101 AND 102 REGULATORS ASSOCIATED WITH 50A DRIVE REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the 50A Drive and its associated 101 and 102 type Regulators which form a part of the twist controller equipment of the type K carrier telephone system.

1.02 This section is reissued to add information covering an improvement in the 50A Drive consisting of the replacement of the hexagon nuts and cup washer on the end of the roller arm drive shaft with two knurled finger adjustable locknuts. This provides means for readily disengaging the indicating wheel from the large bevel gear so that when the clutch pin is disengaged the motor and the roller arm drive shaft may be rotated independently of each other. Paragraphs 1.07 and 3.10(2) have been revised accordingly.

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 the dismantling or dismounting of apparatus or would affect the adjustments 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 The 50A drive box is designed to accommodate 12 Regulators when fully equipped; 6 101 type and 6 102 type. Each two regulators mounted facing each other constitute a pair connected to a voice frequency channel or to a pilot wire and consist in a 101 type regulator mounted on the left hand side and a 102 type regulator mounted on the right hand side.

†1.06 Dagger: Checking the requirements and making the necessary adjustments to meet them as outlined in parts 2 and 3 below will cause interference with working circuits. Requirements are marked with a dagger (†) when to check or adjust for them would necessitate disturbing all of the working circuits in the drive box. These operations should be performed only when necessary and if possible during periods of light traffic.

1.07 In order that the roller arm drive shaft may be rotated freely without disturbing the position of the driving motor while adjustments are being made on the regulator roller arms and studs, the following precautions should be observed; The two knurled locknuts on the end of the roller arm drive shaft shall be loosened. (The knurled locknuts replace the cup washer and hexagonal locknuts formerly used.) The clutch pin in the bevel gear assembly shall be disengaged from the indicating wheel. When adjustments have been completed the indicating wheel shall be rotated by hand until the clutch pin of the bevel gear assembly can be reengaged. With the pin engaged in the indicating wheel tighten the two knurled locknuts securely. The drive is then in step with the Master Controller.

2. REQUIREMENTS

*2.01 Cleaning of Regulator Contacts - Fig. 1 - (A) - The contacts of the regulator springs shall be cleaned when necessary in accordance with the procedures in this section.

†2.02 Lubricating of Gear Teeth The gear teeth of the drive unit shall be lubricated when the drive is first placed in service. It is expected that further lubrication of the gear teeth will not be necessary.

2.03 Clutch Pin Requirement - Fig. 1 - (B) The clutch pin in the bevel gear assembly shall engage and disengage the indicating wheel without binding. Gauge by feel.

2.04 Tightness of Assembly The regulator units, the back guards on the regulator units, the roller brackets, the indicator, the bearing assembly, the spur gear assembly screw and the drive motor shall all be fastened securely when mounted in their proper positions.

†2.05 Roller Requirement - Fig. 2 - (C) - The rollers on the regulator roller arms shall turn freely on their mounting pins. Gauge by feel.

*2.06 Contact Spring Clearance - Fig. 1 - (C) - The contact springs of the regulator units in their unoperated position shall bear lightly against the back guard with at least one prong and the minimum clearance between contacts shall be .006". Use 75E gauge.

