

Section 17

Distributed Power

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Distributed Power Operations

1.0 Introduction

Distributed power systems are designed to provide synchronous or independent control of one to four locomotives located at points along the train used in addition to the lead unit. The system provides control of the remote(s) by command signals transmitted over a radio link.

NOTE: Throughout this GOI section, **WARNINGS** and **CAUTIONS** are highlighted with grey shading.

1.1 Distributed Power Types

CPR locomotives utilize two kinds of Locotrol:

	GE (AC4400's)	EMD (SD90MAC's)
IV	CP 9500 - 9582 (CP1) CP 9583 - 9683 (CP2)	CP 9100 - 9160
LEB	CP 8500 - 8580 (CP3) CP 8600 - 8655 (CP4) CP 9700 - 9740 (CP5) CP 9750 - 9784 (CP6) CP 9800 - 9840 (CP7) CEFX 1026 -1059	
	Note: The CP 9700 – 9714 are equipped with UP – LEB software and therefore do not have Box Car mode or Slow Speed.	
	GE (ES44AC's)	
LEB	CP 8700 - 8759 (CP8) CP 8760 - 8859 (CP9) CP 8860 - 8889 (CP10)	
LEB & ECP	CP 8890 - 8899 (CP10) *These locomotives are equipped for dual mode.	

The instructions in this section are written for inter-operability (i.e., Locotrol IV used with Locotrol LEB remote(s), vice versa, or in any combination of lead and remotes).

CP UHF Radio equipped locomotives will link to BNSF or UP remote locomotives. Also BNSF and UP Locotrol units will be able to link to CP UHF Radio equipped remote locomotives. There is an entry on the lead set up screen to select the initials of the remote unit. The default initials are CPR.

1.2 Abbreviations

AB	Automatic Brake
BP	Brake Pipe
C Brk	Circuit Breaker
IB	Independent Brake
DP	Distributed Power (Distr Pwr)
DP Screen	Distributed Power Operations Screen (Locotrol LEB)
Remote	Remote locomotive consist

1.3 Displaying DP Screen (Locotrol LEB)

In these instructions, the term "DP Screen" refers to the Distributed Power Operations screen; the term "locomotive screen" refers to the screen which normally displays the speedometer, tractive effort, etc. Sometimes the terms right or left screen are also used.

It is possible on these units to select a COMBINED screen that displays abbreviated remote unit information. The main purpose of the COMBINED screen is when one display screen has failed. The COMBINED screen displays remote unit throttle/DB level, tractive effort, brake pressure and air flow. To change from the COMBINED screen to the full REMOTE screen requires the locomotive to be stopped with the reverser centered and independent brake fully applied.

To set up the standard remote operations screen, select DISTR POWER key on one display (left or right), then select the DP MAIN MENU key and then on the other display select the DISTR POWER key and then the DPC CONTROL key. The DISTRIBUTED POWER OPERATIONS SCREEN will be displayed. It shows remote unit throttle/DB level, tractive effort, BP pressure, air flow, remote mode, ER pressure, BC pressure and main reservoir. Use the other display for Locotrol mode functions or other locomotive information or functions as required. Keep the display for DISTRIBUTED POWER OPERATIONS only for Locotrol information, otherwise if you get the combined screen in error and then you need to stop to get back to the DISTRIBUTED POWER OPERATIONS SCREEN.

1.4 Territory Specific Information

a) Between Alyth and Revelstoke

Distributed Power Trains - Marshalling the Remote locomotive(s)

Between Alyth and Revelstoke, whenever practicable, no more than 3100 feet should separate the remote locomotive consist from the lead locomotive consist.

This means that:

- If the cars are approximately 59 feet long, marshal the remote locomotive consist no more than 52 cars from the lead locomotive consist.
- If the cars are approximately 53 feet long, marshal the remote locomotive consist no more than 57 cars from the lead locomotive consist.

On trains with multiple remotes, the 3100 foot restriction does not apply.

b) Mountain Subdivision

CAUTION - On the Mountain Subdivision, when a westward train has been marshalled with one remote locomotive consist more than 3100 feet from the leading locomotive consist, advise the RTC before leaving KC Junction. The RTC should then avoid stopping the train at Bear Creek.

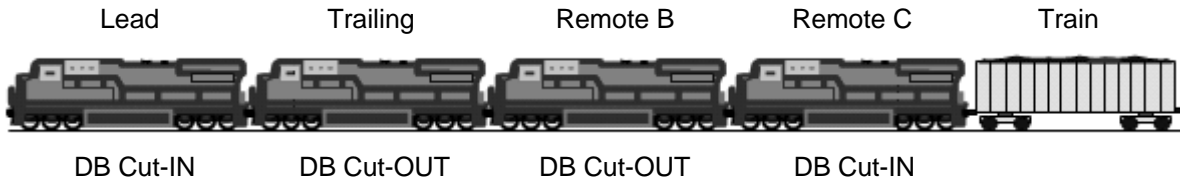
General Instructions

2.0 Locotrol - Restrictions

- a) **All locomotives on the head end** - In certain situations, it may be necessary to operate Locotrol equipped locomotives (with Locotrol equipment powered up) that are normally positioned at a mid-train location, as part of the lead locomotive consist.

With all locomotives located on the head end, it is very important to ensure that available dynamic brake does not exceed a factor of 20. Refer to GOI Section 16, item 7.1.

EXAMPLE: With 4 GE AC4400 locomotives on head end.



Only the brake pipe hose will be coupled between the remote consist(s) and the lead consist. **The jumper cable must not** be connected between the lead and remote consists.

All operating instructions for Locotrol apply. These trains must be considered as Locotrol equipped with the exception that no cars separate the lead and remote consists. The train must be operated with all Remote Brake Valves OUT.

NOTE: On distributed power trains, the DB factor of the head end consist and the DB factor of the remote consist must each not exceed 20 under any circumstances.

- b) **Remote Locomotive Operating Restrictions – Mixed Locotrol Trains ONLY** (as defined in Section 7, item 2.3)

Independent Motoring (Back Group)

- i) When the remote locomotive(s) is in independent motoring (back group), use the same throttle position as the lead locomotive consist, or a lower throttle position than the lead locomotive consist.
EXCEPTION: When lifting a heavy train on an ascending grade the throttle position of the remote(s) may be higher than the lead locomotive consist. Pay close attention to keep in-train forces at an acceptable level.
- ii) When the lead consist is in dynamic brake, do not use the remote locomotive(s) in throttle position.

Restrictions when Moving Backward

When moving backward on mixed trains, Section 16, Item 8.0 applies.

Crews are reminded of the provisions of Section 16, Item 8.2 wherein it states 35 cars, this means 35 cars or platforms.

3.0 Remote Independent Application and Release

When the independent brake handle is moved to the desired position, the command will be sent to the remote(s) and acted on providing the remote(s) is in one of the following modes:

NORMAL, IDLE, BV OUT, ISOLATE, SPEED or STOP / SHTDN / ENGINE S/D.

NOTE: If REMOTE, S/O (Set OUT), EXECUTE are pressed, then remote(s) independent brake is automatically set to maximum (72 psi).

4.0 Automatic Brake

4.1 False gradient brake applications

- a) Except in paragraph b) below, in distributed power operation, the sound of the service exhaust **must not** be used to measure a service reduction. If necessary to apply the brakes with the train brake system not fully charged, the rear car BP pressure must be known, then make an automatic brake application as per GOI Section 16 item 3.2 a) (e.g., 7 psi below the reading on the rear car) or as per GOI Section 16 item 3.2 c) (e.g., determine the amount of false gradient etc.).
- b) If there is only one remote and if it is on the extreme rear of the train, the sound of the service exhaust can be used to measure a service reduction. If necessary to apply the brake with the train air brake system not fully charged, using the equalizing reservoir gauge, measure at a least a 7 psi reduction from the point where the service exhaust starts to blow.
- c) If there is more than one remote and if one remote is on the extreme rear of the train, and it is necessary to apply the brake with the train air brake system not fully charged, an equalizing reservoir reduction of at least 5 psi more than the last reduction must be made.

Example: Immediately prior to release, there was a 10 psi reduction in effect. To comply with this instruction make a 15 psi straight away reduction.

