

Installation Instructions for
UCUB

Command Control Upgrade for O-gauge Locomotives



Designed & Manufactured by:
4137 Boardman-Canfield Rd
Suite LL02
Canfield, OH 44406
(330) 533-7181 Mon-Fri 10a-6p EST
(330) 533-7208 Fax, 24 Hours
www.tastudios.com

Train America Studios UCUB Installation Manual

This is the second edition of the UCUB Installation Manual. We have broken it down into six categories. Please follow the block of instructions that most closely resembles your specific locomotive. If your locomotive has any features that are not listed here, please feel free to contact us. We have been converting engines over the last two years and have encountered pretty much everything there is on the market. We are more than willing to assist you during your installation.

Contents

Special Note; Engines Equipped with Protosounds	2
AC Powered Diesels	3
AC Powered Steam Engines	5
DC Powered Diesel (Excluding MTH Premier)	7
DC Powered Steam Engines (Excluding MTH Premier)	10
DC Powered MTH Premier Steam Engines	12
DC Powered MTH Premier Diesels	14
First Time Testing	16
Special Lighting Section	16
Sound Installation	17
Die Cast Tender Shells	22

MTH Engines with Protosounds

MUST DO THIS FIRST

Protosounds uses the track power to determine its direction, neutral state and reset positions. Because the UCUB provides a constant 12 volts of power to the Protosounds board, the sound board must be locked into forward. To complete this task, follow the directions below;

- 1) Set the engine on the track and turn the transformer on to more than 8 volts. Once the bell dings twice and the sounds fire up raise the track power to full voltage.
- 2) Press the direction button 40 times at a rather fast pace. Each time you press the direction button you will hear a pssssh. After having pressed the direction button 40 times you will hear 8 clanks. This will signify that you in feature 40. (if you do not hear 8 clanks press the direction button one time and wait for the next clank) If you don't understand refer to your Protosounds direction booklet under rest positions.
- 3) Press the whistle button twice, or until you hear 2 dings. Once you have heard two dings, turn the throttle off until the Protosounds board resets, a garbled sound can be heard.
- 4) Once the Protosounds board has reset (mentioned above in step 3) get the engine running forward as you normally would. While the engine is running forward press and hold the whistle button. While holding the whistle button, turn the throttle completely off. The horn will stop blowing and then blow once real short. Once you hear this short blast turn the throttle back on.
- 5) Your engine is now locked into forward. To verify this, turn the transformer off, wait for the garbled sounds. Turn the transformer on again and it should start out in forward only. If these are the results you get, proceed to your specific block of instructions and start the installation process.

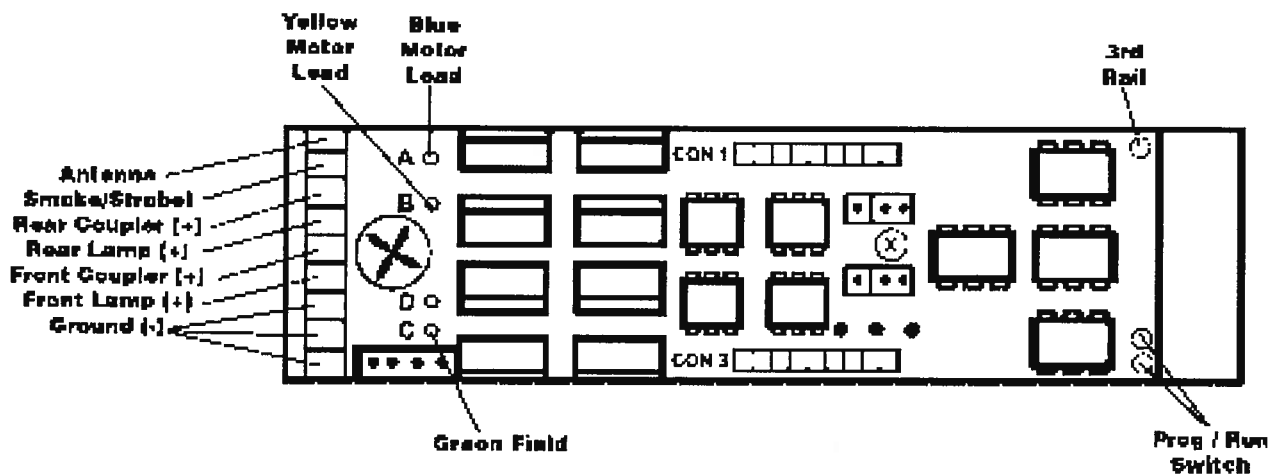
Note; If you are unable to lock the engine in forward, refer to your Protosounds direction manual. For in depth help, call MTH Service at 410-381-2580 ext. 3

Installing UCUB into AC Powered Diesels

99% of all AC powered diesels are made by Lionel. It includes everything from the earliest Standard Gauge Electric Locomotive up to the most recent Dash-8's and 9's. Color coding is not always the same from one locomotive to the next. Please double check your wires before connecting anything to the UCUB. Below are two diagrams; one is an overhead view of an AC UCUB. The other is an overhead view of an AC Pullmor motor, showing the components used during this installation.

Old Postwar F-3's with 2 Pullmor motors will not have enough room in the powered unit to mount the UCUB. Therefore, you will need an 8-pin connector to go between the powered unit and a dummy unit. (You will only use seven of the eight wires)

OVERHEAD VIEW OF AC UCUB



Begin by removing the shell and anything attached to the shell such as lights and battery connections.

Disconnect all wires going to the reverse unit. This includes pickup, ground, motor leads, field windings, headlights, horn wires, sound wires, etc.

Remove any mounting hardware attaching the reverse unit to the frame. Set the old reverse unit aside. If there is a sound system attached to the frame, remove any mounting hardware and set it off the frame, yet still attached to the speaker and cam.

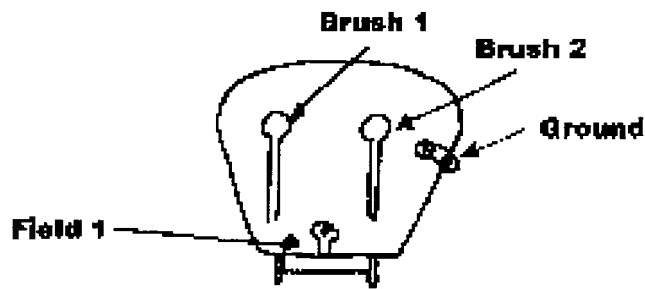
You should now have a bare frame ready for the installation of a UCUB.

Begin by locating a mounting hole for the Prog./Run switch. This may be a preexisting hole in the frame or fuel tank, if this is the case, use the two screws and nuts that came with the UCUB to mount it. It may have to be mounted to the bottom of the frame with the thin double sided tape.

Connect the red wire from the UCUB to the pickup wires. The pickup wires will be coming from the center rollers.

Locate the ground wire from the loco and connect it to the ground screw terminal. The ground wire may be attached to the frame or to the screw that holds the motor cover on.

The yellow and blue wires from the UCUB get connected to the brush wires on the motors. Most brush wires are blue and yellow (but not always as mentioned before). To avoid any confusion see the diagram below (applicable on double motor diesels only).



The green wire from the UCUB gets connected to Field 1 (see diagram).

Locate the ground leads from both headlights. Tie them together and connect to the ground screw terminal. Connect the front headlight positive lead to the front lamp screw terminal. Now the rear headlight positive lead to the rear lamp screw terminal.

If the locomotive has been upgraded to coil couplers, take one wire from each coupler and connect it to the ground screw terminal. Now connect the front coupler hot lead into the front coupler screw terminal. Repeat the process for the rear coupler hot lead. ** If the locomotive is of Postwar vintage, you do not need to connect a ground wire. You only need to connect the hot lead from the coil coupler (usually connected to a slide shoe in the truck) to the front or rear coupler screw terminal (respective to its position). The ground for the coil coupler(s) will come from the frame of the engine.

Connect the antenna (that came with the UCUB) into the antenna screw terminal. Leave it hang loose and proceed to ***FIRST TIME TESTING.***

Once you have completed first time testing, refer to ***SOUND INSTALLATION*** if your engine is equipped with horn or sounds, or if you are adding a sound upgrade.

