



M.T.H. HO Union Pacific 4500 HP Gas Turbine Engine

(PS3)
ENGINEER'S GUIDE

Congratulations! You've just purchased the most feature-rich and technically advanced HO locomotive ever produced! This highly detailed model includes a broader range of features than you'll find on any other HO scale model, including smooth performance from a three-scale-mile-per-hour crawl to full throttle; "cruise control" for steady speeds regardless of curves, switches and grades; built-in decoders for DCC and the M.T.H. Digital Command System (DCS); and a full range of prototype sounds. If you're looking for motive power that's accurately detailed, smooth running, and a great deal of fun to operate, it doesn't get any better than this. Minimum 18" Radius curves Code 70, 83, & 100 Rail.



Freight Yard Sound

PLEASE READ THE MANUAL BEFORE USE AND SAVE
WWW.MTHHOTRAINS.COM

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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.

QUICK START GUIDE

Of course, you should read your manual over before running your engine. But if you just can't wait, choose how you want to run below and enjoy!! Now, after a few minutes, shut her down and read through your engineer's guide.

I USE A REGULAR DC SUPPLY...

Step 1: Unpack your Engine. (refer to unpacking instruction on pg 4)...

Step 2: Set the engine on the track ...

Step 3: Apply increasing **DC** voltage until she starts up and pulls out!

I'M A DCC OPERATOR....

Step 1: Unpack your Engine. (refer to unpacking instructions on pg 4)...

Step 2: Set the engine on the track ...

Step 3: Power up your DCC system...

Step 4: Select engine address 3 and press "F3" to start her up...

Step 5: Turn the throttle and head on down the pike...

I RUN DCS....

Step 1: Unpack your Engine. (refer to unpacking instructions on pg 4)...

Step 2: Set the engine on the track ...

Step 3: Power up your DCS system...

Step 4: Add the engine to your system and start her up...

Step 5: Turn the throttle and move out....

CAUTION: M.T.H. HO engines ***DO NOT OPERATE ON AC VOLTAGE.***

Applying AC power to your locomotive could cause permanent damage and will void your warranty.

Please note, when making setting changes in DCS or DCC, such as address, please wait a minimum of 5 Seconds after removing power to insure the settings are stored in the engines memory. Reapplying power in less than 5 Seconds may result in losing the setting changes.

UNPACKING YOUR ENGINE

Removing and Unwrapping Your Engine

Carefully remove and unwrap the model on a soft surface. By nature, models with high levels of detail have some small fragile parts.

Carefully remove any foam packing pieces that may be surrounding the model.

What Else is in the Box?

The following items are packed with your engine.

Engineer's Guide (1)

You probably know that since you're reading it.

Mechanical Kadee-Compatible Couplers (2) with mounting hardware

Tender Version has 4 couplers in packaging

Ampule with Smoke fluid

PRODUCT OVERVIEW

Getting to Know Your M.T.H. HO Locomotive

Key Features

Your new HO Engine is equipped with the exclusive M.T.H. Proto-Sound® 3.0 digital sound and control system. In plain English, this means your locomotive contains state-of-the-art electronics providing realistic digital sounds, precisely controlled speed in increments of 1 scale mile per hour, and much, much, more.

Compatibility

The Proto-Sound 3 system is universally compatible with track power and/or signal combinations including analog DC (regular DC power pack), DCC (NMRA Digital Command Control), or DCS (MTH Digital Command System). Simply set your Engine on the rails, apply any one of these power/signal sources, and move out! The Proto-Sound 3.0 system automatically senses the track environment and adapts accordingly. No hidden jumpers, switches, magic wands, or programming required!!! A vast array of realistic operation is automatic when the Engine is run on analog DC. You can expand access to features in a DCC environment. Experience the most your new locomotive has to offer in the simple to use yet powerful world of DCS. **To be clear, DCS is NOT a proprietary version of DCC, as some other manufacturers offer. DCS is a comprehensive layout control system designed with one primary goal: make model trains do amazingly realistic things using a simple and intuitive controller. We put the complexity on the inside, and the fun in your hands!**

Digital Sound

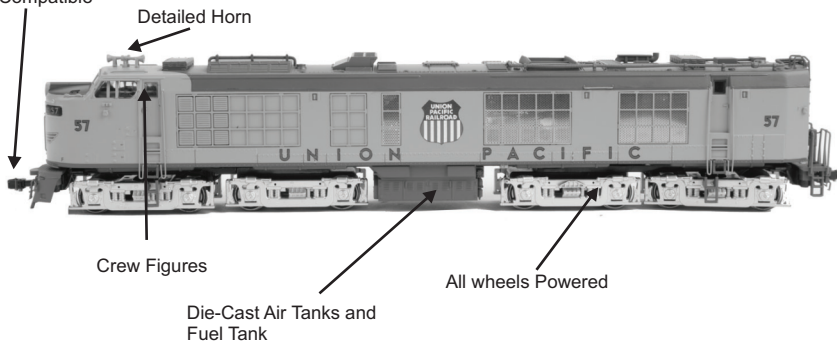
Your Proto-Sound 3 (PS 3) equipped Engine contains over 100 individual recordings. These recordings are played back dynamically at appropriate times to create a symphony of realism for your ears. Hear the diesel roar automatically intensify or lighten when speeding up or slowing down, listen to the sounds of brakes squeaking and squealing as you come to a stop, or enjoy the random conversations of rail men working as your model sits at idle. It's all there and it's incredible.