- d) On trains equipped with TIBS, if the display unit fails to display BP pressure and it is necessary to apply the brake with the train air brake system not fully charged, an equalizing reservoir reduction of at least 5 psi more than the last reduction must be made.

Example: Immediately prior to release, there was a 10 psi reduction in effect. To comply with this instruction make a 15 psi straight away reduction.

4.2 Air Flow Indicators

- a) When operating with the remote brake valve(s) IN (charging), the lead locomotive air flow indicator does not indicate the true state of charge in the entire train air brake system. The sum of the lead and remote air flow indicators can be used to indicate the true state of charge of the entire train air brake system.
- b) When recharging with one or more of the remote brake valve(s) IN (charging), if insufficient recharge time has elapsed prior to making an air brake application, there will be a false gradient condition between the rear car and the remote ahead of the rear car. If the remote brake valve(s) are OUT and the entire system was recharged with the remote brake valves OUT, then the Air Flow Indicator does give a true indication.

4.3 Low BP Feature

Should BP pressure be reduced to less than 45 psi, the low BP feature causes an emergency brake application, unless the reverser handle is centered and the independent brake is fully applied.

4.4 Cycle-braking on trains with remote located at extreme rear

IF - the automatic brake valve is moved to the Full Service position during service brake operation and

IF - any additional brake pipe reduction must be made to control train speed,

THEN - the train must be stopped (e.g., immediately make an additional 10 psi reduction or if needed, an emergency brake application) . The brake system must be recharged. If the locomotive brakes will not prevent train movement while recharging, then high pressure (HP) retainers must be applied. The correct percentage of retainers is:

- on heavy grades of 1.0% to 1.29% apply HP retainers on 25 % of loaded cars
- on heavy grades of 1.3% to 1.8% apply HP retainers on 50% of loaded cars
- on mountain grades apply HP retainers on at least 65 % of loaded cars.

NOTE: Handbrakes may be required to recharge the air brake system.

5.0 Remote(s) Communication

NOTE: The lead locomotive can lose radio communication with one or more remotes. For example, if communication is lost between the lead locomotive and remote C, then all other remotes (B, D & E) will still function normally because they still have communication with the lead locomotive. Remotes do not communicate with each other and do not “know” that the lead locomotive has lost communication with another remote.

5.1 COMM - This indicator is illuminated if communication between the lead and a remote(s) is interrupted. The lead locomotive will declare a communication interrupt 45 seconds after the last successful check or 10 seconds after an unsuccessful automatic brake application message.

5.2 What happens to the remote(s) when communication is lost with lead locomotive?

- a) In a state of communication loss, the remote(s) assume a state of AUTOMATIC OVERRIDE and will remain in the state of motoring or dynamic braking that existed just prior to the loss of radio contact.
- b) On CP & UP Units, Automatic Override is NULLIFIED if the remote brake valve is OUT, in which case the remote(s) will return to IDLE from MOTORING; however they will retain DYNAMIC BRAKE (even with the remote brake valve OUT). N/A on BNSF units, they will return to idle only.
- c) In order to drop OUT a remote brake valve(s) when operating in a state of COMM loss, make an initial automatic brake application of at least 20 psi. If brake is already set, make an additional brake application of at least 20 psi. This 20 psi reduction must be a “straight-away” reduction, not a split reduction. When the service exhaust stops blowing, the remote brake valve is OUT and automatic override is nullified. This procedure is known as “Comm Loss Idle Down” (CLID).

WARNING: Making a 20 psi reduction to drop out a remote brake valve(s) so that the remote(s) will go to IDLE is not a fail safe procedure. This is because the remote(s) has to detect a significant change in BP charging flow rates and this detection is difficult if;

- the train brake had just been released prior to the loss of communication OR
- if there is significant BP leakage OR
- if a brake application of more than 20 psi was already in effect.

Consideration to making an emergency brake application must be given if operating conditions dictate that the remotes must be idled immediately or to set the remotes into the box car mode.

d) Box Car Mode

If a CP or BNSF Remote (N/A on UP units) is in a state of “Comm Loss” and a Emergency or Penalty application has occurred. Once the penalty timer expires, the lead unit can be recovered normally. The Remote will transition to a “Box Car” mode and responds as follows:

- The Lead unit charges the Brake Pipe.
- When the Remote Brake Pipe rises above 60 psi, the independent brakes are released.
- The operator now has control of his train using head end power only.
- Until communication is restored, the remote will now function as a Box Car.

Note: If communication is restored with the Lead, and the Remote is in “Box Car” mode, the operator will see a “Comm Loss Idle Down” event and Remote screen will indicate “ISOLATE” on the display. The remote can be reset to “NORMAL” mode as follows:

- Make a sufficient brake pipe reduction, 15 psi or greater.
- Allow the brake pipe to stabilize.

Press **NORMAL / EXECUTE** and then release the brake.

5.3 What happens to the remote(s) which still have communication?

They simply obey all throttle, dynamic brake and air brake application and release commands from the lead locomotive.

5.4 BP Rise - Emergency Brake Applications

Caution: Attempts to make an automatic brake release in a state of COMM with the remote brake valve IN must not be made - a BP RISE emergency application of the brakes will occur.

On CP locomotives equipped with UHF Radios, the BP rise feature has been aligned with BNSF and UP design and will respond as follows:

If there is communication between the lead and remote(s) and a unknown brake pipe rise occurs when a brake application is in effect, a brake pipe rise alarm will be indicated on the lead unit, however the unit(s) will continue in the commanded state.

If there is a "Comm Loss" between the lead and remote(s) and a unknown brake pipe rise occurs when a brake application is in effect, the remote(s) will go into a state of Comm Loss Idle Down and transition to REMOTE ISOLATE mode (Note: if in DB, it will be maintained). You must command the remote(s) to NORMAL mode to regain control of the remote unit(s).

Note: If the lead unit experiences a un-commanded brake pipe rise while the reverser is centered and full independent brake is applied, then a emergency brake application will occur.

Warning: A communication interrupt which lasts for 90 minutes will cause the system to Unlink; a service brake application will then occur, reducing BP pressure to 0 psi.

5.5 Remote sensed emergency brake application

If a remote senses an emergency brake application it will report PC and zero brake pipe pressure. The emergency is then propagated to the lead unit through the brake pipe. On UHF Radio equipped locomotives (CP & UP), the remote unit will radio command an emergency brake application to the lead unit. This does not occur if the remote(s) is in set-out mode. BNSF remote units do not radio command an emergency sensed at the remote unit.

5.6 Flow Sensor Check Required With Locomotives in Train

A flow sensor check must be performed:

- the first time cars are placed between a lead locomotive and a remote or between remotes AND
- subsequently when cars are added such that the total number of cars between a lead locomotive and a remote or between adjacent remotes exceeds 60, 80, 100 or 120 cars.

If a flow sensor check is required, follow the procedure in item 7.5.

6.0 Controlled Tractive Effort feature (CTE Mode) on ES4400AC Locomotives

CP ES4400AC locomotives, are equipped with a feature (CTE) that will limit tractive effort on remote locomotives to 110,000 lbs each, this system reduces excessive forces at the rear of the train during slow speed / high throttle operations to allow two remotes on the rear of a train.

This feature is available on all CP ES4400AC locomotives (CP 8700 to CP 8899). At this time CP does not operate with two AC remotes on the rear of a train and therefore we do not use the CTE mode.

Operation:

- The Lead unit and Controlling Remote must be equipped with CTE software for the CTE mode to work, otherwise they will only operated in the Full Tractive Effort (FTE) mode.
- Only the remote(s) will work in the reduced mode, the lead unit(s) will still produce full tractive effort.
- At Locotrol power up, CTE equipped locomotives will always default to the FTE mode.
- The Distributed Power Operations Screen on the lead locomotive will indicate if the remote is in the FTE or CTE mode.
- The Main Operating Screen on the controlling remote will indicate if the tractive effort is limited.

To change the remote from the CTE mode to the FTE mode, the following steps are required:

- Locomotives must be linked with good communication – No (comm) loss.
- Locomotives must be stopped. (UP Locomotives must be unlinked, BNSF units are not equipped)
- Brake Cylinder pressure on locomotives must be greater than 25 psi.
- Throttle at Idle.
- Reverser centered.

