

J2 CARRIER REGULATOR CONDENSER DRIVE PER ED-61694-01, ED-61694-021 AND ED-61694-022 REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the Condenser Drive per ED-61694-01, ED-61694-021 and ED-61694-022, used with the regulating amplifiers of the J2 Carrier Telephone System.

1.02 This section is reissued to add a requirement and an adjusting procedure for planetary gear bind, to add information covering the new one piece and two piece steel stop rings to the adjusting procedure

for stop ring position. Detailed reasons for reissue will be found at the end of the section.

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 One drop of oil for the purpose of this section is the amount of oil released from the nozzle of the 486A oil can when the can is depressed to release one drop.

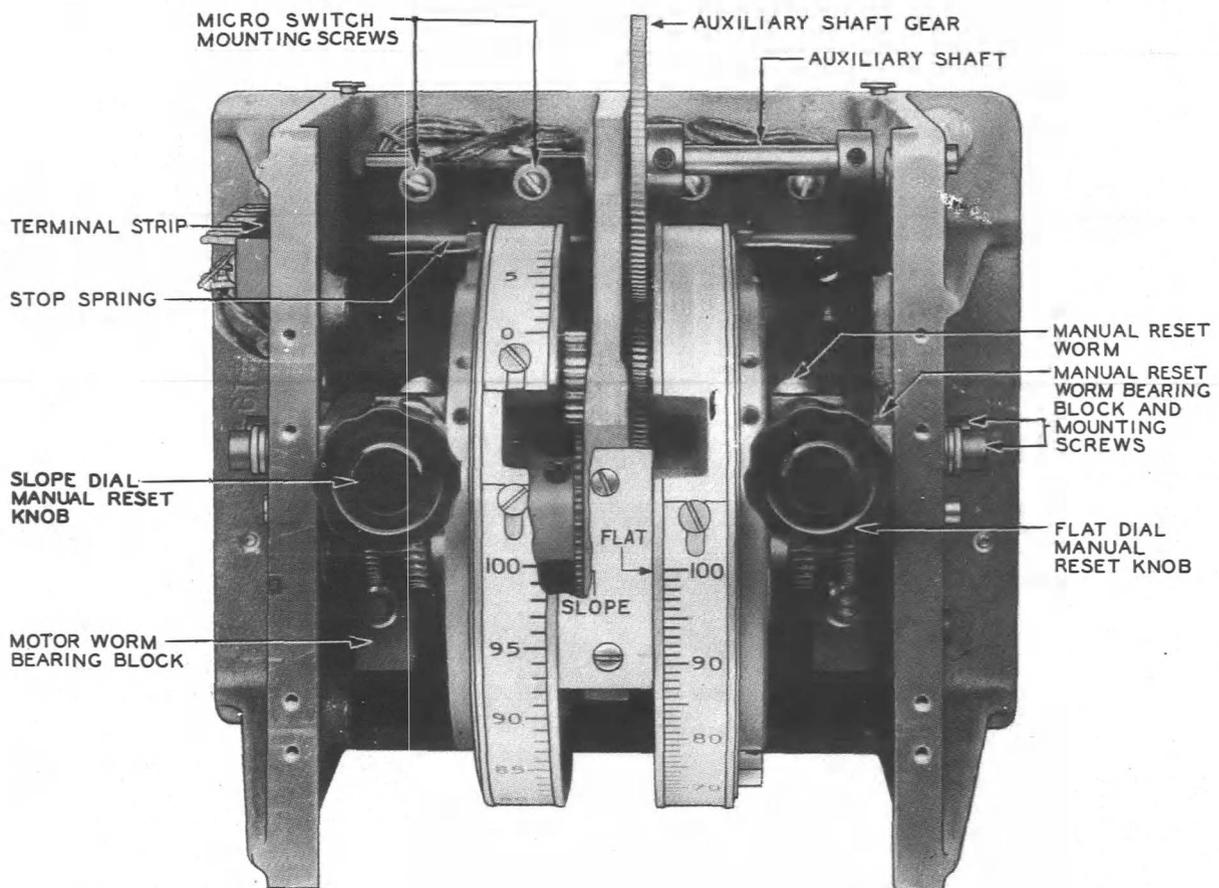


Fig. 1 - Designation of Parts

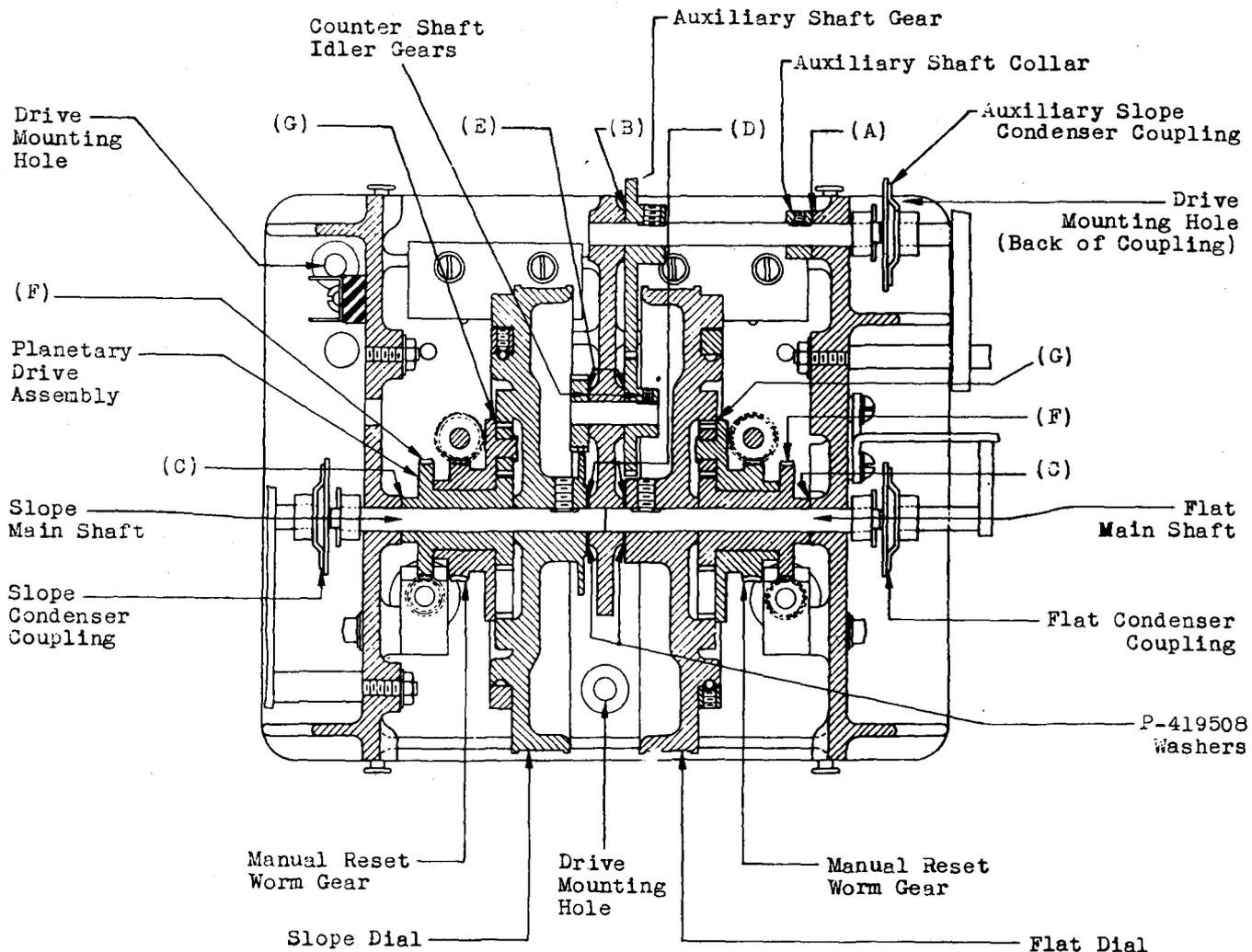


Fig. 2 - Designation of Parts and Lubricating Points

1.05 The associated amplifier should be removed from service before any tests or adjustments are made on the condenser drive. After the tests and adjustments are completed and before the amplifier is connected in service the flat and slope dials shall be given their correct service setting for the circuit in which they are used.

