

SIDE SWITCH
(PART OF EARLIER 197-TYPE SWITCHES)
REQUIREMENTS AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the side switch mounted on some of the earlier types of 197-type switches.

1.02 This section is reissued to revise the requirements and procedures for lubrication, to revise the List of Tools and Materials and, in general, to bring the section up to date. 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 *Normal position of side switch* is that position in which the private magnet is unoperated, the spider arm finger is locked in the first tooth of the escapement spring, and the side switch wiper is resting on the first bank contact.

1.05 *Preparation of KS-16832 L2 Lubricant:*

This lubricant is provided in 2-ounce and 1-pint containers. A small wide-mouth container, such as the 2-ounce jar in which the lubricant is available, should be used as a receptacle from which to dispense the lubricant. If allowed to stand more than 1 day without agitation, the lubricant ingredients tend to separate; therefore, before each day's use, shake the container of lubricant for approximately 30 seconds to insure mixing of the ingredients. The proper method of shaking the lubricant consists of repeated, rapid turning of the container to an upside down position and back to the upright position. If the lubricant from a 1-pint container is to be used, the lubricant must be mixed as just described before it is poured into the smaller container. Under storage conditions, the cover should be tight on the container.

1.06 *One dip of KS-16832 L2 lubricant* for the purpose of this section is the amount of lubricant retained on the KS-14164 brush after being dipped into the lubricant to a depth of approximately 3/8 inch and scraped once against the side of the container as the brush is removed.

1.07 *Private Magnet:* In addition to the requirements specified herein, the private magnet shall meet the requirements which are applicable in the section covering step-by-step relays.

2. REQUIREMENTS

2.01 *Cleaning*

- (a) Contacts shall be cleaned, when necessary, in accordance with approved procedures.
- (b) Other parts shall be cleaned, when necessary, in accordance with approved procedures.

2.02 *Lubrication*

- (a) The following parts shall be adequately lubricated with KS-16832 L2 lubricant. When lubrication is necessary, one dip shall be divided between the following points.
 - (1) The spider arm bearing pin just above the upper bearing lug of the spider arm.
 - (2) The spider arm bearing pin at the angle formed at the upper surface of the lower bearing lug.
 - (3) The spider arm link bearing.
- (b) The escapement teeth shall be adequately lubricated with KS-16832 L2 lubricant. When lubrication is necessary, one dip shall be distributed over all the teeth.
- (c) *Recommended Lubrication Interval:* After turnover it is recommended that the parts listed in requirements (a) and (b) be lubri-

SECTION 030-705-711

cated at intervals of 6 months. This interval may be extended if periodic inspections have indicated that local conditions are such as to insure that these requirements will be met during the extended interval.

2.03 Adjustable Escapement Springs: On connectors equipped with adjustable escapement springs, the upper springs shall be set so that the teeth of the upper spring are ahead of the teeth of the lower spring by 0.030 inch and the space between the tips of the upper and lower escapement springs are

Max 0.050 inch

Gauge by eye.

REQUIREMENTS FOR PRIVATE MAGNET SPRINGS

2.04 Private Magnet Spring Tension: The springs shall be tensioned to produce satisfactory operation of the side switch.

Gauge by eye or feel.

2.05 Private Magnet Contact Follow: There shall be a contact follow on all contacts of

Min 0.015 inch

Gauge by eye.

2.06 Private Magnet Contact Separation: The contact separation for make or break contacts shall be:

Min 0.008 inch

Gauge by eye.

REQUIREMENTS FOR CONTACT BLOCK

2.07 Position of Contact Block: The vertical center line through the contact block assembly shall be approximately parallel to the switch shaft.

Gauge by eye.

2.08 Block Contact Alignment: The block contacts shall be in alignment both horizontally and vertically to allow the wipers to pass over the upper and lower contacts freely.

Gauge by eye.

