

## KS-5746 INTERRUPTERS REQUIREMENTS AND ADJUSTING PROCEDURES

### 1. GENERAL

1.01 This section covers the spring-type code ringing interrupters designed to be driven from a 10-rpm shaft of a Western Electric Company No. 3A interrupter mounting associated with the ringing machine. These interrupters were originally designed for use in a No. 5 crossbar office.

1.02 This section is reissued to specify nylon cams and followers to drive the interrupter springs, to change the spring operating requirements, to add lists 3 and 4, and to show interrupter spring types.

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 Requirements and associated procedures marked with a number sign (#) need not be checked by the installer unless it is thought that the requirement is not being met, or performance indicates that such a check is advisable.

1.05 Requirements and associated procedures marked with an asterisk (\*) need not be checked during maintenance unless the apparatus or part is made accessible for other reasons, or its performance indicates that such a check is advisable.

### 2. REQUIREMENTS

\*#2.01 Lubrication: The bearings are a graphite oilless type which should not be lubricated. The composition rollers on the bumper pins or the nylon cams and cam followers should not be lubricated.

\*2.02 End play shall be perceptible but should not exceed  $1/32$  inch.

Gauge by eye.

### 2.03 Freedom of Rotating Parts

(a) The interrupter shafts shall be aligned with the cross shaft in the gear case so that the couplings mesh properly and the shafts turn freely in their bearings.

Gauge by feel.

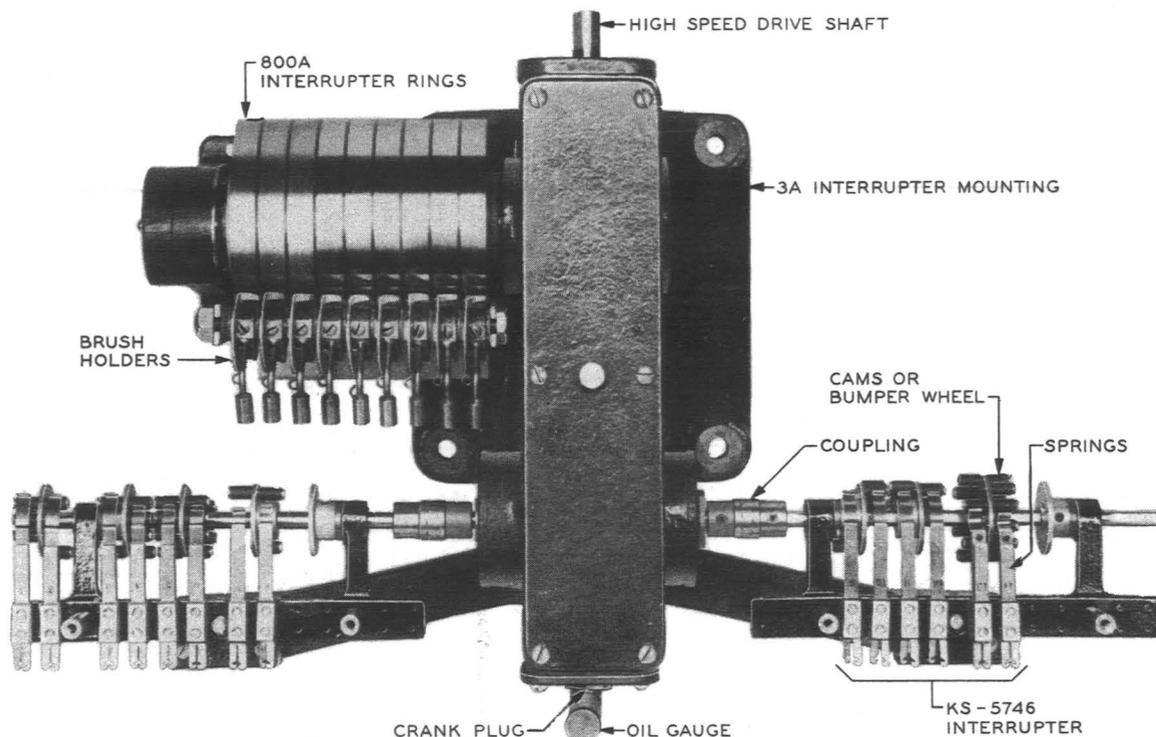


Fig. 1 - 3A Interrupter Mounting With 800A and KS-5746 Interrupters - Top View

SECTION 163-630-701

(b) The composition bumper pin rollers on lists 1 and 2 shall turn freely on the pins and there shall be no flat spots worn on the rollers.

