CLUTCHES - HELICAL SPRING TYPE

AND ASSOCIATED RACKS

1. GENERAL

1.01 This section covers helical spring type clutches (Nos. 1-A, 1-B, 2-A, 3-A and 3-B, and 4, 5, 6 and 7 types) and associated racks and replaces Section A448.002, Issue 1-B.

1.02 Reference shall be made to Section A400.001 covering General Requirements and Definitions for additional information necessary for the proper application of the requirements listed herein.

1.03 Part 1, "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department handbook.

1.04 Requirements are marked with an asterisk (*) when to check for them would necessitate the 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.

1.05 Fully operate means that with its magnet electrically energized on the specified operating current each armature of the clutch assumes a position so that:

(a) Up-Drive The armature spring is extended and the armature is touching the front stop.

(b) Down-Drive The armature spring is extended and the non-freezing discs on the armature further from the fulcrum are touching the associated magnet core.

(c) Trip Magnet The non-freezing disc on the armature further from the fulcrum touches its associated magnet core.

1.06 Operate and remove pawl means that the pawl is disengaged from the rack. The adjusting screw may or may not be away from the roller arm.

1.07 Non-operate means that the armature may be moved, but that no gap shall exist between the adjusting screw and the roller arm.

1.08 Before checking or readjusting a clutch or a rack, the associated circuit shall be made busy.

1.09 In making checks or readjustments on sender selector type line finders where it is necessary to raise and keep the brush rod off normal, the circuit drawing should be consulted for information as to the necessary relays which should be blocked to prevent circuit reactions, and the down-drive armature from operating.

1.10 After checking or readjusting a clutch where the No. 35-C test set was used or where it was necessary to disturb the wiring to the clutches, make a check of the terminal block wiring for loose connections or broken wires and correct as necessary.

1.11 Terminal Designations - Figs. 1, 2 and 3 - The terminal designations of 1, 2 and 3 type clutches are shown in the accompanying figures. On 4, 5, 6 and 7 type clutches, the terminal designations appear on the terminal block.

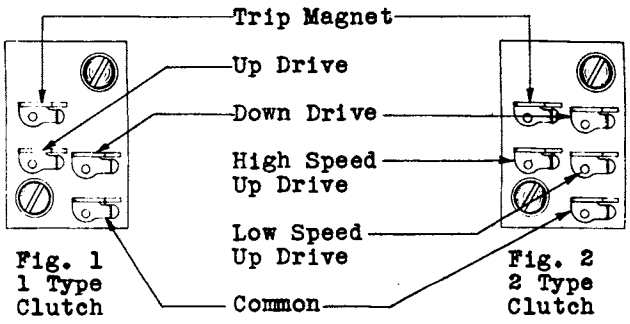

Fig. 1
1 Type
Clutch

Fig. 2
2 Type
Clutch

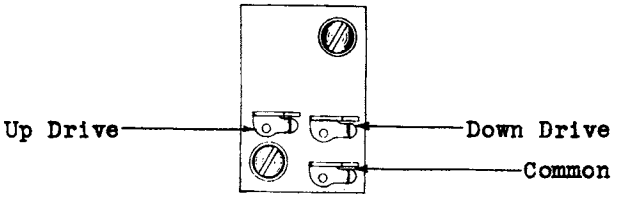

Fig. 3
3 Type
Clutch

1.12 Unless otherwise specified, all requirements must be met with the brush rod attached to the rack.

1.13 Unless otherwise specified, all clutch requirements shall be met and all clutch adjustments shall be made with the cork rolls revolving.

2. REQUIREMENTS

Rack Requirements (2.01 to 2.04 Incl.)

2.01 Rack Tongue Tension - Fig. 4 (A) - The rack tongue shall have sufficient tension to hold it against the rack coupling pin. Gauge by feel.

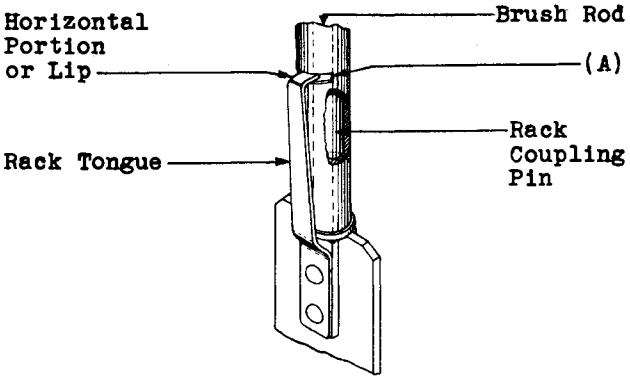

Fig. 4

2.02 Bow of Rack - Fig. 5 (A) - The rack shall be sufficiently straight so as to cause no apparent slipping of the clutch. If there is any question as to whether or not a rack is bowed to such an extent as to cause a noticeable slipping it may be checked to the following limits: for line finder racks, max. 1/4" in entire length, for all others max. 5/16" in entire length. Gauge by eye.

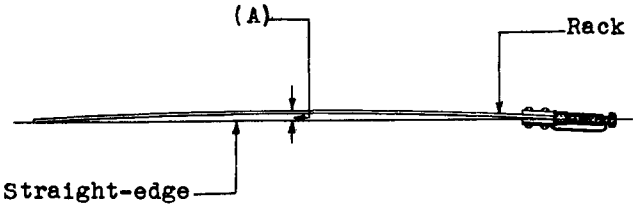

Fig. 5

2.03 Cutting of Rack - Fig. 6 (A) - There shall be no tendency for the rack to cut on the earlier type clutch guide plates. Smooth, bright edges on the rack due to normal wear shall not be considered as an indication of cutting. Gauge by eye.

2.04 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 with the normal number of brushes tripped. Gauge by eye.

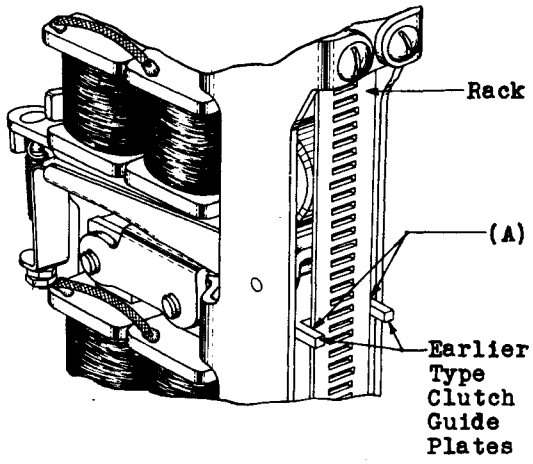

Fig. 6

Clutch Requirements - General (2.05 and 2.06)

2.05 Clutch Location

(a) Clearance There shall be a clearance between adjacent clutches. Gauge by eye.

(b) Position - Fig. 7 (A) - The clutch shall fit snugly in a vertical direction against the top locating plate.
Test - In no case shall the clearance on the side nearer the locating plate be more than .010".
Readjust - If one side of the clutch is snug, it is satisfactory.
Gauge by eye.

*(c) Alignment The vertical alignment of the clutch shall be such that, with the rack uncoupled from the brush rod, 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" away from the centerline of the brush rod. Gauge by eye.

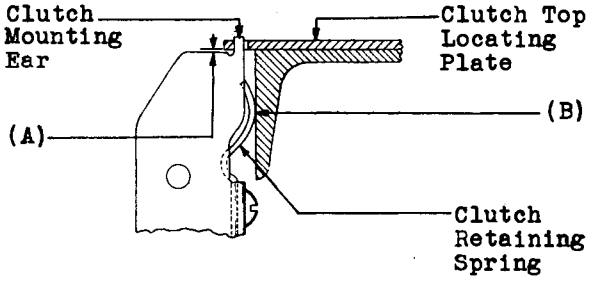

Fig. 7

2.06 Clutch Retaining Spring Tension - Fig. 7 (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 feel.

Trip Magnet Requirements (2.07 to 2.11 Incl.)

2.07 Clearance Between Bent Portion of Trip Armature and Magnet Core - Fig. 8 (A) - There shall be a clearance of
Min. .028"
Max. .052"
between the bent portion of the trip armature and the magnet core with the armature in the operated position. Use the No. 81 gauge.

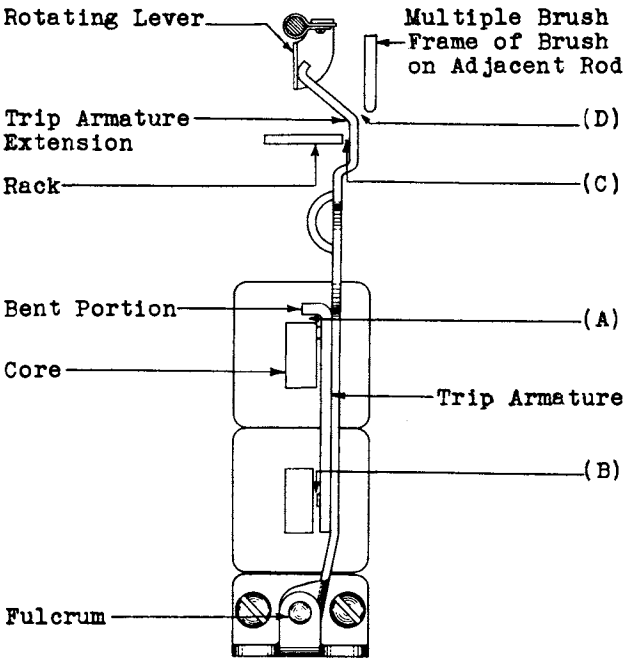

Fig. 8

2.08 Clearance Between Non-Freezing Disc on Trip Armature and Core Nearer Fulcrum - Fig. 8 (B) - With the armature fully operated the clearance between the non-freezing disc on the trip armature and the core nearer the fulcrum shall be
Max. .010"
Gauge by eye.

