TIMERS KS-8543 AND KS-8564
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the KS-8543 and KS-8564 timers.

1.02 Reference shall be made to Section 020-010-711 covering General Requirements and Definitions for additional information necessary for the proper application of requirements listed herein.

1.03 Before checking or readjusting to meet the requirements the equipment should be taken out of service in accordance with the procedures outlined in the section covering taking equipment out of service.

1.04 One drop of oil for the purpose of this section is the amount of oil released from the nozzle of the No. 401A oil gun when the plunger is turned in (clockwise) from the point at which the spring pawl of the oil gun engages one notch to the point at which the pawl engages the next notch.

2. REQUIREMENTS

2.01 Cleaning: Parts shall be cleaned when necessary in accordance with approved procedures.

2.02 Lubrication

(a) The following points shall be adequately lubricated with KS-7470 oil. When lubrication is necessary one drop of oil shall be applied to each of the following points:

Switch Roller Bearings	- Fig. 1 (A)
Cam Shaft Bearings	- Fig. 2 (A)
Rocker Arm Bearings	- Fig. 2 (B)
End of Wire Coupling	- Fig. 2 (C)
Intermediate Gear Bearings	- Fig. 3 (A)
Intermediate Gear Pinion Teeth	- Fig. 3 (B)
Governor Pinion Teeth	

Note: Particular care shall be taken in lubricating the governor pinion teeth as excess oil is likely to reach the inside surface of the governor and affect the speed.

(b) The following points shall be given a much smaller amount of KS-7470 oil than the points outlined in (a). Exercise care to keep the inside friction surface of the governor free from oil.

Governor Bearing
Bearing in Governor Case - Fig. 2 (D)

