

SELECTORS

KS-16201, KS-16202, KS-16203, KS-16563, AND KS-19086 TYPES PIECE-PART DATA AND REPLACEMENT PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of KS-16201, KS-16202, KS-16203, KS-16563, and KS-19086 type selectors. It also covers approved procedures for replacing these parts.

1.02 The section is reissued to add piece-part data and replacement procedures covering KS-19086 selectors and to revise the piece-part data and replacement procedures covering interrupter spring assemblies. Detailed reasons for reissue will be found at the end of the section.

1.03 Part 2 of this section covers the piece-part numbers and the corresponding names of the parts which it is practicable to replace in the field in the maintenance of these selectors. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts. This information is called Piece-Part Data.

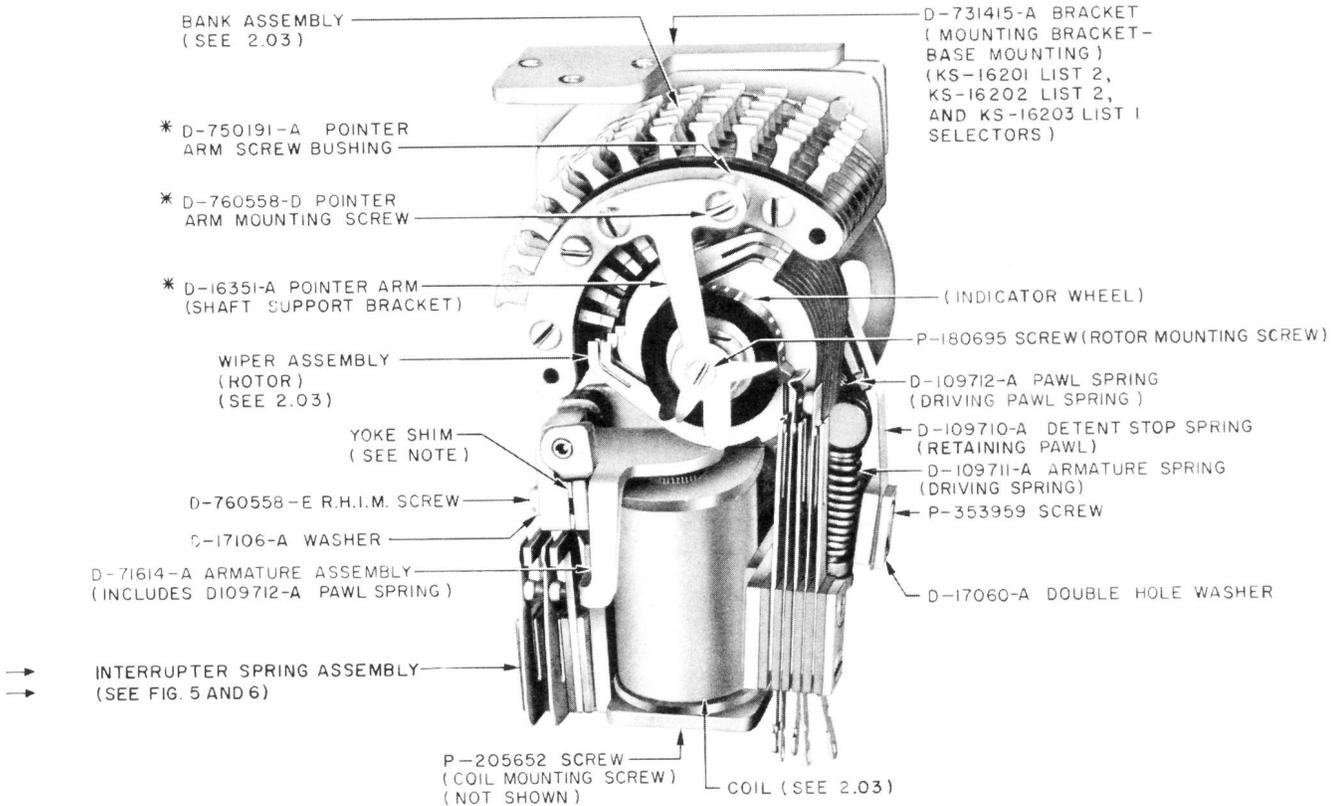
1.04 Part 3 of this section covers the approved procedures for the replacement of the parts covered in Part 2. This information is called Replacement Procedures.

