APPENDIX B
1
TYPICAL PROTECTIVE DEVICE SETTINGS

B-1. Motor circuits

a. Long time pick-up.

(1) 1.15 times motor FLA times motor service factor for applications encountering 90 percent voltage dip on motor starting.

(2) 1.25 times motor FLA times motor service factor for applications encountering 80 percent voltage dip on motor starting.

b. Long time delay.

(1) Greater than motor starting time at 100 percent voltage and the minimum system voltage.

(2) Less than locked rotor damage time at 100 percent voltage and the minimum system voltage.

(3) On high inertia drives it is not uncommon for the start time to be greater than the locked rotor damage time. Under these circumstances, set the time to permit the motor to start. Supplemental protection should be added for locked rotor protection. One example of this is a speed switch set at 25 percent of rated speed tripping through a timer to trip if the desired speed has not been reached in a predetermined time.

c. Instantaneous pick-up.

(1) Not less than 1.7 times motor LRA for medium-voltage motors.

(2) Not less than 2.0 times motor LRA for low-voltage motors.

d. Ground-fault protection.

(1) Minimum pick-up and minimum time delay for static trip units.

(2) Core-balance CT and 50 relay set at minimum for medium-voltage, low-resistance grounded systems.

(3) Residually connected CT and 50/51 relay for medium-voltage, solidly-grounded systems. Minimum tap and time dial equals 1 for 51 relay. Minimum tap (not less than SA) for 50 relay.

B-2. Load center (LC) feeders breakers with static trip units

a. Long time pick-up set at 1.25 times LC full-load rating.

b. Long time delay set greater than duration of cold load inrush or motor starting time. (Typically 20 seconds at four times long time delay).

c. Short time pick-up set 1.25 times largest downstream protective device.

d. Short time delay set at minimum.

B-3. Load center (LC) tie breakers with static trip units

a. Long time pick-up set at 100 percent of transformer FLA.

b. Long time delay set to coordinate with largest feeder breaker and cold load inrush.

c. Short time pick-up set 1.25 times largest feeder short time or instantaneous setting or cold load inrush.

d. Short time delay set at intermediate.

B-4. Load center (LC) main breakers

a. Single-ended substations. Set same as tie breaker but with long time pick-up set at 1.25 times transformer FLA.

b. Three-wire, double-ended substations with static trip units.

(1) Long time pick-up set at 1.25 times transformer FLA.

(2) Long time delay set to coordinate with tie breaker.

(3) Short time pick-up set at 1.25 times tie breaker short time pick-up.

(4) Short time delay set at maximum.

(5) Neutral ground current transformer relay long inverse time plus high drop out instantaneous working into a timer.

(6) Ground-fault long time pick-up set at 1.25 times largest feeder standard long time device, but not greater than 1200A.

(7) Ground-fault long time delay set to coordinate with longest feeder standard long time device.

(8) Ground-fault short time pick-up set at 1.25 times largest feeder standard short time device but not greater than 3000A.

(9) Ground-fault short time delay set 0.3 seconds longer than main breaker short time delay but not greater than 1 second.

c. Four-wire, double-ended substations with static trip units.

(1) Standard neutral ground relay and static trip unit ground relay will not operate correctly. Usually the magnitude of 277V load is so small that it can be provided from a small 480-480Y/ 277V isolation transformer fed from a load center.

(2) It is strongly recommended that double-ended four-wire systems not be used due to the complications and special ground relaying techniques required.

B-5. Medium-voltage load center (LC) feeder breakers

a. Relay.

(1) Long time pick-up set at 1.25 times the reflected current setting of main low side static trip units.

(2) Long time delay set to coordinate with the reflected main low side static trip units.

(3) High drop out instantaneous pick-up set at 1.25 times main low side static trip short time pick-up reflected current.

(4) High drop out time set 0.3 seconds longer than main low side static trip short time delay.

(5) Instantaneous set at 1.7 times maximum 1£ transformer let through fault current.

(6) Ground relaying same as motor circuits.

b. Medium-voltage main and tie breaker are set with the same philosophy as load center main and tie breakers. Relays are the same as the load center feeders without an instantaneous element. Short time pick-up should be 1.15 times the largest feeder instantaneous element with a time delay of 0.3 seconds on the tie breaker. The main breakers will he set to coordinate with the tie. Ground relaying will be from residually connected 51N relays.