CONVRTR-25 Configuration Variables (CV)

Use the AirWire T5000 throttle to setup the CONVRTR-25 CVs as well as the attached decoder. Only a few CVs are used by the CONVRTR-25 and these are usually programmed at the same time as when programming attached decoder. The only CV unique to the CONVRTR-25 is CV200.

When programming the address, the throttle will automatically send appropriate information regardless of the number of digits in the address.

The CONVRTR-25 accepts both SERVICE PROGRAM commands and OPS PROGRAM commands.

Do not use OPS PROGRAM to change the address. The automatic setting of the CVs will be lost.

CV #	Factory Value	Value Range	Description
1	3	0-99	1-99 Primary Address
8	135	135	CVP Manufacturer ID
17	0	0-255	Loco Address Hi-Byte
18	0	0-255	Loco Address Lo Byte
29	2	0-255	Decoder configuration
58	0	0-16	Frequency Select

CONVRTR-25 Warranty Information

This warranty covers substantial defects in materials and workmanship in the CONVRTR-25 module.

What This Warranty Does Not Cover

This warranty does not cover any problems which result from improper installation, modifications, battery polarity reversal, improper operation, leaking batteries, excessive battery voltages, excessive decoder current draw, incorrect connections to decoders, abuse, accidents, or acts of God such as excessive heat, floods, damage caused by exposure to moisture and rain, lightning, earthquakes, volcanic events, tidal waves or hurricanes.

Warranty Duration

The coverage of this warranty lasts for 90 days. After this period, standard repair rates apply. Depending on the problem, CVP reserves the right to repair or replace.

Repairs and Returns

If you purchased your CONVRTR-25 from one of our AirWire900 dealers, please call them first. They are your best and quickest for answers to questions about CONVRTR-25. They are also experts in installation and offer such services should it be required. If you purchased your CONVRTR-25 ***direct*** from CVP Products, call us first.

If you are asked to return an item to CVP for service, you must follow the instructions on the website under service and support and you must obtain an RMA. There you will find the street address plus other helpful tips about sending packages to CVP Products.

Do not send items to us for repair without first obtaining authorization.

CONVRTR-25 Electrical Ratings

Maximum Input Battery Voltage . . . . . 24 Volts DC
Minimum Input Battery Voltage . . . . . 7.4 Volts DC*
Maximum Surge Current without Tripping 8A
Maximum Continuous Current (thermally limited) . . . . . 2.5A at 100°C
Over-Current Trip (Min/Max) 8A/16A
Reverse Polarity . . . . . Not Protected
FCC ID Number X7J-A10040601 . . . . . Part 15 Compliant

*Decoder dependent - it might need a higher input voltage to operate reliably

The AirWire900®
CONVRTR-25™ User Guide

This Product Was Originally Called "CONVRTR"

The CONVRTR-25 was the very first member of the CONVRTR series. This is the same product, just a new name as it takes its place alongside the other members of the CONVRTR Series family.

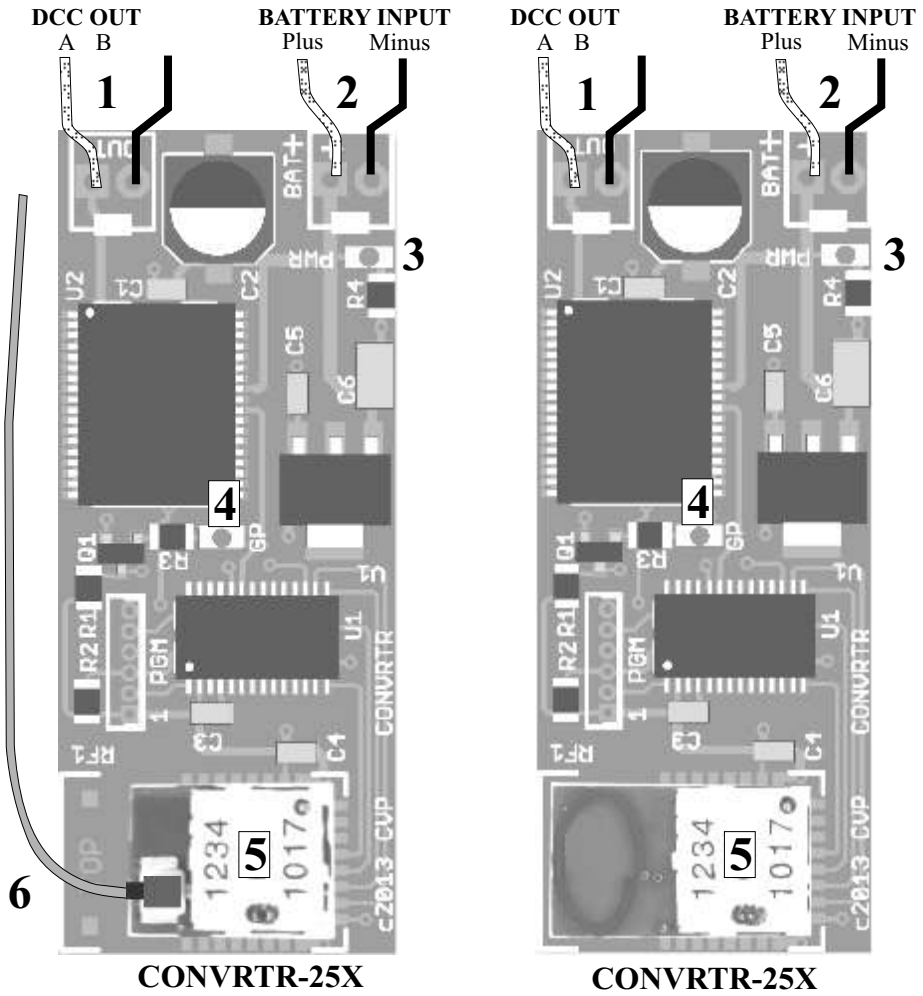
Need Help? Contact Your Dealer/Installer First!