2. REQUIREMENTS

2.01 Lubrication

(a) Telechron Motors: (After Turnover Only) - The two Telechron motors furnished as part of the condenser drive shall be recoiled as covered in the 159 division of the Plant Series.

(b) The drive mechanism shall be lubricated, as specified below, with a good grade of SAE 50 motor oil.

(1) The following points shall be lubricated with 1 drop of oil each.

FIG.2(A) Between the auxiliary shaft collar and casting.

FIG.2(B) Between the auxiliary shaft gear and casting.

FIG.2(C) Between each motor worm gear hub and casting.

FIG.2(D) Between each dial hub and casting.

FIG.2(E) Between counter shaft idler gears and casting.

FIG.3(A) Between each multi-jaw coupling and associated motor worm shaft bearing block.

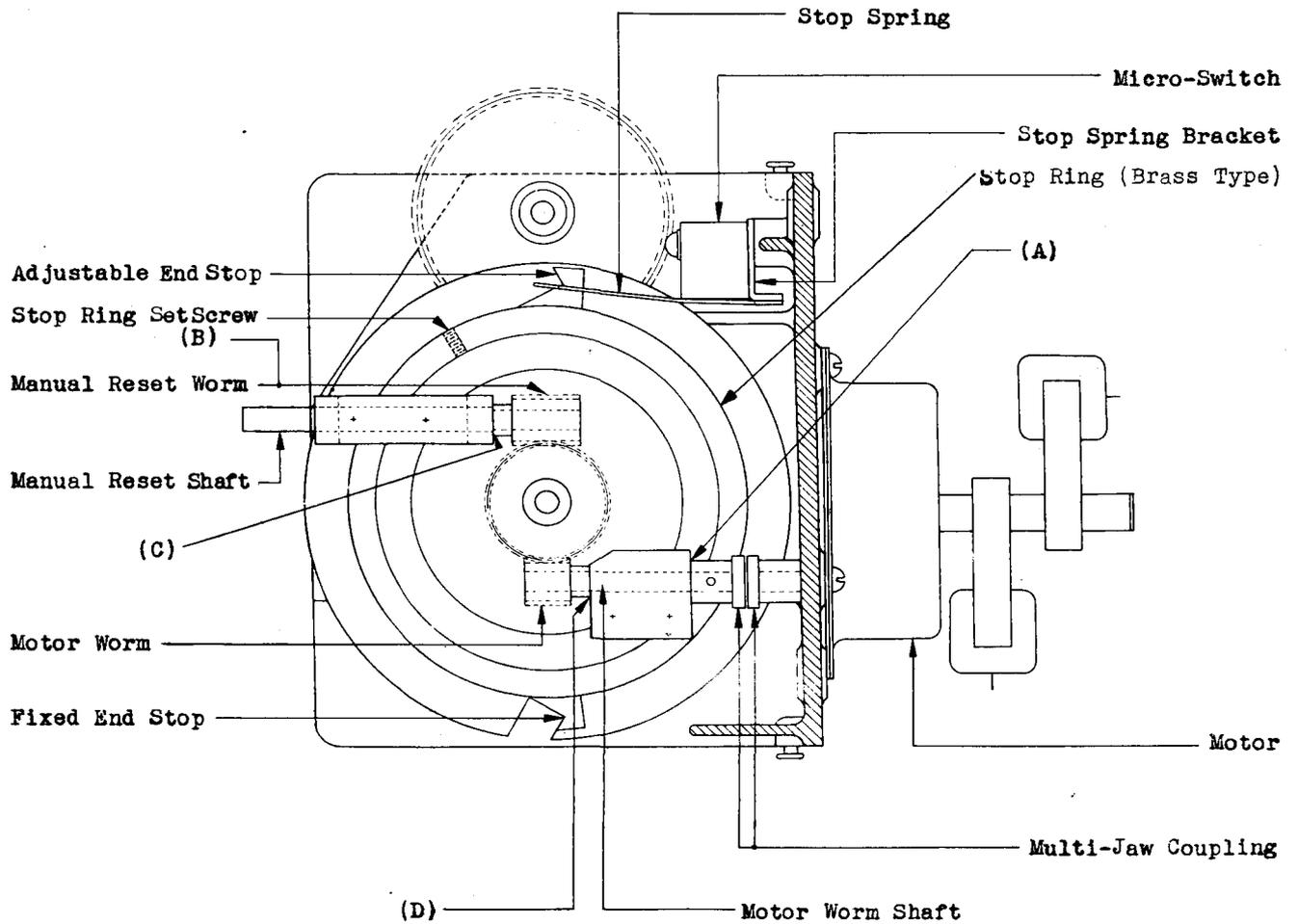


Fig. 3 - Designation of Parts and Lubricating Points
(Phenolic, and Steel Types of Stop Rings are shown in Figs. 14,15,16)

2.01 (Continued)

- FIG.4(A) Between each dial manual reset shaft collar and associated bracket.
 - FIG.4(B) Between each dial manual reset shaft washer and associated bracket.
 - FIG.3(D) Bearing block and worm shaft.
 - FIG.3(C) Bearing block and worm shaft.
 - FIG.5(B) On each fixed end stop.
- (2) The following points shall be lubricated with 2 drops of oil.

