



MAINTENANCE INSTRUCTION

EXTENDED RANGE DYNAMIC BRAKE REVISED SETTINGS AND ADJUSTING PROCEDURE 6-AXLE SD AND F TYPE LOCOMOTIVES

All SD and F type locomotives equipped with extended range dynamic brakes built after June, 1969, have new extended range settings that will make it easier to adjust the extended range system and eliminate the possibility of "D" contactor cycling. These settings must be used when recalibrating any extended range equipped 6 axle units regardless of age.

Also, new extended range adjustment procedures have been developed that will considerably shorten the adjustment time. The new procedure also can utilize stall current through the traction motors to obtain current through the brake current transducers (BCT 6, BCT 7). However, the use of stall current through the traction motors should only be used as an alternate to the regular method of obtaining current through the BCT's as described in the applicable M.I. or Locomotive Service Manual. The use of stall current requires permission by the railroad since there is a safety factor involved — the possibility of the locomotive moving while testing. Also, railroad personnel assigned to test must exercise considerable caution and discretion to prevent possible equipment damage. The traction motor current levels and duration under stall conditions must be kept to an absolute minimum.

The procedure amounts to first checking and resetting (if necessary) the dynamic brake potential line voltage. The second section is for calibrating LOR, IRR and DRR relays. The graphs, Figs. 1, 2, 3, and 4, must be used for references when calibrating the extended range system.

The potential line brake calibration should be checked and adjusted (if necessary) before the extended range dynamic brake is adjusted.

For SD(P)35

1. Shut engine down and install a 2000 amp - 50 MV shunt in place of the main generator shunt panel. Connect a 0-50 millivolt meter to the shunt. Remove BF fuses and restart engine.
2. Put the "Field Loop - Potential Wire" selector switch (if so equipped) in "Potential Wire" position.

3. Connect a 0-150 V DC meter positive lead to the "A" terminal of the dynamic brake zener - Z2 - and negative lead to BN to monitor 24T voltage.
4. Energize the AC1 fan contactor with a jumper wire.
5. Set up the controls for dynamic brake and pull throttle out just far enough to pick up BFA contactor (minimum brake position). The voltmeter should read zero. Place the throttle in maximum brake position and the voltmeter should read at least 70 volts. If voltages are out of tolerance readjust the brake control rheostat position to obtain proper voltages. Return throttle to idle when completed.
6. The minimum generator current should be checked and adjusted (if necessary) as follows:

Reinstall the BF fuses and with the controls set up for dynamic brake, put the throttle in minimum brake position (just far enough to pick up BFA). The main generator current should be between 20-40 amps. If necessary adjust RE64C to obtain proper generator current. Return throttle to idle when completed.

7. Disconnect all wires on LOR — No. 1 terminal.
8. With the BF fuses in place set up the unit for dynamic brake and place throttle in maximum brake position. Observe 24T voltage and Traction Motor Field Current and adjust RH3 using Fig. 1 so that setting is within the graph limits. Return throttle to idle when completed.

For All Other Models

1. Shut the engine down and install a 4000 amp - 50 MV shunt (for 40 and 45 series); 2000 amp - 50 MV shunt for 38 and 39 series in place of the generator shunt panel. Connect a 0-50 millivolt meter to the shunt. Restart engine.

2. Disconnect all wires from LOR - No. 1 terminal.
3. Connect a 0-150 V DC meter positive lead to RCP-1 and negative to BN to monitor 24T voltage.
4. With the GF fuses in place, set up the unit for dynamic brake and place throttle in maximum position. Observe 24T voltage and T.M. Field Current and adjust RH3 [R8 on SD(P)45, F(P)45, and SD40 with PCP] using Fig. 1 (Fig. 2 for SD39 and SD38 with single field D32). Return throttle to idle when completed.

Adjust LOR, IRR and DRR as follows:

1. Disconnect the 0-50 MV meter from main generator shunt and connect it to the indicating ammeter shunt.

2. On late model SD39, SD(P)40, SD(P)45, and F(P)45, isolate unit and disconnect the following wires:

SD39 — Remove ALM6 and ALM1 wires from GFR-G1 and connect together.

SD(P)40 — Remove ALM wire from GFA-C.

All 45 Series — Remove ALM wire from M12-E.

3. Connect a 5000 ohm 25 watt rheostat in series with the TRP panel on SD38 (with single field D32) SD39, all 40's and 45's. On SD(P)35 units either connect the 5000 ohm rheostat in series with the TRP panel (if so equipped) or in series with PLS No. 3 terminal for units without a TRP.

