

Design Requirements for Structures or Pedestals to Support Circuit-Switchers

Circuit-Switcher's high operating speed (total blade-travel time of 1.25 to 1.5 seconds) brings about high acceleration and deceleration rates, resulting in high dynamic forces—which are transferred to supporting structures (or pedestals) and adjoining bus.

Supporting structures (or pedestals) are to be designed to support dead weight and to minimize deflections from bending moments normal to the longitudinal axis of the Circuit-Switcher bases. Structures (or pedestals) should limit deflections as follows:

- a) Maximum deflection, under dynamic forces, of any supporting member for Circuit-Switcher should not exceed $\frac{3}{8}$ inch in any direction.
- b) Similarly, the deflection under static wind load should not exceed one inch.
- c) The rotational deflection of the switch operator (with respect to the center-phase Circuit-Switcher pole-unit base) in resisting the switch-operator locked-rotor torque of 21,500 inch-pounds should not exceed 5.0 degrees.

For purposes of supporting-structure design, it is assumed that dynamic forces and static wind loads do not occur simultaneously. Generally, the bending moments produced by dynamic forces will dictate the design of the structure and the foundation. Forces produced by wind loads must be considered in the case of high structures, as these static bending moments may exceed the dynamic moments.

M_C and M_W (see pages 2 and 3) are bending moments at each Circuit-Switcher pole-unit base. F_C and F_W are shear loads at each Circuit-Switcher pole-unit base. For individual pole-units mounted on independent pedestals of height "B," the maximum bending moment M_t , at the foundation may be found as follows:

a) **Dynamic Loads:** $M_t = M_C + (F_C \times B)$

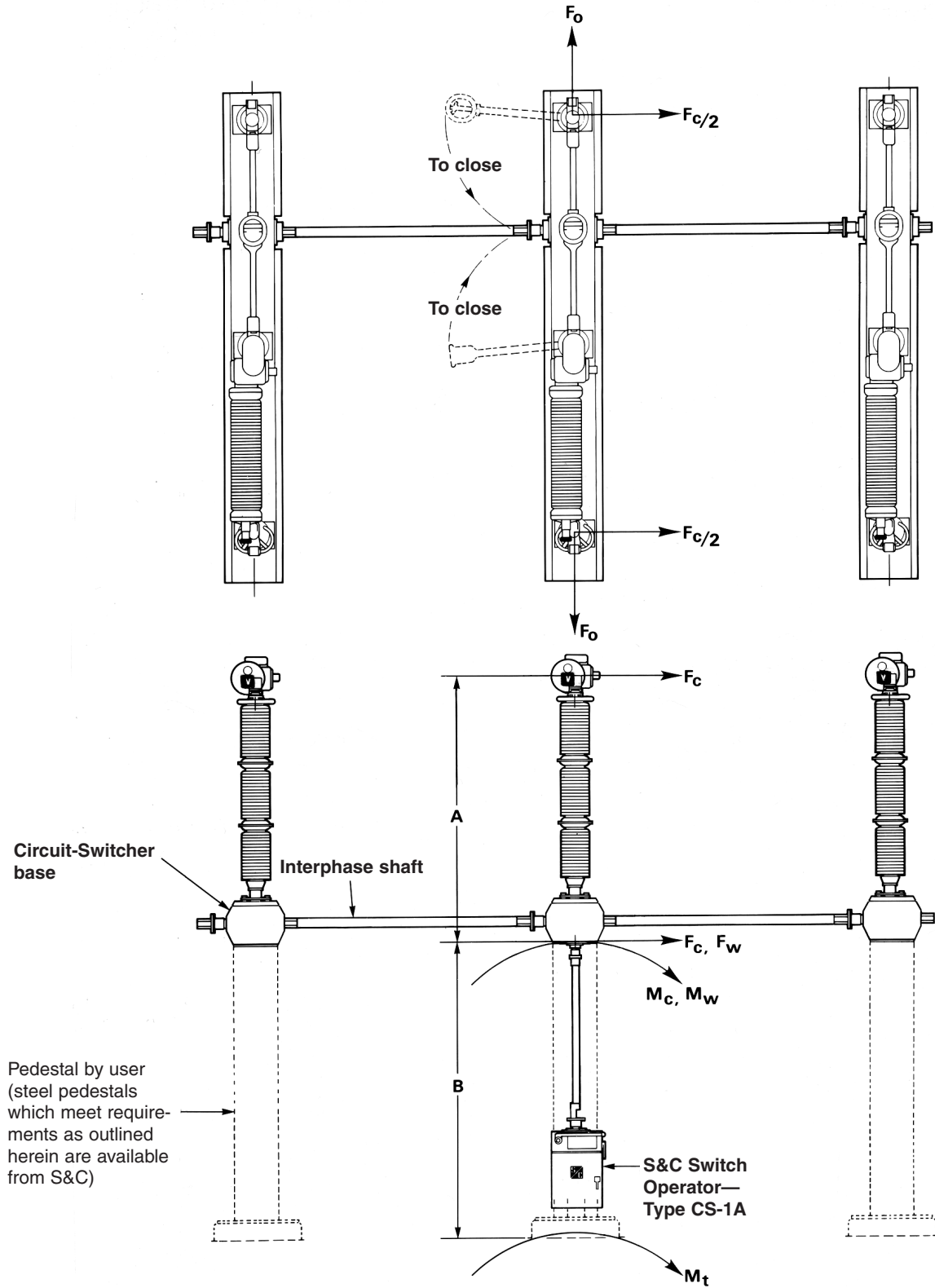
b) **Wind Loads:** $M_t = M_W + (F_W \times B) +$ (Bending moment from wind acting on pedestal)

F_C and F_O are forces at the Circuit-Switcher terminal pads accompanying closing and opening operations. Limiting deflections of the Circuit-Switcher supporting members to recommended values will ensure that these forces will be absorbed by the pedestals and not be transferred to adjoining bus or other apparatus (e.g., bushings). Use of expansion joints at Circuit-Switcher terminal pads will compensate for inherent insulator-column deflection.