Your HO diesel includes built-in realistic horn sound effects, including forward (two blasts) and reverse (three blasts) signaling and crossing signal sounds, all available with one-touch control from a DCS controller or through any DCC controller capable of accessing up to F28.

ENGINE DIAGRAM

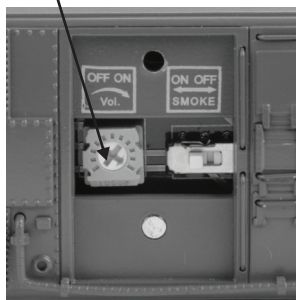
Locomotive

Includes Remotely Activated Proto-Coupler™ and interchangeable magnetic coupler, both Kadee® Compatible



Gently Pull Up and Lift Roof Hatch OFF To Reveal Volume Control

Volume Pot Location



Digital Control

In standard analog DC mode, your model still operates under digital control. The PS 3 advance speed control system converts track voltage into digital speed commands. Your model will run smoothly and consistently at any speed regardless of load, hills, or curves. If you are a DCC user, you'll quickly learn to appreciate the precision of our speed control and linear speed curve. DCS users will enjoy the added benefits of controlling speeds in increments of 1 scale mile per hour displayed on DCS controllers or easily changing acceleration and deceleration rates independently without any discussion of bits or bytes. **To be clear, DCS is NOT DCC.**

Lights

As you read on, you'll notice there are no instructions for replacing light bulbs in your diesel. That's because there aren't any. We use specially designed and controlled LEDs to create realistic lighting effects that occur automatically. Again, **NO PROGRAMMING!!** Just come to a stop and watch as the headlight dims automatically in accordance with rule 17. Of course, as you pull away, the headlight returns to it's fully bright, yet warm, glow. We even included a light in the cab so the engineers can see to do their jobs!

More...

In analog DC operation, just flip the track polarity or direction switch at any speed and watch your Engine gradually come to stop, turn on the appropriate directional lighting, and smoothly accelerate back up to speed. No other HO locomotive has features like these. There are so many more things to learn and enjoy about M.T.H. HO Engines, we could write a book. But, that's no fun. So, if you haven't already done so, flip to the Quick Start Guide and let's run your new engine!!

SET-UP

Installing Couplers

Your locomotive comes equipped with remotely controllable scale proportioned operating Proto-Couplers that can be triggered from any DCC controller or the M.T.H. DCS Digital Command System. Both the front and rear couplers can be individually triggered.

For those who prefer standard mechanical couplers, we've also included a pair inside your locomotive's box. Follow the steps below to remove the remote control couplers and install the mechanical couplers in their place.

Removing The Remote Control Proto-Coupler From The Chassis



Identify & Remove Mounting Screws



Lift Out Cover Plate & Pull Coupler Mechanism Out Through Pilot Hole

Reference Photos Only

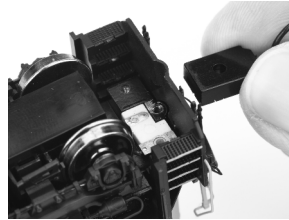
SET-UP

Installing The Mechanical Couplers

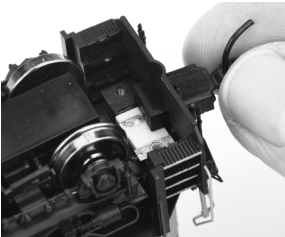
If you prefer the mechanical couplers over the remote control Proto-Couplers, remove the Proto-Couplers by following the steps detailed above and then install the included mechanical couplers or any other Kadee-compatible couplers by following the steps below.



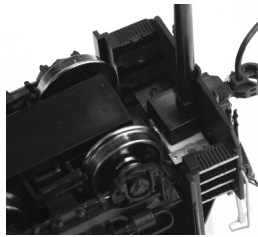
Assembled Coupler
(Shown Right Side UP)



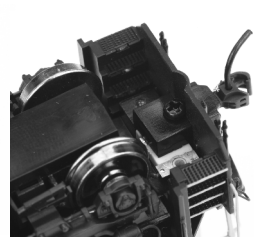
Insert Coupler Into Pilot
(Shown Upside DOWN)



Line Up CENTER Mounting
Hole In Coupler Pocket With
Mounting Hole On Chassis



Tighten In Place Using
Large Screw In Mechanical
Coupler Part Bag



Reference Photos Only

Automatic Coupler Operation

DCS Mode:

The Proto-Coupler can be opened when operating in the DCS mode or the DCC mode.