Once you have completed testing and have installed your sound board it is time to mount the antenna and replace the shell. Chances are the shell is made of either plastic or Bakelite. Remove the paper on the back of the antenna to expose the adhesive side. Mount the antenna top dead center to the inside of the shell. Once the antenna is mounted, cover it with a strip of electrical tape to avoid it contacting anything inside.

Take care to not smash the shell on top of the frame. If the circuit boards inside the engine are bent in any direction it could potentially cause odd things to happen while operating.

Make sure there are no loose wires hanging outside the shell. Also make sure there are no wires between the frame and shell when screwing the two together. Once everything is together refer to First Time Testing to ensure everything is installed properly.

Installing UCUB into AC powered Steam Engines

99% of all AC powered Steam Engines are made by Lionel. Most have AC Pullmor motors, some have Atomic motors, and open frame AC motors. Regardless of the motor type, they will wire up the same. We have a few diagrams that show the locations of each component for that particular motor. Please pick the diagram closest to yours and follow it through the installation process. Color coding was not a high priority during the Postwar years, so your locomotive may not have the same color wires as described in the directions; nevertheless, follow the diagrams below for clarity.

An 8-pin connector will be needed for most installations, this is available from train America Studios for \$10.00. The 8-pin has one red wire and seven black wires. It is very important that you pay close attention to wires when connecting them from engine to tender. It is a bit difficult to keep the wires straight, but if you take your time, it will be a breeze.

Some Modern Era Lionel locomotives will require special installation instructions. For these locomotives we ask that you call us for the wiring diagrams. Or send us the locomotive so we may do the installation. They are as follows;

J Class locomotives with sounds.

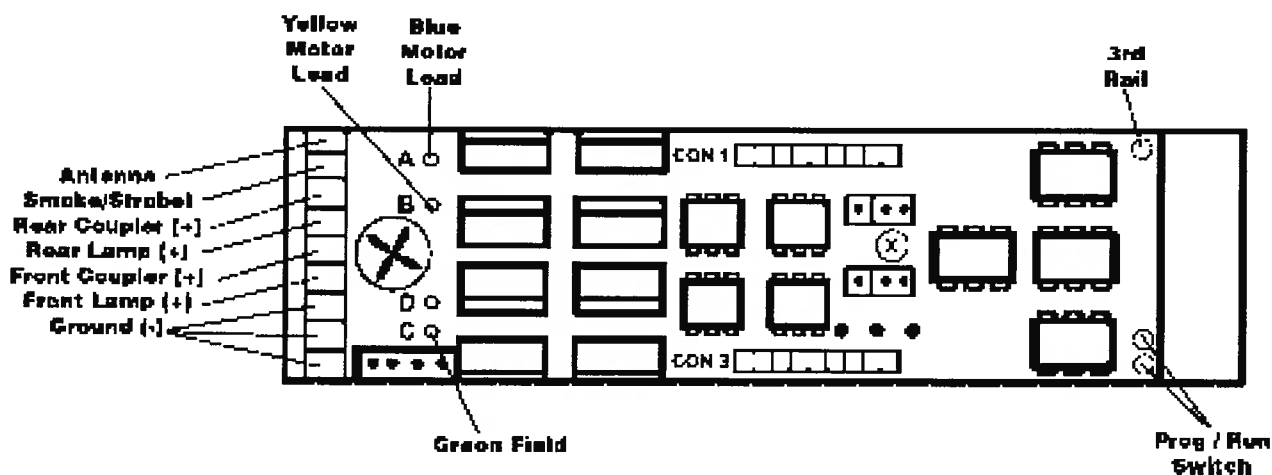
GS-2 & 4 Class locomotives with sounds.

S-2 Scale PRR Steam Turbine

Mikado Class locomotives with sounds will need to have the sounds upgraded. There is not enough room in the tender for both the UCUB and the existing sounds. It either has to be the UCUB and no sounds, or the UCUB and QS-3000 or Railsounds 4.0

Before we get started, review the overhead diagram of an AC UCUB. Note each wires function and the function of the screw terminals.

Overhead View of AC UCUB



To begin the installation remove the shell of the engine and tender. Set them aside until completion.

Locate the E-Unit inside the locomotive and clip the wires off of it. Take the E-Unit completely out of the locomotive. This includes both brush wires, field wires, headlight, smoke unit, and pickup wire.

Inspect the tender shell area and determine if the UCUB will fit into the tender without removing the whistle. If not remove the whistle from the tender (if applicable). Disconnect the wires from the pickup rollers, remove the mounting screws and set the whistle aside. If the engine has a sound system, only disconnect the wires that connect to the reverse unit (E-Unit). Leave the other wires connected (sound cam, speaker, amp board, etc.). Remove any applicable mounting hardware and set the sounds off to the side for now.

You should now have a bare tender frame and a locomotive with no E-Unit.

The UCUB will mount inside the tender. Use the thick double sided tape to mount the UCUB to the tender frame. Ensure the UCUB is properly spaced so the shell will have enough room to fit back onto the frame.

Begin by locating a mounting position for the Prog./Run switch. It may have to be mounted to the bottom of the frame using the thin double sided tape. If you have a mounting hole for the switch use the two screws and nuts that came with the UCUB to mount it.

FROM THIS POINT ON, WE WILL EXPLAIN WHERE EACH WIRE CONNECTS IN THE ENGINE. YOU WILL HAVE TO CONNECT ONE END OF THE TETHER TO THE UCUB AND THE OTHER END OF THE TETHER TO THE LOCOMOTIVE WIRES.

Connect the red wire from the UCUB to the pickup wire in the engine. Make this connection using the red wire on the tether to keep the wires oriented.

Connect the ground wire (inside the Loco) to the ground screw terminal of the UCUB.

The blue wire from the UCUB must be connected to Brush 1.

The yellow wire from the UCUB must be connected to Brush 2.

The green wire from the UCUB must be connected to Field 1.

Locate the positive lead from the headlight and connect it to the front lamp screw terminal of the UCUB.

Locate the positive lead from the smoke unit and connect it to the smoke unit screw terminal. If you do not connect the smoke unit to the UCUB, but directly to pick up, you will need a resistor to avoid burning up the smoke unit. A 82 ohm ½ watt resistor should do the trick.

You will have one additional wire left on your tether that will not be connected to anything. You can clip the wire at the connector to avoid getting it caught on any moving parts.

Install the antenna into the proper screw terminal of the UCUB and leave it hang loose for time being.

Refer to ***FIRST TIME TESTING*** before proceeding any further.

If the engine is going to be retrofitted with sounds or whistle, or came with a sound system refer to

SOUND INSTALLATION.

Once all the testing and sounds have been completed. It is time to button up the engine. Begin with the engine shell. Ensure no wires are being pinched between the frame and shell. Also make sure the tether has enough room to swing back and forth between the frame and shell.

**Plastic Shell Tender? follow the directions below

Die Cast or Brass Tender Shell? Refer to *DIE CAST TENDER SHELLS.***

This set of directions is for plastic tender shells only! Before you place the shell on the tender, remove the double sided tape from the antenna and stick top dead center of the tender shell. Lay a piece of electrical tape over the antenna to avoid any shorts. Reinstall the shell on the frame. Make sure no wires are being pinched and the tether has enough room to move between the engine and tender.

