



# DH163AT

Fits Many Athearn  
HO Locomotives

**HO Scale**

**Mobile Decoder**  
**Digitrax Easy Connect Harness**  
**1.5 Amp/2 Amp Peak**  
**6 FX<sup>3</sup> Functions, 0.5 Amp**

## Features:

- **Digitrax LocoMotion<sup>®</sup> System**-Your locomotives look like the real thing. The Digitrax LocoMotion System makes them run like the real thing, too!
  - Torque Compensation** for smooth as silk silent operation.
  - 128 Speed Step** operation (14 or 28 steps can also be used).
  - Momentum** with acceleration and deceleration.
  - Normal Direction of Travel** is user selectable.
  - Switching Speed** feature for easier and faster access to yard speeds.
  - 3 Step Speed Tables** set start, mid and max voltage for custom control.
  - 28 Step Speed Tables** with 256 level resolution for precise control.
- **Scaleable Speed Stabilization (Back EMF)** with simple setup & 256 level resolution.
- **SuperSonic** motor drive for silent operation.
- **FX<sup>3</sup> Function** outputs for prototypical lighting effects and on/off control:
  - Constant Brightness Lighting** with directional or independent control.
  - Realistic Effects** like Ditch lights, Mars lights, strobes, and many more.
  - FX<sup>3</sup> & Standard Function Qualifiers** operate functions based on direction, F0 on or off, direction and F0, and whether loco is moving.
  - Function Remapping** of 14 functions for custom function setup.
  - Master Light Switch** turns off all lights & functions with one keystroke.
- **Advanced Consist Function Controls**
- **Plug ‘N Play** design makes installation quick and easy.
- **Transponder equipped** ready for transponding on your layout.
- **All Mode Programming with Operations Mode Read Back** reads back CV values right on the mainline.
- **Decoder Reset CV** with or without speed table reset.
- **Motor Isolation Protection** prevents damage to your decoder.
- **Basic, Advanced & UniVersal Consisting**
- **2 Digit and 4 Digit Addressing**
- **DCC Compatible**
- **FCC Part 15, Class B RFI compliant**

## Parts List

- |                                      |                     |
|--------------------------------------|---------------------|
| 1 DH163AT Decoder                    | 1 Instruction sheet |
| 1 DHAT Digitrax Easy Connect Harness |                     |

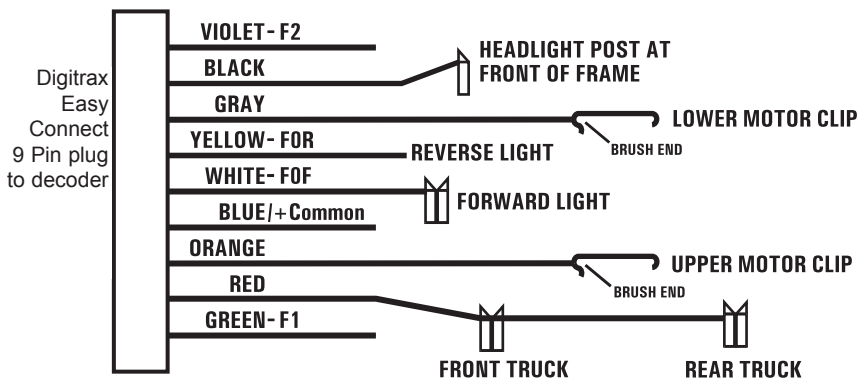
## Installation Information

See the Digitrax Decoder Manual for complete decoder test procedures, installation instructions, programming and technical information. Digitrax manuals and instructions are updated periodically. Please visit [www.digitrax.com](http://www.digitrax.com) for the latest versions, technical updates and additional locomotive-specific installation instructions.

