

Defect Reporting

Any failure of the system, during initialization or en route, must be reported to the Manager Emerging Locomotive Technologies (MELT) for the territory. MELT contact information can be found in Division specific General Notice.

Initialize New Trip

1. Press **Trip Optimizer** key.
2. Press **New Trip** key.
3. Press **Yes** key.
4. Review trip information displayed and if correct, press **Accept Trip** key.
5. Confirm by pressing **Yes** key.
6. If trip information is incorrect, press **Reject Trip** key.

Train Setup Verification

1. Compare locomotive and train information displayed with train documentation received. If correct, press the **Accept** key.
2. Confirm by pressing the **Yes** key.

If Locomotive or Train edits are required, they can be accomplished as follows:

Change Locomotives

Change Locomotives allows a locomotive to be added, removed, or repositioned.

Remove Locomotive: To remove a locomotive, highlight that locomotive and press the **Remove Locomotive** key.

Add Locomotive: Enter the initials and number of the added locomotive. The default power mode of an added locomotive is Isolated. The default position of the added locomotive is 0. A new position must be entered to save changes to the locomotive consist.

To change the position of any locomotive, highlight that locomotive and use the **number keys** to enter the correct position.

Note: On DP trains, it is critical that the position of the remote consist is accurately reflected on the Train Setup screen. Location is determined by line number, not Loads/Empties. Verify positioning and edit if necessary.

When all edits are complete, press the **Accept** key. Train length and axle count will automatically be adjusted in the Train Data.

Change Power Mode

The **Change Power Mode** screen indicates the running status of each locomotive for the TO system. Power Modes are: **DB Only**, **Running** (power and DB cut in), **Isolated** and **DB Cutout**.

Use the **Down Arrow** and **Up Arrow** to highlight the desired locomotive, then press the appropriate key to change power mode.

When all changes are complete, press the **Accept** key to save changes and return to Train Setup.

The **Cancel** key discards all changes and returns to Train Setup.

Change Train Data

The **Change Train Data** screen allows editing of:

- Railcars/Loads/Empties/Tons/Length/Axles
- Maximum train speed

Use the **Up** and **Down** arrows to navigate between items in the train data list. Number keys are used to enter new values for any given train data element. When all train data edits are complete, press the **Accept** key and TOB will automatically recalculate if necessary.

Note: Accurate train data is critical to system performance. When changes are entered, ensure ALL necessary fields are edited, including maximum train speed. Inaccurate information can lead to poor system performance.

Verify Restrictions

Form A and B restriction information will be displayed once the **Train Setup** has been accepted. Compare the restrictions displayed with the train documents received. Use the **Page Down** and **Page Up** keys if more than one page of restrictions have been received. It is only necessary to verify restrictions for the subdivision(s) the train will actually traverse. Restriction information for subdivisions the train will not traverse may be accepted without verification.

1. If all restrictions are correct, press the **Accept** key. (Otherwise, press the **Reject** key and exit.)
2. Press **Yes** key to confirm.
3. Press **Start Trip** key.

At this point, Initialization and required validations are complete. Trip Optimizer will now transition to the running screen.

Track Selection

Once Initialization is complete, the rolling map will appear and the system will prompt for current track. Select the appropriate track to continue. When a train is initialized on other than main track, the appropriate track may not be listed. Select the main track option that the train will occupy upon entering the main.

Engaging Auto Control

When train speed is above 12 mph, the **Auto Control Available** message is displayed. When operating conditions are favorable, **Auto Control** may be engaged as follows:

1. Press **Auto Control** key.
2. Within 30 seconds, move the throttle handle to N8.
3. **Auto Control Active** message will display and the auto notch box appears below the throttle box.

Favorable operating conditions are defined as:

1. Entire train is on a main track.
2. Proceed authority:
 - a. Signaled Territory more favorable than approach medium indication.*
*See auto thru divergence section
 - b. TWC Territory – valid track warrant >2 miles ahead of current location.

