# DC DIGITAL COMMAND SYSTEM CONTROLLER
## OPERATOR'S MANUAL

M.T.H.'s DCS Commander provides the operator with access to a whole new level of sound and operating Proto-Sound® 2.0 and later features. Setup is simple; just insert a DCS Commander between the wires from your existing DCC system and the track and you're ready to switch back and forth between DCS and DCC with the push of a button. Or use the Commander alone with your own AC or DC power supply for an easy-to-use analog DC transformer/power pack, complete with digital voltage and amp meters! The DCS Commander offers intuitive control of multiple Proto-Sound® 2.0 and later engines; for each locomotive, nearly two dozen functions are available at the touch of a single, clearly-labeled button. In addition to the analog DC features, the DCS Commander unlocks a long list of Proto-Sound operating possibilities.

**PLEASE READ BEFORE USE AND SAVE**

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**CAUTION: ELECTRICALLY OPERATED PRODUCT:**
**Recommended for Ages 14 and up. Not recommended for children under 14 years of age without adult supervision. As with all electric products, precautions should be observed during handling and use to prevent electric shock.**

**WARNING:** When using electrical products, basic safety precautions should be observed, including the following:
Read this manual thoroughly before using this device.
- M.T.H. recommends that all users and persons supervising use examine the hobby transformer and other electronic equipment periodically for conditions that may result in the risk of fire, electric shock, or injury to persons, such as damage to the primary cord, plug blades, housing, output jacks or other parts. In the event such conditions exist, the train set should not be used until properly repaired.
- Do not operate your layout unattended. Obstructed accessories or stalled trains may overheat, resulting in damage to your layout.
- This train set is intended for indoor use. Do not use if water is present. Serious injury or fatality may result.
- Do not operate the hobby transformer with damaged cord, plug, switches, buttons or case.

This product may be protected by one or more of the following patents: 6,019,289; 6,280,278; 6,281,606; 6,291,263; 6,457,681; 6,491,263; 6,604,641; 6,619,594; 6,624,537; 6,655,640.

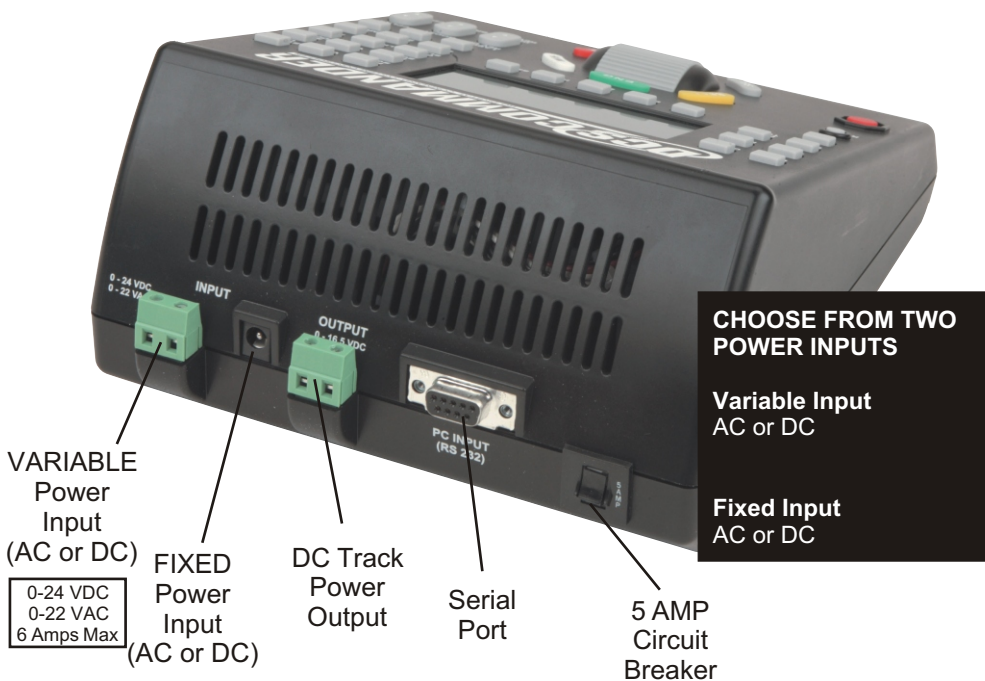©2009, M.T.H. Electric Trains®, Columbia, MD 21046

# Introduction

The DCS Commander is the easiest way to access the dozens of command control functions already programmed into your M.T.H. Proto-Sound® 2.0 or later locomotive. The Commander features clearly-labeled, one-button control of nearly two dozen engine functions; no function keys or special codes to remember.

Use the engine menu to select and control up to 10 different DCS engines from a single Commander - or switch back to DCC or analog DC operation with the push of a button.

# Installation

The commander works by plugging in your power supply to the appropriate Input connections on the back of the unit. Variable inputs (both AC and DC) can be used with any AC or DC transformer. Fixed inputs from enclosed power supplies (like the "brick" found in M.T.H. Z750 and Z1000 transformers) can also be used by plugging the brick's barrel connector into the Input barrel connector port.



**CHOOSE FROM TWO POWER INPUTS**

**Variable Input**
AC or DC

**Fixed Input**
AC or DC

VARIABLE
Power
Input
(AC or DC)

0-24 VDC
0-22 VAC
6 Amps Max

FIXED
Power
Input
(AC or DC)

DC Track
Power
Output

Serial
Port

5 AMP
Circuit
Breaker

# Required Tools

A flathead jeweler's screwdriver for wiring into the Variable Input and Output connectors.

# Quick Start Guide

This guide is to help you quickly and easily get your new MTH DCS Commander up and running. It is broken down into 3 sections: Analog DC, DCS, and DCC (Pass-Thru) operating modes. Simply refer to the operating mode you want and in less than 5 minutes you'll be up and running, enjoying your trains.

In DCS mode, the large LCD screen identifies your locomotive's number and provides readouts for scale speed and active features.

In conventional mode, the LCD provides track voltage, and amperage level read outs making the Commander a full featured DC controller. Adding a DCS Commander to your existing layout is simple: just insert it between the wires that connect your DC transformer or DCC system to the track. The Commander can accept any power input (AC, DC or DCC) and output analog DC with volt and current display. The Commander also acts as a passive conduit for your DCC signal whenever connected to a DCC system.  To switch back to DCS or conventional operation, press the DCS or CONV buttons respectively.

## Analog DC Mode

1.  Connect Input power from either an AC brick (Z1000) into the Input Coax Jack or an AC or DC transformer to the Input Variable Jacks on the back of the DCS Commander

2.  Connect the track to the Output Jacks

3.  Set your engine on the rails

4.  Power up the Commander by turning on the transformer.  The LCD should display the following
5.  Roll the thumbwheel up to the desired output voltage and your engine should come alive and start moving

6.  To change the direction of the engine, simply press the red DIR button. Your locomotive will slow to a stop and then begin moving in the opposite direction at the same speed they were previously running.