2. PIECE-PART DATA

2.01 The figures included in Part 2 of this section show the various piece parts in their proper relation to other parts of the apparatus. The piece-part numbers of the replaceable parts are given together with the names of the parts. If the names of parts differ from those in general use in the field, the latter names are shown in parentheses. Numbers prefixed by "P" are WECO piece-part numbers; numbers prefixed by "D," "PD," or "PP" are AECO part numbers. ←

2.02 Information enclosed by parentheses () is not ordering information. This information may be references to notes, parts referred to in other portions of the section and not considered replaceable, or part names in general use in the field if these names differ from those assigned by the manufacturer.

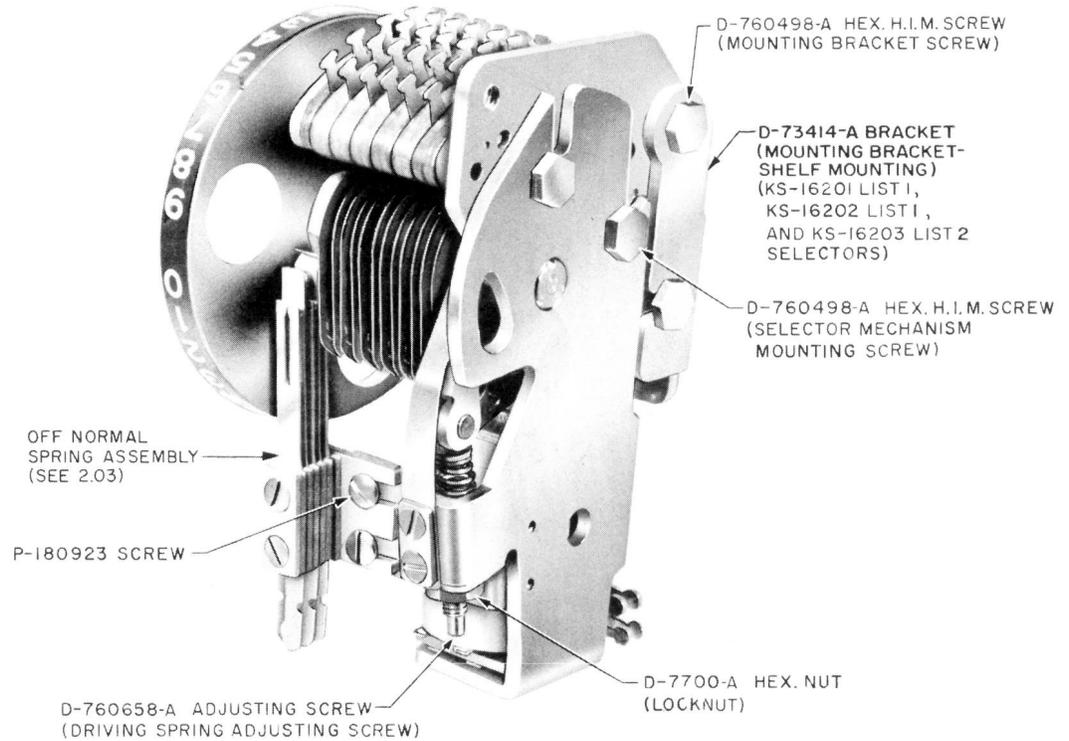
2.03 When ordering piece parts for replacement purposes, both the number and the name of the piece part should be given. If the part is an AECO part, the order should so state. For example, "AECO D-71574-A Armature." Do not refer to the section number or any information shown in parentheses. If a subassembly such as a coil or wiper assembly (rotor) is to be ordered, specify the name of the subassembly and the number of the selector on which the subassembly is used; for example, AECO Off-Normal Spring Assembly — for KS-16201 List 1 Selector.