2.09 Clearance Between Trip Armature Extension and Rack - Fig. 8 (C) - With the trip armature extension fully operated there shall be a reliable clearance between the trip armature extension and the rack for all positions of the rack. Gauge by eye.

2.10 Clearance Between Trip Armature Extension and Multiple Brush Frame

(a) Fig. 8 (D) - With the trip armature in the normal position, the trip armature extension shall clear the frame of the multiple brush to the right of it. Gauge by eye.

(b) With the trip magnet fully operated, the trip armature extension shall clear the frame of the multiple brush directly above it. Gauge by eye.

2.11 Trip Magnet Operate The trip armature shall fully operate and operate the trip rod when the magnet is energized with a current of .200 amp. or less. Where two translator clutch trip magnets are wired in parallel, the trip armature shall operate on a current of .400 amp. or less.

High and Low Speed Up Drive Requirements (2.12 to 2.17 Incl.)

2.12 Unoperated Core Gap - Fig. 9 (A) - When the armature is in its normal position the gap between the top of the non-freezing disc on the armature further from the fulcrum and the core of the corresponding coil shall be
Min. .110"
Max. .120"
Use the No. 84-B gauge.

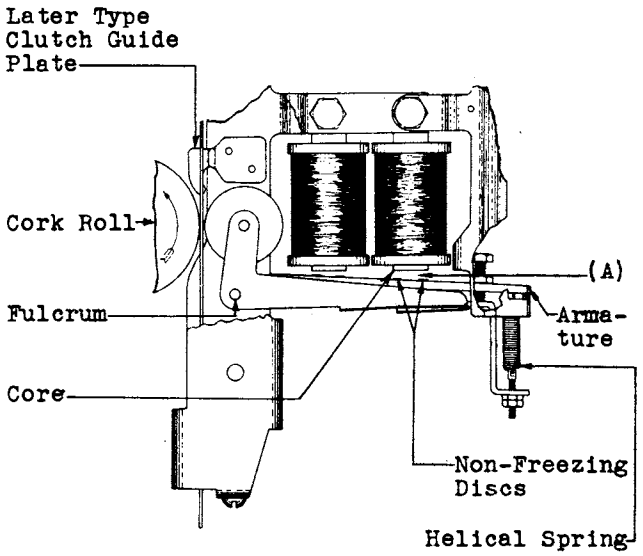

Fig. 9 - Armature Normal

2.13 Operated Core Gap - Fig. 10 (A) - With the armature fully operated, the gap between the armature and core of the magnet further from the fulcrum measured at a point between the two non-freezing discs on the armature shall be
Min. .016"
Max. .024"
Use the No. 82-B gauge.

2.14 Gap Between Adjusting Screw and Roller Arm - Fig. 10 (B) - With the clutch roller and the cork roll at the low spot and with the up drive magnet fully operated, the gap between the adjusting screw and the roller arm shall be:
Test - Min. .010"
Readjust - Min. .015"
Use the No. 80-B gauge.

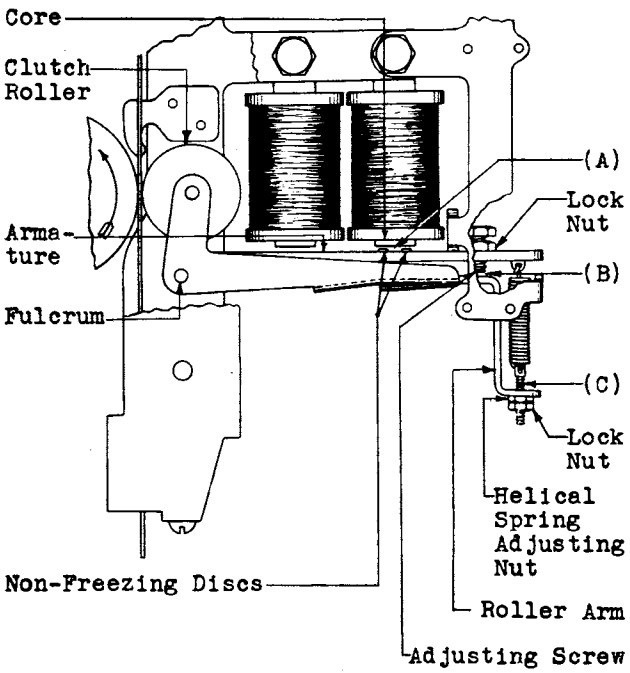

Fig. 10 - Armature Fully Operated

2.15 Operate and Non-operate With the clutch roller at the high spot and with the magnet energized and deenergized at the rate of approximately three times a second for not less than four seconds

(a) The clutch shall fully operate at every position of the cork roll and clutch roller on a current of:
Test - Max. .320 amp.
Readjust - Max. .300 amp.

(b) The clutch shall non-operate in at least one position of the cork roll and clutch roller on a current of:
Test - Min. .260 amp.
Readjust - Min. .280 amp.

(c) No clutch on the same side of the frame other than the one under test shall be operated when checking for requirements (a) and (b).

2.16 Helical Spring Tension - Fig. 10 (B) - With the armature in the normal position, and with the weights specified below applied to the roller arm at a point just behind the helical spring adjusting stud; the gap, if any, between the adjusting screw and the roller arm shall be max. .015".

(a) For translator and linefinder clutches:
Test - Min. 1500 grams
Readjust - Min. 1600 grams

(b) For all other clutches:
Test - Min. 1300 grams
Readjust - Min. 1350 grams

Use the 80-B and 93-B gauges.

2.17 Position of Helical Spring Adjusting Stud - Fig. 10 (C) - (This applies at turnover only) After all adjustments have been made, there shall be at least one thread showing above the roller arm to provide for further tensioning of the spring. Gauge by eye.

Down Drive Requirements (2.18 to 2.26 Incl.)

2.18 Unoperated Core Gap - Fig. 11 (A) - When the armature is in its normal position, the gap between the top of the non-freezing disc on the armature farthest from the fulcrum and the core of the corresponding coil shall be
Min. .080"
Max. .100"
Use the No. 83-B gauge.

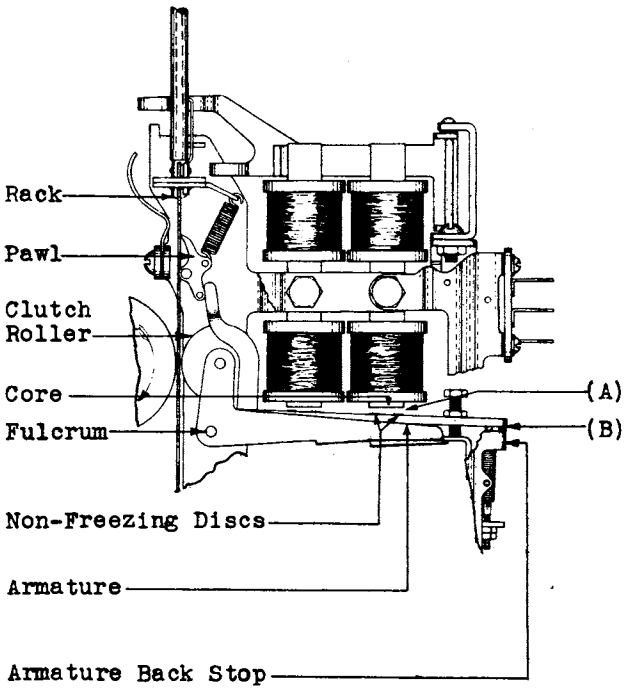

Fig. 11 - Armature Normal

2.19 Clearance Between Front Stop and Armature - Fig. 12 (A) - The front armature stop shall clear the armature when it is fully operated. This requirement applies to 1, 2, 3, 4 and 6 type clutches only, since there are no front armature stops on 5 and 7 type clutches.

2.20 Gap Between Adjusting Screw and Roller Arm - Fig. 12 (B) - With the clutch roller and the cork roll at the low spot and with the down drive magnet fully operated, the gap between the adjusting screw and the roller arm shall be:

Test - Min. .015", max. .035"
Readjust - Min. .020", max. .030"
Use the No. 80-B gauge.

2.21 Operate and Non-operate With the magnet energized and deenergized at the rate of approximately two times per second, the clutch shall fully operate for at least one position of the clutch roller, operate and remove the pawl from the rack for any position of the clutch roller and non-operate for any position of the clutch roller on the following current requirements. No clutch on the same side of the frame other than the one under test shall be operated when checking this requirement.

	Nos. 1-A, 2-A, 4-A and 5-A	Nos. 1-B, 3-A, 3-B, 4-B, 6-A, 6-B, 7-A and 7-B
Fully Operate	Max. .200 amp.	Max. .255 amp.
Operate and Remove Pawl	Max. .170 amp.	Max. .215 amp.
Non-operate	Min. .125 amp.	Min. .165 amp.

2.22 Pawl Clearance - Fig. 12 (C) - With the clutch roller touching the rack and the rack touching the cork roll with just sufficient pressure to prevent the rack from slipping or dropping, the pawl shall not touch the rack in any vertical position the rack may assume. Gauge by feel.

2.23 Pawl Engagement - Fig. 11 (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 .020" gauge is placed between the back stop and armature. Use the No. 80-B gauge.

*2.24 Pressure of Pawl Roller Against Pawl Operating Arm - Fig. 12 (D) - This pressure shall be
Min. 55 grams
Max. 100 grams
Use the No. 79-C gauge.