ARROW DENOTES DIRECTION CHANGE

7. To vary the speed of your engines roll the thumbwheel up or down to vary the track voltage applied to the rails

8. To stop the engines roll the thumbwheel down until the engines stop or to shut them completely down, roll the thumbwheel down so 0 volts is displayed.

# DCS Command Mode

1. Connect an AC or DC power source into the VARIABLE power input terminal or the FIXED power input jack on the back of the DCS Commander.
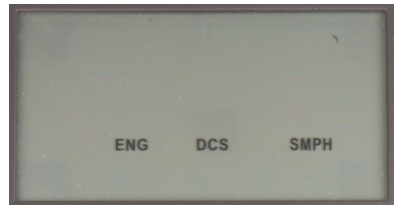
2. Connect the track to the Output Jack.

3. Set your Proto-Sound 2.0 or later-equipped engine on the rails.

4. The LCD should display the following:

5. Hit the DCS button.

6. You now need to add the engine to the DCS Commander. To do this press the ADD button.

7. The LCD will now display the engine's address and 0sMPH.

8. Press the START-UP button and your Proto-Sound 2.0 or later engine will come alive with sounds, lights and smoke.

9. Roll the thumbwheel up to the desired speed and away you go.

10. See the DCS Feature/Function list for all the capabilities of your Proto-Sound 2.0 or later-equipped engine. For detailed instructions on what each feature/function does and how to operate it see the DCS section in this manual.

# DCC (Pass-Thru) Mode

1. Connect the track output from your DCC system to the VARIABLE power input jacks on the DCS Commander.

2. Apply power to your DCC Station and the DCS Commander will power up at the same time (uses a small amount of the power provided by the DCC System). The word "PASS" will be displayed on the LCD indicating the mode.
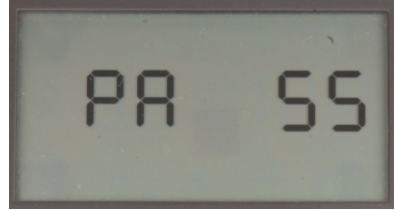
3. Send commands to your DCC equipped engines using your DCC handheld controller just like you would normally.

4. Should you decide you want to run your Proto-Sound 2.0 or later-equipped engines in DCS mode, you can hit the DCS button and you will now be able to select the Proto-Sound-equipped engine and run it in DCS mode. You will also see the LCD change to reflect the mode change on the DCS Commander.

**NOTE** *When the DCS Commander is in Pass-Thru mode it is only passing the DCC signals to the engines on the track. The DCS Commander does nothing to the DCC signal to enhance or alter it in any way.*

# Operating Modes Described

## Analog DC

A. Power is input through either the VARIABLE power input terminal or the FIXED power Input Jack

B  AC input gets rectified to flat-line DC

C. VARIABLE Input Terminal can handle either AC or DC. The FIXED power input is designed for an AC brick (MTH Z1000, for example), however DC will work as well.

D.  Allows for conventional operation of all DC powered  engines (HO), including your MTH HO engines

E.  The following features are available:

> i.   Voltage control
> ii.  Direction
> iii. Boost/Brake
> iv.  Momentum

# DCS Command Mode

A.  Supply either AC or DC or DCC input signal for power

B.  DCC signal and AC get rectified to flat-line DC

C.  Allows for control of M.T.H. Locomotives equipped with Proto-Sound 2.0 (or later)
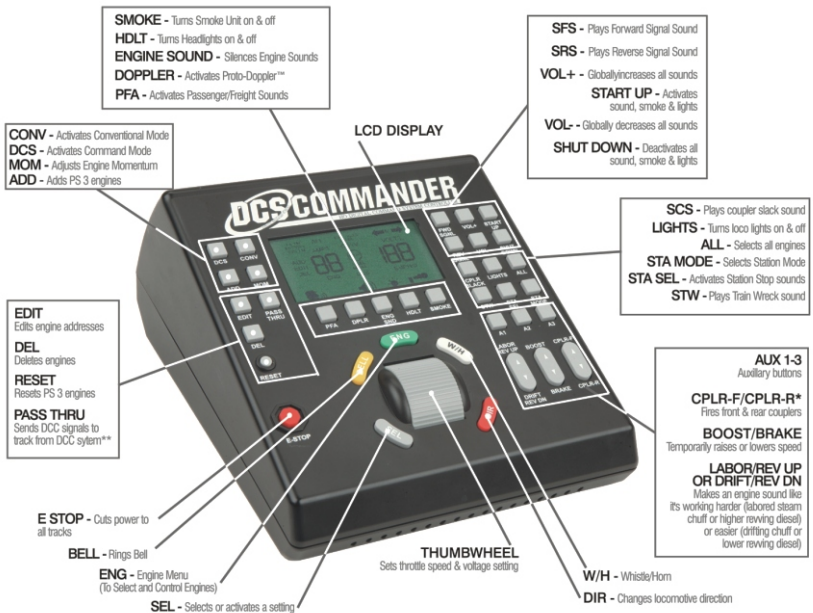
D.  Has the following features:

- •Intricate Speed Adjustments
- •Independent Feature Control
- •Locomotive Smoke Control
- •Doppler Sound Control
- •Accent Sound Control
- •Activate Passenger & Freight Sounds
- •Individual Locomotive Control
- •Selectable Operating Configurations
- •Easy-to-Use, Easy-to-Hookup
- •Large LCD Screen
- •32 Soft-touch Buttons
- •Manual Reset Circuit Breaker
- •18V DC Output
- • Choose from 3 Output Configurations:
  Analog DC, DCS Command, Pass-Thru
  for DCC

# DCC (Pass-Thru) Mode

A.  When DCC is used as input power the DCS COMMANDER will power up  in Pass-Thru mode and display "PASS" on the LCD

B.  If you wish to run DC or DCS, you only need to hit the CONV or the DCS button and the DCS COMMANDER will convert the DCC into rectified flat-line DC

C.  Pass-Thru mode only passes through the DCC signal. The DCS COMMANDER does NOT do anything to it unless you hit the CONV or DCS button

D.  If you want to switch back to the DCC input, press the PASS-THRU button and the DCC output from your DCC System will be re-applied to the track

# Basic Button Explanations

Most of the buttons on the front of the DCS Commander are used while running your engines in DCS mode (for Proto-Sound 2.0 or later-



**SMOKE -** Turns Smoke Unit on & off
**HDLT -** Turns Headlights on & off
**ENGINE SOUND -** Silences Engine Sounds
**DOPPLER -** Activates Proto-Doppler™
**PFA -** Activates Passenger/Freight Sounds

**SFS -** Plays Forward Signal Sound
**SRS -** Plays Reverse Signal Sound
**VOL+ -** Globally increases all sounds
**START UP -** Activates sound, smoke & lights
**VOL- -** Globally decreases all sounds
**SHUT DOWN -** Deactivates all sound, smoke & lights

**CONV -** Activates Conventional Mode
**DCS -** Activates Command Mode
**MOM -** Adjusts Engine Momentum
**ADD -** Adds PS 3 engines

