Disclaimer Of Liability

CVP Products (CVP) is not responsible for any direct, indirect, special, or consequential damages and personal injuries, including that to life, and health, resulting from the customer's application and use of CVP's devices. You, the customer, assume full and unlimited responsibility for all device applications and uses. Your purchase and/or use of this device constitutes your agreement to hereafter assume full and total responsibility for your subsequent utilization of the device and you agree to defend, protect, save harmless, and indemnify CVP Products, its owner and employees relative to your potential use and misuse of this device. By purchasing or using a CVP device, you agree to the above terms.

If buyer does not agree with these conditions, immediately return the product, in its original condition, to the place of purchase.

Warranty Information

This warranty covers substantial defects in materials and workmanship of the T2x00E OPS throttle. This warranty does not cover the wall charger or the interface cable.

What This Warranty Does Not Cover

This warranty does not cover any problems which result from normal wear and tear, improper installation, modifications, battery failure, battery polarity reversal, leaking batteries, incorrect charging procedure, 3rd party battery chargers, 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. Normal wear and tear includes dirty keys, broken pot, cracked case, broken/cracked display, broken charging jack or other wear caused by use and abuse.

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.

Help, Repairs and Returns

If you purchased your T2x00E Throttle from one of our AirWire900 dealers, please call them first. They are your best and quickest for answers about the throttle and its operation.

If you purchased your T2x00E Throttle *directly* from CVP Products, you may call our office during normal business hours or send us an email. If the voice mail system answers, it is either after our normal business hours or we are busy helping other customers. Please leave a message. Be sure to leave your phone number and your location. Have your throttle, the instruction manual and your locomotive nearby before you call.

Do not send items to us for repair without first obtaining authorization. In many cases, problems are easily solved via phone or email without the need or expense to return items to us. For more information about repairs, go to the website home page and click on the red box labeled REPAIR SERVICES.

Warning - Absolutely Never Drill The Throttle Case

Absolutely nothing can be mounted to throttle's case; top or bottom. Do not screw, drill or mount items such as lanyards to the throttle's top or bottom. Never drill the case since the battery can be damaged resulting in a fire hazard and damage to the throttle. If drilling has been done and is discovered by CVP, the throttle will not be repaired and will be returned to you untouched. So don't do it!

If Your We Authorize Repair Service

Visit the CVP home page and click on the red box labeled REPAIR SERVICES. Follow the instructions for obtaining service for your throttle. You must have an RMA before sending it. Be sure to include a copy of your invoice or your invoice number.

T2600E/T2400E Wireless Throttle User Guide

Operator User Guide **3**

Simplified instructions for operators and visitors using the T2x00E throttle.

Owner Setup Guide **7**

Instructions for selecting various hidden options for the T2x00E throttle that are not visible to operators.

This throttle uses a rechargeable Lithium-Ion (Li-Ion) battery. Li-Ion batteries are volatile if not handled properly. Read the safety instructions and warnings on page 11 before using or charging your throttle. Failure to do so may result in fire, personal injury, and damage to property including your new throttle.

Please read and understand the disclaimer of liability on the back page.

Fully Charge Battery Before Using. See Page 6.

T2x00E User Guide

This user guide is for both the T2600E and the T2400E OPS throttles.