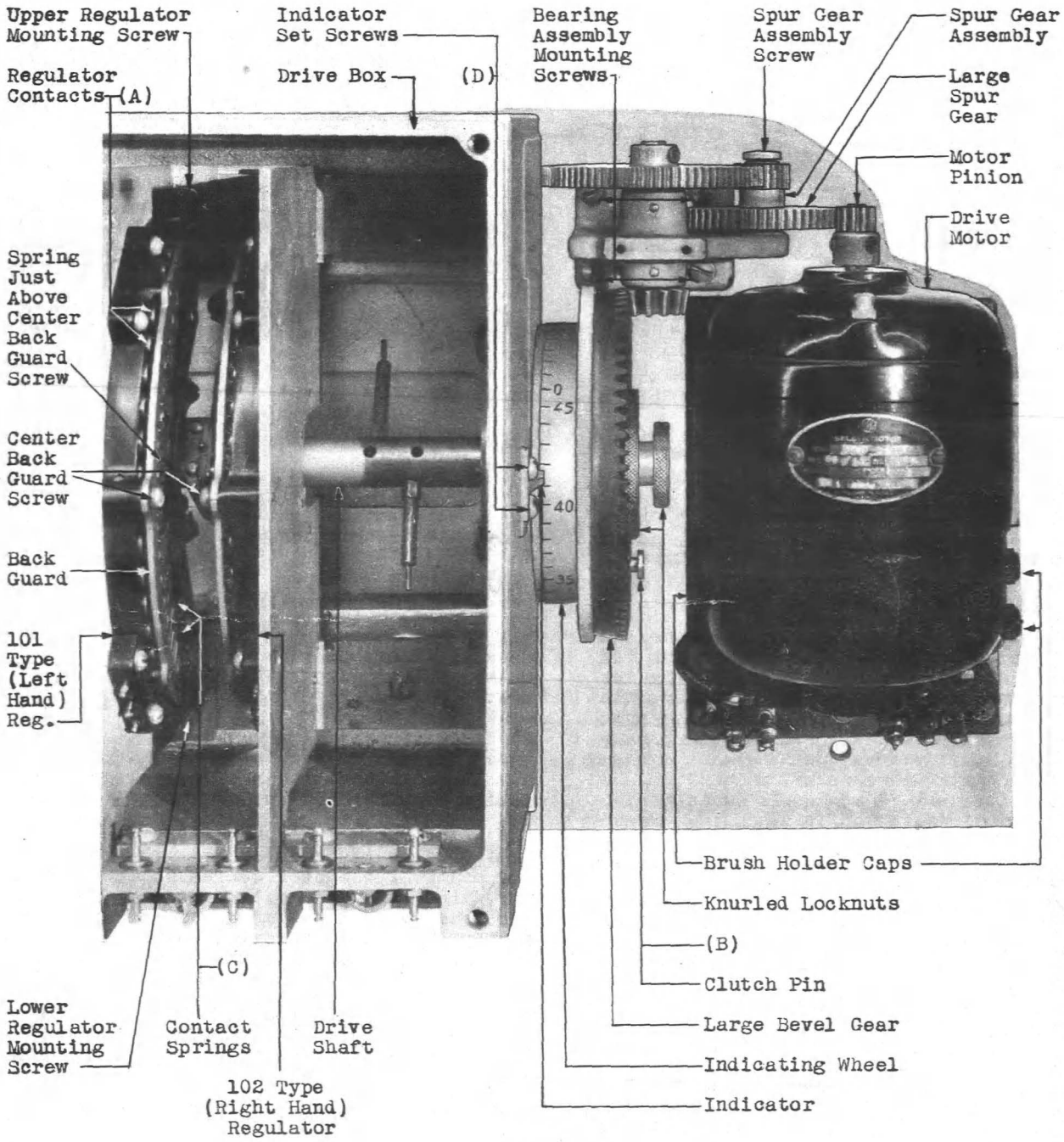
Upper Regulator Mounting Screw
Indicator Set Screws
Bearing Assembly Mounting Screws
Spur Gear Assembly Screw
Spur Gear Assembly
Regulator Contacts
(A)
Drive Box
(D)
Large Spur Gear
Motor Pinion
Drive Motor
Spring Just Above Center Back Guard Screw
Center Back Guard Screw
Back Guard
101 Type (Left Hand) Reg.
Brush Holder Caps
Knurled Locknuts
(B)
Clutch Pin
Large Bevel Gear
Indicating Wheel
Indicator
(C)
Lower Regulator Mounting Screw
Contact Springs
Drive Shaft
102 Type (Right Hand) Regulator

Figure 1

†2.07 Roller Arm Stud Clearance - Fig. 2 - (A) - With the roller of a regulator unit resting on or travelling over the regulator springs, there shall be a clearance between the stud and the roller arm of:
Max. 1/32"
Gauge by eye.

†2.08 Roller Arm Tension - Fig. 2 - (B) - The tension of the roller arms of the regulator units shall be within the limits specified below. This tension shall be measured at the tip of the roller arm with the roller just touching but not depressing a contact spring.
Min. 600 grams
Max. 700 grams
Use 62B Gauge

†2.09 Centering of Rollers
Adjustment of Indicator

(a) Fig. 2 - (F) - With the indicator pointing to position 33 on the indicating wheel the rollers associated with the 102 type regulator units (the right hand units) shall rest in the center of the regulator spring which is located just above the center back guard screw of the regulator. Gauge by eye.

(b) With the indicator pointing to position 10 on the indicating wheel the rollers associated with the 101 type regulator units (the left hand units) shall rest in the center of the regulator spring which is located just above the center back guard screw of the regulator. Gauge by eye.