When operating in the DCS mode the Proto-Couplers on the engine are activated by buttons on the DCS Remote or the DCS Commander.

The front-Proto-coupler on the engine is opened by pressing the FRONT COUPLER on the DCS remote or the on the DCS Commander.

The rear-Proto-coupler on the engine is opened by pressing the REAR COUPLER on the DCS remote or the on the DCS Commander.

DCC Mode:

When operating in the DCC mode the function codes are used to operate the Proto-Couplers.

F7- is used open the front coupler

F8- is used to open the rear coupler

The Proto-Couplers can be closed by gently pushing on the knuckle or by pushing another car with a compatible coupler to the proto-coupler until the knuckle closes.

Manual Couplers – A set of manual couplers are provided in the packaging for those who wish to change out the Proto-Couplers and use the manual couplers.

Coupling the Tender to the Engine (If your version has a tender supplied)

The tender is equipped with mounting pads for 2 Kadee type compatible couplers. Included in the packaging are 2 Kadee compatible couplers for mounting on the tender.

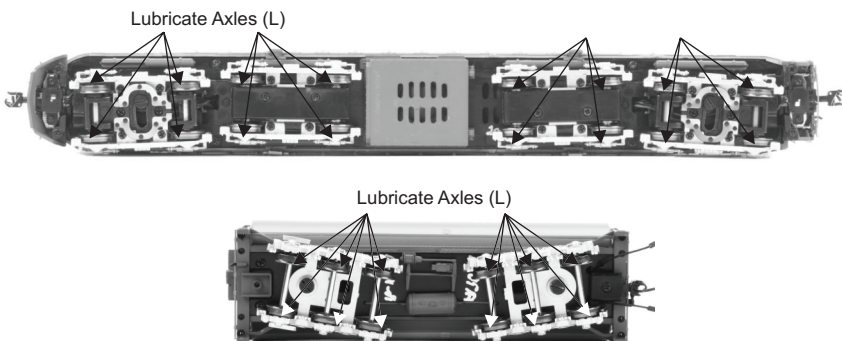
The tender is not equipped to use the Proto-couplers.

The tender is connected to the engine by couplers, the same as freight cars. In addition there are 2 wires at the front of the tender that must be plugged into the engine in order for the reverse light in the tender to operate.

Lubrication

Using light machine or household oil, apply a very small amount to all axle points as shown.

Your gearbox is properly greased at the factory and probably never needs service however, if you run excessive hours pulling heavy loads, it's a good idea to remove the 2 screws from the gearbox cover and re-grease using M.T.H. gear grease or equivalent.



FEATURES AND OPERATION

Now, for the fun stuff! Your new M.T.H. HO Diesel Engine has more features and operating capabilities than any HO engine ever built by any manufacturer. We're going to walk you through everything she does in general but, you'll probably find a few we forgot to mention on your own.

Modes of Operation

There are 3 modes of operation with different levels of features accessible in each. We refer to them as analog DC, DCC, and DCS. Here's a little more explanation before we get into the features of each mode.

Analog DC

This is when there is nothing connected to the rails except a conventional DC power pack. These power packs generally have at least one variable output controlled by a throttle of some sort and a means of reversing DC polarity on the track to change the direction of your engine.

FEATURES AND OPERATION

DCC or Digital Command Control

DCC is a popular digital command control scheme wherein the track power is also a digital control signal. That is, using a DCC controller, you can communicate with multiple engines and have them all moving at different speeds or moving in opposite directions on the same track at the same time. The power/command signal remains constant and engines are “commanded” to perform as desired. M.T.H. is new to DCC but, we recognize it's importance to many HO operators. So, we loaded our engine with more DCC features easily accessible to the operator than any HO engine ever built previously. You DCC guys are in for a real treat!

Please note, when making setting changes in DCS or DCC, such as address, please wait a minimum of 5 Seconds after removing power to insure the settings are stored in the engines memory. Reapplying power in less than 5 Seconds may result in losing the setting changes.

DCS or Digital Command System

While the acronyms are close, this is about where the similarities between DCS and DCC end. Yes, they are both digital control systems however, M.T.H. DCS is NOT DCC. There are several proprietary versions of DCC on the market but friend, this is NOT one of them. M.T.H.'s DCS system is proven technology in the O and One gauge markets and now, we've brought its power and simplicity to you.

Next, DCS employs a fully functional bi-directional communication scheme opening a vast range of advanced features and yet, is so simple and intuitive, you can enjoy them! No programming tracks, bits and bytes, or conversion of binary to hexadecimal numbers here! To add an engine in DCS, just press “ADD ENGINE.” After that, If you want to start your engine, just press “START UP” or, to turn the sound on or off, just press “SOUND.” No combinations of letters or numbers to remember! We think you're really going to like this!