LCD DISPLAY

**SCS -** Plays coupler slack sound
**LIGHTS -** Turns loco lights on & off
**ALL -** Selects all engines
**STA MODE -** Selects Station Mode
**STA SEL -** Activates Station Stop sounds
**STW -** Plays Train Wreck sound

**EDIT**
Edits engine addresses
**DEL**
Deletes engines
**RESET**
Resets PS 3 engines
**PASS THRU**
Sends DCC signals to track from DCC sytem**

**AUX 1-3**
Auxiliary buttons
**CPLR-F/CPLR-R***
Fires front & rear couplers
**BOOST/BRAKE**
Temporarily raises or lowers speed
**LABOR/REV UP OR DRIFT/REV DN**
Makes an engine sound like its working harder (labored steam chuff or higher revving diesel) or easier (drifting chuff or lower revving diesel)

**E STOP -** Cuts power to all tracks
**BELL -** Rings Bell
**ENG -** Engine Menu (To Select and Control Engines)
**SEL -** Selects or activates a setting

**THUMBWHEEL**
Sets throttle speed & voltage setting

**W/H -** Whistle/Horn
**DIR -** Changes locomotive direction

\* Operating couplers are not available on HO locomotives at this time.
\*\* Customer supplied DCC system Required

equipped engines). For Conventional operation only the thumbwheel, DIR, MOM, and E-Stop would be used.

## DCS
This button, when pressed, puts the DCS Commander into the DCS operating mode. The DCS icon will illuminate on the LCD to indicate this mode is active. The last actively run DCS engine will be displayed on the LCD. Also, pressing this button after the DCS Commander has powered up in Pass-Thru mode will rectify the DCC signal and allow you operation of Proto-Sound 2.0 and later equipped engines in Command Mode.
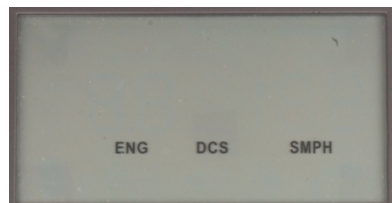
# CONV

**CONV** This button, when pressed, will put the DCS Commander into a conventional operating mode. The CONV icon will illuminate on the LCD to indicate this mode is active. The LCD will indicate Amps and Volts as well as current direction and will also show if Momentum is active. Also, pressing this button after the DCS Commander has powered up in Pass-Thru mode will rectify the DCC signal and allow you to operate your engines in Conventional Mode.

# ADD
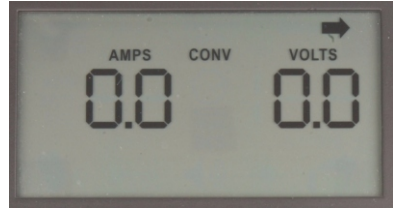
**ADD** This button is used while the DCS Commander is in DCS mode. Pressing this button will add any new Proto-Sound 2.0 or later-equipped engines to the DCS Commander. When a new engine is added that engine at the new address assigned by the DCS Commander will be displayed on the LCD.

# MOM

**MOM** This button, when pressed, will activate the Momentum. This button functions two different ways depending upon which mode is selected. While in Conventional mode the "M" icon will appear next to the direction arrow on the LCD. When you roll the thumbwheel up to a desired track voltage the engine will take its time getting up to speed. Likewise, it will take its time reducing its speed should you roll the thumbwheel down to a lower voltage. In DCS mode the Momentum will allow you to set the Acceleration and Deceleration rates of the engine (how fast or slow it speeds up/slows down).
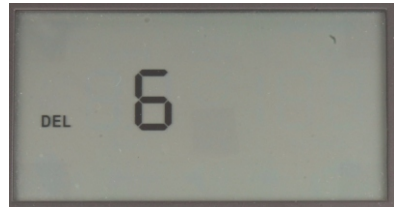
**EDIT** This button is used while the DCS Commander is in DCS mode. When pressed and held, this button will allow you to edit the address of a DCS engine. Pressing and holding the button for 3 seconds will cause the EDIT icon to flash then change the LCD to the display an engine address.
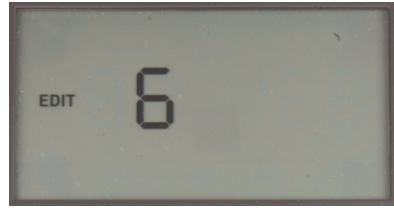
**PASS THRU** Pressing this button will switch the DCS Commander to Pass-Thru mode but ONLY if the DCS Commander was powered up using DCC as the input voltage source. This allows you to come back to Pass-Thru mode from Conventional or DCS modes but ONLY if the DCS Commander is powered using DCC as the input source.
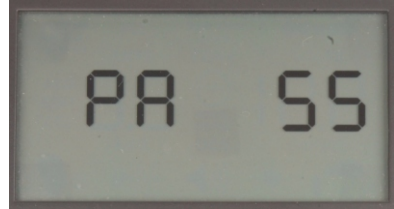
**DEL -** This button is used while the DCS Commander is in DCS mode. When pressed and held until the DEL icon flashes (3 seconds), you can delete any of the added engines in the DCS Commander.

**RESET** This button works only if there is at least one DCS engine added to the DCS Commander. Pressing and holding this button for 3 seconds will flash the FEATURE icon. Subsequent presses of the RESET button will flash FACTORY and SYSTEM. The 4th press of the RESET button will return you to a normal operating screen on the LCD.
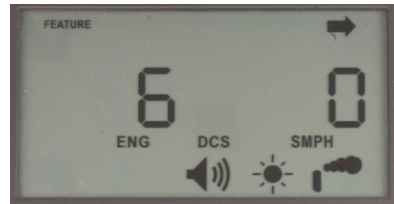
**E-STOP**  This button, when pressed will disconnect power from the OUTPUT jack on the DCS Commander.

**PFA**  This button is used while the DCS Commander is in DCS mode. Pressing this button will activate the Passenger or Freight announcements on your Proto-Sound 2.0 or later-equipped engine. It will also illuminate the PFA icon on the LCD. Pressing it again will shut the feature off.
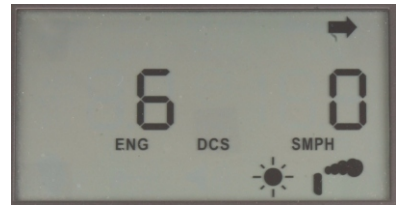
**DPLR -** This button is used while the DCS Commander is in DCS mode. Pressing this button will activate the Doppler Effect on your Proto-Sound 2.0 or later-equipped engine. It will also illuminate the Doppler icon on the LCD. Pressing it again will shut the feature off.
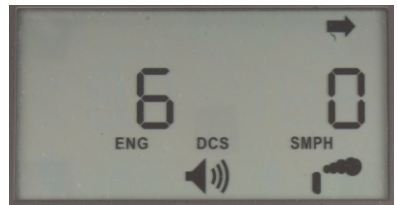
**ENG SND -** This button is used while the DCS Commander is in DCS mode. This button, when pressed, will mute the engine sounds on your Proto-Sound 2.0 or later-equipped engine. It will also illuminate the engine sounds icon on the LCD. Your Whistle/Horn and your Bell sounds will still be active, however. Pressing it again will restore your engine sounds.