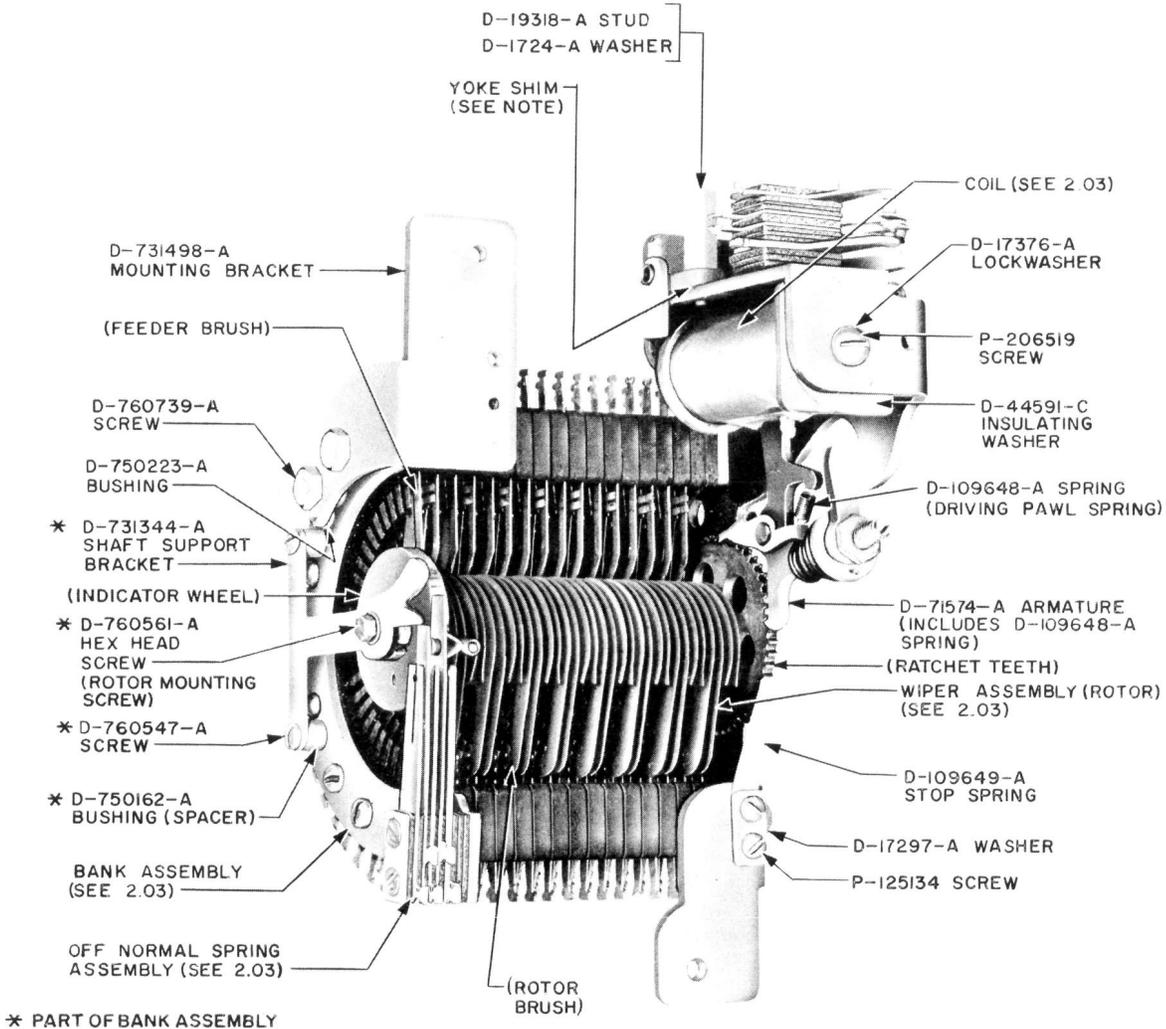
* PART OF BANK ASSEMBLY

NOTE: D-65466-A YOKE SHIM (0.010 INCH)
 D-65466-B YOKE SHIM (0.014 INCH)
 D-65466-C YOKE SHIM (0.016 INCH)
 THESE YOKE SHIMS MAY BE REQUIRED
 WHEN REPLACING D-71614-A ARMATURE
 ASSEMBLY - SEE 3.II.

Fig. 1 - KS-16201, KS-16202, and KS-16203 Type Selectors
 (KS-16201, List 2 Selector Shown)



**Fig. 2 – KS-16201, KS-16202, and KS-16203 Type Selectors
(KS-16203, List 2 Selector Shown)**



NOTE: D-65449-A YOKE SHIM (0.010 INCH)
D-65449-B YOKE SHIM (0.014 INCH)
D-65449-C YOKE SHIM (0.016 INCH)

THESE YOKE SHIMS MAY BE REQUIRED WHEN REPLACING D-71574-A ARMATURE - SEE 3.11

→ Fig. 3 - KS-16563 and KS-19086 Type Selectors
(KS-16563, List 2 Selector Shown)

