DESCRIPTION • INSTALLATION

INSTRUCTIONS

UNIVERSAL OPERATING MECHANISM

Type TP (7.5—69 kv; 400-600-1200 Amp.)

For Horizontally Mounted Type V and Type RL Air Switches

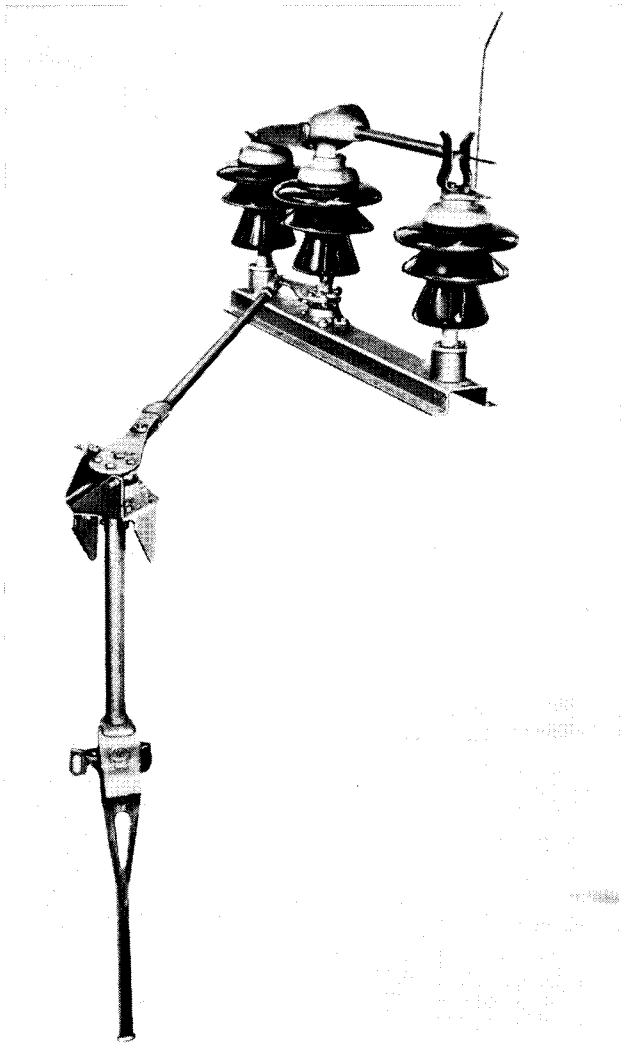


FIG. 1. Horizontally Mounted Switch in Closed Position with Offset-Connected Operating Mechanism

DESCRIPTION

UNIVERSAL OPERATING MECHANISM, Type TP is designed for use on horizontal base, upright or inverted mounted, Westinghouse Type V and Type RL air switches. It may be used either direct connected or offset connected.

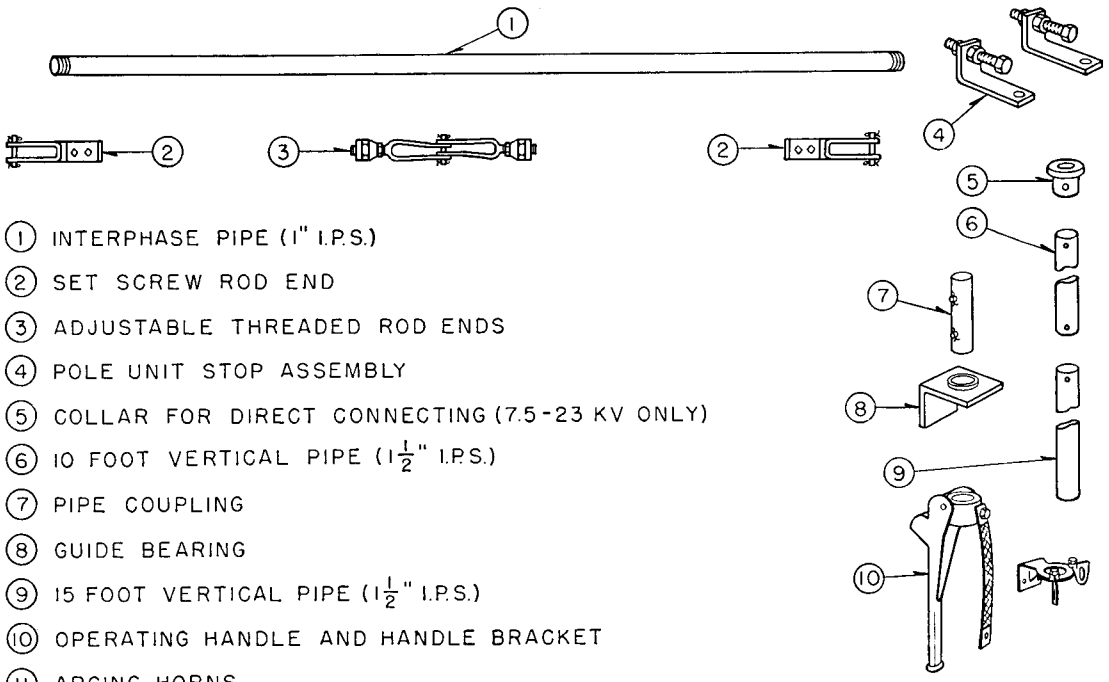
When the mechanism is direct connected, the vertical operating pipe may be attached to any one of the three-pole unit bearings and extended down to the operating handle at ground level. The hinged operating handle is raised to a horizontal plane and moved through an arc of 100° to operate the switch. Adjustable length interphase pipes connect the driven pole unit to the remaining two pole units. A pipe coupling is used to fasten two lengths of vertical pipe together when more than fifteen feet of pipe is required. The pipe sections are held in alignment by a guide bearing to coordinate with each coupling.