Gauge by eye and feel.

2.04 Noise and vibration of the interrupter assembly shall not be excessive.

Gauge by sound and by feel.

2.05 Interrupter Springs and Contacts

- (a) Contacts shall be clean and smooth.
- (b) Spring assemblies shall be tight.
- (c) Make contacts shall have visible follow.
- (d) The point of contact shall fall entirely within the circumference of the opposing contact disc.

Note: The timing of the spring contacts is expressed on the charts in revolutions of the high-speed shaft of the associated ringing machine, the seconds being based on 1200 rpm (20 revolutions equal one second). It is convenient to use this shaft since it gives a vernier adjustment due to the reduction gear. Use crank code C-500. The crank should be removed immediately after completing the adjustments as the machine must not be operated with the crank in place.

2.06 The interrupter timing and tolerances shall be in accordance with the timing charts for lists 1, 2, 3, and 4 and the following unless otherwise specified on the circuit drawing. Front contacts are contacts which are closed by the action of the bumper pin rollers or nylon cams on the wiper springs.

| ADJUSTMENT LIMITS IN REVS. OF HIGH SPEED SHAFT (1200 RPM) | INT SPG NO | ONE CYCLE = 6 SEC.        |    |    |    |    |         |
|---|------------|---------------------------|----|----|----|----|---------|
|   |            | 1                         | 2  | 3  | 4  | 5  | 6       |
| 28-44   | 1          | █                         |    |    |    |    |         |
| 14-22   | 2          |                           | █  |    |    |    |         |
| 14-22   | 3          |                           |    | █  |    |    |         |
| 21-33 7-11  | 4          |                           |    |    | █  |    |         |
| 21-33 7-11  | 5          |                           |    |    |    | █  |         |
| 21-33 7-11 21-33  | 6          |                           |    |    |    |    | █       |
| 3-6   | 7          |                           |    |    |    |    | █       |
| 7-11  | 8          |                           |    |    |    |    | █       |
|   |            |                           | 20 | 40 | 60 | 80 | 100 120 |
|   |            | REVS. OF HIGH SPEED SHAFT |    |    |    |    |         |

— DENOTES CLOSURE OF NORMALLY OPEN CONTACTS

Fig. 2 - Interrupter Timing  
KS-5746, List 1

List 1

(a) The initial closure of ringing springs on interrupters 1 to 6 inclusive, as shown at left of chart, shall occur simultaneously within the limits of  $\pm$  two revolutions.

(b) Wiper springs of interrupters 2 to 7 inclusive, shall touch neither the upper nor the lower springs for at least three-quarter revolution, but one contact shall close within two revolutions after the opening of the other.

(c) In general, closures which are shown to occur simultaneously on the chart shall do so within the limits imposed by the adjustment tolerances. Exceptions are as follows:

(1) Closed periods of the reverting ring spring, interrupter 8, shall meet the following requirements:

First closure shall not overlap preceding closures of interrupters 4, 5, and 6 by more than two revolutions, and shall not overlap at all following closures of interrupters 2 to 6 inclusive.

Second closure shall not overlap preceding closure of interrupter 6 by more than two revolutions.

(2) The pickup spring, interrupter 7, closure shall end not more than three revolutions before nor more than two revolutions after the start of the earliest of any immediately following closures of the springs on interrupters 2 to 6 inclusive.

(d) The wiper spring of interrupter 1 shall release (open) at least one-quarter revolution before the wiper spring for the corresponding interval of interrupter 8.

| ADJUSTMENT LIMITS IN REVS. OF HIGH SPEED SHAFT (1200 RPM) | INT SPG NO | ONE CYCLE = 6 SEC.        |    |    |    |    |         |
|---|------------|---------------------------|----|----|----|----|---------|
|   |            | 1                         | 2  | 3  | 4  | 5  | 6       |
| 14-22   | 9          | █                         |    |    |    |    |         |
| 42-66   | 10         |                           | █  |    |    |    |         |
| 28-44   | 11         |                           |    | █  |    |    |         |
| 14-22   | 12         |                           |    |    | █  |    |         |
| 9-11  | 13         |                           |    |    |    | █  |         |
| 5-6   | 14         |                           |    |    |    |    | █       |
|   |            |                           | 20 | 40 | 60 | 80 | 100 120 |
|   |            | REVS. OF HIGH SPEED SHAFT |    |    |    |    |         |

— DENOTES CLOSURE OF NORMALLY OPEN CONTACTS

Fig. 3 - Interrupter Timing  
KS-5746, List 2

List 2

(e) Wiper springs of interrupters 13 and 14, as shown on chart, may make simultaneously with their upper and lower springs for a maximum of three-quarter revolution.