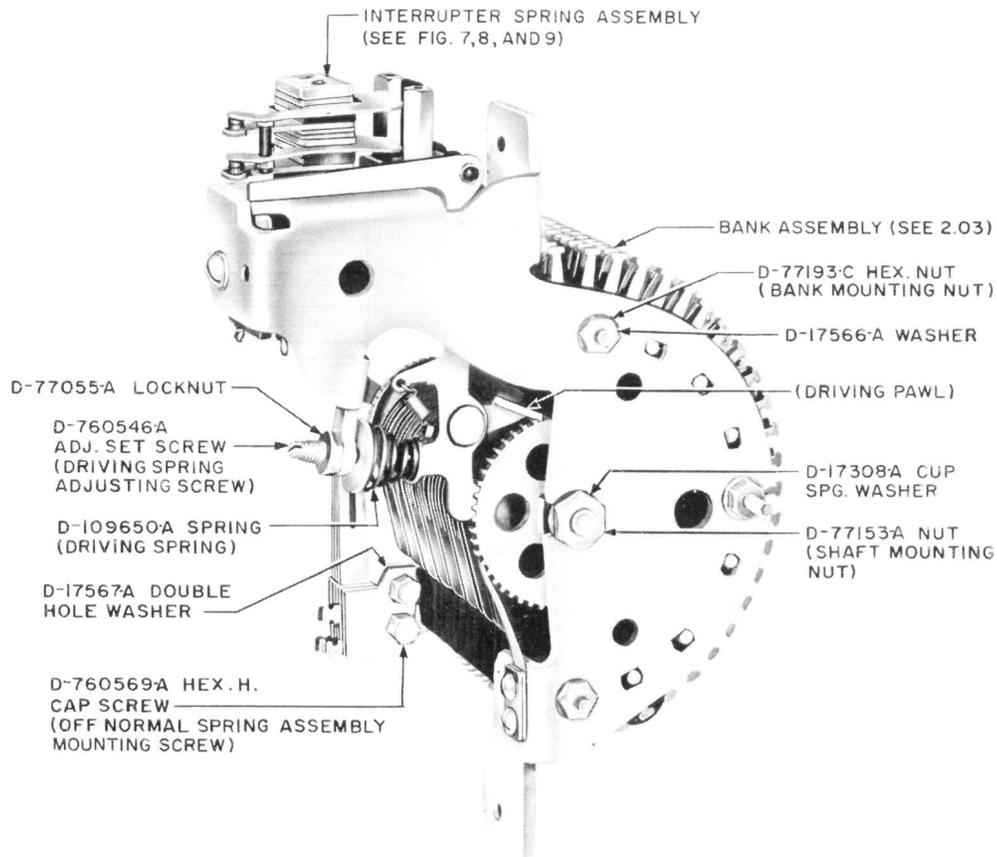


Fig. 4 - KS-16563 and KS-19086 Type Selectors (KS-16563, List 1 Selector Shown)

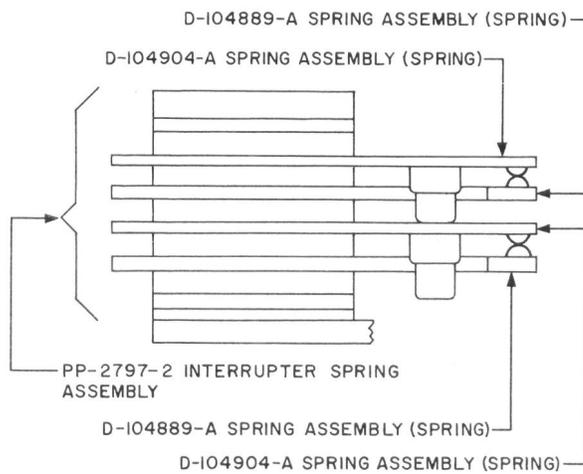


Fig. 5 - Interrupter Spring Assembly - KS-16201, L1 and L2 Selectors and KS-16203, L1 and L2 Selectors