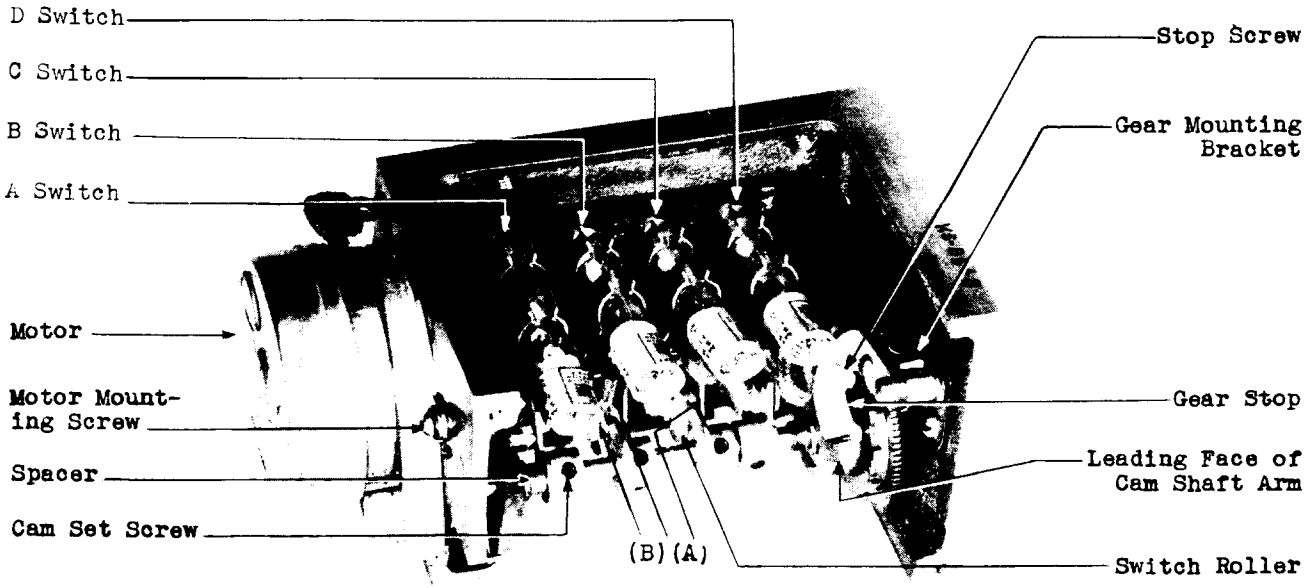

Fig. 1 - KS-8543 Timer

(c) Recommended lubrication interval: After turnover it is recommended that all parts listed above shall be lubricated at intervals of one month. Under ordinary circumstances this interval will be satisfactory. There may, however, be local conditions such as high temperature which will necessitate lubrication at more frequent intervals. The interval may be extended if periodic inspection indicates that the requirements will be met during the extended interval.

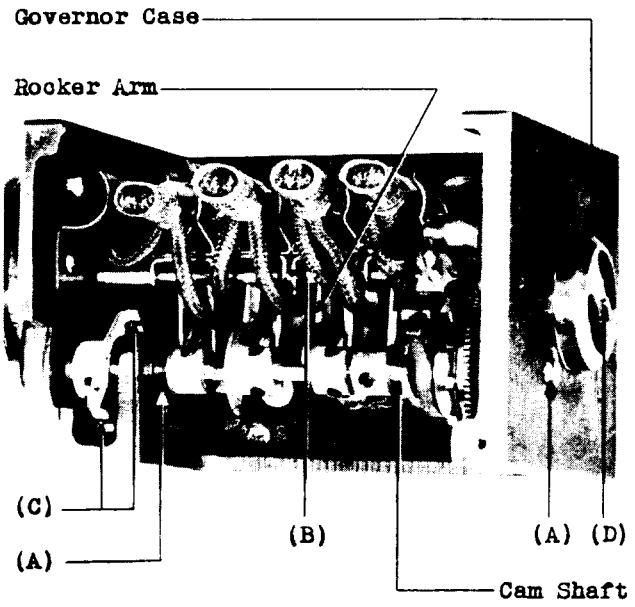

Fig. 2 - End View of Timer

2.03 Record of Lubrication: During the period of installation a record shall be kept by date of the lubrication 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 Mounting of Timer and Timer Parts

(a) Timers shall be fastened securely to the mounting plate and shall be so mounted that the front surfaces of the timer frame are approximately vertical and the cam shaft is approximately horizontal. Gauge by eye and feel.

(b) The motor, gear mounting bracket and gear stop shall be mounted securely. Gauge by feel.

(c) The stop screw lock nut(when equipped) shall be sufficiently tight to hold the stop screw in its adjusted position. Gauge by feel.