(f) In general, closures which are shown to occur simultaneously on the chart shall do so within the limits imposed by the adjustment tolerances. Exceptions are as follows:

(1) Interrupter 10 shall close two revolutions minimum before the closures of interrupters 11 and 12, and shall open two revolutions minimum after interrupter 12 opens. It shall also close two revolutions minimum after the opening of interrupter 9, and shall open two revolutions minimum before the initial closure of interrupter 9.

Lists 3 and 4

(g) Taking the closure of spring 1 on list 3 and spring 9 on list 4 as occurring at 0 revolutions, the closures or openings of the other springs shall occur within  $\pm$  one revolution of the high-speed shaft from

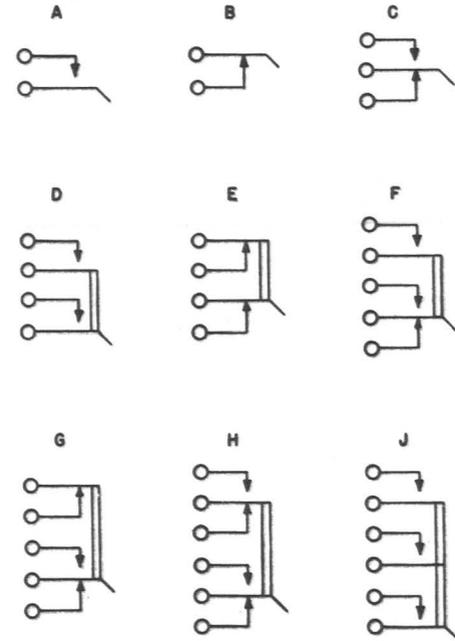
the number of revolutions from 0 shown for them on the timing chart for the machine being tested.

Note: Closure or opening is to be interpreted as the making or breaking of the contacts on the springs which are adjacent to the cam.

(h) Contacts shall remain closed or open for not less than the smaller nor more than the greater number of revolutions tabulated in the adjustment limit column of the timing chart.

Note: As an example, on the list 3 machine, to meet the requirement of (g), the first closure of spring 5 may occur simultaneously with the closure of spring 1, or as much as one revolution before or one revolution after; the second closure must occur from 39 to 41 revolutions after the first closure of 1, and the third closure from 59 to 61 revolutions after the first closure of 1. To meet the requirements of (h), on the first closure of spring 5, the contacts must remain closed for 26 to 28 revolutions, and on second and third closures, for eight to ten revolutions.

| LIST NO. | INT. SPRING NO. | SPRING TYPE | ADJUSTMENT LIMITS IN REV. OF A SHAFT TURNING 120 REV. TO ONE REV. OF INTERRUPTER SHAFT SEE NOTE 1 | ONE CYCLE - 120 REVOLUTIONS OF HIGH SPEED SHAFT |    |    |    |    |     |     |   |   |   |   |   |   |   |
|----------|-----------------|-------------|---|---|----|----|----|----|-----|-----|---|---|---|---|---|---|---|
|          |                 |             |   | REVOLUTIONS                                     |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          |                 |             |   | 0   | 20 | 40 | 60 | 80 | 100 | 120 |   |   |   |   |   |   |   |
| 3        | 1               | A           | 35-37   | █   | █  | █  |    |    |     |     |   |   |   |   |   |   |   |
|          | 2               | C           | 17-19   | █   | █  | █  |    |    |     |     |   |   |   |   |   |   |   |
|          | 3               | C           | 17-19   | █   | █  | █  |    |    |     |     |   |   |   |   |   |   |   |
|          | 4               | C           | 26-28 8-10  | █   | █  | █  |    |    |     |     |   |   |   |   |   |   |   |
|          | 5               | C           | 26-28 8-10  | █   | █  | █  |    |    |     |     |   |   |   |   |   |   |   |
|          | 6               | C           | 26-28 8-10 26-28  | █   | █  | █  | █  | █  | █   | █   | █ | █ | █ | █ | █ | █ | █ |
|          | 7               | C           | 4-6   |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          | 8               | A           | 9-10  |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
| 4        | 9               | A           | 17-19   |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          | 10              | A           | 59-61   |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          | 11              | A           | 35-37   |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          | 12              | A           | 17-19   |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          | 13              | F           | 9-11  |   |    |    |    |    |     |     |   |   |   |   |   |   |   |
|          | 14              | F           | 5-6   |   |    |    |    |    |     |     |   |   |   |   |   |   |   |



