INSTALLATION AND MAINTENANCE INSTRUCTIONS
H.K. Porter/DELTA-STAR Products
TMK40/40A

Turner Electric "Delta-Star" switches and operating mechanisms are designed for rapid and simple installation. By carefully following these instructions, the possibility of error and delay can be minimized. Time spent in reading the instructions can save many hours of installation time.

SHIPMENT & INSPECTION

The switches are normally shipped with the live parts bolted to the base hardware, the insulators being shipped separately.

Bolts and shims (horseshoe) for use with the switch are attached to the switch in a Burlap Bag. Do not discard these parts. Operating Mechanism components are shipped on a maximum assembled basis and labeled, showing part numbers for their associated operating mechanism drawing. The operating mechanism are crated, boxed or bagged and shipped separately from the switch units. All necessary pipe is handled and tagged for shipment.

Uncrate and/or remove all wire ties and check to see that the switch is undamaged. When uncrating, be careful not to discard any attached bags of parts. If damage is evident, report it immediately to the District Office Manager in your territory for his inspection.

ASSEMBLY

The switches are shipped without insulators and are to be installed in the field, some minor adjustments may be necessary. The following procedure is for assembling and adjusting the switch units.

(A) Disengage the live parts from the switch base hardware. Do not disturb the position of the operating levers.

(B) Mount the switch base on the structure. Add the insulators to the base hardware, and the live parts on top of the insulators. Draw up all bolts, including those joining insulator units in the stacks, but DO NOT TIGHTEN.

(C) Arcing horns, if used, are shipped with the switch. However, the stationary horn is unmounted for shipment. Install the stationary horn. Adjust the arcing horns so they do not touch when the switch is in the closed position, but make contact before the switch blade leaves the contact during opening. Only a slight pressure should exist between the horns. Excessive pressure will cause binding during operation of the switch. (See Form #495 attached to a Type “MK-40” Switch)

INSTALLATION AND ADJUSTMENT

Install the switch units on the structure as noted in "B" securely bolting the base in the position sequence shown on the operating mechanism drawing. At this point, no bolts other than base mounting bolts should have been drawn up tight with a wrench.

(1) Fully close all three units manually. Switches are fully closed when the joining blades are straight in line, and the blade is at the pressure points on the contacts. While the switches are in this position, draw up all the bolts tightly.

(2) Open and close the switch units to check alignment. If there is some misalignment, it will probably be due to insulator imperfection or structure distortion. The horseshoe shims and/or adjusting bushings provided with the switch are to be used for alignment correction. These shims and/or

bushings are to be placed and/or adjusted under the adapter at the bass of the insulator and/or the switch unit bearing. DO NOT ever shim, as this will only cause unnecessary binding.

(3) With the switches in the fully closed position, check the operating lever setting. The location should be in accordance with that shown on the operating mechanism layout drawing. Most switches are equipped with fixed interphase levers requiring no adjustment. On control bearings, and some switches, adjustable and toggle levers are used. Proper adjustment of the octagon lever is shown on the operating mechanism drawing. Typical outside toggle lever arrangement in shown on the operating mechanism drawing.

(4) Install the control bearing support assembly (normally fully assembled at the plant with toggle lever, clevises, knuckles and stops.) Attach the vertical operating shaft with guide bearings, swing handle, foot bearings, couplings, designator and other accessories where applicable (i.e., auxiliary switch, mechanical interlock, key interlock etc.) as shown on the operating mechanism layout drawing.

(5) Install the operating handle, gear box, or motor mechanism and couplings with the support bracket as indicated on the operating mechanism layout drawing. The angular relationship of the control bearing octagon lever and/or toggle lever and the operating handle or gear box must be as shown on the mechanism layout drawing. When properly set, the "U" bolts on the operating handle or gear box coupling should be tightened. The set screws can be drawn up tight to prevent slippage, but - DO NOT PIERCE. On indirect operated switches, the interconnecting pipe (or Reach Rod) between the control bearing and the first unit must be connected, being sure the levers angular relationship is in accordance with the operating mechanism layout drawing. Check to see if the switch unit is fully closed (See Paragraph #1 for Switch Type), then install the interconnecting pipe using the clevises that are normally attached to the operating levers. Tighten the "U" Bolts. DO NOT PIERCE THE SET SCREWS.

(6) Operate the first unit by slowly opening and closing it, using the operating handle or gear box. Check again to be sure the switch is fully closed.

NOTE: If the switch is not opening or closing properly, additional shims or lever adjustments may be required.

(7) If one of the blades is lagging when closing the switch (and the interphase linkage has been properly adjusted) continue to close the switch until the blade is within a foot of the jaw contacts. Two (2) Horseshoe Shims should then be placed between the casting and the top of the rotating insulator at the two bolts farthest from the jaw end of the switch. (Do Not place shims at the front bolts at any time). If the blades lean forward with the switch in the fully opened position, loosen the bolts securing the mechanism assembly to the insulators (both rotating and stationary insulators on hinge end of switch) with a slight pressure by hand. Push the leaning blade to its vertical position and observe which side of the hinge end of the mechanism frame raises from the insulator cap. Place the necessary shims under the raised section of the frame and the top of the insulator. Close switch and retighten bolts. Check that the blade is entering the jaw contact properly.

CAUTION: Do not pierce set screws until all adjustments have been finalized.