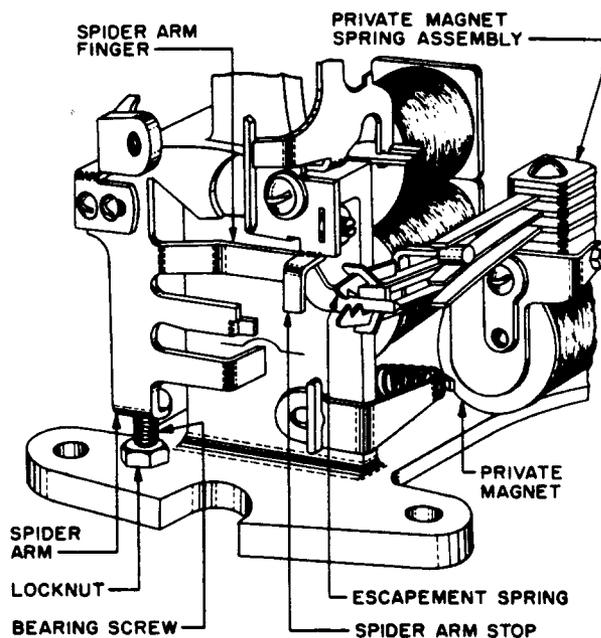


Fig. 1 - Side Switch

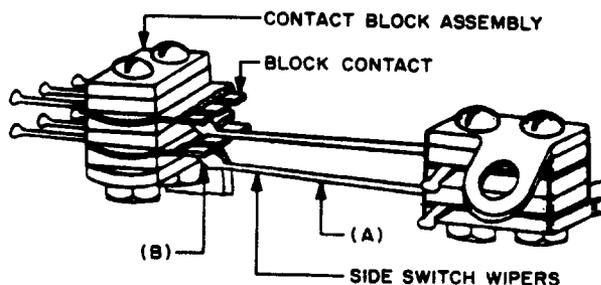


Fig. 2 - Alignment of Block Contacts

REQUIREMENTS FOR WIPER

2.09 Wiper Forming

(a) The wipers shall be approximately straight from the point where the springs leave the insulators to the beginning of the enlarged curved tip. The tip of the wipers shall form an angle of approximately 15 degrees.

Gauge by eye.

(b) The wipers shall make a knife edge contact on the block contacts.

Gauge by eye.

2.10 Wiper Tip Forming: The tips of the wipers shall be curved just enough to prevent them from catching on the block contacts but must not be curved enough for the wipers to drop between the contacts and cause the switch to stick.

Gauge by eye and feel.

2.11 Wiper Spring Tension: Fig. 2 (A) — The wiper springs shall have enough tension so that when pressure is applied midway between the front and back of the wiper to cause it to move 1/16 inch, the spring will just leave its contact.

Gauge by eye.

2.12 Wiper Alignment in the Second Position:

Fig. 2 (B) — When the side switch is in the second position and the private magnet is at normal, the wiper tips shall rest a little to the left of the center of the bank contacts. When the private magnet is energized, the wiper tips shall rest a little to the right of the center of the bank contacts.

Gauge by eye.

2.13 Overlap of Wiper Tips on the Block Contacts: Fig. 3 (A) — The tips of the wipers shall rest midway between the front and back of the block contacts.

Gauge by eye.

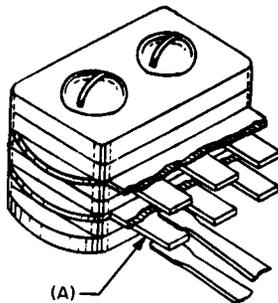


Fig. 3 — Position of the Wiper Tips on the Block Contacts

2.14 Wiper Alignment in the Third Position:

The spider arm stop shall hold the wipers approximately centered on their contacts in the third position.

Gauge by eye.

REQUIREMENTS FOR SPIDER ARM

2.15 Spider Arm Play: The spider arm shall not bind nor have more than 0.003 inch vertical play.

Gauge by eye and feel.