FIG.3(B) On manual reset worm for each dial.

FIG.2(F) On motor gear teeth for each dial.

(3) The following points shall be lubricated with 4 drops of oil.

FIG.2(G) Between planetary drive assembly and side of dial.

Recommended Lubrication Interval: After turnover, it is recommended that the parts be lubricated at intervals of six months. The interval may be extended if periodic inspections have indicated that local conditions are such that the parts affected will be adequately lubricated during the extended interval.

2.02 Record of Lubrication: During the period of installation, a record shall be kept, by date, of the lubrication of the drive mechanism 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.

2.03 Play Between Dial and Condenser Shaft: There shall be no play between the slope and flat condenser shaft and their associated dials. Gauge by eye and feel.

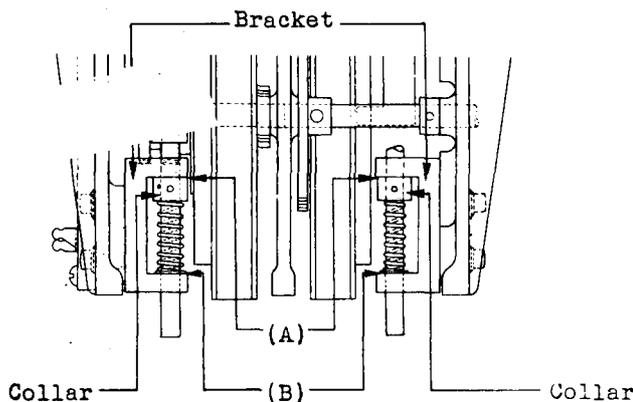


Fig. 4 - Designation of Parts and Lubricating Points

2.04 Dial Ribbon Position: Fig.5(A) - Each dial ribbon shall be positioned so that when the fixed end stop is against the stop spring (maximum travel), the 0 mark (for 0-100 dial ribbon) or 14 mark (for 14-86 dial ribbon) of the dial shall be exactly in line with the indicator mark.

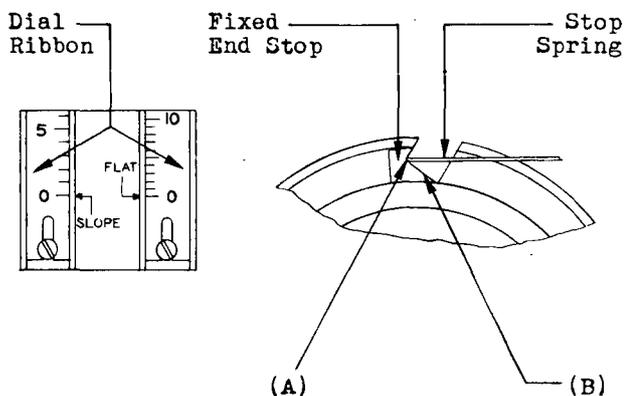


Fig. 5

2.05 Stop Ring Position

(a) Fig. 6(A) - The stop ring for each dial shall be positioned so that the stop is against the associated stop spring (maximum travel) when the dial is set as follows:

0-100 Dial Ribbon

The 100 mark on the dial shall be exactly in line with the indicator mark except at a West-East repeater when 86 shall be in line with the indicator mark.

14-86 Dial Ribbon

The 86 mark on the dial shall be exactly in line with the indicator mark.

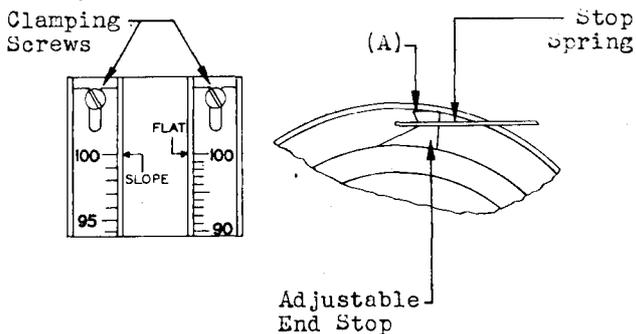


Fig. 6

(b) 0-100 Dial Ribbon Only: When the stop ring is positioned so that 100 is the maximum travel, the rotor plates of the slope condenser shall not touch the shields between stator 1 and 7 and 2 and 8 when the 100 mark on the slope dial is exactly in line with the indicator mark.

Note: Where requirement (b) is not met, the stop ring shall be positioned so that requirement (b) is met. In this case requirement (b) supersedes requirement (a) where the slope dial has a 0-100 ribbon and 100 is used.

(c) After Turnover Only: If desired to limit the travel of the dial to some lower point than that covered in (a), the stop ring shall be so positioned.

2.06 Relation Between Condenser Plates and Dial Settings

(a) Slope Condenser:

(1) For 0-100 dial ribbons not having a 28.6 mark: Fig. 7 (A) With the Slope dial at 0, the leading edges of the rotor plates of the Slope condenser shall be in line with the edges of the associated No. 8 stator plates. Gauge by eye.

(2) For 14-86 dial ribbons and 0-100 dial ribbons having a 28.6 mark: With the Slope dial at the 28.6 mark, the leading edges of the rotor plates of the Slope condenser shall be in line with the edges of the associated No. 6 stator plates. Gauge by eye.

(b) Flat Condenser: Fig. 8(A) - With the Flat dial at 0, the following edges of the rotor plates of the flat condenser shall be in line with the edges of the associated upper stator plates. Gauge by eye.

