

Due to size constraint the following information will be included in the final version of the user instructions:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

HO TRAIN ENGINEER WIRELESS RADIO CONTROL SYSTEM

Congratulations on your purchase of the CREST HO Train Engineer Wireless Radio Control System. This product has been manufactured to the highest standards using only quality components and, with proper care, should provide you with reliable service. Although some of the more advanced features may be new to you, with a little guidance they are easy to use and can add to your overall railroad operating pleasure while protecting your equipment.

INTRODUCTION TO THE HO TRAIN ENGINEER

The CREST HO Train Engineer Wireless Radio Control System is designed to operate with any HO model locomotive that is equipped with a Digital Command Control (DCC) NMRA standard eight pin interface board without any significant modifications. As an added benefit, the receiver utilizes the locomotive's 12-volt lighting system to aid in linking it to the transmitter. Furthermore, the receiver is activated using a magnet. These latter two features allow you to easily link the transmitter and receiver without the need to drill additional holes to mount additional switches on your locomotives.

The unit is designed for easy operation with simple "plug and play" installation. Since this is a true radio control system, no "line of sight" is necessary between the transmitter and locomotive(s) under control.

The HO Train Engineer has ten different frequencies and each frequency has ten different channels available for use. Thus, it is possible for one transmitter to control 100 different receivers independently. There are no unique frequency crystals in the transmitter or receiver. Using a patented CREST innovation, each frequency is digitally generated with a computer code that is user selectable.

FEATURES

In addition to its wireless walk-around control of multiple trains and accessories, the HO Train Engineer offers several other features to both enhance your enjoyment and protect your valuable equipment. These include momentum and directional change time delay.

In real life, trains don't "jack rabbit" to speed or "stop on a dime" so why should yours? The adjustable momentum control incorporated in the HO Train Engineer allows you to increase and decrease the speed of your trains in a smooth and realistic manner. These gradual changes are also easier on your trains' motors and gears.

One of the hardest things on any train is a quick change in direction. This not only causes excessive wear on all moving parts, but also can strip gears in the locomotive. Furthermore, even if no damage is done, it can cause a derailment. To alleviate these problems, the HO Train Engineer incorporates an adjustable time delay feature when changing directions. When the directional buttons are pushed, the train gradually slows to a stop, changes direction, and returns to its prior speed. As with momentum, the delay period is user adjustable.

COMPONENTS

The HO Train Engineer Wireless Radio Control System is a two-piece set that includes both a transmitter and receiver. Additionally, a magnet used to link the receiver to the transmitter is provided.

In addition you will need the following:

- Batteries: four 1.5V "AA" Alkaline to power the transmitter
- 12-14V DC filtered power source

While any good DC well-filtered power source (pure DC without "noise") of proper voltage for HO locomotives will serve to power the receiver, we recommend the use of our switchable power supply. (Note, that no separate controller or "throttle" is necessary as the control comes from the on-board receiver.)

INSTALLATION

Receiver

(Note: The receiver must be placed within the locomotive or tender in a location where it will be influenced by the magnetic field of the provided magnet)

- 1) Following the manufacturer's instructions, remove the locomotive's shell. The HO Train Engineer receiver is designed to plug directly in to the eight-pin DCC port included in many DCC-ready locomotives. Depending upon the selected locomotive, it may be necessary to remove an on-board jumper prior to plugging in the receiver. The instructions included with your locomotive should provide more details on this installation procedure. If the locomotive is provided with the eight-pin DCC port, follow the locomotive manufacturer's instructions regarding DCC conversion. Provided with the receiver is a female eight-pin DCC NMRA standard plug. This is for use in converting locomotives that do not have a manufacturer provided eight-pin plug. If this is your situation, follow instructions in the "Locomotive Conversion" supplement, then continue with step 2.
- 2) Stretch out the antenna wire along the inside of the locomotive shell. Ensure that the wire is routed away from any moving parts within the locomotive.
- 3) Replace the shell.

Transmitter (FIGURE-2)

- 1) Unscrew the two recessed Phillips head screws in the back of the case and remove the back cover.

