

# Section 15

## Locomotive and Train Operation

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**Locomotive and Train Operation**

**1.0 Duties of the Locomotive Engineer**

- 1.1 Locomotive engineers are responsible to ensure they are familiar with current information regarding the systems and mechanical procedures which apply to locomotives in service on CP. Locomotive engineers are responsible for the motive power in their care and when other duties permit, must make every effort to ensure their efficient and productive operation.
- 1.2 The locomotive engineer must take charge, inspect and leave the train in ways that ensure safe operation of both the locomotive and train.
- 1.3 Central Locomotive Specialist's (CLS) provide 24-hour assistance to crew to troubleshoot enroute locomotive problems. ASAP, the locomotive engineer must advise the CLS of locomotive failures, defects, safety hazards or any occasion when a train stalls.

Phone: **1 800 308-6426** or **403 260-5860**  
 (or 5861 or 5862)  
 Fax: 403-319-6735

**1.4 Locomotives may only be operated as follows:**

<b>A</b>	<b>On a shop track</b> , locomotives may be operated by;
	<ul style="list-style-type: none"> <li>1 - certified engine attendant (restricted to confines of the shop track), or</li> <li>2 - an engine attendant in training under the direction of a certified engine attendant.</li> </ul>
<b>B</b>	<b>On all tracks</b> , locomotives may be operated by;
	<ul style="list-style-type: none"> <li>1 - a qualified locomotive engineer (employee or officer)</li> <li>2 - a locomotive engineer trainee under the direction of a qualified locomotive engineer instructor,</li> <li>3 - an operating officer (who is not a qualified locomotive engineer) only when:                             <ul style="list-style-type: none"> <li>• they are under the immediate direction and control of a qualified locomotive engineer (see note), and</li> <li>• that officer assumes all responsibility for his/her actions, (see note)</li> </ul> </li> </ul>

- 4 - a non-operating employee or non-employee only when:
  - they are authorized to be on the locomotive (as per CP Access Policy, Section 11.0, Item 4.0), and
  - they are under the immediate direction and control of an operating officer who is a qualified locomotive engineer, and
  - that officer assumes all responsibility for their actions.

**Note:** "Immediate direction and control," requires the qualified employee remain in the operating cab of locomotive prepared to take control immediately, if required.

**2.0 General Instructions**

- 2.1 Employees are restricted from opening engine covers and electrical cabinet doors unless authorized, or in the case of emergency.
- 2.2 In case of mishap or fire to locomotives or rail diesel cars, the engines and fuel pumps should be stopped, emergency fuel cutoffs tripped and battery switches opened as soon as possible.
- 2.3 When locomotive consists are in motion, personnel may move from one locomotive to an adjoining locomotive only when both locomotives are equipped with walkways or vestibules. Hinged walkways should be in the raised position, with safety chains in place, on single locomotives or when coupled to other locomotives not equipped with walkways or vestibules.
- 2.4 Operation of the uncoupling lever by an employee standing on the side ladder of control cabs 1100-1104 while in motion, is prohibited.
- 2.5 Locomotives or rail diesel cars must not be stopped over open flame switch heaters unless absolutely unavoidable in which case they should be moved off promptly or switch heaters extinguished.
- 2.6 Within block and interlocking signal systems, should locomotive consists or rail diesel cars be stopped on sand, whether sanders are operated manually or automatically, they must be moved off the sanded rail immediately to ensure proper operation of the signal system. If they cannot be moved, protection as prescribed by CROR Rule 35 must be provided.

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**3.0 Maximum Speed of Locomotive and Rail Diesel Car Consists**

**3.1** Maximum speed for RDC or a locomotive when operated singly (not coupled to other equipment or another locomotive) is 40 MPH.

**3.2 Maximum speed for locomotives as governed by traction motor gearing**

Class or locomotive number	MPH
VIA MP27A	100
All Rail Diesel Cars, VIA F40PH	90
VIA GPA-17	89
DRS-12	75
DRF-43, DRF-44, DRF-60	68
DRS-17, DRS-20, DRS-22 DRF-30a, b and g to y 1000 - 1002, 1014, 1018 - 1020, 1022, 1024, 1100 - 1128, 2100 - 2101, 2816 4106 - 4107, 6711	65
1010 - 1013, 1015 - 1016, 1023	41
DS-12, DS-15, DS-17, 1021, 1025 - WHEN OPERATING	35
- WHEN DEAD OR ISOLATED	65
SOO 6000-6041	70
SOO 6042-6062	73
<p><b>NOTE:</b></p> <ul style="list-style-type: none"> <li>All Diesel Road Freight (DRF) 6 axle locomotives are restricted to freight train speed on curves.</li> <li>1100 series locomotives are control cabs - locomotive shells which are used for cab purposes only.</li> <li>In the above chart, DS means Diesel Switcher (4 axle), DRS means Diesel Road Switcher (4 axle), and DRF means Diesel Road Freight (6 axle).</li> </ul>	

**4.0 Number of Locomotives in a Basic Consist**

**4.1** A basic consist is the number of locomotives which may be coupled together, provided current time table permits, and is limited by the number of driving axles as follows:

**4.2 Maximum Driving Axles (non 6 axle territory)**

Unless authorized by Time Table or Special Instruction, on Service Areas / tracks where 6 axle locomotives are **prohibited** (as indicated in Time Table), the maximum number of driving axles is 16.

**4.3 Maximum Driving Axles (6 axle territory)**

On Service Areas / tracks where 6 axle locomotives are permitted, the maximum number of driving axles is 24.

When indicated in Time Table / Special Instruction or when operating on the following:

- Main line corridor between Coquitlam / Roberts Bank and connections to the Quebec Gatineau Railway at St. Martin Junction, Parc Sub
- Alyth to South Edmonton
- Dunmore to Kingsgate via Crowsnest
- Fort Steele to Golden
- Weyburn Sub

the maximum number of driving axles is 30.

**NOTE:** See item 6.0 for additional operating restrictions between Thunder Bay and St. Martin Junction.

**NOTE:** See Appendix 2 in Section 7 for equivalent driving axle ratings for locomotives.

**4.4 Adding Locomotives to the Basic Consist**

On 24 or 30 driving axle territory (unless otherwise restricted) dead, isolated or operating locomotives may be added to the basic consist, not to exceed 8 locomotives in total. The following restrictions will apply:

- weight of dead or isolated locomotives must be included in weight of the train;
- total train tonnage (excluding weight of operating locomotives) must not exceed haulage capacity of the basic consist as indicated in 4.5;
- all locomotives must have coupler alignment control/bolster stops.
- as per fuel conservation messages, excess locomotives must be isolated.

**Exception:** On Distr Pwr Trains, additional Operating Locomotives must not be added to either the lead or remote locomotive consists beyond what is indicated by the instructions in GOI Section 7, item 7.0.

**4.5 Maximum Trailing Train Tonnage allowed on Conventional Trains**

<b>A</b>	On 24 driving axle territory, determine haulage capacity for 4 SD40 (DRF-30) PTC equipped locomotives. Do not exceed this tonnage even if high horsepower locomotives (e.g. AC4400s, SD60s, SD90MACs) are in the consist.
<b>B</b>	On 30 driving axle territory, determine haulage capacity for 5 SD40 (DRF-30) NON PTC equipped locomotives. Do not exceed this tonnage even if high horsepower locomotives (e.g., AC4400s, SD60s, SD90MACs) are in the consist.
<b>NOTE:</b> When determining haulage capacity, consideration must also be given to train makeup, see APPENDIX 1).	

**4.6 Locomotive Restrictions**

- A** - Yard Switchers equipped to operate in road service cannot be used in multiple with any other class of locomotive even when equipped with MU features.
- B** - Unless otherwise instructed, if necessary to cut out more than one motor on a GMD 4-motor locomotive, the locomotive must be isolated and moved to specified shop for repair.

**5.0 Handling of Locomotives NOT Equipped with Coupler Alignment Control**

**5.1 CP Locomotives Not Equipped with Coupler Alignment Control**

The following locomotives are not equipped with Coupler Alignment Control:

CP Locomotives in series...				
1000	1100	1200	1400	1500
1600	1700	6700	8100	

**5.2 Leased Locomotives**

Unless otherwise specified, all locomotives leased by CP will be equipped with coupler alignment control.

**Note:** It may be necessary to move **locomotives owned by industries** that perform their own in-plant switching. These locomotives may be equipped with coupler alignment control, however they must be regarded as **not being so equipped**, and must be marshalled as outlined in item 5.3 below, or item 7.4.

5.3 Except where defined in special instructions, the method for handling this series of locomotives is as follows:

As part of the Lead Locomotive Consist
On CP <b>no more than one</b> locomotive in the series listed or other locomotives as instructed by the NMC, are to be moved in a locomotive consist. When such locomotive is part of the lead locomotive consist (single or multiple), it must be marshalled <b>next behind the lead locomotive</b> . If marshalled as the second locomotive of a consist with no operating locomotive behind, it must have two loaded cars weighting at least <b>45 tons</b> and <b>less than 65 feet</b> in length as the first and second cars behind such locomotive.
Without MU Capability or in Train
When this series or type of locomotive is not equipped for multiple locomotive operation due to design, mishap, damage, etc., it must be marshalled in the train and in accordance with item 7.4. The train must be handled as per 7.5.

**5.4 Locomotive Engineer Responsibility:** In a terminal area the restrictions in item 5.3 do not apply when more than one of these series of locomotives are coupled together in a consist and it is the locomotive engineers responsibility to know before proceeding which locomotives in his care are not equipped with coupler alignment control and to handle the movement avoiding the use of dynamic brake and or independent brake on curves and turnouts.

**5.5 Passenger Service:** There are no restrictions on the use of locomotives in passenger service which are not equipped with coupler alignment control.

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**6.0 Operating Restrictions Between Thunder Bay and St-Martin Jct.**

- 6.1** On all trains, which exceed 12, 700 tons, the following restrictions apply in sidings:
- when moving from a stop, use only enough power to start the train moving.
  - avoid increasing the throttle while the locomotive consist is negotiating the siding turnout.
  - this instruction does not apply to Distr Pwr equipped trains.
- 6.2** On all unit trains of loaded bulk commodities, regardless of tonnage handled, the following restrictions apply between Romford and St-Martin Jct.:
- □□□□□□□□ do not exceed 10 MPH on other than main track (except on the siding at Elder on the MacTier Sub).
  - loaded bulk commodity trains should hold the main track at meeting points whenever practicable (e.g., except when meeting time sensitive traffic such as 100 series trains).
  - whenever possible on the Parc Sub, loaded bulk commodity trains should be handled via the North Track.