Note: TO is not currently designed for auto control use in extremely cold weather. At temperatures below 0° F, take manual control and be governed by ABTH 103.3.1.

Disengaging Auto Control

1. Move the throttle to match the Auto Notch position. This will immediately reinstate Manual Control.
OR
2. Press **Manual Control** key.
3. During the 30 second countdown, move the throttle to match the Auto Notch position as directed.

Manual Control Zones

Manual Control Zones (MCZ) are identified by a gray box on the rolling map display. TO provides a 60 second countdown as a train approaches a MCZ. For the first 30 seconds a message displays saying **Manual Control Ahead**. The message then changes to **Manual Needed Now** for second 30 seconds. While operating within the MCZ, the message changes to **Manual Control Only**. When the train has cleared the MCZ, the message will change to **Auto Control Available**.

Form B Restrictions

Form B Restrictions will be displayed and are designated as Manual Control Zones. Manual control is required from a point approximately 2 miles in advance of the Form B until the train reaches a point 1 train length beyond the Form B limits. Auto Control can then be re-engaged, if operating conditions are favorable.

Dynamic Braking

In Auto Control, TO will transition between power and dynamic braking as needed. To transition from Auto Control to manual control while in dynamic braking, move the throttle to idle and then move the DB handle to match the DB position displayed in the auto notch box. The blue **AUTO CONTROL ACTIVE** box will change to a white **AUTO CONTROL AVAILABLE** box.

To transition from manual control to Auto Control while in dynamic braking, press the **AUTO CONTROL** key, during the 30 second countdown place the DB handle in the off position and move the throttle handle to run eight. The white box **AUTO CONTROL AVAILABLE** box will change to the blue **AUTO CONTROL ACTIVE** box.

If a locomotive fault is present that will restrict the use of dynamic braking while in auto, a grey **NO AUTO DB** box will appear.

Underperforming Dynamic Brakes

TO uses dynamic braking effort when calculating airbrake use and timing. Any change in the ability of your consist to provide dynamic braking effort will affect the timing and accuracy of air brake prompts. Should you have an en route DB failure, at first opportunity, you must correct the consist information on the train make-up screen.

Note: Just as when operating without TO, engineers should remain vigilant for underperforming DB and be prepared to act accordingly.

Recoverability Re-plan

If operating in manual control and train speed has dropped below planned speed, then TO will calculate a recovery plan from the current speed back to the planned speed for when auto control is resumed.

Auto Through Divergence

When approaching a main track divergence, approximately 1500ft before the approach signal, TO will prompt **TRACK INFO NEEDED AHEAD**. If a diverging route is selected, **AUTO ACTIVE CALCULATING** will appear. Once the calculations are complete, the rolling map and plan will update to accommodate the diverging route. The prompt will then display **AUTO CONTROL ACTIVE**.

If the system calculates that it cannot complete the diverging route in auto, **TAKE MANUAL CONTROL NOW** will appear.

NOTE: Auto control may be maintained when the train is performing a “main to main” diverging move. Under these circumstances, TO can remain in auto control on a signal indication of approach limited, advance approach or approach medium into a diverging clear. Do not use auto control on any siding or other than main track.

Forced Idle

Under certain conditions, TO will force a step down of the throttle to IDLE.

In power:

1. If manual control is required and not taken prior to the expiration of the timer.
2. If train speed exceeds maximum authorized speed by 2 mph.
3. Certain TO failures and/or locomotive faults may initiate a forced idle.

Once a forced idle is initiated, the throttle handle must be moved all the way to IDLE to regain throttle control.

In dynamic braking:

1. Current dynamic braking level will be maintained instead of going to IDLE.
2. To regain DB manual control, the throttle must be moved to IDLE and the DB handle must be moved to match the DB position displayed in the auto notch box.

Air Brake Advisement

TO will now prompt for airbrake applications and releases. TO WILL NOT set or release air for the engineer.