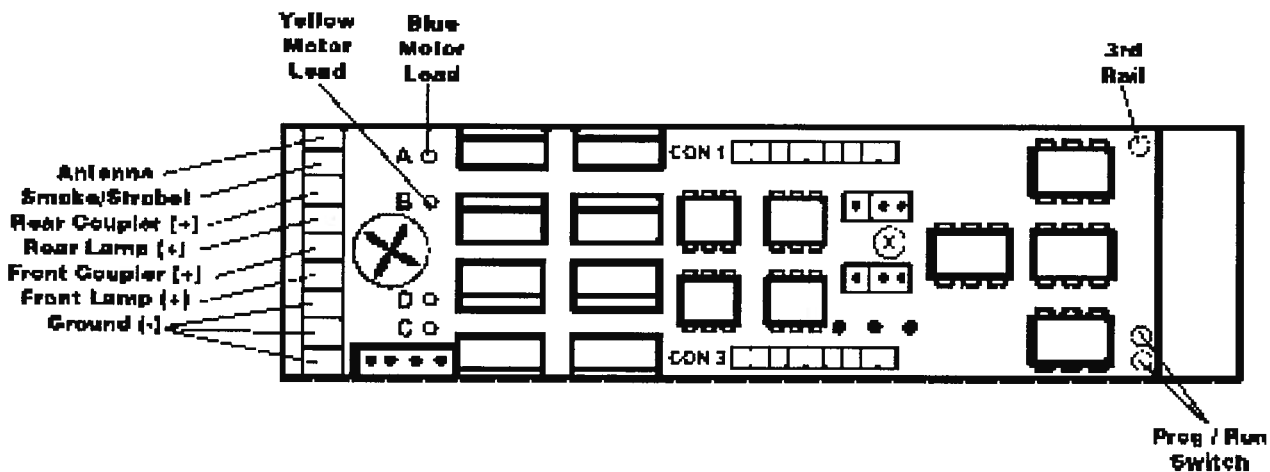
Installing UCUB into DC Powered Diesels (Excluding MTH Premier Diesels)

Most DC powered diesels are made by MTH, Williams, Weaver, K-Line, or Sunset. However, some O27 diesels made by Lionel have small DC can motors installed in the trucks. This section is a general overview of the installation. Please follow the wiring instructions closely, as some features may be different on each individual locomotive.

If you are installing the UCUB into an MTH Railking diesel and are keeping the original Protosounds, refer to STEP 1 "Locking Protosounds Into Forward" before proceeding.

Below is a diagram of a DC UCUB. Please note where each wire goes and its specific function. Also note the position of motor leads on DC Can motors.

Overhead view of DC UCUB



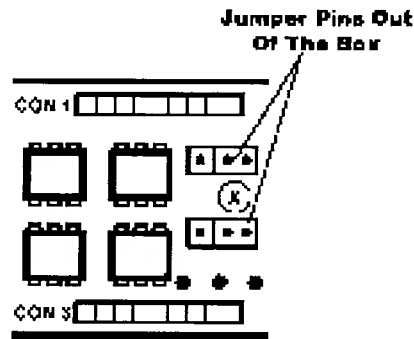
Please remember that not all the wires will correspond in color. It has been our experience that there is no standardized color coding from one engine to the next. Make sure you double check the connections of wires on your locomotive. For example, verify the red wire goes to the center roller and black to ground BEFORE you make any connections to the UCUB.

Start by disconnecting all the wires from the reverse unit. Motor wires, pick up and ground wires, horn wires, and light wires. Remove the old reverse unit and set the horn or sound board off to the side. If you have a Weaver diesel equipped with QSI OEM sounds see the note below, if not, ignore it. This should leave you with an empty frame for mounting the UCUB.

WEAVER LOCOS WITH QSI OEM SOUNDS ONLY

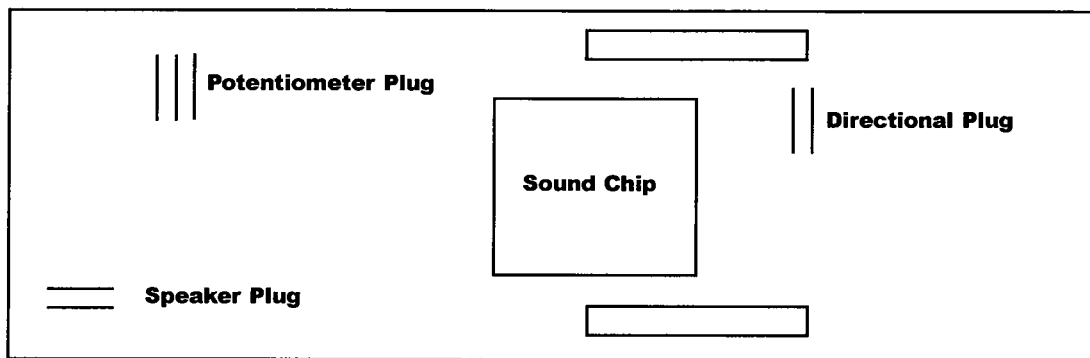
Diesels that are equipped with QSI sounds must first be locked into forward before any disassembly begins. Begin by removing the shell and disconnecting the light wires. Set the shell aside. In order to plug a QSI OEM sound unit into a UCUB one modification must be made to the UCUB. This modification will provide a component necessary to lock the sound unit into forward.

On the UCUB you will notice a set of jumper plugs located between the two 8 socket connectors. These jumpers must be cut down to make room for the capacitors on the bottom of the sound board. See the diagram on the next page for the location of these jumpers.



Remove the jumper on one set of pins and solder a wire between them. Only connect the two pins that the jumper came off of. Once a solder connection has been made, clip the pins down as low as possible; without cutting off your solder bridge. Now repeat the process for the other set of jumpers. You will use one of the jumpers you just removed to lock the sound system in forward.

Locate the pins on the sound board that control the directional state of the unit (see diagram below).



Set the engine on the track and get it running forward. While it is running forward place the jumper plug over the two pins shown above. Hit the direction button on your transformer a couple of times to verify that the unit is locked into forward. If it is, proceed with the installation. If, when you install the sound board into the UCUB, the sounds have unlocked themselves, this process can be done while installed in the UCUB.

Begin by finding a mounting hole for the Prog/Run switch. This may be an existing switch hole in which case you use the screws and nuts that came with the UCUB. It may, however, have to be mounted to the bottom of the frame with the thin double sided tape provided with the UCUB.

The red wire from the UCUB is the Pickup wire. Connect it to the two (or one) pickup wires coming from the center rail pickup rollers.

Your locomotive may or may not have a ground wire connected to the frame. Occasionally it will be soldered to the side of the motor on Williams engines. In most cases the ground wire will be connected to the frame. Connect the ground wire to one of the three screw terminals marked as ground on the UCUB.

You will notice that there are two motor leads coming from the UCUB; yellow and blue. These wires are to be connected to the motor wires. Be sure to refer back to the diagram at the beginning of this section for clarity.

If your locomotive is equipped with front and rear lights, or front lights only locate the ground wire. (the ground may be the frame on Williams engines, if so, ignore this step.) Take the ground wires from the lights and connect them to the screw terminals marked as Ground on the UCUB.

Now locate the positive wire to the headlights. Connect the positive wires to the correct positions on the UCUB screw terminals (see diagram). NOTE: Some lights may be less than 12-14 volts. to find out, see **SPECIAL LIGHTING SECTION**.

Using the antenna that came with the UCUB, connect it to the appropriate screw terminal (shown above). For the time being, leave it hanging loose from the UCUB.

If you are adding coil couplers to the locomotive, or it is already equipped with coil couplers follow the step below. If you are not adding coil couplers skip to the next step.

Each coil coupler has two wires; hot and ground. You can tie the ground into the frame at any location, or connect it to the proper screw terminal on the UCUB. Connect the hot wire to the proper screw terminal on the UCUB (shown above).

Carefully inspect your work, making sure there are no exposed wires that can potentially cause a short. Make sure no wires are near the fly wheels of the motors. Once everything has been checked twice you are ready to test the locomotive.

Go to **FIRST TIME TESTING** before you proceed any further.

If your locomotive is equipped with a horn or sound system, refer to **SOUND INSTALLATION** to proceed.

Once you have completed testing and have installed your sound board it is time to mount the antenna and replace the shell. Chances are the shell is made of plastic. Remove the paper on the back of the antenna to expose the adhesive side. Mount the antenna top dead center to the inside of the shell. Once the antenna is mounted, cover it with a strip of electrical tape to avoid it contacting anything inside.

Take care to not smash the shell on top of the frame. If the circuit boards inside the engine are bent in any direction it could potentially cause odd things to happen while operating.

Make sure there are no loose wires hanging outside the shell. Also make sure there are no wires between the frame and shell when screwing the two together. Once everything is together, refer back to First Time Testing to make sure everything has been installed properly.