## Installation Instructions

1. Carefully remove the locomotive's shell from the frame. Notice the orientation of the shell to the frame so that you can reinstall correctly.
2. The DH163AT is installed into the locomotive using a 6" harness that has a standard 9-pin Digitrax plug on one end and simple no-solder connections for an Athearn standard locomotive on the other end. The harness allows the decoder to be easily installed in a variety of Athearn locomotives according to the following diagram. (**Figure 1**) Simply remove the connectors shown below from the locomotive and replace them with the corresponding connectors on the wire harness. You do not have to solder the connectors in place but you may do so if you want to ensure a more secure installation.
3. Plug the 9-pin connector end of the harness into the DH163AT decoder. The plug is notched for proper orientation of plug and socket.
4. The DH163AT is factory programmed to address 03. You can easily customize the address and other features for your locomotive. See section "Customizing Your Decoder" that follows.

**Figure 1.** DH163AT Wiring Diagram





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## Installation Notes:

1. Do not exceed the decoder's 500mA total function output rating.
2. We recommend that the Blue wire, also called +Common or Lamp Common, be connected as shown. If you wish to omit the Blue wire in your installation, consult the Digitrax Decoder Manual for more information.
3. The head lamp should be hooked up using the Blue/+Common wire for optimal Digitrax transponding operation.
4. To use a function output with an inductive (coil) type load, see the Digitrax Decoder Manual for more information to avoid damage to the decoder.
5. See the Digitrax Decoder Manual for full details of wiring 12-16V lamps, 1.5V lamps, and LEDs. Lamps that draw more than 80 mA when running require a 22 ohm 1/4 watt resistor in series with the directional light function lead to protect the decoder.
6. Some locomotives employ filter capacitors for RFI suppression in the locomotive wiring. These may cause problems with Supersonic decoders and non-decoder analog operation on DCC. This capacitor should be removed for safe operation. This is not usually a problem with Athearn locomotives.

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## Customizing Your Decoder

Your Digitrax decoder is ready to run and will operate using address 03 with no additional programming. For a more prototypical railroading experience, your decoder can be customized for your specific locomotive by programming some of the Configuration Variables, or CVs, available. See the Digitrax Decoder Manual or the Digitrax web site for more information.

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## Changing the Decoder Address

The first CV most people change is the decoder address. This allows you to independently control each loco with a unique address. Digitrax decoders are shipped with CV01 (AD2), the two digit address, set to 03. Following is a brief description of how to change the decoder address with a Digitrax DT series throttle. See your Starter Set Manual for complete programming instructions.

1. Place the loco on the programming track. Go into Program Mode on your system. On DT400/DT402 press **PROG**. On DT300, DT100 & DT200 press **RUN/STOP & FN/F0**.
2. Choose AD2 for 2 digit addressing or AD4 for 4 digit addressing (DT400/DT402 and DT300). (Ad for DT100 & DT200, see set manual for 4 digit instructions).
3. Choose the address you want to set up for the decoder.
4. Complete address programming. On DT400/DT402 press **ENTER**. On DT300, DT100 & DT200 press **SEL**.

**Note:** CV29 must also be programmed to enable 4 digit addressing, this is done automatically by the DT400/DT402 & DT300 but not on earlier throttles.



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## **Digitrax LocoMotion® System**

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Your locomotives look like the real thing, now you can make them run like the real thing, too. Digitrax decoders incorporate torque compensation for smooth as silk operation. You can also program CVs that control momentum, 3 step and 128 step speed tables, switching speed, normal direction of travel, scaleable speed stabilization and more to take full advantage of the Digitrax LocoMotion System.

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## **Momentum-CV03 & CV04**

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Momentum is part of the LocoMotion System. Acceleration is controlled by CV03 and deceleration by CV04. Both come from the factory set to 000. A range of 000 to 031 is available for both accel and decel. Try CV03:003 and CV04:000 as a starting point for experimenting with momentum.