An offset connected mechanism is made by using an outboard lever to drive a pole unit rotating insulator. Adjustable length pipes connect this outboard lever to the driven pole, and the driven pole to the other pole units. Vertical pipe links the outboard lever shaft with the operating handle at ground level. As a result of a toggle formed by the connecting pipe and the outboard lever when the switch is closed, a very high mechanical advantage is available when needed most. The operating handle travels approximately 115°, effecting a smooth and completely controlled switch operation. Care should be taken to install the switch so that the operating mechanism is in toggle when the switch is closed as shown in Fig. 3.

INSTALLATION

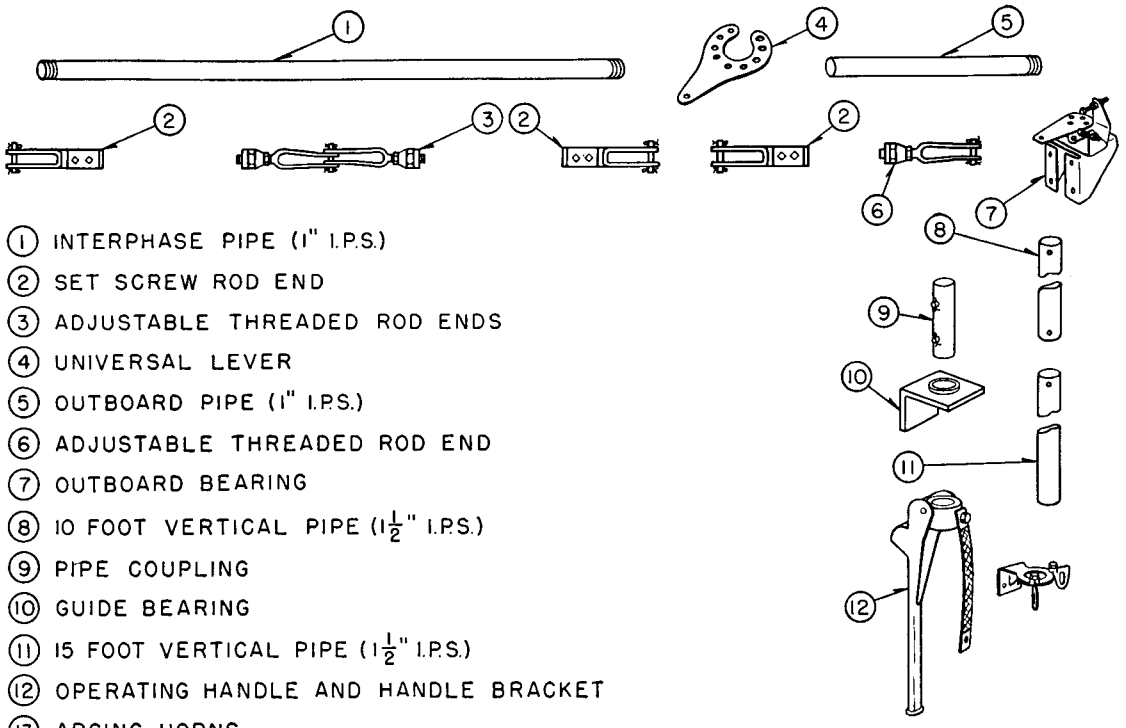
Interphase Pipe. In the mechanism components supplied there is a length of 1″ I.P.S. pipe with tapered threads on both ends. (See ① of Fig. 2). This pipe is for interphase connection and is of sufficient length so that when it is cut, each piece and its associated rod ends can provide more than NEMA standard phase spacing. A piece should be cut from each end of this pipe providing two interphase pipes each having threads on one end. The exact length of each piece should be 12½″ less than the desired phase spacing.