2.25 Position of Retractile Spring Adjusting Stud - Fig. 12 (E) - (This applies at turnover only.) After all adjustments have been made, there shall be at least one thread showing above the roller arm to provide for further tensioning of the spring. Gauge by eye.

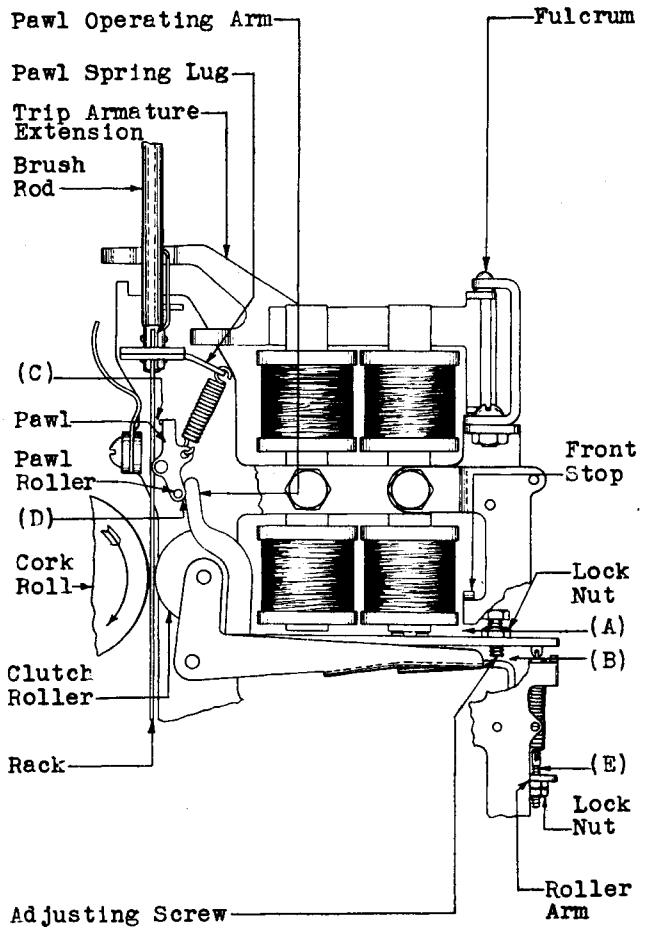

Fig. 12 - Armature Fully Operated

REASONS FOR REISSUE - CHANGES IN REQUIREMENTS

1. To add a requirement covering the vertical alignment of the clutch. (Previously covered in Part 3 only) (2.05 (c)).

2. To correct the down drive "Operate and Non-Operate" requirement current values. (Previously covered by Addendum to Section A448.002, Issue 1-B) (2.21).

3. To make the requirement covering "Pressure of Pawl Roller Against Pawl Operating Arm" an asterisk (*) requirement. (Previously covered by Addendum to Section A448.002, Issue 1-B) (2.24).

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges, Materials and Test Apparatus

Code No.	Description
Tools	
246	Wrench 1/2" Sq. Open-End Flat
273	Adjuster
305	Wrench - 7/16" Hex. Socket-Offset
310 (2 required)	Wrench 9/32" Hex. Open-Double-End Offset
325-B	Adjuster
326-B	Adjuster
335	Front Stop Lug Adjuster
379-A	Driving Spring Lug and Interrupter Back Stop Adjuster
406-B	Rack Holder
KS-6015	Duck-bill Pliers
KS-6367	Wrench - 7/16" and 5/8" Hex. Open Double-end Flat
R-2166	Bracket and Finger
-	Spring Clothespin
-	Bell System Double-grip Screw-driver per A.T.& T. Co. Drawing 46-X-201
-	Bell System 3-1/2" Cabinet Screw-driver per A.T.& T. Co. Drawing 46-X-40
-	Bell System Regular Screw-driver 4" per A.T.& T.Co. Drawing 46-X-34
-	Bell System P-Long Nose Pliers 6-1/2" per A.T.& T. Co. Drawing 46-X-56
-	Bell System Diagonal Pliers 5" per Specification No. 6136-N
Gauges	
74-D	Thickness Gauge Nest
79-C	0-200 Gram Push-Pull Tension Gauge
80-B	.010"-.020"-.030" and .015"-.035" Double-end Thickness Gauge
81	.028" and .052" Double-step Thickness Gauge
82-B	.016" and .024" Double-end Thickness Gauge
83-B	.080" and .100" Double-end Thickness Gauge
84-B	.110" and .120" Double-end Thickness Gauge
93-B	Armature Spring Test Gauge
R-78739	Dial Indicator Measuring Gauge
Materials	
KS-2423	Cloth
KS-6815	C.P. Carbon Tetrachloride
-	Emery Cloth No. 00
-	Wedge
Test Apparatus	
35-C	Test Set
#P2P (or the replaced 804)	Cord
##W2W	Cord (with two No. 360 tools and two No. 365 tools attached)

This cord is used only when the No. 35-C test set is connected in accordance with 3.002, M-2 and M-3.

This cord is used only when the No. 35-C test set is connected in accordance with 3.002, M-4.

3.002 The No. 35-C test set when used for checking the adjustment of clutches shall be set up as follows:

M-1 Consult paragraph 1.11 and determine the location of the common terminal and consult the circuit drawing to determine whether or not this terminal has battery or ground on it.

M-2 Test Set Connections When Either Battery or Ground is Supplied to the Common Terminal Set all keys on the test set normal and slide all the rheostat riders as far as possible to the right. Connect battery and ground to the box either by a P2P cord in the "TEST BATT. & GRD." jack or by test leads to the "BATT." and "GRD." terminals. Where test leads are used it is only necessary to use one lead connecting battery or ground to the "BATT." or "GRD." terminal depend-

3.002 (Continued)

ing on whether or not there is ground or battery on the common terminal. If the common terminal on the clutch has battery, operate the "BATT. & GRD. C.O." and the "REV." keys and throw the "G" knife switch so as to engage with the jaw designated "GRD.". If the common terminal has ground, the keys and switch are left normal.

M-3 Connect the "T" terminal on the test set to the magnet terminals as required.

Caution The "BATT. & GRD. C.O." and the "REV." keys, the "G" knife switch and the rheostat riders must be set as prescribed in M-2 before this lead is connected so as to remove the possibility of operating a fuse.

M-4 Test Set Connections Used When Battery Only is Supplied to the Clutch
Set all keys and rheostat riders as covered in M-2. Insert the No. 110 plug of a W2W cord into the "TEST T & R" jack of the test set. Operate the "BATT. & GRD. C.O." key. If the clutch is one which has terminals equipped to take a No. 360 socket type cord tip, connect the black No. 360-B cord tip to the proper clutch terminal and the white cord tip (equipped with a No. 365 suspender clip) to ground. If the clutch terminals are not equipped to take a No. 360 socket type cord tip, use another No. 365 suspender clip for clipping the black cord to the clutch terminal.

M-5 To obtain a given current value, operate the telegraph key No. 1, and adjust the rheostat riders until the milliammeter indicates the current value desired. Since the resistance of the magnet coils increases due to heating when the current is kept on continuously, shift the riders to compensate for this so as to keep the current at the specified value. In the case of up and down drive magnets, it is advisable except where otherwise specified to block the armature in the non-operated position by inserting a wedge as shown in Fig. 13 between the armature and the magnet core when obtaining the proper current flow value.

M-6 Where an additional current value is applied to a magnet, such as a "non-operate" value, use the No. 2 key in addition to No. 1 key. In the case of down drive magnets which have three values, throw the three knife switches designated "3" so as to engage the jaws designated "0". Then set up the third current value with the No. 3 telegraph key.

M-7 In cases where the specified amount of current cannot be obtained, it may be an indication that all the resistance has not been cut out of the test set. To obtain a higher value of current in such instances, use several dry cells in series with the office battery lead which is connected to the test set.

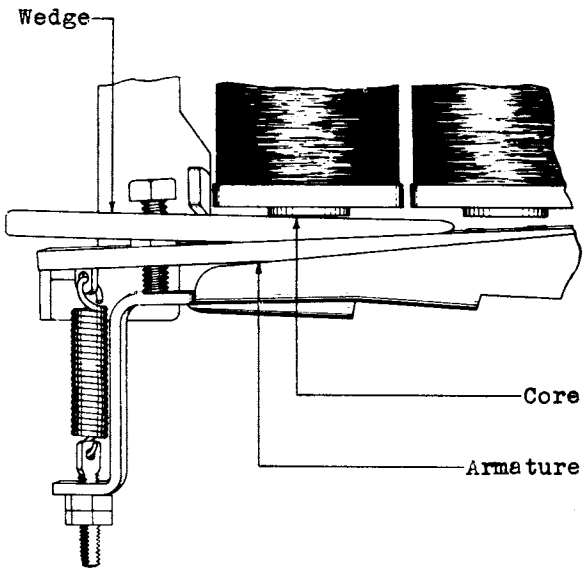

Fig. 13 - Method of Inserting Wedge

Adjusting Procedures for Racks (3.01 to 3.03 Incl.)

3.01 Rack Tongue Tension (Rq.2.01)

M-1 To check whether or not the rack tongue is tensioned against the rack coupling pin, place the index finger in back of the brush rod and press on the rack tongue with the thumb. If the tongue moves with respect to the brush rod it indicates that it is not tensioned against the rack coupling pin. Before readjusting the tension of the tongue it will be necessary to remove the rack.

M-2 To remove a rack from its brush rod, insert the blade of the 3-1/2" cabinet screw-driver between the rack tongue and brush rod as shown in Fig. 14 and turn the screw-driver just enough to disengage the tongue from the brush rod slot. Then with the other hand, lift the brush rod away from the rack.