Select the system mode screen (press **MODE**).

- Press the **SEL FTE** button and then depress **EXECUTE**.
- You should receive a **FTE OK** system event notification.
- If there is no communication after 45 secs, an **FTE Error** message will appear and you will be prompted to select the FTE mode again.

Locotrol Startup and Shut Down

7.0 Preparing Locotrol Equipment for Service

If the Locotrol equipment is not set up by mechanical services, the following procedures must be followed by the locomotive Engineer to set up Locotrol for service.

Locotrol equipped locomotives are qualified every 180 days by mechanical services to work in distributed power service. There is no longer a requirement for mechanical services to previously qualify locomotives (Link & GO) to operate as a set.

CAUTION - Hand Brakes: Without exception, unless movement can be prevented with locomotive brakes sufficient hand brakes **MUST** be applied. BP hoses must be connected between lead and remote consists.

Cab Signals:

Some locomotives are equipped with Cab Signals (a signal system used in the USA). There are Cab Signal indicators on the locomotive operating screen and in order to operate Locotrol in Canada, the cab signal indicator should read as follows:

LEAD Unit;		REMOTE Unit;	
UP Mode	Cut-In	UP Mode	Cut-Out
CNW Mode	Cut-Out	CNW Mode	Cut-Out

Cab Signal Set Up Instructions.

For example, to Cut-In the UP Mode, press:

- CAB SIGNALS
- CAB SIGNAL MODE
- CHANGE UP MODE
- ACCEPT SETTING
- CONFIRM SETTINGS

7.1 Setting Up the Remote(s):

NOTE: Set up REMOTE(s) first, then LEAD. The locomotives may be any combination of Locotrol IV and Locotrol LEB (i.e., Locotrol IV used with Locotrol LEB remote(s), vice versa, or in any combination of lead and remotes). Follow these steps in order for each remote:

	Setting Up Remotes	Locotrol IV Remote(s)	Locotrol LEB Remote(s)		
1	CONTROL STAND:	ENGINE RUN OFF GENERATOR FIELD OFF CONTROL or CONTROL/FUEL PUMP..... ON DYNAMIC BRAKE C Brk ON Power Limit Switch (AC4400s)..... 4000 HP/ENABLE Reverser REMOVED Independent Brake LEAD – RELEASE Automatic Brake Cut-IN - Handle OFF	ENGINE RUN OFF GENERATOR FIELD OFF CONTROL or CONTROL/FUEL PUMP..... ON DYNAMIC BRAKE C Brk ON Power Limit Switch (AC4400s) 4000 HP/ENABLE Reverser REMOVED Independent Brake .. LEAD - FULLY Applied (later to RELEASE) Automatic Brake Cut-IN - RELEASE (later to Handle OFF)		
2	ENGINE CONTROL (EC) PANEL:	EC/ISOLATION Switch RUN DISTRIBUTED POWER C Brk (AC4400)..... ON LOCOTROL C Brk (SD90MAC)..... ON	EC/ISOLATION Switch RUN LEB COMPUTER C Brk ON		
3	SYSTEM MODULE PANEL (In Nose):	LEAD UNIT NUMBER dial to Lead Unit			
4	TOGGLE SWITCHES (3) (In Nose)	LEAD/REMOTE REMOTE LOCOTROL/CONVENTIONAL . LOCOTROL SAME-LEAD/OPPOSITE .. Correct position			
5	CIRCUIT BREAKERS	3 (In Nose): ELEC ON RELAY ON RADIO ON	AC 4400's In Nose, under a protective shield: DP RADIO ON DP TRAINLINE ON	ES4400AC's On Engine Control(EC) Panel DP RADIO ON	
6	LOCOMOTIVE SCREEN			Press: • DISTR POWER, • REMOTE SETUP. Set: • LEAD LOCOMOTIVE ID & NUMBER, • DIRECTION (SAME/OPPOSITE). Press: • DONE (an emergency PCS occurs). Follow IFD screen prompt to place: • IB handle to RELEASE, • AB handle to HO (handle off).	
7		Set up all locomotives coupled to a remote in conventional trailing mode.			
8		After all remotes have been set up, then set up the lead locomotive as per 7.2.			

7.2 Setting Up a Locotrol Lead Locomotive:

NOTE: Set up the LEAD locomotive after the REMOTE(s). Follow these steps in order for the lead locomotive.

LEAD SET UP		Locotrol IV	Locotrol LEB	
1	CONTROL STAND	ENGINE RUN ON GENERATOR FIELD(for now) OFF CONTROL or CONTROL/FUEL PUMP..... ON DYNAMIC BRAKE C Brk ON Reverser NEUTRAL Independent Brake..... LEAD - FULLY Applied Automatic Brake..... Cut-IN – EMERGENCY/RELEASE		
2	ENGINE CONTROL (EC) PANEL	EC/ISOLATION Switch..... RUN DISTRIBUTED POWER C Brk (AC4400)..... ON LOCOTROL C Brk (SD90MAC)..... ON	EC/ISOLATION Switch..... RUN LEB COMPUTER C Brk..... ON	
3	SYSTEM MODULE PANEL (IN Nose)	LEAD UNIT NUMBER..... dial to 0000		
4	TOGGLE SWITCHES (3) (In NOSE)	LEAD/REMOTE..... LEAD LOCOTROL/CONVENTIONAL..... LOCOTROL SAME-LEAD or OPPOSITE..... LEAD		
5	CIRCUIT BREAKERS	(3) (IN Nose) ELEC..... ON RELAY..... ON RADIO..... ON	AC 4400's In Nose, under a protective shield: DP RADIO ON DP TRAINLINE ON	ES4400AC's On Engine Control(EC) Panel DP RADIO ON
6		Set up all locomotives coupled to the lead in conventional trailing mode.		
7		Link Locotrol (item 7.3) and perform a BP test (item 7.4).		

7.3 System Linking (Locotrol Lead Locomotive)

	Locotrol IV After power-up, Control Console performs a display & audible alarm test.	Locotrol LEB NOTE: Ensure locomotive screen (i.e., speedometer, etc.) is on the right.
1	To conclude the test, press any switch on Control Console. SETUP screen will be displayed.	On right screen, press DISTR POWER (if displayed). Press LEAD SETUP.
2	Using arrow switches, enter locomotive number of first remote (unit B). Press LINK. Ensure console displays Linked OK beside unit B.	Using COUNT UP/DOWN, DIGIT LEFT/RIGHT, enter locomotive ID & number of first remote (unit B). Press LINK. Ensure screen displays LINKED OK beside B.
3	Enter locomotive number of second remote (unit C). Press LINK. Ensure console displays OK beside unit C. Repeat process for remotes D and E as applicable.	Enter locomotive ID & number of second remote (unit C). Press LINK. Ensure screen displays LINKED OK beside unit C. Repeat procedure for remotes D and E as applicable.
4	Press DONE. The SYSTEM screen will be displayed.	Press DONE / ACCEPT. System advances to Distributed Power System Log screen.
5		Press DP MAIN MENU. Check event log and alarm log for fault conditions. Air brake system failures and back-up emergency valve failures must be corrected. Press EXIT.