DIRECT CONNECTED MECHANISM



1. INTERPHASE PIPE (1" I.P.S.)
2. SET SCREW ROD END
3. ADJUSTABLE THREADED ROD ENDS
4. POLE UNIT STOP ASSEMBLY
5. COLLAR FOR DIRECT CONNECTING (7.5-23 KV ONLY)
6. 10 FOOT VERTICAL PIPE ($1\frac{1}{2}$" I.P.S.)
7. PIPE COUPLING
8. GUIDE BEARING
9. 15 FOOT VERTICAL PIPE ($1\frac{1}{2}$" I.P.S.)
10. OPERATING HANDLE AND HANDLE BRACKET
11. ARCING HORNS

OFFSET CONNECTED MECHANISM



1. INTERPHASE PIPE (1" I.P.S.)
2. SET SCREW ROD END
3. ADJUSTABLE THREADED ROD ENDS
4. UNIVERSAL LEVER
5. OUTBOARD PIPE (1" I.P.S.)
6. ADJUSTABLE THREADED ROD END
7. OUTBOARD BEARING
8. 10 FOOT VERTICAL PIPE ($1\frac{1}{2}$" I.P.S.)
9. PIPE COUPLING
10. GUIDE BEARING
11. 15 FOOT VERTICAL PIPE ($1\frac{1}{2}$" I.P.S.)
12. OPERATING HANDLE AND HANDLE BRACKET
13. ARCING HORNS

FIG. 2. Operating Mechanism Components

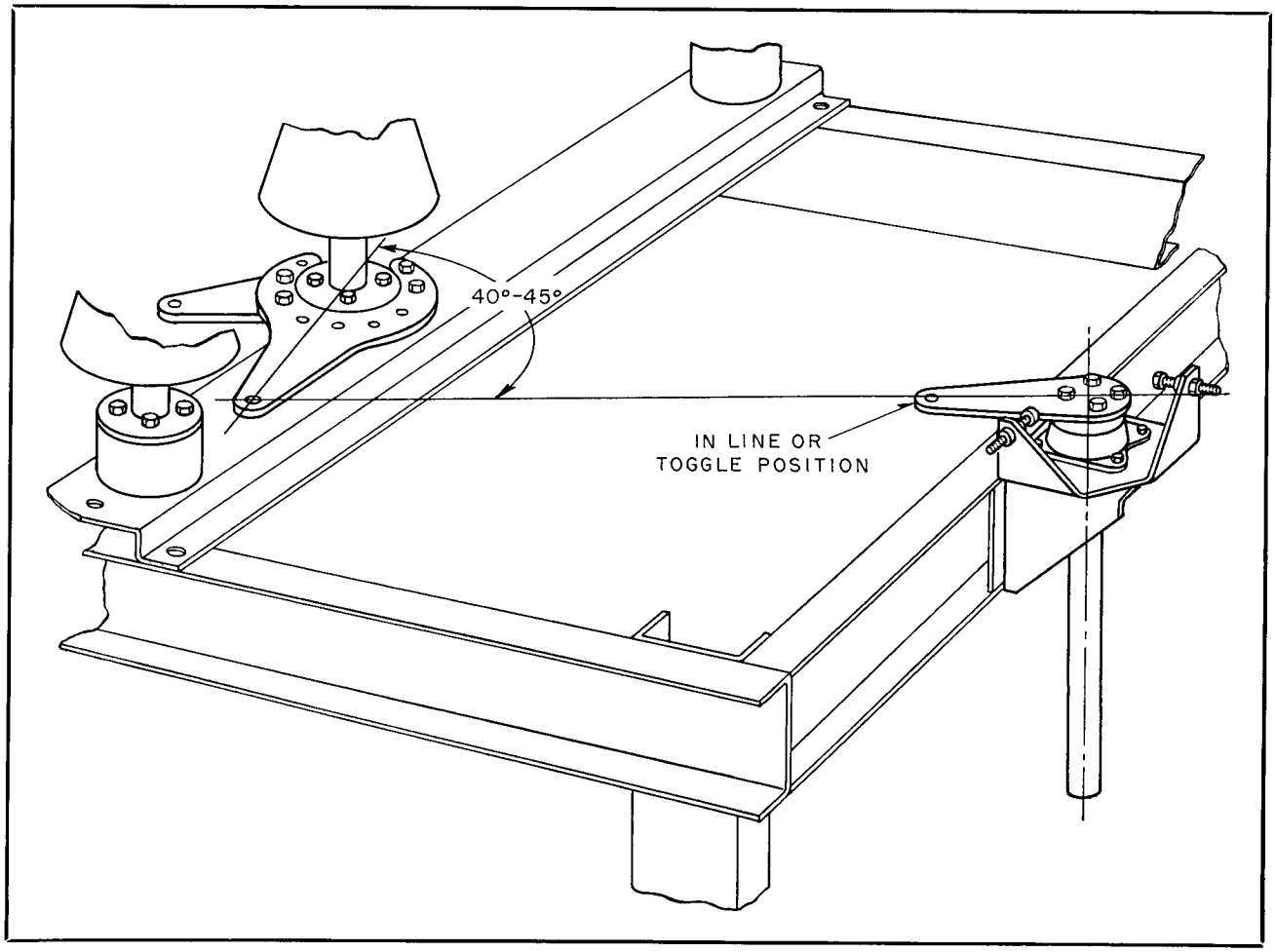


FIG. 3. Outboard Lever in Toggle Position

On the threaded end of the pipe, assemble the adjustable threaded rod end. A set screw rod end should be placed on the opposite end, and the cone point set screws turned into the pipe until the head of the set screw seats on the rod end. ***It is very important that the set screw head be seated on the rod end so that a dependable joint is assured.*** The overall length of the interphase rod may be changed by adjusting the threaded rod end.