Caution Insert the blade of the screw-driver just below the horizontal portion or lip of the rack tongue so as to affect the tension of the rack tongue as little as possible.

3.01 (Continued)

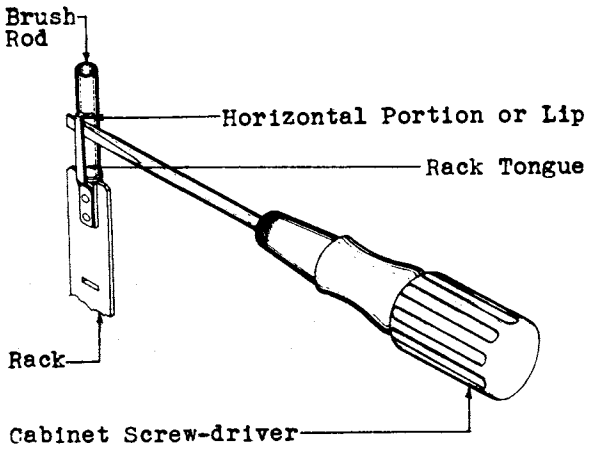

Fig. 14 - Method of Removing Rack from Brush Rod

M-3 The rod now has no means of support so it will be necessary to hold it in place by clamping it with a spring clothespin just above a bearing plate as shown in Fig. 15.

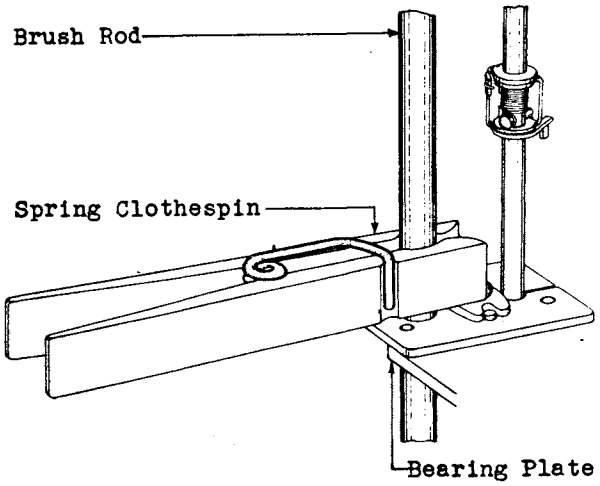

Fig. 15 - Method of Placing Spring Clothespin

M-4 Apply one jaw of the long nose pliers to the flat surface of the tongue just above the offset in the tongue and the other to the back of the rack coupling pin as shown in Fig. 16. Compress a little at a time until the desired tension is obtained. Exercise care in performing the above operation only to tension and not to bend the tongue as bending may cause the bottom of the brush rod to bind on it.

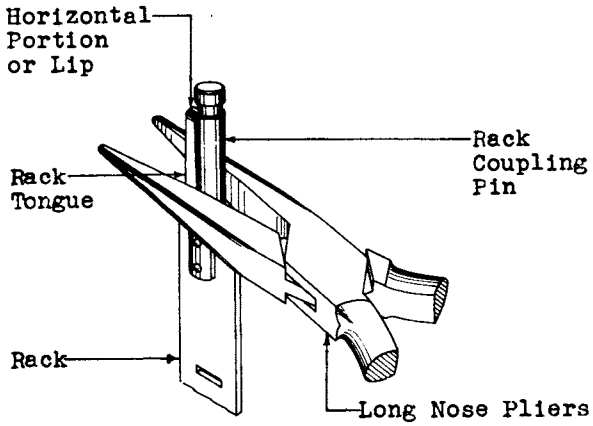

Fig. 16 - Method of Adjusting Rack Tongue

M-5 If, after performing the above operation, it is found that the rack tongue has been bent to such an extent that the brush rod binds on it, straighten the tongue with the KS-6015 duck-bill pliers, exercising care not to remove the tension in the rack tongue.

M-6 In replacing the rack, insert the blade of the 3-1/2" cabinet screwdriver between the tongue and rack coupling pin just below its horizontal portion or lip and force out the tongue so as to permit the brush rod to slide down over the head of the rack coupling pin.

M-7 Check to see that the tongue has not lost its adjustment while being replaced. If readjustment is necessary repeat the above operations giving the tongue more tension than before.

M-8 Check for rack tongue position and rack coupling pin engagement in accordance with the section covering the type of elevator apparatus involved.

3.02 Bow of Rack (Rq.2.02)

M-1 If the rack is bowed to such an extent that it requires straightening attempt to straight it by bending it as a whole and not in sections, thereby preventing putting a kink in it. If it cannot be straightened in this manner it will be permissible to bend the rack in sections exercising extreme care not to produce kinks in it.

3.03 Cutting of Rack (Rq.2.03)

M-1 Whenever the side of a rack is worn so as to present a flat surface, it is an indication that the rack is being cut on the clutch guides. Smooth, bright edges on the rack due to normal wear should not be considered as an indication of cutting.

M-2 This condition is usually caused by improper alignment of the clutch with respect to its associated brush rod. Check for alignment, and adjust for it, if necessary, in accordance with procedure 3.05.

3.04 Slipping of Rack (Rq.2.04)

M-1 If the rack slips it may be due to a binding brush rod. Check for this in accordance with the requirements listed in the section for the particular kind of elevator apparatus involved.

M-2 If the rack still slips, it may be due to a bowed rack or oil on the cork roll or rack.

M-3 If the rack is bowed, straighten it in accordance with precedure 3.02. If the rack is dirty or has oil on it remove it and clean it with a KS-2423 cloth moistened with C.P. carbon tetrachloride.

M-4 Consult the section covering friction roll drives for cork roll cleaning procedures.

M-5 Replace the rack and check the requirement again.

Clutch Adjusting Procedures - General (3.05 and 3.06)

3.05 Clutch Location (Rq.2.05)
3.06 Clutch Retaining Spring Tension (Rq.2.06)

Note It may be desirable to stop the motor driving the cork rolls before performing M-5, M-6 and M-7 directly below.

M-1 Clearance If it is noted that there is no clearance between adjacent clutches or that the clutch is not in its correct alignment or position, loosen the clutch mounting screw with the double-grip screw-driver and shift the clutch until the clearance requirement is met and at the same time check the alignment of the clutch as covered in M-2 and M-3. If requirement 2.05 (a) cannot be met by this method, it is probably due to misalignment of either or both of the adjacent clutches.

M-2 Alignment Uncouple the rack from the brush rod as covered in procedure 3.01 and raise the brush rod to a point near the upper limit of its travel and hold it in this position by means of a spring clothespin clamped around the rod above the bearing plate, preferably between banks No. 2 and No. 3.

M-3 Raise the rack until it is just below the bottom of the brush rod and move the rack from side to side as permitted by the play in the guides and note where the mean of the swing of the rack comes with respect to the center line of the brush rod. If the mean of the swing does not come within the limits given in requirement 2.05 (c) loosen the clutch mounting screw with the double-grip screwdriver and shift the bottom of the clutch slightly to favor the condition and tighten the mounting screw sufficiently to hold the clutch in place. Then check for alignment as described above and, if necessary again shift the bottom of the clutch. Repeat these operations until the correct alignment has been obtained. Then securely retighten the clutch mounting screw and check that requirements 2.05 and 2.06 are met. Recheck the vertical setting of the commutator brush and that of the multiple brushes on all banks. Also recheck the horizontal setting of the multiple brushes on the No. 0 and No. 1 banks. Make these rechecks in accordance with the sections covering commutators and commutator brushes and the type of elevator apparatus involved.

M-4 Clutch Retaining Spring Tension If it is noted that the tension of the retaining spring is not sufficient to hold at least one of the mounting ears firmly against the front of the slot in the clutch locating plate, remove the clutch as follows:

M-5 Loosen the mounting screw with the double-grip screw-driver. Lower the clutch until the two ears are clear of the slots in the clutch locating plate and remove the clutch. When the associated trip rod is equipped with a new style rotating lever, the trip armature extension may be forced upward by coming in contact with the horizontal portion of the rotating lever when the clutch is being removed. Make sure that the rotating lever is not moved downward from its proper position.

M-6 Now determine if the two retaining spring screws are tight. If they are tight, adjust the retaining spring, bend-

3.05-3.06 (Continued)

ing it away from the frame of the clutch with the 4" regular screw-driver.

M-7 Position Mount the clutch by lowering it so that the mounting screw slips in the slot in the bottom of the clutch and the top of the clutch is slightly lower than the top locating plate. Now push the top of the clutch in towards the channel until the ears are in far enough to slip into the holes in the top locating plate. It may be necessary, when the associated trip rod is equipped with a new style rotating lever, to raise the end of the trip armature extension upward so that it seats on the horizontal portion of the rotating lever, before pushing in on the clutch top. Push the clutch up into place and before tightening the mounting screw make sure that the clutch is aligned and located in accordance with M-1, M-2 and M-3 above.

Trip Magnet Adjusting Procedures (3.07 to 3.11, Incl.)

3.07 Clearance Between Bent Portion of Trip Armature and Magnet Core (Rq.2.07)
3.08 Clearance Between Non-Freezing Disc on Trip Armature and Core Nearer Fulcrum (Rq.2.08)

M-1 To check the clearance between the bent portion of the trip armature extension and the magnet core, and the clearance between the trip armature and the core nearer the fulcrum, hold the trip armature operated by manually squeezing the trip armature against the core of the magnet further from the fulcrum. With the trip armature in this position, attempt to insert the No. 81 gauge in the clearance between the bent portion of the trip armature extension and the magnet core and observe the clearance between the trip armature and the core nearer the fulcrum. If it is found that either one of these clearances is not within the limits specified, readjust as follows.

