not budge, apply the R-2512 wrench to the square shank of

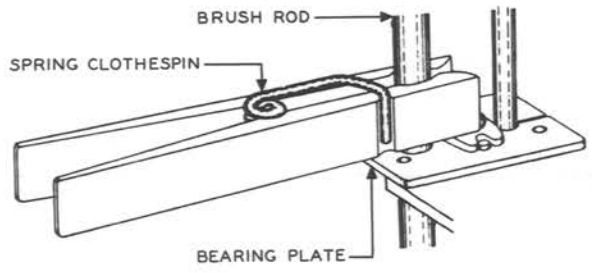

Fig. 13 – Method of Placing Spring Clothespin

the double-grip screwdriver, thereby obtaining greater leverage. Lower the clutch until the two projections at the top just clear the holes in the clutch top locating plate, taking care not to disturb the trip rod rotating lever. Pull the top of the clutch away from the frame until it is clear of the locating plate and then lift it up to disengage the mounting screw at the bottom of the clutch. Take care when removing and handling the clutch while making adjustments not to break the wires connected to the soldering lugs.

3.007 ***Method of Remounting Clutches:*** Rotate the guide rod so that the rotating lever bracket, shown in Fig. 7, is approximately centered between the two clutch mounting holes. Remount the clutch on the frame, making sure that the clutch is satisfactorily located as covered in requirement 2.03 and that the clutch retaining spring tension is satisfactory as covered in requirement 2.04. Remount the fuse that was removed in 3.006. Check that the commutator and multiple brushes are correctly located as covered in 3.008.

3.008 ***Rechecking Other Reqirements After Clutch Is Shifted or Removed From Frame:*** If, for any reason, it is necessary to shift the position of the clutch or to remove the clutch from the frame, make sure that the commutator brush and multiple brushes are located in accordance with the requirements specified in the sections covering the type of apparatus involved. This is important because the vertical location of the entire brush rod assembly may have been affected by shifting the clutch.

3.009 ***Lowering Rear Magnet and Raising Front Magnet of Up Drives***

Lowering Rear Magnet

(1) Remove the rack and support the brush rod with the spring clothespin as covered in 3.005. Remove the clutch from the frame as covered in 3.006. It is not necessary to remove the wires, but the clutch should be supported in such a way to prevent the wires from being broken or the insulation from being damaged.

(2) With the armature operated manually, check the clearance between the armature and the core of the magnet nearer the fulcrum with the KS-6909 gauge. In some cases, it will be necessary to loosen the reed spring adjusting screw locknut with the 310B wrench and turn the adjusting screw toward the roller arm in order to gauge this clearance without interference between the gauge and roller arm.

(3) If this clearance is appreciably greater than 0.010 inch, loosen the rear magnet clamping screw with the KS-8097 wrench as shown in Fig. 14 and lower the rear magnet. On some earlier clutches it will be necessary to use the Williams & Co. superwrench to loosen the magnet clamping screw. In making this adjustment, reduce the clearance as much as possible (without going below 0.010 inch) so as to get the maximum pull from the rear magnet. This adjustment may be facilitated by placing the 0.012 inch blade of the KS-6909 gauge between the armature and the core of the rear magnet and lowering the magnet until the gauge is tight. Make sure that the face of the rear magnet core is parallel to the surface of the armature. Securely retighten the magnet clamping screw, applying enough force to insure that the magnet will not be jarred out of position during service. Then recheck the clearance between the core and armature to be sure that it is not less than 0.010 inch with the armature manually operated.

