

*Section 6*

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TIBS Instructions

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**1.0 Trains Operating With Train Information Braking Systems (TIBS)**

**1.1** The TIBS is composed of either two or three separate units as follows:

**Note:** When the term “display unit” is used in these instructions, it refers to CLU, IDU, CDU, IFD, ICE or FIRE

**1.2 Sense and Braking Unit (SBU)**

The SBU senses brake pipe pressure, motion and direction and transmits this information to the head-end of the train. The SBU is equipped with either a red reflectorized plaque or a highly visible marker (HVM).

**Note:** Further references in this section to the HVM do not apply unless the SBU is so equipped.

**In addition,** the SBU is equipped with an emergency braking feature.

**1.3 Communications Logic Unit (CLU)**

A device located in the short hood of the locomotive which accepts, analyzes and forwards information for display in the cab of the locomotive.

**1.4 Input and Display Unit (IDU)**

The IDU provides audible alerts and displays to the locomotive engineer.

**1.5 Communications Display Unit (CDU)**

The CDU accepts, analyzes and displays information relevant to the rear of the train. The CDU provides audible alerts and displays to the locomotive engineer.

**1.6 Integrated Function Display (IFD), Integrated Cab Electronics (ICE) and Functionally Integrated Railroad Electronics (FIRE)**

The IFD is the menu driven operator’s screen on GE AC locomotives; ICE or FIRE are the operator’s screen on SD90MAC locomotives.

IFD, ICE and FIRE accept and display information relevant to the rear of the train.

**1.7 Procedure to Disconnect Head-End Display Unit**

When necessary to disconnect the display unit, place the radio circuit breaker in the OFF position and then disconnect the twist lock connector.

Once the twist lock connector is removed, it is to be placed in the dummy receptacle (where provided) and the display unit keyed to indicate the test ID code of 00000.

**Note:** To disconnect the display unit on 9000 series locomotives, the circuit breaker marked ETU is to be placed and remain in the OFF position.

**1.8 Disarming SBU (TIBS) and set SBU code to 80000**

After the locomotives are cut-off from a train which has arrived at its terminating location, the locomotive engineer must disarm the TIBS emergency feature as follows:

<b>A</b>	<b>On a GE ACs...</b>
	press <b>EOT Setup, Request Disarm and Disarm Two-Way</b> . Set display unit to SBU code <b>80000</b> and press <b>Enter Code</b> .
<b>B</b>	<b>On EMD SD90MACs...</b>
	press <b>EOT IDENT, EOT 00000, and UNARM TWO WAY</b> . Set display unit to SBU code <b>80000</b> and press <b>ENTER IDENT</b> .
<b>C</b>	<b>On EMD SD90MAC (Fire Screen)...</b>
	press <b>EOT ID, EOT 00000, and UNARM TWO WAY</b> . Set display unit to SBU code <b>80000</b> and press <b>ENTER ID</b> .
<b>D</b>	<b>On a DC traction locomotives...</b>
	with IDU+CLU or CDU, set the display unit to SBU test code <b>00000</b> and press the <b>COMM/ARM</b> button to disarm the SBU. Set display unit to SBU code <b>80000</b> .

**2.0 TIBS ARMING FEATURE**

2.1 ARMING of TIBS is to be performed as follows:

1	Enter the ID Code of the SBU assigned to the train into the display unit, e.g. 80801.
2	During pre-departure testing, when the test button on the SBU is pressed, the display unit will sound an audible alert and display "ARM NOW" for five seconds.
3	To ARM the display unit, the COMM TEST button must be pressed within the five second interval in which the "ARM NOW" display is shown. This will cause the display unit to indicate "ARMED."
4	<p>The COMM TEST button must not be pressed until the display indicates "ARM NOW." Pressing the button in advance of this display will cause the following:</p> <p><b>A</b> - an audible alarm will sound and the display will flash "NOT ARMED." Locomotives equipped with an IFD display "EOT EMERG STATUS DISABLED";</p> <p><b>B</b> - the display will revert to normal, with the exception that "U" will be displayed in the COMM field, or the NOT ARMED indicator will be illuminated, as a reminder that the display unit is not armed. Locomotives equipped with an IFD continue to display "EOT EMERG STATUS DISABLED."</p>

2.2 Once TIBS is armed, if the display unit ID code is changed from that to which the system is armed, the display or light will flash NOT ARMD. After a brief period the system will revert to normal display accompanied by "U" or "NOT ARMED" light as a reminder that the display unit is not armed to the ID code entered therein. Locomotives equipped with an IFD will display "EOT EMERG STATUS DISABLED."

**2.3 IFD Arming Procedure**

<b>A</b>	<p>There are <b>two</b> varieties of IFD.</p> <p>Check EOT Status window. If it displays "Armed" you must disarm it before arming to a new SBU ID (See Disarm Procedure). If it does not display "Armed," continue with the arming process.</p> <p>Select "EOT Setup" Screen</p> <p><b>CP GE Locomotives</b></p> <ul style="list-style-type: none"> <li>The last, current or 80000 EOT Code is displayed,</li> <li>Use Arrow keys to enter new EOT Code.</li> <li>Press F6 'Enter Code.'</li> </ul> <p><b>CP GE EVO Locomotives 8700 to 8899</b></p> <ul style="list-style-type: none"> <li>Press F3 'Modify ID Code'.</li> <li>Use 0-9 keys to enter new EOT code.</li> <li>Press F7 'Accept'.</li> </ul> <p><b>Note:</b> On all CP GE AC's, the % battery used indicator is not functional. It will show *** or an incorrect percentage.</p>
<b>B</b>	<p><b>Arming Procedure continued...</b></p> <ul style="list-style-type: none"> <li>Personnel at end of train is instructed to press button on the SBU.</li> <li>EOT Status flashes "Arm Now." F7 flashes 'Arm Two Way.'</li> <li><b>Press F7 immediately.</b> You have only 3 seconds to do this.</li> <li>If successful, EOT Status window reads 'Armed.'</li> <li>'Rear' indicates air pressure at end of train.</li> </ul> <p><b>Note:</b> The EOT Comm Test window does not update when armed and so may indicate 'failed.' You must press the Comm Test button to get the corrected indication.</p>
<b>C</b>	<p><b>Disarm Procedure ...</b></p> <p><b>CP Locomotives 9500 to 9582 Only</b></p> <ul style="list-style-type: none"> <li>Press F8 'Exit', then F3 'EOT setup'.</li> <li>Press F6 'Request Disarm'</li> <li>Press F7 'Disarm 2-Way'.</li> <li>EOT Status displays 'Not Armed'</li> </ul>