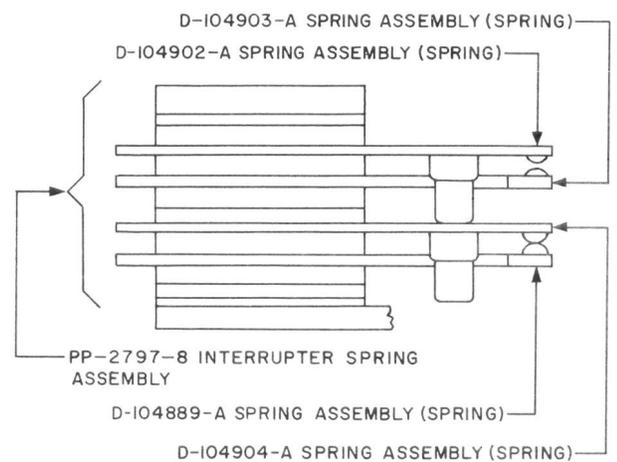


Fig. 6 - Interrupter Spring Assembly - KS-16202, L1 and L2 Selectors

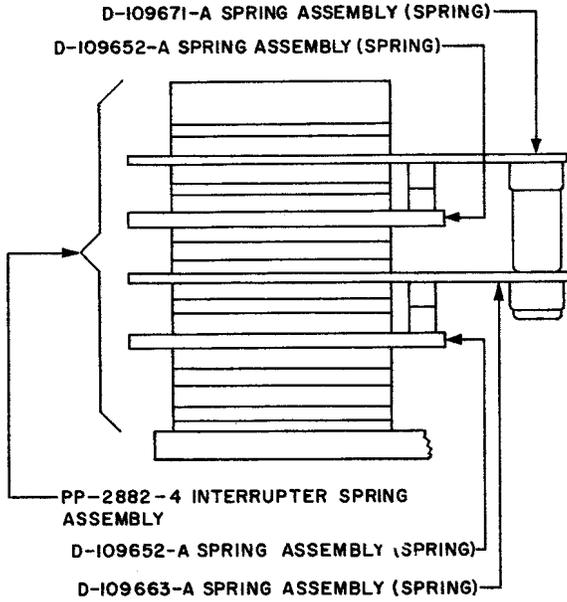


Fig. 7 - Interrupter Spring Assembly —
KS-16563, L1 Selectors

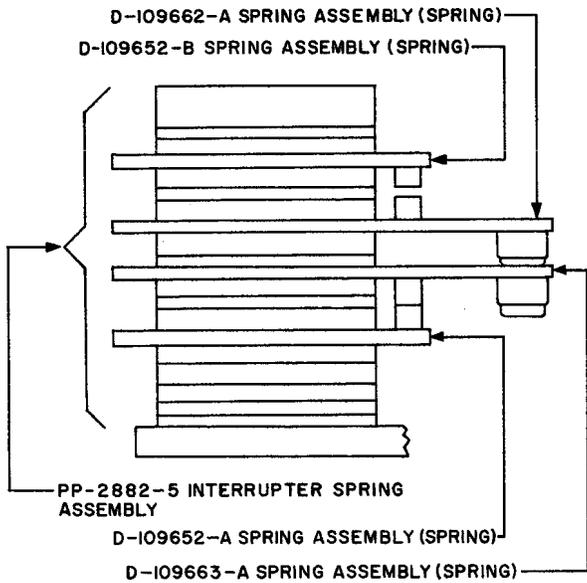


Fig. 8 - Interrupter Spring Assembly —
KS-16563, L2 Selectors

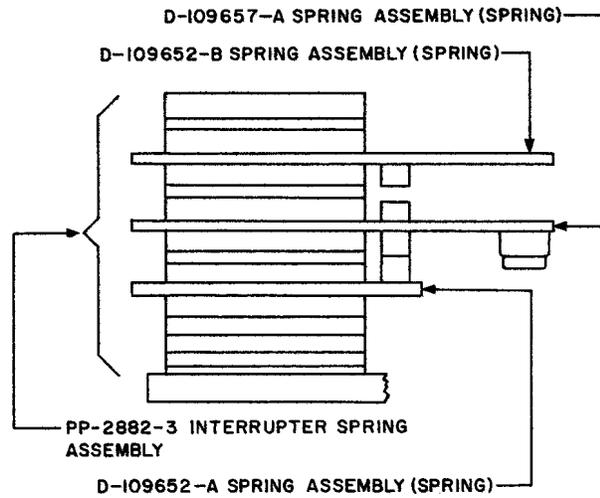


Fig. 9 - Interrupter Spring Assembly —
KS-19086, L1 Selectors

3. REPLACEMENT PROCEDURES

3.01 List of Tools and Materials

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
206	Offset Screwdriver
207	Offset Screwdriver
245	3/8-Inch and 7/16-Inch Hex. Open Double-End Flat Wrench
344	Offset Screwdriver
417A	1/4-Inch and 3/8-Inch Hex. Open Double-End Flat Wrench
418A	5/16-Inch and 7/32-Inch Hex. Open Double-End Flat Wrench
→563A	Offset Screwdriver
KS-6015	Pliers
KS-6320	Orange Stick
KS-8511	Tweezers
↗	3-Inch C Screwdriver (or the replaced 3-inch cabinet screwdriver)
—	4-Inch E Screwdriver (or the replaced 4-inch regular screwdriver)
MATERIALS	
KS-2423	Cloth