Raising Front Magnet

(4) If it is not possible to lower the rear magnet sufficiently to reduce the clearance between the core of the rear magnet and the

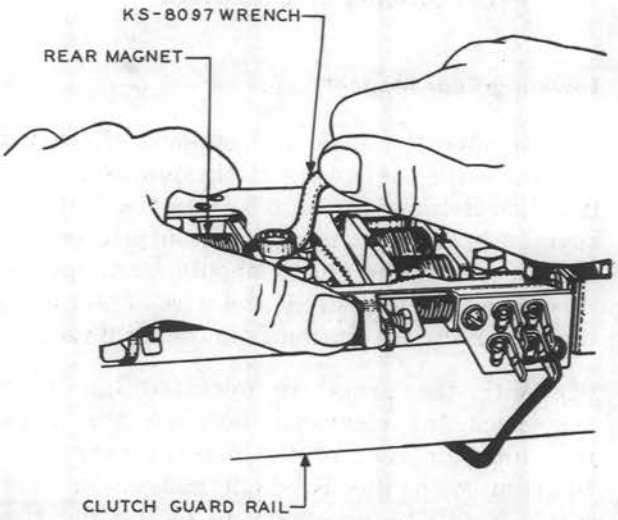

Fig. 14 – Method of Loosening Rear Magnet Clamping Screw

armature to about 0.010 inch, loosen the front magnet clamping screw with the KS-8097 wrench. Raise the front magnet until the clearance between the armature and the core of the rear magnet is not less than 0.010 inch. Make sure that the face of the core of the front magnet is parallel to the surface of the nonmagnetic plate on the armature. Securely retighten the magnet clamping screw, applying enough force to insure that the magnet will not be jarred out of position during service. Check requirement 2.09.

Installing Clearance Screw in Place of Rear Magnet Clamping Screw

(5) In some cases, it may not be possible to lower the rear magnet and raise the front magnet sufficiently to meet the up drive requirements. This is more likely to occur on line finder and translator clutches because of the higher reed spring tension requirement. Where this occurs, if, with the armature operated, the clearance between the core of the rear magnet and the armature still exceeds 0.010 inch, remove the rear magnet clamping screw with the KS-8097 wrench. Substitute the P-173711 magnet clamping clearance screw and lower the rear magnet until the clearance between the armature and the core of the magnet is 0.010 inch, as covered in (3).

Note: The P-173711 screw may be recognized by the undercut.

(6) Remount the clutch as covered in 3.007.

3.010 ***Repaired Clutches:*** On certain repaired clutches that have been converted from helical-type clutches to reed spring type clutches and the front stop has not been removed from the up drive it may be necessary to use the 162B armature location gauge instead of the 149B armature location gauge.

PROCEDURES FOR RACKS

3.01 ***Bow of Rack*** (Reqt 2.01)

(1) Remove the rack as covered in 3.005. Hold the rack vertically and place a straight edge, such as another rack, against the flat side of the rack.

(2) If the rack is bowed to such an extent that it requires straightening, straighten it by bending it as a whole and not in sections, and thereby prevent putting a kink in it. If it cannot be straightened in this manner the rack may be straightened in sections, exercising extreme care not to produce kinks in it.

3.02 ***Slipping of Rack*** (Reqt 2.02)

(1) If the rack slips it may be due to a binding brush rod in which case refer to the division 026 section covering the type of elevator apparatus involved.

(2) If the rack is bowed, straighten it as covered in 3.01.

(3) If the rack still slips and an inspection shows that it is not due to incorrect clutch adjustment, it is probably due to oil or grease on the rack or the surface of the cork roll. In this case, clean the rack and cork roll, as covered in Section 159-720-701.

(4) If the rack only is to be cleaned, remove the rack as covered in 3.006. Then clean it with a KS-2423 cloth moistened with KS-7860 petroleum spirits. Remount the rack and check it for slipping.

GENERAL CLUTCH PROCEDURES

3.03 ***Clutch Location*** (Reqt 2.03)

(1) Before checking the vertical alignment, uncouple the rack from the brush rod as covered in 3.005 and raise the brush rod to a point near the upper limit of its travel. Hold the brush rod in this position by means of the spring clothespin as shown in Fig. 13, preferably between No. 2 and 3 banks.

(2) If any part of the requirement is not met, loosen the clutch mounting screw as covered in 3.006 and shift the clutch as required. If the proper clearance between clutches cannot be obtained in this manner, this may be due to a failure of one or both of the adjacent clutches to meet this requirement. When the clutch is properly located, securely retighten the clutch mounting screw.