Should you have any questions regarding AirWire or installations, your dealer is your best source of information, tips and techniques. Also, almost all dealers will do installations or can recommend good installers. It might take a little more time and cost more, but you'll be assured of an installation that works and works well.

Contents

CONVRTR-25 module
Test Diode
1 ohm resistor
This User Guide

CONVRTR-25 Connections



CONVRTR-25 Board Familiarization

1. Battery Input Pads: Connection to the battery goes here. The positive pad is labeled with a + sign and the pad is square. The battery negative connection is to the round pad. The CONVRTR-25 is polarity sensitive. **Reversing the polarity will permanently damage the CONVRTR-25.**

2. DCC Output: Connect these two pads to the DCC decoder. Use # 22 - #30 AWG stranded wire to make all connections.

3. Green PWR LED Indicator: Glows bright green when power is applied.

4. Red GP LED Indicator: Glows steady bright red when an AirWire throttle is set to the CONVRTR-25's frequency (regardless of loco address).

5. Radio Module: This is the sensitive radio receiver. Keep it away from metal objects. The CONVRTR-25 on the right has a built-in antenna. The antenna can be seen as a thin line on the blue circuit board.

6. Removable Antenna: The CONVRTR-25X on the left has a jack for use with different types of external antennas. A 3 inch whip antenna comes with the CONVRTR-25X. Keep the antenna away from all wiring for best reception.

Use Track Power? - Not Recommended, But...

Warning

The CONVRTR-25 is designed for battery powered operation. Attempting to operate from power scavenged from some other form of track power can damage the battery and possibly the CONVRTR-25. Therefore attempting to use or recharge the onboard battery is highly discouraged.

However, we realize that this may be of interest to some users, especially if they intend to operate their battery powered locomotive on powered track. There are no specific precautions for the **CONVRTR-25**. However, it must stay within the absolute maximum ratings listed on the back page. Insuring proper polarity of applied power is mandatory.

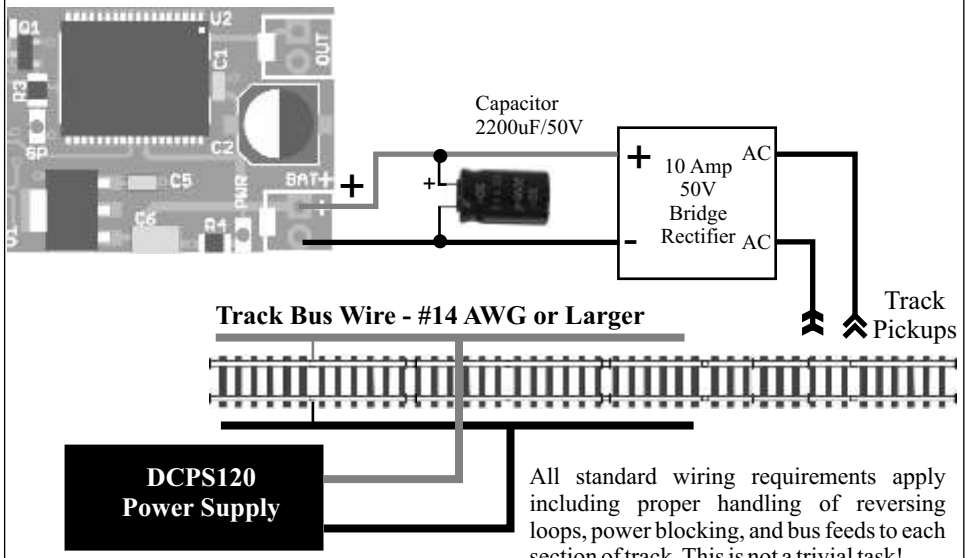
Use A Bridge Rectifier To Insure Proper Polarity. Insert a bridge rectifier between the CONVRTR-25 DC input and the source of external power. Doing so insures proper polarity regardless of the source power polarity.

Use Only Pure and Well regulated DC. The power supply must be well regulated. It must not have any ripple. A minimum specification of 5% regulation is recommended. CVP's DCPS120 power supply can be used.

Set Power Supply Voltage to about 15 volts DC. The voltage at the output of the CONVRTR-25 will be approximately equal to the DC voltage at its power input terminals.

Clean wheels and clean track are mandatory if power is not supplied by batteries.

Wiring the railroad becomes a long and boring chore. If you use battery powered locomotives, your wiring job reduces to simply connecting the decoder to the motor and charging the battery. There is no need to worry about reverse-loops, turnout wiring, dead frogs, opposing point switch wiring, route control wiring and the many other wiring requirements related to properly powering locomotives through the rails.



All standard wiring requirements apply including proper handling of reversing loops, power blocking, and bus feeds to each section of track. This is not a trivial task!

The DCPS120 Power supply is a 120 Watt, adjustable DC power supply with excellent load regulation. The output voltage is variable from 15V to 24V. It has built in overload and short circuit protection. It is available direct from CVP Products. See the website for ordering details.

Battery Considerations And Options

Selection of a suitable battery is based on the battery size, the available physical space, the battery voltage and the battery capacity or runtime. Each factor has a direct influence on the other factors. The general guidelines will get you started down the right path. However, once you have completed your first installation, you'll be much better prepared for subsequent installations. There is no right or wrong battery answer. Let your skills and your experience guide your decisions.

Battery Voltage

The CONVRTR-25 is optimized for 14.8V Lithium-Ion battery packs. Up to 24V is OK.

Runtime or Battery Capacity

A battery's capacity is labeled on the side of the battery. For small batteries, the label will usually list the capacity in milli-Amp-hours. If the label says 500mAh, the battery will deliver 500mA for one hour. If it says 3400mAh, the battery will deliver 3.4 Amps for one hour.

Battery Protection

Lithium battery packs are extremely safe with exceptionally long lifetimes when they are equipped with an internal protection circuit board. When buying packs, make sure it has the protection board built in.

Suggested Battery Suppliers

First check the sizes and capacities of the available CVP Products' batteries. See the CVP website for the latest offerings. If none of the batteries meet your needs, then check the other companies listed below. Each offers literally hundreds of cells and battery packs. There are many more vendors but they come and go at a furious pace. It may be beneficial to spend some time shopping on the Internet to compare prices and availability.