Please note, when making setting changes in DCS or DCC, such as address, please wait a minimum of 5 Seconds after removing power to insure the settings are stored in the engines memory. Reapplying power in less than 5 Seconds may result in losing the setting changes.

Analog DC

Not much explanation is required here, and that's exactly why you run your trains this way! Here's the good news, even if you like to keep it simple, your MTH HO engine is packed with cool sounds, lights, and operating features, that you're going to love.

Running the Engine

Set the engine on the rails, and apply DC power. Refer to the Set-Up section of this guide for instructions on how to lubricate the chassis.

As you increase power, at about 6 volts, the lights and sounds will come on. Keep going on up to about 8 and she'll move out! About 16 volts DC is adequate for prototypical speeds however, your engine can handle up to 24 volts DC if you feel the need for speed!

Changing Direction

If you flip the direction (polarity) switch on your power pack while the engine is moving, it will gradually slow to a stop, and slowly accelerate back up to speed in the opposite direction. This is an exclusive feature of MTH engines that we're sure you'll enjoy. You can also change direction the old fashioned way by reducing throttle until the engine stops, flip the direction switch, and then increase throttle again. Either way is OK, we just thought a graceful transition from any speed would be cool.

If you switch track polarity too slowly, the engine may stop abruptly and not move in the reverse direction. This is normal. There is a feature we call “anti-jack rabbit” that prevents the engine from taking off at high speeds when high voltage is applied to the track instantly. Some direction switches have a “dead” spot where the power is completely off during polarity changes. This can invoke the anti-jack rabbit feature. The solution is to flip the direction switch more quickly. Don't worry you won't hurt the engine.

Speed Control

Your engine is equipped with speed control. This feature is always active, even in analog DC mode. Basically, your engine constantly measures track voltage and converts this to a digital speed command. You should notice the speed remains constant up and down grades, around curves, and with varying loads. This is no accident. You've got the most precise speed control system available today.

Sounds

In this mode, sounds are pretty much automatic. The UP Veranda Turbine has unique sounds. At start up you will hear the sound of a diesel engine starting. Do not be alarmed, the diesel engine is used as a starting motor for the turbine. Once the diesel motor is up to speed, the sound of the turbine winding up will begin. Then the turbine sounds will be at full speed.

When your sitting at idle, there may be some maintenance done. You could hear someone calling for help on the radio. Don't worry, all of this and more is just a normal part of everyday operations.

When your moving at a pretty good clip and you reduce the throttle quickly, you may hear the brakes squeak and squeal as the engineer applies them. Of course, they'll stop when the engine does.

If things get too noisy, just locate the sound volume pot under the rear roof adjust the volume from maximum down to off, whatever suits you. Turn it counterclockwise to reduce the volume or clockwise to increase it. Refer to page 6 for volume pot location.

Lighting

Now, this is an illuminating section (we couldn't resist). Your model is equipped with a headlight, marker lights, mars light, cab interior light, and number board lights..

The first thing to know about the lighting is there aren't any bulbs. It's all LEDs so, if you look for a section on how to replace them, you won't find it. You should never have to. As with sounds, in analog DC mode, lighting operation is fully automatic. They're always on and behave appropriately.

The headlight functions under rule 17 and dims when stopped for a time or while backing up. Of course, just as you begin to move forward, it goes bright to show the way. The cab light is always on so the engineer can always see clearly.

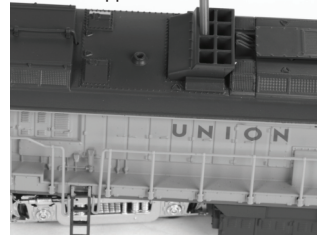
Smoke Unit

The MTH Turbine is equipped with a smoke unit. The smoke is used to simulate the heat oasis and exhaust gases emitted form the turbine unit.

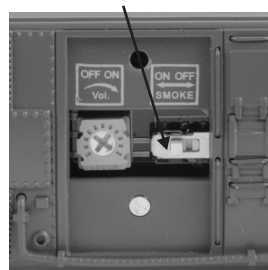
Additional smoke fluid should be added or the smoke unit should be turned off when the smoke output is depleted.

Smoke fluid is added by dropping smoke fluid in the exhaust stack. It is recommended that when adding smoke fluid to use a small applicator with a needle like tip or a use a syringe. If the smoke fluid is not injected below the grid, surface tension of the liquid can suspend the smoke fluid on the grid. This will prevent the smoke fluid from getting to the smoke unit and it will also prevent any smoke vapor from exiting the exhaust stack.