(3) Check requirement 2.04 and the location of the commutator brush and multiple brushes. See 3.008.

3.04 ***Clutch Retaining Spring Tension*** (Reqt 2.04)

(1) Remove the rack as covered in 3.005 and the clutch as covered in 3.006.

(2) Make sure that the two retaining spring mounting screws are tight. If necessary, adjust the retaining spring tension by prying the spring away from the frame with the 4-inch E screwdriver.

(3) Remount the clutch on the frame, making sure that requirement 2.03 is met. Reassemble the rack and make sure that the commutator brush and multiple brushes are correctly located. See 3.008.

3.05 ***Clearance Between Frontstops and Armatures*** (Reqt 2.05)

(1) Adjust the frontstops as required with the 273 adjuster in the same manner as shown in Fig. 15 for adjusting armature backstops.

PROCEDURES FOR TRIP MAGNET

3.06 ***Clearance Between Bent Portion of Trip Armature and Magnet Core*** (Reqt 2.06)

3.07 ***Clearance Between Nonfreezing Disc on Trip Armature and Core Nearer Fulcrum*** (Reqt 2.07)

(1) To readjust it may be necessary to remove the clutch from the frame as covered in 3.006.

(2) In some cases, it may be possible to meet both of these requirements by applying the 325B adjuster to the trip armature between the core of the magnet nearer the fulcrum and the fulcrum and adjusting the trip armature. If both requirements cannot be met by adjusting the trip armature in this manner, proceed as follows.

(3) Loosen the two trip armature bracket mounting screws with the 4-inch E screwdriver, using the 310B wrench, if necessary, to hold the nuts. Position the trip armature bracket as required and securely retighten the screws.

(4) If the clutch was removed, remount it as covered in 3.007.

3.08 ***Trip Magnet Electrical Requirements*** (Reqt 2.08)

(1) If the requirement is not met, this may be caused by a binding trip rod or by faulty trip armature extension or rotating lever adjustment. Refer to the division 026 section covering the type of elevator apparatus involved for the method of correcting these conditions.

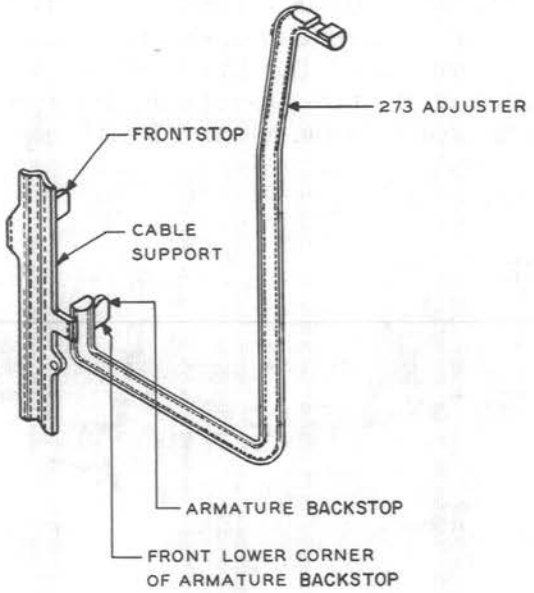

Fig. 15 – Method of Adjusting Armature Backstop

PROCEDURES FOR HIGH AND LOW SPEED UP DRIVES

3.09 ***Unoperated Core Gap*** (Reqt 2.09)

(1) Adjust the armature backstop by bending it up or down as required by using the 273 adjuster as shown in Fig. 15. If difficulty is experienced in placing the adjuster on the backstop, increase the width of the slot by filing with the R-1051 pillar file.

3.10 ***Gap Between Reed Spring Adjusting Screw and Roller Arm*** (Reqt 2.10)

3.11 ***Up Drive Electrical Requirements*** (Reqt 2.11)

3.12 ***Reed Spring Tension*** (Reqt 2.12)

Checking Test Requirement for Gap Between Reed Spring Adjusting Screw and Roller Arm

(1) With the 35-type test set connected to the clutch as covered in 3.004, fully operate the clutch and visually make sure that the clutch has some screw gap. A screw gap is essential to get an indication of the point at which the adjusting screw is closest to the roller arm. Operate the down drive magnet to restore the clutch to normal.