There is one precaution when purchasing on the internet. Beware of sellers that don't show stock availability. They will take your order, charge your credit card but might not ship your order for many weeks or months. If availability is not stated, call the supplier and ask. But if they don't know or won't tell you, take your business elsewhere. Don't support this unethical business practice.

Finally, beware of extra fees when ordering batteries. Some vendors may tack on an extra handling fee, implying that it is fee charged by the carrier. However, there is no such fee when batteries are shipped via ground service. Always request UPS ground service.

CVP Products
P.O. Box 835772
Richardson, TX 75083
972-238-9966
www.cvpusa.com

All-Battery
436 Kato Terrace
Fremont CA 94539
(510) 979-9969
www.all-battery.com

*** Battery Space**
825 South 19th street
Richmond, CA 94804
(510)525-2328
www.batteryspace.com

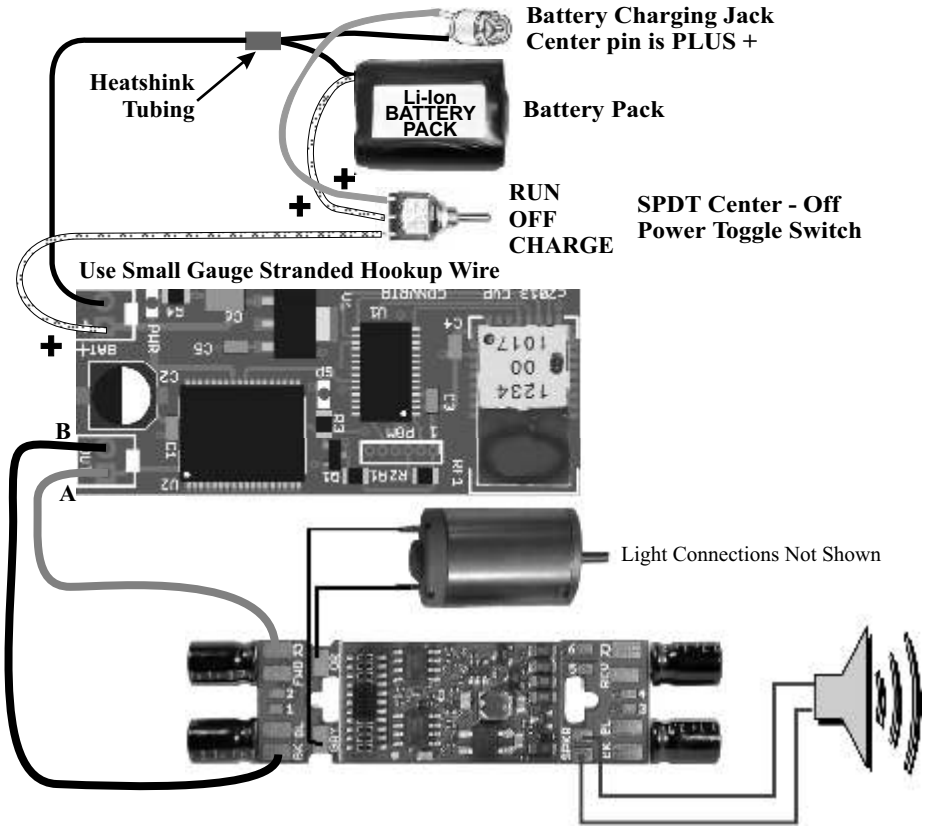
PowerStream
1163 South 1680 West
Orem UT 84058
(801)764-9060
www.powerstream.com

Mouser Electronics
1000 North Main Street
Mansfield, TX 76063
(800) 346-6873
www.mouser.com

*** Caution**

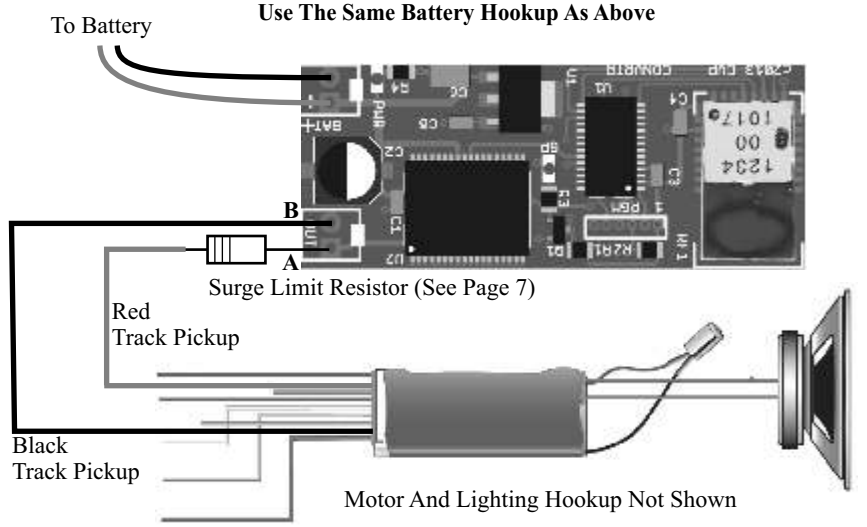
When ordering batteries, always request United Parcel Service (UPS) **Ground** Shipping. Some vendor of batteries, but not all, may add "Hazardous Material Handling Fees" or other special handling fees when shipping Lithium batteries.

Example Hookup Diagram



TCS AK-MKB1 Mother Board+WOW-121

Hookup To A Soundtraxx Decoder
Use The Same Battery Hookup As Above



Wiring Guidelines

Neatness Mandatory: Installation of the CONVRTR-25 and the DCC decoder will be in tight spaces with minimum clearances. Take extra care and extra time to keep wiring neat, with wires trimmed to the proper length and clear of mounting holes.

Basic CONVRTR-25 Connections: This is easy. There are two input pads for the battery connection that are polarity sensitive. There are two output pads for connecting the DCC decoder.