SPRING TYPES

NOTE:  
1. THE TIMING INTERVAL SHOWN IS THE PERIOD DURING WHICH THE NORMALLY OPEN CONTACT ADJACENT TO THE CAM IS CLOSED.

Fig. 4 - KS-5746, Lists 3 and 4 Interrupter Timing and Spring Types

(i) On transfer spring combinations, each closed contact shall break before the associated open contact makes. The minimum separation between the wiper spring and the open contact at the instant of breaking the closed contact shall be 0.007 inch. One contact shall close within one and three-quarter revolutions of the high-speed shaft after the opening of the other.

Note: The high-speed shaft referred to in the above and subsequent paragraphs is a shaft which makes 120 revolutions to one revolution of the interrupter shaft.

(j) On springs having more than one make combination, the make contacts of springs not adjacent to the cam shall not make before the make contacts of the spring adjacent to the cam have made and shall make not later than one-half revolution of the high-speed shaft after these latter make contacts have made.

(k) There shall be perceptible follow to each contact spring after it makes with its associated wiper spring.

\*2.07 These interrupters shall also meet the following timing requirements with respect to the mercury interrupters with which they are associated.

(a) The first closure of springs marked 8, which occurs while springs marked 1 are closed, shall end one to five revolutions after the beginning of the ringing interval of the mercury interrupter ring CODE 1 GEN BRUSH 2.

(b) The second closure of springs marked 12 shall end one-quarter to two revolutions before the closure of the front contacts of springs marked 7.

### 3. ADJUSTING PROCEDURES

#### 3.001 List of Tools and Materials (Equivalents may be substituted)

##### Tools

Adjuster, spring, 507A tool  
Burnisher, contact, No. 265C  
Crank, Holtzer-Cabot code C-500  
Pliers, duck bill  
Screwdriver, cabinet, 3 in.  
Test set, 81A (buzzer)  
Tool, No. 43  
Wrench, Allen setscrew, No. 5 or No. 6, The Allen Mfg. Co., Hartford, Conn.

##### Materials

Cloth, cleaning, KS-14666  
Spirits, petroleum

#### \*#3.01 Lubrication (Rq 2.01) None required.

#### \*3.02 End Play (Rq 2.02)

- (1) The two bumper wheels or nylon cams next to the bracket bearings should be close enough to the bearing to avoid excessive end play but not so close as to cause binding. The bumper wheels or nylon cams have two Allen head setscrews one of which registers with a flat on the shaft. To change the location of a bumper wheel or nylon cams it will be necessary to loosen these two setscrews with a wrench. After moving, be sure the setscrews are tightened snugly.

#### 3.03 Freedom of Rotating Parts (Rq 2.03)

- (1) If binding is due to oil having been applied to the shaft oilless bearings, it will be necessary to replace the bearings. Binding may be due to misalignment of the shaft with the drive shaft of the associated gear case. The flexible couplings will permit only a slight amount of misalignment. Shims are provided to adjust the elevation of the mounting, and clearance is available around the mounting screws for horizontal adjustment.
- (2) Bumper pin rollers on lists 1 and 2 that are flat or have been oiled should be replaced. If rollers are sticking but have not been oiled, they can be removed and the pin cleaned with a cloth and petroleum spirits. The pin should be allowed to dry before replacing the roller, as both petroleum spirits and oil are detrimental to these rollers.
- (3) Recheck interrupter timing after any change in interrupter bearings or bumper pin rollers.

Note: The nylon cams and followers are expected to have a long life and require no maintenance.

3.04 Noise and Vibration: (Rq 2.04) - Where excessive noise or vibration is present, see that all bolts, nuts, and screws are tight. If the trouble still persists, examine the bearings, and replace any that are badly worn or damaged.