- 2) Unscrew the Phillips head screw next to the word "ANTENNA" etched into the top of the circuit board. Place this screw through the loop at the bottom of the provided antenna and place this assembly on the circuit board so that the antenna fits within its cutout in the case. Retighten the screw until secure. (Caution, do not over tighten.)
- 3) Insert four 1.5 V "AA" batteries making sure that they face in the directions indicated on the battery holder.
- 4) Replace the back cover and retighten the two removed screws until secure.

NOTE

- If LEDs on the transmitter flash quickly and then go out when a button is depressed, the batteries are low and need replacing.
- When the batteries are removed, replace them within 30 minutes. The memory of the transmitter will be wiped out after 30 minutes. It will be necessary to reestablish links with the receivers.

Many power supplies, controllers and/or throttles do not provide clean or pure DC voltage that is required for the proper operation of the HO Train Engineer system. For these situations a noise filter is provided. For noise filter installation, see figure 1.

KEY PAD FUNCTIONS (SEE FIGURE-2 & TABLE 2)

- C-L
Channel selection, move left.
- C-R
Channel selection, move right.
- FAST
Throttle up (Increase Speed).
- SLOW
Throttle down (Decrease speed).

- **LEFT ARROW**
Change direction.
- **RIGHT ARROW**
Change direction.
- **EMERGENCY STOP**
Push to emergency stop train or locomotive on current frequency and track channel.
- **KEYPAD "A" - "F"**
Control buttons for accessory devices.
KEYPAD "F" can be used to turn headlights on and off.
- **KEYPAD "SPD"**
Push to check train speed.
- **KEYPAD "ALL STOP"**
Push to emergency stop all trains and locomotives controlled by the transmitter.
- **KEYPAD "FRQ"**
Selects the radio frequency.
(Note: As a safety feature there is a built in response delay to the pressing of buttons to prevent inadvertent changes.)

HOW TO SELECT THE RADIO FREQUENCY

Press the "FRQ" button and hold it down for 2 seconds. At that time the LED will begin to flash at the present frequency location number (1-10). Press "FRQ" again to select the desired frequency. The light will move to the right. Release the button at the desired frequency number. Press any other button or simply wait for the light to extinguish to select the desired frequency.

HOW TO SELECT THE CHANNEL NUMBER

Press either of the Channel Select buttons, "C-L" or "C-R" (under the LED display on the transmitter). The light will begin to flash at the present channel number (1-10). Press again to move left or right to select the desired channel. This setting allows the use of multiple engines with multiple receivers.

button. This step sets the reverse time delay between the transmitter and the locomotive. The reverse time delay determines how quickly the locomotive responds to direction change commands. (See Table #1 for reverse time delay settings.)

- 6) To complete the linking operation, press either the A or F buttons to set the memory. Memory On (A Button) allows the locomotives to automatically return to its present speed and direction in the event that power to the track is lost and subsequently restored. If Memory Off (F Button) is selected, when power to the track is lost, the locomotives will stop and remain motionless until the "FAST" button is pushed. The transmitter and receiver are now linked. NOTE: For the best operation, ensure that all wheels and electrical pick-up contacts of the locomotive are clean and that the track is clean.
- 7) For additional locomotives, select a different frequency and/or channel on the transmitter and repeat linking Steps 2 through 6.
- 8) If multiple locomotives are to be linked on the same frequency and channel (such as for a multiple unit lash-up) follow step 7. Then, ensure that the additional locomotives are running in the same direction (change the direction of the locomotive by pressing a direction button on the transmitter). Repeat steps 3 through 6 for the additional locomotives using the same frequency and track channel and Alpha Key combinations used for the first locomotive.

HOW TO CHECK THE SPEED OF THE TRAIN

To check the relative speed of a locomotive while underway, press the "SPD" button. The number of lights that come on gives a relative indication of the speed of the train. The lights will not stay lit and the higher the speed, the faster they will extinguish.

NOTE: It is necessary to hold the fast or slow key for 2 seconds to change the number of lights displayed.

However, in this mode the receivers are susceptible to radio interference if two users issue commands simultaneously. Furthermore, one user can inadvertently issue commands to another user's receiver (and train). For interference free operation, when you are sharing a layout with others you should change the frequency rather than the track as shown above.