Application:

TO will prompt split reductions up to 15 psi. When air may be required, a horizontal blue line will appear on the screen. When air is needed, TO will prompt **MIN SET AHEAD** with a 15 second countdown timer. At the end of the countdown, an audible alert will signal the ideal time for the application. If an application of greater than a minimum is required, a prompt will display **TARGET ER...xx**. If the requested Application is not performed within the 15 second countdown, TO will flash a prompt **MIN SET NEEDED NOW**, with an additional 15 second countdown. The requested application should be performed as soon as possible during the flashing countdown. When the requested application is performed the prompt will grey out. If the application is not performed before the flashing 15 second countdown ends, a prompt will appear **MANUAL CONTROL NEEDED NOW** and remove the air prompt from the screen.

An un-prompted reduction of a min set and one split reduction up to 10 psi can be made by the engineer and the system will remain in auto.

Release:

TO will prompt **RELEASE AHEAD** with a 15 second countdown. At the end of the countdown, an audible alert signals the optimal time to release. If the release is not performed during the 15 second countdown, a flashing **RELEASE NOW** prompt will appear. The release should be performed as soon as possible during the flashing countdown.

If air brake prompting is not available, a grey box will appear:

AIR ADVISEMENT NOT AVAILABLE.

Distributed Power Operation

On DP trains, when in auto, TO will **always** operate the lead and remote consists with the fence up. When a DP train has multiple DP consists, only one fence will be available. TO will place the fence between the lead and mid consist, and will run all remote consists as one. When transitioning from auto to manual, TO will **always** return control of the remote consist with the **fence up**. At this point, any changes to the DP consist must be made manually.

Isolated remote consist: When required to run a DP train with the remote consist isolated, TO must be set up as follows to allow auto control:

1. Physically isolate remote locomotives if required.
2. On the DP Control screen, the DP operating mode must be **RUN**.
3. Change the remote mode to **idle** for the remote consist.
4. Edit the TO power mode in for remote locomotives to reflect **‘isolated’** in the **Change Power Mode screen**.

In Route Work Events

To perform en route work, utilize the **Set Out Cars** and **Pick Up Cars** functions located on the **Train Setup screen**.

When entering Line #, count each **car number** (line number on your wheel report) as one car set out or picked up - regardless of the number of platforms, segments, control valves, etc.

When entering loads/empties, use the number of loads/empties as reported on your wheel report (multi-segment cars may count as more than one car). If train is DP, remote consist position(s) will update automatically once changes are accepted.

Set Out:

1. **From Line #:** Enter line number of the first car set out.
2. **To Line #:** Enter line number of the last car set out.
3. **Loads Removed:** Total number of loads set out.
4. **Empties Removed:** Total number of empties set out.
5. **Accept** changes.

Pick Up:

1. **Add After Line #:** Enter line number of the car (currently in your train) that the pickup will follow.
2. **Line #'s Added:** Enter number of cars added (total line numbers).
3. **Loads Added:** Total loads added.
4. **Empties Added:** Total empties added.
5. **Block Weight:** Enter total tons added.
6. **Block Length:** Enter total feet added.
7. **Accept** changes.

Ending Trip

1. Press the **End Trip** key.
2. Confirm by pressing the **YES** key.

Note: Trip Optimizer may automatically end your trip when it recognizes your arrival at a crew change point.



Locomotive TRIP OPTIMIZER

This document is a pocket reference outlining procedures relevant to the operation of Trip Optimizer on BNSF and does not supersede any BNSF rules or Special Instructions.

OVERVIEW

Trip Optimizer is a system that uses GPS to synchronize train location with track characteristics. When engaged, Trip Optimizer controls throttle and dynamic brake settings to maximize fuel and train handling efficiency.

SAFETY WARNING

Trip Optimizer is not a substitute for the engineers experience and good judgment. Safe operation of the train, and compliance with rules and special instructions, remains the engineer's first responsibility.

Trip Optimizer Guide Version 7