4. Reconnect the 0-150 V DC meter positive lead to the center tap of RH12 and negative lead to NA source [SD(P)35] or BN (SD38, SD39, all 40 and 45 series).

5. Disconnect all wires at center tap of RH9.

6. To obtain current through BCT's for calibrating LOR, IRR, and DRR one of the following methods can be used.

- a. One or Two Motor Stall Current — Stall current through a traction motor(s) may be used for obtaining current through the BCT's. The set up is as follows:

40 and 45 Series — Isolate unit first and remove arc chutes from S14, S25, and S36 contactors and place insulating material between main contacts. Remove

wires from P2 coil positive and place jumper from PA source to P2 coil positive. On IDAC equipped units, remove ALG1 wire from No. 1 terminal of WSC box. On non-IDAC equipped units remove AL1 wire from TB68A7. Set up the locomotive for power and lock air brakes hard. Control current through BCT's with throttle and 5000 ohm rheostat. Keep time element with stall current through motor to absolute minimum.

SD39 Series — Add a jumper from PA to PR-F2. Jumper from ELD A/Right to ELD B/Right. This allows stall current through two motors. Remove the ALG1 wire from WSC-1 terminal. Set up the locomotive for power operation and control current with throttle and 5000 ohm rheostat. Keep time element with stall current through motors to an absolute minimum. Apply air brakes hard before loading unit.

SD35 Series — Isolate unit and remove arc chutes on S36 and S14 contactors and place insulating material between main contacts. Remove wires from SP25 coil positive and apply jumper from PA source to S25 contactor coil positive. This allows stall current through two motors. Jumper from GR-H to SF coil positive and SF coil positive to BFA coil positive. Set locomotive up for power, lock air brakes hard, and use throttle and rheostat to control current through BCT's. Keep the time element with stall current through the motor to an absolute minimum.

- b. Six Motor Stall Current — The extended range may also be calibrated by simply loading the locomotive against its own brakes if the following conditions are met:

Railroad rules permit use of stall current testing.

The locomotive being tested should be coupled to another unit and all air brakes set hard to prevent movement.

Time period with stall current through motors must be kept to an absolute minimum.

Only competent railroad personnel should use this method. Set locomotive up for power operation and control current through BCT's with throttle and rheostat.

c. Cabling Method

All Models — Add a 1100/24 power jumper cable from the indicating ammeter shunt AA2 cable side to the main generator negative bus. Jumper from ELD-A/Right to ELD-B/Right on 39, 40, and 45 series. Disconnect the following wires:

ML6 wire from BR-H1 on SD(P)35;

MU wire from BR-P1 on 40 and 45 series.

MF6 wire from BR-M1 on SD39.

On SD35 jumper from GR-H to SF coil positive to BFA coil positive. Set up unit for power operation and control current through the BCT's with the throttle and rheostat.

7. LOR Setting — Obtain 500 amps through BCT's and adjust RH12 to 29 ± 2 volts. Use LOR settings on Fig. 3 as reference. Return throttle to idle when completed.
8. Reconnect all wires to center tap on RH9.
9. Reconnect the positive lead of 0-150 V DC meter to center tap of RH9 (negative lead remains the same).
10. IRR Setting — Obtain 550 amps through BCT's and adjust RH9 to 60 ± 1 volt. Use IRR curve on Fig. 4 as a reference. Return the throttle to idle when completed.

NOTE: The DRR settings must be made in the following manner.

11. Reconnect the positive lead of the 0-150 V DC meter to the center tap of RH8 (for SD(P)35] or center tap of RH13 (all other models).
12. DRR No. 1 Setting — Obtain 550 amps through BCT's and adjust RH8 [SD(P)35] or RH13 (all others) to 72 ± 1 volt. Use DRR No. 1 curve on Fig. 4 for reference. Return throttle to idle when completed.
13. Pick up the D4 contactor by connecting a jumper across BPS7 interlock.
14. DRR No. 2 Setting — Obtain 500 amps through BCT and adjust RH11 [SD(P)35] or RH14 (all others) to 72 ± 1 volt. Use DRR curve No. 2 on Fig. 4 as a reference. Return throttle to idle when completed.