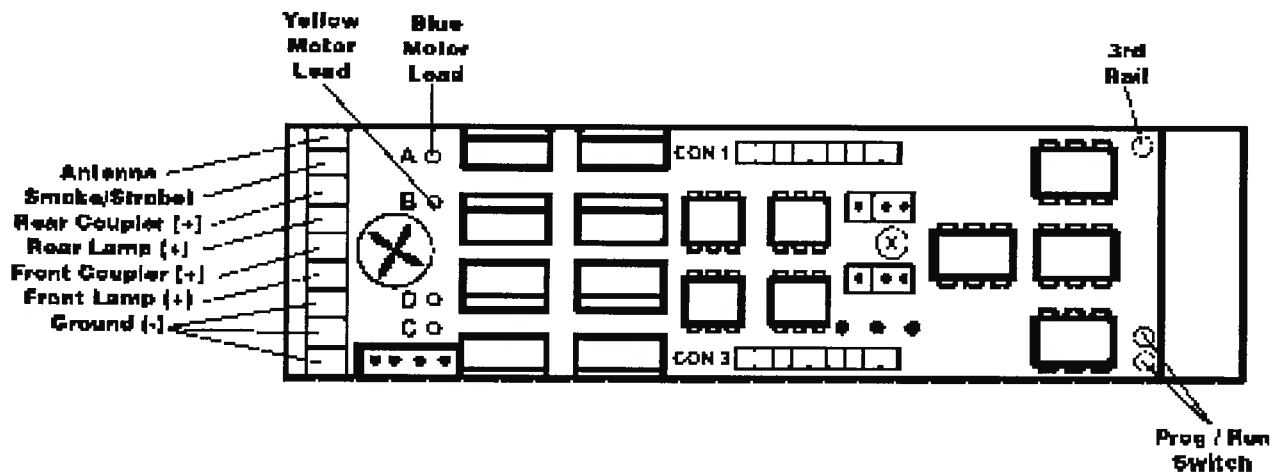
Installing UCUB into DC Powered Steam Engines (NOT MTH PREMIER)

DC powered steam engines are made by almost every manufacturer on the market today. It is difficult to make a specific block of instructions for each manufacturer. So, if during these instructions you find something that does not pertain to your locomotive, skip it and proceed to the next instruction.

Most DC powered steam engines already have a tether, it is usually a 4-pin tether. Inside that tether there will be these four wires; pickup, ground, and two motor leads. Most sound systems are contained in the tender. If the engine has a sound system and are planning on keeping it or upgrading, leave the speaker in tact and work around it.

Below is a diagram of a DC UCUB. Please pay close attention to the function of each wire and screw terminal, refer to it as needed.

OVERHEAD VIEW OF DC UCUB.



Remove the shell of the tender and set it aside.

Most all DC powered locos have a voltage regulator board in the engine that regulates power for the front light and smoke unit. Leave these alone. You should not have to remove the engine shell if you follow these instructions closely.

If the engine is an MTH Railking and has a whistle installed, remove it at this time. Do so by removing the electrical tape holding it to the DCRU. Carefully unplug the whistle board and set it off to the side. The wires will stay connected to the speaker during installation. Disconnect the wires from the reverse unit and remove any mounting hardware holding the reverse to the frame. You should now have a loose tether and a bare tender frame. If the engine has a sound system, set it off to the side without disconnecting any wires except those connected to the reverse unit.

Begin by stripping the loose ends of the tether. You need to determine the function of each wire before any work can be done.

Insert the loose tether into the engine using the mating plug on one end of the tether. Put the engine on the track. Turn the track power on, and use a volt meter to verify the polarity of each wire. The two motor wires will be dead. One wire will be pick up (+), and the other will be black(-). Mark each wire. Using the volt meter touch the black lead to the outside rail. Touch the red lead to each wire in the tether. You will find the pickup wire when the display shows the track voltage. Reverse the volt meter leads to the track and repeat this process. Sometimes the wires will be color coded, but you should double check with a volt meter to be dead sure.

Locate a mounting position for the Prog./Run switch on the tender frame. Using the two screws and nuts that came with the UCUB make sure it is tightly in place. The switch may have to be mounted to the tender frame using the thin double sided tape provided with the UCUB.

Begin by connecting the red wire from the UCUB to the pickup wire on the tether.

Connect the tether ground wire to the ground screw terminal of the UCUB.

Connect the blue wire from the UCUB to a motor lead in the tether.

Connect the yellow wire from the UCUB to the other motor wire from the tether. If the motor leads are installed backwards, meaning the train starts in reverse, it can be changed during testing.

If the locomotive has a back up light refer to **SPECIAL LIGHTING SECTION**.

Connect the ground wire from the backup light to the ground screw terminal of the UCUB. Connect the positive lead from the backup light to the rear lamp terminal of the UCUB.

Install the antenna in the proper screw terminal and leave it hang loose for the time being. Refer to **FIRST TIME TESTING** before you proceed any further.

If the engine has a sound system or you are upgrading refer to **SOUND INSTALLATION**. Once that is complete, refer back here to finish up.

**Plastic Shell Tender? follow the directions below

Die Cast or Brass Tender Shell? Refer to **DIE CAST TENDER SHELLS.

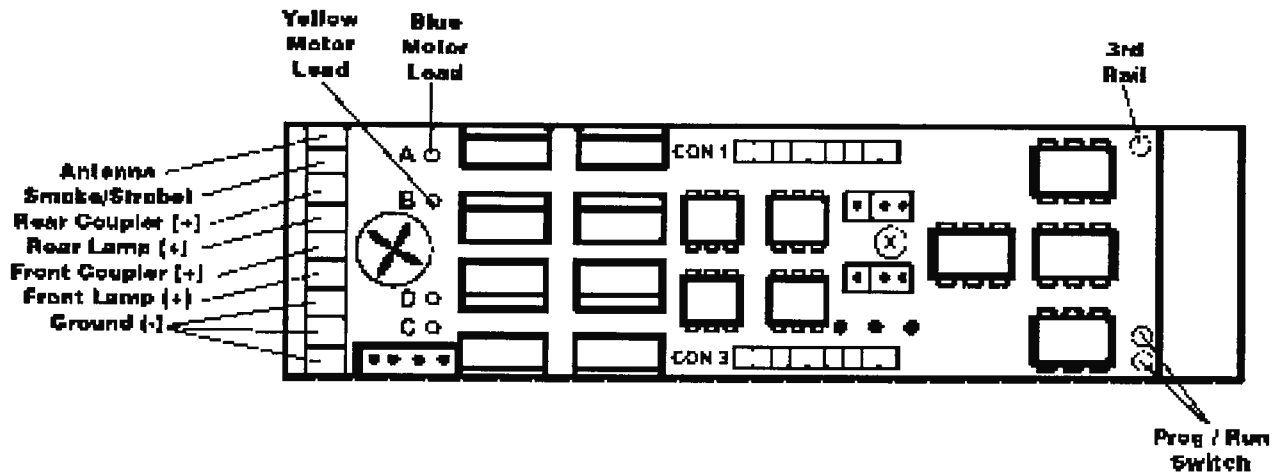
This set of directions is for plastic tender shells only! Before you place the shell on the tender, remove the double sided tape from the antenna and stick top dead center of the tender shell. Lay a piece of electrical tape over the antenna to avoid any shorts. Reinstall the shell on the frame. Make sure no wires are being pinched and the tether has enough room to move between the engine and tender.

Installing UCUB Into DC Powered MTH Premier Steam Engines

If you are planning to keep your existing Protosounds you must refer to STEP 1 “Locking Protosounds into forward” before proceeding with this section.

Once STEP 1 has been successfully completed, follow the steps below to begin the installation. Below is an overhead view of the UCUB, please notice the location of each wire and its appropriate function. You will be referring to this page to complete the installation.

Overhead View of DC UCUB



Begin by removing the tender shell from the tender. Set it aside along with the mounting screws.

If the engine is equipped with sound remove the electrical tape holding the sound and reverse unit together. Disconnect the speaker and potentiometer plugs from the top of the sound board.

Gently grab the ends of the sound board with your thumb and forefinger Rock the sound board back and forth from end to end until the sound board comes out of its mounting holes. Set it aside.

Unscrew the necessary mounting hardware to remove the DCRU from the frame.

Unplug the wires from the bottom of the DCRU and any other wires connected to the reverse unit. Clip any plugs off the ends of wires to expose the wire itself.

You should now have a bare frame containing only a speaker (if applicable).