Add Smoke Fluid
with Small Applicator



Smoke On/Off Switch



DCC Digital Command Control

Now, if your operating in this mode, you may very well know more about DCC than we do so, we're going to stick to telling you about our engine in this operating environment. First of all, in DCC mode, we brought all the features of analog DC along and of course, added to them. Your new engine has more user features than any DCC engine ever built. Some of them are even ahead of the world of DCC!!

Running the Engine

Set the engine on the rails, and apply DCC power. Refer to the Set-Up section of this guide for instructions on how to connect the boiler and tender.

The first thing you will notice is the engine does absolutely nothing! Don't panic. This is by design. M.T.H. HO engines never do anything in command mode until told to do so, regardless of what brand DCC controller you use. In this way, you could have a fleet of M.T.H. HO engines on the rails and they will remain shutdown until you command them to start up.

F3 Start up/Shut Down

Select engine address 3 (factory default), press the F3 (Start Up/Shut Down) key, and your engine will start-up. Lights, sounds, ACTION!!! Roll the throttle and away you go. Our models are compatible with 14, 28, and 128 speed steps. We strongly recommend 128 because in this mode, speed steps correspond directly to scale speeds. That is, speed step 10 = 10 smph, speed step 47 = 47 smph, etc. You get the idea. When your done, press the F3 key again, your engine will shut down.

To be clear, pressing F3 when the engine is shut down will start it up. Pressing F3 when the engine is started up will shut it down. Pretty clever, eh?

Sounds

As in analog DC mode, the default sound arrangement is automatic. So, you can just run your engine and its sounds will follow the action. But, you operate in DCC for a reason. You want access to more features, right? Well, depending upon the capabilities of your DCC controller, you now have access to a range of sound features including bell, horn, PFA, engine sounds on/off, master volume, Doppler, and more.

Here's a brief description of commonly used sound features.

F1 Bell

Toggles bell sounds on/off. Listen to the last half ring of the bell when it stops!

F2 Horn

Blows the horn, for as long as it's on. There are several different ending signatures depending on how long you hold the button down. Check it out!

F3 Start-up/Shut-down

F4 PFA

PFA in MTH lingo stands for passenger and freight announcements. Since your engine provides freight service, you'll hear freight yard sounds.. PFA is a very popular sound feature that's a staple in almost all MTH products. We had to give you this!

There are 4 sound sequences or segments in PFA. You advance through them at your command. Each segment has a minimum time of ~10 seconds but more sounds play the longer you listen.

When running the engine, simply press the F4 key to activate PFA. When you bring the engine to a stop, the arrival sequence will play. You can remain in this segment as long as you like.

Press F4 again, and advance to disembarking sequence. Again, you can listen to this sequence as long as you like.

Press F4 again, and advance to the embarking sequence. Again, you can listen to this sequence as long as you like.

Press F4 again and advance to the departure sequence. The bell will begin ringing then turn off after a short period of time. You must advance the throttle to start the train moving and accelerate to the running speed. The engine will not move automatically as it does in the DCS mode.

F6 Master Volume

This command cycles through 9 volume settings from off to max. Each press advances to the next cycle. Unlike the F6 engine sounds command, when the master volume is set to off, no sounds can be heard.

If your DCC controller has more F functions, you can access even more features. Check out the complete list in the chart at the end of this section.

Lighting

As with other feature categories, lighting in DCC mode operates just like analog DC with regard to rule 17, constant brightness and directional behavior. See that section for details. DCC provides some additional control to suit your preferences.

F0 Headlight

Toggles the headlight on/off.

F5 Lights (Classification/Marker, Mars, Interior, & Number Board)

Toggles all lighting on/off, including Marker and Classification LED's. When on, all lighting behaves automatically as described elsewhere. When F5 is off, all lighting is off.

More DCC

Okay, we've walked you through the basic features and functions available in DCC (F0..F8) but, there is much, much more. In fact, we've filled up functions F9 through F28. Some controllers are available today that provide easy access to F9 through F12 however, we don't know of any that allow you to press a button for F13 through F28. When the DCC controllers expand to include these functions, your MTH HO engine will be waiting. Here is a list of the F9 through F28 functions present in your engine with a brief description of how they work.

F9 Forward Signal

Plays 2 short horn toots to signal the engine is moving forward

F10 Reverse Signal

Plays 3 short horn toots to signal the engine is moving in reverse

F11 Smoke On/Off

F12 Smoke Volume

Cycles smoke volume through min, med, and max output levels.

F13 Grade Crossing

F14 Coupler Slack

F15 Extended Start UP

Plays a longer, more detailed and realistic start up sound sequence.

F16 Extended Shut-down

Plays a longer, more detailed and realistic shut down sound sequence.

F19 Engine Sounds (On/Off)

F20 Single Horn Blast

Plays a single short horn blast so you can make up your own signal patterns.

F21 Coupler Close

Plays the sound of 2 couplers crashing together and closing.

F22 Feature Reset

Resets the engine back to factory defaults with the exception of the address.