#### 3.05 Low-speed Interrupter Springs and Contacts (Rq 2.05)

#### 3.06 Timing and Tolerances (Rq 2.06)

- (1) Tighten spring assembly screws with a screwdriver, as necessary. Timing of interrupter springs must be rechecked after tightening of spring assembly screws.
- (2) The contacts may be smoothed by using a contact burnisher and then wiping

with a clean cloth. If the contacts are in bad condition or if the contact springs are badly bent, they shall be replaced. Shape contact springs that are slightly bent or out of adjustment with a pair of duck-bill pliers or spring adjuster.

(3) The springs may be adjusted by shaping. This adjustment may be determined by using a buzzer test set or equivalent, such as a test receiver or indicating lamp, connected across the contacts. Check the intervals by counting the number of revolutions of the high-speed shaft of the gear case while turning it by hand. Use crank C-500 which has a 10-32 threaded stud which can be screwed into the end of the high-speed shaft. To apply the crank to the shaft, remove plug in gear case at the end of the high-speed shaft and screw the crank stud into the end of the shaft. Loosen the setscrews of the coupling on the high-speed shaft at the opposite end of the gear case. Disengage the coupling by sliding it back on the shaft. See Section 155-307-701 for replacing the belt in the coupling. The timing of each spring assembly should be checked for a complete revolution of the associated bumper wheel or cam.

\*3.07 No attempt should be made to adjust the interrupter with respect to the mercury interrupter rings until the requirements of 2.06 have been met. Then disengage the high-speed shaft and apply the crank C-500 as described in 3.06(3). With the setscrews of the coupling halves on the spring interrupters tight and those on the coupling halves on the cross shaft of the gear case loose,

(1) Rotate the high-speed shaft in a clockwise direction until the ringing interval of CODE 1 GEN BRUSH 2 just starts. Continue rotation of the high-speed shaft for three turns. Rotate the bumper wheel shaft or cam by hand until the first closure of springs marked 8 just opens. Tighten the setscrews of the coupling half engaging this shaft.

(2) Rotate the high-speed shaft in a clockwise direction until the front contacts of springs marked 7 just close. Then turn the high-speed shaft back (counterclockwise) one and one-half revolutions. Rotate the bumper wheel shaft or cam for springs marked 12 by hand until the second closure of those springs just opens. Tighten the setscrews of the coupling half engaging this shaft.

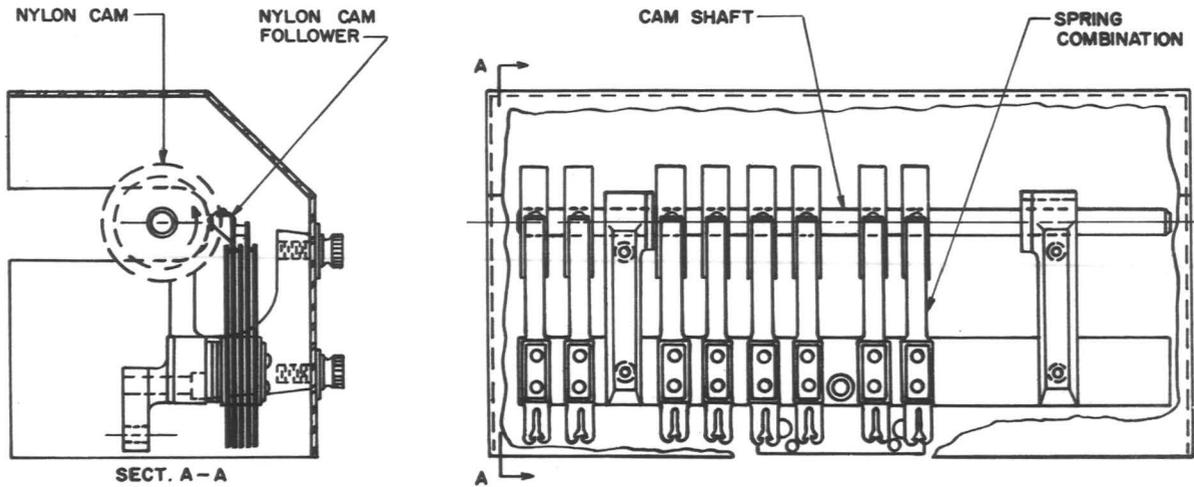


Fig. 5 - KS-5746, Lists 3 and 4 Interrupters