

DRIVES
16-C AND D-78675
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

- 1.01 This section covers 16-C and D-78675 drives.
- 1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.
- 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 Part 1, "General" and Part 2, "Requirements" form part of the Western Electric Co. Inc. Installation Department handbook.
- 1.05 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.
- 1.06 One discharge of oil for the purpose of this section is the amount of oil discharged from the No. 431-A oil gun when the piston is depressed to the limit of its stroke.
- 1.07 For definitions and general information regarding the associated vertical drive shafts, refer to the section covering the apparatus requirements and adjusting procedures for vertical drive shafts and associated apparatus.

2. REQUIREMENTS

- 2.01 Cleaning The drive housing and adjacent surfaces of the vertical drive shafts shall be kept free of oil and dust.
- 2.02 Lubrication
- (a) Fig. 1 (A) - The Ball Bearings shall be adequately lubricated with KS-6438 oil. When lubrication is necessary one discharge of oil shall be applied.
- (b) After turnover it is recommended that the bearings be lubricated at intervals of two years. These intervals may be extended if periodic inspections have indicated that local

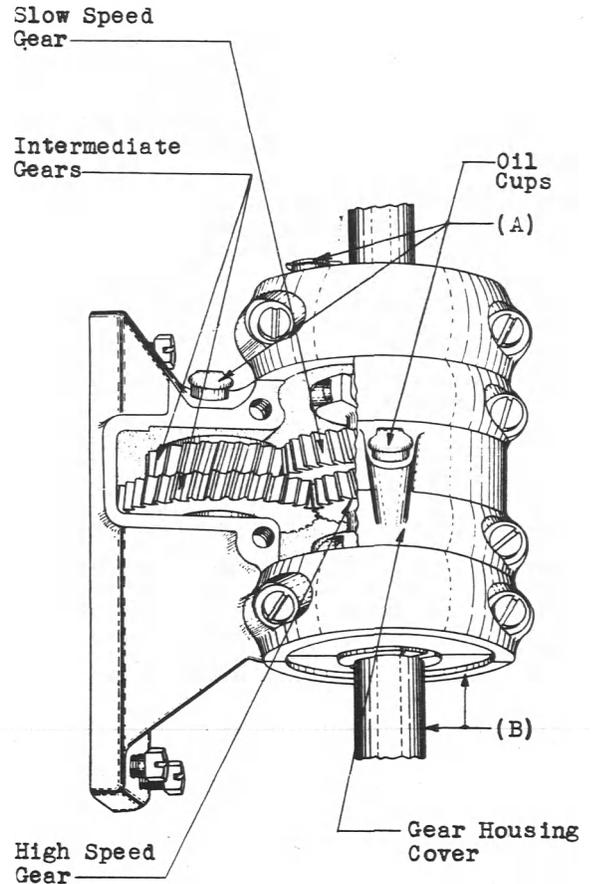


Fig. 1

conditions are such as to insure that requirement (a) will be met during the extended interval.

2.03 Record of Lubrication During the period of installation, a record shall be kept, by date of the lubrication of the ball bearings and this record shall be turned over to the Telephone Company with the equipment. If no lubrication has been done it shall be so stated.

2.04 Squareness of Drive - Fig. 1 (B) - The lower finished surface of the drive shall not be out of perpendicular (out of square) with the axis of the vertical drive shaft by more than .010" when measured across the outside diameter of the bearing bracket. Use the R-1306 bracket squaring gauge and gauge by eye.

*2.05 Starting Torque Test - Fig. 2 (A) - The pull required to start the rotation of a shaft, equipped with a No. 16-C or D-78675 type drive, from any position of rest about its axis, at the radius of the lower or high speed vertical drive shaft shall be as follows:

Shafts having ball bearings exclusively

<u>No. of Shaft Bearings</u>	<u>Max. Tension</u>
4 or less	1100 grams
5	1200 grams
6	1300 grams
7	1400 grams
8	1500 grams

Shafts having one or a combination of crash-alloy bearings and ball bearings

<u>No. of Shaft Bearings</u>	<u>Max. Tension</u>
4 or less	1200 grams
5	1400 grams
6	1600 grams
7	1800 grams
8	2000 grams

Use the No. 79-E gram gauge. Before checking this requirement the gear guards shall be removed and any outside cause of friction such as the interrupter gears, the coupling and driving discs touching the driven discs, etc., eliminated. This requirement may be checked for by the Telephone Company if they require it before the Installation Department has mounted the coupling between the vertical drive shaft and the vertical shaft of the drive.