F23..F25 Idle Sounds 1 - 4.

Plays what we call idle recipes 1 through 4. These sound sequences play randomly when the engine is at idle but if you have these F functions, you can trigger them whenever you like.

F26 One Shot Doppler (On/Off)**F27 Brake Sounds**

Toggles brake sounds between auto and off. They are on by default but you can turn them off.

F28 Cab Chatter

Toggles random voices between auto and off. They are on by default but you can turn them off.

DCC “F” FUNCTION LIST

F Key Function

- F0 Headlight
- F1 Bell
- F2 Horn
- F3 Start-up/Shut-down
- F4 PFA
- F5 Lights (Classification/Marker, Mars, Interior & Number board)
- F6 Master Volume
- F7 Front Coupler
- F8 Rear Coupler
- F9 Forward Signal
- F10 Reverse Signal
- F11 Smoke On/Off
- F12 Smoke Volume
- F13 Grade Crossing
- F14 Coupler Slack
- F15 Extended Start-up
- F16 Extended Shut-down
- F17 Not Used
- F18 Not Used
- F19 Engine Sounds (On/Off)
- F20 Single Horn Blast
- F21 Coupler Close
- F22 Feature Reset
- F23 Idle Sequence 1
- F24 Idle Sequence 2
- F25 Idle Sequence 3
- F26 One Shot Doppler (On/Off)
- F27 Brake Sounds (On/Off)
- F28 Cab Chatter (On/Off)

CV Description (Program on Main or OPS mode only)

1	Short Address 1-127 (default = “3”)
3	Acceleration Rate 1-25 smph/sec (default = “4”)
4	Deceleration Rate 1-25 smph/sec (default = “4”)
17 & 18	Extended Address (upper bits must be set to 1)
29*	“38” to enable long address (uses values set in CV17 & CV18). “6” to enable short address (uses value set in CV1)
49	Short Address (for controllers that prohibit POM)
50 & 51	Extended Address (for controllers that prohibit POM)
55**	Reset (CV55=55 on address 55 to reset engine)

* Please refer to “Addressing” for more details.

** Please refer to “Resetting your Loco” for more details.

Addressing

Using the Default Short Address

Out of the box your MTH engine is programmed with a default short address of 3. To simply get your engine running on this address select loco 3 using your DCC controller and press Function 3 to start the engine up and away you go.

Changing the short address (1-127)

Set CV1 equal to the desired address between 1-127

Using the Default Long Address

Your engine's long address is also preprogrammed into your engine. The long address is equal to the cab number of your engine if the cab number is higher than 127, otherwise your default long address is 3333. To enable this long address set CV29 = "38". To revert back to the short address set CV29 = "6".

Changing the Long Address

To change the long address to something other than the default you must change the values that are saved in CV17 & CV18. In order to find the correct values a hexadecimal conversion must be made. To simplify things MTH recommends searching the Internet for "CV17 & CV18 calculator". Multiple calculators are available that will allow you to simply type in the desired address and will give you the values required for CV17 & CV18.

Resetting your Loco

Resetting back to factory defaults is a very useful feature. It is most commonly used if the engines address has been forgotten. Resetting an engine will restore all CV's, settings, and addresses back to their default values. To perform a factory reset, place the engine on the track, select engine address 55 with your DCC System. Set CV55 = 55. Remember to use POM or OPS mode (no programming track). Please note that all Ps3 equipped engines listen to address 55 for this command so any Ps3 loco powered on track will also reset.

DCS Digital Command System

As you may have gathered by now, DCS is an M.T.H. exclusive Digital Control System that provides easy access to dozens and dozens of features in our models. We developed DCS to provide a powerful and advanced model train control system that was simple and enjoyable to use. We've accomplished that goal. DCS further expands the features available far beyond that of DCC. After all, in DCC, we only had a limited number of "F" commands to fill.

As with DCC, we'll leave the detailed "how-to" system explanations to the DCS system manuals. What you should know are all the cool features your engine has built-in, waiting for you to experience.

Running the Engine

Once the DCS system is connected to your track and powered up by a DC Power Supply (even though DCS can be controlled by AC and DC power supplies, your M.T.H. HO locomotive will ONLY run on DC power), you simply place your engine on the rails, press "ADD ENG" and the system will scan the track and automatically upload your engine into the controller. At this point, you can press "START UP", roll the throttle and pull out! That's it!

Speed Control

DCS engines are controlled in scale miles per hour (smph) and increments of one. So, that means if you dial up 10, your engine will smoothly accelerate to 10 smph. There is no need to select a speed step setting, there's only one precise linear control at scale speeds. See, powerful yet simple.

Sounds

Independent Volume Settings

Using DCS, you independently adjust the bell, horn, engine, and accent sounds volume. This is like a mixer so you can set up the engine fit your specific tastes and sense of realism. Oh, they all move relatively up or down with the master volume settings.