Verify Battery Polarity: There is no protection against polarity reversal. Connecting the CONVRTR-25 to the wrong polarity will destroy it. Use the suggestions on the next page if you are not sure of the wire or connector polarity.

Battery Requirements: The CONVRTR-25 is optimized for 11.1V Lithium-Ion battery packs. But, it will work with battery voltages as low as 8.2 volts or as high as 22 volts. If using the higher voltages, verify that the DCC decoder will tolerate higher battery voltages.

Pick the highest energy capacity battery for which you have physical space. Energy capacity is stated in milliamp-hour abbreviated mAhr. This rating states how much current can be supplied by the battery for 1 hour. A 500mAhr rating means the battery will supply 500mA or 0.5A for one hour. The higher this number, the longer the battery will last, but its physical size will be bigger.

Make sure the battery fits the available space. There are many types and sizes available. Pick the battery that offers the best compromise in space and energy density. For easiest installation of a larger battery, use a separate battery car or a dummy locomotive.

See the battery suggestions and recommendations section at the end of this booklet.

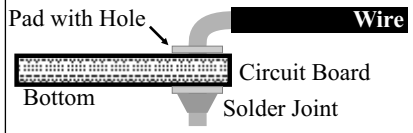
DCC Decoder Types: Any NMRA-DCC compatible decoder may be connected to the CONVRTR-25. For sound+motion, the TCS-WWOW or the Soundtrax Tsunami are recommended.

When connected to the CONVRTR-25, the decoder will operate and be programmed as if it were sitting on the track and powered by a DCC system .

Wire: Small and flexible #22 - #30 AWG stranded wire is best although almost any kind of wire can be used. Use multiple colors to prevent confusion or polarity reversal.

Power Switch and Charging Jack: A power switch is not absolutely necessary. You can equip the battery with a simple plug and socket and that becomes the power switch. A latching reed relay can substitute for a switch. See page 10 for details.

Soldering Wires To The CONVRTR-25



The traditional method usually requires a 90 degree bend in the wire. The bent wire is fragile and easily broken.

Traditional Method

- Strip the wire back ½ inch
- Tightly twist strands together and tin wire
- Insert tinned wire into hole
- Solder wire on bottom side of board
- Bend wire carefully to avoid breaking
- Trim wire to top of solder joint

This method eliminates the fragile bend. Before soldering, trim the wire and visually confirm the end of the wire will not touch adjacent pads or components.

Better Method

- Strip the wire back about 1/10 inch
- Tightly twist strands together and tin wire
- Apply small amount of solder to pad
- Lay tinned wire <u>on top</u> of pad
- Heat joint top side of board - add a bit more solder

Troubleshooting Tips - *continued*

CONVRTR-25 <u>Suddenly</u> Stops

1) Battery is depleted. Recharge the battery.

2) Excessive Motor Current. Turn off the power switch and turn it back on to reset the CONVRTR-25. Common causes include binding, overloading and motor operation close to its stall current.

3) CONVRTR-25 is too hot. Turn off the power and let the CONVRTR-25 cool down. Improve the ventilation of the CONVRTR-25 and it's attached decoder.

4) Jamming. Make sure that another throttle is not jamming your frequency or address.

<u>CONVRTR-25 Won't Run</u>

1) Battery is depleted. Recharge the battery

2) Jamming. Make sure that another throttle is not jamming your frequency or address.

3. Throttle not set to proper frequency or address. Set the throttle correctly or use the JUMP MODE to program the CONVRTR-25 to the desired frequency. If you are not sure what the frequency is, follow the instructions in the section labeled, 'Forgotten Frequency."

4) An overload is tripping the CONVRTR-25's fault protection. The most common cause is a pinched wire. There may also be a problem with the attached motion/sound decoder.

Operational Considerations

Beware of Lurking Locomotives When Using SERVICE PROGRAM Mode
SERVICE PROGRAM mode is a broadcast command that can be heard and understood by any other AIRWIRE decoder or CONVRTR-25 sharing the same frequency as the CONVRTR-25. If another decoder receives the command, it too will be programmed. Play it safe and make sure to turn off all power switches on locomotives not being programmed.

Beware of Other Transmitters
The CONVRTR-25 decoder operates in an unlicenced band shared by many other transmitters. These transmitters can and will create interference, intermittent throttle operation or complete failure of one or more of your decoder's 17 frequencies. The sources of these external interfering signals can be from your own home or from adjacent homes and businesses. They can also be from other CVP wireless equipment.

Here's a list of devices known to have caused interference problems to AirWire900 equipment: wireless devices attached to computers, TV/Radio/Entertainment-center, remote controls, cordless telephones, alarm systems, baby monitors, unlicenced personal communication devices, lawn sprinkler controllers, remote starter switches, cordless light switches, outdoor lighting controllers, toys, wireless headphones, and games. Of course, if you have additional wireless throttles, make sure each is on its own frequency; two throttles on the same frequency will jam each other.

If you find a strong interfering signal on one or more of your frequencies, don't use those frequencies. Simply select another, different frequency.

Never Use RTV or Silicon Adhesive On The CONVRTR-25
NEVER use RTV or other liquid adhesive to attach the CONVRTR-25 to the locomotive. That material is conductive and will destroy the CONVRTR-25. Use only double-sided foam tape.

Placement Suggestion For Best Range - Metal Locomotives
If possible, mount the CONVRTR-25 horizontally and as high as possible within the locomotive. If you are using the CONVRTR-25 with a whip antenna, a vertical antenna may offer better range although you should also try horizontal. Keep the whip antenna away from motor and battery wiring as much as possible. Never let it touch anything metal. For metal locomotives, the use of the external antenna is mandatory. Make sure the antenna is as far outside of the metal chassis as possible.

Not Sure About The CONVRTR-25's Frequency?
Not sure about the CONVRTR-25's frequency? Don't worry. Use the forgotten frequency procedure to set it to what you need. It's fast and painless as described on page 10.