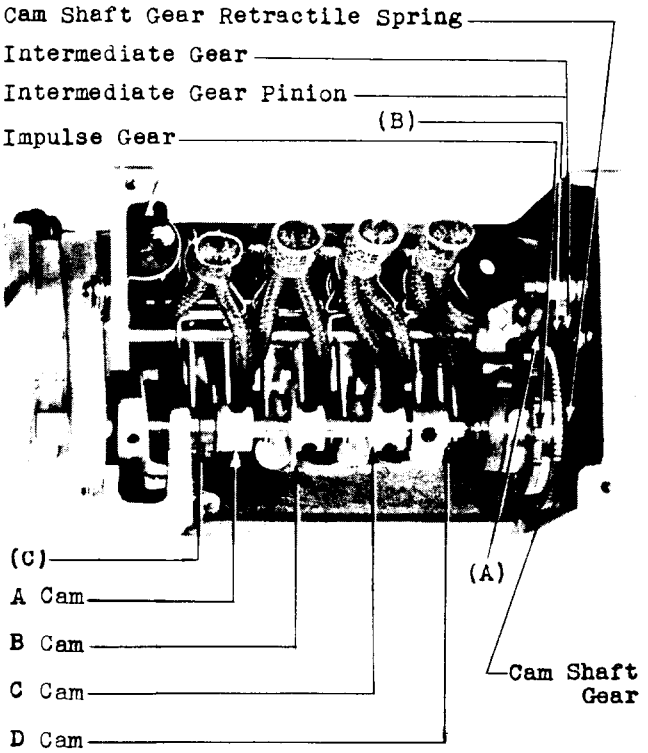

Fig. 3 - Cam Arrangement

2.05 Cam and Switch Roller Engagement: Fig. 1 (B): In all positions of the cam shaft in which the face of a cam contacts the associated roller and with the end play of the cam shaft taken up in one direction and the end play of the rocker arm and switch roller taken up in the other, each edge of the cam shall clear the adjacent edge of the roller by
Min. .010".
Turn the cam shaft and gauge by eye.

2.06 Freedom of Movement and End Play of Cam Shaft

(a) Fig. 3 (C): The cam shaft shall have perceptible end play. Gauge by eye and feel.

(b) The cam shaft shall turn freely in its bearings. Gauge by feel.

2.07 Freedom of Switch Movement

(a) The switch rollers shall at all times rest against the cams and the switch units shall not bind at any point. Gauge by eye and feel.

(b) The switch rollers shall turn freely in their bearings. Gauge by feel.

(c) The rocker arms shall move freely on their bearings. Gauge by feel.

2.08 Cam Shaft Gear Retractile Spring Tension

(a) With the cam shaft rotated from the normal position so that there is a gap of approximately 1/4" between the cam shaft arm and the gear stop, the gear shall move toward the normal position with a force applied to a tooth of the impulse gear in the operating direction of
Test 40 grams
Readj. 55 grams
Use the No. 70J gauge as shown in Fig. 4.

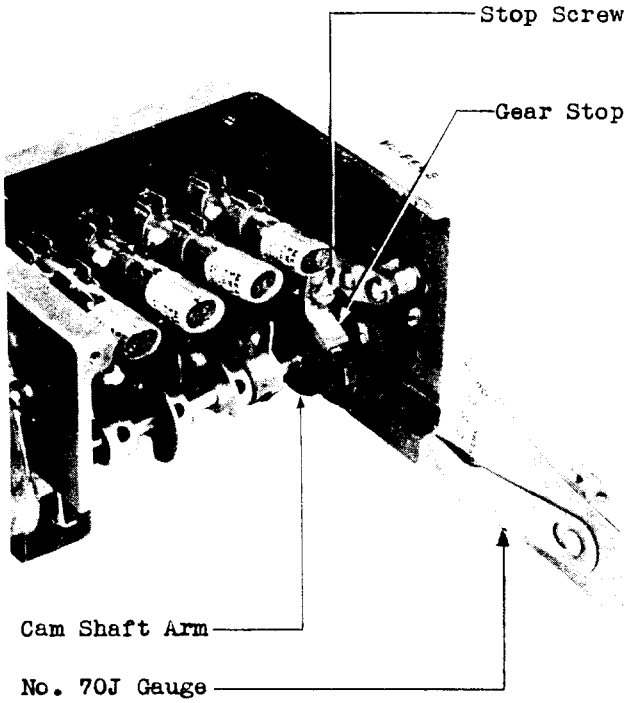

Fig. 4 - Checking Cam Shaft Gear Retractile Spring Tension

(b) With the cam shaft rotated until the cam shaft arm strikes the stop screw, the cam shaft arm shall not leave the stop screw with a force applied to a tooth of the impulse gear in the operating direction of
Test 250 grams
Readj. 225 grams
Use the No. 62B gauge

2.09 Timing Requirements

KS-8543 Timer

(a) The A switch shall open in
Min. 1 sec.
Max. 2 sec.
after the motor is energized. Use the KS-3008 stop watch.

(b) The B switch shall close in
Min. 10 seconds
Max. 11 seconds
after the A switch opens.
Use the KS-3008 stop watch.

(c) The C switch shall close in
Min. 20 seconds
Max. 22 seconds
after the A switch opens.
Use the KS-3008 stop watch.