Doppler Loop

You can either press the Doppler button on the remote to activate what we refer to as "one-shot" Doppler or, using DCS, you can program a Doppler loop that will peak at the same point on your layout, over and over.

Custom Sounds

You can fire any of 10 individual sound bites pre-loaded into your engine. These are typically, diesel idling sounds. Each one at the press of a single button. You can also make voice or other audio recordings and play them back on command with ease.

Proto-Dispatch

Press the “MIC” (microphone) button on your DCS remote and speak. Your voice will be digitized and played out of the model in real-time. Talk about station announcements!

Proto-Cast

Another MTH exclusive, you can connect any audio source with a line output to the DCS TIU and send music, train sounds, or anything you like down the rails to be played through the engine as it moves along the track. Your holidays may never be the same!

Lighting

As with everything in DCS, this becomes a little more than obvious. Pressing the “HEADLIGHT” button turns off the directional headlight and reverse light (if equipped). Pressing the Interior light will turn off the cab interior light.

SPECIFICATIONS

Electrical	Input Voltage	0 - 24 VDC
	Current Draw (lights, sounds)	~230 – 650 mA
	Lighting	LED - Rule 17
Operating Modes	Analog DC	Yes
	DCC - Digital Command Control	Yes
	DCS - Digital Command System	Yes
Default Addresses	DCS	1
	DCC short	3
	DCC extended	Cab No. or 3333

US PATENTS

US 6,457,681	Oct. 2, 2002
US 6,619,594	Sept. 16, 2003
US 6,655,640	Dec. 2, 2003

CARE AND MAINTENANCE

HO Troubleshooting Guide

The following Guide will help you trouble shoot your M.T.H. HO engine. This guide is broken up into the three operating modes of the engine Analog DC, DCC, and DCS

Analog DC

Start-up	Solution
When I apply power to the track my engine doesn't do anything. No lights, no sound, no nothing.	Check to see if that section of track has power. Use a voltmeter or a lit passenger car.
	Slide the engine a couple of feet in either direction, you may have a bad track section
	Have you got that section electrically isolated with a toggle switch or other device?
Sound	Solution
I have no sound from my engine, but my lights are on and it moves just fine.	Check the volume pot on your locomotive. Full CW = Max volume
There's a crackling sound from my engine	Check to see if a screw or some other material hasn't lodged itself in the underside of the engine body.

Analog DC

Lights	Solution
One of my lights is out	Most likely you had been running the engine in DCC or DCS mode and toggled that light off. Put it back into one of those modes and turn that light back on. The engine will remember that when you run it again in Conventional DC.
None of my lights are on	Could be the same reason as “One of my lights is out”
	Is the engine getting power? Check to see if there is voltage on the track or move the engine a few feet in either direction.
Motion	Solution
When I apply power to the track my engine starts up (lights and sound) but it won't move	Lower the track voltage then raise it again. The engine should start moving. If you apply greater than 9VDC quickly the engine will just set there. Lowering it below 9VDC then raising it will get the engine moving
My engine hesitates at slow speeds	An engine may do this right out of the box if it has not been lubricated. Follow the lubrication instructions. Now go ahead and run it.
	New engines even after they are lubricated may take a little bit to get everything run in. Be a little patient and let it run for a bit. It should clear up shortly after lubricating and running

DCC

Start-up	Solution
When I apply power to the track my engine doesn't do anything. No lights, no sound, no nothing.	Did you press F3 yet? F3 on your DCC handheld will start your engine up.
	Check to see if that section of track has power. Use a voltmeter or a lit passenger car, not your tongue.
	Slide the engine a couple of feet in either direction, you may have a bad track section
	Have you got that section electrically isolated with a toggle switch or other device?
Sound	Solution
I have no sound on my engine, but my lights are on and it moves just fine	You may have it turned off. Repeatedly press F6 to cycle through the volume levels (there are 9 levels, 0-max)
When I run Doppler I can hear the Doppler shift but then the engine sounds fade out and I can't get them back	This is normal. You will need to press the F26 button again to turn Doppler off. Your engine sounds will now return to normal