LED Indicators For Troubleshooting

Assuming you can see the little LED indicators on the CONVRTR-25 board, they can provide you with some hints as to the causes of poor, erratic, or non-operation.

The PWR Green LED will always be on if power of the correct polarity is applied. Even if the voltage is above or below normal, this LED will be on. If it is off, when you think it should be on, check your battery, switch and fuse wiring.

The GP Red LED offers several indications that can serve as an effective aid to troubleshooting.

Steady On: it says the throttle frequency matches the CONVRTR frequency.

Slow Blink: CONVRTR is in count down mode prior to entering Jump Mode. You must turn on a throttle with a matching frequency to cancel Jump Mode. The GP LED will go dark after one minute.

Dark: there is no throttle present that matches the CONVRTR frequency setting and it has now entered Jump Mode. To cancel this mode, power cycle the CONVRTR and make sure the throttle is set to the CONVRTR's frequency.

Erratic blinking on and off: the throttle is set to a power level that is too low or the throttle is too far away or both.

Troubleshooting Tips

Train Stops When It Is Far Away - This is an easy one. You need to set the decoder's loss of signal timer, set CV11 to a value of 0. Any other value and the locomotive will come to a halt when the throttle signal is gone and the timer has expired.

Throttle Loses Control When Locomotive Is Far Away - This is just the normal limitation of the radio system. Do not expect the throttle to control the train when it is a thousand yards away. However, if your railroad is in a large loop, then leave the throttle on its original setting and let the train come back to you.

Horn/whistle Won't Stay On When F2 is Pushed And Held - This is usually caused by a combination of noisy motors and distant operation and is not actually a problem. Instead, it is an automatic feature of the CONVRTR-25. If for any reason, the CONVRTR-25 stops receiving throttle commands, and the last command was horn ON, then it will automatically issue a horn OFF command after a preset amount of time.

Limited Reception Range - There are many causes that contribute to shorter than expected range. In no particular order, here's a list of items known to impact the range.

Antenna parallel to motor or battery wiring: Keep all wiring away from the antenna.

Metal shell: If loco has a metal shell, the antenna must be outside of the metal shell.

Noisy motor: Consider remotoring with a low current, high efficiency motor. Not only will the range be better but the battery will last much longer.

LOCO Runs If Throttle Is OFF
This is easily solved since it is the decoder causing this. The decoder must have the analog conversion turned off. To do this, program the decoder's CV29 to a value of 2 if the loco address is between 1 and 99. For loco addresses higher than 99, program the decoder's CV29 to a value of 34. These values turn off the analog conversion.

The troubleshooting list below assumes that the CONVRTR has been properly installed and was working OK. The bold face type is the symptom.Common causes are described with the most common listed first and the least common listed last.

Any condition that trips the CONVRTR's self protection will require a power cycle to reset it. In other words, turn off power to the CONVRTR and then turn it back on.

Recommended Soldering Tools and Solder

Soldering small wire is not difficult. However, if you don't have the correct tools, proper soldering is difficult and frustrating.

Use Small Diameter Rosin Core Solder. The choice of solder is also important. One of the things to remember is to never use acid core solder. Acid core solder will destroy the board and components. The best solder for electronics work is small diameter, 0.015 to 0.02 inch "no-clean-flux" core solder. Larger diameter solder should not be used as there is a risk of putting too much solder on the pad which will short out adjacent pads.

Use A Small Diameter Soldering Iron. Do not use so-called soldering guns. These are very high wattage and will damage delicate traces, pads and components. A 25 watt, temperature controlled iron is the best.

Tool Source: The following part numbers and prices are from Mouser Electronics www.mouser.com. They are an excellent supplier that we use as often as we use Digikey.

Apex Soldering Iron, 25W, Temperature Controlled	578-WP25
Soldering Iron Stand and Sponge Holder	578-PH100
60/40 Rosin Core Solder Roll	738-13427

Keep The Soldering Tip Clean. Buy an inexpensive soldering iron stand, that includes a holder for a small sponge. Keep the sponge damp. Swipe the tip across the damp sponge to clean it before soldering. Don't clean after soldering - the excess solder protects the tip. Before turning off the iron's power, put a blob of solder onto the tip. This solder coats the tip and prevents oxidation.

Always Twist and Tin Stranded Wires Before Using. Stranded wire must have their individual strands twisted together followed by a applying a small amount of solder - this is called tinning. It makes soldering the wire to the board much easier.

Soldering Tips

- Do Not use too much solder. A tiny amount is all that is needed.
- Never apply the solder directly to the iron and attempt to 'paint' it onto the lead.
- Proper soldering takes a little patience. This is the most important part of learning to solder. You must watch and wait if you want to have a good solder joint. Soldering can not be rushed.
- When the joint has cooled, trim the excess lead using the wire cutters. Do not cut off the solder joint - rather trim the lead to the top of the joint.

Hookup Wire and Heatshrink Tubing Source

To avoid confusion and possible damage, always use different colored wires for hookup. Standardize on what each color does. Take a few minutes document your installation. Make a record of the colors used and take pictures of your installation. You might remember what you did a month from now. But what will you remember a year from now?

The suggested hookup wire comes in 100 foot rolls. This wire is #30 AWG, stranded and tinned. More important is the thin outer insulation. Share the cost of this wire among friends - the roll will last a long time.

Hookup Wire Color and Digikey Part Numbers:	**www.digikey.com**
Red #30 AWG Stranded and tinned	A1851R-100-ND
Black #30 AWG Stranded and tinned	A1851B-100-ND
Orange #30 AWG Stranded and tinned	A1851A-100-ND
Grey/Slate #30 AWG Stranded and tinned	A1851S-100-ND
Blue #30 AWG Stranded and tinned	A1851L-100-ND

Heatshink Tubing Kit of various diameters also from digikey.com

Heatshrink Kit - 180 variety pak of 6 inch pieces	Q2Z1-KIT-ND

Verifying Battery Polarity - It's Cheap Insurance!

Verify Battery Connector And Wire Polarity!