†2.10 Freedom of Movement of Driving Mechanism With the clutch pin of the bevel gear assembly engaged with the indicating wheel and with the electrical connections to the drive motor open, the entire driving mechanism including the drive shaft, gears and motor armature shall move freely without binding in any position when the indicating wheel is rotated in either direction. Gauge by feel. To check for free operation remove the fuses from the S1, S2 and S3 leads to the drive motor, and rotate the indicating wheel by hand for at least one full revolution in each direction.

†2.11 Setting Drive Unit in Step With Master Controller With the clutch pin engaged in the indicating wheel and all electrical connections to the drive motor closed the indicator on the drive unit shall point to the same number on the indicating wheel that is shown by the (TRS MOT) indicator on the Master Controller. A tolerance of ± 1/52" is permissible. Gauge by eye.

†2.12 Motor Brush Length The brushes on the driving motor at the time of turnover shall be minimum 11/16 inch long outside of the brush spring. They shall be replaced when their length outside of the brush spring has been reduced through wear to a minimum of 3/8 inch. Gauge by eye.

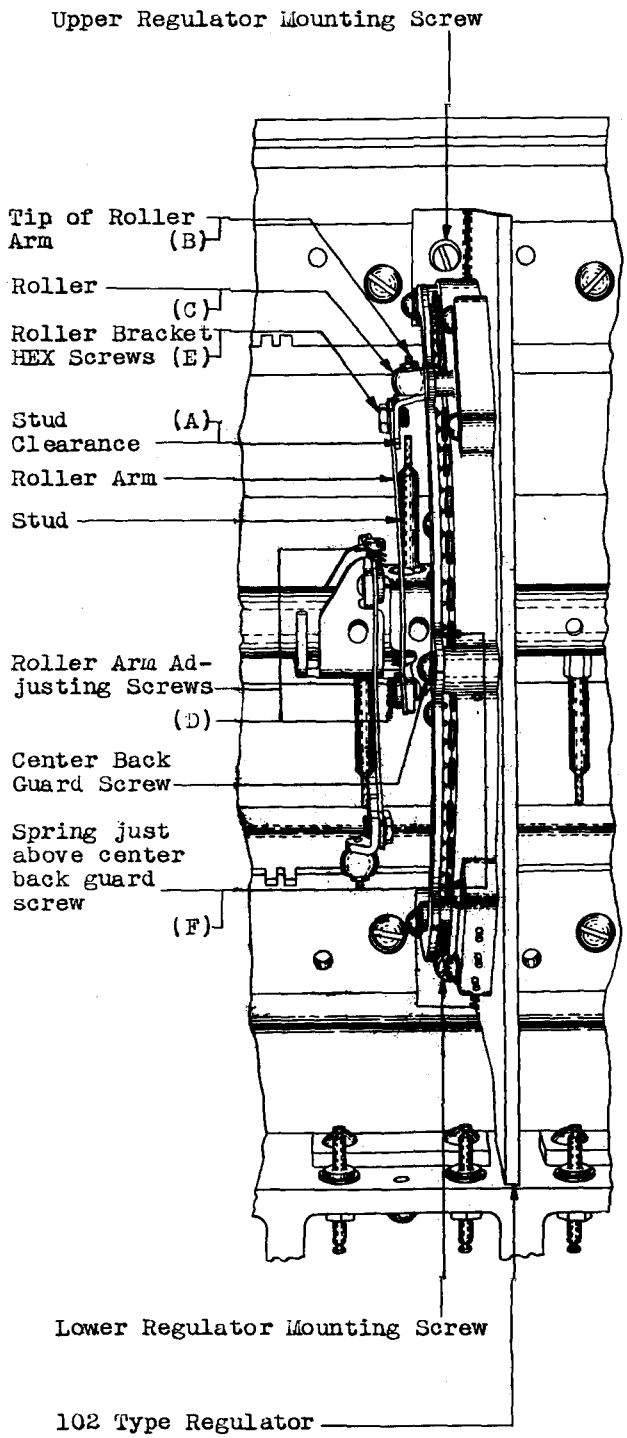

Figure 2

†2.13 Motor Brush Pressure With the brush holder screw cap removed and the brush in its holder and resting against the commutator the brush spring shall extend outside of its holder.
Min. 1/8 inch.
Gauge by eye.