**2.4 TIBS Arming for EMD (SD90MAC) ICE and FIRE Screen**

For arming procedures refer to the job aids on RailCity or the Internet.

**3.0 Operation and Displays of Sense and Braking Unit (SBU)**

**3.1 SBU Model 6651**

Operation	
<b>A</b>	The SBU self-activates when brake pipe pressure rises to 10 psi. When the pressure is less than 5 psi for a period of 5 minutes the SBU will automatically shut down to conserve the battery.
<b>B</b>	A viewing window on the SBU allows employees to view the brake pipe pressure display for a period of 5 seconds, any time the test button is pressed.
<b>C</b>	Pressing the test button initializes the arming feature.
<b>D</b>	Indications which the SBU is capable of displaying and their meanings are as follows:
	<b>1 JXX</b> (e.g.: 1 J20) indicates normal power up sequence.
	<b>ROM</b> Indicates that the SBU has detected an internal fault and must be removed for servicing.
	<b>075</b> Indicates normal pressure display of 75 psi.
	<b>99%</b> Any number preceding the % symbol indicates the timed battery charge remaining. If the percentage falls below 50% the batteries must be changed out.
	<b>W50%</b> Indicates the battery is weak and has approximately 12 hours of operating life remaining.
	<b>R40%</b> Indicates imminent battery failure and that the battery may not last until the next regular scheduled change-out point.
	<b>A20%</b> Indicates that the battery has failed and that the SBU will not transmit.
	<b>Note:</b> If displays other than those listed above appear, the SBU must be removed for servicing.
<b>E</b>	Use of the test button after initial power up, will result in pressure and timed battery charge displays only.
<b>Note:</b> Regardless of the percentage of timed battery charge remaining, the batteries must be changed out at any time the display indicates "W," "R" or "A." Each time a battery is first installed, the display will indicate "99%" as it is based on time and not on voltage. It is possible to have a "W99%" display in which case the batteries must be changed out.	

**3.2 SBU Model 6695**

Test Button Operation	
<b>Note:</b> The test button must be pressed and held until the display shows the feature desired.	
<b>Menu Items ...</b>	
<b>1 - PRESSURE</b>	
Releasing the test button when the word "PRESSURE" appears allows you to read the brake pipe pressure.	
<b>2 - ARM</b>	
ARMING: Releasing the test button when the word "ARM" appears will start the "ARMING" sequence.	
<b>3 - TEST</b>	
Releasing the test button when the word "TEST" appears will start a self test. The SBU display will scroll the following items during the test.	
Display	Definition
<b>CANADIAN PACIFIC RAILWAY DIGITAIR REV 5</b>	Indicates equipment owner and software version.
<b>BATTERY OK##</b>	Indicates the batteries are OK and have between 39% and 99% of the charge remaining.
<b>BATTERY LO##</b>	Indicates the batteries are low and have between 12% and 39% of the charge remaining. When LO is displayed, both batteries must be changed.
<b>BATTERY WEAK</b>	Indicates the batteries are less than 12% and must be replaced.
<b>BATTERY REPLACE</b>	Indicates the time the battery is expected to operate has been exhausted and batteries must be changed.
<b>SELF TEST GOOD</b>	Indicates the SBU is functioning properly. If not displayed or an error message is displayed, the unit must be removed for servicing.
<b>PRESSURE P ###</b>	Indicates the brake pipe pressure (where ### is the pressure). <b>HVM will flash for 30 seconds.</b>

<b>4 - PHOTOCELL</b>
Releasing the test button when the word "PHOTOCELL" appears allows you to test the HVM operation. Pressing the test button again ends the test.
<b>5 - LITE</b>
Releasing the test button when the word "LITE" appears will activate a feature where the HVM will continue to flash with no air pressure and light present. THIS FEATURE IS NOT USED ON CP. If selected by mistake, lay the SBU gently on its side to deactivate.
During pre-installation and testing of the Model 6695 at other than major terminals, at locations not equipped with an air supply and/or test CLU/IDU, the following pre-installation tests must be performed to verify the SBU is operating as intended: <b>A</b> - Install fully charged batteries. <b>B</b> - Depress the test button and release when the display indicates "TEST" and observe the test procedure. <b>C</b> - Ensure the display indicates "Self Test Good" and does not indicate "Battery LO##," "Battery WEAK##," or "Battery REPLACE."
Enhanced train consists will indicate when a train is equipped with a Model 6695 SBU.

**3.3** SBUs in the ID number series CPT-85318 to CPT-85368 and CPT-85806 to CPT-85813 are stencilled with "NOT PERMITTED OFF LINE" on the side frame panel. These SBUs are NOT to be used on trains or transfers going to foreign carriers. This restriction does not apply to trains temporarily detoured over foreign railways due to track closures.

**4.0 Operation of Highly Visible Marker (HVM)**

The OFF/ON status of the HVM is indicated on the display unit in the locomotive cab.

**4.1 Manual HVM Light Test**

To perform a manual test on the HVM, the SBU must first be powered up. During daylight hours, to activate the light, cover the photo-electric cell. This test will only be performed at the location where the SBU is initially installed on the train.