2.16 Spider Arm Spring Tension: The spider arm spring shall have sufficient tension to move the wipers from the first to the last position when the movement of the wipers is retarded by hand. The spring shall not be tensioned sufficiently to prevent the release magnet of the 197-type switch from restoring the side switch wipers to normal.

Gauge by eye and feel.

2.17 Spider Arm Finger Position: With the switch at vertical normal, the spider arm finger shall set parallel to the switch frame and the top shall be tilted a little to allow the finger to slide freely over the teeth of the lower escapement spring.

Gauge by eye.

2.18 Clearance Between Spider Arm Cam Lug and the Shaft Hub: With the lower lug held against the frame, the upper offset of the

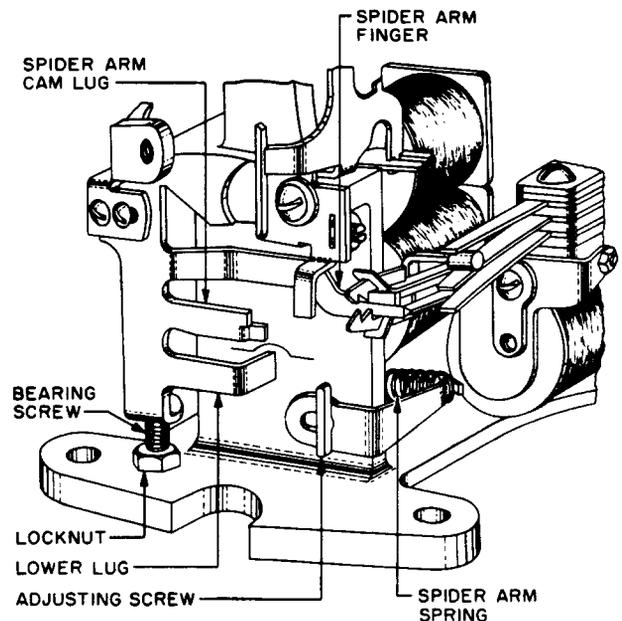


Fig. 4 — Spider Arm

SECTION 030-705-711

spider arm cam lug shall clear the hub of the shaft, when at normal, by

- Min 0.002 inch
- Max 0.006 inch

Gauge by eye.

2.19 Clearance Between Spider Arm Cam Lug and Shaft Cam: Fig. 5 (A) — With the shaft up on any level and cut in one step, there shall just be perceptible clearance between the spider arm cam lug and the shaft cam.

Gauge by eye.

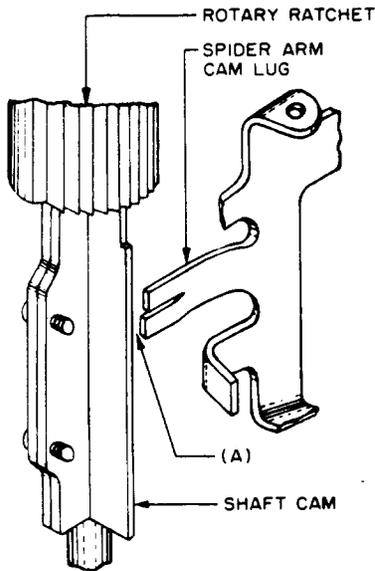


Fig. 5 — Relationship of the Spider Arm Cam Lug and the Shaft Cam

2.20 Clearance Between Rotary Ratchet and Upper Offset of Spider Arm Cam Lug:

Fig. 6 (A) — With the shaft up one step and the spider arm in second position, there shall be a clearance between the upper offset of the spider arm cam lug and the rotary ratchet of 0.015 inch.

Gauge by eye.

2.21 Spider Arm Link Position

(a) With the switch in the second position and the private magnet electrically operated, there shall be a clearance between the rotary dog and the rotary teeth when the

double dog is held lightly against the spider arm link and the shaft is rotated by hand of

Max 0.010 inch

Gauge by eye.

(b) With the switch at normal, the release link shall hold the lower spider arm lug lightly against the frame.

Gauge by eye.