**7.0 Dead or Disabled Locomotives**

- 7.1** The appropriate mechanical officer at the originating point must notify the following (in writing) of the movement of disabled locomotives, specifying speed or other restrictions:
- Operations Manager - NMC
  - Multi Yard Process Manager or Designate
  - Central Locomotive Specialist.
- 7.2** The Multi Yard Process Manager or Designate
- must secure authority of the Locomotive Distributor on which train to move the disabled locomotive.
- 7.3** The RTC must notify
- in writing, the conductor and locomotive engineer of any specific train handling required;
  - the connecting service area of the movement and restrictions required.

**7.4 Handling dead or disabled locomotives in a train.**

A dead, isolated or disabled locomotive, including those listed in item 5.1, which cannot be added to the basic consist, may be handled in the train provided:

<b>A</b>	It is separated from the lead locomotive consist handling the train and from other locomotives marshalled as follows... <ul style="list-style-type: none"> <li>• between at least <b>4 loaded</b> cars (two on each side) weighting at least <b>45 tons</b> and <b>less than 65 feet</b> in length.</li> </ul> <p><b>Exception:</b> The requirement to marshall these locomotives between <b>4 LOADED</b> cars will not apply when there are no loaded cars marshalled to the rear of the locomotives being handled in the train. In this case, 2 loaded (45 ton &lt;65 foot) cars in front and 2 empty cars behind that are less than 65 feet in length may be used. <b>(See Appendix 2 for Marshalling Examples)</b></p>
<b>B</b>	No more than two locomotives may be marshalled <b>in-train</b> and each locomotive must be marshalled between loads as described in <b>A</b> , unless the exception applies.
<b>C</b>	Locomotive(s) can be at any location in-train and if required to move at the extreme rear of train, must be marshalled as instructed in <b>D</b> .
<b>D</b>	A single locomotive which has a damaged drawbar may be moved at the extreme rear of train providing: <ul style="list-style-type: none"> <li>• the locomotive is dead, with air brakes set for "Dead in Train"</li> <li>• the air brakes are operative</li> <li>• the train is mostly loaded cars (at least 2/3 loads)</li> <li>• there are no large blocks of empty cars (10 or more) marshalled anywhere ahead of the disabled locomotive and the 2 cars immediately ahead of the locomotive, loaded or empty, must be less than 65 feet in length.</li> </ul>

**Note:** Apply GOI Section 7, item 4.2 to determine if a TrAM check is required when lifting a dead, isolated or disabled locomotive.

- 7.5** When dead or disabled locomotives are marshalled in accordance with item 7.4(A):

**DYNAMIC BRAKE FACTOR MUST NOT EXCEED 10 AND THE USE OF INDEPENDENT BRAKE ON CURVES MUST BE AVOIDED.**

**7.6 Handling dead remote locomotive(s) on the extreme rear of a distr pwr train, (Brake Cylinder pressure failure)**

In the event Tail End Remote(s) shutdown enroute and cannot be restarted, arrangements must be made with the NMC to conventionalize or re-marshall the train at the first available location. The train may proceed to an alternate location, providing **all** of the following conditions are met.

- Must still have communication between the lead and remote.
- Remote unit must be in the Isolate mode with the remote feed valve cut out.
- Main Reservoir pressure on the remote must be 85 PSI or greater.
- Must pass a TrAM check.

Note: During freezing weather arrange to drain the locomotive as per GOI Section 15 Item 11.0.

**Note:** Locomotive Engineer must monitor the main reservoir on the remote. If the MR pressure drops below 85 PSI and/or communication is lost<sup>(\*)</sup> with the remote, then train speed must be reduced to 25 MPH and only proceed to the first available location and be conventionalized or remote(s) replaced.

\* This does not include intermittent comm loss that is experienced with normal operations.

**CAUTION: If main reservoir pressure has depleted, the brakes will be inoperative on the remote, even if the brake pipe is reduced or the unit is placed into emergency!**

**7.7 New Locomotives (North American Models) Moving from EMD Factory in London, Ontario to USA or other points.**

**NOTE:** These locomotives are usually brand new and usually leave the factory unpainted.

<b>A</b>	In the application of GOI Section 13, item 16.5, step 2, these locomotives will be handled trailing in the lead locomotive consist, DEAD and with only the brake pipe coupled. This above information must be recorded on the Crew to Crew Form.
<b>B</b>	The locomotives have operative air brakes and should be tested in accordance with train air brake tests (automatic brake application and release only).
	<b>Note:</b> EMD personnel will set up the air brake system properly and will ensure all controls and switches are properly positioned; locomotive cab doors will be subsequently locked. CP employees must not alter any controls or switches on these locomotives unless so advised by the central locomotive specialists.
<b>C</b>	The locomotives will be handled in standard freight service.
<b>D</b>	The total number of these locomotives plus the operating locomotives must not exceed 8 (as per GOI sec 15, item 4.4).
<b>E</b>	WARNING! Wheelslip protection will NOT be available for these locomotives. It is mandatory that train crew members make frequent running inspections on both sides of the locomotive consist to ensure that all wheels are turning freely.
<b>F</b>	Any time one of these locomotives is set off and left standing, apply a hand brake and test its effectiveness. It will not be possible to re-position the air brake handles and valves as per GOI Section 14, item 5.0 b) and d).
<b>G</b>	Should difficulty be experienced with one or more of these locomotives during transit, or should one of these locomotives need to be picked up or set out in route, crews must immediately notify the Central Locomotive Specialists located in Calgary.
<b>H</b>	Special Instructions will be issued for EMD passenger locomotives and for EMD export locomotives destined for railroads outside North America which may not be equipped with alignment control couplers. All new EMD freight locomotives built for North America are equipped with alignment control couplers.

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**8.0 Pre-Departure Locomotive Inspections**

**8.1 Locomotive Safety Inspection Locations**

**NOTE:** The Schedule B brake test form has been revised to include information regarding a locomotive safety inspection, locomotive defects, and dynamic brake (DB) factors. Other methods may also be used to convey this information.

At locations where a locomotive safety inspection has been performed by mechanical services personnel, the locomotive engineer must be notified verbally or in writing that:

- 1 - the inspection was completed, and
- 2 - the nature of any safety defects when a locomotive is being moved for repair, and
- 3 - to ensure safety of movement, any restrictions.

Before departing, the locomotive engineer must:

<b>A</b>	Record any safety defects on the Crew to Crew Form.
<b>B</b>	Know that the DB factor does not exceed the maximum permissible limit, and record the DB factor on the Crew to Crew Form.
<b>C</b>	Ensure that the headlights, ditchlights, bell and whistle are working on the lead locomotive.
<b>D</b>	Know that the flagging equipment is fully supplied on the lead locomotive.
<b>E</b>	Ensure that the hand brakes are released. <b>NOTE:</b> If the locomotive consist does not roll freely when movement is commenced, stop and check hand brakes on all locomotives.
<b>F</b>	Unless advised verbally or in writing (Schedule B) that a locomotive brake test was previously completed at that location, perform a locomotive brake test in accordance with GOI Section 13, Item 2.0.
<b>G</b>	Unless advised verbally or in writing that a locomotive safety inspection was previously completed at that location, perform a locomotive pre-departure inspection in accordance with Item 8.2. <b>NOTE:</b> At safety inspection locations where remote locomotive(s) are to be added to a train or a rear end remote is set up for lead position (switching ends), the remote locomotive(s) must receive a safety inspection.

**8.2 Locations Other than Locomotive Safety Inspection Locations**

At locations where a locomotive(s) has laid over more than eight hours without a safety inspection, prior to departing, the locomotive engineer or other qualified person must perform a locomotive pre-departure inspection as follows:

<b>A</b>	start up the engines, if shutdown.
<b>B</b>	inspect the running gear and trucks for visible defects.
<b>C</b>	inspect the locomotive(s) for any other apparent hazards likely to cause an accident or injury.
<b>D</b>	where applicable, the Automatic Reporting Unit (ARU) must be disconnected. (Refer also to item 10.4.)
<b>E</b>	record any defects on the Crew to Crew Form.
<b>F</b>	know that the DB factor does not exceed the maximum permissible limit and record the DB factor on the Crew to Crew Form.
<b>G</b>	know that the air brake system is set up correctly for lead and trailing locomotives.
<b>H</b>	ensure that the headlights, ditchlights, bell and whistle are working on the lead locomotive. Locomotives with one or more of these defects may depart only when authorized by the Director Operations - NMC. In the application of CROR Rule 19, the designated repair points for ditch lights are: Coquitlam, Calgary, Winnipeg, Toronto and Montreal.
<b>I</b>	know that the flagging equipment is fully supplied on the lead locomotive.
<b>J</b>	ensure that the hand brakes are released on all locomotives.
<b>K</b>	perform a locomotive brake test in accordance with GOI Section 13, Item 2.0.

**NOTES:**

- At other than safety inspection locations where remote locomotive(s) are added to a train, the remote locomotive(s) must receive a pre-departure inspection.
- Where remote locomotive(s) have already been added to a train but the train lays over more than 8 hours, no pre-departure inspection is required.
- When a rear end remote locomotive is set up to operate in the lead position (switching ends), that locomotive must receive a pre-departure inspection at that time.

**8.3 Changing Off with Another Locomotive Engineer**

<b>A</b>	Examine the Crew to Crew Form. If the form does not clearly indicate that the DB factor is within permissible limits, check each locomotive and then update the Crew to Crew Form.
	<b>NOTE:</b> Normally a remote consist will not include enough locomotives to exceed the maximum permissible DB factor, so a personal check is not required
<b>B</b>	know that the flagging equipment is fully supplied on the lead locomotive.