2.14 Regulator Wiring (Initial Test on New Equipment Only): The wiring of the regulators shall be so connected that a progressive change in resistance shall take place, except as covered below, between the common terminal for the contact springs and a resistance terminal, when the contacts on a regulator are closed one at a time, in order. Gauge by electrical test.

(a) When the last contact, at the end of the 101A regulator farthest from terminals A, B and C is closed, this contact will be shorted to the adjacent contact stud.

(b) The last contact, at the end of the 101B regulator farthest from terminals A, B and C shall have no wired connection to any part of the regulator.

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges and Materials

Code No.	Description
Tools	
-	3-1/2" Cabinet Screw-driver
206	Offset Screw-driver
207	Offset Screw-driver
265B	Contact Burnisher
R1575	Brush, Artist Show Card #4
224	Spring Bender
474A	Hex. Wrench, 3/16"
326B	Adjuster
486A	Oil Gun
Gauges	
75E	Thickness Gauge, .006"
62B	Gauge (0-700 Grams)
Materials	
WE #3	Lubricating Compound
D-98063	Cloth
KS-6232	Oil
Test Apparatus	
(1 Req'd.)	Ohmmeter (accurate to 5% at 10 and 2000 ohms)

3.01 Cleaning of Regulator Contacts (Rq. 2.01)

(1) Fig. 1 - (A) - When it becomes necessary to clean the contacts of the

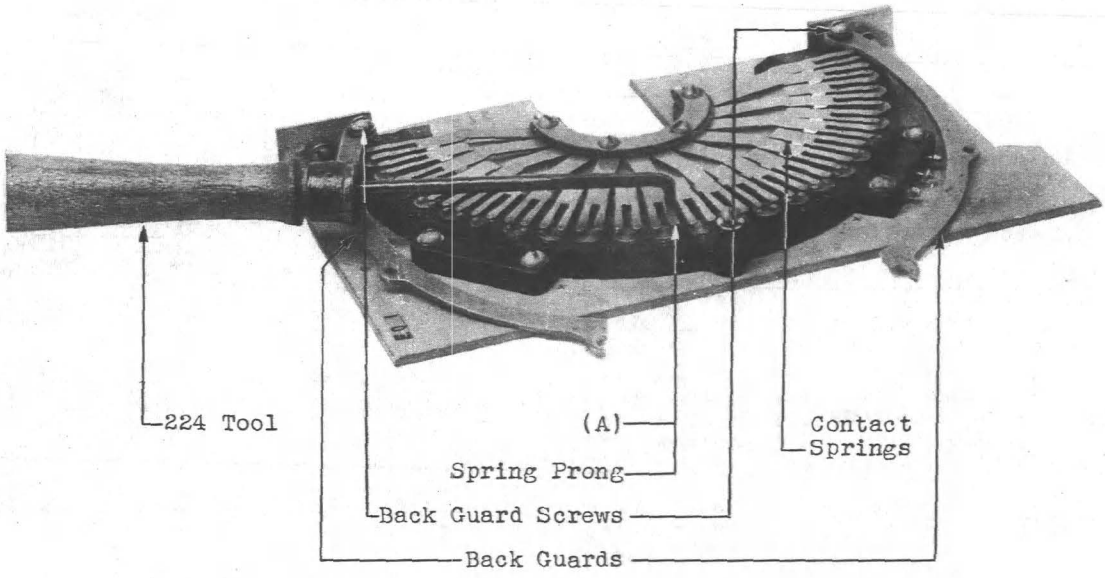

Figure 3

3.01 (Continued)

regulator springs the regulator unit shall be removed from the drive box in order that all of the contacts may be made accessible. This can be accomplished by first unsoldering the wires connected to terminals A, B and C and then removing the upper and lower mounting screws which hold the regulator in place. With the regulator resting on a table or other flat surface, the contacts may be cleaned by sliding a 265B tool (contact burnisher) back and forth between the upper and lower contacts associated with each spring prong at the same time pressing the spring prong down with the finger against the burnisher near the point of contact. Several back and forth strokes with the burnisher should be sufficient to clean each set of contacts. When all contacts have been cleaned the regulator shall be replaced in the drive box, the mounting screws tightened and the wires resoldered to terminals A, B and C.