Vertical Pipe. The vertical operating pipe supplied with the standard mechanism consists of a 10 and 15 ft. length of 1½-inch I.P.S. pipe. Either piece is used separately or the two pipes are fitted together with the pipe coupling to provide the necessary length of operating shaft. Extra lengths can be ordered when needed. When two or more pieces are used they are coupled by the pipe couplings and aligned by guide bearings which mount immediately above or below each coupling.

In order to connect the vertical pipe directly to a bearing shaft of a 7.5 to 23 kv pole unit it is necessary to remove the collar and pin on the bearing shaft and replace with the special flanged collar and long pin in the shipping bag attached to the stop bracket assembly. On outboard bearings of this rating the flanged collar is an integral part of the outboard assembly. This special collar is flanged so that it cannot fall inside the vertical pipe during assembly of the pipe to the bearing shaft. The pipe coupling then joins the two pipes and the guide bearing aligns the pipes with the structure.

On a 34.5 to 69 kv direct connected mechanism the vertical pipe pins directly to the pole unit bearing with the long pin in the shipping bag attached to the stop bracket assembly. This pin is a part of the 34.5 to 69 kv outboard bearing assembly.

The operating handle should be slipped over the vertical pipe and the bearing bracket mounted approximately 40 inches above ground level. Any excess vertical pipe should be cut off approximately 6 inches below the bracket. The handle mounts above the bracket as shown on the 3-pole outlines (Figs. 8, 9 and 10) so that it coordinates with the lugs for padlocking.

Before pinning the handle to the vertical pipe the direction of throw should be considered. On direct connected switches the handle must turn 100° counterclockwise to open the switch. On an offset connected mechanism the outboard bearing lever should turn clockwise when viewed from above in order to provide the most efficient operating mechanism. The operating handle turns through approximately 115° when an outboard bearing is used. The grounding shunt attached to the handle should be bolted to the mounting structure or ground rod as shown on 3-pole outline drawings.

Pole Unit Stop Assembly. The direct mechanism is provided with two stop assemblies (See Fig. 4) which mount on the bearing housing of the pole unit to which the vertical pipe connects (3-pole outlines, Figs. 8 and 9). The stop bolts may be adjusted to limit the travel of the operating lever to 100°.

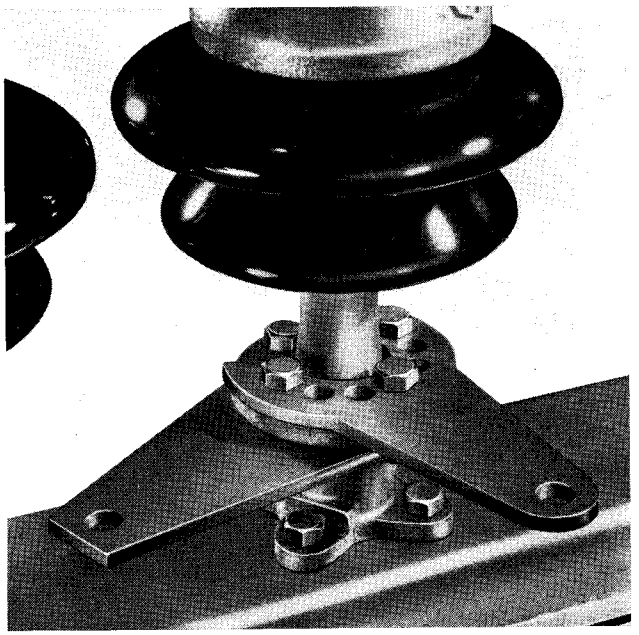


FIG. 5. Mounting of 7.5 to 23 kv Universal Lever

Universal Lever and Outboard Pipe. The offset mechanism is provided with an outboard bearing, outboard pipe, universal lever, and rod ends for attachment to the outboard pipe (See Fig. 2, Offset Connected). The 3-pole outline (Fig. 10) shows a typical arrangement for these items with additional possibilities shown in the schematic views on page 5.