**8.4 USA Destined Locomotives**

<b>A</b>	Each locomotive that is destined to or in service in the USA shall be inspected at least once during each calendar day (24 hour period from midnight to midnight).
<b>B</b>	This inspection may be either a mechanical safety inspection or a pre-departure inspection by the locomotive engineer.
<b>C</b>	In addition to the minimum pre-departure inspection requirements provided in Item 8.2, the engineer must ensure that an FRA Form F6180-49A (blue card) is displayed in the cab.
<b>D</b>	A written report of the inspection, using Form 2068 Daily Inspection Report, or equivalent, must be completed and filed with mechanical.
<b>E</b>	A record shall be maintained on the locomotive showing the place, date and time of the most recent inspection.
<b>F</b>	If any safety defects are identified during an inspection or that develop while enroute, the engineer must complete a Non-Complying Tag (Form 2067), or equivalent, attaching one copy to the isolation switch on the defective locomotive and one copy on the control stand of the controlling locomotive.
<b>G</b>	The Non-Complying tag shall include the following information: <ul style="list-style-type: none"> <li>- The words "Non-complying locomotive"</li> <li>- Locomotive initials and number</li> <li>- Nature of defect</li> <li>- Movement restrictions, if any</li> <li>- Destination</li> <li>- Name of the railway company and name of employee completing the tag.</li> </ul>
<b>H</b>	All non-complying conditions must also be reported to the Central Locomotive Specialist (diesel doctor) or other mechanical supervisor, as soon as possible.

**9.0 Movements Not Controlled by the Lead Locomotive, Pilots**

<b>A</b>	Except for snowplows, cab cars on commuter trains or other similar passenger equipment, movements not headed by the controlling locomotive must not exceed 25 MPH, <b>unless otherwise specified by CROR Rule 115.</b>
<b>B</b>	If a locomotive is not equipped with a pilot in the direction of movement, that movement is restricted to 20 MPH. <b>Note:</b> <ul style="list-style-type: none"> <li>• All "DRF" (Diesel Road Freight) locomotives have a pilot on the front end only, the rear has an end plate.</li> <li>• All "DRS" (Diesel Road Switcher) locomotives have a pilot at both ends.</li> <li>• The "pilot" can be either the standard CP curved pilot or a snow plow type.</li> </ul>
<b>D</b>	A sperry car moving backwards is restricted to 25 MPH.

**10.0 Winter Operation: Leaving Locomotives Unattended - (Nov 15 - Mar 15)**

**10.1 High Idle Protection:**

Most CP locomotives GE, SD40-2 and SOO 6000 to 6062 (SD60's) have been equipped with high idle feature which will automatically increase engine RPM if cooling water temperature drops below a certain point.

However this feature is not trainlined.

Locomotives not equipped with this feature have to be throttled up manually (from the controlling locomotive).

**10.2 Locomotives that may NOT be Equipped:**

Leased Units, Yard Engines, low horse power road switchers and most SOO and former SOO locomotives are NOT equipped with High Idle protection.

Many StL&H, D&H, DM&E and ICE locomotives may NOT be equipped with high idle protection.

**Note:** If in doubt, the locomotive(s) should be manually throttled up as per the policy below.

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**10.3 Policy:**

<b>IF...</b>	
Temperatures are at, or expected to drop below minus 20° Celsius (- 20°C) <b>and</b>	
any locomotive in the consist that may not be equipped with high idle protection <b>and</b>	
such locomotives are being left unattended,	
<b>THEN...</b>	
manually throttle up the consist as follows: On Leading locomotive ensure:	
<ol style="list-style-type: none"> <li>1 - Generator Field switch is OFF.</li> <li>2 - Control/Fuel Pump &amp; Engine Run switches are ON.</li> <li>3 - REVERSER is inserted and in NEUTRAL.</li> <li>4 - Throttle is in #4 position.</li> </ol>	
<b>Note:</b> Locomotives equipped with the High Idle feature should be ISOLATED so that they do not rev up unnecessarily. This should be noted on the Crew to Crew Form.	
It is recognized that train crews do not have easy access to the exact outside temperature. Care and good judgment are essential tools in the application of this instruction.	

**10.4 Automatic Reporting Units (ARU)**

<b>A</b>	In areas where locomotives are connected to an ARU, do not increase the throttle to notch 4 unless so advised by maintenance personnel.
<b>B</b>	All unattended locomotive consists which are tied up at locations where an ARU is located or a portable ARU is used at a remote location, must have the ARU connected as per local operating instructions or as per instructions posted at the ARU or within the portable unit.
<b>C</b>	ARU & DISTR PWR - When leaving DISTR PWR consists at a location where an ARU is to be used, the remote unit(s) must have a MU cable connecting it to the lead consist. This will allow any alarms on the remote unit to be relayed to the lead unit and the ARU. This information must be recorded on the Crew to Crew Form.
<b>D</b>	<b>CAUTION:</b> Before moving the locomotive(s), check to ensure ARU cable is unplugged:
<b>1</b>	On DISTR PWR consists, the MU cable between the master (lead) consist and the remote consist(s) <b>MUST</b> be disconnected prior to the movement of the locomotives.
<b>2</b>	Store the ARU in the designated area to avoid possible damage to equipment/components. Crews are responsible to ensure that portable ARU's are with the consist prior to leaving the initial location as well as the remote location.

**NOTE:** If the reverser is placed in a direction before the ARU is unplugged, the locomotive wheel slip alarm will activate.

<b>E</b>	If responding to an alarm from an ARU:
<b>1</b>	Find and correct fault and restart if shut down.
<b>2</b>	Ensure locomotive(s) is running in idle. Check isolation switch to ensure it is in RUN position.
<b>3</b>	Ensure the ARU plug is correctly set into the MU receptacle on the locomotive.

**11.0 Draining A Locomotive In Freezing Weather**

**Note:** UP 8500 – 8561 (SD90MACs) are equipped with anti-freeze in the cooling system and must not be drained.

**11.1 Winter Operation (Nov 15 - Mar 15) - Draining Locomotives.**

<b>Winter Operation</b>	<p>During winter operations (Nov 15 - Mar 15),</p> <ol style="list-style-type: none"> <li>1 - IF any engine dies and cannot be restarted, THEN the cooling system <b>MUST</b> be drained using the manual drain valve.</li> <li>2 - IF a LEASED locomotive is trailing and                     <ul style="list-style-type: none"> <li>- it has to be left ISOLATED and</li> <li>- it is not equipped with an Alarm Silence Switch THEN the cooling system <b>MUST</b> be drained using the manual drain valve:</li> </ul> </li> </ol> <p><b>CAUTION:</b> refer to item 11.2 below.</p>
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<b>Silent Alarm Circuit</b>	<p>CP locomotives are equipped with an Alarm Silence Switch so even when isolated will “sound the alarm” if the engine shuts down</p> <p>About one half of leased locomotives do not have this feature and if ISOLATED, will NOT “sound the alarm” if the engine shuts down.</p>
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<b>Automatic Drain Valve</b>	Do not rely on automatic drain valves. When a crew member responds to an alarm, the cooling water temperature may still be warm enough to prevent the valve from opening. When it is cool enough, no one will be present to confirm that the valve opens automatically and if it doesn't, serious damage is likely.
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**11.2** When the engine of a locomotive is shutdown and there is a possibility of damage from freezing, the engine cooling water must be drained.

Refer to the draining instruction posted in the cab. If in doubt, contact the locomotive Specialist for instructions.

<b>PRECAUTIONS</b>	
<b>A</b>	<b><i>When it is necessary to drain the coolant from a locomotive, ensure the drain pipe or pressure relief outlet is not pointed at you.</i></b>
<b>B</b>	If the locomotive is not equipped with a pressure relief valve on the expansion tank and it is required to remove filler pressure cap, ensure that coolant temperature gauge indicates that coolant temperature is normal or cold prior to attempting to remove the filler cap.
<b>C</b>	Stay clear of the filler pipe connector when releasing pressure. Once the pressure is vented, carefully remove filler pressure cap.
<b>D</b>	Any former SOO, D&H, foreign and leased locomotives not equipped with an Alarm Silence Switch that for any reason are required to be ISOLATED when trailing in a consist must be shut down and drained during freezing weather.
<b>E</b>	Care should be taken as to where cooling water containing compound is drained.

**11.3 Locomotive Water Cooling Systems**

There are many different types of water cooling systems on locomotives. Water fill instructions are located in the locomotive cab or at the water filling station on the locomotive. If in doubt as to the procedure or if the instructions are missing, contact the Locomotive Specialist and be governed by their instructions.

**Note:** For GE locomotives, an illustrated **Job Aid** is available on **RailCity** (*Teams – Operations – Safety & Environmental Services*) for proper water level and fill procedures for GE locomotives.

<b>Water Filling Precautions</b>	
<b>1</b>	Allow the locomotive to Idle for at least 10 minutes to allow water to drain from Radiators into the tank.
<b>2</b>	When possible always use the water fill pipe connection (Chicago Coupler) at the side of the expansion tank.
<b>3</b>	Open the spring loaded water fill valve to relieve pressure before (at least <i>60 seconds</i> ) and during filling. This valve is on the top, forward side of the expansion tank.
<b>4</b>	If required to open the expansion tank (radiator) cap, <b>Do not</b> open the cap unless you have pulled down the Vent Valve handle for at least <i>60 Seconds</i> to prevent injury.
<b>5</b>	On GE Locomotives, ensure the green light located at the water fill location on the locomotive is "ON" before filling or removing radiator cap.
<b>6</b>	On some GE locomotive a radiator cap cover has been installed to prevent removing the radiator cap. <b>DO NOT REMOVE THIS COVER</b> unless authorized by the Locomotive Specialist.
<b>7</b>	Add water until the level reaches the " <b>Full At Idle</b> " mark on the sight glass. <b>Do not overfill!</b>
<b>8</b>	Once proper level is achieved, turn water supply off immediately to avoid over-filling, then release the spring-loaded water fill valve so valve returns to it's closed position.
<b>9</b>	If the water level needs to be lowered, open the water drain valve located below the water tank and drain to the correct level.
<b>10</b>	When draining water, it will drain under the platform, ensure no one is near the drain pipe.

**11.4 GE AC Locomotives - Drain Valve Circuit Breaker**

The drain valve circuit breaker on the engine control panel is to remain ON at all times.