3.02 Lubricating of Gear Teeth (Rq.2.02)

(1) To lubricate the gear teeth of the drive unit, dip a #4 artist show card brush in WE Co. #3 lubricating compound removing the excess lubricant from the brush before withdrawing it from the container, and apply it evenly over the teeth of all of the gears. An excess of lubricant tending to form a thick deposit is to be avoided. The large bevel gear shall be turned by hand during this process in order that all the teeth may be lubricated. If the motor is electrically connected to a Master Controller, it will be necessary to remove the motor fuses while performing this operation.

3.03 Clutch Pin Requirement (Rq.2.03)

(1) Fig. 1 - (B) - To lubricate the clutch pin of the bevel gear assembly disengage the pin from the indicating wheel and apply 2 or 3 drops of oil per KS-6232 from a 486A oil gun to the pin. Engage and disengage the pin several times and then wipe the surplus oil from the pin with a clean piece of cloth per D-98063.

3.04 Tightness of Assembly (Rq.2.04)

(1) The regulator mounting screws, the indicator set screws, the bearing assembly mounting screws, the spur gear assembly screw and the drive motor mounting screws shall be tightened when necessary with a screw driver.

(2) The regulator back-guard screws shall be tightened when necessary with either a 206 or 207 tool (offset screw driver).

(3) The roller bracket hexagonal screws shall be tightened when necessary with a 474A wrench.

3.05 Roller Requirement (Rq.2.05)

(1) If the roller does not turn freely on the roller mounting pin, it shall be lubricated with Western Electric Lubricating Compound No. 3 as follows. Rotate the drive shaft until the roller is near the top of the regulator. Dip a #4 artist show card brush in the lubricant, removing the excess lubricant from the brush before withdrawing it from the container and apply it at the top of the roller arm (Fig. 2-B) so that the lubricant will flow downward between the inside of the roller and the roller mounting pin. After lubricating it is advisable, if service conditions permit, to allow the roller to remain idle for approximately 15 minutes so that the carbon tetrachloride may evaporate.

3.06 Contact Spring Clearance (Rq.2.06)

(1) Fig. 3 - (A) - In order to adjust the contact springs it is necessary to remove the regulator from the drive box as described in Par. 3.01 (1). The back guard screws of the regulator shall then be loosened and the back guards swung clear of all the contact springs as shown in Fig. 3. By means of the 224 spring bender working at the base of the spring prong, bend the prong back in such a manner that it will rest lightly and approximately flat against the back guard after the guard has been swung back into place. Swing the back guards into place and tighten the screws which hold the guards in position. A check should be made using the 75E gauge to determine whether the spring prongs meet their clearance requirement. The regulator shall be placed in the box, the top and bottom mounting screws replaced and tightened, and the wires resoldered to terminals A, B and C.

3.07 Roller Arm Stud Clearance (Rq.2.07)

(1) Fig. 2 - (A) - In order to adjust the clearance between the stud and roller arm rotate the indicating wheel by hand until the stud is in approximately a vertical position with the roller arm resting against a contact spring. By means of the 326B adjuster bend the thin tip of the stud so that the clearance requirements are met.

3.08 Roller Arm Tension (Rq.2.08)

(1) Fig. 2 - (D) - To change the tension of the roller arm of the regulator unit turn the roller arm adjusting screw with a screw driver, to the right to increase the tension and to the left to decrease the tension. The required

3.08 (Continued)

tension shall be obtained at the tip of the roller arm as shown in Fig. 2 (B) with the roller just touching but not depressing a contact spring.

3.09 Centering of Rollers (Rq.2.09) Adjustment of Indicator

(1) If part (a) of the requirement is not met proceed as follows. Rotate the indicating wheel by hand until a majority of the rollers associated with the right hand regulator units are resting in the approximate center of the first spring directly above the center back guard mounting screw. Loosen the indicator set screws - Fig. 1 (D) - and set the indicator to point to position 33, and tighten the indicator set screws. Any rollers which do not rest in the center of the reference spring after this adjustment has been made may be centered by loosening the two hexagonal screws of the roller bracket - Fig. 2 (E) - with a 474A wrench and moving the roller to the center of the spring. The hexagonal screws shall then be tightened.

(2) If part (b) of the requirement is not met adjust the rollers associated with the left hand regulators by centering them as follows. With the indicator pointing to position 10 on the indicating wheel loosen the two hexagonal screws of the roller bracket associated with the left hand regulators using the 474A wrench and move the roller to the center of the first spring directly above the center back guard mounting screw. The hexagonal screws shall then be tightened. Care should be exercised not to change the position of the indicator.

