

7. Open 11-kv disconnects and dismantle test connections.

8. Return line to service.

Note that each step of this procedure checks the preceding step. That is, step 2 checks continuity of wiring and lamp filaments; step 3, the connections; step 4 checks lamps before step 5, which is the actual operation of phasing out.

It is assumed that station synchroscope is not connected to 11-kv lines. If it were, JR could use it for phasing out the repaired line.—E E Jones, Gardena, Calif.

Transformers and Lamps

BEST METHOD I know to check phase reversal is use of simple incandescent lamp in conjunction with potential transformers. This is essentially same method used to synchronize two ac generators.

Three transformers should be used with primary of each connected across the open disconnects at power-station end. When both power-station bus and feeder have the same phase rotation, lamps will not light.—James J Anderson, St. Paul, Minn.

Mark Phases Beforehand

I suggest JR check phase reversal by installing potential transformers on power transformer side of power-station disconnects; a small 3-phase motor connected across secondaries (hooked in open delta) will give indication of phase rotation.

If JR paints an identifying letter on each phase at both ends of every cable, he can use a simple "ringing out" test to check for phase reversal. In this case the test is made between the secondary of the power transformer and the substation ocb.—Ira A Butcher, Plover River, Va.

Check With Synchroscope

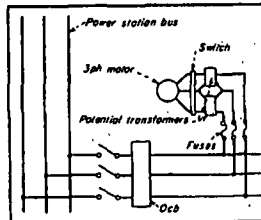
GLOW-STICK METHOD of checking for reversal of phase, which JR describes, is satisfactory provided the three phases are tested simultaneously. Although this method is reliable, it presents a definite hazard to the operator.

Rather than the method he now uses, I suggest JR adapt the synchroscope on his control board for phasing out. This method may be readily used if the station bus is sectionalized. Let us take the case where the feeder in question comes from section A of the power-station bus. During a light load period, all feeds from and to that bus section are dropped off and the ocb opened between sections A and B. The feeder in question, energized from the substation end, is now closed in on section A.

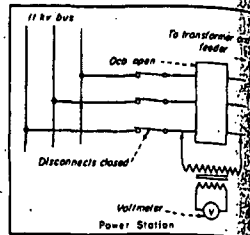
We now have section A fed through substation bus which, in turn, is supplied from section B of power-station bus. Since each section of bus has its own instrument transformers connected to synchroscope plugs on control board, the problem now is to check that section A and B are in synchronism. After this check, remaining feeders and generator to that section of bus are returned to service.—K B Hoffman, Tenafly, N. J.

Check With Small Motor

SIMPLEST WAY for JR to check for phase reversal is to hook up a small 3-phase motor through potential transformers. Knowing rotation of this motor when connected to bus, it is simple to check cable phase rotation (sketch below).



All leads from potential transformer secondaries could be brought to one point and motor with geared hand on a dial connected through interlocking switches. The same idea could be used with phase rotation indicators using resistors, reactors and lamps. I believe the motor gives an indication the operator is less liable to mistake.—E A Roberts, Carlsbad, N. M.



Use Ring-Out Test With Pot

JR CAN BEST CHECK phasing of cable with a potential transformer. Connect one transformer primary lead to phase on bus side of open ocb and other primary lead to corresponding phase on cable side as in above sketch. Energize cable from substation end.

If cable is in phase with bus no current will flow through transformer primary winding. Hence a lamp or voltmeter connected across secondary will not indicate voltage. All three phases must be checked in the same manner.

Where it is possible to disconnect cable at each end, a simple system of lettering phases at terminal points will further simplify the phasing problem. When cable is so marked, a low dc voltage may be used with a test lamp in series with one line, the other line connected to cable sheath. At other end of cable, that same lead may be found by use of voltmeter or test lamp connected between cable sheath and lead.—C. J. Mercer, Memphis, Tenn.

Test With Bus Transformer

I suggest JR use a voltmeter in conjunction with a potential transformer instead of a glow stick if he continues this test method. The disconnect should be closed on one phase and voltage measured across the two open disconnects. In this test a single-phase instrument transformer should be used, remembering that it will be subjected to about twice normal voltage in case of reversed phase in feeder.

Since there is probably a 3-phase instrument transformer on bus, I recommend a second transformer be connected on transformer side of disconnect. A permanent connection is made across one phase on the secondary. Voltmeter is connected, in turn, across the two phases. Check transformer ratings.—P VanHerck, Liege, Belgium



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