**12.0 Causes of a PCS Operation (Pneumatic Control or Power Cut-off Switch)**

**NOTE:** In the following instructions, PCS also refers to PC or Power Cut-Off lights.

The following will cause the PCS switch to operate:

<b>A</b>	<b>An emergency brake application.</b>
<b>B</b>	<b>A penalty brake application caused by:</b> <ul style="list-style-type: none"> <li>- a timing out of the reset safety control (RSC),</li> <li>- the safety control foot pedal being released, or</li> <li>- exceeding the maximum speed of the locomotive.</li> </ul>

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**13.0 Recovering a PCS Following a Penalty Brake Application**

1	Place the independent brake handle in FULL application.
2	Place the throttle/dynamic brake handle(s) in IDLE/OFF.
3	On a locomotive equipped, depress the safety control foot pedal.
4	Place the AB handle in SUPPRESSION (or LAP for No 6 and 24 equipment)
5	On a locomotive equipped with a safety control foot pedal, wait for the PCS light to extinguish.
6	On a RSC equipped locomotive, operate any system reset and wait for brake pipe exhaust to cease, or the PCS light to extinguish.
7	Return the AB handle to RELEASE (or RUNNING for No 6 and 24 equipment).

**WARNING - PCS RECOVERY (GM & GE Locomotives)**

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

**NOTE:** On some locomotives, after the exhaust ceases, the PCS light will not extinguish until the AB handle is returned to the RELEASE or RUNNING position.

**14.0 Recovering a PCS Following an Emergency Brake Application**

1	Place the independent brake handle in FULL application.
2	Place the throttle/dynamic brake handle(s) in IDLE/OFF.
4	Place the AB handle in EMERGENCY (or LAP for No 6 and 24 equipment)
5	Wait 60 seconds AND on locomotives equipped with an electronic display screen, ensure reset message appears or the fault disappears.
6	Return AB handle to RELEASE, pausing briefly in HANDLE OFF and SUPPRESSION; (on No 6 or 24 equipment, return AB handle to RUNNING position).

**WARNING - PCS RECOVERY (GM & GE Units)**

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

**14.2 PCS Recovery/TIBS Failure**

The TIBS is known to be defective and it is necessary to recover the PCS while standing on a grade, and

**IF** the state of charge of the brake pipe cannot be determined or is in doubt, and

**IF** the locomotive brakes are not sufficient to prevent train movement,

**THEN** a sufficient number of retainers and/or hand brakes must be applied to hold the train standing, before releasing the automatic brake.

**14.3 Emergency Brake Application Recovery Procedure when Moving from a Stop - Retainers/Handbrakes**

<b>A</b>	Refer to: <ul style="list-style-type: none"> <li>GOI Section 16 Appendix 1, Descending Heavy Grade Job Aid, item 6.0, "Use of Retaining Valves," or</li> <li>Time Table footnotes regarding mandatory use of retainers or handbrakes.</li> </ul> See also GOI Section 15, item 29.3.
<b>B</b>	When hand brakes are used, they must be released before moving the train, but only after the train air brake system is fully charged.
<b>C</b>	When High Pressure (HP) retainers are used, the train must not exceed 20 MPH. The train must be stopped every 20 minutes for a period of 10 minutes in order to allow the wheel and brake shoes time to cool off.

**15.0 Changing Operating Cab of a Multiple Locomotive Consist**

**Note:** ensure that the locomotive is protected from unintended movement.

**15.1 At the cab being cut-out (to set up for TRAILING locomotive).**

1	Place <ul style="list-style-type: none"> <li>the throttle in IDLE</li> <li>the selector handle in OFF (if applicable) and</li> <li>remove the reverser handle.</li> </ul>
2	Place the independent brake handle in FULL application.
3	<p>1 - Make a full service reduction.</p> <ul style="list-style-type: none"> <li>Cut-out the automatic brake.</li> <li>Move the automatic brake handle to HANDLE OFF and remove the handle, if removable.</li> </ul> <p>2 - With No. 6 and 24 equipment</p> <ul style="list-style-type: none"> <li>Make a full service reduction and move the brake handle to LAP.</li> </ul>

	<ul style="list-style-type: none"> <li>Close the brake valve cut-out or double heading cock.</li> <li>Move the automatic brake handle to RUNNING and remove the handle, if removable.</li> </ul>
4	Place the MU-2-A valve or electronic equivalent in TRAIL position. With No. 6 and 24 equipment, place the Rotair valve in FREIGHT LAP or PASS LAP as required.
5	Place the independent brake handle in RELEASE and remove the handle if removable. <b>Note:</b> Brake cylinder pressure is not maintained when the independent brake is cut-out. Observe brake cylinder pressure for leakage, and if necessary apply hand brake(s).
6	At the control stand, ensure the Generator Field switch is OFF. Leave the Control/Fuel Pump and Engine Run switches ON until after having set up the controls on the locomotive being cut in as the controlling locomotive. <b>Note:</b> On AC4400 locomotives, ensure the dynamic brake circuit breaker on the control stand is OFF.
6	Return AB handle to RELEASE, pausing briefly in HANDLE OFF and SUPPRESSION; (on No 6 or 24 equipment, return AB handle to RUNNING position).

### 15.2 At the cab being cut in (to set up for LEAD).

1	Replace the handles to the automatic and independent brake, and move the independent brake handle to FULL application.
2	Place the MU-2A valve or electronic equivalent in LEAD. With No. 6 or 24 equipment, move the Rotair valve to FRT or PASS as required.
3	Move the automatic brake handle to RELEASE. With No. 6 or 24 equipment move automatic brake handle to RUNNING. If necessary adjust Equalizing Reservoir Pressure.
4	Cut-IN the automatic brake. For No. 6 or 24 brake equipment, open the brake valve cut-out or double heading cock.
5	At the control stand, ensure the Control/Fuel Pump, and Engine Run switches are ON. <b>Note:</b> On AC4400 locomotives ensure the dynamic brake circuit breaker on the control stand is ON.
6	Return to the cab of the locomotive being cut out, place the Control/Fuel Pump and Engine Run switches to OFF.
7	Perform a Locomotive Air Brake test.

### 16.0 Joining a Locomotive Consist

1	Couple the locomotives and STRETCH to ensure that the couplers are locked.
2	On the controlling locomotive, apply the independent brake FULLY.
3	Before coupling the air hoses, open the cocks enough to blow out any accumulation of dirt or snow from the hose couplings. Check the air hose gaskets.
4	Ensure that all air hoses are properly connected, and that the air line cocks are open.
5	Ensure that the jumper cables are properly connected and secured in the captain hook, or other securing device.
6	Ensure that the controls and switches are properly positioned on all locomotives in the consist. (e.g. for lead or trailing).
7	Release the hand brakes where applied.
8	Perform the required air brake test.
<b>Note:</b> Ensure that any locomotive(s) to be left standing is properly secured with hand brakes and in accordance with GOI Section 14, Item 4.0.	

### 17.0 Starting/Stopping the Diesel Engine - Battery Knife Switch

**CAUTION:** Electrical arcing may occur when opening or closing the main battery knife switch.

- do not wear dangling accessories, jewelry or other similar items likely to come in contact with the bare metal parts of the switch
- grasp the battery knife switch by the handle only
- avoid direct contact with the bare metal bars and bare metal surfaces of the battery knife switch

#### 17.1 ZTR Smart-Start or Q-Tron QEG or GE Auto Engine Start/Stop (AESS)

If a diesel engine has been shut-down by ZTR Smart-Start or Q-Tron QEG or GE Auto Engine Stop/Start System (AESS), it can be re-started as follows:

- insert reverser and move to Forward or Reverse
- some locomotives (GP7s, GP9s and GEs) may also require Generator Field switch moved to the ON position.

**18.0 Starting/Stopping the Diesel Engine - GMs and GEs**

**18.1 GM Locomotives – Starting**

	Description	Action
1	Lube oil, cooling water, compressor oil	Check
2	<b>On control stand:</b>	
	Engine Run switch	ON
	Generator Field switch	OFF
	Control/Fuel Pump switch	ON
	Throttle	IDLE
	Reverser handle	CENTERED
	MU Engine Shutdown (if equipped)	RUN
3	<b>SD90MACs ensure:</b>	
	CONTROL circuit breaker (C Brk)	OFF
	COMPUTER CONTROL C Brk	OFF
4	Main Battery Knife Switch	CLOSE
5	<b>On SD90MACs in the following order:</b>	
	FUEL INJECTION SWITCH (on #2 C Brk Panel)	START/RUN
	C Brks in black and yellow striped zone	ON
	COMPUTER CONTROL C Brk	ON
	CONTROL C Brk	ON
	<b>WAIT FOR 2 MINUTES TO ALLOW COMPUTER POWER UP</b>	
6	Isolation switch	START/STOP/ ISOLATE
7	Alarm Silence Switch (if equipped)	ON
8	<b>On DC traction locomotives, at start station:</b>	
	governor low oil button (if equipped).	Reset if tripped
	engine overspeed lever (if equipped).	Reset if tripped
	Fuel Prime/Engine Start switch (if equipped)	PRIME (until return fuel sight glass is full and free of Bubbles)
	Fuel Prime/Engine Start switch (if required).	(20 seconds maximum)
	Layshaft (if equipped)	move to 1/3 of full travel (until engine starts)
	<b>CAUTION: Do NOT use layshaft on engines equipped with Q-TRON Electronic Governor (QEG).</b>	
	Low Water protective device (within 1 minute of starting)	RESET
9	<b>On SD90MACs, in the locomotive cab on Engine Control Panel:</b>	
	Engine Start	Press for 2 Seconds and Release

	<b>Note:</b> An alarm will sound for 5 seconds prior to start-up. If the engine fails to start, the computer will display a fault message on the left operator screen.
10	If engine fails to start within 20 seconds, re-check steps 1 - 9, allow at least 2 minutes between attempts (for starting motors to cool or computers to reboot) and try starting again.

**18.2 GM locomotives - Shutting Down**

**Note:** On GM locomotives equipped with a turbocharger, ensure the engine has been in throttle 4 or lower for at least 15 minutes before shutting the engine down.