3.02 Before replacing any parts of a selector, make the associated circuit busy in the approved manner and block the necessary relays operated or nonoperated to isolate the selector circuit.

3.03 In order to replace parts under some selector mounting conditions, it is necessary to remove the selector from its mounting. If this is done, take care to avoid damaging the wiring and if necessary provide a support for the selector while working on it. When the selector is mounted in the control panel of a substation equipment cabinet, it may be desirable to loosen the lower and remove the upper shock mounting screws and to swing the mounting bar to a position which provides better access to parts of the selector.

3.04 No replacement procedures are specified for screws or other parts where the procedure consists of a simple operation.

3.05 After replacing any parts of a selector, the part or parts replaced shall meet the readjust requirements as specified in Section 026-720-701. Other parts whose adjustments have been directly disturbed by the replacing operations shall be checked to the readjust requirements and an over-all operation check shall be made of the selector before restoring the circuit to service.

3.06 Removing Selector Mechanism From Bank

(1) **KS-16201, KS-16202, and KS-16203 Selectors:** Remove the selector mechanism from the bank as follows. To facilitate removing the selector mechanism from the bank without snagging the rotor brushes, step the selector so that the tips of one set of rotor brushes are in a position one step before passing the tip of the retaining pawl. Place a KS-2423 cloth directly below the selector to catch parts which may be dropped. Using the 206 and 207 offset screwdrivers, loosen the screws holding the off-normal spring assembly bracket on the frame. Remove the spring assembly from the frame and support it by the leads. Tag and disconnect the leads to the coil and interrupter springs. Using the offset screwdrivers, remove the screws and bushings that mount the shaft support bracket to the bank. Remove the screws mounting the selector mechanism on the bank frame, using the

418A wrench. Carefully separate the selector mechanism from the bank and remove the assembly.

(2) **KS-16563 and KS-19086 Selectors:** Remove the selector mechanism from the bank as follows. Step the selector so that one set of rotor brushes is one step in front of the feeder brushes. Loosen the off-normal spring assembly mounting screws with the 417A wrench and remove the spring assembly. Tag and disconnect the leads to the coil and interrupter springs. Remove the shaft support bracket screws with the 3-inch C screwdriver or the 206 and 207 offset screwdrivers. Remove the shaft support bracket and associated spacers. Using the 245 wrench, remove the shaft mounting nut at the right side of the selector. Using the 418A wrench, remove the two frame mounting nuts toward the front of the frame and loosen the third nut near the rear of the frame. Remove the frame from the bank. Carefully disengage the upper portion of the rotor from the bank and remove the rotor.

3.07 Mounting Selector Mechanism on Bank

(1) **KS-16201, KS-16202, and KS-16203 Selectors:** Mount the selector mechanism on the bank as follows. To facilitate mounting the selector mechanism on the bank without snagging the rotor brushes, step the selector so that the tips of one set of rotor brushes are in a position four steps beyond the tip of the retaining pawl. With the selector mechanism frame against the outside of the bank frame and in approximately its correct position with respect to the bank, carefully engage the rotor brushes with the bank feeder brushes so that each pair of rotor brushes straddles its associated pair of feeder brushes. Position the selector mechanism with reference to the bank so that the requirement covering position of rotor brushes on bank contacts in Section 026-720-701 is met, and securely tighten the mounting screws, using the 418A wrench. Mount the off-normal spring assembly and securely tighten the mounting screws, using the 206 and 207 offset screwdrivers. Remount the screws and bushings that mount the shaft support bracket on the bank, using the offset screwdrivers. Reconnect the leads to the coil and interrupter springs.