7.4 BP Test (Lead Locomotive)

	Locotrol IV	Locotrol LEB
	When the SYSTEM screen is displayed for the first time, BP TEST must be performed. The operator cannot select another display.	
1	Ensure FULL independent brake. To recover PCS, place AB in Emergency.	Ensure FULL independent brake. To recover PCS, place AB in EMER (for 60 seconds) and then move to RELEASE as per message on screen.
2	When IFD so indicates, place AB handle in RELEASE. Each remote will begin to charge when it senses an increase in BP pressure.	On left screen, press: <ul style="list-style-type: none"> • DP MAIN MENU (if displayed), • EXIT (if displayed), • DISTR POWER, • DP CONTROL On right screen, press: <ul style="list-style-type: none"> • DISTR POWER (if displayed), • DP MAIN, • SYSTEM
3	Press BP TEST.	On left screen, wait for message PERFORM BRAKE PIPE TEST WHEN READY, and then go to next step.
4	When every flow rate is less than 30 cfm and sum is less than 60 cfm, wait 2 minutes. Press EXECUTE.	When every flow rate is less than 30 cfm and sum is less than 60 cfm, wait 2 minutes. On right screen, press BRK PIPE TEST, press EXECUTE
5	Move AB handle to MINIMUM REDUCTION, Wait approximately one minute.	On left screen, when message box says SET AUTOMATIC BRAKE HANDLE TO MINIMUM, move AB handle to MINIMUM REDUCTION.
6	If BP TEST is OK, system will advance to IDLE mode. Locotrol is now fully operational and other screens as desired may now be selected. <ul style="list-style-type: none"> • MODE, • RUN, • EXECUTE, • CANCEL. 	In left screen display BRAKE PIPE TEST OK, then on right screen press DP MAIN MENU. Locotrol is now fully operational. On right screen, press: <ul style="list-style-type: none"> • MODE, • RUN, (RUN – FTE on ES4400AC) • EXECUTE, • EXIT.
7	If BP TEST is not successful, move AB to RELEASE, check angle cocks, recharge BP and repeat steps 3, 4, 5 & 6.	
8	On UHF Radio equipped locomotives, if the automatic brake handle is moved to a greater than minimum application, the system will cancel the test and display the following message "Brake Pipe Test cancel - excessive application". To correct, release the brake, recharge to less than 30 CFM on lead and remote(s) and perform the test again. There is also an optional brake pipe test that can be performed on demand at any time while the train is stopped. Note - if this test is selected on demand, and if it does not pass, the remote(s) will revert to IDLE mode.	

7.5 Flow Sensor Check Required With Locomotives in Train, as per item 5.6

A Flow Sensor Check is performed as follows:

	Locotrol IV	Locotrol LEB
1	Move AB to RELEASE.	
2	Ensure unit A and unit(s) B, C, D, and E (as applicable) display charging flow rates less than 30 cfm.	
3	Wait at least 2 minutes for the air flow charging rate to stabilize.	
4	Place the Locotrol RADIO circuit breaker OFF.	Place the Locotrol Distributed Power RADIO circuit breaker OFF.
5	Make an AB application of at least 15 psi.	
6	Ensure the service exhaust ceases and ensure that TIBS (if equipped) indicates a BP pressure drop of approximately 15 psi.	
7	Place the Locotrol RADIO circuit breaker ON.	Place the Locotrol Distributed Power RADIO circuit breaker ON.
8	Ensure that the applicable remotes B, C, D & E each report ISOLATE: this means the Flow Sensor check was successful and that it is OK to bring in the remote brake valve(s) and then perform a train air brake test as per normal procedures.	<p>Ensure the applicable remotes B, C, D, and E each report FLOW OUT. This means the Flow Sensor check was successful and that it is OK to bring in the remote brake valve(s).</p> <p>To bring in the remote brake valve(s), press:</p> <ul style="list-style-type: none"> • MORE MENU (if displayed), • REMOTE MENU (if displayed). <p>For each remote, press:</p> <ul style="list-style-type: none"> • NORMAL, • EXECUTE. <p>Move AB to RELEASE.</p> <p>Perform a train air brake test as per normal procedures.</p>
<p>NOTE: If step 8 was not successful, repeat steps 1 through 8 (in the application of step 3, it is important to have steady stable air flow.)</p>		

8.0 Shutting Down Locotrol (Unlinking)

8.1 Shutting Down the Lead Locomotive

- NOTE** 1 - Train must be stopped, throttle IDLE, independent brake FULLY applied.
 2 - Shutdown Locotrol on LEAD locomotive FIRST, then REMOTE.
 3 - Hand brakes may be required. The train will be standing with a penalty brake application while Locotrol is being shutdown.

	Locotrol IV	Locotrol LEB	
1	Press: SYSTEM <ul style="list-style-type: none"> • UNLINK • EXECUTE System unlinks and penalty brakes apply.	On locomotive screen, press: (soft key) <ul style="list-style-type: none"> • DISTR POWER (if displayed), • DP MAIN, • SYSTEM. 	
2	TOGGLE SWITCHES (3) (In Nose): LEAD/REMOTE LEAD LOCOTROL/CONVENTIONAL..... CONVENTIONAL SAME-LEAD or OPPOSITE LEAD	Press: <ul style="list-style-type: none"> • UNLINK, • EXECUTE. System unlinks, and emergency brakes apply.	
3	CIRCUIT BREAKERS (3) (In Nose): ELEC OFF RELAY..... OFF RADIO..... OFF	Press: <ul style="list-style-type: none"> • END DIST PWR, • EXECUTE. 	
4	ENGINE CONTROL (EC) PANEL: DISTRIBUTED POWER C Brk AC4400)..... OFF LOCOTROL C Brk (SD90MAC) OFF	CIRCUIT BREAKERS (AC4400's) (In Nose, under a protective shield): DP OFF DP TRAINLINE OFF	CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DP OFF

8.2 Shutting Down the Remotes

Shut down the remote(s) AFTER the lead locomotive. Follow these steps in order for each remote.

	Locotrol IV	Locotrol LEB	
1	SYSTEM MODULE PANEL (In Nose): LEAD UNIT NUMBER dial to 0000	On locomotive screen, press: (soft key) <ul style="list-style-type: none"> • DISTR POWER, • END DIST PWR, • EXECUTE. 	
2	TOGGLE SWITCHES (3) (In Nose): LEAD/REMOTE NO CHANGE LOCOTROL/CONVENTIONAL..... CONVENTIONAL SAME-LEAD or OPPOSITENO CHANGE	Ensure DP ON , or DP REMOTE ENABLED indicator is OUT .	
3	CIRCUIT BREAKERS (3) (In Nose): ELEC OFF RELAY..... OFF RADIO..... OFF	CIRCUIT BREAKERS (AC4400's) (In Nose, under a protective shield): DP OFF DP TRAINLINE OFF	CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DP OFF
4	ENGINE CONTROL (EC) PANEL: DISTRIBUTED POWER C Brk AC4400)..... OFF LOCOTROL C Brk (SD90MAC) OFF		
5	CONTROL STAND: Set up control stand and electronic air brake system for either lead or trailing unit operation.		
6	The shutdown of Locotrol equipment is now complete.		

9.0 Changing Ends

- To change ends:
- 1 - re-configure the lead as a remote,
 - 2 - re-configure middle remote(s) to the new lead, and
 - 3 - re-configure the tail-end remote as the new lead.

The locomotives may be any combination of Locotrol IV and Locotrol LEB (i.e., Locotrol IV used with Locotrol LEB remote(s), vice versa, or in any combination of lead and remotes.)

CAUTION – Handbrakes: Unless movement can be prevented with locomotive brakes, sufficient hand brakes must be applied. The train will be standing with emergency brakes applied while changing ends.

9.1 To re-configure LEAD as remote:

	Locotrol IV	Locotrol LEB		
1	Press: SYSTEM UNLINK EXECUTE (a penalty brake will occur)	Press: DISTR POWER (if displayed) DP MAIN – SYSTEM – UNLINK – EXECUTE (a penalty brake will occur) END DIST PWR – EXECUTE		
2	CIRCUIT BREAKERS (3) (In Nose): ELEC, RELAY, RADIO..... OFF (emergency will occur)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> CIRCUIT BREAKERS (2) (AC4400's) (In Nose under protective shield): DP TRAINLINE.....OFF DP RADIO.....OFF ...Then turn both C Brks.....ON </td> <td style="width: 50%; vertical-align: top;"> CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DPOFF ...Then turn C Brkr.....ON </td> </tr> </table>	CIRCUIT BREAKERS (2) (AC4400's) (In Nose under protective shield): DP TRAINLINE..... OFF DP RADIO..... OFF ...Then turn both C Brks..... ON	CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DP OFF ...Then turn C Brkr..... ON
CIRCUIT BREAKERS (2) (AC4400's) (In Nose under protective shield): DP TRAINLINE..... OFF DP RADIO..... OFF ...Then turn both C Brks..... ON	CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DP OFF ...Then turn C Brkr..... ON			
3	TOGGLE SWITCHES (2) (In Nose): LEAD/REMOTE..... REMOTE SAME-LEAD / OPPOSITE..... Correct Position	Press: <ul style="list-style-type: none"> • DISTR POWER • REMOTE SETUP Set: <ul style="list-style-type: none"> • new LEAD LOCO # • DIRECTION (SAME/OPPOSITE) Press: <ul style="list-style-type: none"> • DONE 		
4	SYSTEM MODULE PANEL (In Nose): LEAD UNIT NUMBER..... dial to new Lead Unit			
5	CIRCUIT BREAKERS (3) (In Nose): ELEC, RELAY, RADIO..... ON			
6	CONTROL STAND: Reverser REMOVED Independent Brake..... RELEASE Automatic Brake..... HO (handle off) ENGINE RUN..... OFF GENERATOR FIELD..... OFF Power Limit Switch..... 4000 HP/ENABLE			