	Description	Action
1	<b>Ensure that the locomotive is protected from unintended movement.</b>	
2	<b>On control stand:</b>	
	Throttle	IDLE
	Selector handle (if applicable)	OFF
	Reverser handle	REMOVED
3	Isolation switch	ISOLATE
4	Emergency Fuel Cutoff Switch (EFCO)	PRESS to shutdown the engine.
	<b>On SD90MACs:</b>	
	COMPUTER CONTROL Circuit Brk.	leave ON
	All C Brks protected by shield (e.g. TURBO etc.)	leave ON
	All other Circuit Brks	OFF
5	Main Battery Knife Switch	OPEN
6	Doors and Windows	CLOSED
7	At diesel facilities, advise shop planner locomotive #, and shutdown date and time.	

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**18.3 GE AC4400 Locomotives - Starting**

	Description	Action
1	Lube oil, cooling water, compressor oil	Check
2	<b>On control stand:</b>	
	Engine Run C Brk	ON
	Generator Field C Brk	OFF
	Control Circuit Brk	ON
	Throttle	IDLE
	Reverser handle	CENTERED
	MU Engine Shutdown (on overhead console).	RUN
3	Engine Control (EC) switch	START
4	Main Battery Knife Switch	CLOSE
5	<b>Engine Control Panel:</b>	
	Drain Valve C Brk.	ON
	TOP ROW C Brks	
	<ul style="list-style-type: none"> <li>TRAILING unit</li> <li>LEAD unit</li> </ul>	OFF ON/OFF as required
	LOWER ROW C Brks: LEAD & TRAILING units.	ON
6	<b>Miscellaneous:</b>	
	DID panel	Check for Fault Messages
	Alternator Field (BFCO) switch	NORMAL
	<b>NOTE:</b> The BFCO switch is in center electrical cabinet near top.	
	Traction motors # 4 and # 5	Cut-IN
	Barrier Bar (in Auxiliary Cab doorway)	DOWN
7	<b>At start station:</b>	
	Fuel Prime/Engine Start switch.	PRIME (until fuel sight glass is full and free of bubbles and ensure fuel pressure gauge reads 55 psi)
	Fuel Prime/Engine Start switch	ENGINE START
	<b>Note:</b> There will be a 5 to 40 second delay before engine begins to crank.	
	If engine fails to start within 20 seconds cranking re-check steps 1 - 6, and try starting again.	
8	Lubricating oil pressure gauge	CHECK for proper pressure

**18.4 GE AC4400s Locomotives - Shutting Down:**

**Note:** Ensure the engine has been in IDLE for at least 5 minutes before shutting the engine down.

	Description	Action
1	<b>Ensure that the locomotive is protected from unintended movement.</b>	
2	Throttle	IDLE
3	Reverser handle	REMOVED
4	Engine Control (EC) switch	START position
5	Engine STOP push button	PRESS to shutdown the engine
6	<b>Circuit Breakers:</b>	
	Water Drain C Brk	leave ON
	All C Brks protected by shield All other C Brks	leave ON OFF
7	Main Battery Knife Switch	OPEN
8	Doors and Windows	CLOSED
9	At diesel facilities, advise shop planner locomotive #, and shutdown date and time.	

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**19.0 Engine Shutdown Account Crankcase Overpressure**

Certain conditions can cause a severe build-up of dangerous gases within the engine crankcase. GM and GE engines are protected in different ways and therefore respond differently.

**GM Engines:**

If the crankcase pressure button trips (pops out), DO NOT attempt to restart the engine. Explosive gases in the crankcase could be ignited and cause injury.

**GE Engines:**

**1 Low levels of overpressure:**  
 GE engines, when crankcase overpressure is sensed, the computer will return the engine to idle speed for low levels of overpressure, but will not shut the engine down for this indication alone. The DID panel on the back cab wall will indicate "7A7F SHUTDOWN: Crankcase Overpressure."  
 When this occurs, **isolate** the locomotive and **do not reset** any such indication.  
 If an engine with a 7A7F fault displayed will be left unattended for more than one hour, or any abnormal engine noise or condition becomes apparent at idle, the engine **must** be shutdown manually, and **must not** be restarted.

**2 High levels of overpressure:**  
 Will be indicated on the DID panel by "7A80 SHUTDOWN: Crankcase Overpressure," and the engine should shutdown automatically and **must not** be restarted.  
 When this occurs, isolate the locomotive and **do not reset** any such indication.

**Summary:**  
 Any engine shutdown (GM or GE) account excessive crankcase pressure **must** be left shutdown until inspected by qualified mechanical personnel.  
 Report defect to the Central Locomotive Specialist and book on the Crew to Crew Form. Arrangements will then be made for Mechanical Services to perform a thorough inspection of the engine crankcase, and repair as necessary.

**20.0 Locomotive Stop Start Systems**

**20.1** All Stop Start Systems must be operational on a year round basis. Do not disable or override these systems except as provided below.

**20.2** There are 3 types of systems on CP:

<b>A</b>	<b>ZTR Smartstart System</b>
<b>B</b>	<b>QEG 1000</b> (Q-tron Electronic Governor) QEG also increases tractive effort, improves traction motor cooling in Dynamic Brake and improves fuel economy.
<b>C</b>	<b>AESS</b> - GE AC's have a system called "Auto Engine StopStart System (AESS)".

**20.3 Switches and Circuit Breakers (C Brk):**

<b>A - ZTR System</b>	
<b>Autostart Circuit Breaker</b>	Is a single pole breaker located in Circuit Breaker panel or electrical cabinet (there is no label applied to help identify this C Brk).
• <b>ON</b>	normal position
• <b>OFF</b>	when performing maintenance or when manually shutting down

<b>B - QEG 1000 System</b>	
<b>QEG 1000 C Brk</b>	located on C Brk panel
• <b>ON</b>	normal position
• <b>OFF</b>	when performing maintenance or when manually shutting down

<b>GP 38 Locomotives only</b>	
<b>Autostart Disable Switch</b>	located on engine control panel
<b>AUTOSTART ENABLED</b>	must be in this position in order for locomotive to load
<b>LEAD UNIT DISABLED</b>	will prevent auto shutdown on lead locomotive only

<b>WARNING</b>	
<b>IF</b>	<b>THEN</b>
<ul style="list-style-type: none"> <li>the lead locomotive is a GP 38 series and</li> <li>an automatic brake application is being used to hold a train standing</li> </ul>	the start stop system must be disabled to prevent lead unit shutdown. This is to maintain main reservoir pressure. Failure to comply with this instruction may result in a undesired release of the train air brakes if one of these locomotives (GP38s) had shut down and then automatically restarted.

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C - GE AC4400s/AESS	
Disable Toggle Switch	located behind DID panel:
• <b>ON</b>	must be in this position in order for locomotive to load.
• <b>OFF</b>	when performing maintenance or when manually shutting down.

**20.4** If a stop start system did not shut down the engine, it will not re-start the engine; manual re-start is required (e.g., place the isolation switch in START/STOP/ISOLATE position and re-start as per normal procedure).

**20.5** SHUTDOWN: With systems enabled and with engine oil and water at certain temperatures, throttle in IDLE, reverser CENTERED, independent brake applied, ambient temperature above 0°C (5°C on GE's) auto shutdown will occur:

- 10 minutes after loading on GE's
- 20 minutes after loading on QEG/ZTR system

**20.6** RE-START: If a stop start system did shut down the engine, the system will re-start the engine automatically. With systems enabled, and throttle in IDLE, any one of the following will cause automatic re-start to occur:

- Coolant temperature falls below 37°C (100°F)
- Ambient temperature falls below -2°C (5°C on GE's)
- Battery voltage falls below 63 Volts
- Reverser: moved to FORWARD / REVERSE (on some GP9s, GF switch must be ON)
- Locomotive brake cylinder pressure falls below certain levels
- Main reservoir pressure falls below 100 psi (not on GP38 & GP9 series locomotives)

**Exception:** On SD40 and GE AC Locomotives, Main Reservoir, Brake Pipe & Brake Cylinder pressures are not monitored if the locomotive Start/Stop (ECS) switch is in the ISOLATE position.

On distributed power trains, the remote(s) must be left in the Isolate Mode to prevent the remote(s) from trying to maintain brake pipe pressure.

**Warning:** It is important to ensure that locomotives and/or trains are properly secured and tested, as it is expected that M/R, B/P and B/C pressures will eventually leak off.

If air is required to be maintained on the train, the Start/Stop (ECS) switch may be left in the RUN position. The Stop / Start system will still operate, however the main reservoir pressure will prompt a restart of the locomotive

**20.7 IMPORTANT – Stopped on a descending or ascending grade?**

GE locomotives with operational AESS will shutdown 10 to 30 minutes after loading and other locomotives may shutdown after 20 minutes.

You may not be aware that a trailing or remote locomotive has been automatically shutdown.

To begin auto re-start of the locomotives

- ensure Generator Field is ON
- select Forward or Reverse

Before releasing the brakes and attempting to move the train, wait 2 ½ minutes. It will take this long for the locomotive(s) to be re-started and then provide traction or dynamic brake.

If the procedures above do not restart the locomotive(s), secure the train, if locomotive brakes are insufficient to hold the train. Make an Emergency Brake application. This should cause the shut down locomotives / remotes to restart. Recover the brake as per Section 17 Item 17.0.

**21.0 Operating over Railway Crossings at Grade**

Before passing over Railway crossings at grade, the throttle must be reduced to No. 4 position or lower at least eight seconds before reaching the crossing. If speed is less than 25 MPH and throttle is in No. 4 position or lower, the throttle must be reduced one position, adhering to the same eight second interval. This procedure is necessary, to ensure reduction of motor and generator voltage to a safe level, to prevent damage to electrical equipment from flashovers.

**Note:** This instruction does not apply to AC traction motor equipped locomotives.

**22.0 Operating Through Water**

Locomotives should not be operated through water of a depth of more than three inches above the rail. They may be operated through water if the depth is three inches or less above the top of the rail, but at a speed not exceeding three miles per hour. Should it be necessary for a locomotive to operate through water above rail level the following should be done:

- |          |  |
|----------|--|
| <b>1</b> | Place the throttle in idle and reduce the speed as quickly as possible.  |
| <b>2</b> | Place the generator field switch in OFF and advance throttle to notch 4 to increase the volume of air supplied by the traction motor blowers to prevent water from entering the traction motors. |

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3	After passing through the water, resume power with caution and watch for any abnormal operation. If locomotive operates normally (no ground relay, etc), it may be considered safe to proceed.
4	If the motors are flooded, power should not be reapplied.
5	Whether water has affected the motors or not, the occurrence must be reported to the CLS and noted on the Crew to Crew Form.