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## **Speed Tables-How the Loco Responds to the Throttle**

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With Digitrax LocoMotion, there are two types of speed tables: 3 Step Tables and High Resolution 28 Step Tables. Please see your Decoder Manual for a discussion of the 28 Step Tables. The 3 Step Tables are set up by programming 3 CVs: Start Voltage (CV02), Mid point Voltage (CV06) and Max Voltage (CV05). These values are set at 000 at the factory. All have a range of values from 000 to 255. We recommend the following CV values as a starting point for experimenting with speed tables.

<b>Loco Type</b>	<b>V Start CV02</b>	<b>V Mid CV06</b>	<b>V Max CV05</b>
<b>Switcher</b> Concentrated low speed. Limited top speed	002	038	064
<b>Road Switcher</b> Prototypical top speed w/evenly distributed curve from 0 to top speed	002	048	098
<b>Mainline Loco</b> Quick increase to cruising speed then levels off to prototypical top speed.	002	128	154



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## **Other LocoMotion® Features: Switching Speed, Normal Direction of Travel & Scaleable Speed Stabilization (Back EMF) Features**

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**Switching speed** is controlled by CV54. The factory setting is 000 for OFF. To turn on the switching speed feature, program CV54 to a value of 001. When this feature is on, use F6 to activate and deactivate switching speed. When switching speed is ON and F6 is ON, the switching speed feature is on. With the feature on the throttle's target speed is effectively reduced by about 50% and the effects of accel and decel programmed into the decoder are reduced by 1/4. This is useful for yard switching operations.

**Normal Direction of Travel** is controlled by CV29. See your decoder manual for additional information on the settings for CV29.

**Scaleable Speed Stabilization (Back EMF)** intensity, or droop, is controlled by CV57. The factory setting for this feature is 006 which is suitable for most locos. You can adjust this value in the range of 000 for OFF to 015 for the maximum effect. Consult your Digitrax Decoder Manual for info about CVs 55 & 56 and their effects on scaleable speed stabilization. The factory setting for both CV55 and 56 is 000.

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## **SuperSonic Silent Operation and Torque Compensation**

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The factory settings in the decoder provide silent, smooth operation of your locomotive under most conditions. For more information about these settings, please see the Digitrax Decoder Manual or our website.

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## **Digitrax Transponding CV61**

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**Digitrax Transponding** is controlled by CV61. The initial factory set value is 000 for OFF. To turn on transponding, program CV61 to a value of 002. This allows you to use Digitrax transponding to keep track of your rolling stock. When transponding is enabled, the front light of the locomotive will flicker slightly to indicate transponding signal is being communicated. For optimal transponding operation, we recommend that you hook up the forward and rear lights as shown above.

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## **Decoder Reset CV08**

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Decoder reset lets you reset all CV values to the initial factory settings. To reset all CV values, program CV08 to a value of 008. You also have the option of resetting all values except the 28 speed step tables. To do this, program CV08 to a value of 009.

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## Function Outputs on the DH163AT

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The DH163AT is set up at the factory to control six function outputs. The DH163AT is configured to control the forward and reverse lights on the locomotive through the yellow lead and white lead using Function 0 (F0F-forward yellow and F0R-reverse white) for directional lighting. Functions F1(Green) and F2 (Violet) are part of the harness for easy hookup.

F3 and F4 are also available on the decoder board. These can be accessed by snipping the shrink wrap and peeling it back to expose the solder pads that control these functions (Figure 2). To use these functions, solder a wire from the pad for the function you wish to use to the lamp (or other function) you wish to control. The Blue/+Common pad works the same way as the blue wire on the harness and is provided here for convenience. The wire colors indicated are the standard color code used in the industry (you can use any color you like). These colors are important if you plan to use function remapping.

***CAUTION:** When adding function wires, be very careful that the wires you add do not come into contact with any other pads or components on the board where they might create a short circuit.*

All six function outputs can be easily set up with Digitrax FX3 lighting effects or as standard on/off functions with the following operational qualifiers:

1. Forward or Reverse direction of travel, or
2. Whether F0 is on or off, or
3. Both direction of travel and whether F0 is on or off, or
4. Whether the locomotive is stopped or moving.