**4.2 Automatic HVM Light Test**

The HVM will self test when a train has been standing for at least 30 seconds, and then starts moving. During daylight hours, a marker light ON indication will appear briefly on the display unit. During darkness, the photo-electric cell will keep the HVM activated continuously. Failure to operate as described above will indicate either of the following problems:

- A** - If the marker light ON indication does not appear with first movement, the HVM may be defective.
- B** - If the replace battery indication is displayed, the batteries may be too weak to turn the light on.

**5.0 Operation of IDU**

**5.1 POWER ON SEQUENCE**

When the power is first applied, a series of self-diagnostic tests will cause displays as follows: DIGITAIR, 6650 J20, and \*\*\*\* \*\*

**5.2** All characters will remain displayed until receipt of a message bearing the same ID code.

**5.3** The buttons on the IDU labelled **C** and **D** have no application on CP. The button marked **P** is used to adjust the brightness of the display panel.

**5.4** In addition to continuously displaying information relevant to the rear of the train, the IDU provides audible warnings for: LOW PRESSUE, NO AIR, LOSS OF COMUNICATION, BATTER STATUS, FAILURE OF THE EMERGENCY VALVE, HVM STATUS CHANGES and ARMING STATUS.

**6.0 Operation of Model 6656 CDU**

- 6.1 Operation of the CDU is similar to that of the IDU.
- 6.2 The CDU is provided with a **VIEW** Key and a **SET** Key.

<b>VIEW</b> Key:	Used to select available functions.
<b>SET</b> Key:	Used to set parameters of functions selected with the <b>VIEW</b> key.
When <b>ID</b> function is selected:	Pressing the <b>SET</b> key once will activate SET ID mode and enable entry of a new ID code.
When <b>SET</b> key a second time:	It will cause the CDU to store the new ID and the alphanumeric display will indicate <b>STORING</b> .

6.3 Functions which may be selected with the **VIEW** key are:

- VOLUME
- LAMPTEST
- BLANK
- return to previous stored ID code

6.4 Using the **SET** Key

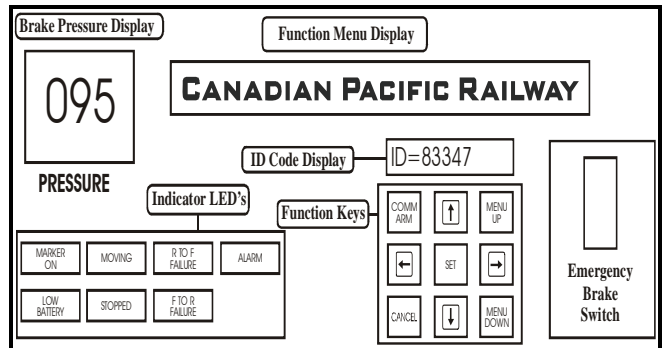
Used in **SET ID** mode:

- a flashing digit is displayed in leftmost position of the Numeric Display;
- the **ODOM** Key and **DIM** Key take on the arrow functions;
- to change the value on the Numeric Display, use the Arrow Keys [**→←**] or [**↑↓**] to select and change the digit(s);
- when the desired ID code has been entered, press the **SET** Key again to store it.
- to cancel, or return to original ID code selection, press **VIEW** key. **CANCEL** will be displayed accompanied by an audible tone.
- Used to adjust volume of the **SONALERT** audible tone. Each press of the **SET** Key will change the volume.
- Used in **LAMPTEST** mode: Verifies operation of all Front Panel Display LEDs.
- Used in **BLANK** mode: Extinguishes all displays except pressure.

6.5 Using the **DIM** Key adjusts brightness of the Front Panel Display LEDs.

6.6 It is essential that the ID code entered into the display unit matches that of the SBU installed on the train, thereby preventing display of erroneous information.

**7.0 Operation of Model 6696 CDU**



7.1 Functions which may be selected with "MENU UP" or "MENU DOWN" are:

- Change ID
- Change train length
- Odometer
- TL Distance
- Measured mile
- Disarm
- Change loudness
- Change brightness
- Self test

**7.2 Changing ID Code**

1 To change the ID code:	Press the <b>MENU UP</b> or <b>MENU DOWN</b> key until the function menu display reads "change ID #####". The ID code is changed by using the [ <b>→</b> ] or [ <b>←</b> ] keys to select digits to be modified. The current active digit flashes. Use the [ <b>↑</b> ] or [ <b>↓</b> ] keys to increment or decrement the selected active digit.
2 Once the ID code has been selected:	Press the <b>SET</b> key to store the new ID code.
3 Function menu display will read:	"Saving..." followed by "Press <b>SET</b> to change to One-Way" followed by "New ID #####" Do not press <b>SET</b> while is displaying "Press SET to change One-Way". This will time-out after 2 seconds. <b>Note:</b> The one-way option has been disabled. If a CDU is found that still has this menu choice available, please tag it bad order with a note describing the problem.