9.2 To re-configure MIDDLE REMOTE(s) to new lead locomotive (if applicable):

	Locotrol IV MIDDLE Remote(s)	Locotrol LEB MIDDLE Remote(s)	
1	CIRCUIT BREAKERS (3) (In Nose): ELEC, RELAY, RADIO.....OFF	Press: DISTR POWER (if displayed) END DIST PWR – EXECUTE	
2	TOGGLE SWITCH (In Nose): SAME-LEAD / OPPOSITE.....Correct Position	CIRCUIT BREAKERS (2) (AC4400's) (In Nose under protective shield): DP TRAINLINE.....OFF DP RADIO.....OFF ...Then turn both C Brks.....ON	CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DPOFF ...Then turn C Brkr.....ON
3	SYSTEM MODULE PANEL (In Nose): LEAD UNIT NUMBER.....dial to new Lead Unit	Press: • DISTR POWER • REMOTE SETUP	
4	CIRCUIT BREAKERS (3) (In Nose): ELEC, RELAY, RADIO.....ON	Set: • new LEAD LOCO # • DIRECTION (SAME/OPPOSITE) Press: • DONE	

9.3 Re-configure the REMOTE at extreme rear of train as LEAD, and complete the linking and testing on the new Lead locomotive:

	Locotrol IV	Locotrol LEB	
1	CIRCUIT BREAKERS (3) (In Nose): ELEC, RELAY, RADIO.....OFF	Press: DISTR POWER (if displayed) END DIST PWR – EXECUTE	
2	TOGGLE SWITCHES (2) (In Nose): LEAD/REMOTE.....LEAD SAME-LEAD / OPPOSITE.....LEAD	CIRCUIT BREAKERS (2) (AC4400's) (In Nose under protective shield): DP TRAINLINE.....OFF DP RADIO.....OFF ...Then turn both C Brks.....ON	CIRCUIT BREAKER (ES4400AC's) On Engine Control (EC) Panel: DPOFF ...Then turn C Brkr.....ON
3	SYSTEM MODULE PANEL (In Nose): LEAD UNIT NUMBER.....0000		
4	CIRCUIT BREAKERS (3) (In Nose): ELEC, RELAY, RADIO.....ON		
5	CONTROL STAND: Independent Brake..... FULLY Applied Automatic Brake..... EMERGENCY Reverser CENTERED ENGINE RUN..... ON GENERATOR FIELD..... ON Power Limit Switch..... 4000 HP/ENABLE		
6	Link , following the procedure in item 7.3.		
7	Perform BP Test , following the procedure in item 7.4.		
8	Complete Flow Sensor Check , following the procedure in item 7.5.		
1	If provided, install SBU . Before testing the TIBS emergency feature in accordance with GOI Section 6, item 15.3.		
2	Perform a Locomotive Brake Test .		
3	Perform a Train Brake Test .		

9.4 Modified Locomotive Brake Test Procedure for Changing Ends on Tail End Remote Trains at Sparwood.

STEP	PROCEDURE
1	Change ends as per GOI Section 17 Item 9.0.
2	Test the operation and recovery of the Safety Control System (RSC).
3	Set the Automatic Brake on the train to hold the train on the grade to protect against unintended movement.
4	Release the locomotive brakes by depressing the independent brake handle (bail) for at least 4 seconds for each locomotive in the consist.
5	Fully apply and release the independent brakes.
6	Make a further 10 psi brake pipe reduction and upon the train's departure from Sparwood, release the automatic brake.

LOCOTROL OPERATION

Front Group and Back Group

10.0 MU Operation (Front Group)

	Locotrol IV	Locotrol LEB
1	If RUN is displayed in upper right corner of the screen, each remote is automatically configured with the lead locomotive (FRONT group) and will respond to all air brake, throttle and dynamic brake commands from the lead locomotive.	If RUN is displayed in upper left corner of the distributed Power Operation screen, each remote is automatically configured with the lead locomotive (FRONT group) and will respond to all air brake, throttle and dynamic brake commands from the lead locomotive.
2	If Locotrol is not in RUN mode, then press: <ul style="list-style-type: none"> • MODE – RUN – EXECUTE. (Ensure current mode indicates RUN.) 	If Locotrol is not in RUN mode, then on the locomotive screen press: <ul style="list-style-type: none"> • DIST POWER (if displayed) – DP MAIN • MODE – RUN – EXECUTE. (Ensure current mode indicates RUN.)
3	If a remote(s) brake valve has been cut out, then make a 10 psi AB application, select each remote and press NORMAL – EXECUTE. Move AB to RELEASE and note charging or flow rates for each remote. (The remote must see a 4 psi rise in BP pressure to allow its brake valve to come in.)	
N	Three other choices are available on MODE display: IDLE, TOWER and Speed.	
O	<ul style="list-style-type: none"> • if IDLE is pressed, the remote remains in idle, but all air brake functions (including remote brake valve IN capability) are enabled. 	
T	<ul style="list-style-type: none"> • TOWER should only be pressed in the procedure used at Roberts Bank for unloading coal. Delays will occur if TOWER/EXECUTE is pressed elsewhere. 	
E	<ul style="list-style-type: none"> • If SPEED is pressed, the remote(s) is enabled for slow speed operation. 	

11.0 Independent Motoring (Back Group)

	Locotrol IV	Locotrol LEB
1	Independent motoring is only available in the RUN mode (i.e., RUN/EXECUTE have been pressed), and the remote(s) is operating in the throttle or dynamic brake position #1 or greater.	
2	When independent mode is required, press: <ul style="list-style-type: none"> • MAIN • BACK 	When independent mode is required, press: <ul style="list-style-type: none"> • CONTROL MENU (if displayed) • MOVE TO BACK
3	This causes a remote unit to be removed from the FRONT group (MU mode) and placed in the BACK group where it can be controlled independently of the lead locomotive.	
4	When placed into the back group, its previous throttle/dynamic brake continue at same level, but can now be controlled by the (up), (down), IDLE, TRA and DYN switches.	When placed into the back group, its previous throttle/dynamic brake continue at the same level, but can now be controlled by pressing MORE/LESS TRACTION, MORE/LESS BRAKE, IDLE, TRACTION, or BRAKE. A green vertical bar separates the front and back group.
5	To return the remote unit to the FRONT group, press FRONT.	To return the remote to the FRONT group, press: <ul style="list-style-type: none"> • CONTROL MENU (if displayed), • MOVE to FRONT.

Brake Tests

12.0 Train Air Brake Test**12.1 AFM Train Brake Test Train Brake**

	Locotrol IV	Locotrol LEB
1	Press REMOTE - ensure each remote reports CHARGING. This means the brake valve is IN on each remote.	Press: <ul style="list-style-type: none"> • MORE MENU (if displayed) • REMOTE MENU (if displayed). Ensure each remote displays a value for FLOW (0 or higher). This means the brake valve is IN.
2	If a remote brake valve is OUT, then make a 10 psi AB application. <ul style="list-style-type: none"> • Press NORMAL – EXECUTE. • Move AB to RELEASE. (The remote must see a 4 psi rise in BP pressure to allow its brake valve to come in.) • On Locotrol IV Press MAIN 	
3	When rear car is charged to at least 75 psi and when the sum of the lead and remote(s) air flow indicators displays 60 cfm or less, AND when a signal is given to apply the brakes, make a full service AB application.	
4	Press REMOTE . Wait 30 seconds after service exhaust ceases. Select remote(s) one at a time, press BV OUT. Press EXECUTE. Ensure each remote reports BV OUT.	Wait 30 seconds after service exhaust ceases. Select remote(s) one at a time, press BV OUT. Press EXECUTE. Ensure each remote reports flow is OUT and BV OUT.
5	In the application of the note in GOI Section 13, Item 8.1, the incoming locomotive engineer should perform steps 2 and 3 above.	
6	When the signal is given to release the brakes, select each remote one at a time, press NORMAL, EXECUTE. Move automatic brake handle to RELEASE.	
7	Ensure each remote displays CHARGING and that BP pressure is rising at the rear of the train.	Ensure each remote displays a value for FLOW and that BP pressure is rising at the rear of the train.