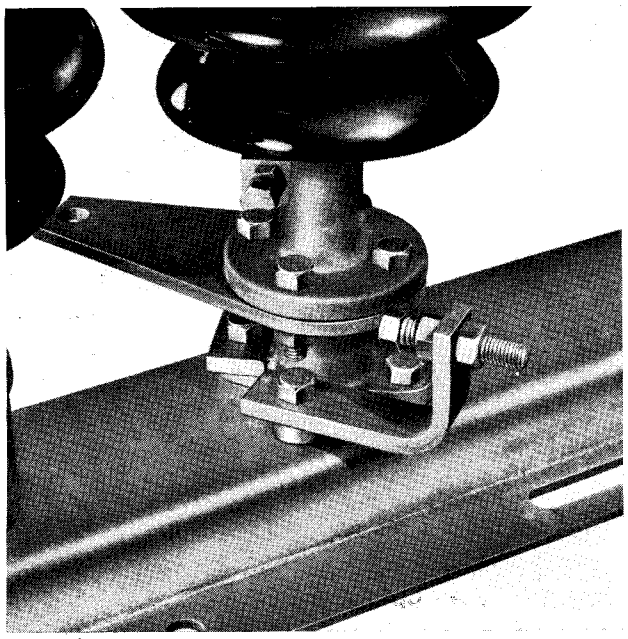


FIG. 4. Mounting of Pole Unit Stop Assemblies

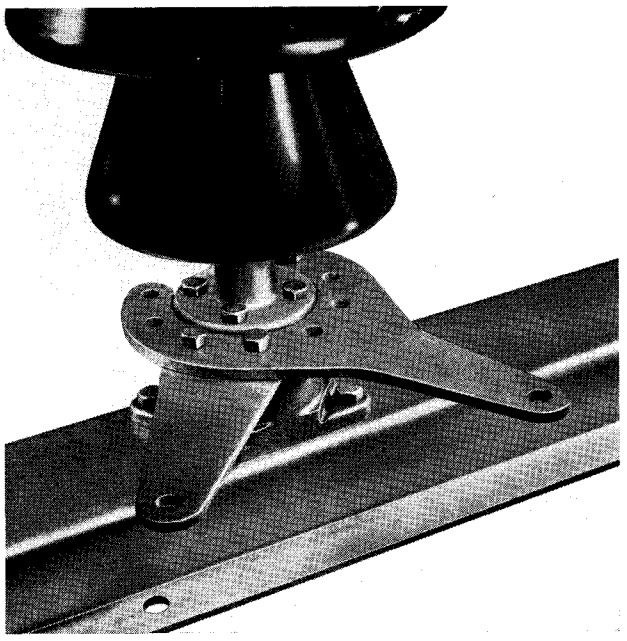


FIG. 6. Mounting of 34.5 to 69 kv Universal Lever

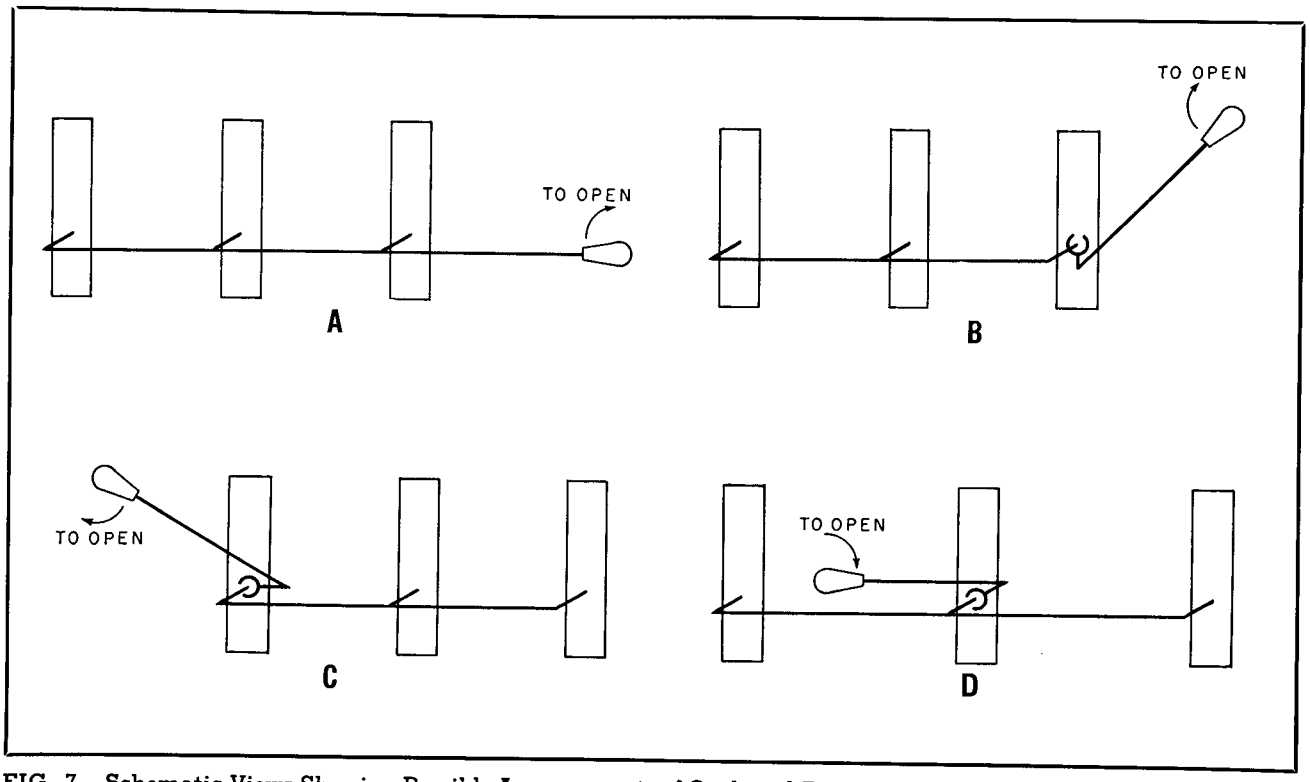


FIG. 7. Schematic Views Showing Possible Arrangements of Outboard Bearing, Outboard Pipe and Universal Lever

When the outboard bearing is located so that the outboard pipe and interphase pipes are in a straight line when the switch is closed, (Fig. 7a), the universal lever is not used. In this case two set screw rod ends fasten directly to the end pole unit lever. A long pin for attaching both of these rod ends to the pole unit lever is provided in the shipping bag tied to the universal lever.