**23.0 Rail Diesel Cars (RDC)**

Refer to VIA Rail operating instructions in regard to troubleshooting RDC.

**24.0 Locomotive Load Meter**

**Note:** AC traction locomotives are not subject to short time ratings or traction motor stall burn.

**24.1 Short Time Ratings**

1	Unless the locomotive is isolated, Locomotive Engineers should observe the load meter, but particularly so when under slow speed full throttle conditions.	
2	If the load meter enters the short time current rating, or if an AC locomotive is controlling in a consist with DC locomotives trailing, the rating table must not be exceeded in order to avoid traction motor damage.	
	Speed	Rating
	11 MPH	continuous
	10.5 MPH	60 minutes
	10 MPH	30 minutes
	9 MPH	15 minutes
	8 MPH	10 minutes
	5 MPH	5 minutes

**24.2** If the load meter enters the short time current rating, to avoid traction motor damage, the short time rating must not be exceeded.

**24.3** It should be understood that the different short time rating zones are not to be considered as consecutive ratings.

For example: The locomotive must not under any circumstances be operated at the ¼ hr rating for ¼ hr, then at the ½ hr rating for ½ hr, then at the 1 hr rating for 1 hr.

**24.4** If operating in the short time rating zone, but the load is then reduced such that the load meter falls below the short time rating zone for less than 20 minutes, and then the pointer re-enters the short time rating zone, the time operating in

the short time rating zones must be added together. Do not exceed the time indicated by the most restrictive zone reached by the load meter.

**24.5** Should it appear that the short time rating will be exceeded, the RTC must be advised and the train crew shall take the necessary corrective action by either,

**A** - Stopping the movement and cooling the traction motors for 20 minutes by centering the reverser, place the GF switch OFF and advance the throttle to No. 4 position, or

**B** - stopping the movement and either reducing or doubling the grade.

**24.6** In addition, to avoid traction motor damage, DO NOT power up the locomotive to hold a train at a stand still on a grade OR allow the locomotive to stand without movement for more than 10 seconds after the throttle is opened.

**25.0 Locomotive Speed Indicators**

**25.1** Locomotive engineers must verify that speed indicators are in working order when leaving a shop track.

**25.2** The speed indicator must be checked for accuracy, as soon as possible after leaving a terminal. This check must be made before reaching maximum speed and again after maximum speed is reached, and thereafter as often as may be required. When speed indicator inaccuracy is observed, speed must be adjusted accordingly and the exception noted on a Crew to Crew Form.

**25.3** In the event the speed indicator on a controlling locomotive fails enroute, the locomotive engineer will advise the RTC accordingly. Arrangements will be made so that the controlling locomotive leaving the next scheduled crew change location will have an operative speed indicator.

**26.0 Locomotive Event Recorders & Cameras**

**26.1** Locomotive Event Recorders are installed to record the following data:

Locomotive number	Time/Date
Speed	Distance and Direction
Acceleration / Deceleration	RSC system operation
Throttle position	Dynamic Brake position
Tractive Effort	Wheel Slip
Brake pipe pressure	Brake cylinder pressure
End of train (EOT) messages	End of train pressure
Equalizing Reservoir	Independent Bail
Horn	Bell
Headlight Operation	Ditchlight Operation
RSC override operation	RSC system failure
Locomotive overspeed	ECP Messages (if equipped)
Emergency Brake Application – Lead Loco	
Emergency Brake Application – Train Initiated	
Additional engine/locomotive diagnostic data	
Other miscellaneous operational data (Manufacturer provided)	

**26.2** The data will be monitored to provide information in a minimum of the following areas:

- Rule compliance/speed control
- Train handling/fuel conservation
- Training/qualification standards
- Accident/incident analysis
- Litigation/claims and legal
- Identifying mechanical problems.

**26.3 Locomotive Video Camera Systems.**

A number of CP and Foreign locomotives have been equipped with forward facing on board video camera systems, designed to capture images from crossing accidents and incidents that may occur.

In addition to the camera, a microphone is positioned underneath the cab in the airbrake compartment to capture the sound of the horn, bell and air brakes. Crew conversations are not audible.

The Locomotive Camera System switch (LCS), must be "On" at all times, except for a system malfunction or authorized by the Director NMC. Any practice or action which otherwise interferes with the normal and proper functioning of this equipment will be considered tampering with a safety device and will be subject to discipline or dismissal.

Note: Crews must ensure that the camera's view is unobstructed at all times.

**27.0 Pumping Air**

If main reservoir pressure cannot be maintained 15 psi above feed or regulating valve setting at low engine speed, air compressor output can be increased by:

- 1 Place reverser handle in NEUTRAL.
- 2 Place generator field switch OFF.
- 3 Advance throttle to not exceed No. 4.

**NOTE:** On GE & SD90MAC locomotives, leave the throttle in IDLE.

**28.0 Response to Alarms**

**28.1 Continuous Wheel Slip/Pinion Slip Indication**

If wheel slip and/or pinion slip indicator and accompanying ALARM indicates slipping, even though throttle or dynamic braking are reduced enough to prevent slipping:

- 1 **STOP MOVEMENT IMMEDIATELY.**
- 2 Check locomotive wheels while moving slowly to see that all wheels are rotating freely.
- 3 If all wheels are rotating freely, a traction motor pinion may have loosened. Contact the Central Locomotive Specialist and be governed by their instructions. Inform RTC of train delay.
- 4 If no loose pinion is detected and the locomotive is equipped with a traction motor cut-out switch, cut out the motors in sequence until the wheel slip indicator stops.  
The locomotive can now be worked unless special instructions specify otherwise.
- 5 If a locked pair of wheels is found the locomotive must not be moved further, until instructions are received from the Central Locomotive Specialist.

**28.2 Response to Locomotive Alarm Indications**

**IF** the locomotive alarm is sounding and/or being displayed, the cause of the alarm must be investigated as soon as practical. If the cause of the alarm cannot be determined, the alarm indication may indicate pinion or wheel slip problems and must be handled as per item 28.1.

**Note:** Before SILENCING continuous alarms by cutting out traction motors or ISOLATING a locomotive when the cause cannot be determined, it must be known that:

- 1 All wheels are rotating freely, and
- 2 There is no evidence of overheating or disintegration of rotating electrical equipment.

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**28.3 VIA Rail Locomotives - Hot Box and Bearing Alarms**

**The Warning Light Panel** on some VIA locomotives indicates faults for the controlling and trailing locomotives as well as certain cars. Warning lights are labelled and coloured (RED & YELLOW). Whenever a VIA Rail locomotive (lead or trailing) is operated on CP lines:

- |          |   |
|----------|---|
| <b>1</b> | If a Journal or Suspension BEARING FAILURE alarm lights <b>red</b> or if a Journal or Suspension BEARING ALERT alarm lights <b>yellow</b> , then the train must be stopped immediately. |
| <b>2</b> | Contact the Central Locomotive Specialist and be governed by their instructions.  |

**28.4 Locked Axle Protection GE AC Locomotives - Conventional or Distr Pwr Operation**

**Traction Motor Cut-Out Switch**

If one or more traction motors are manually or automatically **CUT-OUT** but their speed sensors are all **CUT-IN**, then the locomotive may continue to operate in the lead or remote consist. Even if **ISOLATED**, it may remain in mid-train location.

**Locked Axle Cut-Out Switch**

This switch may be placed in the **CUT-OUT** position only when advised to do so by the Central Locomotive Specialist.

The **Locked Axle Cut-Out Switch** is used only when the **Speed Sensor Cut-Out Switch** does not suppress a locked axle alarm. This switch will disable the operation of the alarm bell for a false locked axle alarm. Protection for locked axles is still provided through the **Wheel Slip** light.

The locked axle trainline alarm bell will operate even if the locomotive is isolated, except when the **Locked Axle Cut-Out Switch** is in the **CUT-OUT** position.

If the **Locked Axle Cut-Out Switch** is in the **CUT-OUT** position on a remote locomotive, and the locomotive is **ISOLATED**, it must as soon as practicable, be re-marshalled to the lead consist to enable crew observation.

**Speed Sensor Cut-Out Switch**

This switch may be placed in the **CUT-OUT** position only when advised to do so by the Central Locomotive Specialist.

This switch is used to cut-out a faulty traction motor speed sensor, but the corresponding traction motor **MUST** be cut-out as well.

**Speed Sensor Failure**

All GE AC locomotives have software that automatically monitors traction motor (TM) rotation when the locomotive is in RUN and all TMs are cut-in.

If a speed sensor fails, the DID panel will display "Fault Message Stored" or "Ready" and the locomotive monitor will display a calculated speed for the affected TM. The affected motor will continue to power and a locked axle fault will be logged. At this point, no special actions are required by the locomotive engineer.

If the locomotive is subsequently isolated, and if the locomotive is moving above 8 MPH, the usual locked axle alarm bell will immediately sound, the DID panel will display "Locked axle no. \_\_\_" and the **Cont'd**.....locomotive monitor will display 0.0 MPH for the affected TM.

If moving at less than 8 MPH, a wheel slide fault will log instead of a locked axle.

Immediately stop and check locomotive wheel rotation as per 28.1 paragraphs 1 and 2.

If it has been confirmed that all wheels are rotating freely, and if the locomotive is operated in RUN and all TMs are cut in, then the locomotive does not need to have the TM or speed sensor cut out and can continue to operate at track speed. However, if any TM is cut out, or if the locomotive is **ISOLATED**, or if the speed sensor is cut-out then the defective locomotive may be moved to a maintenance facility at a speed not exceeding 30 MPH, marshalled in lead consist to enable close observation. The locomotive engineer must update the Crew to Crew Form accordingly.