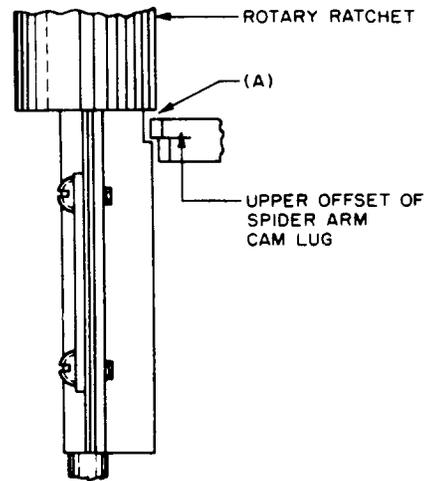


Fig. 6 — Clearance Between Rotary Ratchet and Upper Offset of Spider Arm Cam Lug

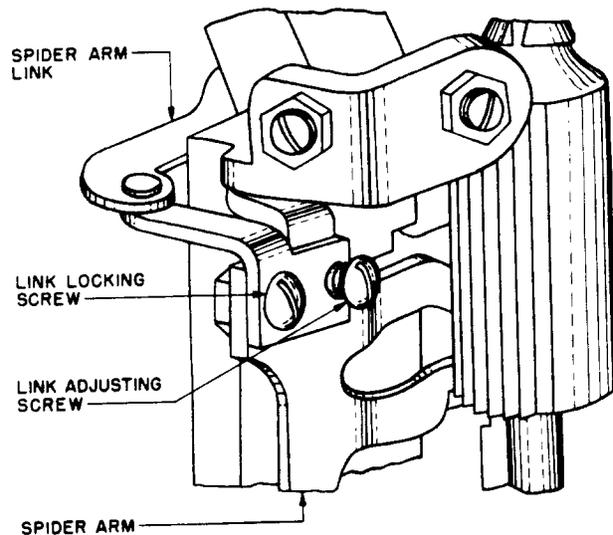


Fig. 7 — Spider Arm Link

2.22 Private Magnet Position — Fig. 8 (A)

(a) With the private magnet electrically operated, there shall be a perceptible clearance between the upper edge of the spider arm finger and the lower edge of the upper escapement spring.

Gauge by eye.

(b) When the private magnet is de-energized, the armature stop spring shall allow the same space between the lower edge of the spider arm finger and the upper edge of the lower escapement spring.

Gauge by eye.

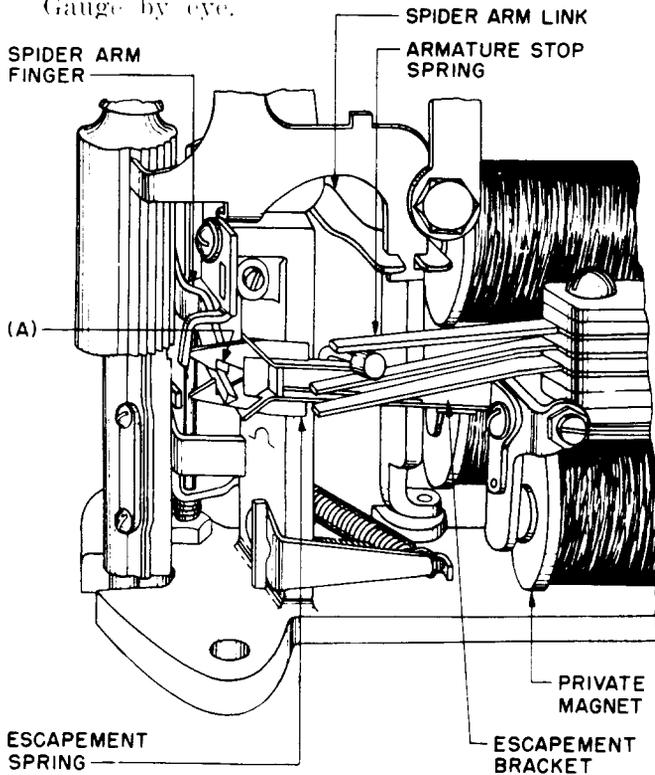


Fig. 8 — Position of Private Magnet

2.23 Clearance Between Spider Arm Finger and the First and Second Escapement Teeth

(a) With the shaft in the vertical normal position and the double dog disengaged from the release link, there shall be a space between the spider arm finger and the first escapement tooth of

Max 0.004 inch

Gauge by eye.