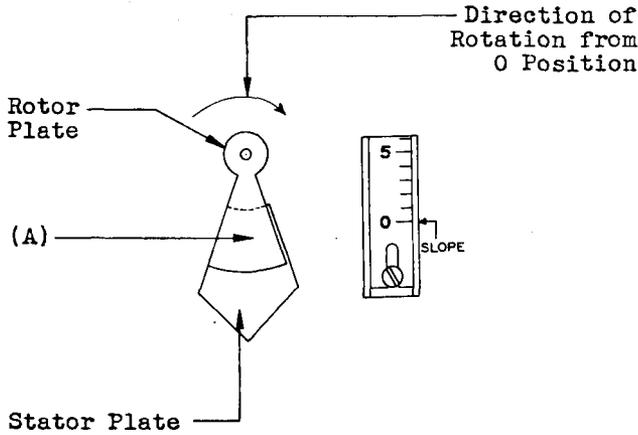


Fig. 7

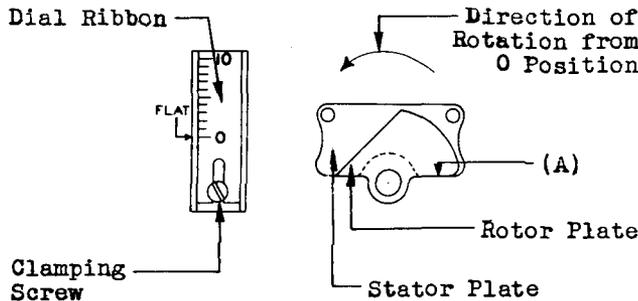


Fig. 8

(c) Auxiliary Slope Condenser: Fig. 9(A) - (Where provided) - With the Slope dial at 0, the leading edges of the rotor plates of the auxiliary slope condenser shall be exactly in line with the edges of the stator plates. Gauge by eye.

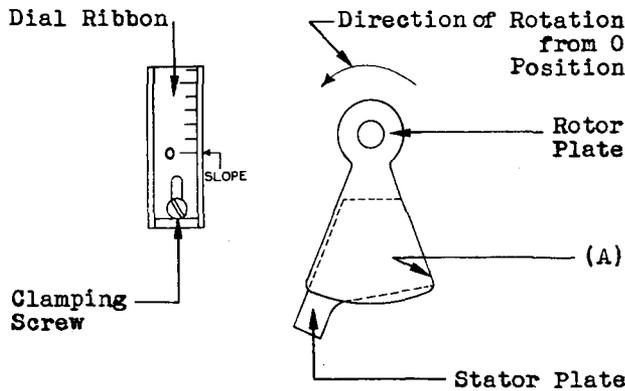


Fig. 9

2.07 Stop Spring Position

(a) Fig. 10(A) - The stop springs shall be positioned so that the associated micro switches operate with the dials set as follows. Gauge by ear as the switch snaps or by connecting a test receiver across terminal strip punchings 1 and 2.

Dial	Dial Range	Dial Setting	Micro Switch Operated
Slope	0-100	Between 1 and 3	Slope
Slope	14-86	Between 15 and 17	Slope
Flat	0-100	Between 2 and 4	Flat

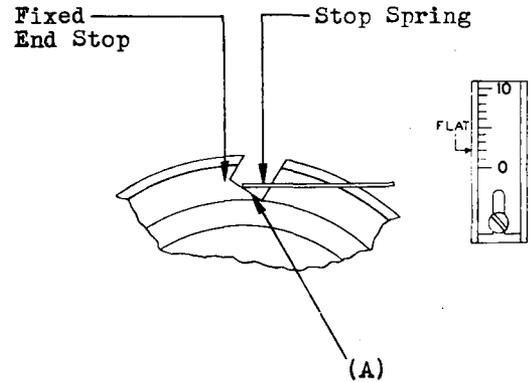


Fig. 10

(b) Fig. 11(A) - The stop springs shall not ride on the dial except at the end stops and shall clear the side of the dial in all positions. Gauge by eye.

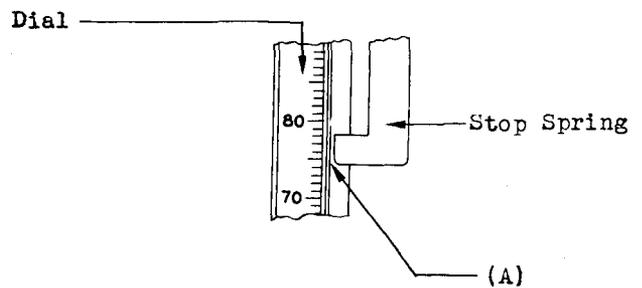


Fig. 11

2.08 Tightness of Auxiliary Shaft Gear and Counter Shaft Idler Gear: (Where Provided) - The gear shall be tight on the shaft. Gauge by feel.

2.09 Tightness of Flexible Coupling on Auxiliary Shaft: (Where Provided): The coupling shall be tight. Gauge by feel.

→ 2.10 Slope and Flat Dial Backlash and Gear Bind

(a) With the dials set at 50, the backlash shall be as follows:

Dial	Max. Backlash
Slope	1/2 dial division
Flat	1 dial division

(b) If requirement (a) on backlash cannot be met without introducing bind between the motor worm and its gear (or between the manual reset worm and gear) then requirement (a) is waived in which case the backlash shall be at a minimum consistent with free running. Gauge by eye and feel.

(c) There shall be no bind in the gears of the planetary gear train for the whole range of travel of the dial. Turn the dial through its range of travel by means of the manual reset knob. Also move the dial through its range of travel by means of its motor drive.

2.11 Motor Worm Shaft End Play: (Readjust Only) - The end play shall not exceed .003". Gauge by eye.

2.12 Clearance Between Multi-Jaw Coupling Sections: (Readjust Only) - Fig.12(A) - The clearance between the two sections of the multi-jaw coupling shall be approximately 1/16". Gauge by eye.