(2) Insert the 310 plug of the 2W17A cord equipped with the KS-6278 connecting clip in the 360B tool end into the SIGNAL BAT & GRD jack of the test set. Make sure that a 48-volt lamp is in the lamp socket and connect the black (ring) conductor of the cord to the common terminal of the clutch, or some other source of 48 volts. Operate the knife switch designated L to the 500 and LAMP position.

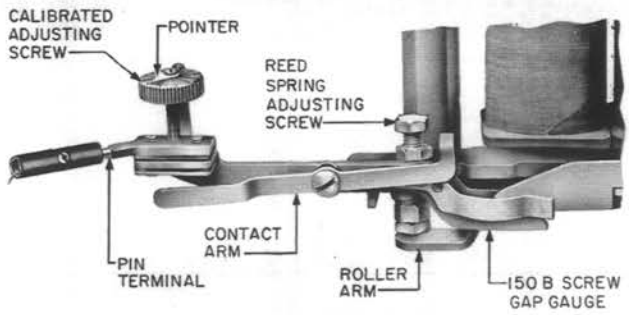

Fig. 16 – Method of Checking Gap Between Reed Spring Adjusting Screw and Arm

(3) Mount the 150B screw gap gauge on the channel portion of the roller arm as shown in Fig. 16. In mounting the gauge, hold the contact arm so the contacts are open about 1/2 inch or more. This will permit the gauge to be mounted on the roller arm without interference between the head of the reed spring adjusting screw and the offset end of the contact arm. Push the gauge toward the clutch as far as permitted by the base of the clamping jaws of the gauge. Connect the white (tip) conductor of the cord in the SIGNAL BAT & GRD jack of the test set to the pin terminal of the gauge.

(4) To gauge the screw gap, fully operate the clutch. As the brush rod travels upward, carefully adjust the calibrated adjusting screw of the gauge until the test set lamp barely flickers or is practically extinguished. Release the clutch when the brush rod approaches the upper limit of travel and restore the brush rod. When the calibrated adjusting screw is correctly set, with the clutch fully operated, the lamp will be lighted only momentarily at the instant the adjusting screw and roller arm assume their closest positions, and if the screw is turned part of a division in a counterclockwise direction, the lamp will be completely extinguished. The setting of the screw should be based upon the lamp indications obtained from two or three upward trips of the brush rod. With the armature in the normal position, the lamp should be lighted.

Note: If another clutch up drive on the same side of the frame operates while the calibrated adjusting screw of the gauge is being adjusted, the lamp indication may change. Therefore, set the screw when no other brush rods on the same side of the frame are being driven upward.

(5) With the armature resting on the armature backstop, observe the position of a calibration mark on the head of the calibrated adjusting screw with respect to some part of the gauge, for example, an edge on the frame of the gauge. Turn the pointer on the calibrated adjusting screw with the fingers so it lines up with the reference point selected, taking care not to turn the calibrated screw. Then turn the calibrated adjusting screw in a counterclockwise direction and carefully note the number of divisions the screw is turned

before the point is reached where the lamp is again barely lighted. (In determining this point, turn the calibrated adjusting screw until the lamp is extinguished, after which turn the screw back to the point where the lamp is barely lighted.) The pointer will aid in counting the number of divisions passed when this point is reached. Each full turn of the screw corresponds to 12 of the divisions referred to in the requirements.

Readjusting for Gap Between Reed Spring Adjusting Screw and Roller Arm

(6) Proceed as covered in (1) to (4), inclusive.