(b) With the spider arm in the second position, the space between the spider arm finger and the second escapement tooth shall be approximately the same as the space in the first position.

Gauge by eye.

REQUIREMENTS FOR ESCAPEMENT SPRINGS

2.24 Escapement Spring Tension: The escapement springs shall be tensioned to rest firmly against the escapement bracket.

Gauge by feel.

OPERATE REQUIREMENTS

2.25 Operate Requirements: After the above requirements have been met, the side switch shall operate satisfactorily when connected in its circuit.

3. ADJUSTING PROCEDURES

3.001 List of Tools and Materials

CODE OR SPEC. NO.	DESCRIPTION
TOOLS	
206	30-Degree Offset Screwdriver
207	90-Degree Offset Screwdriver
363 (2 reqd)	Spring Adjuster
415A	Spring Adjuster
418A	5 16- and 7 32-Inch Open-Double End Flat Wrench
KS-6015	Pliers
KS-6257	3 8-Inch Straight Socket Wrench
KS-14164	Brush
A.E. Co H-7067	Double Dog Adjuster (or the replaced A.E. Co No. 7067 double dog adjuster)
A.E. Co H-21766	Screwdriver (or the replaced A.E. Co No. 21766 offset screwdriver)
—	3-Inch C Screwdriver (or the replaced 3-1 2 inch cabinet screwdriver)

SECTION 030-705-711

CODE OR
SPEC. NO.

DESCRIPTION

TOOLS

- 4-Inch E Screwdriver (or the replaced 4-inch regular screwdriver)
- 4-Ounce Riveting Hammer

MATERIALS

- KS-16832 L2 Lubricant

3.002 Before making any adjustments, make the associated 197-type switch busy in accordance with approved procedures.

3.003 *Removal of Switch From Frame:* Remove the switch when necessary in accordance with the section covering 197- and 198-type switches.

3.01 *Cleaning* (Reqt 2.01)

- (1) Clean the contacts when necessary in accordance with the section covering cleaning of relay contacts and parts.
- (2) Clean other parts in accordance with approved procedures.

3.02 *Lubrication* (Reqt 2.02)

- (1) Make sure that the container of KS-16832 L2 lubricant has been shaken as covered in 1.05.
- ↳ (2) Lubricate the various parts with KS-16832 L2 lubricant applied with a → KS-14164 brush. Distribute the lubricant retained by the brush after each dip as specified.
- (3) After lubricating the parts, operate the switch a few times so as to work the lubricant into the bearings. Keep the switches covered as much as possible after they have been lubricated.

3.03 *Adjustable Escapement Springs* (Reqt 2.03)

- (1) To change the lead on adjustable escapement springs, loosen the setscrew with the 4-inch E screwdriver and move the escapement spring in or out as required.

PROCEDURES FOR PRIVATE MAGNET SPRINGS

- 3.04 *Private Magnet Spring Tension***
(Reqt 2.04)
- 3.05 *Private Magnet Contact Follow***
(Reqt 2.05)
- 3.06 *Private Magnet Contact Separation***
(Reqt 2.06)

- (1) To change the spring tension, contact follow or contact separation, adjust the springs near the insulators as required with the KS-6015 pliers.

PROCEDURES FOR CONTACT BLOCK

3.07 *Position of Contact Block* (Reqt 2.07)

- (1) To realign the contact block assembly, remove the two mounting screws beneath the frame of the switch with the H-21766 screwdriver and remove the block. Place the bracket in a vise and adjust the assembly bracket up or down as required by means of the 4-ounce riveting hammer.