M-2 Determine whether the two trip armature bracket mounting screws can be loosened with the 4" regular screw-driver, while holding the nuts with the No. 310 wrench. It may be necessary, in some cases, to swing one end of the clutch guard rail away from the frame in order to fully expose the mounting screws. In this event, first remove the screw holding the clutch guard rail to the frame with the No. 246 wrench, holding the nut attached to the screw with the KS-6367 wrench, if necessary. If the frame is one on which the local cable to the clutch terminals is run directly beneath the guard rail, remove the screw at the end of the rail away from that at which the cable form enters. Swing the rail outward until the mounting screws are fully exposed. Take care not to swing the rail so far as to cause the wires to break from the terminals. With the trip armature bracket mounting screws loosened, shift the bracket so that the .028" step of the No. 81 gauge will enter and the .052" step will not enter between the bent portion of the armature and the pole-piece and at the same time note that the non-freezing disc on the trip armature clears the core nearer the fulcrum and that the clearance does not exceed the maximum limit. If it does, attempt to decrease it by shifting the bracket. If the required clearance cannot be obtained in this manner it will be necessary to adjust the armature by applying the No. 325-B adjuster to the armature near the fulcrum. Locate the bracket so that both requirements are met and tighten the bracket mounting screws. After the screws have been tightened see that the adjustment has not been destroyed in the tightening operation.

M-3 Check the requirements for trip armature extension clearance, 2.09 and 2.10. Also check for the proper engagement of the trip rod rotating lever and trip finger clearances on all brushes in accordance with the section covering the particular type of elevator apparatus involved.

M-4 Replace the clutch guard rail, if it has been moved.

3.09 Clearance Between Trip Armature Extension and Rack (Rq.2.09)
3.10 Clearance Between Trip Armature Extension and Multiple Brush Frame (Rq.2.10)

M-1 To check for the clearance between the trip armature extension and the rack, fully operate the trip armature. Raise the brush rod approximately ten notches from its normal position and with the play of the rack in its guides taken up toward the trip armature extension check the clearance between the rack and the trip armature extension. Make this check at several points in the travel of the brush rod.

M-2 With the brush rod and trip rod in the normal position, check that the trip armature extension clears the trip finger of the adjacent multiple brush to the right of it. Fully operate the trip magnet and check for the clearance between the trip armature extension and the multiple brush frame directly above it.

M-3 To adjust for these clearances, bend the trip armature extension with a No. 325-B adjuster while holding the extension with a No. 326-B adjuster as shown in Fig. 17. As this may change the angular travel of the trip rod, recheck the associated trip fingers in accordance with the section covering the particular type of elevator apparatus involved.

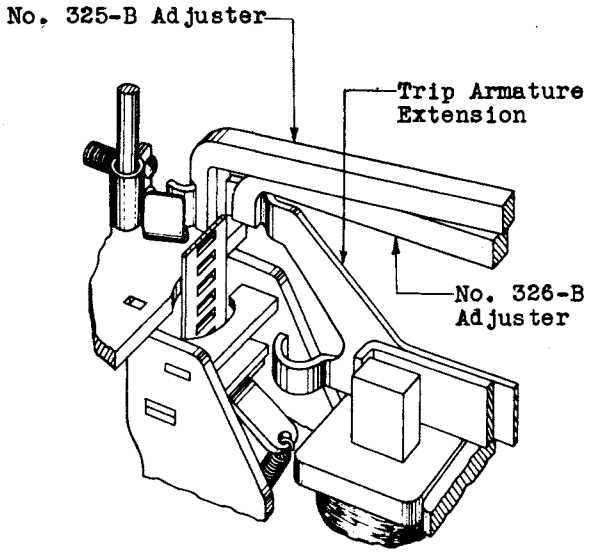

Fig. 17 - Method of Adjusting Trip Armature Extension

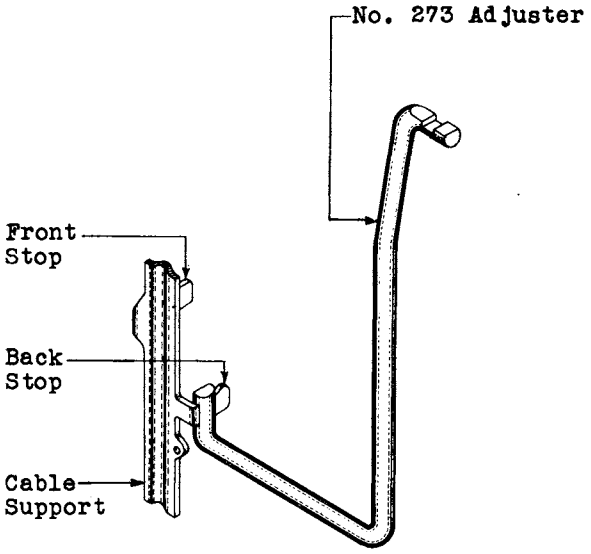

Fig. 18 - Method of Adjusting Back Stop

3.11 Trip Magnet Operate (Rq.2.11)

M-1 If the armature will not operate on the specified current check the trip rod bearings for binding at all cross members and at the top clutch locating plate. If it binds in the cross member bearings correct by loosening and relocating the bearing halves in accordance with the section covering the type of elevator apparatus involved. If it binds at the top clutch locating plate clean the bearing in accordance with the section covering the type of elevator apparatus involved.

M-2 After adjusting the bearing halves make sure that the associated brush rod does not bind at any cross member. Also make sure that the trip rod retractile spring is tensioned and that the trip armature extension is adjusted in accordance with the section covering the type of elevator apparatus involved.

High and Low Speed Up Drive Adjusting Procedures (3.12 to 3.17, Incl.)

3.12 Unoperated Core Gap (Rq.2.12)

M-1 If the .110" step of the No. 84-B gauge does not enter or if the .120" step of the gauge does enter the gap, adjust the back stop by bending it up or down as required using the notch in the shorter arm of the No. 273 adjuster as shown in Fig. 18.

3.13 Operated Core Gap (Rq.2.13)
3.14 Gap Between Adjusting Screw and Roller Arm (Rq.2.14)
3.15 Operate and Non-operate (Rq.2.15)
3.16 Helical Spring Tension (Rq.2.16)

M-1 Two essentials necessary for satisfactory clutch operation are: First, that there is always a gap between the adjusting screw and the clutch roller arm; and second, that the spring tension is as high as possible and still consistent with the electrical requirements. If these conditions are not met, slipping of the rack and failure to drive the load properly will result. In order to insure that the first condition is met, the low spot of the clutch roller is made to contact with the rack and the minimum gap between the adjusting screw and the clutch roller arm is measured at all positions of rotation of the cork roll. In order to insure that the second condition is met the operate requirements must be met with the high spot of the clutch roller making contact with the rack, which is the hardest operate condition for the clutch. It is therefore necessary that the low and high spots be located properly by means of the indicator gauge as covered in M-8 and M-15.

M-2 Operated Core Gap Raise the rack above the brush selection position and restrain it by means of the No. 406-B rack holder. Place the phosphor bronze spring of the rack holder between the

3.13-3.16 (Continued)

clutch sighting plate and the rack locating plate directly below it. Slide the tool forward, forcing the prong end in such a way that the top prong assumes a horizontal position on the clutch sighting plate. Then insert the top prong into the rack notch showing just above the sighting plate as shown in Fig. 19.

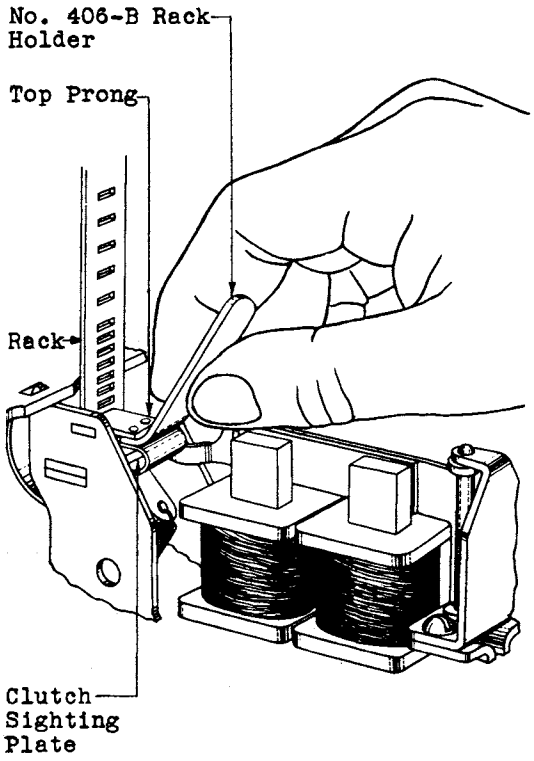

Fig. 19 - Method of Placing Rack Holder

M-3 Connect the proper leads of the test set to the up-drive magnet terminals so that a current of .300 ampere is applied to the magnet and close the locking key of the test set. If necessary raise the armature manually to bring it to the operated position. Should the helical spring tension be so great that the armature will not stay in the operated position, reduce this tension just enough to bring about the above condition by loosening the helical spring stud adjusting nut and lock nut with two No. 310 wrenches as shown in Fig. 20.