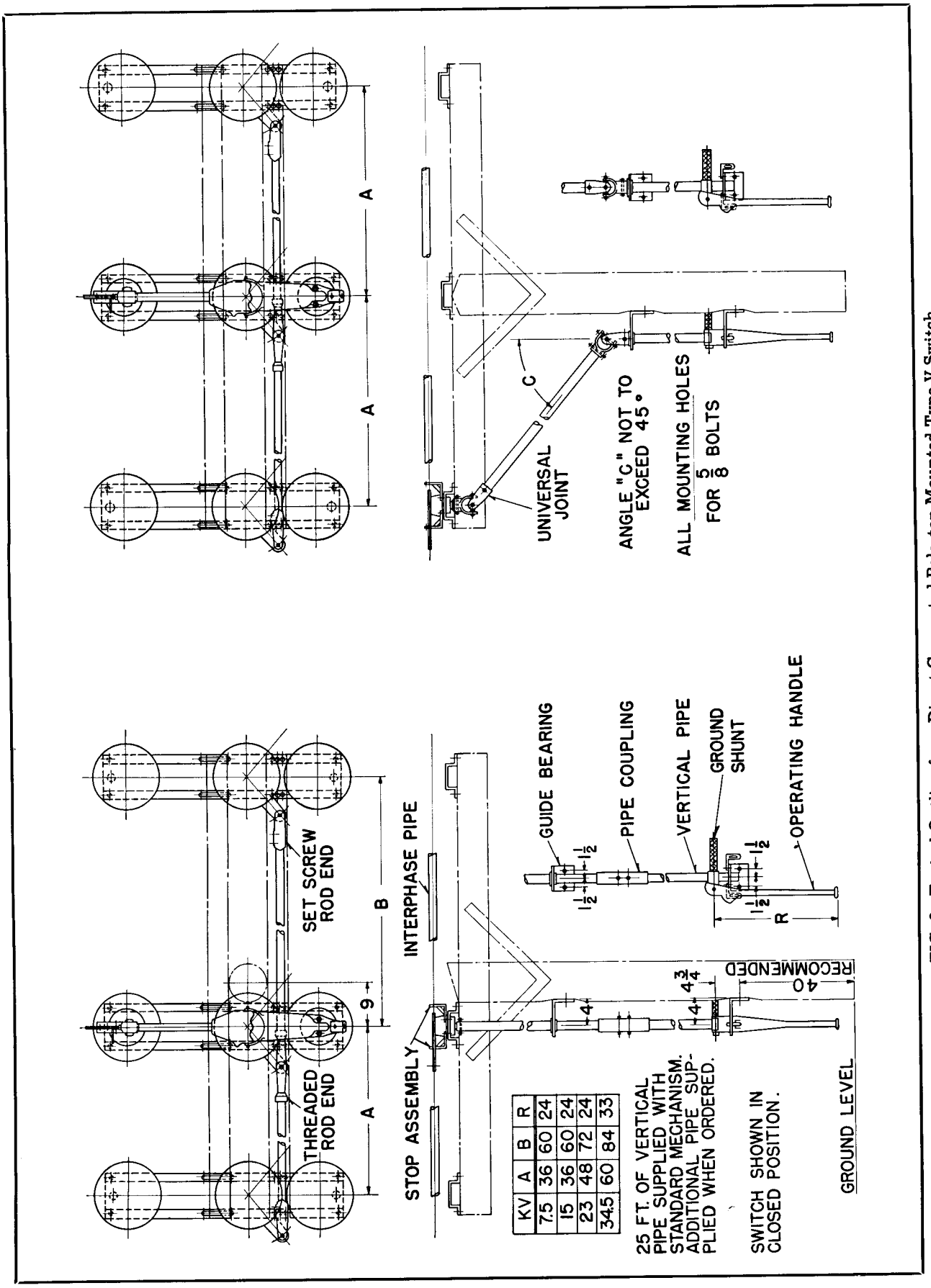
If the outboard pipe is not in line with the interphase pipes (Fig. 7b) or the switch is operated from the left as shown in schematic view Figs. 7c and 7d, the universal lever should be used.

When mounting the universal lever it should be set at an angle of approximately 40° to 45° to the outboard pipe when it is in toggle position as shown in Fig. 3. The holes in the universal lever are displaced angularly from the center line of the lever (See Figs. 5 and 6). This feature permits fine adjustment of the angular setting of the universal lever. To obtain the most desirable setting, try a set of holes, and if these are not suitable move the lever until the adjacent set of holes match the operating lever. If this still does not provide the desired position, turn the lever over to get an intermediate setting.