3.08 *Block Contact Alignment* (Reqt 2.08)

- (1) To realign the block contact so that the upper and lower contacts are in alignment vertically, loosen the assembly screws slightly with the 4-inch E screwdriver and move the contacts to the right or left as required.
- (2) To realign the contacts horizontally, adjust the contacts as required with the 363 spring adjuster.

PROCEDURES FOR WIPER

- 3.09 *Wiper Forming*** (Reqt 2.09)
- 3.10 *Wiper Tip Forming*** (Reqt 2.10)
- 3.11 *Wiper Spring Tension*** (Reqt 2.11)

- (1) Use the 415A spring adjuster to adjust for proper wiper forming and wiper spring tension. Place the adjuster on the spring approximately 1/4 inch from the point where the spring leaves the insulators. Adjust the springs with a slight twist up or down as required, exercising care not to disturb the adjacent spring. In adjusting the springs, exercise care to adjust them in line with their movement so as not to twist them off center. When a satisfactory adjustment cannot be obtained

in this manner, distribute the tension by adjusting the spring as covered in (2), giving the spring its final adjustment at a point approximately 1/4 inch from the point where the spring leaves the spring assembly. Also adjust the springs so that the flat part of the wiper next to the tip will have sufficient clearance to prevent it from catching on the side switch block contacts.

(2) Where a spring is bowed, place the 415A spring adjuster at the far end of the bow and adjust the spring slightly in the opposite direction to the bow and then while applying only enough pressure to hold the spring just off its block contact, draw the adjuster forward the length of the bow, pausing momentarily at each 1/16 inch of the spring to apply a slightly greater pressure than the drawing pressure in a direction opposite the bow. If the spring is bent, follow the same procedure as covered for a bowed spring except that it will only be necessary to adjust the spring from approximately 1/4 inch beyond the bend to approximately 1/4 inch in front of the bend.

(3) If a wiper does not make a knife edge contact on the block contacts, or if the form of the wiper tip requires adjustment, hold the wiper at the base of the tip of the wiper with a 363 spring adjuster and adjust the tip of the spring with another 363 spring adjuster as shown in Fig. 9.

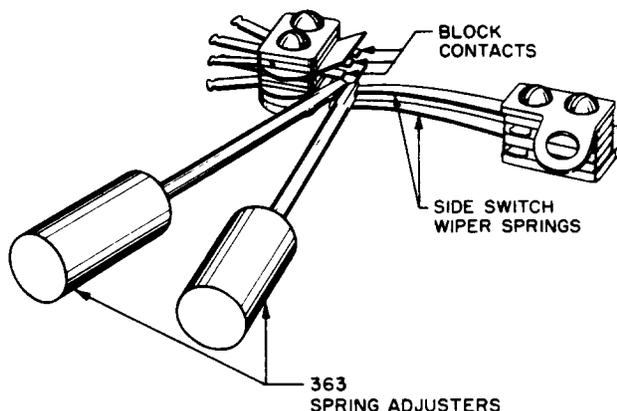


Fig. 9 - Method of Adjusting the Side Switch Wiper Tips

3.12 Wiper Alignment in the Second Position (Reqt 2.12)

3.13 Overlap of Wiper Tips on the Block Contacts (Reqt 2.13)

(1) If the wipers rest too far to the right or left when the side switch is in the second position, loosen the two mounting screws beneath the frame of the switch with the H-21766 screwdriver and move the side switch block to the right or left as required.

(2) To center the wiper tips between the front and back of the block contact, move the side switch block forward or backward as required.

Note: Front and back or right and left, refer to the positions as seen from the front of the switch.

3.14 Wiper Alignment in the Third Position (Reqt 2.14)

(1) To center the wipers on the block contacts in the third side switch position, adjust the spider arm stop as required with the H-7067 double dog adjuster as shown in Fig. 10.