Strip the ends of the wires from the tether. Insert the connecting end of the tether into the engine and place the engine on the track. Turn the track power on. Using a volt meter, check the polarity of each wire in the tether. There should be two motor leads, a pickup and ground. Take the black wire from the voltmeter and place it on the outside rail. Now with the red lead touch each wire from the tether. When you get a voltage reading on the voltmeter, that is your pickup wire. Now using the red lead of the voltmeter to the center rail repeat the process to find the ground wire. Some tethers are color coded, use a voltmeter anyway to make sure you are dead on.

Start by locating a mounting hole on the frame of the tender for the prog/run switch. If a hole is available, use the two small screws and nuts that came with the UCUB. The switch may have to be mounted to the bottom of the frame using the thin double sided tape supplied with the kit.

Connect the red wire from the UCUB to the pickup wire in the tether.

Connect the ground wire from the tether to the ground screw terminal of the UCUB.

Connect the blue wire from the UCUB to one motor lead from the tether.

Connect the yellow wire from the UCUB to the other motor lead from the tether.

If the tender is equipped with coil couplers locate one wire from the coupler and connect it to the ground screw terminal of the UCUB. Connect the other coupler wire to the rear coupler screw terminal of the UCUB.

Connect the antenna to the correct screw terminal of the UCUB and leave it hang loose. Refer to ***FIRST***

TIME TESTING before going any further.

If the engine is equipped with sound or you are upgrading to a sound system refer to **SOUND INSTALLATION** before continuing.

If the tender has a backup light and/or marker lights refer to **SPECIAL LIGHTING SECTION**. Do this before proceeding!

Connect the ground wire(s) from the marker lights and backup lights to the ground screw terminal of the UCUB. Connect the positive lead of the rear backup light to the rear lamp terminal of the UCUB.

Once everything has been installed you are ready to reinstall the shell. To do so refer to **DIE CAST TENDER SHELLS**. This section is extremely important, as it is imperative the instructions be followed carefully.

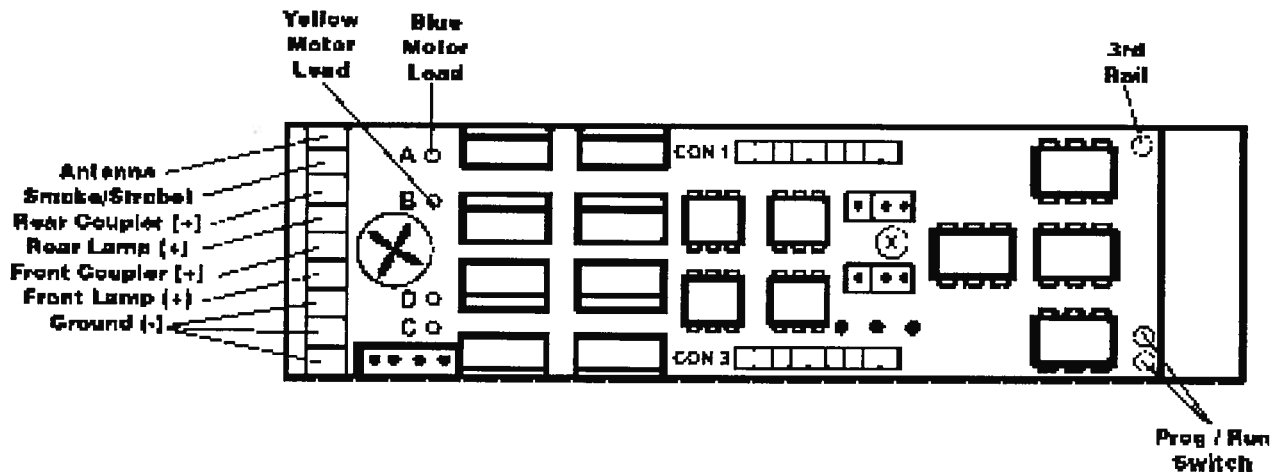
Once the tender is back together you are ready to go!

Installing UCUB into MTH Premier Diesels

If you are planning to keep your existing Protosounds you must refer to STEP 1 “Locking Protosounds into forward” before proceeding with this section.

Once STEP 1 has been successfully completed, follow the steps below to begin the installation. Below is an overhead view of the UCUB, please notice the location of each wire and its appropriate function. You will be referring to this page to complete the installation.

Overhead View of DC UCUB



Once the shell has been removed from the frame, continue as follows;

Carefully remove the electrical tape holding the sound board to the DCRU.

Carefully take the battery off the frame and disconnect it from the battery connection going to the DCRU.

Carefully unplug the potentiometer and speaker wires from the top of the Protosounds board. Grabbing the sound board with your thumb and finger on each end, rock the sound board back and forth from end to end until it becomes free from the DCRU. Set it aside.

Unscrew the proper mounting hardware that holds the DCRU on the frame. Remove the DCRU and any mounting hardware, so the frame is completely exposed.

Unplug the four connectors on the bottom of the DCRU, as well as any other plugs that are connected.

You should now have an exposed frame with several loose wires, at this point you are probably wondering what you have gotten yourself into? Not to worry!

Before the UCUB installation begins, we need to do a few minor things to prep the engine for installation. Locate the slide switch that is connected to the front and rear coil couplers. Disconnect the wires from the switch. You will need to add additional wire to the existing wires to make them longer. Each coupler should have two wires, hot and ground.

You will also need to extend the other wires in the locomotive (if it applies). Front light pads, rear light pads, and smoke unit leads. There may be some wires in your engine that are not listed, if you feel they need to be extended, do so at this time. Be sure to cover any exposed solder jobs with shrink tube or electrical tape to avoid any shorts.

Begin by mounting the program/run switch on the frame. Use the two screws and nuts that came with the UCUB. Mount the switch into one of the existing switch holes on the loco frame.

Locate the pickup wire coming from the center rollers, connect both wires to the red wire on the UCUB. You will need to cut the plug off the ends of the pickup wires in order to expose the leads.

Locate the ground wire on the loco (probably mounted to the frame) connect it to the ground screw terminal on the UCUB (see diagram). Cut off the plug on the end of the ground lead to expose the wire.

Locate the motor leads, there is one on each side of the motors. Connect the blue wire from the UCUB to one set of motor leads. And the yellow wire from the UCUB to the other set of motor leads. You will need to cut the wire connector off the ends of the motor leads in order to expose the wire.

Before you connect the lights to the UCUB, you must first determine the voltage of the bulbs. To do this refer to the **SPECIAL LIGHTING SECTION**. It is *imperative* that this be done to avoid blowing out any lights.

Once the voltages have been determined, connect the positive leads of the lights to the proper screw terminal of the UCUB. Also connect the ground wire to the proper screw terminal of the UCUB.

If your locomotive has a smoke unit, connect the ground wire to the ground screw terminal of the UCUB and the positive lead to the correct screw terminal. No resistor will be needed in-line, as the UCUB outputs 12 volts AC.

If your locomotive was originally equipped with sound, it has coil couplers. Each coupler will have one hot wire and one ground wire. Connect one ground wire from each coupler and place them in the ground screw terminal of the UCUB. Place the front and rear coil coupler hot leads into the respective screw terminals on the UCUB (see diagram).

Now install the antenna (that came with the UCUB) in its proper screw terminal. Leaving it hang loose for the time being.

Double check your work, making sure there are no loose connections that can cause a short. Also check to make sure the wires will not get caught between the motor and flywheel. Set the shell on top of the frame and refer to **FIRST TIME TESTING**. In the event you have extra wires and are unsure of their position, give us a call at (330)629-7625 M-F 9a-5p EST.

If your locomotive is equipped with sound or horn refer to **SOUND INSTALLATION**.

Once you have completed testing and have installed your sound board it is time to mount the antenna and replace the shell. Chances are the shell is made of either plastic or Bakelite. Remove the paper on the back of the antenna to expose the adhesive side. Mount the antenna top dead center to the inside of the shell. Once the antenna is mounted, cover it with a strip of electrical tape to avoid it contacting anything inside.

Take care to not smash the shell on top of the frame. If the circuit boards inside the engine are bent in any direction it could potentially cause odd things to happen while operating.

Make sure there are no loose wires hanging outside the shell. Also make sure there are no wires between the frame and shell when screwing the two together. Once everything is together, you are ready to go.