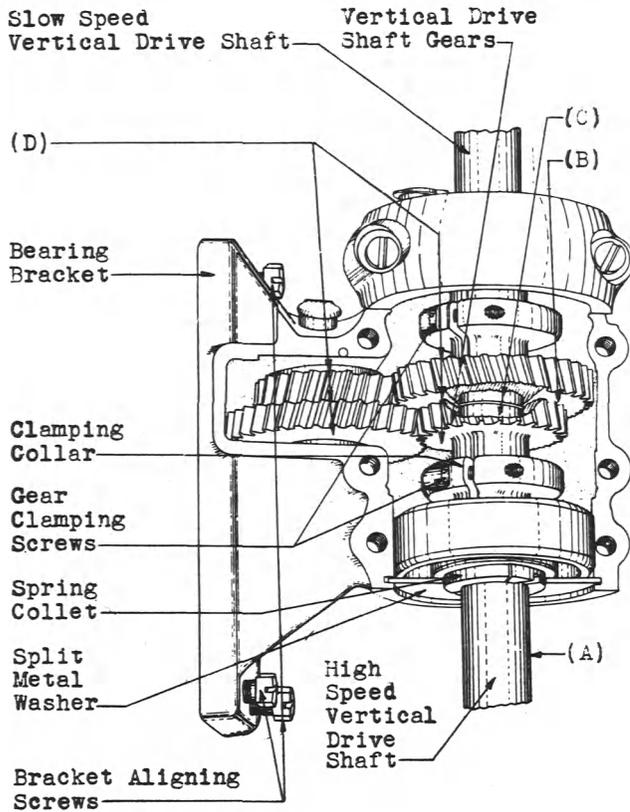


Fig. 2

*2.06 Rigidity of Mounting The drive shall be rigidly fastened to the frame. Gauge by feel.

*2.07 Gear Clearance - Fig. 2 (B) - There shall be a clearance of approximately 1/32" (within ± .005") between the adjacent surfaces of the vertical drive shaft gears. Gauge by eye.

*2.08 Location of Gears on Vertical Drive Shafts - Fig. 2 (C) - The end of either vertical drive shaft shall not extend beyond the face of the gear mounted on it. Gauge by eye.

*2.09 Alignment of Gears - Fig. 2 (D) - The top and bottom surfaces of the vertical drive shaft gears shall be approximately in a plane with the corresponding surfaces of the gears in the housing. Gauge by eye.

3. ADJUSTING PROCEDURES3.001 List of Tools, Gauges and Materials

<u>Code No.</u>	<u>Description</u>
<u>Tools</u>	
254	Wrench - 1/4" Sq. Socket
305	Wrench - 7/16" Hex. Socket Offset
346	Wrench - Spanner
347	Wrench - Spanner
431-A	Oil Gun
-	Paint Brush, 1/4" Round
-	Bell System Regular Screwdriver 4" per A.T.&T. Co. Drawing 46-X-34
-	Bell System Cabinet Screwdriver 3-1/2" per A.T.&T. Co. Drawing 46-X-40

Gauges

79-E	0-3000 Gram Push-Pull Tension Gauge
R-1306	Bracket Squaring Gauge

Materials

KS-2423	Cloth
KS-7860	Petroleum Spirits
-	Fish Line

3.01 Cleaning (Rq.2.01)

M-1 When necessary, wipe off the drive housing and the adjacent surfaces of the drive shafts with KS-2423 cloth moistened with petroleum spirits.

3.02 Lubrication (Rq.2.02)Ball Bearings

M-1 When it is necessary to lubricate the ball bearings, proceed as follows using the No. 431-A oil gun as the means of applying the lubricant. Before lubricating, examine the oil gun to see that it is filled and working properly. If the oil gun fails to eject oil properly when the piston is depressed it is an indication that either the gun is empty or there is an air pocket beneath the piston. In this case it will be necessary either to refill the gun or to follow M-3 below.

M-2 To Fill the Oil Gun Remove the bar-

rel by turning it in a counter-clockwise direction. Fill the barrel with KS-6438 oil and replace and securely tighten it on the gun. Wipe off any oil that may have been forced out of the barrel with a KS-2423 cloth moistened with petroleum spirits. Depress the piston several times to make certain that all air is expelled from the nozzle before lubricating the bearings.

M-3 To Remove Air Pocket Depress the piston several times to expel the air from the nozzle until the oil begins to flow again.

M-4 To Lubricate the Ball Bearings Raise the cap of the oil cup and hold the nozzle of the gun over the cup and depress the piston to the end of its stroke. Then release the piston.

M-5 Reset the cap and wipe off any oil that may have dropped on the drive housing. Repeat this above operation for lubricating the other bearings.