<p>4 The alarm indicator will flash ON accompanied by 5 beeps from the sonalert and "ID Code Display" will show:</p>	<p>"ID = #####" alternating with "NOT ARMED".</p>
<p>5 The locomotive engineer then alerts the employee at the rear of the train via voice radio to proceed with arming.</p>	<p>The employee at the rear of the train momentarily presses the <b>TEST</b> button on the SBU.</p>
<p>6 When the CDU receives the request to arm message, it prompts the locomotive engineer for a response. The function menu display reads:</p>	<p>"PRESS COMM/ARM TO ARM" for five seconds accompanied by beeps from the sonalert.</p>
<p>7 If the locomotive engineer presses the <b>SET</b> key during the 5 second window, the system will arm and the CDU will then briefly display:</p>	<p>"SYSTEM IS NOW ARMED" The NOT ARMD alarm indication will turn off.</p>
<p>8 If the <b>SET</b> key is not pressed during the 5 second window, or if the SBU doesn't respond as described above, the function menu display will briefly show:</p>	<p>"ARMING FAILED".  <u>In this case, the process must be repeated from Step 5 above.</u></p>

**7.3 Entering the Train Length**

<p>1 To view the current train length or enter a new one.</p>	<p>Press the <b>MENU UP</b> or <b>MENU DOWN</b> key until the function menu display reads: "Change train length ##### ft"</p>
<p>2 Use the [→] or [←] key to select the digit(s) to be modified. Use the [↑] or [↓] to increment or decrement the selected active digit.</p>	
<p>3 Once the desired train length has been selected:</p>	<p>Press the <b>SET</b> key to store the new value.</p>

**7.4 Using the Train Length Distance Function**

<p>1 To use the Train Length Function:</p>	<p>Press the <b>MENU UP</b> or <b>MENU DOWN</b> key until the function menu display reads: "TL Distance press <b>SET</b>".  As the lead locomotive passes the initial starting point, press <b>SET</b> and the displayed length will decrement accordingly. The display will always indicate the distance to go before the end of the train is clear of the point to be passed.</p>
<p>2 Press <b>CANCEL</b> key to reset the train distance function.</p>	

**7.5 Measuring Distance Travelled Using the Odometer**

<p>1 To use the Odometer:</p>	<p>Press the <b>MENU UP</b> or <b>MENU DOWN</b> key until the function menu display reads: "Odometer press <b>SET</b>".</p>
<p>2 To measure distance:</p>	<p>Press the <b>SET</b> key. The function menu display reads: "Odometer 00000 ft".  The 5-digit count is initially set to zero and, as train moves, it begins to count the distance.</p>
<p>3 Press the <b>CANCEL</b> key to reset the odometer function.</p>	

**7.6 Calibrating the Odometer Using a Measured Mile**

Calibration of the Odometer is used to compensate for locomotive wheel wear and differences in wheel diameter from one locomotive to another. The allowable range of locomotive wheel diameters is 34.00 inches through 46.00 inches. The CDU default is 38.1 inches.

<p><b>1</b> To calibrate using a measured mile:</p>	<p>Press the <b>MENU UP</b> or <b>MENU DOWN</b> key until the function menu display reads: "Measured Mile press <b>SET</b>".</p> <p>When the zero mile marker is passed:</p> <p>Press the <b>SET</b> key to begin the measurement. The function menu display reads: "Press <b>SET</b> at End of Mile ##### ft".</p>
<p><b>2</b> When the one mile marker is reached:</p>	<p>Press the <b>SET</b> key a second time to mark the end of the mile and to calculate the new wheel size.</p>
<p><b>3</b> If the measurement is such that the calculated wheel size falls within the permitted range, the calibration passes and the sonalert will beep once to indicate that the measurement is completed.</p>	<p>For example: If the function menu display reads: "4954 ft, corrected to 5280 ft".</p>
<p><b>4</b> However, if the measurement is such that the calculated wheel size falls outside of the permitted range, the calibration fails, the sonalert will beep once, and the</p>	<p>Function menu display reads: Measured Mile FAILED".</p>

**7.7 Change Display Panel Brightness**  
Using menu item "Change Brightness" adjust the display brightness using [ **↑** ] or [ **↓** ] keys, accept setting with the **SET** key.

**7.8 Change Loudness Sonalert**  
Using menu item "Change Loudness" adjust the beep loudness using [ **↑** ] or [ **↓** ] keys, accept setting with the **SET** key.

**8.0 ATX – Air Turbine SBU**

**8.1 Wabtec TrainLink® ATX (CPT3xxxx series) START-UP/SHUTDOWN**



The *TrainLink*® ATX ...is equipped with an air turbine generator that operates over a pressure range of about 50 to 125 psi\*. It will operate in the same environmental conditions as a standard EOT (SBU).

They also have a built-in battery for backup purposes when the air supply is cut off, which can keep the SBU operating for up to 12 hours on full charge.

□\*Note: The *TrainLink*® ATX (Air Turbine) EOTs (SBUs) should not be routinely operated at pressures greater than 100 psi, since this may significantly shorten the projected lifespan of the unit.

Air must be applied to the EOT (SBU) for startup. When air is present on the EOT (SBU), the alternator supplies electrical power and charges the back-up battery.

**Note:** Upon power up of the ATX SBU, the read out information is different than the existing equipment.

The *TRAINLINK*® ATX will scroll through the following displays on each button press:

- "WRE" Wabtec Railway Electronics.
- "EOT" and then "ATX" are displayed.
- "VERS" X.XX where X.XX is the EOT (SBU) software version.
- "PSI" where XX is the brake pipe pressure.
- "VGEN" where XX is the Air Generator voltage.
- "V" where XX.X is the battery voltage.
- "IBAT" where X.XX is charging current or "NIBA" where X.XX battery sourcing current.

To shutdown the ATX EOT press and hold the test button for 3-5 seconds (pressure must be zero for this feature to be active). The unit will also shutdown automatically when tilted horizontally for 5 minutes.



## 8.2 Arming the LCU (IDU) in the TrainLink® System

Arming and pre-departure procedures will be identical to present battery powered EOT (SBU) Operations (see item 2.0).

## 8.3 Disarming the LCU (IDU) in the TrainLink® System

Follow those instructions as outlined in Item 1.8 for various locomotive disarming sequences.

## 8.4 Wabtec ATX Operation in Winter

In normal operating conditions the ATX SBUs can recharge their backup battery, however the battery's recharging capability diminishes as the temperature drops further below freezing and at extreme cold temperatures below -15C (5F) the SBU will not be able to recharge its backup battery.