12.2 Test with a Remote on Extreme Rear of Train

	Locotrol IV	Locotrol LEB
1	Press REMOTE - ensure each remote reports CHARGING. This means the brake valve is IN on each remote. Press MAIN	Press: <ul style="list-style-type: none"> • MORE MENU (if displayed) • REMOTE MENU (if displayed). Ensure each remote displays a value for FLOW (0 or higher). This means the brake valve is IN.
2	Press MAIN. When the sum of the lead and remote air flow indicators displays 60 cfm or less, AND a signal is given to apply the brakes, press REMOTE, select each remote one at a time, press BV OUT. Press EXECUTE. Ensure each remote reports BV OUT.	When the sum of the lead and remote air flow indicators displays 60 cfm or less, AND a signal is given to apply the brakes, select each remote one at a time and press BV OUT. Press EXECUTE. Ensure each remote reports flow is OUT and BV OUT.
3	Wait 1 minute for BP pressure to stabilize. Ensure last Remote Screen / TIBS indicates BP pressure at least 75 psi.	
4	Make a full service brake application.	
5	In the application of the note in GOI Section 13, Item 8.1, the incoming locomotive engineer should apply the brake, but it is not necessary to drop each remote BV OUT until after a full service brake application has been made.	
6	When the signal is given to release the brakes, select each remote one at a time, press NORMAL, EXECUTE. Move automatic brake handle to RELEASE.	
7	Ensure each remote displays CHARGING and that BP pressure is rising at the rear of the train.	Ensure each remote displays a value for FLOW and that BP pressure is rising at the rear of the train.

12.3 Train Air Brake Test Brake Pipe Leakage Method - When AFM test cannot be performed

	Locotrol IV	Locotrol LEB
	Perform this train air brake test when the AFM test cannot be performed. (e.g., Air flow indicators are not working.)	
	NOTE: Ensure the Locotrol system is in IDLE mode.	
1	Press REMOTE - ensure each remote reports CHARGING.	Press REMOTE MENU (if displayed) - ensure remote(s) display a value for FLOW.
2	When the last car / remote is charged to at least 75 psi AND a signal is given to apply the brakes, press SYSTEM. Press LEAKAGE. Press EXECUTE.	When the last car / remote is charged to at least 75 psi AND a signal is given to apply the brakes, on the locomotive screen, press DISTR POWER (if displayed). Press DP MAIN, press SYSTEM, press LEAKAGE TEST, press EXECUTE.
3	<p><i>The Locotrol system will initiate a 15 psi automatic brake application and then allow BP pressure to stabilize.</i></p> <p><i>Approximately 1 minute after the service exhaust stops blowing, both the lead and remote brake valves will automatically be cut-out.</i></p> <p><i>Leakage will be measured by the Locotrol system and PASS/FAIL results of the test will be displayed. This will take approximately 2 to 2.5 minutes.</i></p> <p><i>Leakage must not exceed 5 psi per minute.</i></p>	
4	When prompted by the Locotrol console, place the AB handle in the FULL SERVICE position. The brake valve on the lead locomotive is automatically cut-in so that the full service reduction can be made.	
5	When the full service reduction is complete and the signal is given to release the brakes, move the AB handle to RELEASE. The remote brake valve(s) will automatically be cut-in.	
6	Ensure each remote displays CHARGING and that BP pressure is rising at the rear of the train. Ensure the Locotrol system is in RUN mode as per item 10.0 Step 1.	Ensure each remote displays a value for FLOW and that BP pressure is rising at the rear of the train. Ensure the Locotrol system is in RUN mode as per item 10.0 Step 1.

12.4 Testing Locotrol Emergency Brake Feature for Tail End Remote Operation and no SBU

At the location where train is first made up, perform pre-departure emergency brake test with Remote Locomotive on Extreme Rear of Train (without an SBU) as follows;

PROCEEDURE	
1	Ensure that the sum of the lead and remote air flow indicators displays 60 CFM or less.
2	Close a brake pipe angle cock anywhere ahead of the remote locomotive on extreme rear of the train. NOTE: on conductor only trains, it is permissible to close the angle cock immediately behind the lead locomotive consist.
3	Using the automatic brake valve on the lead locomotive, cause an emergency brake application.
4	Locomotive Engineer: Verify that an emergency brake application occurs on the remote locomotive (e.g., remote reports PC alarm flashing, BV OUT and B Pipe = 0 PSI.) Conductor/Qualified Person: Verify that the emergency propagates to the head end car or to the car/locomotive on either side of the closed angle cock.
5	Recover the emergency brake application on the train as per GOI Section 17, item 17.0.
6	Complete the Crew to Crew form. (see example)

Crew to Crew Example: Crew to Crew with remote at extreme rear of train and no SBU.

Train	Lead Locomotive	Date	FBS/TE Remote - Emergency Brake Feature
# 830	# 9809	01 / 10 / 2004 DD MM YY	SBU/REMOTE# 9810 tested by ENGR Green (PLEASE PRINT) at 1400 Golden time location

13.0 Brake Pipe Continuity - IMPORTANT (as per GOI Sec 13 item 9.3)

	Locotrol IV	Locotrol LEB
1	Make a 15 psi BP reduction and know that BP pressure has decreased at the rear of the train. If locomotive is equipped, the Train Check Test feature can be used in lieu of the procedures below. If the train check test fails, the following message will be displayed: "Train Check Fail – Check Train".	
2	Press REMOTE . Wait 30 seconds after service exhaust ceases. Select remote(s) one at a time, press BV OUT. Press EXECUTE. Ensure each remote reports BV OUT.	Wait 30 seconds after service exhaust ceases. Select remote(s) one at a time, press BV OUT. Press EXECUTE. Ensure each remote reports flow is OUT and BV OUT.
3	When ready to proceed, select each remote one at a time, press NORMAL, EXECUTE. Move automatic brake handle to RELEASE.	
4	Ensure each remote displays CHARGING and that BP pressure is rising at the rear of the train. If not, check BP angle cocks and repeat steps 1-3.	Ensure each remote displays a value for FLOW and that BP pressure is rising at the rear of the train. If not, check BP angle cocks and repeat steps 1-3.
5	Train may be started when brakes have been released.	
4	At points on grades where it is not practical to re-establish BP continuity in the foregoing manner, every effort must be made to ensure correct air pressure readings are maintained at the rear of the train and any variation or other indication that the train may have been tampered with must result in immediate action to secure the train and re-test before proceeding.	

Coupling/Uncoupling and Break-in-Two

14.0 Coupling Lead and Remote Locomotives (with/without cars)

	Locotrol IV	Locotrol LEB
1	Recouple the two portions of the train. Place the AB handle in EMERGENCY (for at least one minute), UNLESS movement can be prevented with locomotive brakes. Open the angle cock and then recharge train air brake system as per Emergency Brake Application Recovery outlined in item 17.0.	
2	<p>After recoupling the two portions of the train, if it was NOT necessary to make an emergency brake application because movement can be prevented with locomotive brakes, follow these steps:</p> <ul style="list-style-type: none"> • If coupling is made, ensure independent brake is FULLY applied. • Make at least a 35 psi AB reduction. • Open BP angle cock. • Request removal of 3 point protection. • Press REMOTE. • Select each remote one at a time, and press NORMAL, EXECUTE. • Move AB handle to RELEASE. <ul style="list-style-type: none"> ○ Ensure PCS alarm indicator for each remote goes out. ○ Ensure each remote displays CHARGING (IV) or a value for FLOW (LEB). ○ Ensure BP pressure is rising at the rear of the train. 	
<p>WARNING: Do NOT exit setout (S/O) mode (see item 15.0 - step 4) unless the lead and remote consists (with/without cars) are coupled together with BP hoses connected and angle cocks opened.</p>		