Gear Teeth

M-6 No special attention need be given to the lubrication of the gear teeth since sufficient lubricant in the ball bearing units creeps onto the gear teeth.

M-7 However if an examination of the teeth shows that they are coated with dirt, clean them with 1/4" round paint brush moistened with petroleum spirits. Take care to protect the other apparatus while this cleaning process is going on and to prevent the petroleum spirits getting into the ball bearings.

M-8 After the teeth have been satisfactorily cleaned, lubricate them as follows: Hold the nozzle of the No. 431-A oil gun near the upper gears and lubricate them with approximately 1/4 charge of KS-6438 oil. Then repeat this operation for the lower gears.

3.03 Record of Lubrication (Rq.2.03)
(No Procedure)3.04 Squareness of Drive (Rq.2.04)

M-1 To check a drive for squareness, hold the R-1306 bracket squaring gauge with the "V" surface against the shaft and the three upper ground points of the gauge near the lower finished surface of the drive.

M-2 With the gauge held in this position, check the gaps between the ground points of the gauge and the drive. Then move the gauge 180° and check the gaps.

M-3 If the drive is more than .010" out of square with the axis of the vertical drive shaft, realign the drive as

follows: Loosen the bracket mounting screws with the No. 305 wrench and adjust the bracket aligning screws with the 4" regular screw-driver as required.

M-4 When the bracket has been satisfactorily adjusted, tighten the bracket mounting screws securely. Then recheck the bracket for squareness as covered above.

3.05 Starting Torque Test (Rq.2.05)
3.06 Rigidity of Mounting (Rq.2.06)

M-1 Before dismantling any apparatus to make these tests or readjustments for torque, check the shaft for straightness as outlined in the section covering apparatus requirements and adjusting procedures for vertical drive shafts and associated apparatus.

M-2 Starting Torque Test Before making the torque test, remove the coupling connecting the vertical drive shaft and the vertical shaft of the drive as follows.

M-3 Where an eccentric coupling is used and it is equipped with a coupling guard it will be necessary to remove the guard and clean it as outlined in the section covering apparatus requirements and adjusting procedures for vertical drive shafts and associated apparatus before removing the coupling. After the coupling guard has been removed and cleaned, remove the upper coupling clamp and driving and driven lugs of the eccentric coupling before making the torque test. In cases where the rigid type coupling is used, loosen the coupling clamping screws with the No. 265 wrench.

M-4 To make the torque test proceed as follows: If the driving discs have filister head clamping screws, hook one end of a fish line over the clamping screw of a disc just above or below a bearing and about four feet from the floor and wind several turns of the line around the vertical drive shaft without crossing by rotating the shaft backward. If, however, the driving discs are secured to the shafts by Bristo set screws proceed as follows: Place a piece of fish line around the shaft just above or below a bearing and wind several turns of the line around the vertical shaft by rotating the shaft backwards. Four or five turns of the line should be wound over the end of the line to prevent it from slipping and then an additional four or five turns should be wound around the shaft without crossing or overlapping. Then attach the No. 79-E push-pull tension gauge to the loose end as shown in Fig. 3.

M-5 Test by starting and stopping (approximately 20 times per revolution) from the point of greatest friction in three complete revolutions of the shaft

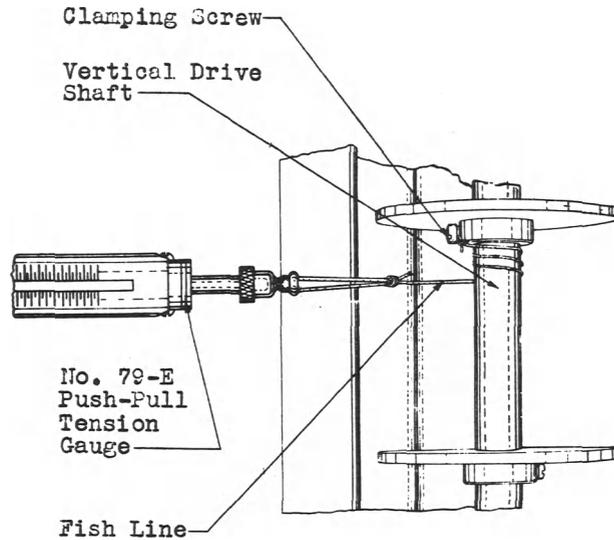


Fig. 3 - Method of Measuring Starting Torque

in its normal direction. If the starting torque at any point does not exceed the amount specified, the vertical drive shaft and the bearing alignment can be considered satisfactory and no further check for alignment need be made. If the starting torque exceeds this requirement, lubricate the drive as outlined in procedure 3.02 and the ball bearings as outlined in procedure 3.02 of the section covering apparatus requirements and adjusting procedures for vertical drive shafts and associated apparatus and repeat the starting torque test. If the starting torque at any point still exceeds this requirement after being lubricated consider the operation of the shaft unsatisfactory and remove the source of the bind by realigning the shaft and bearings if they are not in satisfactory alignment or by locating and replacing a bearing having a bind. To detect a binding bearing, refer to the section covering apparatus requirements and adjusting procedures for vertical drive shafts and associated apparatus.