Turn the calibrated adjusting screw of the screw gap gauge in a counterclockwise direction as covered in (5), except that the screw should be turned 24 divisions (corresponding to the average adjustment specified). The magnitude of the existing gap should be noted as the screw is being turned the 24 divisions by observing when or whether the lamp is extinguished as the screw is being set. If the lamp is not extinguished after turning the screw 24 divisions, it is an indication that the screw gap is near or exceeds the maximum permitted gap.

(7) To adjust the gap between the reed spring adjusting screw and roller arm, loosen the reed spring adjusting screw locknut with one 310B wrench, using another 310B wrench to hold the adjusting screw. Turn the adjusting screw in the required direction when the setting is such that the lamp is barely lighted. Retighten the adjusting screw locknut and make sure that the clutch operates and nonoperates on the specified current when checked with the armature location gauge as covered in (8) to (11), inclusive. If not, loosen the adjusting nut locknut with one 310B wrench, using another 310B wrench to hold the adjusting nut. Position the adjusting nut as required and retighten the adjusting nut locknut. Recheck that the gap between the reed spring adjusting screw and the roller arm is still within the specified limits as covered in (4) and (5) and if not, refine the adjustments as required.

Checking Up Drive Electrical Requirements

(8) Mount the 149B armature location gauge on the cable support of the clutch as shown in Fig. 17. In mounting the gauge, open the mounting clamp sufficiently to permit the cable support to enter the clamp by turning the clamping screw out. In mounting the gauge on the cable support, if the clutch has frontstops, lower the gauge so the clamping jaw rests against the frontstop. If the clutch does not have frontstops, place the forefinger on the bottom of the armature backstop and move the gauge downward until the frame of the gauge rests against the finger. When positioned in this manner, the bottom of the frame of the gauge will be about even with the bottom of the armature backstop. Make sure that the portion of the contact arm which contacts the clutch armature when the clutch operates is above the armature. Then tighten the gauge clamping screw sufficiently to hold the gauge securely on the cable support.

Note: On clutches equipped with frontstops, in some cases the frontstop may interfere with the movement of the contact arm. In this case, bend the frontstop as required with the 273 adjuster as covered in 3.05. If the condition cannot be overcome in this manner, remove the clutch from the frame and loosen the front magnet clamping screws as covered in 3.006 and reposition the cable support as required. If this is done, recheck all clutch requirements.

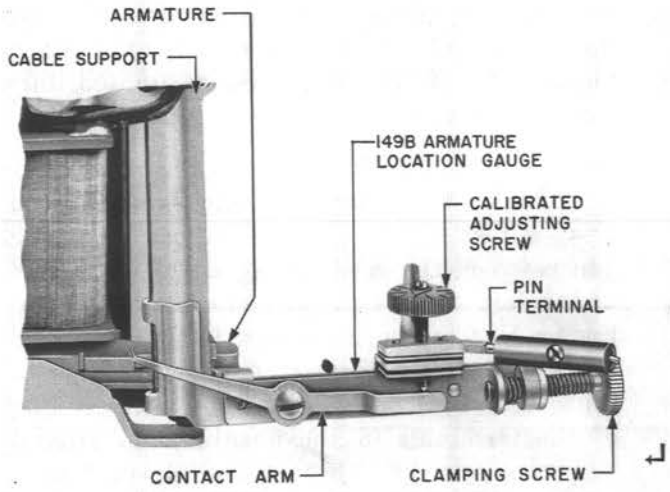

Fig. 17 – Method of Checking Electrical Requirements

(9) Disconnect the cord from the screw gap gauge and transfer it to the pin terminal of the armature location gauge. Fully operate the clutch and carefully adjust the calibrated adjusting screw of the armature location gauge so that the lamp just lights or flickers. When the calibrated adjusting screw is correctly set, the lamp will be extinguished or will flicker when the clutch is operated. Observe the position of a calibration mark on the head of the calibrated adjusting screw with respect to some part of the gauge as, for example, an edge on the contact arm of the gauge. Then turn the calibrated adjusting screw five divisions in a counterclockwise direction. The resulting contact setting will be such that the contact will open as the armature moves closer than 0.005 inch from the core of the front magnet to permit the operate and nonoperate conditions as covered in 1.07 and 1.08 to be gauged. In checking for the operate and nonoperate conditions, obtain the required current flow values as covered in 3.003. Depress the proper key of the 35-type test set for approximately 1/2 second (time required for high speed up drive to travel over approximately 20 bank terminals on line finders or 30 bank terminals on other circuits) and then release the key long enough for the armature to restore to the backstop. These operations constitute one trial. On a 100-point bank and a high speed up drive it will be possible to complete three such trials during the upward travel of the brush rod (two trials on 40-point line finders and only one trial on 20-point line finders). The clutch operates if the lamp is extinguished, even momentarily, during the interval the current is applied; it nonoperates if the lamp remains lighted during that interval.