HOW TO LINK THE TRANSMITTER AND RECEIVER

- 1) Turn on the power source, which supplies 12 volt DC current to the track.
- 2) Place the locomotive(s) on the track if not already on the track.
NOTE: The direction that the locomotive faces has no relation to its orientation relative to the direction buttons on the transmitter.
NOTE: If the lights do not blink, depending on the receiver's proximity to the locomotive shell, it may be necessary to reorient the magnet relative to the shell. If the lights still fail to blink, it may be that the power supply does not supply a "clean" source of DC current. CREST has found that some power supplies will not work with the HO Train Engineer system.
- 3) Place the magnet over the locomotive shell above the receiver location to activate the decoder. The locomotive lights will blink rapidly. Remove the magnet.
NOTE: if the lights still fail to blink, it may be that the power supply does not supply a "clean" source of DC current. CREST has found that some power supplies will not work with the HO Train Engineer system.
- 4) Press and hold one of the Alpha buttons (A-F) on the transmitter until the blink rate of the lights slows. Release the Alpha button. This step links the loco to the transmitter and sets the desired momentum. The "A" button sets no momentum while buttons "B" through "F" increases the relative momentum from minimum to maximum, respectively. The exact momentum will vary between different locomotives. (See Table #1 for momentum settings.)
- 5) Press and hold one of the Alpha buttons (A-F) on the transmitter until the lights stop blinking. Release the Alpha

Thank you for choosing the CREST HO Train Engineer and we hope this innovative product enhances your enjoyment of the hobby. Enjoy!

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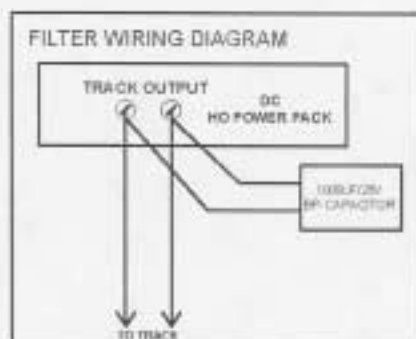


FIGURE-1

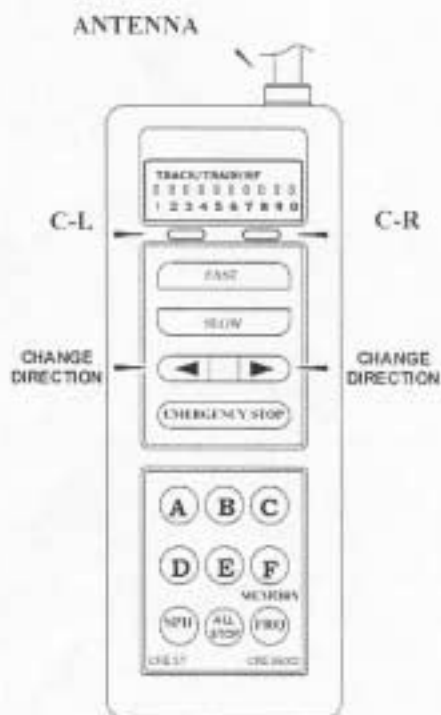


FIGURE-2

Table 1
Alpha Keypad Use in Locomotive/Transmitter Linking Procedure

KEYPAD BUTTON	STEP #4 MOMENTUM SETTING	STEP #5 REVERSE TIME DELAY	STEP #6 MEMORY SETTING
A	No Momentum	0.1 Second	Memory On
B	#1	0.2 Second	
C	#2	0.5 Second	
D	#3	1.0 Second	
E	#4	1.5 Seconds	
F*	Maximum Momentum	2.0 Seconds	Memory Off

*After linking process is complete Keypad Button "F" can be used to turn headlights on and off.