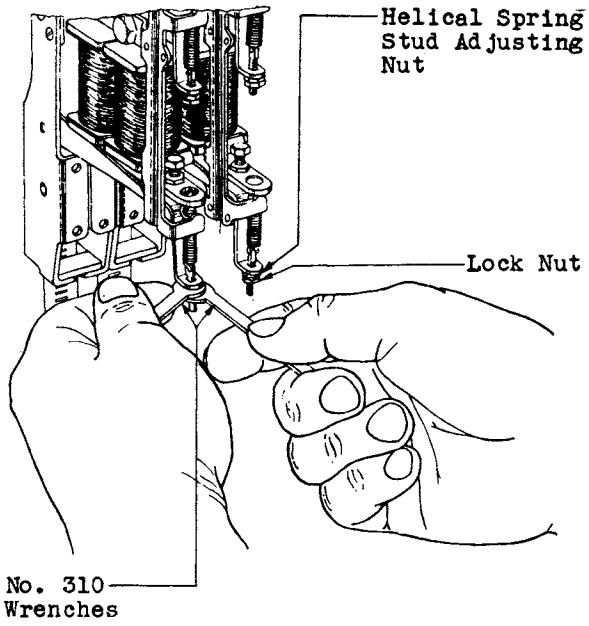

Fig. 20 - Method of Reducing Helical Spring Tension

M-4 With the armature in the operated position, check the operated core gap with the No. 82-B gauge as shown in Fig. 21. The .016" end of the gauge should be free and the .024" end of the gauge should be tight in the gap.

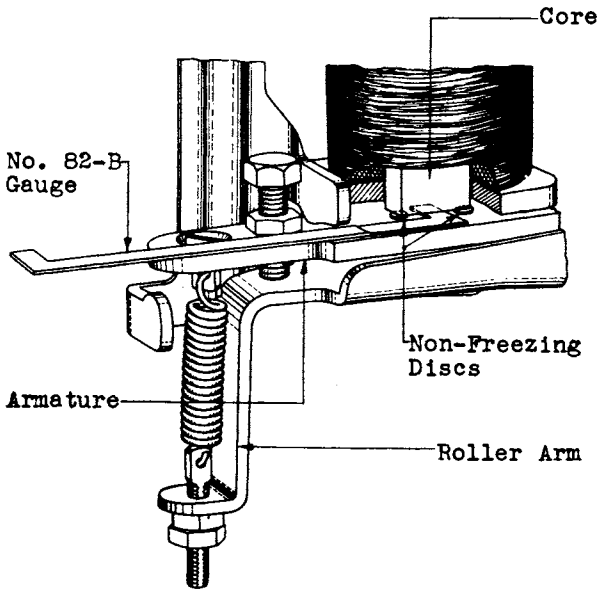

Fig. 21 - Method of Checking Operated Core Gap

3.13-3.16 (Continued)

M-5 Be sure that the gauge is not applied on top of the non-freezing disc. To insure this, place the gauge on top of the nearest non-freezing disc, and then energize the magnet and push the gauge away until it snaps off from the disc and the armature is felt or seen to move. Also work the gauge back and forth between the discs which will act as stops for the gauge.

M-6 To adjust for this requirement bend the front stop up or down as required. Use the notch in the shorter arm of the No. 273 adjuster for making this adjustment on Nos. 1, 2 and 3 type clutches in the same manner as adjusting the back stop as shown in Fig. 18, and the No. 335 adjuster for making the adjustment on Nos. 4, 5, 6 and 7 type clutches as shown in Fig. 22.

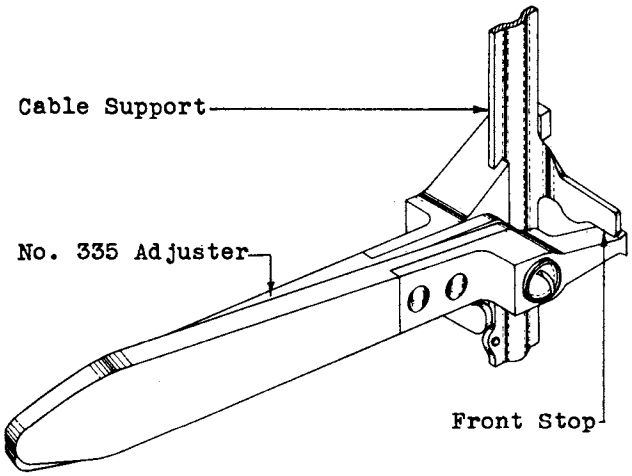

Fig. 22 - Method of Adjusting Front Stop

M-7 Release the locking key of the test set.

M-8 Gap Between Adjusting Screw and Roller Arm In order to adjust for this requirement it will be necessary to locate the low spot on the clutch roller as follows: Attach the R-2166 finger (Det. 2) to the R-78739 indicator gauge and attach this assembly to the cable support by means of the R-2166 bracket (Det. 1) so that it assumes the position shown in Fig. 23. Apply the bracket so that the jaws grasp the cable support upright to which the clutch wiring is attached at the point on the upright slightly above the bottom of the magnet. See that the larger jaw of the bracket grasps the upright on the wiring side so as to clear the wiring, and that the smaller jaw fits snugly over the rounded surface of the upright. Force the bracket down until the stop on the bracket engages the back stop preventing further downward movement. Make sure that the finger attached to the plunger of the indicator rests on the top of the armature.

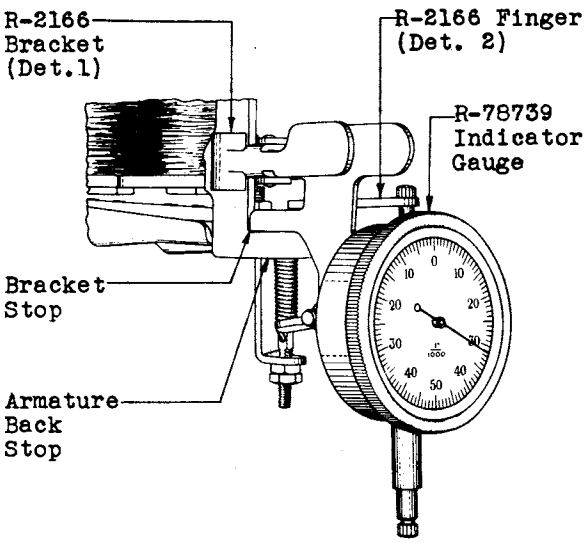

Fig. 23 - Position of Indicator Gauge

M-9 With the No. 406-B rack holder placed in the rack and the rack in the position outlined above in M-2 operate a different key in the test set from that used in obtaining the specified operate current as covered in M-3 and move the associated slider of the test set until a current of approximately .135 ampere is obtained. Close the locking key of the test set and do not release it until this adjustment is completed. The current of .135 ampere is sufficient to bring and hold the clutch roller in contact with the rack and the rack in contact with the cork roll.

M-10 Remove the rack holder from the rack and raise or lower the rack by hand approximately 1/2" at a time until the rack has traveled about 3-1/4", holding the rack in each position for at least one revolution of the cork roll and at the same time noting the travel of the indicator pointer. When the peak deflection in a clockwise direction has been reached, the low spot of the clutch roller has been approximately located. To determine this spot more accurately move the rack up and down slightly and hold it in each testing position for at least one revolution of the cork roll. With the low spot of the clutch roller finally located, insert the rack holder into the nearest rack slot, in order to hold the rack and clutch roller in this position.

3.13-3.16 (Continued)

M-11 Remove the indicator gauge.

M-12 With the clutch roller and rack located as in M-10, operate the clutch armature by applying the specified operate current to the magnet. Use the key in the test set employed under M-3 for this purpose and lock the key. If the clutch armature does not assume the fully operated position, raise it manually until it touches the front stop.

M-13 With the armature in this position, insert the .015" step of the No. 80-B gauge in the screw gap as shown in Fig. 24 and adjust the screw with the No. 310 wrenches in a manner similar to that shown in Fig. 20 so that the feeler gauge is free in all positions of rotation of the cork roll. The meeting of succeeding requirements will be facilitated by working close to the minimum limit.

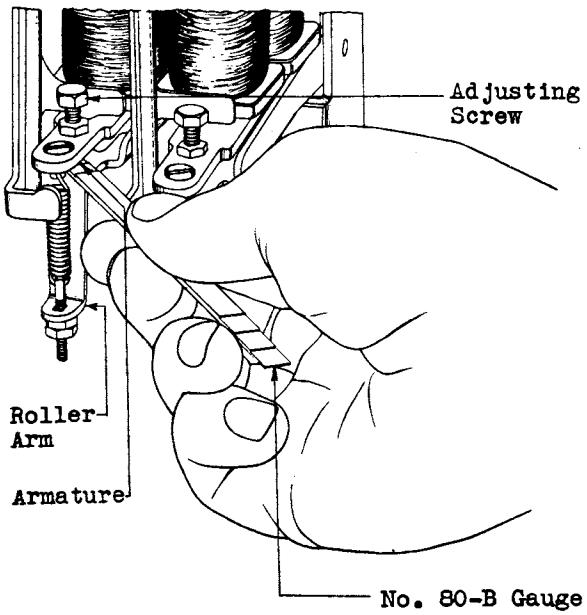

Fig. 24 - Method of Checking Screw Gap

M-14 Release the test set key controlling the operate current referred to in M-12. Do not release the key controlling the .135 ampere current referred to in M-9 or remove the rack holder until instructed in subsequent methods.

M-15 Operate and Non-operate In order to meet this requirement it will be necessary to locate the high spot on the clutch roller. To do this, proceed as outlined in M-8, M-9 and M-10, except that the word "counter-clockwise" shall be substituted for the word "clockwise".

M-16 Remove the indicator gauge, but do not release the key controlling the .135 ampere current until instructed in subsequent methods.