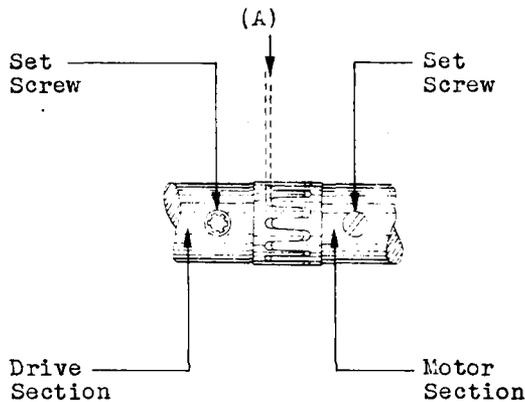


Fig. 12

3. ADJUSTING PROCEDURES

3.001 List of Tools and Materials

Code No.	Description
<u>Tools</u>	
418A	5/16" and 3/8" Hex. Open Double End Flat Wrench
486A	Oil Can

Code No. Description

Tools

- (See Note) Bristo No. 8 Set Screw Wrench-6 Spline
- (See Note) Bristo No.10 Set Screw Wrench-6 Spline
- (See Note) P-431479 Wrench
- Screwdriver, Cabinet, 3-1/2"
- Screwdriver, Regular, 4"
- Test Receiver

Note: These tools are furnished with equipment.

Materials

- W.E.Co. Petrolatum (unmedicated white vaseline may be used) 57997
- SAE 50 Motor Oil
- P-419508 Washers
- - KS-7860 Petroleum Spirits

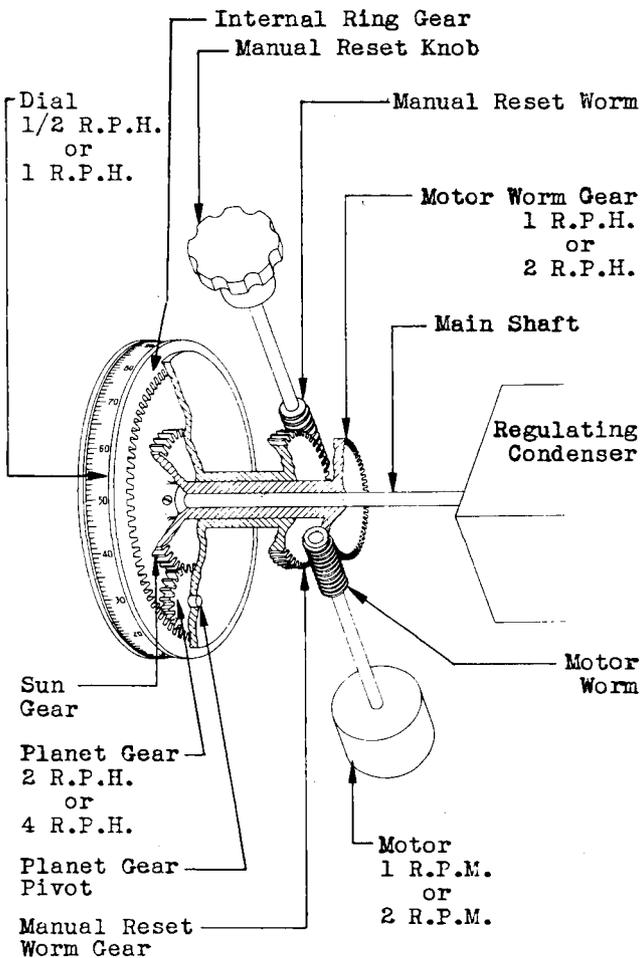
3.002 Remounting Telechron Motors: In remounting the motor after reoiling, exercise care to line up the two halves of the multi-jaw coupling so that the motor will run freely. To insure this, mesh the coupling while the motor is running. Check requirement 2.12.

→ 3.003 Operation of Planetary Gear Train:

(1) This condenser drive involves the use of a planetary gear train so that the condenser may be moved by either the motor or the manual reset knob independently. A functional sketch of this drive is shown in Fig. 13. It will be noted from this sketch that the motor worm, driving through its worm gear, will turn the sun gear. The sun gear turns the planet gear on its pivot. With the manual reset knob at rest, the planet gear pivot is stationary and the planet gear acts as an idler between the sun gear and the internal ring gear on the dial. Therefore the motor turns the dial and condenser, operating through the sun gear and the planet gear to the internal gear on the dial. As previously stated, under motor drive conditions, the planet gear pivot is held stationary. This is due to the irreversibility of the manual reset worm drive, i.e., the manual reset worm gear cannot drive the manual reset worm.

(2) When it is desired to set the condenser manually the manual reset knob is turned. In this case consider the motor stationary and, again due to the irreversibility of worm drives, the sun gear is stationary. Turning the manual reset worm will drive the manual reset worm gear and the disc in which

the planet gear pivot is mounted. Thus the planet gear and pivot will revolve about the sun gear. This planetary motion will drive the dial internal gear in the same direction as the planet gear pivot. Since the motor worm gear travels at a very slow rate (1 revolution per hour) the manual reset gear train acts practically as though the motor were stationary whether it is actually running or not, and the differential action of the epicyclic gear train provides ready manual adjustment at all times.



Note: The higher speeds are associated with the 2 R.P.M. motor.

Fig. 13 - View Showing Operation of Planetary Gear Train

3.01 Lubrication (Rq.2.01)

(1) Remove the top and bottom covers and the front cover plate, before lubricating. It will be necessary to remove the dial knobs before removing the cover plate. Remove all screws with the 3-1/2" cabinet screwdriver. Apply oil to the points specified with the 486A oil can.

3.02 Record of Lubrication (Rq.2.02)

No procedure.

3.03 Play Between Dial and Condenser Shaft (Rq.2.03)

(1) To correct the play, remove the top cover screws with the 3-1/2" cabinet screwdriver and remove the cover. Then turn the dial until it is near the top end to permit access to the dial set screw thru the cut out in the dial. Tighten the dial set screw with the Bristo No. 10 wrench and the set screws in the condenser and shaft flexible coupling with the 3-1/2" cabinet screwdriver. Exercise care that the dial set screw engages the flat on the shaft. Remount cover, tightening the screws securely.

(2) Recheck requirement 2.06.

3.04 Dial Ribbon Position (Rq.2.04)

(1) To reset the dial ribbon, remove the top cover screws with the 3-1/2" cabinet screwdriver and remove the cover. Then turn the dial until the dial ribbon clamping screws are accessible. Slightly loosen the two clamping screws with the 3-1/2" cabinet screwdriver and rotate the dial ribbon as required. Retighten the clamping screws securely. Remount cover, tightening the screws securely. Recheck 2.05.