The outboard bearing should mount relative to the switch base mounting surface as shown in 3-pole outline Fig. 10 so that the operating levers are in the same plane. The stop bracket on the outboard mounting bracket is adjustable through 360°. Stop bolts provide fine adjustment for limiting the travel of the outboard bearing lever. These bolts should be backed out of the way until after the pole units and interphase pipes are set up.

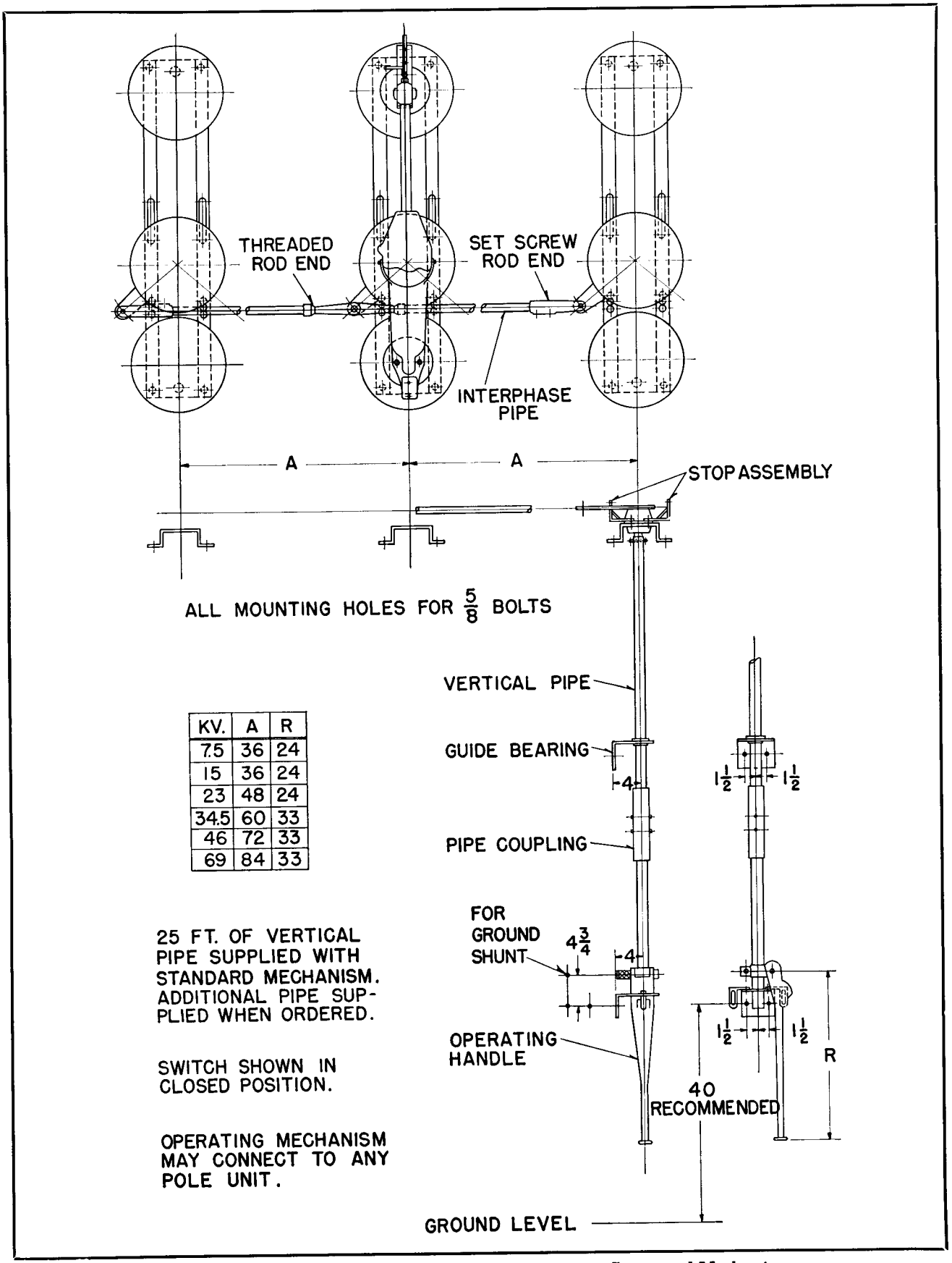
The blade stop bolts on the Type V pole units are factory adjusted to limit blade travel to 90°. With the switch blades fully open, the interphase pipes should be adjusted in length so that all three poles start to close simultaneously. At the same time the open position stop bolt on the outboard bearing should be set and the switch then closed. The closed position stop bolt should be set to limit the travel of the outboard lever to 2 or 3 degrees beyond the toggle or in line position.

Arcing Horns. Arcing horns for the Type V pole units are shipped with the operating mechanism. The moving arc horn is a short stud shipped with a lock nut assembled on it. This horn threads into the tapped hole in the end of the switch blade. The upright stationary horn is mounted on the top of the break jaw terminal pad by using the bolt which fastens the terminal pad to the insulator.