The weight of the bus plus any associated ice load exerts a vertical force on the Circuit-Switcher terminal pads. This vertical force must not exceed 400 pounds on the terminal pad at the interrupting-unit end, or 300 pounds on the terminal pad at the disconnect-blade end. Furthermore, bus connections to the terminal pads on the disconnect-blade end must be sufficiently rigid to preclude wind-induced oscillation of the terminal pads.

★ Information given in this publication applies to equivalent models of Mark III and Mark IV Circuit-Switchers.





Legend:

- A** = Moment arm for force F_C
- B** = Height of mounting pedestal
- F_C** = Dynamic force accompanying closing operation
- F_O** = Dynamic force accompanying opening operation
- F_W** = Static wind force (does not include wind load on supporting pedestal)
- M_C** = Dynamic bending moment
- M_t** = Total bending moment at foundation
- M_W** = Static wind bending moment
- T_1** = Switch-operator locked-rotor torque
- T_2** = Torque delivered to interphase shaft
- W_1** = Weight of one Circuit-Switcher pole-unit
- W_2** = Maximum dead load per pedestal
- W_3** = Weight of switch operator
- \bar{X}** = Horizontal distance from centerline of center rotating insulator stack to center of gravity

LOADING DATA ①

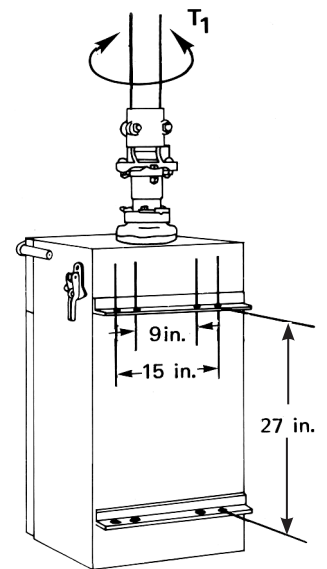
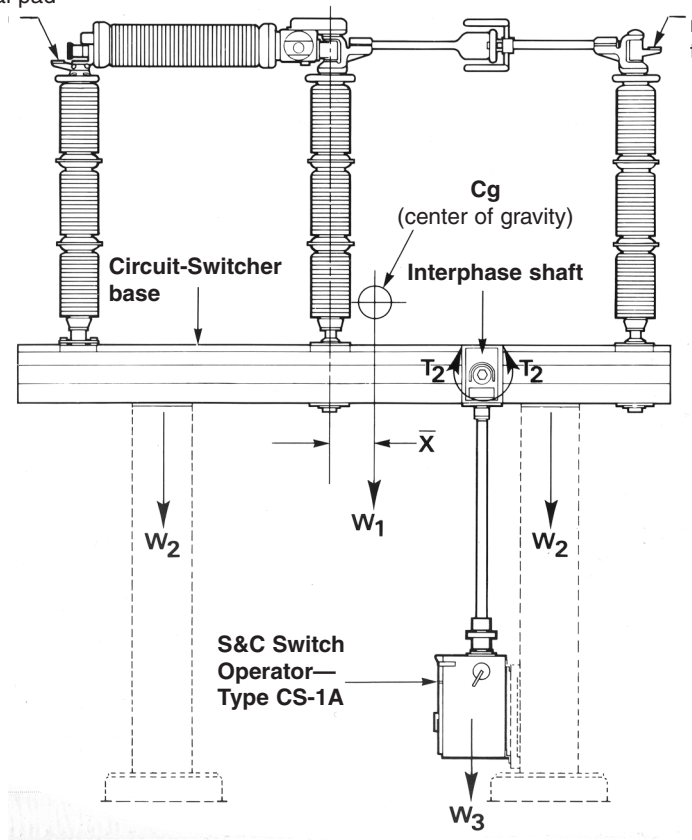
Rating, kV		F_C Lbs. ②	F_O Lbs.	F_W Lbs. ②	M_C In-Lbs. ②	M_W In-Lbs. ②	W_1 Lbs. ②	W_2 Lbs. ②	W_3 Lbs.	T_1 In-Lbs.	T_2 In-Lbs.	A, Inches	\bar{X} , Inches
Nom.	BIL												
345	1300	520	240	2630	72 800	127 000	4900	2940	350	21 500	20 000	140	2

① Values shown are for Circuit-Switchers equipped with: (a) station post insulators, (b) three interrupting gaps per pole-unit, (c) 2000-ampere blades, and (d) S&C Switch Operator—Type CS-1A. Wind force based on 100-mph wind velocity.

② Per Circuit-Switcher pole-unit.

Maximum vertical force from weight of bus plus any ice load not to exceed 400 pounds at this terminal pad

Maximum vertical force from weight of bus plus any ice load not to exceed 300 pounds at this terminal pad



Switch operator mounting-hole spacing and output torques.