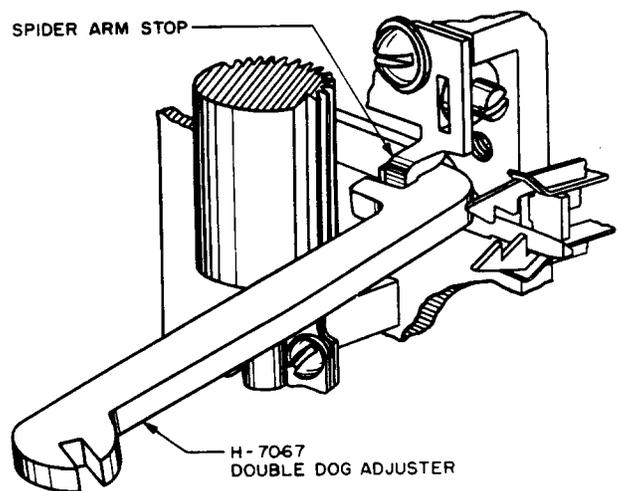


Fig. 10 - Method of Adjusting the Spider Arm Stop

PROCEDURES FOR SPIDER ARM

3.15 Spider Arm Play (Reqt 2.15)

(1) To change the vertical play of the spider arm, loosen the locknut on the bearing screw with the 418A wrench and turn the

bearing screw clockwise or counterclockwise as required with the 206 and 207 offset screwdrivers to give the required vertical play.

3.16 Spider Arm Spring Tension (Reqt 2.16)

(1) Vary the tension of the spider arm spring by turning the T adjusting screw clockwise or counterclockwise as required.

3.17 Spider Arm Finger Position (Reqt 2.17)

(1) If the spider arm finger is not parallel to the frame when in the normal position, adjust it as required with the H-7067 double dog adjuster.

(2) To tilt the spider arm finger, apply the H-7067 double dog adjuster as shown in Fig. 11 and twist the finger slightly by bearing upward on the tool adjuster.

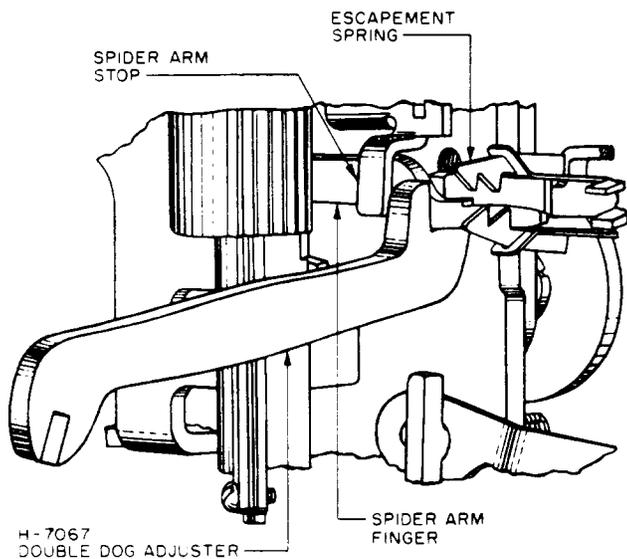


Fig. 11 – Method of Tilting the Spider Arm Finger

3.18 Clearance Between Spider Arm Cam Lug and Shaft Hub (Reqt 2.18)

(1) To change the clearance between the spider arm cam lug and the shaft hub, raise the shaft to the fifth level and adjust the lug as required with the H-7067 double dog adjuster as shown in Fig. 12.

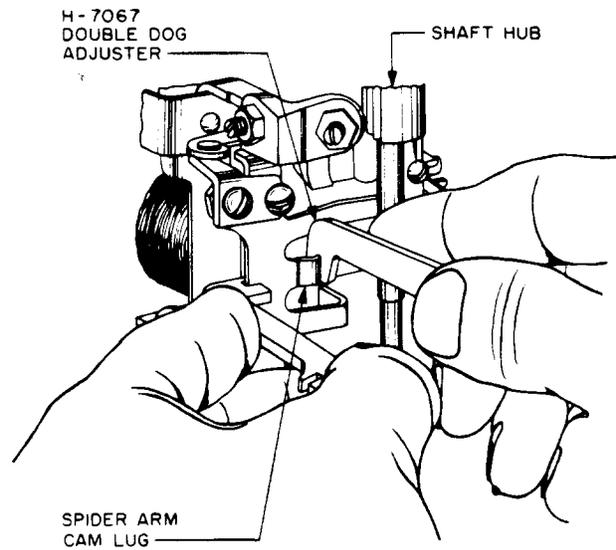


Fig. 12 – Method of Adjusting the Clearance Between the Spider Arm Cam Lug and the Shaft Hub