If you don't have a VOM meter, you can use the testing diode that came with the to verify that you have the plus and minus leads properly identified before permanently connecting the battery to the . There is no protection for reversed battery wires and the will be destroyed.

To verify proper identification of the two battery wires, use the steps below. This is a temporary hookup. Do not allow the battery wires to short together or brush against the board. This will damage the board and the battery.

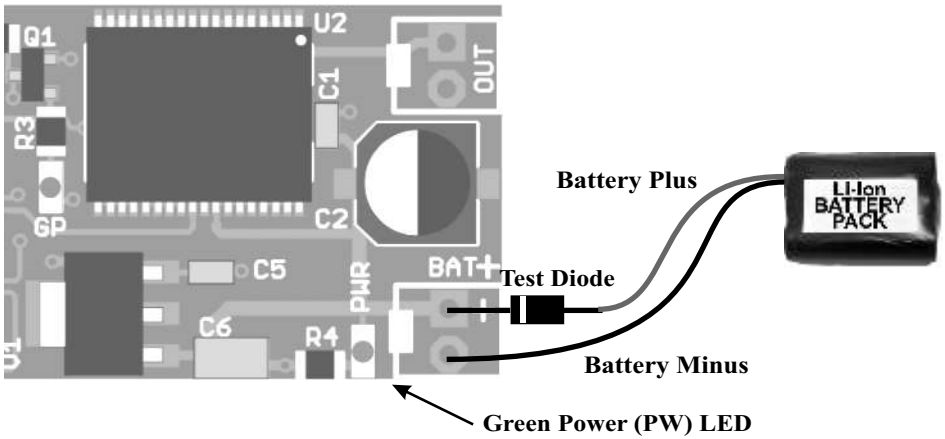
Step 1: Temporarily solder the black or negative wire from the battery (or what you think is the negative wire) to the pad labeled BN.

Step 2: Temporarily solder the banded end of the test diode into pad labeled with the large plus symbol.

Step 3: Touch the battery plus wire (or what you think is the plus wire) to the free end of the diode (the non-banded end). If the green power (PWR) LED turns on, then the polarity is correct. Label the battery's plus wire and note its color.

If the green LED does not turn on, first verify that the banded end of the diode is in the CONVRTR's + pad. If that is correct, then reverse the two battery wires. If the green LED now turns on, mark the wire connected from the battery to the diode as the + wire.

Once you have confirmed and identified the proper polarity, mark the wires or make a drawing so that you can refer to it when you are ready to make the permanent hookups. Disconnected the diode - do not leave it attached. It wastes too much energy to be permanently installed.



Warning!
Reversing the input polarity to the CONVRTR-25 will damage it beyond repair. This is not covered by the warranty.

Using OPS PROGRAM Mode

The CONVRTR-25 both understands and passes on to the attached DCC decoder, any OPS programming command from an AirWire throttle. This feature allows the attached decoder to be reprogrammed without modifying any other decoder that may be sharing the same frequency.

When using the OPS PROGRAM mode, the throttle must be set to the same frequency and the same address as the locomotive. If either is wrong, the command will not be received.

For the attached DCC decoder, any CV supported by the decoder can be changed. Any change to the decoder using OPS PROGRAM mode, takes effect immediately. Be sure to have your decoder's user guide available to verify the desired CV number for the effect or action to be changed.

OPS Programming Of The CONVRTR-25, is also possible for its own CVs. As with the attached decoder, don't use OPS programming to change the locomotive address. The complete list of CVs inside the CONVRTR-25 are listed on the back page.

Do not change CV1 using OPS PROGRAM mode which is the decoder address.

Use only SVC PROGRAM mode to set the locomotive address so that both the microBooster and the attached decoder receive the same address.

Overloading And Overheating Fault Protection

In the event of an overload or a short circuit, or if the CONVRTR-25 gets too hot, it will automatically shut off its DCC output to protect itself. If the train was running, it will stop. If the train was idling, the sound and any lights will turn off. Both of these conditions are because the DCC output has shut off. Nothing is damaged if this occurs; a power-cycle will restore normal operation. But, you need to determine what caused the CONVRTR-25 to shut down and remedy it.

The 2.5A continuous current rating is not an absolute limit. Output current can be higher if there is sufficient ventilation. But if there is limited or no ventilation, the maximum current will be much less. If the CONVRTR-25 is operated in a hot environment, this will also limit the maximum available current.

Short circuit protection is initiated at a minimum value of 8 Amps. A typical value is 12 Amps. The maximum value is 16 Amps. Many sound decoders will exceed12 Amps momentarily when first powered on. If this occurs, the CONVRTR-25 will shut down and the sound decoder will not power on. A surge limit resistor must be used if this occurs. See page 10 for using the supplied resistor.

Total current load on the CONVRTR-25 is the sum of the amperage from the motor, sound effects and lights. Thus incandescent bulbs should be replace by LEDs. Not only are LEDs significantly brighter but they require much less current and have a very long lifetime.

A thermal overload will cause the CONVRTR-25 to shut down. The thermal overload can be caused by several factors or combinations of factors. These factors include inadequate ventilation, higher than normal motor current, or battery voltages higher than 14.8V.

Caution - No Automatic Reset After Fault
The CONVRTR <u>does not</u> automatically reset. You must turn the main power off and then back on - this is called a power cycle.

Operating Notes For Frequency Jump Mode

These notes discuss what happens with "Jump Mode" under various operating conditions.

- The jump mode is canceled and normal operation resumes if a throttle is turned on that matches the present CONVRTR-25 frequency **within one minute** of the CONVRTR-25's power being turned on.
- If the CONVRTR-25 jumps to frequency 0 because you waited too long to turn on the throttle, just cycle the CONVRTR-25 power and make sure the throttle is turned on within one minute.
- The jump to frequency 0 is temporary and **nothing is changed** in the CONVRTR-25. You must now set the desired frequency before turning the power off agian.
- The CONVRTR-25 will not jump to frequency 0 if any throttle with a matching frequency is on within one minute of turning on the power. The assigned loco address does not matter.