15. To return circuits to normal do the following. Isolate unit.

- a. Remove jumper from BPS7 interlock.
- b. Remove meters and remove main generator shunt and reinstall shunt panel bus.
- c. Reconnect all wires on LOR - No. 1 terminal.
- d. Remove 5000 ohm rheostat and reconnect wiring.
- e. Remove insulation from main contacts of any power contactors that were blocked. Reapply arc chutes.
- f. Remove following jumpers (if used):
 - (1) From PA source to P2 coil or SP25 coil or PR-F2.
 - (2) From ELD A/Right to ELD B/Right.
 - (3) From GR-H to SF-coil.
 - (4) From SF-coil to BFA-coil.
 - (5) Power cable jumper from indicating ammeter to generator negative bus.
- g. Reconnect the following wires (if removed):
 - (1) ML6 to BR-H1.
 - (2) MU to BR-P1.
 - (3) MF6 to BR-M1.
 - (4) AL1 to TB68A7.
 - (5) ALG1 to WSC-1.
 - (6) ALM1 and ALM6 to GFR-G1.
 - (7) ALM to GFA-C.
 - (8) ALM to M12-E.

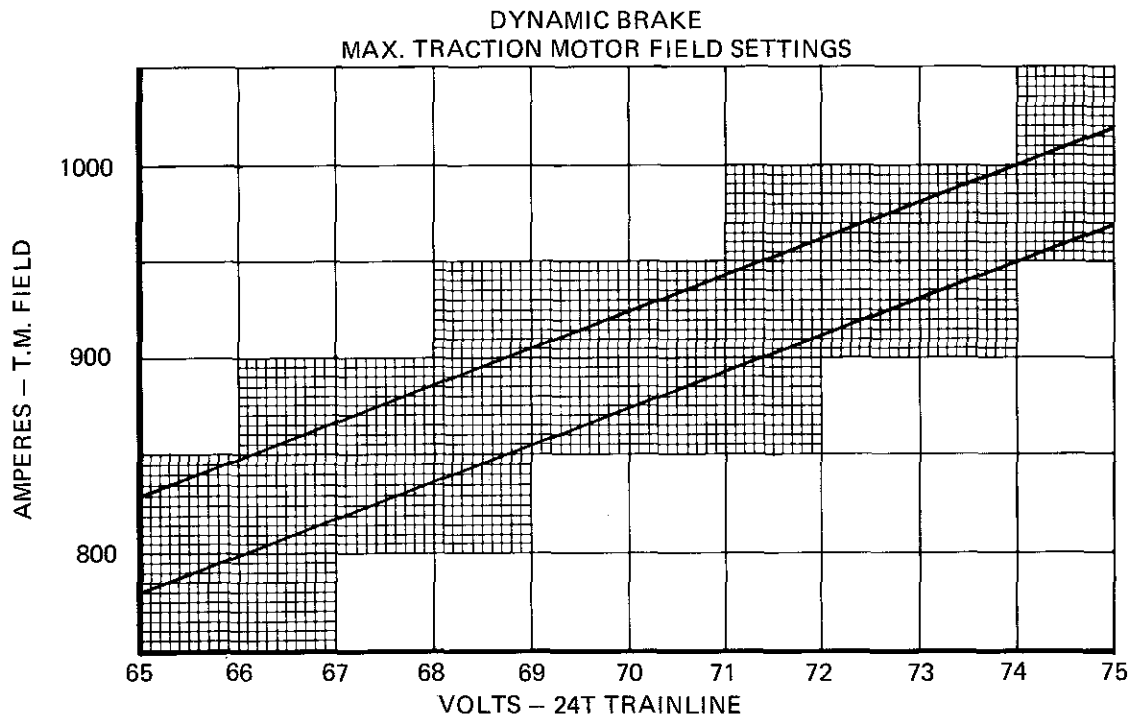


Fig. 1

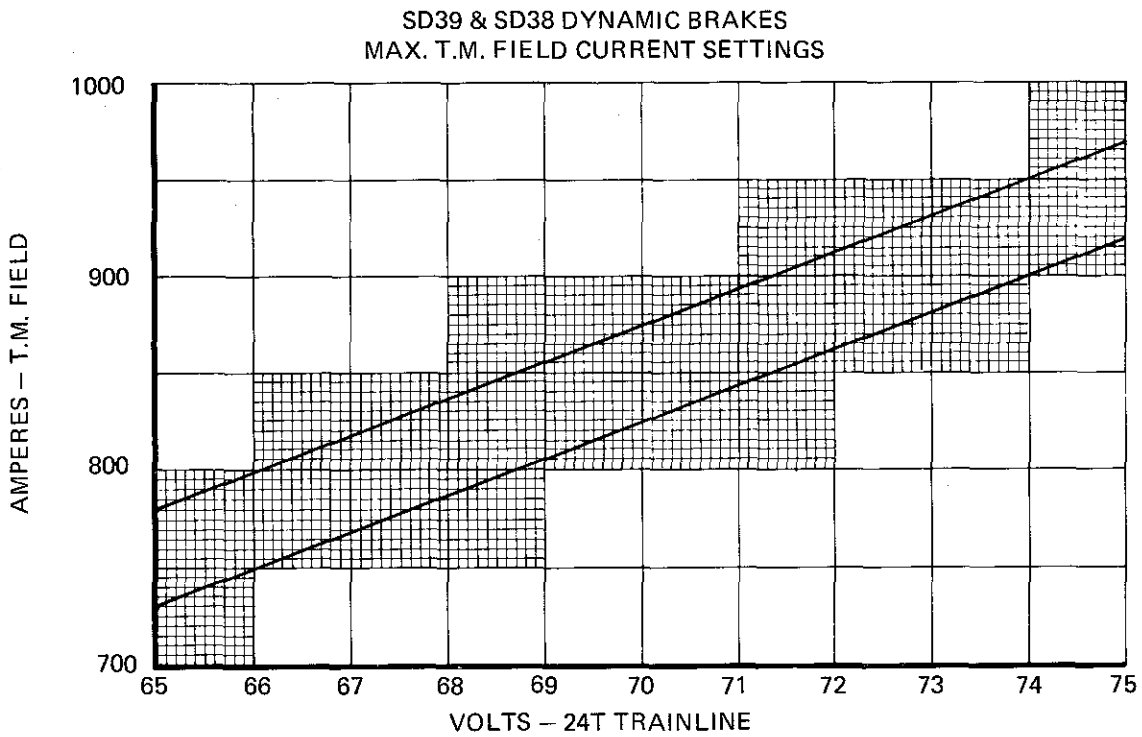


Fig. 2

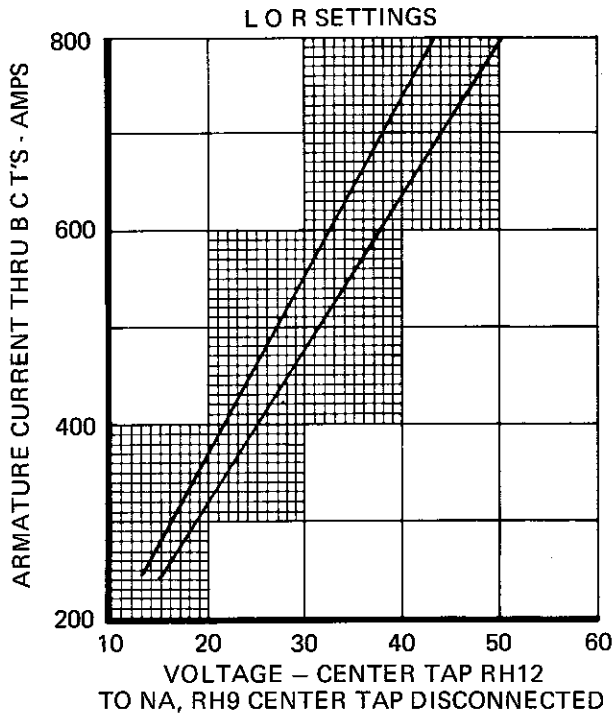


Fig. 3

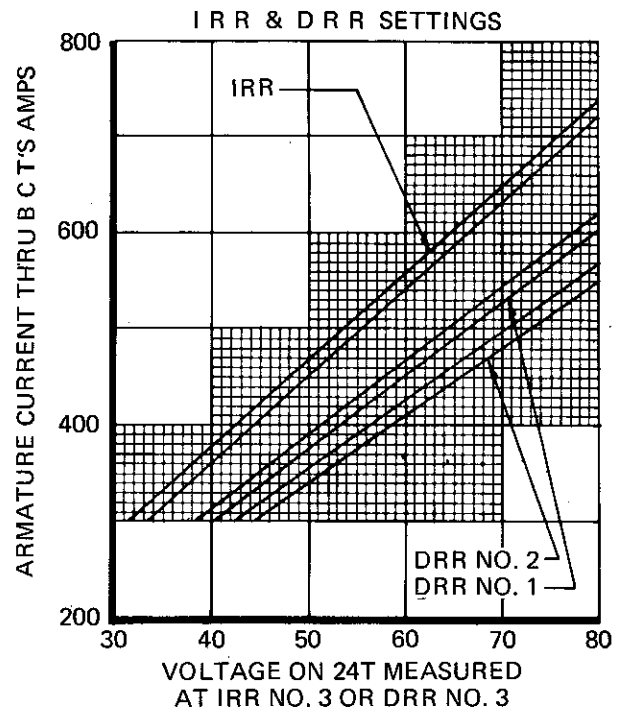


Fig. 4

NOTE: For extended range dynamic brake checking, an additional tolerance band shall be allowed above and below the setting band. These additional tolerance bands shall be equal in width and shape to the setting band.