(d) The D switch shall close in
Min. 30 seconds
Max. 33 seconds
after the A switch opens.
Use the KS-3008 stop watch.

(e) The timer shall restore to normal in
Min. 1 second
Max. 2 seconds
after the D switch closes.
Use the KS-3008 stop watch.

KS-8564 Timer

(f) The A switch shall open in
Max. 5 seconds
after the motor is energized.
Use the KS-3008 stop watch.

(g) The B switch shall close in
Min. 2 minutes
after the A switch opens.
Use a KS-3008 stop watch.

(h) The B switch shall operate and then immediately restore to normal in
Max. 2 minutes 20 seconds
Use the KS-3008 stop watch.

Checking Timing Requirements

(i) To check timing requirements (a) to (h), inclusive, first manually operate the associated relay which starts the timer.

(1) When checking requirement (e), release the start relay just as the mercury in switch D touches the contacts and at the same time start timing with the stop watch. Cease timing when the cam shaft arm rests against the gear stop.

(2) When checking requirement (h), begin timing when the relay that starts the timer is operated. Release the relay when the mercury in the B switch touches the contacts. Cease timing when the cam shaft arm restores against the gear stop.

2.09 (Continued)

(3) In all cases release the relay that starts the timer after timing has been completed, unless it has already been released.

2.10 Stop Screw Position

(a) With a gauge of
Test .035"
Readj. .030"
inserted between the stop screw and the leading face of the cam shaft arm and the cam shaft gear rotated until the gauge fits snugly between the stop screw and the cam shaft arm, the mercury in the switch which is nearest to the stop screw shall not touch the contacts. To check the requirement, use the No. 92K gauge as shown in Fig. 5.

(b) With a gauge of
Test .010"
Readj. .015"
inserted between the stop screw and the leading face of the cam shaft arm and the cam shaft gear rotated until the gauge fits snugly between the stop screw and the cam shaft arm, the mercury in the switch which is nearest to the stop screw shall touch the contacts. To check the requirement, use the No. 92A gauge as shown in Fig. 5.

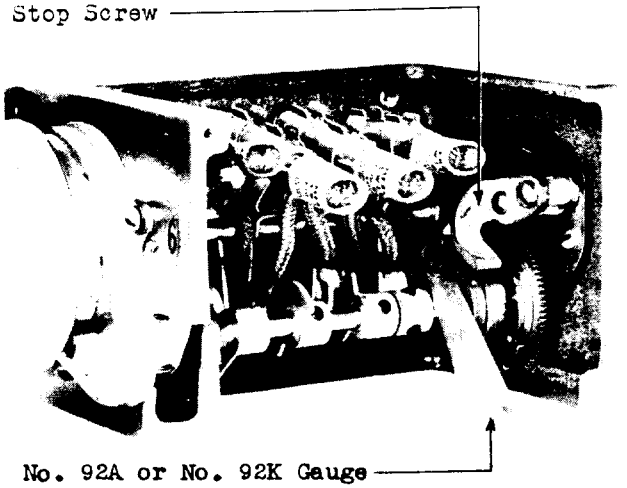

Fig. 5 - Checking Stop Screw Position

3. ADJUSTING PROCEDURES

3.001 List of Tools, Gauges and Materials

Code No.	Description
Tools	
206	30° Offset Screwdriver
207	90° Offset Screwdriver
265C	Contact Burnisher Holder
485A(Two required)	Smooth Jaw Pliers
401A(Equipped with P-249511 Nozzle)	Oil Gun
539A	1/4" Hex. Open Double End Wrench
R2217	Bent Tweezers
R1575	No. 4 Artist's Show Card Brush
-	3" Cabinet Screwdriver
-	4" Regular Screwdriver
-	No. 5 or No. 6 Allen Set Screw Wrench
-	4 oz. Riveting Hammer
-	No. 57 Twist Drill
Gauges	
62B	0-700 Gram Gauge
70J	0-150 Gram Gauge
74D	Thickness Gauge Nest
92A	.010" Non-magnetic Offset Thickness Gauge
92E	.015" Non-magnetic Offset Thickness Gauge
92J	.030" Non-magnetic Offset Thickness Gauge
92K	.035" Non-magnetic Offset Thickness Gauge
KS-3008	Stop Watch
Materials	
D-98063	Cloth
KS-7470	Oil
KS-7860	Petroleum Spirits
-	No. 18 gauge bare wire - approximately 1" long