3.19 Clearance Between Spider Arm Cam Lug and Shaft Cam (Reqt 2.19)

(1) To change the clearance between the shaft cam and the spider arm cam lug, loosen the setscrews in the cam with the 3-inch C screwdriver and turn the cam into the proper position.

3.20 Clearance Between Rotary Ratchet and Upper Offset of Spider Arm Cam Lug (Reqt 2.20)

(1) If there is no clearance between the upper offset of the spider arm cam lug and the rotary ratchet, replace the spider arm.

3.21 Spider Arm Link Position (Reqt 2.21)

(1) To change the position of the spider arm link, loosen the link locking screw with the 4-inch E screwdriver and turn the adjusting screw in a clockwise direction to decrease the space between the double dog finger and the spider arm link, and in a counterclockwise direction to increase this space.

3.22 Private Magnet Position (Reqt 2.22)**3.23 Clearance Between the Spider Arm Finger and the First and Second Escapement Teeth** (Reqt 2.23)

(1) To equalize the clearance between the spider arm finger and the upper and lower escapement springs, remove the coverplate located on the rear of the switch frame. Then loosen the private magnet locking screws with the 4-inch E screwdriver and turn the adjusting bushing with the KS-6257 wrench so that when the private magnet is energized there will be a perceptible clearance between the spider arm finger and the lower edge of the upper escapement spring. Tighten the locking screws and adjust the armature stop spring with the KS-6015 pliers so that there is a corresponding clearance between the finger and the upper edge of the lower escapement spring when the private magnet is de-energized.

(2) To meet the requirement of maximum 0.004 inch between the spider arm finger and the first escapement tooth, loosen the private magnet locking screws with the 4-inch E screwdriver and turn the adjusting bushings with the KS-6257 wrench in a clockwise direction to increase the space and in a counterclockwise direction to decrease the space. Care should be taken to move each bushing an equal amount so as not to change the clearance between the spider arm finger and the upper and lower escapement springs.

(3) To equalize the space between the spider arm finger and the escapement teeth in the first and second positions, move the side switch to the second position and adjust the escapement bracket to the right or left with the fingers until the space is approximately equal to the space in the first position.

(4) If the space in first and second positions cannot be equalized as covered in (3), change the offset between the upper and lower

lugs of the spider arm cam lug. Use this method as a last resort only.

PROCEDURE FOR ESCAPEMENT SPRINGS**3.24 Escapement Spring Tension** (Reqt 2.24)

(1) To change the tension of the escapement springs, loosen the escapement spring mounting screw with the H-21766 screwdriver and adjust the escapement springs with the KS-6015 pliers. Tension the springs near the point where they are attached to the escapement bracket.

OPERATE PROCEDURES**3.25 Operate Requirements** (Reqt 2.25)

(1) If the switch fails to operate satisfactorily, it is an indication that the contact spring tension may be excessive. Reduce this tension slightly. If the switch still fails to operate satisfactorily, recheck requirements 2.18 through 2.20 and if necessary readjust to meet these requirements.

REASONS FOR REISSUE

1. To omit information covering definition of one dip of KS-2832 or KS-7506 lubricant (1.05 of previous issue).
2. To add information covering preparation of lubricant (1.05).
3. To add the description of one dip of KS-16832 L2 lubricant (1.06)
4. To revise the requirements for lubrication (2.02).
5. To revise the List of Tools and Materials (3.001).
6. To revise the procedures covering lubrication (3.02).