3.05 Stop Ring Position (Rq.2.05)

(1) The stop ring may be one of the following four types; brass, phenolic (plastic), one piece steel or two piece steel. The first two types of stop rings are held in position by a set screw, whereas the one piece steel stop ring is held in position by a clamp screw and the two piece steel stop ring by two clamp screws. See Figs. 3, 14, 15, 16.

(2) To reposition the stop ring, remove the top cover screws with the 3-1/2" cabinet screwdriver and remove the cover. Then set the dial near the top end to make accessible the clamp screw (or set screw) of the stop ring. (The set screw should be in the hole nearest the adjustable end stop.

(3) If the full travel is reached before the 100 mark or 86 mark (where this is used) is in line with the indicator mark, proceed as follows. Loosen the set screw in the stop ring with the Bristo No. 8 wrench (or loosen the clamp screw of the steel stop ring with the screwdriver), and then turn the manual control knob slowly until the 100 mark or 86 mark is exactly in line with the indicator mark. Then securely tighten the set screw (or clamp screw), while keeping the stop at maximum travel. Remount the cover tightening the screws securely.

(4) If, when the full travel is reached, the 100 mark or 86 mark (where this

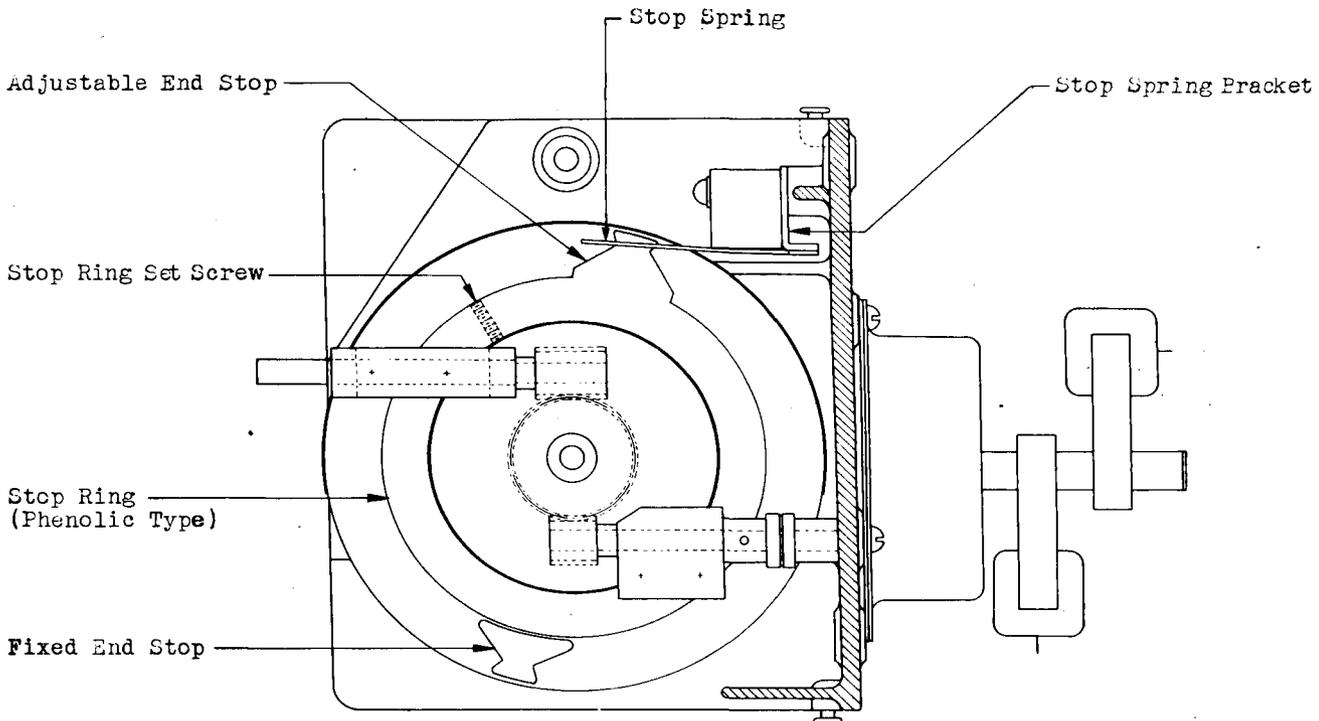


Fig. 14

3.05(4)

is used) is past the indicator mark, proceed as follows. Loosen the set screw in the stop ring with the Bristo No. 8 wrench (or loosen the clamp screw of the steel stop ring with the screwdriver) and then rotate the stop ring toward the front of the unit until with the fixed stop against the stop spring (maximum travel) the 100 mark or 86 mark has not quite reached the indicator mark. Then turn the manual control knob until the 100 mark or 86 mark lines up with the indicator mark. Tighten the set screw (or clamp screw) securely while keeping the stop at maximum travel. Remount the cover, tightening the screws securely.

(5) If, at the point of maximum travel the 100 mark is in line with the indicator mark but the rotor plates of the slope condenser touch the shields, set the stop ring so that the rotor plates cannot touch the shields. This waives the requirement for the slope dial that at maximum travel the 100 mark shall be in line with the indicator mark. To adjust so that the rotor plates of the slope condenser do not touch the shields, turn the dial until the plates

do touch the shields and then back off the plates slightly. Then, loosen the set screw in the stop ring with the Bristo No.8 wrench (or loosen the clamp screw of the steel stop ring with the screwdriver), and then rotate the ring toward the front of the unit until the adjustable stop engages the stop spring and establishes the maximum travel. Tighten the set screw (or clamp screw) securely. Remount the cover, tightening the screws securely.

(6) Where, for maintenance reasons, it is desired to limit the maximum gain of the amplifier, adjust the stop ring the same as above to stop the travel at some point below 100.

3.06 Relation Between Condenser Plates and Dial Settings (Rq.2.06)

(1) To align the condenser plates with the dial settings, loosen the condenser coupling set screws, where accessible, otherwise loosen the shaft coupling set screws with the 3-1/2" cabinet screwdriver and rotate the condenser as required. Retighten the set screws securely.