**HDLT -** This button is used while the DCS Commander is in DCS mode. By default this will be illuminated on the LCD. Pressing this button will cause your Proto-Sound 2.0 or later-equipped engine to shut its headlight off. Also, it will shut off the icon on the LCD.

**SMOKE -** This button is
used while the DCS Commander is
in DCS mode. Pressing this button
will toggle the smoke on/off on your
Proto-Sound 2.0 or later-equipped
engine. When active, it will display
the Smoke icon on the LCD.

**SOUND LIGHT
ON ON**

**FWD SGNL** This button is used while the DCS Commander is
in DCS mode. Pressing this button will play the forward horn/whistle
signal (two toots)

**REV SGNL** - This button is used while the DCS Commander is in
DCS mode. Pressing this button will play the reverse horn/whistle signal
(three toots).

**CPLR SLACK -** This button is used while the DCS
Commander is in DCS mode. Pressing this button will play the coupler
slack sound if the engine is moving or will arm the sound if the engine is
at 0sMPH. As soon as the engine starts moving it will then play the sound.

**STW -** This button is used while the DCS Commander is in DCS
mode. Pressing this button will play the train wreck sound. Once the
sounds have completed the engine will shut off.

**VOL (+) -** This button is used while the DCS Commander is in
DCS mode. Pressing this button will incrementally increase the master
volume on your Proto-Sound 2.0 or later-equipped engine.

**VOL (-) -** This button is used while the DCS Commander is in DCS
mode. Pressing this button will incrementally decrease the master volume
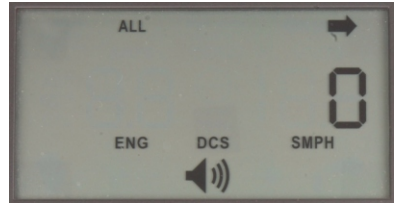on your Proto-Sound 2.0 or later-equipped engine.

**LIGHTS -** This button is used while the DCS Commander is in
DCS mode. Pressing this button will toggle the lights on your Proto-
Sound 2.0 or later-equipped engine. This does NOT affect the headlight.

**STA SEL -** This button is used while the DCS Commander is in
DCS mode. Pressing this button will allow you to step through the
stations while you are in Learn or Manual Mode.

# START UP - This button is used while the DCS Commander is in DCS mode. Pressing this button will start you Proto-Sound 2.0 or later-equipped engine. Its lights and sound and smoke (if equipped) will turn on.

# SHUT DOWN - This button is used while the DCS Commander is in DCS mode. Pressing this button will shut down your Proto-Sound 2.0 or later-equipped engine. The lights and sound and smoke (if equipped) will turn off.

# ALL - This button is used while the DCS Commander is in DCS mode. Pressing this button will allow you to control all the Proto-Sound 2.0 or later-equipped engines currently on the track and loaded into the DCS Commander.



# STA MODE - This button is used while the DCS Commander is in DCS mode. Pressing this button will allow you to enter the two other modes of operation on a trolley/subway engine. The default state is Manual Mode. Pressing the button once will put the engine into Learn Mode, pressing it again will put the engine into Auto Mode.

# LABOR/REV UP - This button is used while the DCS Commander is in DCS mode. Pressing and holding this button while controlling a steam Proto-Sound 2.0 or later engine will force the engine to play its labored chuffing sounds. Pressing and releasing this button on a diesel/electric with incrementally increase the rev sounds of the engine.

# DRIFT/REV DN - This button is used while the DCS Commander is in DCS mode. Pressing and holding this button while controlling a steam Proto-Sound 2.0 or later engine will force the engine to play its drift chuffing sounds. Pressing and releasing this button on a diesel/electric with incrementally decrease the rev sounds of the engine.

# BOOST/BRAKE - This button is used while the DCS Commander is in DCS mode. Pressing and holding this button towards BOOST will incrementally increase the speed of your Proto-Sound 2.0 or later-equipped engine up to 120sMPH. Likewise, pressing and holding this button towards BRAKE will incrementally decrease the speed of your Proto-Sound 2.0 or later-equipped engine to 0sMPH. Releasing the button will put the engine back to the speed it was running before you pressed this button.

# CPLR F/R - This button is used while the DCS Commander is in
DCS mode. Pressing the button towards CPLR-F will play the front
coupler release sound. Pressing the button towards the CPLR-R will play
the same coupler release sound. If equipped, the engine will also open its
coupler.

# BELL  This button is used while the DCS Commander is in DCS
mode. Pressing and releasing this button will turn on the bell sound on
your Proto-Sound 2.0 or later-equipped engine. Press and release the
button again to shut it off.

# ENG - This button is used while the DCS Commander is in DCS
mode. Pressing this button allows you to access all the engines loaded in
the DCS Commander. You can have up to 10 engines stored.

# W/H - This button is used while the DCS Commander is in DCS
mode. Pressing and holding this button will play the whistle or horn
sound on your Proto-Sound 2.0 or later-equipped engine. Release the
button and whistle sound will decay just like the real thing. Also,
depending upon how long you hold the button, once you release it the
engine will play up to three different whistle endings.

# SEL  This button is your Select button. It's used in a variety of
functions like selecting an engine, selecting a station stop. It tells the DCS
Commander that you have made your selection.

# DIR  Pressing this button in
DCS mode will cause your Proto-
Sound 2.0 or later-equipped engine
to come to a stop and then sit at
0sPMH in the opposite direction it
was traveling. In Conventional DC
mode it will change the direction of
your engine. In a Proto-Sound 2.0 or
later-equipped engine it will bring
the engine to a gradual stop depending upon how fast it was traveling,
then reverse the engine's direction and gradually return the engine to that
same speed.

# DCS Operation

When operating the DCS Commander in DCS Mode you will need at least one Proto-Sound® 2.0 or later-equipped engine on the track. The DCS Commander can store up to 10 Proto-Sound® 2.0 or later engines in memory. These instructions assume there is already a power source connected to the INPUT jack and the track is connected to the OUTPUT jack and track power is applied.
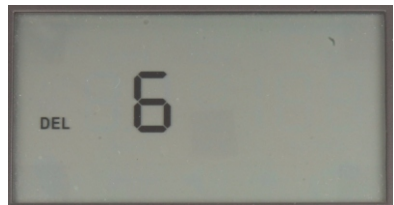
## Adding Engines

1. Press the DCS button

2. Press the ADD button. The DCS Commander will now go out and "see" if there are any Proto-Sound 2.0 or later engines on the track. Once a new engine is found it will display this engine on the LCD.