**28.5 Locked Axle Protection EMD SD90MAC Locomotives - Conventional or Distr Pwr Operation.**

**Traction Motor - Truck/Inverter Cut-Out**

SD90MAC locomotives do not have individual traction motor cut-outs and there is no mechanical cut-out switch as on other locomotives. SD90MAC locomotives do not have automatic traction motor (truck) cut-out. A fault in a motor or in an inverter requires the entire truck to be cut-out.

**Caution:** Cut-out a truck only when the throttle is in **IDLE**.

A fault will cause the display of a fault message and a prompt to press the F3 key on the crew message screen. Pressing F3 causes the Traction Cut-out screen to appear. Select the faulted truck and then press F3 to cut-out (disable) that truck. Exit the Traction Cut-out screen. After a short delay, the message screen will show the truck cut-out.

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If only a truck is cut-out but all axle speed sensors are still cut-in (e.g. locked axle detection status for all axles is shown as enabled), then the locomotive may continue to operate in the lead or remote consist. Even if ISOLATED, the locomotive may remain in mid-train location.

**Locked Axle Detection Status**

There is a Locked Axle Status screen available from the main menu on the message display screen. Normal cut-in status is shown as ENABLED (locked axle detection is enabled). An axle that does not have locked axle protection (due to a possible faulty or cut-out speed sensor) will be shown as DISABLED.

**Speed Sensor Cut-out**

**Caution:** Cutting-out (disabling) a speed sensor must only be done when advised to do so by the Central Locomotive Specialist and after following instructions in item 28.2.

Cutting-out a faulty speed sensor is achieved by selecting the appropriate axle and pressing the disable key on the Locked Axle Detection screen. A disabled speed sensor does not require the corresponding truck to be cut-out.

If a speed sensor is cut-out (disabled) on a remote locomotive, the locomotive must be re-marshalled to the lead consist to enable crew observation.

The locked axle trainline alarm bell will operate even if the locomotive is isolated providing all speed sensors are cut-in (enabled).

If a truck is cut-out and the speed sensor on that truck is also cut-out (disabled) because of wheel slip or locked axle alarms, the locomotive can continue to operate at track speed (this differs from GE AC4400 locomotives).

**28.6 Dummy Wheelsets**

A defective traction motor assembly is sometimes removed and replaced with a temporary dummy wheelset. The locomotive engineer will be advised of the repair made and if there are any speed restrictions. In most cases, a locomotive can be towed at track speed with dummy wheelsets, depending on mechanical services specifications. The defective locomotive must be isolated and marshalled in the lead consist to enable close observation. The Crew to Crew Form must be updated accordingly.

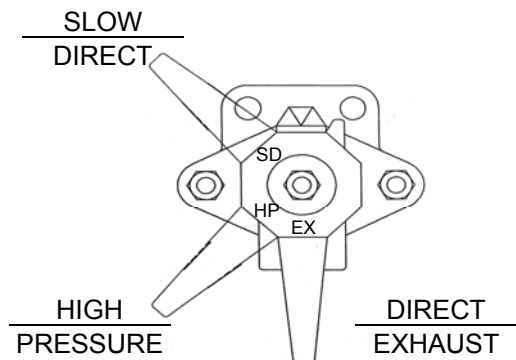
**29.0 Car Equipment Instructions**

- 29.1** Unless in regular passenger train service, cars with UC (Universal Control) type brake equipment are normally set to be hauled in freight trains. If on occasion they are to be hauled in a passenger train, it is only necessary to cut in the supplementary or emergency reservoir if so equipped.
- 29.2** When passenger cars equipped with D-22 or 26-F control valves are handled in freight trains, the graduated release cap on the control valve must be turned to the direct release position.

**29.3 Use of retaining valves**

- A** Retaining valves must be used on at least 50% of the cars on freight trains on descending grades of 2% or over if the tonnage is in excess of full haulage capacity for the ascending grade for the locomotives on which the dynamic brake is in effective operating condition, unless the train is controlled with a pressure maintaining brake valve.
- B** Retaining valves must be used on any downgrade where in the judgment of the locomotive engineer their use is considered necessary. Handles should be placed in high pressure position on loaded cars and in slow direct position on empty cars. Please refer to items 14.2 and 14.3.
- C** Retaining valve positions
  - EX - Direct Exhaust; air from brake cylinder will exhaust directly to atmosphere.
  - SD - Slow Direct; air from brake cylinder will SLOWLY exhaust DIRECTLY to atmosphere.
  - HP - High Pressure; air from brake cylinder will exhaust to atmosphere, retaining 20 psi in the brake cylinder.

**NOTE:** Some retainers have a low pressure position which will retain 10 psi in the brake cylinder.



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**29.4** Prior to coupling brake pipe hoses between equipment, employees must ensure that the hoses are either blown free of foreign matter (dirt or snow) or in the case of an uncharged system, the hoses must be shaken to ensure such foreign matter is removed.

**30.0 Work Equipment and Snow Plows - Connecting Air**

**Snowplows, spreaders, air dumps or other work equipment requiring a supplementary source of air, must be connected to the locomotive main reservoir equalizing pipe.**

**31.0 Overcharged Conditions**

**31.1** When a train's air brake system is charged to a pressure higher than the prescribed standard for that train, the overcharge will be maintained to the train's destination, providing the brake pipe pressure is not higher than 110 psi.

**31.2** An overcharged air brake system occurs when the storage reservoirs on the locomotive and/or cars are charged to a value higher than the feed or regulating valve setting on the controlling locomotive. This is indicated by the air brakes being applied on the train or portion thereof, when the automatic brake handle is in the RELEASE position on the controlling locomotive.

**31.3** To eliminate an overcharge on a car or block of cars:

<b>A</b>	Close the angle cock between the locomotive and the overcharged car(s).
<b>B</b>	Bleed the reservoirs on the overcharged car(s).
<b>C</b>	Cut the air in on the car(s).

**31.4** To eliminate an overcharge on a train:

<b>A</b>	protect against undesired train movement.
<b>B</b>	place the automatic brake handle in RELEASE position.
<b>C</b>	using the feed/regulating valve, ensure equalizing reservoir pressure is adjusted to the required pressure.
<b>D</b>	place the automatic brake handle in EMERGENCY position. Wait at least 2 mins before recharging the train air brake system.
<b>E</b>	a pull-by inspection must always be made to ensure the overcharge has been eliminated.
<b>F</b>	repeat the above procedure if the pull-by inspection reveals the overcharge has not been eliminated.

**31.5** An overcharged brake system is most likely to occur in the following situations:

<b>A</b>	When adding one or more cars with an overcharged condition to a train.
<b>B</b>	When attaching locomotive to the opposite end of a train.
<b>C</b>	When changing the locomotive.
<b>D</b>	When picking up cars that were set off of a train operating with higher brake pipe pressure.

**32.0 GE AC Locomotives - Special Instructions**

**32.1 4000/4400 Power Limit Switch.**

At speeds less than 15 MPH, the Power Switch on GE AC locomotives can be used to reduce HP on the locomotive. The reduction in HP only applies to the locomotive where the switch has been set to the reduced or 4000 HP position, it is not trainlined to other locomotives in the consist.

The HP boost system will automatically reduce the HP to 4000 when GE AC locomotives reach 25 MPH or greater and will not regain 4400 HP until speed is less than 15 MPH.

**32.2 Distributed Power Circuit Breaker.**

This circuit breaker on the engine control panel must be placed in the OFF position unless required for Distr Pwr operation. A non-recoverable emergency brake application will result if this instruction is not complied with.

**33.0 Fire Season and Prevention - Locomotive Exhaust**

**33.1** Some locomotives have a tendency to discharge sparks (carbon deposits or unburned oil) from the exhaust stack, especially if they have been idling for extended periods of time (6 to 8 hours). The following guidelines will assist in preventing fires during seasons when there is high risk of starting fires along the right of way.

**33.2** Actions which will help reduce sparks:

After departure from a location where locomotives may have been idling for 6 to 8 hours, it is beneficial to advance the throttle to notch 5 for at least ten (10) minutes before working the locomotives under heavy load. Extra care is required near open top bulk sulphur trains.

While operating under load, if spark emissions do occur, decrease throttle to reduce the distance that such sparks may be thrown. This will also help reduce the size and heat content of the sparks.

Enroute, to minimize sparks due to stack emissions and automatic brake applications;

- if the locomotives have been "drifting" in IDLE or operated in low throttle positions for several miles, it is beneficial to advance the throttle slowly, one notch at a time.
- use dynamic brake. It should be considered the primary choice of retardation, and
- use contour braking/throttle modulation by allowing the natural resistance of grade, curvature and friction to slow the train.

**33.3** Whenever possible, if a locomotive is suspected of starting fires, it must be shut down to prevent further damage to right of way or adjacent areas. Report accordingly on the Crew to Crew Form and notify the Central Locomotive Specialist.

**33.4** Train Crews should be particularly alert to detect any evidence of excessive spark emission from locomotives or the train. Your cooperation in the prevention of fires along the right of way is essential.

**33.5** Due to the danger of fires being ignited on the right of way, when yard locomotives are moved on freight trains, they must be moved dead or isolated to their destination. CP locomotives in 1200, 1500, 1600, 6700 and 8100 series will be shut down or isolated at origin (by the Mechanical Department where available) and must not be restarted or operated by train crews enroute.

**34.0 Broken Drawbar - Locomotive Towing Cable Safety**

**34.1** When using locomotive 7/8" tow cables to move equipment (including multi-platform cars), do not exceed the following maximums:

Car Weight	Maximum Ascending Grade
331 to 400 tons	Level to 0.7 percent
261 to 330 tons	0.7 to 1.0 percent
211 to 260 tons	1.0 to 1.5 percent
181 to 210 tons	1.5 to 2.0 percent
156 to 180 tons	2.0 to 2.5 percent
Nil to 155 tons	2.5 to 3.0 percent
Not permitted	Over 3.0 percent

**Example:** you may tow a 5 platform car whose weight is between 331 to 400 tons up a grade which is .7 percent maximum. If the grade is steeper, be governed by item 34.4 below.

**34.2 SAFETY PRECAUTIONS**

**WARNING!** Tow cable may snap. DO NOT stand within striking distance of a tow cable when pulling.

Do not attempt to tow a car with any cable less than 7/8" diameter.

Do NOT attempt to tow more than one car except multi-platform cars when required as per 34.1.