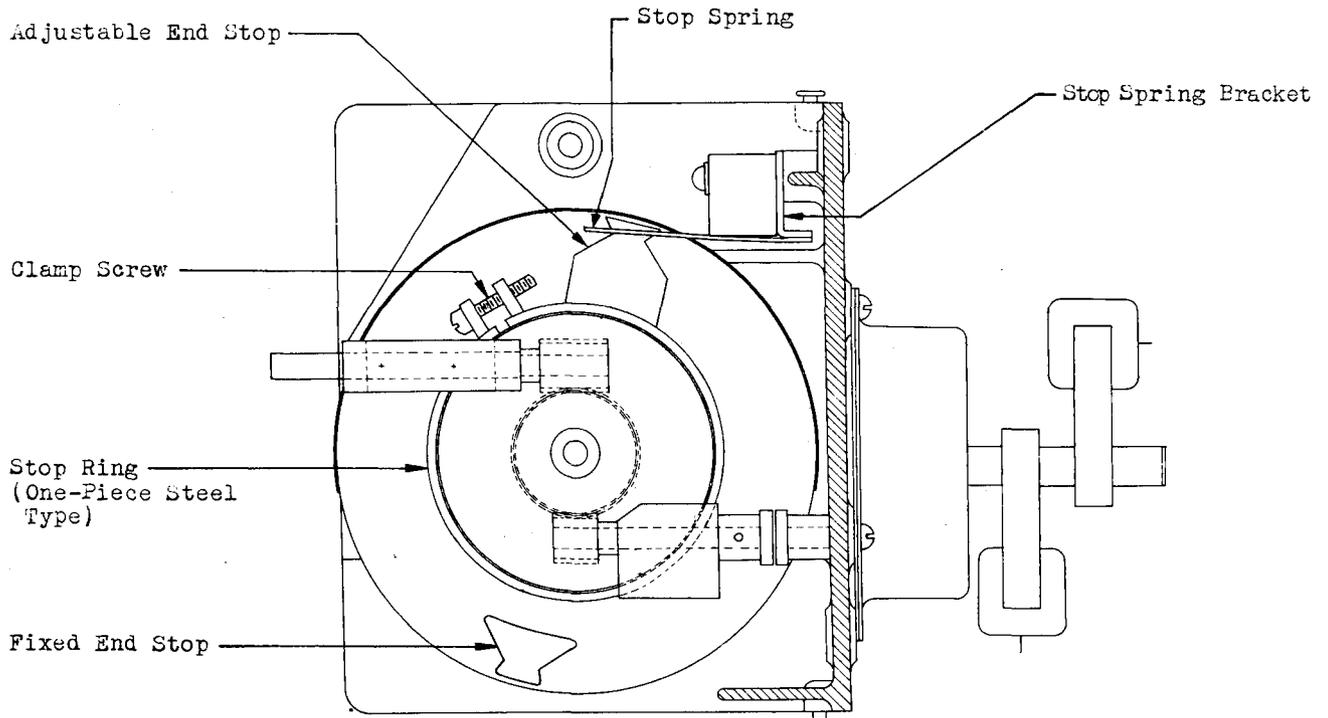


Fig. 15

3.07 Stop Springs Position (Rq.2.07)

(1) To reposition the stop springs, remove the top cover screws with the 3-1/2" cabinet screwdriver and remove the cover. Then loosen the two mounting screws for the micro switch and stop spring bracket with the 3-1/2" cabinet screwdriver and shift the bracket as required. Retighten the mounting screws securely. Replace the cover, tightening the screws securely.

3.08 Tightness of Auxiliary Shaft Gear and Counter Shaft Idler Gear (Rq.2.08)

(1) Remove the top cover screws with the 3-1/2" cabinet screwdriver and remove the cover. Turn the flat dial manual reset knob until the dial is about at 70. Then turn the slope dial manual reset knob until the set screw in the gear hub can be seen through the opening in the flat dial. Tighten the set screw with the Bristo No. 10 set screw wrench, inserting the wrench through the cutout in the flat dial. Tighten set screw for auxiliary shaft with the Bristo No. 10 set screw wrench. Remount cover, tightening the screws securely.

3.09 Tightness of Flexible Coupling on Auxiliary Shaft (Rq.2.09)

(1) Tighten the set screws in the coupling with the 3-1/2" cabinet screwdriver. Then recheck requirement 2.06 (c).

3.10 Slope and Flat Dial Backlash and Gear Bind (Rq.2.10)**3.11 Motor Worm Shaft End Play (Rq.2.11)****3.12 Clearance Between Multi-Jaw Coupling Sections (Rq.2.12)**

(1) To correct for excessive backlash, where binding does not exist, remove the condenser drive as follows. Remove the leads from the condensers and external leads to the terminal strip on the left side of the casting. Then remove the mounting screws for the condenser drive with the 4" regular screwdriver and lift off the condenser drive. Remove the top and bottom covers, dial knobs and front plate and spacers using the 3-1/2" cabinet screwdriver. Place the unit so that the front end is up.