**Figure 2.** DH163AT Decoder Function Outputs



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## Function Remapping

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Function remapping allows you to program the function outputs of your decoder to be controlled by selected function keys on your throttle. Please consult the Digitrax Decoder Manual or website for information on function remapping.



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## Master Light Switch

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Each of the six function outputs can be programmed to turn on and off with the F0 ON/OFF key on your throttle, creating a Master Light Switch. The CV values for creating this effect are listed in the Digitrax Decoder Manual in the section: *Setting Up FX & FX<sup>3</sup> Effects On Function Outputs*.

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## Digitrax Easy Connect Harness System for Athearn

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Your DH163AT comes with the Digitrax Easy Connect system—a socket on the decoder board and a wire harness to connect to your locomotive. The DHAT harness has simple no-solder connections for standard Athearn locomotives on one end and a 9 pin plug on the other end that plugs into the decoder.

Once you have installed the harness in your locomotive, it's easy to unplug the decoder from the loco. This is useful if you have many locos to equip and a limited budget. It also makes it easy to unplug a decoder and try a different one if you suspect a problem. And, if you need to return the decoder for service, you won't have to remove the wiring from the loco, just send in the decoder.

Simply install harnesses in your locos and share decoders among your locos. To run your harness equipped locos on DC, just add a shorting plug, DHDP. The wire harnesses and shorting plugs are sold separately by your dealer. Clubs often use this approach so that their members who don't run DCC at home can still enjoy it at the club.

Your decoder can also be used with one of the other Digitrax Easy Connect Harnesses. These are available in long (DHWHP) and short (DHWHPs) wire length versions with the Digitrax plug on one end and a DCC medium plug on the other end. Another version (DWH) has the Digitrax plug on one end and wires on the other end for installation in other locomotives.

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## Warranty & Repair

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Digitrax gives a one year *"No Worries" Warranty* against manufacturing defects and accidental customer damage on all Digitrax products.

**That's it! A simple, straightforward warranty with no tricky language!**

Visit [www.digitrax.com](http://www.digitrax.com) for complete warranty details and instructions for returning items for repair.

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# DH163AT

Fits a Variety of Athearn HO Locomotives

## Go Beyond DCC With



## Complete Train Control

### Main Station

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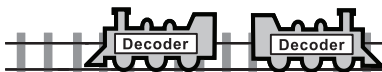
Your Digitrax LocoNet® Starter Set is just the beginning of an exciting trip! Pick the one that's right for you!



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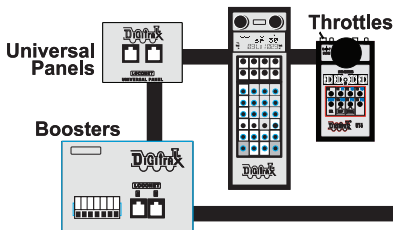
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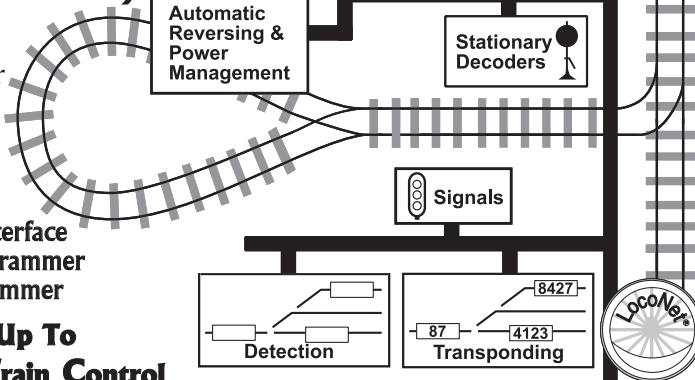
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