It is important that in freezing temperatures below -10C (14F) ATX SBUs are not operated for an extended duration when *the air supply is cut off*, otherwise this would deplete the backup battery and generate "low battery" alarms. The ATX SBU must then be sent to a Radio Shop or Car Shop for recharging on the ATX chargers.

In horizontal or tilted position ATX SBUs shut down automatically in 5 minutes without air pressure. In upright position attached to a car's coupler -- but with no air supply -- it will **not** shut down automatically, it will continue to operate until the backup battery is depleted.

Therefore, **in cold temperatures below -10C (14F) do not let ATX SBUs on the coupler operate for more than an hour when the air supply is cut off. The ATX SBU must be shut down manually** by holding the TEST button for 5 seconds. The SBU will turn on automatically when the air pressure resumes.

## 9.0 Motion Detector System

### 9.1 Motion Displays

The display unit will indicate the initial direction of movement with either a small arrow or a light. Forward direction is indicated by a light or by an arrow pointing towards the right of the display unit. Indication of motion/direction will be replaced with a double arrow <> or a light, indicating continuous motion. When the train is stationary, this is indicated by a light or two horizontal bars - - in the motion field.

On locomotives equipped with an IFD, possible indications are FWD, REV, and STOP."

#### Model 6696 CDU

The display unit will indicate the initial direction of movement with message "FORWARD" or "REVERSE" on "ID Code Display." The message will flash for 10 seconds, then continues steadily for another 10 seconds. The "MOVING" status light will be lit.

## 10.0 Emergency Braking Feature

To activate the emergency braking feature, lift the red safety cover located on the right side of the display unit and move the EMERGENCY toggle switch upwards. This will cause the EMERGENCY VALVE of the SBU to which the system is ARMED to be activated.

## 11.0 Communications Test

If communications problems are suspected, continuity may be tested by pressing the COMM TEST button. When the button is pressed a "+" or "reply pending light" will appear briefly. Disappearance of either of these indications verifies continuity of communications. Locomotives equipped with an IFD will display COMM TEST PASSED.

If the "+" symbol, or "reply pending light" remain displayed, the COMM TEST button must be pressed three times in rapid succession. If this fails to overcome the problem the train should be moved one train length and the test repeated.

#### Model 6696 CDU

If communications problems are suspected, continuity may be tested by pressing the "COMM ARM" button. When the button is pressed a "WAITING FOR REPLY" message is briefly displayed on the "Function Menu Display," followed with brief message "COMM TEST OK."

If the "Function Menu Display" reads "**COMM TEST FAILED**" for 2 seconds, the "COMM ARM" button must be pressed three times in rapid succession. If this fails to overcome the problem the train should be moved one train length and the test repeated.

**Note:** A manual COMM TEST must be performed at run through locations to verify TIBS is operating as intended.

**12.0 Alarms**

**12.1** The display unit automatically detects and displays alarms accompanied by an audible alarm for the following conditions:

- Rear-to-Front Communications Failure
- Front-to-Rear Communications Failure

**Note:** After a brief interval, the display will revert to normal pressure display, or accompanied by a; ← or F → R **NO COMM**, and remain until continuity is restored.

- EMERGENCY Valve Circuit Failure

**Note:** The display will then revert to displaying normal readings, accompanied by either a V or a steady VALV FAIL light.

**If any VALV FAIL alarms are experienced, EMERGENCY BRAKING FEATURE must be considered inoperative. Employees will be governed by instructions included in item 19.0.**

- No air
- Telemetry battery weak
- Replace telemetry battery
- Replace HVM battery
- Low pressure
- Not armed
- Service, NO DATA or I/O ERR - Any one of these displays indicates that the display unit is faulty and requires servicing by qualified personnel.

**12.2** On locomotives equipped with an IFD, possible alarm displays are:

<b>1</b>	EOT COMM	Will light YELLOW when a condition of Front to Rear or Rear to Front communication failure exists; REAR pressure display will show <b>***(RED)</b> .
<b>2</b>	EOT EMERG STATUS DISABLED	Locomotive engineer take note, another alarm indicator may be lit.

<b>3</b>	EOT BATT	Will light yellow if SBU battery is weak. Will light red if SBU battery is dead; REAR pressure display will show <b>***(RED)</b> .
<b>4</b>	EOT VALVE	Will light yellow if SBU Valve Circuit fails; REAR pressure display will show <b>***(RED)</b> .
<b>5</b>	REAR	Last car pressure display WHITE if over 45 psi, last car pressure display RED if below 45 psi.

**13.0 Pre-Installation Testing of SBU at Major Terminals:**

**(Montreal, Toronto, Thunder Bay, Winnipeg, Calgary, Golden and Coquitlam)**

- A** - The SBU must be equipped with fully charged batteries and tested to ensure proper operation prior to installing on a train.
- B** - To facilitate testing, major terminals are equipped with an air supply and a test IDU/CLU set. This test equipment will be located in the same area as SBUs are stored.
- C** - Successful performance of the pre-departure tests as posted at storage locations, will be considered as verification that the SBU is operating as intended and may be installed on the train.

**14.0 Pre-installation Testing of SBU at Other Than Major Terminals**

At locations not equipped with an air source and/or a test CLU/IDU, the following pre-installation tests must be performed to verify the SBU is operating as intended prior to installing on a train.

- A** - Install fully charged batteries.
- B** - Depress the test button and observe the power up sequence of the SBU.
- C** - Ensure the display is not accompanied by "W," "R," "A" or "ROM."

**Note:** Successful performance of the above is verification that the SBU is operating as intended. The same series of tests, with exception of installing fully charged batteries, must be performed on the SBU when it arrives at the storage location.

**15.0 Installation of SBU**

When installing an SBU, ensure that the two urethane contact feet are firmly seated against the coupler casting and equally seated above and below the casting holes.

After firmly tightening the clamping screw handle, turn it to the vertical position, close the locking bracket and install a lock or hook.