M-17 With the clutch roller and rack located as in M-15, use the key of the test set mentioned in M-12, and apply the specified operate current to the magnet at least six times to permit the armature and roller arm to take their natural positions. Then operate the test box key again, but this time it shall be operated approximately three times a second for not less than four seconds, causing the magnet to operate in several positions of the cork roll. If the armature does not operate in all positions, reduce the spring tension by adjusting the helical spring stud adjusting nut and lock nut with two No. 310 wrenches. Lower the tension just enough to insure that the clutch will operate on the specified value. Each time the position of the adjusting nut is changed, either up or down, eliminate the bind on the fulcrum by applying the operate current at least six times before checking for the operate requirement.

M-18 With the clutch roller and rack in the same position as above, apply the specified non-operate current to the clutch magnet and operate the test box key as in M-17. See that the clutch armature does not move sufficiently to extend the spring or open up a gap between the adjusting screw and the roller arm in at least one position. If the clutch does not meet this condition, increase the spring tension slightly but not enough to interfere with the meeting of the operate requirement.

M-19 When the helical spring has been adjusted to meet both operate and non-operate values, securely lock the helical spring stud adjusting nut.

M-20 After the adjusting nut is locked recheck M-17 and M-18, to make sure that in tightening the adjusting nut the operate and non-operate adjustment has not been lost. If it is found that this adjustment has been lost, relocate the adjusting nut and recheck M-17 and M-18 repeating this procedure until requirement 2.15 is met.

M-21 Check requirement 2.14 if the helical spring tension has been increased in meeting this requirement.

M-22 Helical Spring Tension To check for this requirement see that the speci-

3.13-3.16 (Continued)

fied weight of the No. 93-B gauge when suspended at the point just behind the centerline of the helical spring adjusting stud as shown in Fig. 25 will not free the .015" step of the No. 80-B gauge placed in the screw gap. Make this adjustment and check it with the armature in the non-operated position.

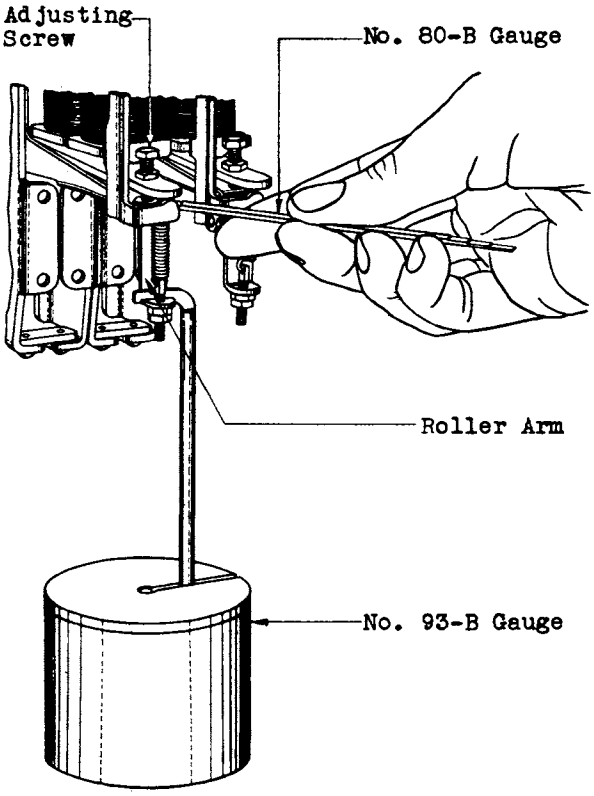

Fig. 25 - Method of Checking Helical Spring Tension Requirement

M-23 If this requirement is met, release the locking key of the test set to remove the current of .135 ampere from the winding. Also remove the rack holder and restore the elevator to normal.

M-24 If this requirement cannot be met, using the weights specified, reduce the screw gap and the operated core gap as close as possible to the minimum values.

M-25 If the operated core gap is readjusted in meeting this requirement, check requirement 2.14 and 2.15. If the screw gap alone is changed, check requirement 2.15.

M-26 If the helical spring tension requirement cannot be met, after refining those adjustments, note whether the spring has a copper finish on it. If it has not, replace the spring with a copper finished one in accordance with the section covering the piece part data and replacement procedures covering this apparatus, and adjust the clutch as covered in the preceding methods.

M-27 If the spring tension requirement still cannot be met, examine the clutch to determine whether it is possible to lower the rear magnet.

M-28 Remove the current of .135 ampere from the winding and the rack holder from the rack.

M-29 Lowering Rear Magnet Raise the brush rod as far as possible and support it by a spring clothespin.

M-30 Uncouple the rack from the brush rod, hold the rod with one hand and operate the down drive manually until the rack is low enough to clear the bottom of the rod.

M-31 Lift the rack out from behind the clutch.

M-32 Loosen the large screw at the bottom of the clutch with the double-grip screw-driver. Lower the clutch until the two projections at the top are clear of the holes in the clutch top locating plate. It is preferable to stop the drive while changing a clutch in order to avoid possible injury to the equipment.

M-33 Pull the top of the clutch away from the frame until it is clear of the plate, and then lift it up. The clutch should be clear.

M-34 It is not necessary to remove the wires but the clutch should be supported in such a way as to prevent the wires from being broken or the insulation from being frayed.

M-35 With the armature operated manually, check to see that there is a minimum clearance of .006" between the top surface of the non-freezing disc nearest the fulcrum and the associated magnet core using the .006" feeler of the No. 74-D gauge. If the clutch is of the later type which is not equipped with non-freezing discs at this point, check to see that a clearance of .010" exists between the armature and the magnet core nearer the fulcrum using the .010" feeler of the same gauge.

M-36 If the above clearance is greater than .006" or .010" depending on whether the armature of the clutch is or is not equipped with non-freezing discs opposite the rear magnet core, loosen the rear mounting clamping screw with the No.

3.13-3.16 (Continued)

305 wrench as shown in Fig. 26, and drop the rear magnet down until with the armature operated manually, the proper feeler gauge can just be inserted between the rear magnet core and the top of the non-freezing disc nearest the fulcrum, or the armature. Note that the face of the magnet core is parallel to the surface of the armature. Retighten the clamping screw, applying enough force to insure that the magnet will not be jarred out of position during service.

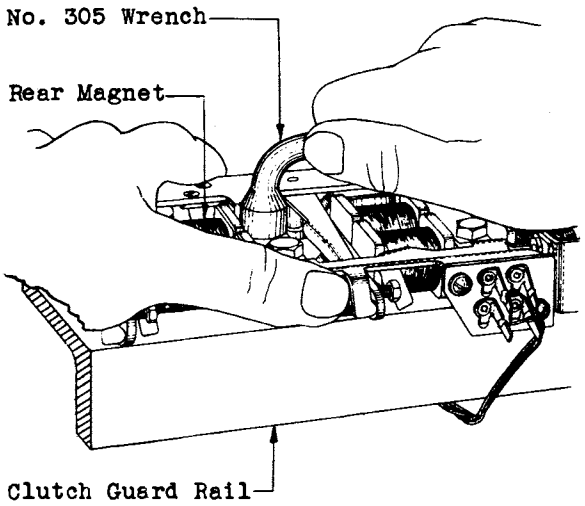

Fig. 26 - Method of Loosening Rear Magnet Clamping Screw

M-37 Raising Front Magnet If it is not possible to lower the rear magnet by following the above procedures, make an effort to raise the front magnet. Raise the front stop with the No. 273 adjuster if the clutch is of the 1, 2 or 3 type, or with the No. 335 adjuster if the clutch is of the 4, 5, 6 or 7 type, sufficiently to allow the armature to come up against the front magnet core. Loosen the front magnet clamping screw with the No. 305 wrench and raise the front magnet until the required minimum clearance exists between the armature and the magnet core nearer the fulcrum as covered in M-35. Adjust the front stop so that this clearance can be maintained and raise or lower the front magnet until the requirement covering operated core gap is just met. Note that the face of the magnet core is parallel to the surface of the armature. Retighten the clamping screw, applying enough force to insure that the magnet will not be jarred out of position during service.

M-38 Replace the clutch as covered in procedure 3.05, M-7.

M-39 Make a recheck of all adjustments to insure that they were not disturbed during the foregoing operation.

3.17 Position of Helical Spring Adjusting Stud (Up Drive) (Rq.2.17)
(No Procedure)

Down Drive Adjusting Procedures
(3.18 to 3.27, Incl.)

3.18 Unoperated Core Gap (Rq.2.18)

M-1 If the .080" step of the No. 83-B gauge does not enter or if the .100" step of the gauge does enter the gap, adjust the back stop up or down as required, using the notch in the shorter arm of the No. 273 adjuster as shown in Fig. 18.

3.19 Clearance Between Front Stop and Armature (Rq.2.19)

M-1 If the front armature stop does not entirely clear the armatures of the Nos. 1, 2 and 3 type clutches, adjust the front stop with the No. 273 adjuster as shown in Fig. 18 until it clears the armature in its operated position. If this clearance between the front armature stop and the armature is not present on the Nos. 4 and 6 type clutches make the adjustment with the No. 335 adjuster as shown in Fig. 22.

3.20 Gap Between Adjusting Screw and Roller Arm (Rq.2.20)
3.21 Operate and Non-Operate (Rq.2.21)

M-1 Gap Between Adjusting Screw and Roller Arm Locate the low spot on the clutch roller as covered in 3.14, M-8, M-9 and M-10.

M-2 Apply the maximum operate current to the magnet as specified in requirement 2.20. Use another key of the test set for this purpose and lock the key.