T2600E for V6xx EASYDCC

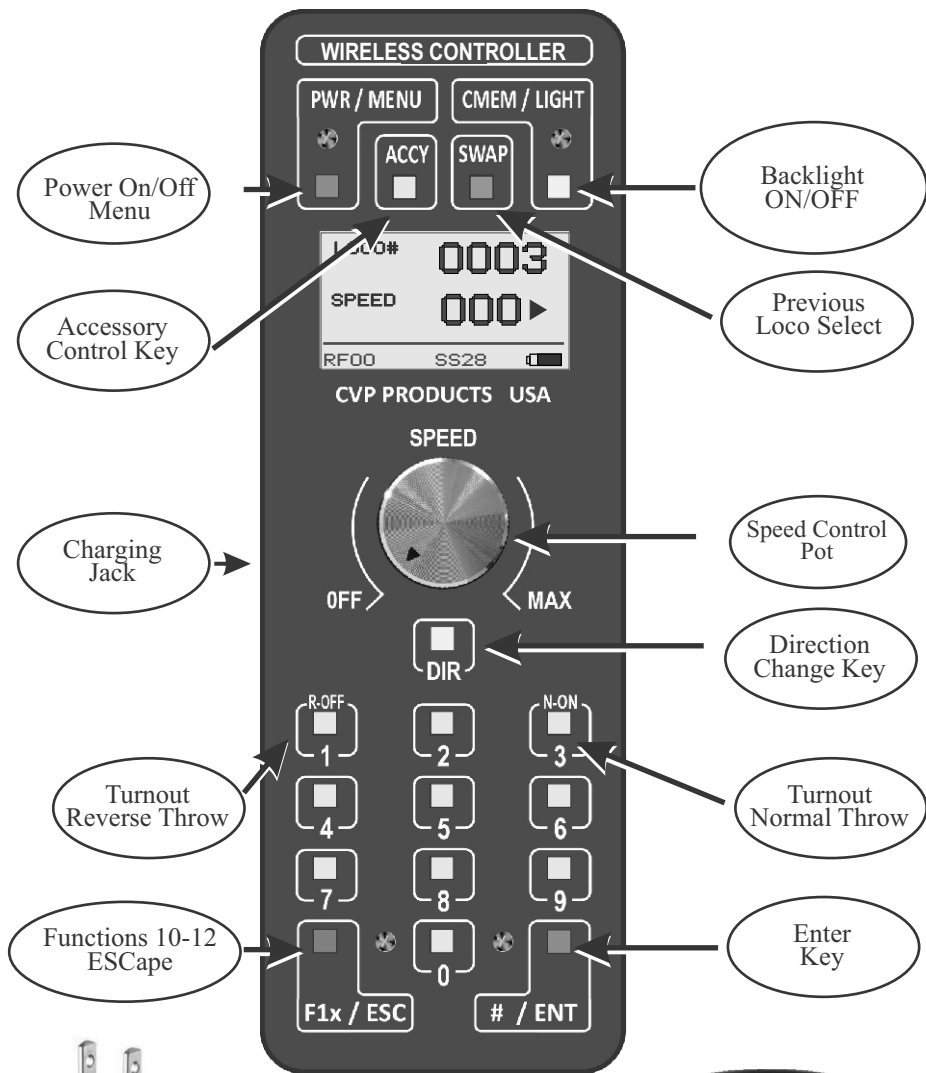## T2400E for V4xx EASYDCC and LENZ Systems

T2x00E Combo Contents
T2x00E Throttle
*USB Wall Charger
*USB to microUSB Cable
This User Guide

*If the T2x00E is purchased alone, the * items will not be present.*

T2x00E OPS Wireless Throttle - Front View

Fully Charge Battery Before First Use

WIRELESS CONTROLLER

PWR / MENU   CMEM / LIGHT

ACCY   SWAP

Power On/Off Menu

Backlight ON/OFF

LOCO#   0003

SPEED   000 ▶

RF00   SS28

CVP PRODUCTS USA

Accessory Control Key

Previous Loco Select

SPEED

OFF   MAX

Charging Jack

Speed Control Pot

DIR

Direction Change Key

R-OFF   N-ON

1   2   3

4   5   6

7   8   9

Turnout Reverse Throw

Turnout Normal Throw

0

F1x / ESC   # / ENT

Functions 10-12 ESCape

Enter Key

USB Wall Charger

USB to microUSB Charging Cable

Replacing Internal Battery

The T2x00E throttle's internal battery is specified for about 600 full charge-discharge cycles before needing replacement. This means the battery will last for many years of normal use. Incorrect charging will shorten its lifespan.

Should a replacement be required, it is simple to do. The replacement battery is called the BAT4 and the latest price is available on the CVP website. Call or email your order to CVP Products.