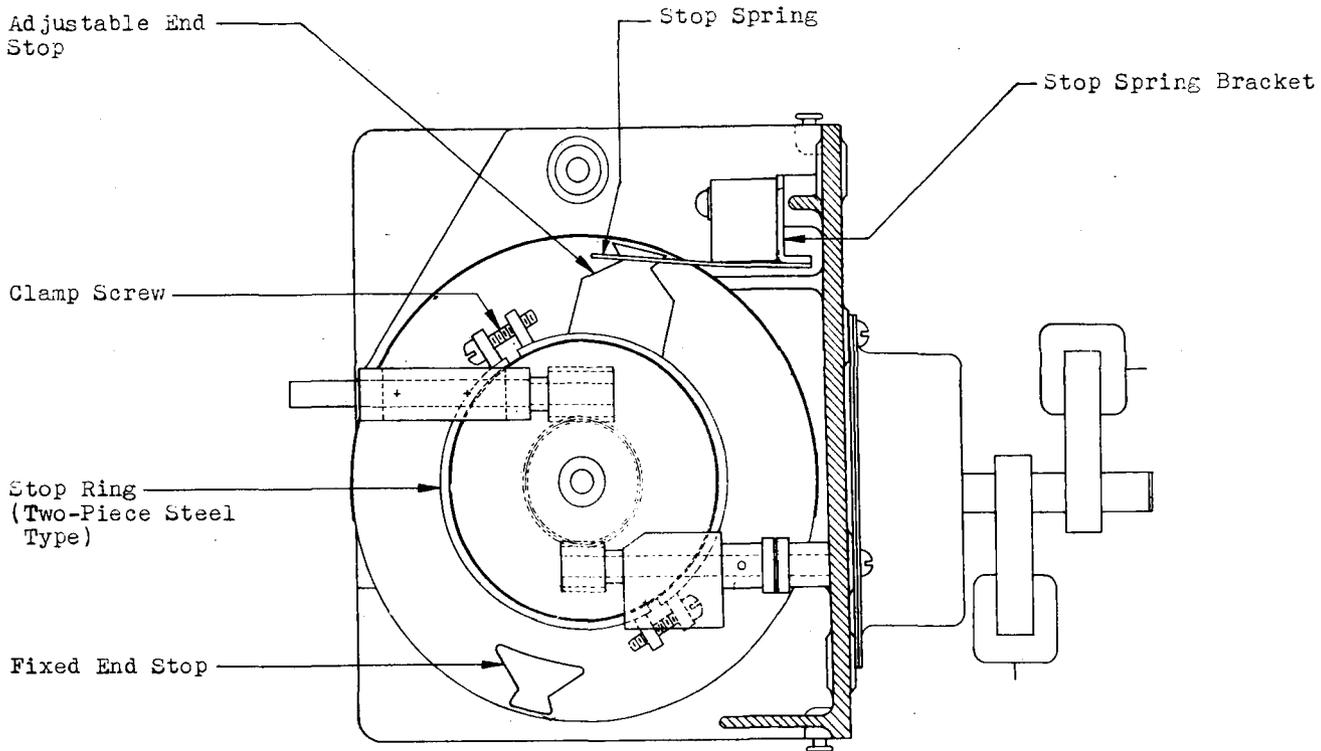


Fig. 16

3.10-3.12

(2) Check that end play of motor worm shaft does not exceed .003". If it does, loosen the set screw in the section of the multi-jaw coupling on the shaft with the Bristo No. 8 wrench and reposition coupling.

(3) Check that the gap between the two halves of the multi-jaw coupling is approximately 1/16". If it is not, loosen the set screw in the motor half of the coupling with the 3-1/2" cabinet screwdriver or Bristo No. 8 wrench and shift the coupling as required.

(4) Check the position of the motor worm with relation to the driven worm gear. The mesh should be as close as possible without causing binding. To change position of motor worm with respect to the gear, loosen the motor worm bearing block mounting screws with the P-431479 wrench and shift bearing block as required. Retighten screws securely.

(5) Check the position of the manual reset worm with relation to the driven gear. The mesh should be as close as →

possible without causing binding. To change position of manual reset worm with respect to the gear, loosen the manual reset worm bearing block mounting screws with the P-431479 wrench and shift bearing block as required. Retighten screws.

(6) Remount drive, top and bottom covers, front plate and spacers and dial knobs, tightening all screws securely. Connect leads.

(7) If it has been necessary to reposition bearing blocks as covered in (4) and (5) a continuous test run should be made on the motor, running in one direction for one hour, to be certain that there is no binding. In addition, the manual reset knob should be turned throughout its range and tightness determined by feel. Any adjustment of the motor worm bearing block or manual reset worm bearing block to relieve tightness should be as slight as possible to keep the backlash of the dial at a minimum.

(8) To correct for bind, remove the condenser drive as in (1), check motor

3.10-3.12

worm as in (4), and check manual reset worm as in (5). If, after the best possible adjustment of the worms, it is still difficult to turn the manual reset knob, or if the motor fails to drive the assembly, it is an indication that the trouble is in the planetary gear assembly, in which case proceed as follows.

(9) Remove the mounting screws of the manual reset worm bearing block with the P-431479 wrench and lift off the manual reset shaft, bearing block and worm.

(10) Remove the flat (or slope) condenser, depending on the drive assembly in question. To remove the flat condenser, loosen the condenser coupling set screws on the main shaft with the 3-1/2" cabinet screwdriver. Remove the condenser mounting screws with the 3-1/2" cabinet screwdriver and then slide out the condenser and coupling. Then with the Bristo No. 10 set screw wrench loosen the set screw that holds the dial in position on the main shaft and withdraw the main shaft. The entire dial wheel and planetary gear assembly can then be removed.

(11) To remove the slope condenser, loosen the condenser coupling set screws on the main shaft with the 3-1/2" cabinet screwdriver. Then remove the condenser mounting nuts with the 418A wrench and remove the condenser. Then with the Bristo No. 10 set screw wrench loosen the dial set screw that holds the dial in position on the main shaft and withdraw the main shaft. The entire dial wheel and planetary gear assembly can then be removed.

(12) In order to keep the dial ribbon from becoming soiled or smudged with lubricant from the gears during the following procedure it should be temporarily removed from its dial wheel. Lift the sun and planet gears away from the internal gear. (The internal ring gear is permanently fastened to the dial wheel). Inspect the sun gear, planet gear and internal gear for the presence of small metal particles or burrs which may be causing the bind. Wipe off the lubricant present on the planetary gears, and scrape out the lubricant between the gear teeth with a toothpick. Further clean out the gear teeth using KS-7860 petroleum spirits and a small brush. While holding the manual reset worm gear stationary, turn the motor worm gear to check that the planet gear and sun gear mesh and turn freely on each other. Add

the internal gear to the gear train and check that the whole gear train works freely. Lift off the internal gear and apply W.E.Co. 57997 petrolatum to the teeth of the sun, planet and internal gears. Reassemble the planetary gear train. Remount the dial ribbon in place.

(13) Remount the planetary gear assembly in the housing taking care to see that the dial hub set screw engages the flat part on the main shaft provided for this purpose. Sufficient P-419508 washers should be used to keep the end play at a minimum. If there is end play between the planetary gear assembly and the housing in excess of .005" (the thickness of one P-419508 washer) wear on the worm gear will be accelerated. In addition, there is a possibility that the motor will not be able to back away after it has stalled in the end stop position.

(14) Remount the condenser in position, tightening the condenser mounting screws (or condenser mounting nuts on the slope condenser) securely. Tighten the condenser coupling set screws securely.

(15) Remount the manual reset worm bearing block in position. The mesh of the worm with the worm gear should be as close as possible without causing binding.

(16) Remount the drive, top and bottom covers, front plate and spacers and dial knobs, tightening all screws securely.

(17) Recheck dial ribbon position (2.04), stop ring position (2.05), and relation between condenser plates and dial settings (2.06).