3. If no engine can be found or if there are no new engines to add the LCD will display "Er".

## Deleting Engines

1. Press and hold the DEL button for 3 seconds (the DEL icon will flash on the LCD).

2. The LCD will display the engine currently on the tracks.

3. Press the SEL button. The engine is now deleted from memory.

4. If you have more than one engine on the track you can use the thumbwheel to scroll to the engine you want deleted and press the SEL button.
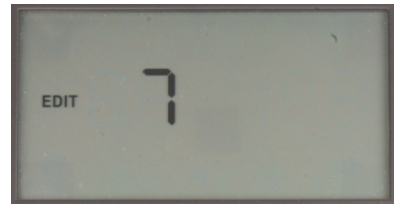
# Editing Engines

1. Press and hold the EDIT button for 3 seconds (the EDIT icon will flash on the LCD).

2. If there is only one engine on the tracks that engine's address will be displayed and you can go to step 3. Otherwise use the thumbwheel to scroll to the engine you wish to edit and press SEL.
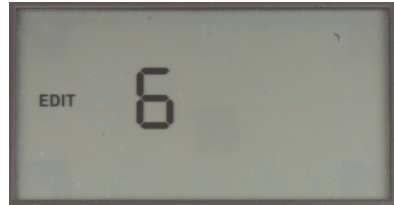
3. Use the thumbwheel to scroll to the new address you wish to program for the engine and press the SEL button. NOTE Those engine address that are already in the DCS Commander's memory will be skipped when you scroll the thumbwheel.

# Resetting Engines

1. Press and hold the RESET button until the FEATURE icon is flashing.

2. If you wish to Feature Reset the engine press the SEL button. All volumes and lights will be restored to their factory settings. However, the address will not be reset. If you wish to activate the Factory or System Reset continue on to step 3.

3.  Press the RESET button again and the LCD will display a flashing FACTORY icon. Press the SEL button if you wish to Factory Reset the engine. This will return the engine to it's factory state including the address. If you wish to activate the System reset continue to step 4.

4.  Press the RESET button again and the LCD will display a flashing SYSTEM icon. Press the SEL button if you wish to return the DCS Commander back to its factory state.

5.  If you wish to return to a normal operating mode press the RESET button again and the icon will disappear.

# Momentum

1.  Press the MOM button.

2.  The LCD above "SMPH" will flash with a number. Also, the ACCEL icon will display. Use the thumbwheel to scroll to a value for your Acceleration Rate. These are in SMPH/Sec. That is, the lower the number the slower the engine will accelerate to the commanded speed.
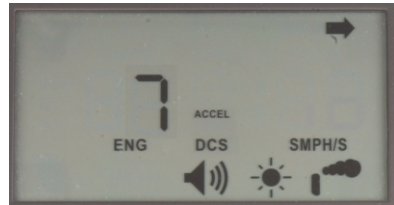
3.  Once you have the number you wish for the acceleration rate press the SEL button. The DECEL icon will now display and number will flash above the "SMPH".

# Running A Proto-Sound® 2.0 or Later Engine

1.  Set your Proto-Sound® 2.0 (or later) equipped engine on the track and ensure power is applied.

2.  Hit the DCS button.

3.  If the engine is not added to the DCS Commander hit the ADD button.

4.  Press the START-UP button. Your engine will start up with lights and sound and smoke (if equipped).

5.  Use the thumbwheel to scroll to a desired speed for your engine. The DCS Commander displays the engine's speed in scale miles per hour (sMPH).

6.  You now have total control of your Proto-Sound 2.0 or later-equipped engine.

7.  To shut down your engine, press SHUT DOWN. Your engine will be dark and quiet.

# Running Multiple Proto-Sound® 2.0 or Later Engines

1.  Set your Proto-Sound 2.0 (or later) equipped engine on the track and ensure power is applied.

2.  Hit the DCS button.

3.  If the engine is not added to the DCS Commander hit the ADD button.

4.  Press the START-UP button. Your engine will start up with lights and sound and smoke (if equipped).

5.  Repeat steps 1-4 for each additional engine you want to add or operate

6.  Use the thumbwheel to scroll to a desired speed for your engine. The DCS Commander displays the engine's speed in scale miles per hour (sMPH).

7.  You now have total control of your Proto-Sound® 2.0 or later-equipped engine.

8.  Now, to switch between any of the Proto-Sound® 2.0 or later-equipped engines on the track, press the ENG button and then use the thumbwheel to scroll to the engine's address that you want to run and press the SEL button

9.  To shut down your engine, press SHUT DOWN. Your engine will be dark and quiet.

# ALL Mode

1.  When you have more than one Proto-Sound® 2.0 or later-equipped engine on the track at the same time you have the option of running all of them at the same time. Press the ALL button.
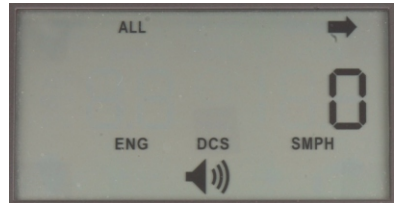
1.  Now you can start-up and control all your Proto-Sound® 2.0 or later engines on the track without having to switch between each one to send commands (though you can still do this).

3.  Go ahead and press the W/H button and listen to the symphony of Whistles play from each engine you have on the track.

4.  When you change speeds on the DCS Commander each and every Proto-Sound® 2.0 or later engine will be going the same speed; no more wrecks.

5.  There are certain features that won't operate while you're in ALL mode. For example, Labor/Drift chuffing.

# Train Wreck

1.  To play the train wreck sound in your Proto-Sound® 2.0 or later-equipped engine press the STW button.

2.  The engine will come to stop and play the train wreck sounds.

3.  Once the sounds have completed your engine will shut down.

4.  To get your engine running again press the START UP button.

# Passenger/Freight Announcements (PFA)

1. Select the engine on which you wish to run PFA.

2. Press the PFA button. The PFA icon will light up on the LCD.

3. The engine will begin playing its PFA sounds (passenger or freight depending upon the type of engine the prototype was).

4. Press the DIR button to get the engine to stop.

5. The DIR button now controls the PFA steps. There are 4 steps to each PFA sequence:

> - 1$^{st}$ DIR press stops the engine at the station or freight yard
> - 2$^{nd}$ and 3$^{rd}$ DIR presses cycle the engine through it's loading unloading or passengers/freight
> - 4$^{th}$ DIR press gets the engine ready to move again. The engine will signal forward or reverse, begin ringing its bell and away it will go at the speed in which it entered the station or freight yard.

6. To exit the PFA sequence at any time and return to normal engine operation, press the PFA button. The PFA icon will shut off on the LCD.

# Doppler

1. Select the engine on which you wish to run Doppler.

2. Press the DPLR button. The Doppler icon will light up on the LCD.



3. This is a one-shot Doppler so you'll want to time it so when the engine passes you it makes the Doppler shift just like you're standing next to the tracks.
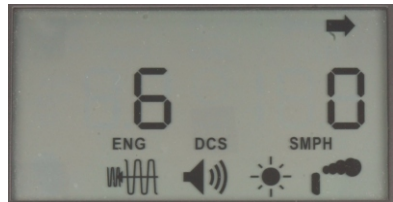
4. To shut off Doppler, press the DPLR button, the icon will shut off on the LCD.