Using OPS PROGRAM Mode During Jump Mode

If you are confident you know the CONVRTR-25's assigned locomotive address, then you can use OPS PROGRAM to change the CONVRTR-25 assigned frequency. If you are not sure, then use SERVICE PROGRAM mode. OPS PROGRAM is the safest way to change the CONVRTR-25 assigned frequency and insures no other decoders will have their frequency changed. The only caution is that you must know the CONVRTR-25 assigned loco address.

- Step 1: Turn off **all** AirWire throttles. This is very important since it is the absence of any throttle signal that forces the CONVRTR-25 to temporarily jump to frequency 0.
- Step 2 - Turn off the CONVRTR-25 and then turn it back on. .
- Step 3 - Wait at least one minute. If you can see the GP LED, it will slowly blink during the wait time. After the wait time is up, it will be dark. You must wait the full minute.
- Step 4 - Turn on your throttle, set it to frequency to 0 and enter the decoder's address. If visible, the CONVRTR's GP LED will now turn on steady.
- Step 5 - Use **OPS PROGRAM** to set CV200 to the desired frequency. Be sure and reset your throttle to the new frequency. A power cycle is not needed.

Resetting CONVRTR-25 To Original Factory Settings

CV8 is used to reset the CONVRTR-25 back to original settings as it comes from the factory. Both the locomotive address and the frequency will be changed back to the original settings. After issuing the factory reset command, the CONVRTR-25's address is changed to 3 and its frequency is changed to 0.

The CONVRTR-25's reset command will have no affect on the attached decoder.

If you know your CONVRTR's present radio frequency, set your throttle on the same address and frequency.

> If you do not remember the radio frequency, you must first use the forgotten frequency command to set the radio frequency. Once this is done, then you can reset the CONVRTR to its original factory values. See page 7.

Turn on the T5000 by pushing MENU. Verify it is set to the same frequency as the .

1. Push MENU twice followed by 4 to select SVC PROGRAM mode.
2. Press 8 and then ENT to enter CV8.
3. Press 1,3,5 then ENT to enter the reset value. All other values are rejected.
4. Press ESC to exit SVC PROGRAM mode.

At this time, the CONVRTR-25 has been reset to factory defaults. It will be on address 3 and frequency 0.

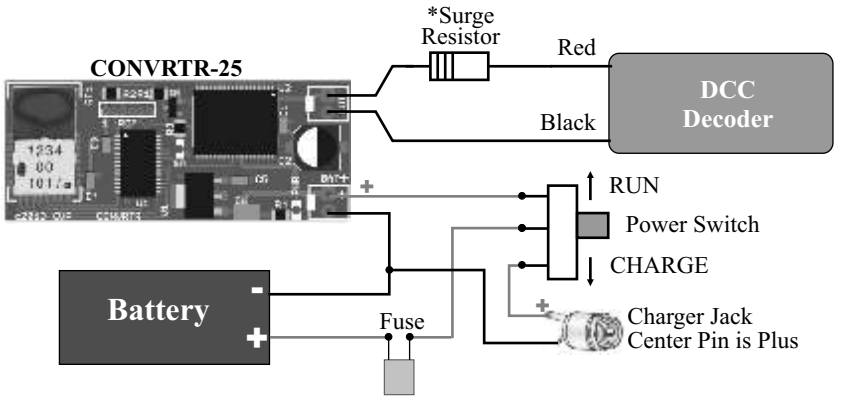
Remember, the attached decoder is still on its original locomotive address. Now is the time to set both the CONVRTR and the attached decoder to the desired address.

Basic Hookup

Basic CONVRTR-25 Connections: This is easy. There are two input pads for the battery connection that are polarity sensitive. There are two output pads for connecting the DCC decoder.

Page 3 shows the connections for both a TCS-WOW sound decoder and a Soundtraxx decoder. from

Power Switch, Charging Jack and Fuse: None of these are absolutely necessary. You can equip the battery with a simple plug and socket and that becomes the power switch. A fuse is not absolutely necessary. If your battery has the protection circuit board, the external polyfuse can be eliminated. If the battery has no internal protection, you should include a fuse to prevent a short circuit from melting the wire insulation. A 4A polyfuse is a good choice.



*Surge Resistor & Sound Decoder Surge Currents

Surge Current - With most sound decoders, there is a huge current surge when power is first applied. This surge current, can easily exceed 8 Amps which will trip the CONVRTR-25's short circuit protection. This will shut off the DCC output. No harm has been done, but a power cycle will be needed to reset the CONVRTR-25. The overload trip point is not adjustable. The only outward indication that the CONVRTR-25 output has shut off is that the locomotive will not operate nor will it respond to programming commands.

Solving the surge current problem: To solve surge current shutdown, the current must be limited. This is easily done using a series resistor between the one of the decoder's power input wires and the CONVRTR-25 output. A 1 ohm resistor is included with your CONVRTR-25. Insert the resistor between the decoder's red input wire and the CONVRTR's DCC output.

Not all decoders have a surge current problem. Nearly all motion-only decoders will not need the surge resistor. Also, the new TCS-WOW 1-Amp and 2-Amp sound decoders have much lower surge currents and may not need the surge limiting resistor either. If in doubt, hook up the decoder without the resistor. If it reliably powers up, then the resistor is not needed.

All operating current flows through the resistor. The included resistor is rated at 3 watts so that it stays cool even when operating near the CONVRTR-25's limits. Using a lower power rated resistor will result in resistor overheating and damage under normal operating conditions.

Note that the the CONVRTR's red LED is not a fault indicator. The CONVRTR's red LED will be on if there is an AIRWIRE throttle turned on and set to the CONVRTR's frequency.

Installation Tips

Disconnect Track Pickups

The locomotive track pickup contacts and wiring must be disconnected and removed before hooking up the CONVRTR-25 especially if the locomotive has a factory installed DCC decoder.

If the track pickups are not removed, there is a risk that the onboard battery voltage may appear on the track pickups and thus on the rails. Contact between and external power source and the onboard battery will short out and destroy the battery and CONVRTR-25.