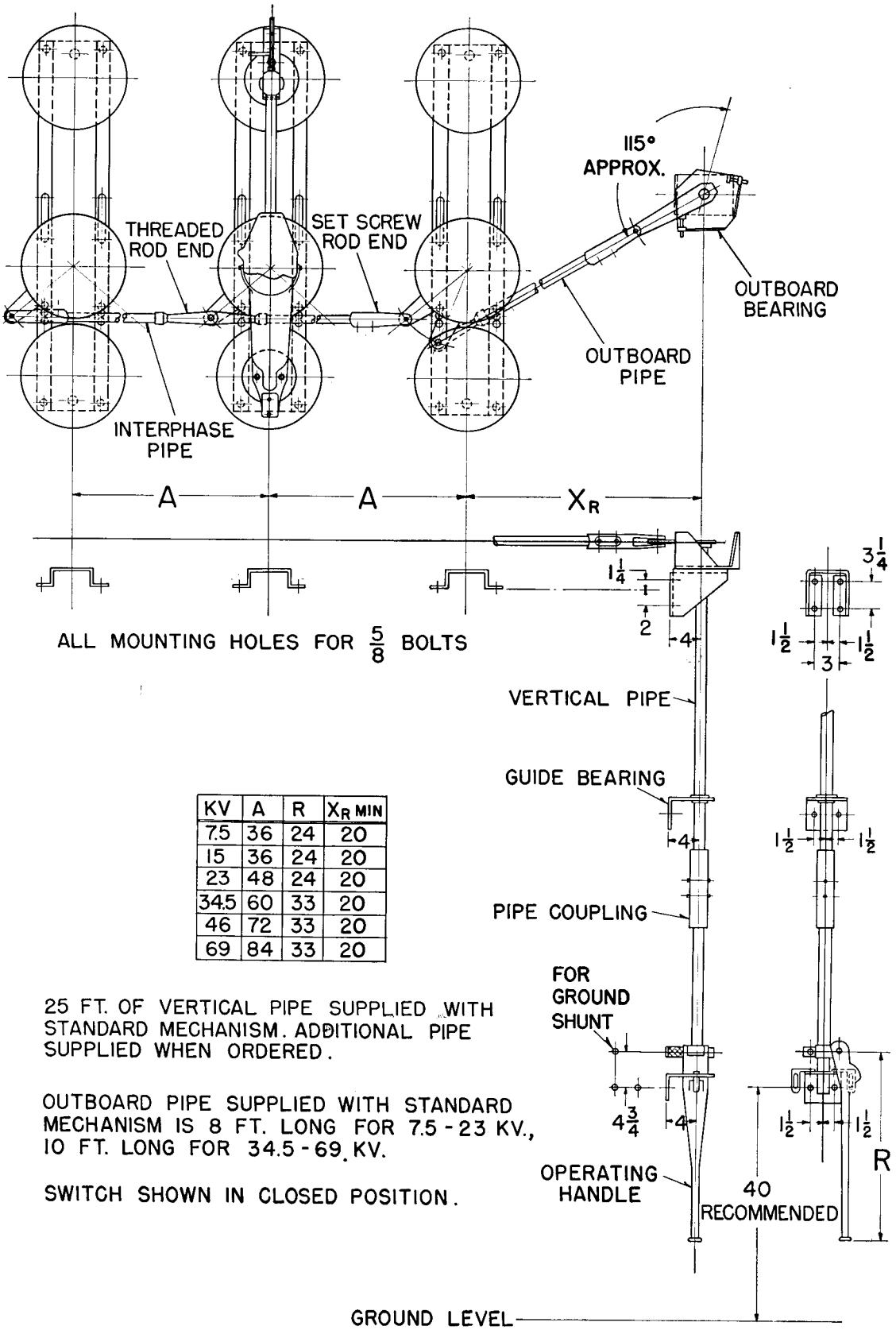
KV	A	B	R
7.5	36	60	24
15	36	60	24
23	48	72	24
34.5	60	84	33

FIG. 8. Typical Outline for a Direct Connected Pole-top Mounted Type V Switch



KV.	A	R
7.5	36	24
15	36	24
23	48	24
34.5	60	33
46	72	33
69	84	33

FIG. 9. Typical Outline for Type V Switch with Direct Connected Mechanism



KV	A	R	X_R MIN
7.5	36	24	20
15	36	24	20
23	48	24	20
34.5	60	33	20
46	72	33	20
69	84	33	20

25 FT. OF VERTICAL PIPE SUPPLIED WITH STANDARD MECHANISM. ADDITIONAL PIPE SUPPLIED WHEN ORDERED.

OUTBOARD PIPE SUPPLIED WITH STANDARD MECHANISM IS 8 FT. LONG FOR 7.5 - 23 KV., 10 FT. LONG FOR 34.5 - 69 KV.

SWITCH SHOWN IN CLOSED POSITION.

FIG. 10. Typical Outline for Type V Switch with Offset Connected Mechanism

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EAST PITTSBURGH PLANT • SWITCHGEAR DIVISION • EAST PITTSBURGH, PA.
(Rep. 5-57) Printed in U.S.A