# Smoke

1. To operate the smoke on equipped Proto-Sound® 2.0 or later engines, press the SMOKE button. The icon will light up on the LCD. You will also see the smoke unit begin operating on your Proto-Sound 2.0 or later-equipped engine.



2. To shut the smoke off, press the SMOKE button again and the icon will disappear and the smoke unit on your Proto-Sound 2.0 or later-equipped engine will shut off.

# Trolley/Subway Proto-Effects™

Your Proto-Sound® 2.0 or later-equipped trolley/subway cars are unique in how they can be operated. There are three modes you can choose from Manual, Auto, and Learn. In Auto mode, you first "teach" your trolley/subway car while it's in Learn mode. Once you have programmed the stops you want it to make you can run it in Auto mode and it will run all by itself, stopping at the stations you programmed. The default mode on start-up is Manual mode.

1. Select the trolley/subway car you want to run.

2. Ensure you are in DCS mode.

3. To run the trolley/subway in Manual mode go to step 4. If you want to teach your trolley/subway stops, go to step 9.

4. When running your trolley/subway in Manual mode you get to manually stop the car and select the stop you want, just like you were the engineer.

5. Press the STA SEL button to select the stop you want.

6. Now drive the car to wherever you want it to stop and bring the speed to 0sMPH. You will now hear the doors opening and the ambient sounds of the stop you selected as well as passengers loading and unloading.

7.  When you are ready to depart the stop simply scroll the thumbwheel to the speed you want and the car will play its door closing sounds and then proceed down the rails.

8.  In Manual mode you have full control over the engine on where it stops.

When running your engine in Auto mode you first much teach it where to stop. Proceed to the next step to program the stops for your trolley/subway's journey.

9.  Select the trolley/subway you want to program.

10. Ensure you are in DCS mode.

11. Drive the car to where you wish the starting location to be. Ensure the speed is at 0sMPH.

12. Press the STA MODE button until "Learn" is displayed on the LCD. The car will also announce that's it in Learn mode. Note  The engine sounds will disappear while you are in Learn mode, this is normal.

13. Press the STA SEL button to select the station you you'd like to program then press SEL.

14. The engine will respond with "Saved".

15. Drive the engine to the next stop, bring the speed to 0sMPH and repeat steps 13 and 14 for each station you wish to program.

16. Now, you have a decision to make….Do you want to save what you've saved as a loop or an out and back? To save it as a Loop proceed to step 17. If you want to save it as an Out and Back, proceed to step 20.

17. Drive your engine back to the EXACT spot you saved your first stop in Learn mode.

18. Press the STA SEL button until the engine announces the same station that you saved first.

19. Press the SEL button. The engine will say "Saved Complete" and the regular engine sounds will return.

20. Leave the trolley/subway car where you saved the last station.

21. Press the SEL button again and the car will say "Saved Complete". You have now saved your Learn mode as an Out and Back. The engine sounds will return to normal.

Now that you saved your route as either a Loop or an Out and Back you can set it to Auto mode so it will stop as the stops you pre-programmed in the steps above

22. Drive the engine to the EXACT spot where you saved the first station.

23. Press the STA MODE button until the car responds with "Auto Mode".

24. Set the car to the speed you'd like it to run at and sit back and watch it run all by itself, stopping at the stations you programmed.

# Switching From DCS To Conventional Mode and Conventional Back To DCS

1. Press the CONV button and the DCS Commander will now be in Conventional mode.
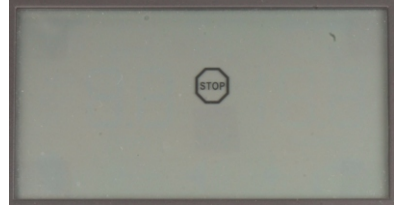
2. Press the DCS button and the DCS Commander is back in DCS mode allowing you to run your Proto-Sound®2.0 or later-equipped engines in Command mode.
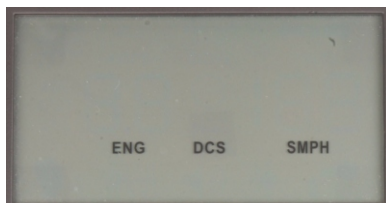
# E-Stop

1. In case of a derailment or emergency on your tracks you can cut the output power from the DCS Commander by pressing the E-STOP button.

2. In order to restore power to the DCS Commander, remove power from the Input jack and re-apply it. The DCS Commander will re-start.

# Track Signal Test

Running the Track Signal Test will allow you to get a picture of how well your engine and DCS Commander are signaling to one another. The most common cause of bad track signaling is dirty track, dirty wheels, or dirty pick-ups on the engine.

1. To start the track signal test place a Proto-Sound® 2.0 or later-equipped engine on the rails.

2. Apply power and start the engine up.

3. Get the engine moving at a moderate speed (about 25sMPH).

4. Press and hold both the DCS and the FWD SIGNAL buttons for 5 seconds.

5. The LCD will now display two numbers. The left set of numbers are the outgoing signal and the right set of numbers are the return signal.

6.  The numbers go from 1-10 with 10 being the best, strongest signal. However, do not worry if you see numbers that range from 5-10. Those values are acceptable enough to run any of your Proto-Sound® 2.0 or later-equipped engines reliably.

7.  If you notice a very low value appear on either side mark that section of track and inspect it after you have completed the test. Most likely that section either has a loose electrical connection or the track is dirty.

8.  When you have completed the test press the DCS button and you can run the Proto-Sound® 2.0 or later-equipped engine.normally.

# Conventional DC Operation

When operating the DCS Commander in Conventional DC Mode you can run all of your conventional DC engines. Your DCS Commander takes the AC or DC input and outputs flat-line DC. This allows you to use a brick-type transformer and run any DC engine. These instructions assume the track is connected to the OUTPUT terminal and power is connected to the INPUT terminal or jack.

## Running Conventional DC Engines

1.  Set your conventional DC engine on the track.

2.  The LCD will display 0 Volts and 0 Amps.

3.  Roll the thumbwheel up to the desired voltage.

4.  To change directions press the DIR button.

5.  When you change directions you will notice the Direction arrow icon will change giving you an indication of direction on your track.

6. The W/H and BELL buttons are not functional in this mode.

# Momentum

1. To activate Momentum (simulates pulling away/braking with a heavy consist) press the MOM button.

2. You will see the "M" icon light up next to the Direction arrow.

3. To turn the Momentum off, press the MOM button so the "M" icon disappears.

# E-Stop

1. Should a problem arise on your track, you can hit the E-STOP button and this will immediately shut off track power. The STOP icon will stay lit on the LCD.

2. To run your engine again after you hit E-STOP, disconnect the power from the INPUT jack, then re-apply power to the INPUT jack. The DCS Commander will come alive again and display 0 Volts and 0 Amps. You're now ready to run your conventional DC engine again.