Prior to making the gladhand coupling, open the rear angle cock slightly to remove any moisture or debris. Connect the SBU gladhand to the brake pipe hose of the rear car and fully open the angle cock.

**16.0 Pre-Departure Testing of TIBS**

**16.1** Pre-departure testing of TIBS will only be performed at the location where the components of TIBS are initially installed on the train. Once a pre-departure test of TIBS has been performed, such test will not be repeated unless one of the components has been changed out.

**16.2** Pre-departure testing of TIBS will be performed by train crews and/or other qualified personnel. At locations where this test is performed prior to the train crew coming on duty, the fact that the equipment has been tested shall be documented on the Train Brake Statue form and the crew must record this information on the Crew to Crew form. At locations where the crew performs the test, the crew must record this information on the Crew to Crew form (see example of form filled in).

Pre-departure test procedures for TIBS shall be conducted as follows: (Also see Item 21.0)	
<b>A</b>	The head-end crew or other qualified person, must enter the ID Code of the SBU assigned to that train into the display unit.
<b>B</b>	When the air pressure has been applied to the SBU it must be verified that pressure is shown on the display unit.
<b>C</b>	Depress the SBU test button and confirm that pressure is displayed in the viewing window.
<b>D</b>	As soon as the display unit indicates ARM NOW, the person performing the test shall depress the COMM TEST button or ARM 2-WAY switch and verify the display ARMED is given, indicating the display unit is authorized to the SBU assigned to that train.
<b>E</b>	Instruct person on the locomotive to perform a COMM TEST in accordance with item 11.0.

<b>F</b>	After the brake-pipe has been charged to not less than 48 psi., close the angle cock on the lead end of the rear car and verify that the display unit shows pressure.
	<b>Note:</b> It is acceptable to leave rear car angle cock open, but for next step <b>(G)</b> , verify emergency brake application propagates from SBU through to leading locomotive.
<b>G</b>	Instruct the person performing the test to activate the emergency feature and verify that the SBU initiates an emergency brake application on the rear car and that the display unit indicates 0 psi.
<b>H</b>	The EOT (SBU) pressure must remain at <b>0 PSI</b> for at least <b>30</b> seconds before the emergency valve will close and allow the EOT to recover. Failure to do this will result in a “ <b>VALVFAIL</b> ” message at the LCU (IDU). After creating the emergency brake application and all air is exhausted from the brake pipe, the solenoid valve on the SBU will reset (30 Seconds) and air may be reapplied. Open the angle cock on the rear car and confirm that the pressure is again being displayed on the display unit.
	<b>Note:</b> In the application of 3 point protection (minimum application), prior to the angle cock being opened, the engineer must reduce brake pipe pressure to 55 psi (equivalent of a 35 psi reduction) to prevent the possible release of the train brakes. <b>CAUTION:</b> If 3 point protection was applied in a state of false gradient, a undesired release may occur when the air is cut in.
<b>I</b>	Perform the required brake test.
<b>J</b>	At run-through points, pre-departure testing consisting of a COMM TEST, will be made by the outbound crew to verify TIBS is operating as intended.

**Example:**

Train	Lead Locomotive	Date	TIBS/TE Remote - Emergency Brake Feature
# 401-09	# CP 9510	25 / 12 / 03 DD MM YY	SBU/Remote# 88893 tested by Carman Jones (PLEASE PRINT) at 10:10 Toronto time location

**16.3 Pre-departure testing of TIBS on trains with Remote Locomotive on Extreme Rear of Train (If equipped).**

<b>A</b>	In the application of item 16.2, after the SBU is armed, <ul style="list-style-type: none"> <li>do NOT close the angle cock on lead end of the remote locomotive at rear of train</li> <li>the employee on the locomotive must ensure the Locotrol console indicates charging flow rates on the remote locomotive(s) is less than 30 cfm.</li> </ul>
<b>B</b>	When TIBS emergency feature is activated, the employee on the locomotive must ensure that: <ul style="list-style-type: none"> <li>the TIBS display and Locotrol console both indicate rear brake pipe pressure = 0 psi and that the PC alarm and BV OUT indicators are displayed for the remote locomotive(s), and</li> <li>that the emergency brake application propagates from the SBU through to the leading locomotive.</li> </ul>
<b>C</b>	Crew members must confirm with each other that the TIBS emergency feature worked as intended.
<b>D</b>	30 seconds after creating an emergency brake application, the solenoid valve on the SBU will reset; the TIBS test is complete.
<b>E</b>	Recover the emergency brake application on the train as per GOI Section 17, item 17.0.

**17.0 Installation of Display Unit**

During installation of the Display Unit, the radio circuit breaker must be placed in the OFF position until such time all power and antenna connections have been made.

**18.0 Shop Track Tests of Display Unit**

**18.1** It must be known that the display unit is operating as intended both upon arrival and departure from diesel shops. Test SBUs bearing the test ID code of 00000, are located in diesel shops at major terminals.