DCC

Lights	Solution
One of my lights is out	Check your F keys. F0 is the headlight (also controls the Back-up light) and F5 will toggle the Cab light
None of my lights are on	Could be the same reason as "One of my lights is out"
	Is the engine getting power? Check to see if there is voltage on the track or move the engine a few feet in either direction.
Motion	Solution
My engine hesitates at slow speeds	An engine may do this right out of the box if it has not been lubricated. Follow the lubrication instructions. Now go ahead and run it.
	New engines even after they are lubricated may take a little bit to get everything run in. Be a little patient and let it run for a bit. It should clear up shortly after lubricating and running
PFA	Solution
I hit F4 to start PFA but the engine just keeps ringing its bell, that's all it'll do	Bring the engine speed to 0. You will now hear the station arrival sounds (pretty cool, huh?). Pressing F4 will cycle you through the PFA sequence (check out the PFA section of the manual for more)
Why does my engine run away all by itself after the PFA is over?	This is normal. The engine will leave the station at the same speed it entered (when you hit F4 the first time). You can not control the speed of your engine while it's leaving the station, until the bell stops ringing.
Shut Down	Solution
Okay, I give up. What do I have to do to shut it down?	Well, you can either remove power from the track or press F3 again
Smoke	Solution
My engine isn't smoking at all	Make sure you've got the smoke switch ON. It must be ON for the smoke to operate in DCC mode
	Press F11 on your DCC handheld. This will activate the smoke
	If you just filled it with smoke fluid sometimes the fluid can make a seal in the stack blow down the stack to clear the air bubble.
My engine barely smokes	You may have set the smoke to Low. F12 will vary the smoke levels. Or, if you were running in DCS mode you may have toggled it there (If you don't have F12 on your DCC handheld you will have to put it back into DCS mode and change it from there)
	Check for an obstruction in the smoke stack

DCS (Remember, it's NOT DCC)

Start-up	Solution
When I apply power to the track my engine doesn't do anything. No lights, no sound, no nothing.	This is normal. You have to hit the Start-Up button.
	Check to see if that section of track has power. Use a voltmeter or a lit passenger car, not your tongue.
	Slide the engine a couple of feet in either direction, you may have a bad track section
	Have you got that section electrically isolated with a toggle switch or other device?
I get an error when I hit Start-Up	Have you recently changed the engine address?
	Check if there is power on that section of track the engine is sitting on (there has to be power for the signal to get to the engine and for the engine to be able to hear it)
	If you have two engines on the track they both may have the same address. Take one of them off the rails and try it again
DCS is polarity sensitive when powered by a DC power supply.	Check the polarity of the DC power supply connected to the Fixed 1 or Fixed 2 Inputs. Shut down power, reverse the inputs and repower DCS. Hitting the startup button the DCS remote should start up the locomotive.
Sound	Solution
I have no sound on my engine, but my lights are on and it moves just fine	You may have it turned off. Repeatedly press VOL + to bring the Master Volume up
	Did you turn off the ENG Sounds? Press the ENG SND button on your DCS controller.
	Check that you haven't lowered any of the independent engine volumes (Eng Sounds, Bell, Whistle, or Accent)
When I run Doppler I can hear the Doppler shift but then the engine sounds fade out and I can't get them back	This is normal. You will need to press the Doppler button again to turn Doppler off. Your engine sounds will now return to normal

DCS (Remember, it's NOT DCC)

Lights	Solution
One of my lights is out	Check that you haven't turned it off with the DCS controller. You have independent control over lights on your engine
None of my lights are on	Could be the same reason as "One of my lights is out"
	Is the engine getting power? Check to see if there is voltage on the track or move the engine a few feet in either direction.
Motion	Solution
My engine hesitates at slow speeds	An engine may do this right out of the box if it has not been lubricated. Follow the lubrication instructions. Now go ahead and run it.
	New engines even after they are lubricated may take a little bit to get everything run in. Be a little patient and let it run for a bit. It should clear up shortly after lubricating and running
	Check to see if you have any kind of binding on the side rods. There may be a chuck of your favorite, perfectly scaled pine tree stuck in there.
PFA	Solution
When I enter PFA all that happens is the bell rings. What do I do?	Press the DIR button. Your engine will stop and begins the arrival sequence. Pressing the DIR button will cycle you through the next 3 PFA sequences
Why does my engine run away all by itself after the PFA is over?	This is normal. The engine will leave the station at the same speed it entered (when hit the PFA button). The speed setting can be changed after the bell stops ringing.
Shut Down	Solution
Okay, I give up. What do I have to do to shut it down?	Well, you can either remove power from the track or press or press Shut-Down. Button on the DCS Remote
Smoke	Solution
My engine isn't smoking at all	Press the smoke button this will activate the smoke
	If you just filled it with smoke fluid sometimes the fluid can make a seal in the stack. Blow down the stack to clear the air bubble
	Check the Tender/Boiler drawbar connection. You've got to have them locked together
My engine barely smokes	You may have set the smoke to Low. This can be changed from Low to Med to High
	Add 10-12 drops of smoke fluid.
	Check for an obstruction in the smoke stack

HOW TO ORDER PARTS

How does it work?

Use Product Search to look up the item and view its exploded view.

Enter your item number here

Click Here to View the Exploded View Drawing and Parts List

M.T.H. HO Union Pacific 4500 HP Gas Turbine Engine

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 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). These centers 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 www.mthtrains.com to identify an M.T.H. Retailer near you.

M.T.H. products are warranted 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 repair, replace, or credit (at our option) the defective part 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 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. Train Merchant**, which gives 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