- (2) **KS-16563 and KS-19086 Selectors:** Mount the selector mechanism on the bank as follows. Hold the rotor in front of the bank with the indicator wheel at the left and the off-normal actuating arm toward the bank. Align the brush at the right end of the rotor with the second feeder brush from the right side of the bank and the other brushes in this group with their associated feeder brushes. Carefully engage these rotor brushes with the feeder brushes so that each pair of rotor brushes straddles its associated pair of feeder brushes. Move the rotor toward the bank so that the rotor brushes engage the bank contacts and then engage the remaining feeder brushes with the rotor as follows. Carefully move the rotor so that the remaining pairs of feeder brushes lie between the associated rotor brushes. Moving the rotor slightly from side to side will facilitate properly engaging the feeder brushes. Then rotate and move the rotor to its proper radial position with respect to the bank. Position the frame against the right side of the bank with the rotor shaft in the frame notch and with the driving pawl and armature stopping teeth engaging the rotor ratchet wheel teeth. Place the washers and nuts on the bank screws and the nut on the rotor shaft and tighten the nuts with the 418A and 245 wrenches. Mount the shaft support bracket on the spacers and secure the support to the shaft, using the 3-inch C screwdriver or the 206 and 207 offset screwdrivers. Mount the off-normal spring assembly, using the 417A wrench. Reconnect the leads to the coil and interrupter springs.

3.08 Driving Pawl Spring: On KS-16201, KS-16202, and KS-16203 selectors, loosen the lower mounting screw and remove the upper mounting screw of the retaining pawl using the 3-inch C screwdriver. Swing the retaining pawl aside to gain access to the driving pawl spring. Using the KS-8511 tweezers, unhook the spring at the pawl end and then disengage the other end from the armature. Hook one end of the new spring in the hole in the pawl and hook the other end of the spring in the armature. If the retaining pawl was moved, reposition it and securely tighten the mounting screws.

3.09 Driving Spring: Block the armature unoperated with the KS-6320 orange stick. Grasp one turn of the driving spring as near to the pawl end of the spring as possible, using the KS-6015 pliers. Compress the spring and remove it from the selector. Using the pliers in a similar manner, mount the new driving spring. Remove the orange stick.

3.10 Driving Spring Adjusting Screw and Locknut: Remove the driving spring as covered in 3.09. Remove the adjusting screw and locknut, using the 3-inch C screwdriver and 418A wrench (KS-16201, KS-16202, and KS-16203 type selectors) or the 4-inch E screwdriver and 417A wrench (KS-16563 type selector). Substitute the new parts and remount the driving spring.

3.11 Armature Assembly

- (1) On KS-16201, KS-16202, and KS-16203 type selectors, remove the selector mechanism from the bank as covered in 3.06. This is generally not necessary on the KS-16563 type selector.
- (2) Step the rotor to a position providing sufficient clearance for removing the armature assembly. Remove the driving spring as covered in 3.09. Remove the armature bearing screws with the 3-inch C screwdriver or the studs (KS-16563 and KS-19086 type selector) with the 417A wrench, taking care not to lose the shim under the armature bearing. Remove the armature assembly, taking care not to snag the tips of the rotor brushes.
- (3) Carefully place the new armature assembly in the selector. Insert the mounting screws with washers in the armature bearing holes and place the shim over the ends of the screws. Swing the bearing into position and partially tighten the mounting screws. Position the bearing so that the following requirements in Section 026-720-701 are met.
 - (a) Position of driving pawl and armature stopping teeth.
 - (b) Driving pawl and driving pawl spring clearance with adjacent rotor brush.
 - (c) Interrupter arm position.
- (4) With the armature in the unoperated position and the rotor play taken up in the direction opposite to rotation of the wipers,

there should be clearance (max. 0.008 inch) between the ratchet teeth and the stopping surface of the associated armature stopping teeth. On KS-16201, KS-16202, and KS-16203 type selectors there should be clearance at all stopping teeth; on the KS-16563 and KS-19086 type selectors, clearance is essential at the top stopping tooth only. If this condition is not met after mounting the new armature assembly and meeting the requirements listed in (3), increase or decrease the height of the yoke shims as follows. If there is no clearance, add a yoke shim or substitute a thicker shim. See Fig. 1 and 3 for the available shims. If there is too much clearance, substitute a thinner shim. The total shim thickness should be kept as small as possible to obtain satisfactory clearance.

(5) When satisfactory clearance has been obtained, check the requirement in Section 026-720-701 covering clearance between armature and heelpiece. If the yoke shims were changed, also check the requirements listed in (3).