*NOTE  When using AC as your input power source (for DCS or Conventional DC modes) you will notice the LCD will stay illuminated for several seconds after you disconnect power. This is normal. After a few seconds the LCD will go blank. There is no power getting to the track while the LCD is sitting in this state.*

# DCC Operation (Pass-Thru)

When operating your DCS Commander in DCC mode it's important to note that the DCS Commander only passes through the DCC signal to the track. The DCS Commander does not alter the signal in any way unless you press the CONV or DCS buttons. In those cases it rectifies the DCC square-wave signal into flat-line DC power.

## Running DCC Through The DCS Commander

1.  Apply the output of your DCC Controller to the Input jacks on the DCS Commander (polarity is not important).

2.  Turn on your DCC Controller. The DCS Commander will power up and then display "PASS" on the LCD. This tells you the DCS Commander is now passing through the DCC signal to the track.

3.  Use your DCC Controller handheld just like you normally would to run your DCC-equipped engines.

4.  If you are running MTH Proto-Sound® 2.0 or later-equipped engines, refer to the engine's manual for DCC operation.
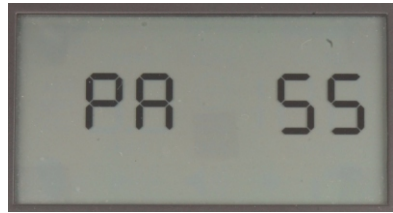
## Switching From DCC to DCS or Conventional Mode

If you wish to run your MTH Proto-Sound® 2.0 or later-equipped engines in DCS mode you can use your existing DCC Controller as the Input power source.

1.  Apply power to the DCS Commander from your DCC Controller.

2.  The DCS Commander will power up in Pass-Thru mode, "PA SS" will be displayed on the LCD.

3.  To run your Proto-Sound® 2.0 or later-equipped engines in DCS mode, press the DCS button and if you have already added the engine to the DCS Commander previously, select that engine with the ENG button and the SEL button and away you go in DCS mode.

4.  If you have not added the engine, please refer to the ADD Engines section of this manual.

5.  To run in Conventional mode, press the CONV button. In both cases, either switching to DCS mode or Conventional mode from DCC (Pass-Thru) mode will rectify the DCC square-wave signal to flat-line DC power

*NOTE  Once you switch from DCC (Pass-Thru) to DCS or Conventional modes you can switch back TO DCC (Pass-Thru) control by simply pressing the PASS button. However, you cannot power up the DCS Commander with AC or DC power and then switch to a DCC input. In order for the DCS Commander to operate in Pass-Thru mode you must first power it up with a DCC signal at the Input jack.*



To Track From Power Output Terminals

To Power Input Terminals

DCS COMMANDER

DCC SOURCE
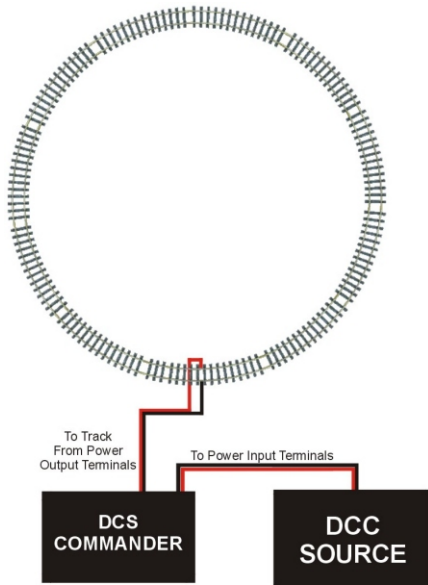
Use DCC Main Track Output
Do NOT Use Programming Track Output

Track Polarity is NOT Important

# Troubleshooting DCS Commander Problems

Although DCS has been designed and engineered for ease of use, you may have some questions during initial operation. The following table should answer most questions. If your problem cannot be resolved with this table, visit the M.T.H. Proto-Sound web site for more information and instructions for contacting M.T.H. for direct service.

## WWW.PROTOSOUND2.COM

| Power Problems | Remedy |
|---|---|
| DCS Commander will not power up | Check Circuit Breaker, reset if necessary |
| Circuit Breaker trips as soon as power is applied | Check to see if track is shorted |
| | Check to see if there is too much load on track (lights, operating accessories, etc). |
| After running engines for a duration the circuit breaker trips | The max output rating is 5 Amps. If the load on the track is approaching 5 Amps there may be current spikes exceeding that rating. Reduce the load on the track |
| DCS Commander continually resets | If using DCC as the input power source check that the load on the track is not exceeding the DCC Controller's max current rating |
| LCD does not immediately shut off after AC power is removed from the Input jack | This is normal operation. After approximately 5 seconds the LCD will go blank |
| The "Stop" icon is lit on the LCD | The E-STOP button has been pressed. Reset input power to the DCS Commander |
| **Conventional Operation** | **Remedy** |
| Engine direction does not match direction arrow on LCD | Reverse the polarity to the track at the Output jack |
| Whistle/Bell do not work on my Proto-Sound 2.0 or later-equipped engine | This is normal operation. The whistle and bell work when your engine is run under conventional DC power |
| The engine takes a while to slow to a stop after the DIR button is pressed | This is normal operation. Just like a real engine the faster the engine is traveling the longer it takes to slow down |
| | Check that the Momentum is not set to ON *(An "M" will be displayed on the LCD when it's active. Press the MOM button to turn the Momentum off)* |

| DCS Operation | Remedy |
|---|---|
| Can't add a Proto-Sound® 2.0 or later engine | If "Er" is displayed it's possible there is another engine on the rails with the same address. Ensure the engine you are adding is the only one on the rails |
| | Check that your Proto-Sound 2.0 or later engine is a powered piece of track or not sitting on dead track section |
| | The engine address you are trying to add may already exist in the DCS Commander. After you see the "Er" message the screen will display the current engine's address. You should be able to hit START UP and run the engine |
| Engine address flashes when attempting to send a command to the engine | The engine is most likely on a dirty spot of track. Make sure the track is clean as well as the locomotive pickups |
| No audio on engine | Check that the ENG SND icon on the LCD is lit |
| | Press the VOL + several times to ensure the Master Volume is turned up |
| | Ensure the DPLR icon is NOT lit on the LCD |
| No lights on engine | Press the LIGHTS button and the interior lights should turn on |
| | If the headlight is off ensure the engine is in Forward. Also, ensure the HDLT icon is lit on the LCD |
| Factory or Feature Reset aren't working | You must have at least one DCS engine in the DCS Commander for Feature or Factory Reset to function |
| The engine takes off too slowly when the thumbwheel is scrolled up or takes too long to slow down to a stop | Check that the Accel and Decel rates are not set to 1 or 2. The lower the number the longer it takes for the engine to reach the commanded speed |
| The Whistle/Horn sticks on when the W/H button is pressed and released | It's possible the engine is sitting on a dirty piece of track or a track section that has a poor electrical connection. Run the Track Signal Test to see what the signal level is on that section |

| DCC Operation | Remedy |
|---|---|
| No DCC signals appear to be getting to the DCC-equipped engine | Check that the DCS Commander is in Pass-Thru mode. "PASS" will be displayed on the LCD. If not, reset the Input power from your DCC Controller. The DCS Commander should now display "PASS" on the LCD |

# DC DIGITAL COMMAND SYSTEM CONTROLLER

## PROTO-WHISTLE ADDENDUM

This DCS Commander was produced with a new feature after the original manual was printed. This one-page addendum includes the instructions for operating the Proto-Whistle feature included in the DCS Commander and found in some M.T.H. Proto-Sound 3.0 equipped locomotives. To confirm if your engine is equipped with the Proto-Whistle feature, check the engine's manual for inclusion of the feature.