Cable must be carefully inspected for surface defects (such as nicks or gouges) which will drastically reduce safe load limit; do NOT use defective cables.

Avoid pinching the cable while pulling as this will also reduce the safe load limit.

When possible, an employee should be in position to operate the hand brake on a car being towed unless doing so will place this employee in vicinity of tow cable

When possible, apply a light hand brake to the car being towed to avoid slack action that will cause shock loading of the cable and may result in cable failure.

**34.3 Tow cable connections:**

Do NOT connect a tow cable to an axle.

Do NOT connect a tow cable to a truck sideframe.

DO connect a tow cable securely to the center of a car (e.g., at center sill near broken drawbar/knuckle location); if this is not possible, be governed by item 34.4 below.

**34.4** When there is doubt about the safe movement of any car with a locomotive tow cable, arrangements must be made to:

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- have another locomotive couple onto and move the car from the other end, or
- have mechanical services employees deployed to assist and supervise movement of the defective car.

**34.5** After a locomotive cable has been used to tow a car, please report on the Crew to Crew form and advise the Central Locomotive Specialist. This is so arrangements can be made for a locomotive service facility to inspect the cable and if damaged, replace it.

**34.6 IMPORTANT:** Find and remove the broken drawbar (and related debris) from the track. If this removal cannot be safely accomplished because of the size and weight of a drawbar, request help from mechanical services or other employees in the area.

**35.0 AC Locomotive Electronic Display Screen Failure**

SD90MAC and GE AC locomotives have two electronic display screens on the control stand. Should one or both screens fail enroute, the following will apply:

**35.1** If one display screen fails, the locomotive may continue in service.

**35.2 Complete Screen Failure (Both Screens)**

If both display screens have failed completely or display asterisks (\*\*\*) instead of air pressure readings, the problem may be due to one of the following conditions:

<b>1</b>	Display screen may lose communication with the electronic brake valve. This results in a PENALTY brake application which is non-recoverable unless communication is restored.
<b>2</b>	If locomotive speed is 0 MPH, the computer is programmed to perform a periodic "self diagnostic check" during which air pressure readings will be replaced with asterisks (***). When the self test is complete normal air pressure readings should return.

Trouble shooting procedure:

Ensure train is stopped, because the following steps will also cause a penalty brake application.

<b>1</b>	ON GE locomotives, reset (switch OFF, then ON) the ELECTRONIC AIR BRAKE & BATTERY CHARGE/COMPUTER circuit breaker.	ON EMD locomotives, reset (switch OFF, then ON) the AIR BRAKE COMPUTER & CAB/DISPLAY COMPUTER circuit breaker.
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**Cont'd.....**This will put the computers through a self check and should reactivate the screens to display all air pressure functions.

<b>2</b>	If step 1) was successful, recover penalty PCS, perform a Continuity test and proceed.
<b>3</b>	<p>If step 1) was not successful, a replacement lead locomotive is required. If the train has to be moved in order to exchange locomotives, it will be necessary to operate the brakes and controls from a trailing locomotive. Change operating cabs as follows:</p> <ul style="list-style-type: none"> <li>• if required, apply hand brakes to ensure train is protected from unintended movement</li> <li>• to ensure brake pipe pressure is 0 psi throughout the train, place automatic brake valve handle in EMERGENCY and activate TIBS emergency braking feature</li> <li>• on the defective locomotive, turn the air brake computer circuit breaker OFF; this will automatically configure the defective locomotive's automatic and independent brakes for trailing mode; set up all other controls for TRAILING (as per item 15.1).</li> <li>• set up the controls on one of the trailing locomotives for LEAD (as per item 15.2).</li> <li>• if equipped, enter the SBU # into the EOT setup screen or TIBS display unit and perform a pre-departure test of TIBS as per GOI Section 6, item 16.2</li> <li>• perform a locomotive brake test and a Continuity brake test</li> <li>• the train may proceed at a speed not exceeding 25 mph to the first available point where the defective locomotive can be set-off or re-marshalled to a trailing position.</li> </ul> <p><b>Note:</b> If there is no available trailing locomotive, do not move the train. Wait for another locomotive.</p>

**35.3** On Locotrol IV Equipped Trains, if the Locotrol console is not affected, then Locotrol console air pressure displays for UNIT A (controlling locomotive) may be used, instead of operating from a trailing locomotive.

**35.4** When reporting screen defects, please report with as much detail as possible what the failure mode was (e.g., screen went completely blank, or screen momentarily re-booted etc.). Quite often the display screens seem to be working properly when locomotive arrives at the diesel shop tracks.

**36.0 Snowblaster Operations – If equipped**

The snowblaster uses compressed air from the Main Reservoir to clean snow off the railhead. The intention is to prevent train stalls when operating through snow (or other poor rail conditions such as rain etc.) on ascending grades.

The device will be mounted near each lead axle sand bracket on the front of the locomotive.

GE AC4400 & ES4400	EMD SD90MAC's
<b>Activation:</b>	
A manual electrical switch (toggle) and label will be mounted on the EC panel or operators screen. This will activate or disable the snowblaster.	A separate switch on the control console (labelled "Snow Remover") will activate the snowblaster.
<b>Automatic Operation:</b>	
It will be triggered by the lead axle sand pushbutton providing certain conditions are met (e.g., locomotive speed below 12 mph, tractive effort, engine RPM, no bell and no horn), main reservoir pressure greater than 125 psi.	The EMD snowblaster will automatically operate when the snow removal switch is "ON" and certain other conditions are met (no bell, main reservoir pressure greater than 120 psi, sand application).
<b>Manual Operation:</b>	
Below 12 MPH the GE & EMD snowblaster can be manually activated by pressing the "lead axle sand" push-button. <b>Note:</b> when operating under 12 MPH in full throttle conditions, when rail conditions are poor account snow or rain, the lead axle sand push-button must be used.	
<b>Additional Information:</b>	
A manual shut-off valve will be located below deck (on the locomotive engineer's side in front of the fuel tank) that will allow manual shut-off of air flow to the device. The shut-off valve is identified with a tag labeled "Snow Remover." There is also a decal on the side sill that says "Rail Cleaning C/O Cock."	At any speed, by cycling the snow removal switch ON-OFF-ON, the snowblaster will manually operate for a period of 60 seconds. This feature is useful when approaching snow-covered rails, or wet rails where loss of traction is anticipated.
<b>CAUTION:</b> Use of the device may result in reduced visibility near ground level account blowing snow or debris. When employees are entraining or detraining, or when other persons are standing on or near the track, the Snowblaster should not be manually activated by pressing the lead axle sand switch or cycling the "snow removal" switch (SD 90's).	

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**APPENDIX 1: INSTRUCTIONS FOR CALCULATION OF HAULAGE CAPACITY**

1. Determine the class and number of locomotives to be operated on the train. Add together the haulage ratings for all of the locomotives in the locomotive consist as shown in table 1. If a locomotive has traction motors cut out, refer to table 2 to determine what percentage of normal haulage rating to use for that locomotive.
2. Refer in time table to subdivision over which the train is to be operated and multiply the sum obtained in (1) above by the lowest haulage capacity factor between the applicable stations on the subdivision. Note that haulage capacity factors for controlling grades on a subdivision are underlined.
3. The number obtained in (2) above is the haulage capacity, in tons, of the locomotive consist on the subdivision over which the train is to be operated. This tonnage may be exceeded by one percent if by doing so another car can be taken. Any reduction in this tonnage must be authorized by the Operations Manager, NMC.

**TABLE 1 LOCOMOTIVE HAULAGE RATINGS**

CLASS	HAULAGE RATING	
DS-15-17 (Note 1)	1000	
DRS-17	1000	
DRS-20/24 Mother/Daughter	2000	
DRS-20 DRS-30 abcde	1000	
DRS-20 QEG equipped	1200	1300 (Note 2)
DRF-30	1500	
DRF-30 PTC or QEG Equipped	1710	1790 (Note 3)
DRF-38 (SD60)	2000	
DRF-44 (AC 4400)	2220	2950 (Note 2)
DRF-43 (SD90MAC)	2220	2950 (Note 2)

Table Notes:

1. Must not be used in multiple with any other class of locomotive.
2. Applies only if all locomotives in consist are QEG or PTC equipped, and/or if they are DRF-38, DRF-44, DRF-43 and DRF-60.
3. Applies only to Bulk or Uniform trains (see Section 7, item 2.3).

**Note:** All other Classes of Locomotives, including VIA Locomotives used in Freight Service, will be handled and rated at the direction of the NMC.

**TABLE 2 HAULAGE RATING REDUCTIONS IF TRACTION MOTORS CUT OUT (Also see Section 7 Appendix 3)**

Type of Locomotive	Number of Traction Motors Cut out	Reduce Haulage Rating by
All GMD 4-axle locomotives	1	50%
	2	100%
All GMD 6 axle locomotives with DC traction motors	2	34%
	More than 2	100%
DRF-44 (AC 4400)	1	17%
	2	34%
	3	50%
	More than 3	100%
DRF-43 (SD90MAC)	3	50%
	6	100%

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**APPENDIX 2: Preferred Marshalling Examples: (applicable to items 5.3 and 7.4)**

**Preferred Marshalling Examples: (applicable to items 5.3 and 7.4)**

Lead Locomotive Consist			Loaded Buffer Cars 45t/<65ft		Unit	Loaded Buffer Cars 45t/<65ft		Unit	Loaded Buffer Cars 45t/<65ft		Trailing Train
AC	GP	AC	Car	Car	GP	Car	Car	GP	Car	Car.....	trailing train
AC	GP	AC	Car	Car	GP	Car	Car.....				trailing train
AC	GP		Car	Car	GP	Car	Car.....				trailing train
AC	GP		Car	Car.....							trailing train
AC	GP	AC	.....(no buffer cars required).....								trailing train

**Note:** GP's are any locomotive(s), (Switcher (SW) or General Purpose (GP)) in the series listed in item 5.1 or any locomotive that cannot be handled in the controlling locomotive consist. AC can be either AC or DC locomotives and the total number is not limited by these examples, provided that, the operating locomotives have coupler alignment control. Also, these examples do not limit the possibility of having other cars between the lead consist and the loaded buffer cars or between buffer cars that are required on either side of a GP or other locomotive.