15.0 Uncoupling Lead and Remote Locomotives (with/without cars)

	Locotrol IV	Locotrol LEB
1	Before uncoupling lead consist (with/without cars or with/without all remote units), a service brake application must be made. It must be sufficient to prevent train movement while BP hoses are parted.	
2	Wait 30 seconds after exhaust ceases.	
3	Press REMOTE.	Press MORE MENU (if displayed). Press REMOTE MENU (if displayed).
4	Select each remote to be left standing and one at a time, press SETOUT (S/O). Press EXECUTE. On each applicable remote unit, this will drop out the brake valve and apply full independent brake.	
5	Press UNIT. Select each remote one at a time and ensure each remote reports ISOLATE, BV OUT and Brk Cyl Press = 72 psi.	Ensure each remote reports FLOW OUT, SETOUT and Brk Cyl = 72 psi.
6	Advise the crew member that it is now OK to close the angle cock on the portion to be moved.	
7	That portion to be left standing must be placed in EMERGENCY. On trains so equipped, the TIBS emergency braking feature must be activated.	
8	It must be observed that each remote to be left standing reports: B Pipe = 0 psi, Br Cyl = 45 psi (or higher) and that PC alarm is flashing.	
9	Movement of the head end of the train is now permitted.	
10	The standing portion must be left in compliance with GOI Section 14, item 2.0 b), c) and d).	

16.0 Break-in-Two

	Locotrol IV	Locotrol LEB
	When a break-in-two occurs on a Locotrol train between the lead consist and the remote consist, or between 2 remote consists, after movement stops:	
1	Select each remote and one at a time, press S/O, press EXECUTE. On each applicable remote unit, this will drop out brake valve and apply full independent brake.	
2	Press UNIT. Ensure each remote reports ISOLATED, BV OUT and Br Cyl Press = 45 psi and that the PC alarm is flashing.	Press MORE MENU (if displayed). Press REMOTE MENU (if displayed).
3	Select each remote to be left standing and one at a time, press SETOUT (S/O). Press EXECUTE. On each applicable remote unit, this will drop out the brake valve and apply full independent brake.	
4	Press UNIT. Select each remote one at a time and ensure each remote reports ISOLATE, BV OUT and Brk Cyl Press = 72 psi.	Ensure each remote reports Brk Pipe = 0, Brk Cyl = 45 psi (or higher), and PCS alarm is illuminated.
5	Determine which remote(s) are still coupled to the lead unit and apply sufficient hand brakes to hold both portions of the train as required.	
6	Close the angle cock on the lead portion of the train and recover emergency PCS on lead unit and on the remote(s) units which are still coupled to the lead locomotive.	
7	If necessary, remove or repair the equipment which caused the emergency brake application. Recouple the two parts of the train as per item 14.0.	

Emergency and Penalty (PCS) Brake Application Recovery

17.0 Emergency and Penalty (PCS) Brake Application Recovery

	Locotrol IV	Locotrol LEB
1	If considered necessary, apply sufficient hand brakes to prevent train movement while attempting to recover PCS and recharge train air brake system.	
2	Ensure throttle/dynamic brake handle is in IDLE, and reverser is in NEUTRAL.	
3	<p>EMERG PCS:</p> <ul style="list-style-type: none"> Place AB handle in EMERGENCY until IFD/ICE indicate GO TO RELEASE. Move AB handle to HANDLE OFF and then SUPPRESSION. Ensure PCS indication goes out on lead locomotive. <p>PENALTY PCS:</p> <ul style="list-style-type: none"> Place AB handle in SUPPRESSION for 8 seconds. Ensure PCS indicator goes out on lead locomotive. 	
4	Select each remote unit one at a time, press NORMAL or IDLE, press EXECUTE.	<ul style="list-style-type: none"> Press MORE MENU (if displayed). Press REMOTE MENU (if displayed). Select each remote one at a time, and press NORMAL, EXECUTE.
5	<p>On the Locotrol console, ensure:</p> <ul style="list-style-type: none"> PC alarm indicator goes out for each remote, Each remote displays CHARGING, BP pressure is rising at the rear of the train. 	<p>On DP screen, ensure:</p> <ul style="list-style-type: none"> PCS alarm indicator goes out for each remote. Each remote displays a value for FLOW. Ensure BP pressure is rising at the rear of the train.
6	After the train air brake system is recharged, a sufficient BP reduction must be made to prevent train movement while hand brakes (if any) are being released.	
7	If necessary, remove or repair the equipment which caused the emergency brake application. Re-couple the two parts of the train as per item 14.0.	

WARNING: PCS Recovery

The throttle and dynamic brake handle **MUST NOT** be moved from the **IDLE** position before attempting an automatic brake release. Following the release, ensure **BP** pressure is being recharged **AND** the **PCS** lights are out.

Locomotives or Trains Being Left Unattended

18.0 Locomotives or Trains Being Left Unattended

	Locotrol IV	Locotrol LEB
1	Apply handbrakes in accordance with hand brake policy and test their effectiveness.	
2	<ul style="list-style-type: none"> • Press MODE, press IDLE. • Ensure IDLE is displayed in upper right corner of screen. 	On locomotive screen, press: <ul style="list-style-type: none"> • DISTR POWER, • DP MAIN, • MODE, • IDLE (and ensure IDLE is displayed in upper left corner of DP screen), • EXIT.
3	<ul style="list-style-type: none"> • Place independent brake handle in FULL application position. • Place AB handle in RELEASE position. 	On DP operation screen, press: <ul style="list-style-type: none"> • MORE MENU (if displayed), • REMOTE MENU (if displayed), • ISOLATE & EXECUTE (ensure ISOLATE is displayed under each remote number).
4	<ul style="list-style-type: none"> • Press REMOTE. • Select each remote unit one at a time, press ISOLATE, press EXECUTE. • Ensure each remote displays ISOLATE and Brk Cyl = 72 psi. 	<ul style="list-style-type: none"> • Place independent brake handle in FULL application position. • Place AB handle in RELEASE position. • Ensure each remote displays Brk Cyl = 72 psi.
5	Center reverser and remove handle.	
6	Ensure generator field circuit breaker is OFF.	

Loading and Unloading

19.0 Tower Control - Roberts Bank Instructions**19.1 Positioning a Train for Unloading:****Note: BNSF & UP locomotives (including CP 9700 - 9714) do not have Tower Mode.**

	Locotrol IV	Locotrol LEB
1	A stop must be made outside the dumper. Wait for instructions from Westshore operations personnel to proceed. NOTE: maximum speed through the dumper is 2 MPH.	
2	Spot the leading car. Press REMOTE. Ensure Unit B is left in the RUN mode. For all other remote units C, D & E, select each remote unit one at a time, press IDLE – EXECUTE and ensure each remote displays IDLE.	Spot the leading car. Ensure unit B is left in RUN mode. For all other remotes C, D, and E, select each remote one at a time and press IDLE .
3	Press: MODE – TOWER – EXECUTE The independent brakes and a train penalty brake will automatically apply. The system will remain in IDLE mode until the tower takes control.	On locomotive screen, press: DISTR POWER – DP MAIN – MODE – TOWER – EXECUTE The independent brakes and a train penalty brake (Full Service on UHF Radio equipped locomotives) will automatically apply. The system will remain in IDLE mode until the tower takes control.
4	In the lead consist, ensure the EC/ISOLATION switches on all trailing locomotives are in the ISOLATE position. Ensure the EC/ISOLATION switch on the leading locomotive is in RUN position.	
5	On Locotrol IV and LEB locomotives with VHF Radios, place AUTOMATIC and INDEPENDENT brake handles in RELEASE position.	UHF Radio equipped locomotives, follow screen prompts to place AUTOMATIC to FULL SERVICE and INDEPENDENT to RELEASE position.
6	Center and remove REVERSER; place GEN FIELD circuit breaker OFF.	
7	Advise control tower personnel that train is ready for tower control - CROR Engine whistle signal 14 b (oo).	