M-6 Also, replace the drive shaft coupling in accordance with this section.

M-7 Rigidity of Mounting After all adjustments have been made, tighten the bracket mounting screws securely with the No. 305 wrench.

- 3.07 Gear Clearance (Rq.2.07)
 3.08 Location of Gears on Vertical Drive Shafts (Rq.2.08)
 3.09 Alignment of Gears (Rq.2.09)

M-1 To check for gear clearance, location of the gears on the vertical drive shafts and the alignment of the gears, remove the gear housing cover screws with the 4" regular screw-driver and remove the cover.

M-2 While adjusting for the proper clearance between the gears mounted on the vertical drive shafts, take care that the requirement covering the alignment of these gears with those in the housing is met. It will be noted that if each of the vertical drive shaft gears are lined

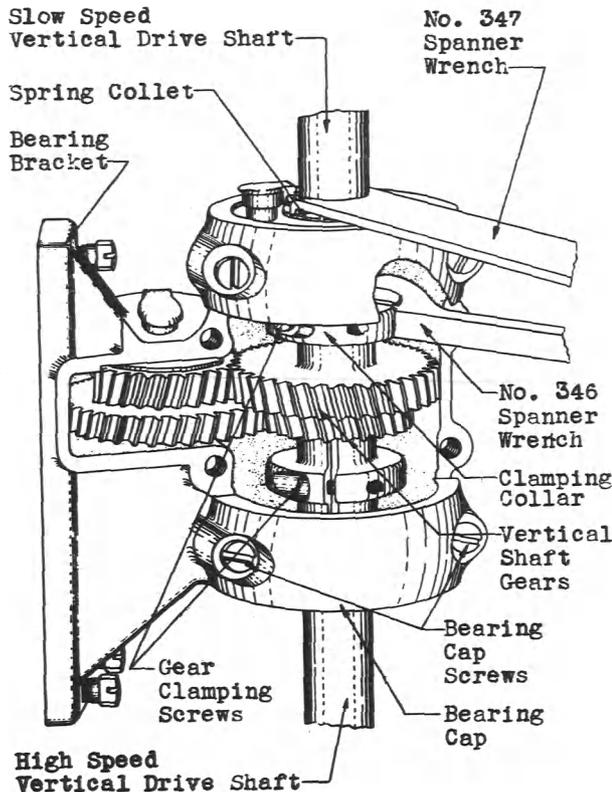


Fig. 4 - Adjusting For Gear Clearance

up with their associated gears in the housing the clearance requirement will automatically be met.

M-3 Gear Clearance If the clearance between the gears is not satisfactory, determine whether the upper or lower gear is at fault and loosen the corresponding clamping screws with the 3-1/2" cabinet screw-driver. Place the No. 346 wrench in the collar as shown in Fig. 4 and tighten or loosen the spring collet with the No. 347 wrench as required. Tightening will increase and loosening will decrease the gap. Then tighten the clamping screws securely so that the shaft will not slip in the bearing.

M-4 Location of Gears on Shafts If the end of either shaft extends beyond the upper or lower surfaces of the gear mounted on it, raise the slow speed vertical drive shaft or lower the high speed vertical drive shaft and then move the associated gear as outlined in M-3. If it is necessary to lower the high speed vertical drive shaft, it may be necessary to remove the eccentric coupling as outlined in the section covering apparatus requirements and adjusting procedures for vertical drive shafts and associated apparatus. After making the above adjustments, replace the eccentric coupling, check the location of the driving discs as outlined in the sections covering apparatus requirements and adjusting procedures for sequence switches and power driven rotary selectors.

M-5 Alignment of Gears If the top and bottom surfaces of the vertical drive shaft gears are not in satisfactory alignment with the corresponding surfaces of the gears in the housing loosen the bearing cap screws, remove the gear clamping screws and adjust as outlined in M-3 above. Move the gears on the shaft until the requirements for gear clearance, location of gears on the vertical drive shafts and alignment of gears are met.

M-6 After the gears have been satisfactorily adjusted to meet all the requirements, tighten the spring collet and collar securely. Tighten the bearing cap screws and replace the gear housing cover and tighten the bearing cap and gear housing cover screws securely.