M-3 With the armature in the operated position insert the .020" step of the No. 80-B gauge in the screw gap and adjust the screw so that the .020" step is free in the gap for all positions of rotation of the cork roll and the .030" step of the gauge is felt to be tight in the gap for at least one position of the cork roll. To adjust for this gap, loosen the

3.20-3.21 (Continued)

lock nut with a No. 310 wrench and with another No. 310 wrench turn the adjusting screw as required, locking it in the desired position.

M-4 Release the key controlling the operate current.

M-5 Release the armature gently by hand taking care not to force it away from the magnet cores violently enough to move the clutch roller.

M-6 Change the current of .135 ampere to the minimum non-operate value specified in requirement 2.21 without releasing the test box key controlling this current.

M-7 Do not release the test box key controlling the minimum non-operate current nor remove the rack holder until directed.

M-8 Operate and Non-operate The current value requirements are all more or less directly dependent upon the helical spring tension. Consequently, do not change the spring tension any more than necessary to meet one requirement so as to eliminate adjustment thereof when adjusting to meet other electrical requirements.

M-9 To adjust the helical spring, hold the adjusting nut with one No. 310 wrench and loosen the lock nut with another No. 310 wrench as shown in Fig. 20. Turn the adjusting nut as required and tighten the lock nut holding the adjusting nut in place.

M-10 Non-operate If, with the minimum non-operate current applied to the clutch magnet the adjusting screw leaves the roller arm, increase the helical spring tension in accordance with the general methods above.

M-11 Fully Operate To check for the "Fully Operate" requirement apply the maximum fully operate current using another key of the test set and locking the key. If the armature does not touch the non-freezing discs in at least one position of the roller, adjust the helical spring tension in accordance with the general methods above.

M-12 Release both keys of the test set and remove the rack holder from the rack.

M-13 Operate and Remove Pawl Raise the brush rod and apply the "Operate and Remove Pawl" current value. The rack should not slip while the rod returns to the normal position.

M-14 If this current value is insufficient to remove the pawl, it is probably due to a burr on the pawl. To check and adjust for this it will be necessary to remove the clutch in accordance with the methods under procedure 3.05.

M-15 If the surface of the pawl is rough or burred, smooth the surface with a small piece of fine emery cloth. Replace the clutch in accordance with the procedures listed under 3.05.

3.22 Pawl Clearance (Rq.2.22)
3.23 Pawl Engagement (Rq.2.23)

M-1 When checking the requirement on "Pawl Clearance" raise the brush rod and apply just sufficient pressure to the armature to restore the rack under power.

M-2 To check the requirement for "Pawl Engagement", place the .020" step of the No. 80-B gauge between the armature and the back stop. Clamp the gauge in this position with the thumb and index finger, placing the index finger on the back stop and the thumb on the armature as shown in Fig. 27.

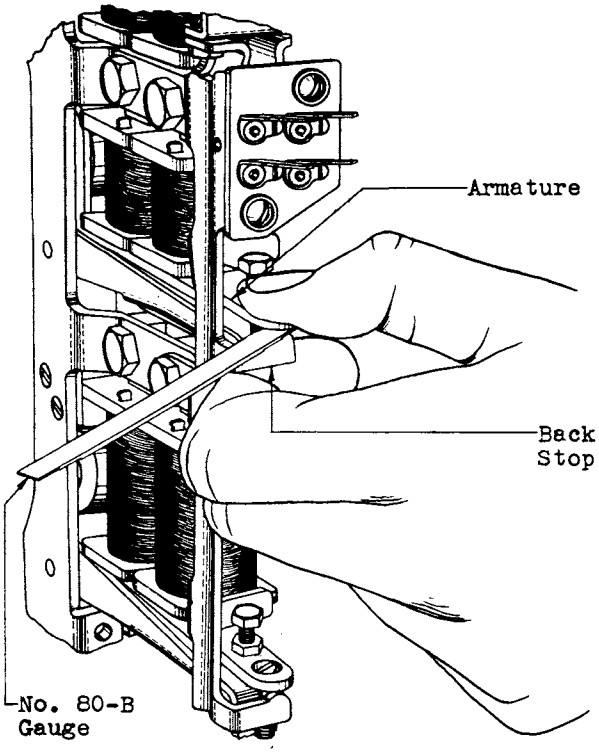

Fig. 27 - Method of Holding Gauge to Check Pawl Engagement

3.22-3.23 (Continued)

M-3 Grasp the rod above the first bearing plate, and, starting with the rod in the normal (down) position, raise it several notches and note that the pawl engages the rack sufficiently to prevent it from slipping or dropping. Continue this throughout the length of the travel of the rack.

M-4 If it is found that the pawl will not meet either or both of these requirements, bend the pawl operating arm in the desired direction very slightly with the No. 273 adjuster as shown in Fig. 28.

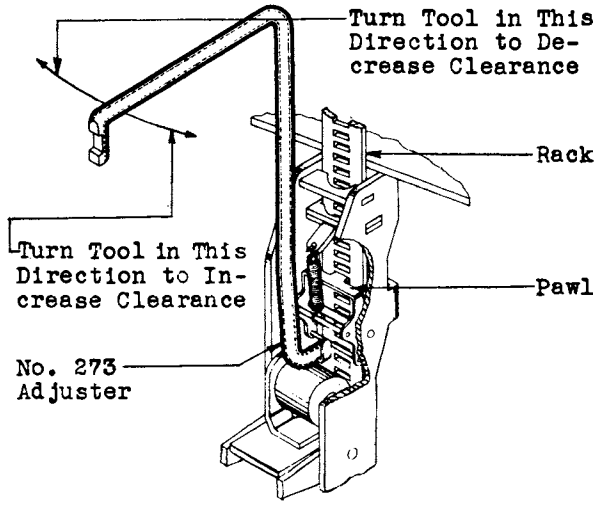

Fig. 28 - Method of Adjusting Pawl Operating Arm

M-5 Make an effort in adjusting the pawl to keep it as close as possible to the rack.

M-6 If considerable trouble is experienced in adjusting the pawl to meet these requirements, check the gap between the armature and the core.

M-7 If the gap is near the minimum limit, readjust the core 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.

3.24 Pressure of Pawl Roller Against Pawl Operating Arm (Rq.2.24)

M-1 To check the pressure of the pawl roller against the pawl operating arm it is necessary to first remove the clutch as covered in procedure 3.05.

M-2 With the clutch removed, loop a piece of twine over the roller and attach the No. 79-C gauge to the twine as shown in Fig. 29. See that the pull registered by the gauge when the pawl roller leaves the pawl operating arm is within the specified limits.

M-3 To adjust for this pressure on clutches where the fixed end of the pawl spring is attached to a round cross bar it will be necessary to remove the fixed end of the spring from the cross bar. To increase the tension cut a turn or two off the spring as required with a pair of 5" diagonal cutting pliers and with a pair of 6-1/2" long nose pliers form a new loop and attach it to the cross bar. To decrease the tension stretch the spring slightly.

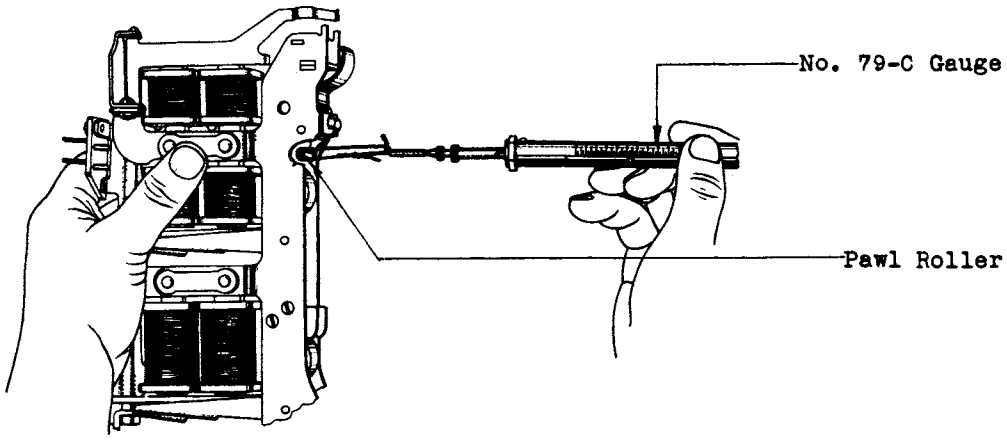

Fig. 29 - Method of Measuring Tension of Pawl Roller Against Pawl Operating Arm

3.24 (Continued)

M-4 In cases where the fixed end of the pawl spring is attached to a lug, adjust the lug as required with the No. 379-A adjuster.

M-5 Replace the clutch in accordance with procedure 3.05.

3.25 Position of Helical Spring Adjusting Stud (Down Drive) (Rq.2.25)
(No Procedure)

REASONS FOR REISSUE - CHANGES IN ADJUSTING PROCEDURES

1. To revise the list of tools, gauges, materials and test apparatus.

2. To revise the procedures covering the use of the No. 35-C test set.

3. To add to the procedures covering "Rack Tongue Tension", (3.01), to provide for straightening the rack tongue.

4. To revise the procedures covering the "Clearance Between Bent Portion of Trip Armature and Magnet Core" (3.07), to supply information for removing the clutch guard rail.

5. To add a general procedure before those covering "Operated Core Gap", (3.13), outlining the necessity of determining the high and low spots of the clutch roller and the cork roll.

6. To add to the procedure covering "Helical Spring Tension" (3.16), information regarding the replacement of a spring not so equipped by one having a copper flashing.

APPROVED:

Bell Telephone Laboratories, Inc. FAC 9-14-31
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