Table 2
Transmitter Keypad Buttons & Functions

BUTTON	FUNCTION
C-L	CHANNEL SELECT CHANGE TO LEFT
C-R	CHANNEL SELECT CHANGE TO RIGHT
FAST	INCREASE SPEED
SLOW	DECREASE SPEED
ARROW BUTTONS	CHANGE DIRECTION
EMERGENCY STOP	STOPS LOCOMOTIVE(S) ON CURRENT FREQUENCY & CHANNEL
ALFA KEYS (A-F)	SEE TABLE 1
SPD	SPEED RELATIVE TO VOLTAGE
ALL STOP	STOPS ALL LOCOMOTIVES CONTROLLED BY TRANSMITTER
FRQ	FREQUENCY SET/CHECK

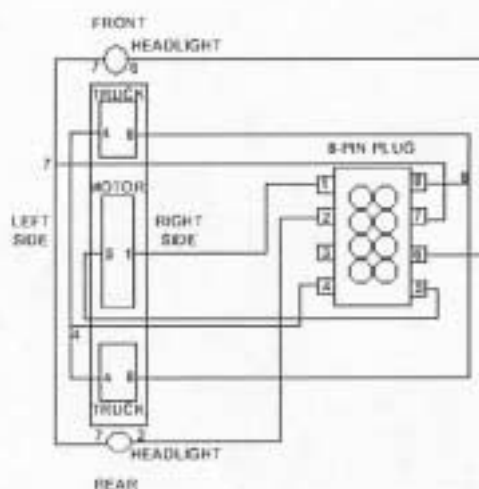
CREST Electronics **LOCOMOTIVE CONVERSION** **FOR LOCOMOTIVES WITHOUT 8 PIN DCC PORT**

Many HO locomotives do not come equipped with the female 8-pin DCC port that is required for the proper installation of the CREST HO Train Engineer Receiver. Therefore, a female 8 pin DCC port is provided. Wiring of the locomotive to the 8-pin DCC port follows the standards and practices used by DCC decoder manufactures. This provides compatibility with DCC systems.

Before wiring the 8-pin DCC port to the locomotive, you will need to establish the right-hand and left-hand sides of the locomotive. Establish which side of the locomotive is the front. You can decide which end is the front, or use the end established by the manufacturer. The front can be considered to be the side of the locomotive facing the direction of travel when the locomotive is traveling in the forward direction.

Place the locomotive with the front facing away from you. The right-hand side of the rail power pick-ups is on your right. Follow the right-hand power pick-up, it will be wires, the locomotive frame, or metal clip, to the motor. Where the right-hand power pick-up connects to the motor is the right-hand motor power pick-up. The left-hand side of the rail power pick-ups is on your left. Follow the left-hand power pick-up, it will be wires, the locomotive frame, or a metal clip, to the motor. Where the left-hand power pick-up connects to the motor is the left-hand motor power pick-up.

When wiring the 8-pin DCC port to the locomotive, it is recommended that you solder the wires to the wiring locations on the locomotive. Do NOT solder the wires to the 8-pin DCC port. Instead, use the plastic wiring caps provided with the 8-pin DCC port. Soldering the wires the 8-pin DCC port may cause damage preventing proper operation of the locomotive.



NUMBER	WIRE COLOR	WIRING LOCATION
1	orange	Motor power pick-up (right-hand)
2	yellow	Rear headlight
3	Not used	
4	black	Left-hand rail power pick-up
5	gray	Motor power pickup (left-hand)
6	white	Front headlight
7	blue	Common (+) headlight power source
8	red	Right-hand rail power pick-up

The above table shows the location number on the 8-pin DCC port, the appropriate wire color according to established DCC wiring standards, and the wiring location on the locomotive. It is necessary to maintain consistency with the 8-pin DCC port location number and the wiring location on the locomotive. While wire color does not effect proper operation of the locomotive, for the purposes of simplicity and maintenance, it is recommended that you follow established DCC practices.

When wiring the motor, the motor must be isolated from any power source except for the orange (number 1) and gray (number 5) wires originating with the 8-pin DCC port. Many locomotives use the frame to conduct electricity through the locomotive. The motor power pick-ups must be insulated from the frame. After the power pick-ups are soldered to the orange and gray wires, isolating the motor and insulating it from the frame can be done by wrapping the power pick-ups in electrical tape.

Many manufacturers do not provide 12-volt light bulbs in their locomotives. If this is your situation, you will need to replace the manufacturers provided light bulbs with 12-volt bulbs or install resistors in the wires between the light bulbs and the 8-pin DCC port.