FIRST TIME TESTING

This block of instruction is intended to make sure everything is wired correctly before proceeding to the next few steps. For instance, if the engine starts out in reverse, the motor leads are backwards. If the rear coupler fires when the Front coupler button is pushed, etc. You will need to test the locomotive when the sound system is installed and you will also need to test it with the shell on. Refer to these instructions after you complete **SPECIAL LIGHTING SECTION, SOUND INSTALLATION, & INSTALLING THE SHELL.** If you find a problem with anything, testing in this order will isolate the problem right away.

To successfully complete this block of instruction, you will need a track that has a transformer that can provide 18 volts AC power. A Lionel Command Base connected to the Outside rail of the track and **Plugged In!**, and a Lionel Cab-1 hand held remote **WITH THE 4 AA BATTERIES INSTALLED.**

Your locomotive should have everything installed except the shell and sound system at this point. Place the locomotive on the track, and turn the track power on to 18 volts. Your engine is programmed as ENG 1 out of the box. Using your Cab-1, address Engine 1 and turn the throttle clockwise. If the engine starts in reverse, the motor leads are backwards. Simply reverse the motor leads from the UCUB to the motor wires when you get back to the bench.

Check the directional lighting, (if applicable at this stage). If it is backwards, simply reverse the positive leads in the screw terminals of the UCUB.

Check to make sure the couplers fire properly. By pushing F & R on the Cab-1. If they do not fire double check the ground connection as well as the positive connections.

If nothing is happening during any of these commands, the engine may be in Program. Check the prog/run switch to ensure the switch is in the run position. This is the position where the switch is not connecting the two wires. Recheck the commands.

If nothing still, reprogram the engine by sliding the switch to program, and pressing ENG + 1 + SET. If the engine is equipped with smoke, set the ID# as follows; ENG + 1 + SET + AUX1 + 6. Slide the switch back to run. Repeat the steps listed above.

Check the smoke unit (if applicable) by pressing ENG + 1 + AUX1 + 9 to turn it on. To turn it off press ENG + 1 + AUX1 + 8.

Take the engine back to the bench and make any necessary corrections. Once complete, retry this section to verify everything works.

If for some reason you don't get any response, double check all your connections, especially pickup and ground. Also make sure the antenna is not touching ground, this will kill the signal reception.

If you experience a result that is not listed here, give us a call at (330)629-7625 M-F 9a-5p EST. Our technicians are always standing by!

Once First Time Testing has been completed and you are happy with the results, it is time to mount the UCUB into the locomotive. Refer to **MOUNTING UCUB ON FRAME.**

MOUNTING UCUB ON FRAME

Using the thick double sided tape that came with the UCUB kit, mount the UCUB to the frame of the locomotive. **MAKE SURE** the bottom of the UCUB does not touch the frame or any metal components that may cause a short. If necessary cover the bottom of the UCUB with electrical tape to prevent this from happening. Ensure the UCUB is evenly spaced on the frame so there is enough room to reinstall the shell. Remember! the UCUB can be mounted on its side, up-side-down, on an angle, or however it needs to be. This will not effect the performance at all. Unless the board is bent in any way.

SPECIAL LIGHTING SECTION

This section is designed to avoid blowing out lights for no reason. Some manufacturers use lights that are less than 14 volts. They vary in voltage from 6 volts, 1.5 volts, and .5 volts. There are other voltages that are not listed as well. The UCUB outputs 12 volts AC in a command environment. To ensure you don't blow out the bulbs we recommend you bench test the bulbs before connecting them to the UCUB.

To test the bulbs you will need an AC transformer set at 12 volts AC. You will also need several resistors varying in values from 560 ohm ½ watt all the way down to 82 ohm ½ watt. Please bare in mind that the resistors average about \$.10 each, as opposed to \$2.00 a bulb.

Below is a list of resistors you will need for this section. They are all available at Radio Shack.

ALL VALUES ARE ½ WATT.

560 ohm, 390 ohm, 330 ohm, 270 ohm, 220 ohm, 180 ohm, 150 ohm, 100 ohm, 82 ohm, 68 ohm.

The easiest way to test these bulbs is to start from the highest resistor value and work downward until the bulbs are at a good intensity. The following resistors are for the following voltage bulbs;

560 ohm ½ watt = 2 1/2 volt marker lights.

390 ohm ½ watt, 330 ohm ½ watt, 270 ohm, ½ watt, and 220 ohm ½ watt = 1.5 V bulbs

180 ohm ½ watt, 150 ohm ½ watt, and 100 ohm ½ watt = 6 volt bulbs

82 ohm ½ watt, and 68 ohm ½ watt = 12 volt bulbs.

Place the resistor in-line with the ground lead when testing. For MTH engines, that have the copper light pads, test the small springs on the shell using the resistors. For Engines made by Weaver that have two front bulbs, tie the front lights together (2 hots & 2 grounds). Do the same for the rear lights. Test marker lights with 12 volts AC and resistors in-line. For marker lights, tie them directly to pickup and ground after the resistors have been added. If the lights are slightly dim, its OK, its better than burning them out.

Some MTH locomotives have a small lighting circuit board in the front of the engine. These boards run the front light, MARS light, and marker lights. They already have the resistors in-line and do not need to be tested.

Once you have chosen the correct resistor for the lights, solder the resistor in-line with the ground lead. Go back to your specific instructions and finish the installation process.

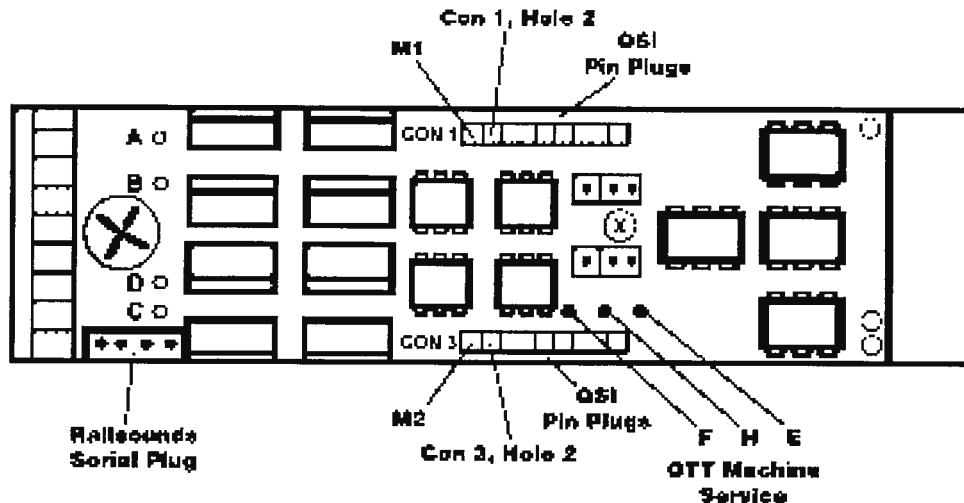
SPECIAL: You may notice during operation that some lower voltage lights will flicker on and off while running. This is due to the bulbs not pulling enough power. It is fixed by adding a 390 ohm 1 watt resistor from the positive light terminal directly to ground. This sounds like a short, but will cure the problem. A 390 ohm 1 watt resistor will be needed for each positive headlight terminal.

SOUND INSTALLATION

There are several sound systems available in the market today. We have broken them down into a few categories; Lionel: Sound of Steam, Railsounds 1 and 2, Railsounds 4.0, Steam Whistle/Diesel Horn. Williams: True Sounds. Ott Machine Service; Diesel and Steam. QSI: Protosounds, QS-2+, OEM, and QS-3000. Ott Machine Service, and Williams True Sounds. Follow the directions that apply to your particular locomotive. If your sound system is not listed here please give us a call at (330)629-7625 M-F 9a-5p EST.

Below is an overhead view of the sound connectors on a UCUB. Please note the positions and their functions. These positions apply to most all sound systems. You will be referring back here to complete your special block of instructions.