Using Locomotives With Factory Installed DCC Decoder

This is one of the easiest installations since the DCC decoder is already installed. However, because of the limited available space, a dummy locomotive or trailing car is required to hold the battery and the CONVRTR-25.

First, open up the locomotive and locate the track pickup wires going to the decoder. Unsolder these wires from the decoder or removed the plastic clips to free the wires. Note that a diesel locomotive,usually has a pair of track pickup wires soldered or clipped onto each end of the decoder circuit board. It is mandatory that ALL track pickups are disconnected from the decoder.

With the track pickup wires removed, decide how to route the wires from the locomotive to the dummy or car where the CONVRTR-25 and battery are located. For a diesel locomotive, one end of the board may be closer than the other end. Solder a pair of wires to the decoder's track input pads or decoder input wires. If the decoder uses wires, the NMRA-DCC color code is red and black. If the decoder uses tabs or contacts, carefully solder the input wires to these locations.

Quick Start Instructions

This "Quick Start"section assumes you have either installed the CONVRTR-25 and the decoder or you are testing the two devices on the bench. As delivered from the factory, the CONVRTR-25's frequency is set for 0 and its address is set for 3. First hookup the CONVRTR-25 and the decoder.

Step 1: Turn Power On To The CONVRTR-25

- The CONVRTR-25's green LED will glow brightly indicating power is connected.
- If you have not done so, now turn on your AirWire throttle and set it to frequency 0. If your decoder is brand new, set the throttle to loco 3 which is the default address for nearly all decoders.
- When the throttle is turned on and set to the proper frequency, the CONVRTR-25's red LED will glow brightly. If the red LED is not on, then your throttle is not on the proper frequency. Do not proceed to step 2 until both of the CONVRTR-25's red and green LEDs are on steady.

> The next step is very important. By setting the loco address into the attached decoder, the CONVRTR-25 gets the same address at the same time. Without doing this, the "stuck horn/whistle" feature will not work. The CONVRTR-25 must know to what loco address the "horn/whistle off" command is sent to. If you forget to do this, the decoder will continue to operate normally although the "stuck horn/whistle" feature is disabled.

Step 2: Set the Decoder Address Into The CONVRTR-25 Using SVC Program Mode

- Select SERVICE PROGRAM mode on your throttle. For T5000 throttle, press menu twice and then push the number 4.
- For T5000 users, push 1 and push ENT to select CV1 for changing the address.
- Enter the decoder address that you want to use. The address must be unique. The loco's cab number is always a good idea. Once you have entered the numbers, push ENT.
- Address 0 is not allowed. If you accidentally use 0, start over and use the desired address.

Step 3: Set the Throttle To The New Address And Run!

- If the new address is not already in your T5000 throttle, enter the address using #, nnnn, # where nnnn is the locomotive address. Set the direction, turn up the speed knob and run the train.

continued on next page

Quick Start Instructions - *continued*

- For T5000 users, you can store the decoder address and the CONVRTR-25's frequency in your throttle memory by pushing the LOCO MEM key twice. This is not mandatory but does make it easier to recall the address and automatically set the proper frequency in the throttle. For older AirWire throttles, see the appropriate user manual.

Two Very Important Decoder Setup Requirements

1. Turn Off Decoder Analog Conversion if this feature is available in the attached decoder. Use the SVC PROGRAM mode to set CV29 to one of the following values based on the decoder's locomotive address. Failure to make the change to CV29 will result in unexpected high speed runaway if the decoder is powered on without a throttle on a matching frequency being turned on.

For address between 1 and 99: Set CV29 to a value of 2.

For address between 100 and 9999: Set CV29 to a value of 34.

2. Set The Decoder Packet Timeout Value To 0 if this feature is available in the decoder. Use the SVC PROGRAM mode to set CV11 to a value of 0. This will permanently disable the feature. Without setting the value to 0, the locomotive will stop if it goes out of range of the throttle. The preferred setting of 0 allows the locomotive to continue running at its current speed until it comes back into the throttle's range. If you would rather have the loco come to a stop when it is out of range, then set CV11 to a value other than zero. The value entered is the number of seconds that will elapse before the decoder automatically stops the locomotive if it no longer is receiving throttle commands.

Changing The CONVRTR-25 Frequency

As delivered, the CONVRTR-25 is set to frequency 0. If you want to use a different frequency, follow the series of steps below. The procedure below uses the **SVC PROGRAM** mode of your T5000 throttle. Verify that all other locos sharing the same frequency are turned off or they too will be changed.

- Select SVC PROGRAM mode. On the T5000, push MENU twice, and then push the 4 key.
- Enter 58 followed by ENT. CV58 is the memory location where the desired frequency is to be stored inside the CONVRTR-25. It is remembered even if battery is disconnected.
- Enter the desired frequency number, from 0 to 16, and push ENT. Note that the red LED goes out because the decoder is now on the new frequency.
- Push ESC to cancel OPS mode.
- Change the throttle to the new frequency and verify the train runs normally.

Forgotten Frequency? - Resetting CONVRTR-25 Frequency

There may come a time when the CONVRTR-25 no longer responds to what you believe is the correct frequency, or you can not remember the correct frequency. If this occurs, follow this procedure called the "Jump Mode." This feature will temporarily force the CONVRTR-25 to frequency 0 where you can make a permanent frequency change. There are a few guidelines to consider about the Jump Mode, and these are discussed on the next page.

Warning: make sure there are no lurking powered decoders assigned to frequency 0 or they too will have their frequency changed.

Step 1 - turn off all AirWire throttles. This is very important. It is the absence of a throttle signal, plus turning the CONVRTR-25's power off and then back on (a power cycle), that allows theCONVRTR-25 to temporarily jump to frequency 0 where you can set a new frequency.

Step 2 - Turn off the CONVRTR-25 if it was powered on.

Step 3 - Turn on the CONVRTR-25 and wait at least 60 seconds.

Step 4 - Now turn on your throttle, and set it to frequency 0.

Step 5 - Use SERVICE PROGRAM to set CV58 to the desired frequency.