3.002 To remove a timer, disconnect the plug of the wiring cable from its associated jack at the rear of the frame. Loosen the timer mounting screws with the 4" regular screwdriver. At the front of the frame, lift the timer and remove it from its mounting screws.

3.01 Cleaning (Rq.2.01)

(1) Bearings, Gears and Pinions: If, upon inspection, there is found to be an accumulation of gummy oil or foreign matter on these parts, flush them with the No. 4 Artist's Show Card brush which has been dipped in petroleum spirits. Operate the parts a few times and them wipe off excess petroleum spirits and foreign matter with a clean dry D-98063 cloth. Repeat this operation until all the dirt has been removed and then relubricate the parts, as outlined in 3.02.

3.02 Lubrication (Rq.2.02)

(1) After lubricating any part of the timer, wipe off excess lubricant with the D-98063 cloth.

(2) Apply the specified quantity of lubricant with the No. 401A oil gun to the specified parts. Lubricate the governor bearing and bearing in the governor case, as outlined in (4), below.

(3) Caution: Exercise great care to keep the inside friction surfaces of the governor free from oil.

(4) Governor Bearing and Bearing in the Governor Case: Instead of turning the plunger of the oil gun in order to give a drop of oil prior to oiling, as described in 1.04, merely touch the point of the nozzle to the governor bearing, and also the bearing in the governor case. This will give these bearings a smaller amount of oil than that given the other points of the timer.

3.03 Record of Lubrication (Rq.2.03)

(No procedure)

3.04 Mounting of Timer and Timer Parts (Rq.2.04)

(1) Use the 4" regular screwdriver to tighten the timer mounting screws. If the timer is mounted so that the cam shaft is not horizontal, loosen the timer mounting screws and adjust the position of the timer, as required. Tighten the mounting screws securely.

(2) If the frame of the timer is not vertical and the position prevents the timing requirements from being met, loosen the timer mounting screw with the 4" regular screwdriver and shift the position of the timer, as required. Tighten the mounting screws securely. If the mounting requirement cannot be met in this way refer the matter to the supervisor.

(3) Tighten loose motor mounting screws, gear mounting bracket mounting screws and gear stop mounting screws with the 3" cabinet or 206 and 207 offset screwdriver.

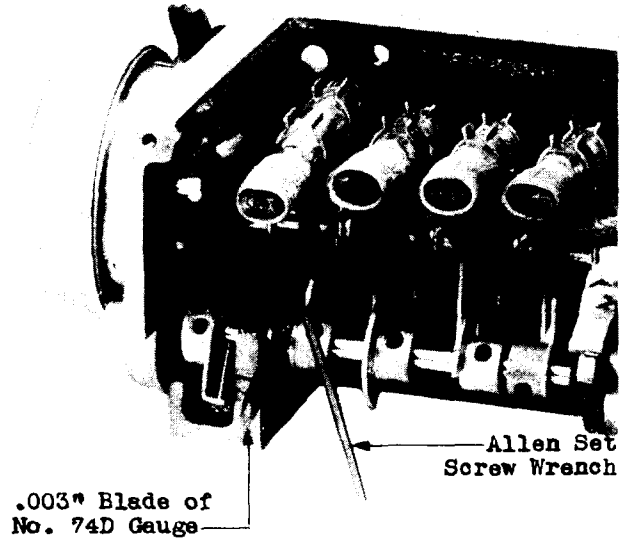

Fig. 6 - Adjusting End Play of Cam Shaft

(4) To tighten the stop screw lock nut, when equipped, hold the stop screw in position with the 3" cabinet screwdriver and tighten the lock nut securely with the No. 539A wrench.