(8) Switch unit levers and connecting pipe are fixed and set at the factory. No adjustments are necessary. All pipe is cut to the correct length at the Factory. If the switch is installed properly, no cutting will be necessary. The interphase pipe is cut two inches shorter than the phase spacing shown on the mechanism layout drawing. Connecting pipe will vary depending on the

configuration and placement of the vertical shaft. The vertical pipe is cut to the correct length. The motor mechanism vertical shaft has its associated coupling and driving knuckle attached to it.

CAUTION: Be sure to disengage the motor mechanism coupling from the knuckle fixed to the top of the motor mechanism before testing for adjustment electrically. See Form #1223DPC 58R, or 1095DPC51, whichever is applicable, before attempting to make adjustments on the motor mechanism. These forms along with a wiring diagram are packed inside the motor mechanism in a weatherproof envelope. All switch blades are NOT designed to open a full 90°, See: Mechanism Layout or Switch Drawing for correct degree of opening.

The stops on the gear box are not designed to stop the switch operator from turning the crank, but to serve as an indicator to show the switch is either open or closed.

(9) When a swing type handle or gear box is used to operate switch, Stops are furnished for attaching to the interphase pipes. With the switch fully closed, the "Closed" Stop should be assembled on the interphase pipe so that the stop lacks 'about ¼" of touching the switch base or other obstructions shown on the layout drawing.
With the switch Open, the "Open" Stop should be set tight against the base. (No Stops are provided in the switch units themselves for the Open Position.)

* A Vertical Break horizontally mounted switch is fully open when the blade is perpendicular to the base.

* A Vertical Break vertically mounted switch is fully open when the blade is about 70° open.

(10) After the interphase pipe stops are set on a swing handle operated switch, the handle and adjustable notch plate (or plates) on the foot bearing should be set so the handle lug fits snugly into the notches when the switch is in the fully open or closed positions. A slight torque in the pipe is desirable to insure that the switch will be driven into the fully closed position after contact and pins become weathered.

(10A) When a gear box is used for operating the switches, the stops at the gear box should be set so that the stop arm lacks ¼" to ½ of touching the stop when the switch is in the fully closed position. This is to insure complete closing of the switch due to play in the mechanism. If the vertical shaft is greater than 30 ft. long, the above gap should be ½ to 5/8" to compensate for the wind-up and play in the mechanism.

(11) After all adjustments have been completed, and the switch units operated in synchronism, all the self-piercing set screws should be tightened until they pierce the pipe and the heads are down on the bosses. Back off the set screws about one turn and retighten the "U" bolts, then retighten the set screws down to the bosses. If extra heavy or double extra heavy pipe is used, holes may be drilled in the pipe for the set screws. Drill bushings are furnished when heavy pipe is used.

SPECIAL NOTE: FOR (11)

(1) Do not remove the hinge bolts on the Vertical Break Switch without opening the switch first, if it is horizontal mounted, or closing the switch if it is vertically mounted.

(2) Never disassemble counterbalance spring mechanisms on the switch live part mechanism assembly, as these are properly adjusted at the Factory.

(3) The switch bearings are of the greaseless type and should not be lubricated. Stainless Steel Balls and Races are used in their construction, and they will not corrode in normal atmosphere.

(4) The self-piercing set screws are made from a hardening type stainless steel and are electro-polished. The apparent slight rusting that sometimes develops after a time is difficult to overcome, and is not detrimental to the set screw. It can be minimized by coating the exposed head with No-Oxide or other protective paint.

(12) These instructions are written to cover the installation of the most common switches and mechanisms. They do not take the place of the switch and mechanism drawing layouts furnished with this order - but - supplement them. It may be apparent that these instructions do not adequately meet the demands of your installation. In such instances where the installation is not covered by these instructions, please refer to the Factory for assistance.

MAINTENANCE

The switches have been designed to operate with little or no maintenance. However, when inspections are made, the following will result in an easier operating switch.

(A) Clean contacts with fine sandpaper or steel wool, and apply dry contact lubricant Electrodag 154 or Dry Flake Graphite on all contact surfaces. Grease should not be used. DO NOT USE EMERY CLOTH OR EMERY OF ANY KIND ON THE CONTACTS.

(B) Apply Dow Corning "IDL-460" Dry Lubricant on all pin and knuckle joints. Oil or grease should not be used.

(C) Straighten or replace damaged arcing horns.

(D) Apply grease to upper bearing of the gear box through the grease fitting, if so equipped. DO NOT fill the housing with grease. But, about every year or two remove the cover and if the teeth are dry, daub a liberal amount of grease on the gears making certain that the grease applied will travel toward the worm, when operating.
We recommend Dixons #677 Graphite Grease for 20:1 gear box, and Standard Oil Superla #57 for 42:1 gear box for this purpose, and carry a stock for immediate shipment.

CAUTION: After becoming corroded and dirty, a switch tends to resist the efforts of the operator to a certain degree, and complete switch operating may not be obtained unless precautionary measures are taken. When the switch is new and being installed, some extra travel should be allowed at the operating handle after the switch is closed. This setting is covered under Paragraph 10 and 10-A depending on the type of switch and type of operating handle being used. In an extremely corrosive atmosphere, such as power houses and industrial sites, it is recommended that the contacts and blades be coated with a suitable dry lubricant or some other inhibitor at regular intervals to prevent excessive corrosion. This coating should be renewed as required, depending on the severity of atmospheric conditions.