**Note:** On locomotives equipped with an IFD, do not attempt shop track 00000 test.

**18.2** To test the display unit, the following series of functions must be performed in the following order:

<b>A</b>	Enter the test ID Code 00000.
<b>B</b>	Place the radio circuit breaker in the OFF position.
<b>C</b>	Place the radio circuit breaker in the ON position.
<b>D</b>	Observe the following sequence of displays; <ul style="list-style-type: none"> <li>DIGITAIR</li> <li>6650 JXX (e.g.: J20)</li> <li>**** ** displayed with all screens lit (or three dashes - - - in the pressure field.)</li> </ul> <p><b>Note:</b> Prior to transmitting a COMM TEST command, if the Display Unit displays other than listed above, it is indication that another Display Unit is being tested. If this should occur, you must wait for the display to indicate NO AIR prior to transmitting a command from the equipment you are testing.</p>
<b>E</b>	Perform a COMM TEST which will cause the test SBU to be activated and transmit a series of displays and alarms.
<b>F</b>	Once the COMM TEST is initiated, observe the Display Unit, noting that displays and alarms appear in the following order: <ul style="list-style-type: none"> <li>ARMED</li> <li>pressure display of 125 psi and HVM light ON indication</li> <li>pressure display of 100 psi.</li> </ul>
<b>G</b>	The EMERGENCY BRAKING FEATURE must be activated immediately upon display of 100 psi. This will cause the following displays: <ul style="list-style-type: none"> <li>a * in the COMM Field and 100 psi. (or reply pending light and 100 psi.)</li> <li>LOW PRES</li> <li>0 psi Brake Pipe Pressure</li> <li>NO AIR</li> </ul> <p><b>Note:</b> Once the display of NO AIR is given, the display unit is to be considered operating as intended. When departing the shop track the ID CODE of the SBU assigned to that train must be entered.</p>

**18.3** On trains which originate at locations not equipped with test SBUs, the following test sequence must be performed, to confirm the Display Unit is operating as intended.

<b>A</b>	Set and ARM the display unit to ID Code 00000.
<b>B</b>	Place the radio circuit breaker in the OFF position.
<b>C</b>	Place the radio circuit breaker in the ON position.
<b>D</b>	Observe the following sequence of displays: <ul style="list-style-type: none"> <li>• DIGITAIR</li> <li>• 6650 JXX (e.g.: J20)</li> <li>• **** ** display with all screens lit (or three dashes - - - in the pressure field.)</li> </ul> <p><b>Note:</b> Once the locomotive(s) are on the train, the Display Unit must be ARMED in accordance with items 2.0 and 15.0. At run-through points, a COMM TEST must be performed to verify the TIBS is operating as intended.</p>

**19.0 Definitions & Operating Procedures in Event of TIBS Failure**

**19.1 Scheduled Crew Change Location**

**A train operating without a manned caboose must not depart a scheduled crew change location if:**

<b>A</b>	The display unit fails to display brake pipe pressure.
<b>B</b>	The emergency braking feature is inoperative.
<b>C</b>	The HVM is inoperative. (If so equipped)
<b>D</b>	The batteries are known to be weak.
<b>E</b>	The distance measuring device (DMD) is inoperative.

**19.2 Enroute**

**Note:** In this instruction, the words “inoperative enroute” or “TIBS fail” also include situations where an SBU falls off the rear car or is stolen and cannot be recovered or reinstalled.

If **TIBS** fails to display **BRAKE PIPE PRESSURE** and/or the **EMERGENCY BRAKING FEATURE** becomes inoperative enroute, trains **must** be governed as follows:

<b>A</b>	Should TIBS fail and the standard locomotive gauges and Air Flow Indicator indicate no loss of air pressure, the train may proceed at a speed not exceeding <b>25 MPH</b> until the equipment resumes normal operation or to the next regular crew change point.
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<b>B</b>	Should TIBS fail and the standard locomotive gauges and Air Flow Indicator indicate a loss of air pressure, the train crew is required to perform a Continuity Brake test. After completion of the Continuity test, the train may proceed at a speed not exceeding <b>25 MPH</b> until the equipment resumes normal operation or to the next regular crew change point.  <b>Note:</b> If a successful Continuity test cannot be performed, the train must not proceed except to clear the main track, until the TIBS is repaired, resumes normal operation or a Continuity test is successfully completed.  Such movements shall be made only after appropriate measures have been taken to ensure safety of movement and then only to the nearest location where the main track may be cleared.
<b>C</b>	Train crews must not pick up cars enroute while the display unit is failing to display brake pipe pressure.
<b>D</b>	<b>Do not</b> commence the descent of a mountain grade ( <b>greater than 1.8 percent</b> ).
<b>E</b>	<b>Do not</b> move from a stop on a mountain grade unless High Pressure Retainers are applied on at least 50 percent of the loaded cars.
<b>Note:</b> The intent of paragraphs (D) and (E) above are for those occasions when TIBS has failed. Paragraphs (D) and (E) do not apply at locations where it is normal to lose communication with the SBU.	

**19.3 For the purpose of Items 19.1 and 19.2, the EMERGENCY BRAKING FEATURE must be considered inoperative under the following circumstances:**

<b>A</b>	The display of “ <b>VALV FAIL</b> ” or a “ <b>V</b> ” in the valve field or the IFD displays EOT VALVE.
<b>B</b>	A successful COMM TEST cannot be performed in accordance with item 10.0.
<b>C</b>	The display unit indicates a Front to Rear communications failure or the IFD displays EOT COMM.
<b>D</b>	The display unit indicates NOT ARMED.
<b>E</b>	During pre-departure testing of TIBS (items 16.1 or 16.2), activation of TIBS emergency feature will not cause an emergency brake application on the rear car.
<b>Note:</b> If at <i>any time</i> during the trip the display unit indicates “ <b>VALV FAIL</b> ”, or a “ <b>V</b> ” in the valve field or the IFD displays “ <b>EOT VALVE</b> ”, movement is restricted to a speed not exceeding <b>25 MPH</b> until the SBU has been replaced or repaired.	

**19.4** Train crews must immediately notify the RTC of any equipment defects or damage. Conductors must complete Train Information Braking Systems-Exception Report (Form 1225) and turn same in with Form 125 and FAX TIBS exception report to 403 260-5841.

**19.5** In the event of a failure of the highly visible marker (HVM), the train will be operated to the next regular crew change location, and there be governed by the instruction outlined in item 19.1.

**20.0 Distance Measuring Device (DMD)**

**20.1** The DMD enables the head-end train crew to determine the location of the rear car of the train in relation to any given reference point at which the counter is activated.