3.05 Cam and Switch Roller Engagement (Rq.2.05)

(1) If the cam and switch roller engagement requirement is not met it may be due to improperly positioned cams or to a bent cam.

(2) To adjust the position of a B, C, or D cam, loosen the two cam set screws with the Allen set screw wrench and move the cam to the right or left as required, exercising care not to rotate the cam on the shaft. Tighten the cam set screws securely.

(3) If any cams are bent straighten them with the No. 485A pliers. Grasp the cam with the pliers near the base of the cam and adjust the cam to the right or left as required exercising care not to bend the cam shaft. If the B or C cams are being straightened, use two pairs of pliers. Use one pair to hold the straight part of the cam and straighten the bent part with the other pair.

(4) After making any of the above adjustments check that requirements 2.06 and 2.08 are met.

3.06 Freedom of Movement and End Play of Cam Shaft (Rq.2.06)

(1) If the cam shaft end play requirement is not met, loosen the A cam set screws with the Allen set screw wrench and shift the "A" cam as indicated in (2). Exercise care not to change the front to rear position of the A cam when making this adjustment.

(2) Insert the .003 in. blade of the No. 74D gauge between the A cam and the adjacent spacer as shown in Figure 6. Take the play in the cam shaft up to the right and hold the A cam against the gauge. Tighten the set screws securely. Remove the No. 74D gauge.

(3) If the cam shaft does not turn freely, rotate the cam shaft manually and if any switch leads touch the cams, position the leads with the fingers or the R-2217 tweezers, as required to give adequate clearance.

(4) If the cam shaft still does not turn freely it may be due to dirt in the bearings or gears. Clean dirty gears and bearings as outlined in 3.01.

(5) Check that requirements 2.05 and 2.08 are met.

3.07 Freedom of Switch Movement

(1) If the rollers do not at all times rest against the cams, or if the rocker arms do not move freely, check that the switch leads do not obstruct the movement of the rocker arms. Position the leads with the fingers, or the R2217 tweezers, as required, to prevent interference with moving parts.

(2) If adjacent switch units touch, attempt to obtain a clearance by inserting the flat blade of a No. 265C contact burnisher between the mountings and burnish the surfaces which touch. If a clearance cannot be obtained in this manner, refer the matter to the supervisor.

(3) If the switch rollers or rocker arms do not turn freely, it may be due to dirty bearings. Clean dirty roller bearings or rocker arm bearings as outlined in 3.01.

3.08 Cam Shaft Gear Retractile Spring Tension (Rq.2.07)

(1) If the retractile spring tension requirement is not met, dismount the timer and then proceed as follows. Break off the shank end of a No. 57 twist drill about 3/4" long by bending the drill with the No. 485A pliers. Turn the cam shaft until one end of the pin in the cam shaft arm is accessible. Use the 4 oz. riveting hammer and the shank end of the twist drill and drive out the pin, using care not to damage the timer or lose the pin.

(2) Loosen the stop screw lock nut with the No. 539A wrench and remove the stop screw with the 3" cabinet screwdriver. Remove the gear stop bracket mounting screws with the Nos. 206 and 207 offset screwdrivers. Hold the cam shaft gear to prevent its turning when the bracket is removed from its mounting.

(3) If more tension is required in the retractile spring, rotate the cam shaft gear in the operating direction one or more revolutions, as required, from its normal position. If less tension is required, rotate the gear one or more revolutions, as required, in the restoring direction.