(10) If desired, a KS-14250 L1 flashlight may be used in place of the lamp in the 35-type test set, to give an indication of the gap between the reed spring adjusting screw and roller arm. This will eliminate shifting the lead of the cord in the SIGNAL BAT & GRD jack of the test set from one gauge to the other. To use the flashlight, connect one of the terminals of the flashlight to ground by means of a 1W13B cord and KS-6278 connecting clip. With another 1W13B cord, connect the pin terminal of the screw gap gauge to the other terminal of the flashlight instead of the cord in the SIGNAL BAT & GRD jack. Operate the flashlight switch.

Checking Reed Spring Tension

(11) ***If no depression is worn in the roller arm*** beneath the adjusting screw, check the reed spring tension as follows. Suspend the specified weights of the 93B gauge directly back of the reed spring adjusting nut locknut as shown in Fig. 18 and make sure that the 92E gauge binds when placed between the tip of the reed spring adjusting screw and the roller arm.

(12) ***If a depression is worn in the roller arm*** beneath the adjusting screw, the 92E gauge cannot be used to gauge the 0.015-inch clearance between the roller arm and the adjusting screw. In this case, the 150B screw gap gauge may be used in place of the 92E gauge as covered in (13).

(13) With the 150B screw gap gauge mounted on the clutch as covered in (3) and with the clutch armature normal, carefully adjust the calibrated adjusting screw of the gauge till the lamp is barely lighted. Then suspend the 93B gauge as covered in (11). If the lamp is extinguished, turn the calibrated adjusting screw in a clockwise direction and carefully note the number of divisions the screw is turned before the lamp lights again. If less than 15 divisions are passed, the requirement is met.

Readjusting for Reed Spring Tension

(14) If the tension is less than the specified minimum, remove the 93B gauge and increase the tension as required by means of the reed spring adjusting nut and then recheck that the gap between the reed spring adjusting screw and roller arm and up drive electrical requirements are still met. If these requirements cannot be met with the same adjustment, it will be necessary to lower the rear magnet or raise the front magnet as covered in 3.009 in order to increase the pull on the armature and then repeat the adjustments. Securely tighten the reed spring adjusting nut locknut.