3.10 Freedom of Movement of Driving Mechanism (Rq.2.10)

(1) If it is found that the driving mechanism does not turn freely through all positions of the indicating wheel proceed as follows in order to correct the trouble:

(2) Motor: Remove the spur gear assembly screw and lift the spur gear assembly on its shaft until the teeth of the large gear no longer engage with the teeth of the pinion on the motor shaft. Note the position of the motor armature. While holding the spur gear assembly in this position with one hand, rotate the motor armature through several revolutions. If the motor armature does not turn freely the motor should be replaced. If the armature turns freely rotate it to approximately its original position, replace the spur gear assembly so that it reengages with the pinion on the motor shaft and replace and tighten the spur gear assembly screw.

(3) Drive Shaft: Loosen the two knurled locknuts which hold the bevel gear tight against the indicating wheel, disengage the clutch pin from the indicating wheel and while holding the bevel gear with one hand so it will not turn, rotate the indicating wheel through one full revolution in each direction. If the drive shaft does not turn freely check that the roller arms meet their requirements. If the drive shaft turns freely, turn the indicating wheel until the clutch pin of the bevel gear assembly can be reengaged. With the pin engaged in the indicating wheel tighten the two knurled locknuts securely.

(4) Gears: Slightly loosen the four mounting screws which hold the bearing assembly on the mounting plate. Then with the handle of the screwdriver tap lightly on the bearing assembly in order to alter the position of the assembly on the mounting plate so that the gears may turn freely. Tighten the four mounting screws.

3.11 Setting Drive Unit in Step With Master Controller (Rq.2.11)

(1) If the reading of the indicator on the drive unit does not agree with the reading of the (TRS MOT) indicator of Master Controller this condition shall be corrected as follows. Remove the spur gear assembly screw and lift the spur gear assembly on its shaft until the teeth of the large gear no longer engage with the teeth of the pinion on the motor shaft. Rotate the spur gear assembly until the indicator reading agrees with the reading of the (TRS MOT) indicator on the Master Controller. Allow the spur gear assembly to drop back into place so that the teeth on the large gear will mesh with the teeth of the pinion on the motor shaft. In order to make these gears engage, it may be necessary to rotate the spur gear assembly through the distance of one half of a gear tooth. Replace and tighten the spur gear assembly screw.

3.12 Motor Brush Length (Rq.2.12)

(1) Replace any short brushes.

3.13 Motor Brush Pressure (Rq.2.13)

(1) If this requirement is not met the coil brush spring shall be lengthened by hand until the requirement is met.

3.14 Regulator Wiring (Initial Test on New Equipment)

(1) When regulators are being added to a 50A Drive, connect terminals A and B of the 101A or 101B regulator to terminals A and B respectively of the 102A or 102B regulator with which it will be used and proceed as covered below before the regulators are mounted. When the regulators are received mounted in the 50A Drive, disconnect the leads from the regulators to terminals 1 and 2 on the housing and proceed as covered below.

(2) Connect an ohmmeter between the C terminals of the two regulators.

(3) When testing 101A and 102A regulators, close the last contact at the end of the 102A regulator nearest the A, B and C terminals. With this contact closed there is 10.5 ohms in series with the ohmmeter. Close each next adjacent contact of the 102A regulator in turn. The ohmmeter should indicate an increase in resistance for each contact closure. Close the last contact, at the end of the 101A regulator, nearest the A,B and C terminals. With this contact closed there is 173 ohms in series with the ohmmeter. Close each next adjacent contact of the 101A regulator, in turn. The ohmmeter should indicate an increase in resistance for each contact closure, except that the indication for the last two contacts will be the same when the last contact, at the end of the 102A regulator, nearest terminals A, B and C is open.

(4) When testing 101B and 102B regulators, close the last contact, at the end of the 101B regulator, farthest from terminals A, B and C. With this contact closed there is 153 ohms in series with the ohmmeter. Close the next adjacent contact on the 101B regulator. The ohmmeter should indicate a short circuit. Close each next adjacent contact, of the 101B regulator in turn. The ohmmeter should indicate an increase in resistance for each contact closure. Close the last contact, at the end of the 102B regulator, farthest from terminals A, B and C. With this contact closed there is 75 ohms in series with the ohmmeter. Close each next adjacent contact, of the 102B regulator, in turn. The ohmmeter should indicate an increase in resistance for each contact closure.