(6) If the selector mechanism was removed, remount it.

3.12 Rotor

(1) **KS-16201, KS-16202, and KS-16203 Type Selectors:** Remove the selector mechanism from the bank as covered in 3.06. Using the 3-inch C screwdriver, remove the rotor mounting screw and shaft support bracket if provided. Remove the rotor from the rotor shaft. Lubricate the rotor shaft as covered in Section 026-720-701. Mount the new rotor and shaft support bracket if provided and securely tighten the rotor mounting screw. Remount the selector mechanism as covered in 3.07.

(2) **KS-16563 and KS-19086 Type Selectors:** Remove the rotor from the bank by removing the selector mechanism as covered in 3.06. Mount the new rotor with the other parts of the selector mechanism as covered in 3.07.

3.13 Shaft (KS-16563 and KS-19086 Type Selectors): Remove the selector frame by following the procedures for removing the selector mechanism covered in 3.06 but do not remove

the rotor from the bank. Remove the shaft, taking care not to move the rotor out of position. Substitute the new shaft and remount the frame as covered in 3.07.

3.14 Coil: Unsolder the leads from the coil and proceed as covered in (1) or (2).

(1) **KS-16201, KS-16202, and KS-16203 Type Selectors:** Remove the armature assembly as covered in 3.11. Remove the coil mounting screw with the 4-inch E screwdriver. Remove the coil. Mount the new coil and securely tighten the coil mounting screw. Remount the armature assembly as covered in 3.11. Connect and solder the leads to the coil terminals.

(2) **KS-16563 and KS-19086 Type Selectors:** Remove the coil mounting screw with the 344 offset screwdriver. Remove the coil and insulating washer. Mount the new coil with a new insulating washer if necessary. Securely tighten the coil mounting screw making sure the lockwasher is under the head of the screw. Connect and solder the leads to the terminals.

3.15 Interrupter Spring Assembly — (Fig. 5[†] through 9)

(1) To replace the complete interrupter spring assembly or an individual spring, loosen the interrupter spring clamping screws sufficiently to disengage them from the selector frame using the 207 offset screwdriver for KS-16201, KS-16202, and KS-16203 selectors or the 563A offset screwdriver for KS-16563 and KS-19086 selectors. In the case of KS-16563 selectors mounted in 83B teletype equipment, first remove the selector mounting screws using the 4-inch E screwdriver and swing the selector away from its mounting plate as far as the wiring permits, taking care not to damage the leads.

(2) If the complete interrupter spring assembly is to be replaced, loosen the clamping screws of the replacement assembly sufficiently to remove the clamping plate which held the assembly together during shipment. Take care not to disengage the screws from any parts of the assembly. Mount the assembly on the selector frame, align the springs to meet the requirement covering interrupter contact alignment in Section 026-720-701, and securely tighten the clamping screws.

SECTION 026-720-801

↖ (3) If individual springs in the assembly are to be replaced, remove insulators and springs as required to make the springs to be replaced accessible, noting the order in which the parts are removed. Substitute the new springs and position the parts on the clamping screws in the reverse order of removal. Make sure that embossed insulators, if provided, properly engage their adjacent parts. Mount the assembly on the selector frame, align the springs to meet the requirement covering interrupter contact alignment in Section 026-720-701, and securely tighten the clamping screws.

(4) Check the requirements covering interrupter contact make and break, interrupter spring contact pressure, and interrupter contact test in Section 026-720-701.
↳

3.16 Bank Assembly: Remove the selector mechanism from the bank as covered in 3.06. Using the 418A wrench, remove the mounting bracket screws and associated bushings if provided and remove the bank from the bracket.

Tag and unsolder the leads to the bank terminals. Substitute the new bank assembly. Mount the mounting bracket on the bank assembly and securely tighten the mounting screws and bushings if provided. Connect and solder the leads to the bank terminals. Remount the selector mechanism on the bank as covered in 3.07.

REASONS FOR REISSUE

1. To revise information covering prefixes on AEC Co part numbers (2.01).
2. To revise Fig. 1 and 4.
3. To revise title of Fig. 3.
4. To add Fig. 5 through 9.
5. To revise the list of tools and materials (3.01).
6. To add KS-19086 selector in replacement procedures [3.06(2), 3.07(2), 3.11(2) and (4), 3.12(2), 3.13, and 3.14(2)].
7. To revise replacement procedures covering interrupter spring assembly (3.15).