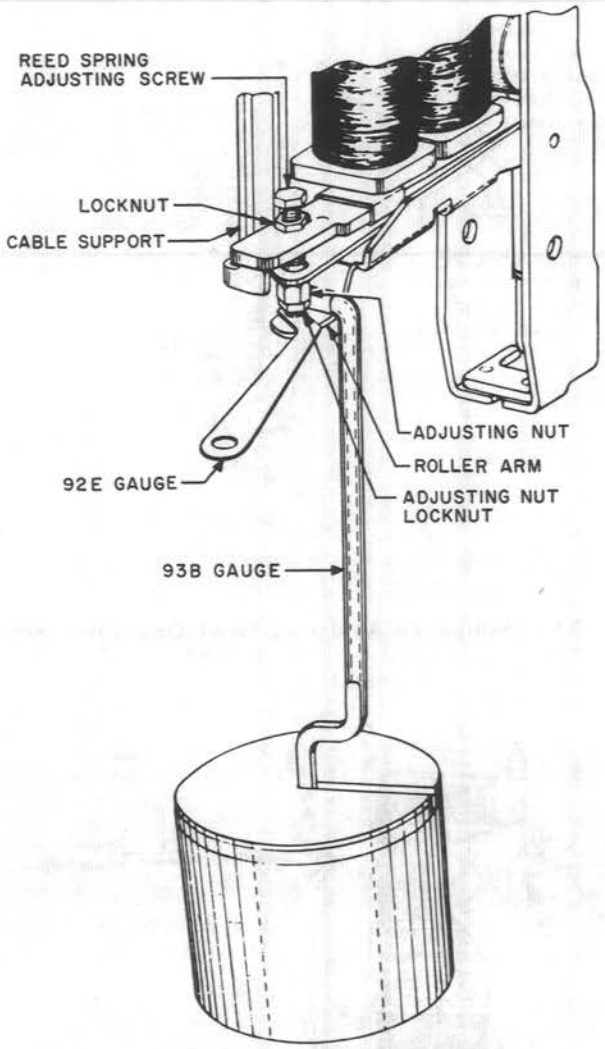

Fig. 18 – Method of Checking Reed Spring Tension

(15) When the screw gap and reed spring tension requirements are met, dismount the 149B armature location gauge and 150B screw gap gauge. To avoid the possibility of damaging the screw gap gauge in dismounting it, take care to grasp the frame of the gauge back of the calibrated adjusting screw mounting plate. Avoid placing unnecessary stress against the head of the calibrated adjusting screw.

PROCEDURES FOR DOWN DRIVES

3.13 ***Unoperated Core Gap*** (Reqt 2.13)

(1) Adjust the armature backstop by bending it up or down as required using the notch in the shorter arm of the 273 adjuster as shown in Fig. 15.

3.14 ***Gap Between Reed Spring Adjusting Screw and Roller Arm*** (Reqt 2.14)

3.15 ***Down Drive Electrical Requirements*** (Reqt 2.15)

(1) Check and readjust for the gap between the screw gap adjusting screw and roller arm and the operate and nonoperate electrical requirements as covered for up drives in 3.10 through 3.12. When checking the remove pawl electrical requirement, proceed as covered in (2) and (3), making sure that requirement 2.12 is met. When checking the electrical requirements, remove the 150B screw gap gauge.

Remove Pawl

(2) Raise the brush rod and apply the specified current the specified number of trials. The pawl should be removed and the rack should be driven downward without slipping when each trial is applied.

(3) If the pawl is not removed, make sure requirement 2.16 is met and, if necessary, readjust for that requirement as covered in 3.16 and 3.17. In some cases, failure to remove the pawl may be caused by a burr on the pawl. In this case, remove the clutch from the frame as covered in 3.006 and smooth the surface of the pawl with the FT10 oil stone. Remount the clutch on the frame as covered in 3.007.

3.16 ***Pawl Clearance*** (Reqt 2.16)

3.17 ***Pawl Engagement*** (Reqt 2.17)

Checking Pawl Clearance

(1) To check the pawl clearance, raise the brush rod manually. Hold the rod to prevent it from dropping and manually raise the down drive armature. Apply just sufficient pressure to the armature to restore the rack under power and make sure that the pawl does not snag or touch the rack as the brush rod restores to normal.

Checking Pawl Engagement

(2) To check the pawl engagement, place the 80B gauge between the armature and the backstop. Clamp the gauge in this position with the thumb and index finger, placing the index finger on the backstop and the thumb on the armature as shown in Fig. 19.