Proto-Whistle is a revolutionary new feature that allows the user to "play" a locomotive whistle or horn using the DCS Commander thumbwheel. When activated, the user can rotate the thumbwheel up and down to play different "pitches" of the whistle or horn. With just a little practice, you'll be blowing your whistle or horn just like a real engineer!

# PROTO-WHISTLE ADDENDUM

1. Place your Proto-Whistle-equipped locomotive on the rails.
2. Apply power to the Input jack on the DCS Commander.
3. Press the DCS Button. **NOTE - This feature will only work while the DCS Commander is in DCS Mode.**
4. Press the ADD button.*
5. Press the START-UP button and your new HO engine will start up.
6. Press the A1 button and the LCD will display two dashes where your SMPH indication used to reside.



7. Using the thumbwheel, you can scroll up or down to vary the pitch of the steam whistle. There are three levels to the steam whistle: the **FIRST** click up on the thumbwheel will give you the first level of the whistle, the **SECOND** click up will give you the second level and the **THIRD** click will give you the full intensity of the whistle.
8. Scrolling the thumbwheel down does the exact same thing only in reverse

**Note:** Any clicks beyond three, either scrolling up or down, will not effect the sound "pitch" since there are only three levels.
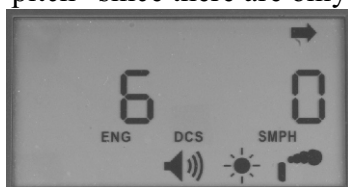


9. To disable the Proto-Whistle feature and return your engine to its normal whistle mode, press the A1 button again. You will see the LCD display return to the original SMPH read out.

**NOTE:** While in Proto-Whistle mode the White Whistle button is Not active.

* This step only required the first time the specific locomotive is added to the commander roster.

## Crossing Signal

Pressing the "A3" button on the DCS Commander's keypad will play the crossing signal (not available on all PS2 or PS3-equipped engines). This new sound feature adds more realism to your railroad. When activated, the engine will play the two-long, one-short, one-long whistle signal.

## Track Signal

1. To start the track signal test place a Proto-Sound® 2.0 or later-equipped engine on the rails
2. Apply power and start the engine up
3. Get the engine moving at a moderate speed (about 25sMPH)
4. Press and hold the DCS button for 5 seconds
5. The LCD will display a number from 1 through 10 on the left-hand side
6. The numbers go from 1-10 with 10 being the best, strongest signal. However, do not worry if you see numbers that range from 5-10. those values are acceptable enough to run any of your Proto-Sound® 2.0 or later-equipped engines reliably
7. If you notice a very low value appear on the LCD mark that section of track and inspect it after you have completed the test. In most cases it's just a loose connection or dirty track

When you have completed the test press the DCS button and you can then run your Proto-Sound® 2.0 or later-equipped engines again, normally

# Service & Warranty Information

## How to Get Service Under the Terms of the Limited One-Year Warranty

When you suspect an item is defective, please check the operator's manual for standard operation and trouble-shooting techniques that may correct the problem. Additional information may be found on the M.T.H. Website. Should you still require service, follow the instructions below to obtain warranty service.

First, e-mail, write, call or fax M.T.H. Electric Trains or a M.T.H. Authorized Service Center (ASC) in your area to obtain Repair Authorization. You can find the list of ASCs on the M.T.H. Website, www.mth-railking.com. Authorized Service Centers are required to make warranty repairs on items sold *only* from that store; all other repairs may-- or may not be done at the store's own discretion. If you did not purchase the item directly from the ASC, you will need to select a National Authorized Service Center (NASC) or contact M.T.H. Electric Trains directly. NASC Dealers are compensated by M.T.H. to perform warranty service for any customer whose repair qualifies for warranty service. A list of NASC retailers can be located on the M.T.H. Website or by calling 410-381-2580. Should the warranty no longer apply, you may choose either an ASC or NASC retailer to service your M.T.H. Product. A reasonable service fee will be charged.

CAUTION: Make sure the product is packed in its original factory packaging including its foam and plastic wrapping material to prevent damage to the merchandise. There is no need to return the entire set if only one of the components is in need of repair *unless otherwise instructed by the Service Center*. **The shipment must be prepaid and we recommend that it be insured. A cover letter including your name, address, daytime phone number, e-mail address (if available), Return Authorization number (if required by the service center, a copy of your sales receipt and a full description of the problem must be included to facilitate the repairs. Please include the description regardless of whether you discussed the problem with a service technician when contacting the Service Center for your Return Authorization.**

Please make sure you have followed the instructions carefully before returning any merchandise for service. Authorized M.T.H. Service Centers are independently owned and operated and are not agents or representatives of M.T.H. Electric Trains. M.T.H. assumes no responsibility, financial or otherwise, for material left in their possession, or work done, by privately owned M.T.H. Authorized Service Centers.
If you need assistance at any time email MTH Service at service@mth-railking.com, or call 410 381-2580.

## Limited One-Year Warranty

All M.T.H. products purchased from an Authorized M.T.H. Retailer are covered by this warranty.
See our Website to identify an Authorized M.T.H. Retailer near you.

M.T.H. products are warrantied for one year from the date of purchase against defects in material or workmanship, excluding wear items such as light bulbs, pick-up rollers, batteries, smoke unit wicks, and traction tires. We will replace or credit (at our option) any defective item with a manufactured suggested retail price of $279.95 or less (excluding all motive power and electronic items), if the item is returned to an M.T.H. Authorized Service Center (ASC) or M.T.H. National Authorized Service Center (NASC) within one year of the original date of purchase. For any item with an MSRP greater than $279.95 (including all motive power and electronics), We will repair, replace or credit (at our option) the defective item without charge for the parts or labor, if the item is returned to an M.T.H. Authorized Service Center (ASC) or M.T.H. National Authorized Service Center (NASC) within one year of the original date of purchase. This warranty does not cover damages caused by improper care, handling, or use. Transportation costs incurred by the customer to ship the product for warranty service are not covered under this warranty.

Items sent for repair must be accompanied by a return authorization number, a description of the problem, and a copy of the original sales receipt from an Authorized M.T.H. Retailer stating the date of purchase. If you are sending this product to an Authorized Service Center, contact that Center for their return authorization.

This warranty gives you specific legal rights, and you may have other rights that vary from state to state. Specific questions regarding the warranty may be forwarded to M.T.H. directly.

Service Department
M.T.H. Electric Trains
7020 Columbia Gateway Drive
Columbia MD 21046-1532
410-381-2580
service@mth-railking.com