(4) Remount the gear stop and tighten its mounting screws securely. Replace the stop screw. Position the cam shaft in its approximate normal position to line up the holes in the shaft and the cam shaft arm, and insert the shank end of the drill through the hole in the cam shaft arm and cam shaft to position the gear. Insert the pin in the hole of the cam shaft arm and hammer it in place, which action will drive the wire out on the opposite side of the shaft. Take care not to bend the pin or injure the timer. Readjust the stop screw position, as outlined in 3.09.

3.09 Timing Requirements (Rq.2.09)

(1) If the timing requirements are not met it may be due to improper mounting, bind in the shaft, interference from switch leads, governor out of adjustment or incorrectly positioned cams.

(2) If the mounting requirement is not met, adjust the timer position, as outlined in 3.04.

(3) If the cam shaft binds due to dirt in the bearings clean the bearings as outlined in 3.01. If the cam shaft is bent refer the matter to the supervisor.

(4) Position switch leads, with the fingers or the R-2217 tweezers, to prevent interference with moving parts.

(5) If the timer does not restore to normal evenly or within the specified time it is an indication that the governor is out of adjustment. Adjust the governor as outlined in (6) to (9) inclusive.

(6) Place the No. 260 governor holder on the governor as shown in Figure 7.

3.09 (Continued)

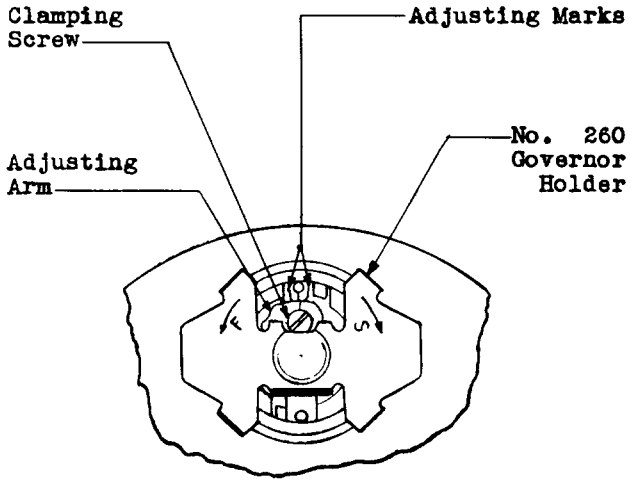

Fig. 7 - Illustrating the Position of the No. 260 Governor Holder

(7) Loosen the clamping screw with the 3" cabinet screwdriver only enough to permit movement of the adjusting arm with slight friction.

Note: In case the tip of the blade of the 3 in. cabinet screwdriver is too thick to engage the slot in the governor clamping screw, select a screwdriver which has a narrower blade or file the blade down slightly to fit the slot in the screw.

(8) Move the adjusting arm toward "F" (to increase the speed) or toward "S" (to reduce the speed) gauging the amount of movement by the adjusting marks, when provided.

(9) Tighten the clamping screw and remove the governor holder.

(10) To adjust the timing requirements for the A, B, C or D switch, loosen the associated cam set screws with the Allen set screw wrench. Rotate the cam on the shaft, as required, to close the switch contacts as required, exercising care not to change the right to left adjustment of the cams.

(11) After making this adjustment check to determine that requirements 2.04 and 2.05 are met.

3.10 Stop Screw Position (Rq.2.09)

(1) To adjust the position of the stop screw, loosen the stop screw lock nut, when equipped, with the No. 539A wrench. Hold the end of the No. 92J gauge against the end of the stop screw and turn the cam shaft until the gauge is held in position by the cam shaft arm, as shown in Fig. 5.

(2) Use the 3" cabinet screwdriver and turn the stop screw clockwise or counterclockwise, as required, until the mercury in the D switch is not touching the contacts, but with the switch moved perceptibly from its normal position. Tighten the stop screw lock nut securely.

(3) Check that the D switch closes when the No. 92E gauge is used, instead of the No. 92J gauge. If necessary, loosen the lock nut and turn the stop screw until the requirement is met with the No. 92E gauge. Tighten the lock nut securely.