OVERHEAD VIEW OF UCUB/SOUND PLUGS



LIONEL SOUND SYSTEMS

Most Lionel sound systems from the early “Sounds of Steam” up to Railsounds 2.0 have only six or seven wires coming from the sound board. 2 wires are for the speaker. 2 or 3 wires are for the cam that regulates chuff and ramp up/ramp down. 2 that connect to pickup and ground. These two (pickup and ground) are the ones we’re interested in. The red wire (pickup) connects to Con 1 hole 2, which is positive from the UCUB. The black wire (ground) connects to Con 3 hole 2, which is ground from the UCUB. The same connections apply for steam whistle/diesel horn.

Once these connections are made, mount the sound system in a position where it will not short out against anything else. If necessary, wrap the sound board in electrical tape to avoid shorting it out.

Railsounds 4.0- These directions are included with the upgrade. Since Railsounds 4.0 are only available from us, the directions that show you how to connect it to the UCUB are included in the box.

QSI Sounds

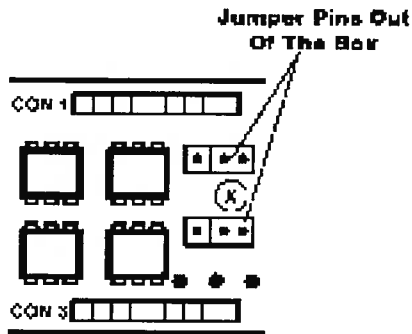
IMPORTANT NOTE: Some QSI sound boards will have a battery plug on the intermediate sound board. These battery plugs do not need to have a battery plugged into them when being installed in a UCUB. As long as the engine is operated in a command mode, the battery is not needed. This is due to the constant power supply used in the command environment. If you wish to reinstall the battery, you can (provided you have the space) but it is not necessary.

Most all QSI sound boards and steam whistle/diesel horns are the same. Some may differ slightly with an intermediate board, but most are all the same. The UCUB was designed for these sounds to be plugged in just the same as they were in their original DCRU.

In some cases the pins on the sound board may be short, thus causing the bottom of the sound board to rest on top of the UCUB’s heat sinks. In the event this happens, simply wrap electrical tape around the bottom of the sound board to prevent any shorts from occurring.

For QSI OEM sounds or sound boards that have an intermediate battery back up board such as QS-2+, you will need to do some slight modifications to the UCUB. . This modification will provide a component necessary to lock the sound unit into forward (for OEM sounds only).

On the UCUB you will notice a set of jumper plugs located between the two 8 socket connectors. These jumpers must be cut down to make room for the capacitors on the bottom of the sound board. See the diagram below for the location of these jumpers.

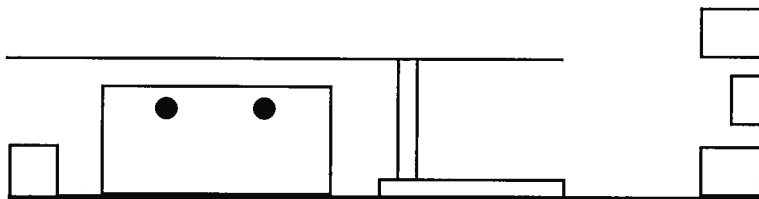


Remove the jumper on one set of pins and solder a wire between them. Only connect the two pins that the jumper came off of. Once a solder connection has been made, clip the pins down as low as possible; without cutting off your solder bridge. Now repeat the process for the other set of jumpers. You will use one of the jumpers you just removed to lock the sound system in forward.

Locate the pins on the sound board that control the directional state (shown below). This only applies to QSI OEM Sound systems. Sound such as QS-2 and QS-2+ are not subject to this lock out procedure.

Set the engine on the track and get it running forward (In a conventional mode only. The command base unplugged and using a transformer and direction button to change directions, not the Cab-1!). While it is running forward place the jumper plug over the two pins shown above. This will lock the sound system in forward. Again, this only applies to QSI OEM sound systems found in Weaver Models and Sunset/3rd Rail Models.

For QSI steam whistle/diesel horns, the installation is quite simple. The pins on these boards plug into the QSI connectors on the UCUB (just like their sound counterparts). See the diagram below for the exact location of the horn/whistle board on the UCUB.



When installing QS-3000 into a UCUB there are several reset settings that must be made to make the sounds work properly with the UCUB. When you order a QS-3000 from Train America Studios the programming is already complete. The directions for plugging QS-3000 into the UCUB and the directions for operating QS-3000 come with the sound system. For more information on QS-3000 check out our website at www.tastudios.com, or give us a call for a free brochure.

Once the sound board is in place reconnect the potentiometer and the speaker from where you removed them and you're set.

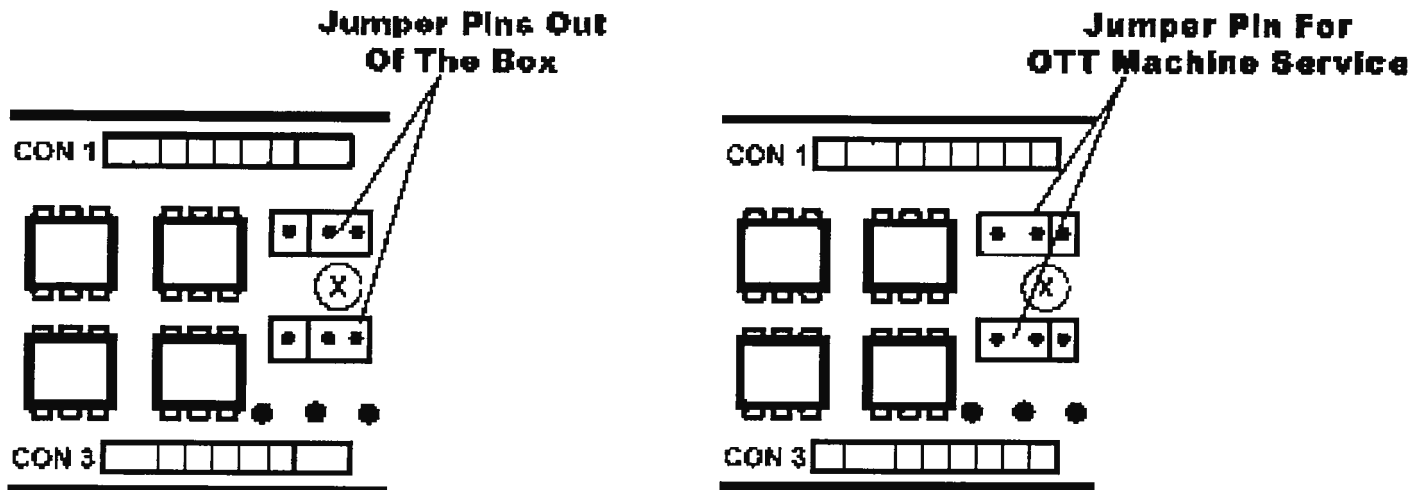
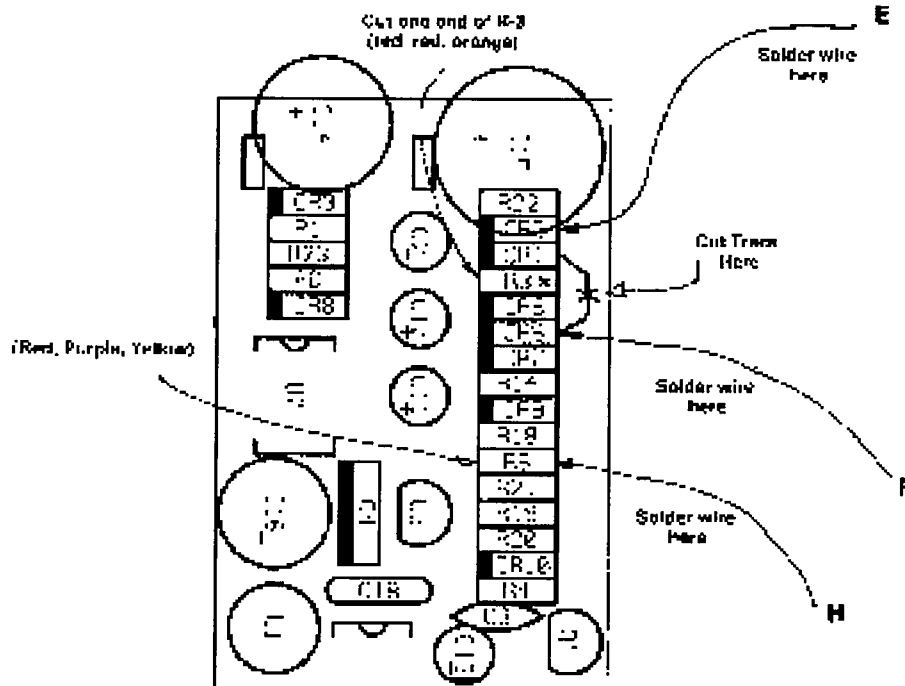
If you have encountered a sound system that does not correspond with the instructions above please let us know. Our tech line is open M-F 9a-5p EST at (330)629-7625.