**Note:** When entering the train length into the DMD, the actual train length must be used, except in non-signalled territory the 3% factor must be used. Should the train length change enroute, due to a pick-up or set-off, crews are responsible to ensure the train length entered into the DMD is adjusted accordingly and such information passed on to succeeding train crews.

**20.2** Signs marking out accurate measured miles, are erected on each side of each regular scheduled crew change location, to permit train crews on an outbound train to verify accuracy of the DMD. To verify calibration of the DMD, a crew member will activate the DMD at the designated start of the measured mile ("0" indication sign), and deactivate the DMD at the end of the measured mile ("1" indication sign). Any discrepancies noted in the calibration test must be compensated for by adjusting the train length entered.

**Note:** Should the DMD become inoperative at any time, the crew must use their discretion and travel extra distance to satisfy themselves the train has cleared any point of restriction and be governed by instructions in item 19.1.

**20.3 Using the Odometer portion of the CDU**

The ODOM key on SOO equipment controls the odometer feature.

The odometer count appears on the numeric display as the distance travelled in feet. The alphanumeric display indicates that the Odometer is active by displaying ODOMETER.

- The first press of the ODOM key resets it and activates the counter.
- The second press of the ODOM key freezes the count showing the total distance travelled in feet.
- The third press of the ODOM key clears the odometer count and reverts the CDU back to its previous mode (e.g., ID mode).

**21.0 Proper Protection Required**

**When Testing, Installing or Removing an SBU or an SBU Battery**

**Note:** This instruction applies to running trade employees or running trade supervisors.

**21.1** Equipment which is coupled to a locomotive:

IF YOU	
<b>1</b>	have personally notified the locomotive engineer of your intentions AND
<b>2</b>	have received confirmation that the locomotive engineer has provided <b>3 point protection</b> as follows: <ul style="list-style-type: none"> <li><b>A</b> - Fully applied locomotive brakes and if the air is cut in, made at least a minimum reduction.</li> <li><b>B</b> - Centered the reverser.</li> <li><b>C</b> - Opened the generator field switch.</li> </ul>
THEN YOU MAY	
<b>3</b>	install or remove the SBU or
<b>4</b>	install or remove the SBU batteries or
<b>5</b>	couple the train brake pipe hose to the SBU or
<b>6</b>	press the SBU test button, and Advise the locomotive engineer when you have completed work on the SBU and are safely in the clear.

**21.2** Equipment which is **NOT** coupled to a locomotive:

IF YOU	
1	have personally notified the yardmaster or other employee in charge and
2	have received confirmation that: <ul style="list-style-type: none"> <li>• no movement will occur on or into that particular track</li> </ul>
THEN YOU MAY	
3	install or remove the SBU or
4	install or remove the SBU batteries or
5	couple the train brake pipe hose to the SBU or
6	press the SBU test button, and Advise the supervisor or other employee in charge when you have completed work on the SBU and are safely in the clear.

**21.3 Caution**

<b>CAUTION</b>	<p>In the application of items 21.1 and 21.2, the employee requesting protection must:</p> <ul style="list-style-type: none"> <li>• check for other movements on the track on which he is working,</li> <li>• insure that those movements (if any) are stopped, and if necessary,</li> <li>• secure with a sufficient number of hand brakes to prevent movement.</li> </ul>
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**22.0 Transportation (Deadheading) of SBUs**

**21.1** The following applies to the transportation (deadheading) of SBUs on trains, between terminals on CP property.

**Note:** This does not apply to normal handling while in terminals/yards or local operations.

Numerous CP locomotives are equipped with special SBU brackets for the purpose of transporting SBUs.

- **Transportation of SBUs anywhere in the car body / cab of a locomotive is prohibited** (except in the SBU holder/bracket).
- SBUs must **not be interchanged or sent offline in these holder/brackets** on CP locomotives.

**Note:** For the purpose of this instruction, trains operating in directional run zones on CN track are not considered as interchanged or offline.

SBU Bracket on a GE Locomotive



6

**End of Train Setup for TIBS EMD Fire Screen**

	Action	Result is
<b>LEFT SCREEN</b>		
1	Ensure left screen displays menu with <b>EOT ID</b> option.	
2	Press <b>EOT ID</b> .	<b>End of train identification</b> menu displayed.
3	Press <b>CHANGE EOT ID</b>	
4	Enter SBU # by pressing the keys below the spaces or existing digits.	
5	Press <b>ENTER</b>	IDENT updated on <b>Right</b> Screen.
6	Press <b>COMM TEST</b>	<b>"Comm Test Passed"</b> indicates test successful.
	<i>SBU Test button pressed by another employee.</i>	"ARM EOT" key is displayed.
7	Press <b>ARM EOT</b> within <b>2-5 seconds</b> after the key displayed.	"EM Enabled" is displayed on <b>Right</b> screen.
8	Press <b>EXIT</b> .	Returns to Main Menu.
9	Comply with remainder of, item 16.2 ( steps <b>F</b> through <b>J</b> ).	

**End of Train Setup for TIBS GE ACs**

	Action	Result is
<b>LEFT SCREEN</b>		
1	Ensure left screen displays operational menu with <b>EOT ID</b> option.	
2	Press <b>EOT ID</b> .	<b>EOT keys displayed..</b>
3	Enter SBU # by pressing the keys below the spaces or existing digits.	
4	Press <b>ENTER IDENT</b>	IDENT updated on <b>Right</b> Screen.
	<i>SBU Test button pressed by another employee.</i>	"ARM EOT" key is displayed.
5	Press <b>COMM TEST</b>	<b>"Comm Test Passed"</b> indicates test successful.
6	Press <b>ARM EOT</b> within <b>2-5 seconds</b> after the key displayed.	"EM Enabled" is displayed on <b>Right</b> screen.
7	Press <b>EXIT</b> .	Returns to Operational Menu.
8	Comply with remainder of, item 16.2 (steps <b>F</b> through <b>J</b> ).	