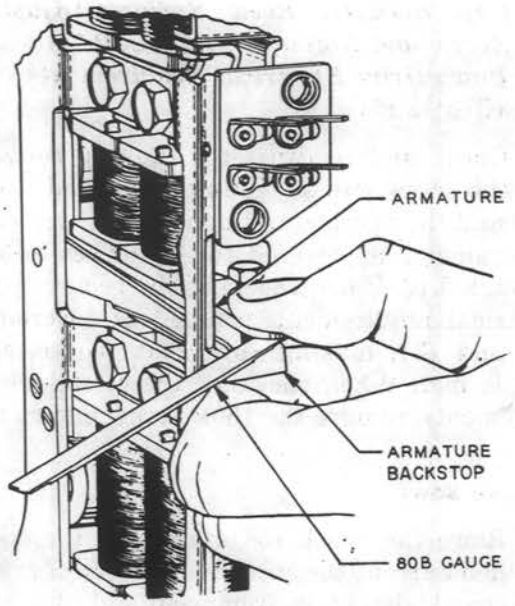

Fig. 19 – Method of Holding Gauge to Check Pawl Engagement

(3) By means of the test set, operate the up drive magnet sufficiently to raise the rack several terminals and then allow the up drive to release. Continue this throughout the length of the rack, checking that the elevator rod does not drop back as the clutch is released.

Readjusting for Pawl Clearance and Pawl Engagement

(4) Adjust the pawl operating arm in the desired direction very slightly with the 273 adjuster as shown in Fig. 20.

(5) In readjusting for these requirements, make an effort to keep the pawl as close as possible to the rack. To insure the best clutch operation and least pawl wear, make the pawl shoulders set against the face of the rack taking care, however, that the pawl clearance requirement is still met.

(6) If difficulty is experienced in adjusting the pawl to meet these requirements, recheck requirement 2.13. If the unoperated core gap is near the minimum limit, readjust the gap as near the maximum limit as possible. By so doing the maximum pawl engagement can be obtained which, in turn, means a wider range for adjusting the pawl to meet both requirements.

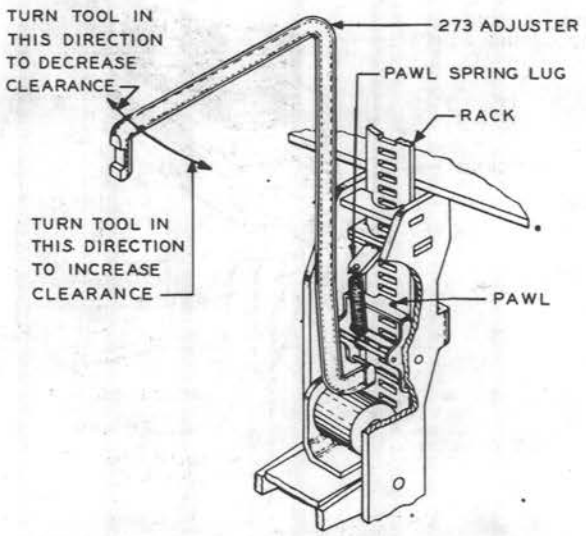

Fig. 20 – Method of Adjusting Pawl Operating Arm

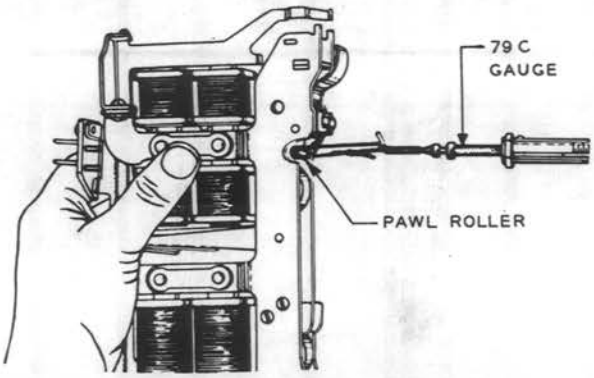

Fig. 21 – Method of Measuring Tension of Pawl Roller Against Pawl Operating Arm

3.18 ***Pressure of Pawl Roller Against Pawl Operating Arm*** (Reqt 2.18)

(1) To check the pressure of the pawl roller against the pawl operating arm, remove the clutch from the frame as covered in 3.006.

(2) Loop a piece of the R-1313 fish line over the roller and attach the 79C gauge to the twine as shown in Fig. 21. Measure the tension required to barely pull the pawl roller away from the pawl operating arm.

(3) Adjust the pawl spring lug as required with the 379A adjuster. Then remount the clutch on the frame as covered in 3.007.