Ott Machine Service Sounds

Before the actual sound installation can occur, the jumper pins on the UCUB must be moved into the Ott sound position. Refer to the diagram below for the location of these jumpers. Fig. 1 shows the current location of these pins out of the box. Fig. 2 shows the correct location of these pins for use with Ott sounds.

Some modifications will be needed to make Ott sound systems work properly with the UCUB. These modifications are shown on the diagram below. Please follow it carefully. The letters E, F, and H correspond to the white wires coming from the UCUB.

This modification is only for diesel sound systems.



E wire connects to the CR2 component at one end only. (where arrow is shown)

The R3 component must have a post cut off. The post is located on the side that the "X" is shown on. R3's color code is red, red, orange.

F wire connects to component CR5 as shown above.

H wire connects to component R5 (color code red, purple, yellow)

To cut the trace as shown in the diagram you will need to use an X-Acto knife. Make sure the trace has been cut all the way through.

IMPORTANT NOTE: There is a difference when connecting the wires from the Ott sound board to the UCUB. These are the red and black wires on the diesel board, and red, black, and 2 blues on the steam boards. Please refer to the directions below this section.

Diesel Sounds by Ott

Once the above modification is complete it is time to connect the pick up and ground wires to the UCUB. These are the red and black wires on the sound board itself. Refer to the beginning of **SOUND INSTALLATION** and locate the Con 1 Hole 2 position on the UCUB. This is where the red wire connects. Now locate Con 3 Hole 2. The black wire connects here. To connect the wires to these positions, simply insert a small exposed end of the wires into the holes. The diesel sound system is installed.

Steam Sounds by Ott

There are 2 blue wires on an Ott Sounds steam board. These wires sense the motor voltage to control the chuff. Refer back to the beginning "**SOUND INSTALLATION**" and locate the positions marked as M1 and M2. These are know as Con 1 Hole 1 and Con 3 Hole 1. Insert one blue wire into each of these holes just as you did with the red and black wires. Now locate Con 1 Hole 2, the red wire from the sound board inserts here. The black wire connects to Con 3 Hole 2. The steam sound installation is complete.

Ott Whistle and Horn Boards

Ott Machine Service also makes a few whistle only and horn only sound boards. To connect these boards to the UCUB refer back to the beginning of **SOUND INSTALLATION** and refer to the overhead diagram of the UCUB. Locate the Con1 Hole 2 position. The red wire plugs in here. Also locate Con 3 Hole 2, the black wire connects here. This is all that must be done for the horn/ whistle boards.

William's True Sounds

To connect the sound boards to the UCUB refer back to the diagram at the beginning of **SOUND INSTALLATION**. Locate Con 1 Hole 2. This is where the red lead of the sound board connects. Locate Con 3 Hole 2, this is the location of the black wire. The installation is complete. Please note, when using True Sounds with the UCUB the bell sound will not work. This is due to the sound board only receiving one DC offset to activate the horn and bell.

TESTING SOUND SYSTEMS

Now that your sound system is installed in the UCUB it is time to test it. Below are the general commands that apply to each manufacturers sound system. Should a sound not occur, or a problem persists, return to

the block of instructions pertaining to your sound system and recheck the steps. If that proves nothing useful please give us a call at (330)629-7625 M-F 9a-5p EST.

Lionel Sounds

Horn = Horn Blast or Whistle Blast
Bell = Bell comes on, press bell again, turns off
Turn throttle CW= Engine ramps up or chuff begins
Turn throttle CCW= Engine ramps down or chuff slows down.

Railsounds 4.0

Explained in directions with 4.0 system.

QSI Sounds

Horn = Horn Blast or Whistle Blast
Bell = Bell comes on, press Bell again, turns off
Turn throttle CW = Engine may or may not ramp up, depends on system model type.
Steam will chuff up as a result of speed.
Turn throttle CCW = Engine may or may not ramp down, depends on system type.
Steam will chuff down as a result of speed.

Ott Sounds

Horn = Press and hold horn button, horn will sound
Horn (bell)= Press horn quickly and release, bell will come on, repeat to turn off.
Any type of announcement will be lost. This is due to the constant 12 volts of power the sound system receives.

True Sounds

Should be the same as Ott sounds. Any type of announcement will be lost. This is due to the constant 12 volts of power the sound system receives.

DIE CAST & BRASS TENDER SHELLS

Now that 90% of the installation is complete it is time for the most crucial step of all, mounting the antenna. With die cast and brass tender shells this can potentially be the most cumbersome part of the installation. Here's why;

The radio signal emitted from the Command base is known as the "Com". This is the signal that is always transmitting from the outside rails. This signal has several purposes. The first is the most important. It tells the locomotives if it is going to operate in the command mode or the conventional mode. If the Command base is plugged in and is transmitting a signal the engines will immediately assume it is to be operated in the command mode. In order for the engine to receive this signal it must receive a clear reception. The "Com" also talks to each command engine via its ID number. The "Com" is what tells the engine what to do, and the antenna listens for its commands.

To properly install the antenna in a converted engine there are two choices. One, to tear the engines handrails apart and insulate the grommets that hold it in place. Two, to isolate the tender shell from ground, thus making the entire tender shell the antenna. We are going to do the latter. We do not want people tearing their engines apart simply for value reasons. So insulating the tender shell is the next best thing, if not THE best thing.

It is relatively easy to isolate a tender shell. This is done by covering the area on the tender frame that contacts the shell using electrical tape. The most common areas are the perimeter of the frame and anywhere

else the shell may touch. This is a bit tricky, as too much tape will cause the shell to fit too snugly around the frame. Too little tape will cause the shell to touch the frame thus killing the signal.

Any type of ground (from the outside rails) will dissipate the signal. So long as the entire area where the shell touches the frame is insulated, the shell will be "neutral" not Grounded.

The final step in mounting the shell to the now insulated frame is to use nylon screws to hold it on. Most all engines use a No. 4 x 3/8" self tapping screw to hold the shell to the frame. If you cannot find these screws, we have them available for \$3.00 for a set of 4. This doesn't hold true for brass tender shells like those made by Williams, Weaver, and Sunset. A lot of times these are No. 1 or 2 screws. These screws can be found at most electronic supply stores. If you cannot find them, we have a very limited supply to work from, so give us a call. The other option is to drill the holes bigger and tap them to a #4 screw size.

Once the frame has been isolated with the electrical tape it is time to install the antenna. The antenna is to be mounted top dead center to the inside of the shell. If there is any paint or residue where the antenna is to be mounted take it off. Make sure the zinc or brass is exposed before the antenna is mounted. Remove the adhesive back of the antenna and apply it to the clean area on the inside of the shell. Cover the brass side of the antenna with electrical tape to avoid any shorts from occurring. Also to keep it from touching ground. Set the shell over the frame and test the signal reception BEFORE you put any nylon screws in. If the engine responds well to all commands return to the bench to install the screws. Once the nylon screws have been added recheck the engine for signal reception. If all is well you are ready to go!. If the engine acts erratic, the shell is contacting the frame. Remove the electrical tape and start over again. This can sometimes be a breeze and other times be a headache. "Patience is the watchword of the wise".

If after several attempts you cannot make the engine receive the command signal give us a call at (330)629-7625 M-F 9a-5p EST. We can assist you in getting it to work.

The command signal or "Com" is the most important ingredient in the success of your UCUB. Without it the UCUB is virtually useless for command operation. A good strong signal has a lot to do with the wiring of your layout. A common ground and the transmission of the command signal is just as important as turning the power on to run the trains. Below is a list of potential signal savers that we have come up with over time that you may find useful on your own layout. Feel free to take advantage of them!