19.2 When Train is Ready to Leave Roberts Bank After Unloading:

	Locotrol IV	Locotrol LEB
1	Train must already be in penalty brake. If not, the tower still has control. Before pulling from the dumper or departing, obtain permission from the BC Rail supervisor at Roberts Bank.	
2	To re-establish the Locotrol IV radio link, press: MODE – RUN – EXECUTE	To re-establish the Locotrol LEB radio link, press: DP MAIN – MODE – IDLE – RUN (RUN-FTE on ES44AC's) – EXECUTE
3	Place the EC switch on all units in lead consist to RUN position.	
4	The Locotrol IV equipment is now ready to proceed. Charge the train air brake system and perform required train air brake test.	

20.0 Slow Speed Control

Before entering the load out facility, a STOP must be made, and requested loading speed obtained from load out operating staff.

NOTES

- Trailing GE AC4400 and SD90MACs units do not require any special set up.
- All CP AC locomotives (except 9500 - 9582) & (9700 - 9714) and most BNSF locomotives are equipped with Slow Speed Control. UP locomotives are not equipped.
- Trailing DC Traction GM units (SD40-2) require pacesetter slow speed repeater (PSRP) switch set to ON. On CP 9000-9024, this switch is labelled SCIP.

20.1 Using Locotrol IV Console (CP 9583 – 9683) (CP 9100 – 9160)

NOTE: To enter SPEED mode, train speed must be less than 0.1 MPH.

1	Place the throttle in IDLE, center the reverser, apply the independent FULLY and RELEASE the automatic brake.
2	On the Locotrol console, press MODE.
3	Press SPEED. The screen displays the set speed information, the UP and DOWN arrows, and lights the EXECUTE and CANCEL switches. The operator can adjust the set speed in 0.01 MPH increments with single presses of the UP and DOWN buttons. If the UP or DOWN arrow is pressed for more than 10 seconds, the set speed will begin increasing in 0.05 MPH increments.
4	After desired speed is selected, press the EXECUTE.
5	Place the reverser in forward, place the throttle in TRACTION 1 and release the INDEPENDENT brake. The LOCOTROL system will now control power at the desired speed automatically. If train speed is too fast (such as though a sag), apply up to 10 psi of independent brake to control the train.
6	If tower operator requests a stop, place throttle in IDLE. To resume, place throttle in TRACTION 1.

To end slow speed control mode:

1 - Place the throttle in IDLE.

2 - On Locotrol console

- press IDLE
- press EXECUTE.

NOTE 1 - When in distributed power operations, the REMOTE MODE overrides the SPEED CONTROL MODE. If a remote consist has been placed in IDLE or ISOLATE, the remote consist throttle will remain in IDLE during Speed control operations.

NOTE 2 - When CP 9583 through 9683 are operating as lead controlling units, then units 9500 through 9582 will not load when operating as a remote locomotive. This is due to the older series of AC-4400 locomotives not being equipped with Locotrol slow speed control features.

20.2 Using IFD Screen (LEB Units) AC4400's

NOTE: To enter SPEED mode, train speed must be less than 0.1 MPH.

1	Place the throttle in IDLE, center the reverser, apply the independent brake FULLY and RELEASE the AB.
2	On locomotive screen press: <ul style="list-style-type: none"> • DISTR POWER, • DP MAIN, • MODE, • SPEED, • EXECUTE
3	Adjust speed using the SPEED UP and SPEED DOWN keys.
4	Place the reverser in forward, place the throttle in TRACTION 1 and release the INDEPENDENT brake. The Locotrol system will now control power at the desired speed automatically. If train speed is too fast (such as through a sag), apply up to 10 psi of independent brake to control the train.
5	If tower operator requests a stop, place throttle in IDLE. To resume, place throttle in TRACTION 1.
6	To end slow speed control mode: A - Place the throttle in IDLE. B - On MODE screen press IDLE.
NOTE	When in distributed power operations, the REMOTE MODE overrides the SPEED CONTROL MODE. If a remote has been placed in IDLE or ISOLATE, the remote throttle will remain in IDLE during speed control operations.

20.3 Using Slow Speed on ES44AC Locomotives

1	Place the throttle in IDLE, center the reverser, apply the independent brake FULLY and RELEASE the AB.
2	Exit all screens until you are on the Main Operating screen 0000-0, press: <ul style="list-style-type: none"> • SPEED CONTROL, • SLOW SPEED,
3	Adjust speed using the UP or DOWN arrow keys.
4	Press "SLOW SPEED ON" to activate the system. The system will display a prompt to place the throttle handle in Notch 1. Place the reverser in forward, place the throttle in TRACTION 1 and release the INDEPENDENT brake. The Speed Control system will control power at the desired speed automatically. If train speed is too fast (such as through a sag), apply up to 10 psi of independent brake to control the train.
5	If requested to stop, place throttle in IDLE. To resume, place throttle in TRACTION 1.
6	To end slow speed control mode: <ul style="list-style-type: none"> A - Place the throttle in IDLE. B - On locomotive screen press "SLOW SPEED OFF".
NOTE	When in distributed power operations, the REMOTE MODE overrides the SPEED CONTROL MODE. If a remote has been placed in IDLE or ISOLATE, the remote throttle will remain in IDLE during speed control operations.

Alarms and Displays

21.0 Audible Alarms – Locotrol IV and LEB

The control console includes an audible alarm which sounds to alert the locomotive engineer of alarms or other significant conditions. This alarm device sounds once, twice or three times based on the importance of the condition being reported.

Single Chime	Information only, such as brake pipe test completed.
Double Chime	Alarm or miscompare condition, such as brake warning.
Triple Chime	Major alarm such as sustained wheel slip or locked axle.

22.0 Alarm Displays – Locotrol IV (appropriate remotes will be indicated on console)

Zone	Definition
Screen ID	The left of the top line always displays the identification of the particular screen. This may be SETUP, SYSTEM, REMOTE, etc.
Top Alarms	The center section of the top line displays the two most important alarm conditions in the train. This display is automatically updated as data is detected or received. The field is blank if no alarm conditions exist.
System State	The right of the top line always displays the current state of the LOCOTROL System. This may be LINKING, TEST, IDLE, SPEED, TOWER, or RUN.
General Display	The middle four lines of the display contain data which is display specific to the various screens.
Switch Identification	The bottom line of the display is used to identify the function of the eight touch switches which are immediately below the display. Typically, arrows are used for scrolling or shifting operations.

23.0 Data Display Panel – Locotrol IV (appropriate remotes will be indicated on console)

Indicator	Definition
COMM	A red indicator which flashes whenever radio messages have been interrupted, but not for a period of greater than 45 seconds. It illuminates continuously and the alarm sounds to indicate that no messages have been received for 45 seconds.
FAIL	A red indicator which lights and the alarm sounds to indicate a major system malfunction. Further system operation is not allowed.
WS	A red indicator which lights and the alarm sounds to indicate a continuous wheel slip condition. It lights momentarily to indicate a non-continuous slip.
PS	A red indicator which lights and the alarm sounds to indicate a continuous pinion slip condition. It lights momentarily to indicate a non-continuous slip.
PC	A red indicator which lights and the alarm sounds to indicate the PCS trip condition.
PENALTY	A red indicator which lights and the alarm sounds to indicate a penalty brake condition.
TRACTN	An amber indicator which lights, while using the Independent Motoring feature, to indicate that the remote locomotives are in traction. This indicator will flash if the lead locomotive is in IDLE at the same time.
REDUCED	An amber indicator which remains lighted whenever any remote unit is operated in reduced mode (IDLE, BV OUT, ISOLATE or STOP).

24.0 Alarm Displays – LEB

The location of each alarm is indicated on the display (e.g. "B" indicates alarm at remote).

MU Alarm (white)	General locomotive alarm (e.g. hot engine).
Alarm	New data is on the ALARM screen.
Comm (Yellow)	Communication interrupted for less than 45 seconds.
Comm (Red)	Communication interrupted for more than 45 seconds.
Sys Fail (Red)	Major system malfunction. Emergency brake is applied, further system operation is not allowed.
Whl Slip (Red)	Continuous wheel slip condition. It lights momentarily to indicate non-continuous slip.
PCS (Red)	PC open at lead or remote locomotive.
Traction (Yellow)	If using independent motoring feature (back group), lights when remote is in traction. Flashes if the lead locomotive is in IDLE at the same time.
Reduced (Yellow)	Lights whenever the remote is operated in reduced mode (e.g. IDLE, BV OUT, ISOLATE or STOP).
Lock Axle (Red)	Indicates a locked axle condition

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