To replace the battery, first remove the 4 screws from the back of the case. Carefully lift the back up and lay it next to the case.

The battery plug has two small tabs that keep it from being unplugged. Use a non-metallic tool to gently spread the socket to release the tabs. Then unplug the battery pack by wiggling and pulling up on the plug's wires.

The battery is attached to the back with thin, double sided 3M tape. Remove the battery from the tape and discard in a safe manner.

Remove every piece of the old tape from the back. Apply a fresh piece the same length as the battery. Using the picture as a reference, position the battery and press it firmly to the back. Plug in the new battery. The socket is polarized so the plug only fits one way.

Place the back onto the throttle and check for pinched battery wires. When all is clear, reinstall the 4 screws.
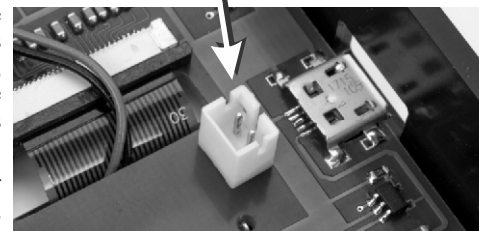
Battery And Charger Specifications

Battery Type	Lithium-Ion Rechargeable Battery (Li-Ion)
Battery Voltage	3.7V typical, 4.2V maximum, 2.75V to 3.0V cutoff
Battery Capacity	2000mAh
Battery Protection	Over voltage, under voltage, over current
USB Socket Type	microUSB socket on side of throttle
Charger Voltage	6 VDC maximum (higher voltages will damage throttle)
Charger Current	500mA maximum, lower is OK but charging takes longer

Li-Ion Rechargeable Battery Pack Precautions

NEVER use a NiCd/NiMH charger to charge Li-Ion batteries.

ALWAYS store Li-Ion batteries at room temperature. Do not allow them to freeze.

NEVER charge batteries if the ambient temperature is above 113° F.

ALWAYS unplug the battery if storing the throttle for more than 2 months without charging.

ALWAYS charge the battery if it has not been used for more than a month.

ALWAYS keep Li-Ion batteries out of reach of children or pets.

NEVER puncture, cut or drill into the battery pack.

Swap Loco - Operating Notes

New Throttle: As received from the factory, or after a throttle reset, swap memory is initialized to loco 9999.

After Use Of Swap: If swap has been used, the swapped loco number is saved with power off.

Miscellaneous Notes

Automatic Power Off Timer - The T2x00E throttle automatically turn itself off after 15 minutes of non-use but <u>only</u> if the speed knob is set to OFF. However, if the speed control is not OFF, like when you are operating a train, the throttle will not automatically turn off.

Teach your operators to set the speed control to OFF when not operating a train. Before putting the throttle down, verify the speed value shows 000, then turn off the throttle.

Low Battery Warning - When the battery has about 5 minutes of life remaining, the BAT icon will show an empty rectangle. When the battery life drops to less than 5 minutes the CHARGE BATTERY message appears, It is strongly recommended to park the train before the throttle automatically shuts down to protect the battery. If the train is still running when the throttle shuts down, the train will be uncontrolled.

Battery Has Automatic Shutoff When Depleted - If the battery is fully depleted, it will automatically shut off. The throttle can't be used and nothing will be displayed. A voltmeter will measure 0 volts. But, there is nothing wrong with the battery. It simply needs to be charged to reset the internal protection circuit. If the battery is allowed to be fully depleted, allow it to charge overnight. The battery must be charged before the throttle can be used again.

OK To Leave Battery Plugged Into Charger - The battery can remain plugged into its USB charger when not in use. It will not be overcharged or damaged. *The battery does not develop a "memory."*

Assign Throttles to An Unused Loco Number Before Turning Off - Loco number 99 or 999 or 9999 is recommended. This will flush the old number out of the wireless receiver.

Check Throttle Frequency And Throttle Id Before An Operating Session - Compare the screen with the label you put on the throttle and do this before you begin operating.

> **Set Loco Number to 9999 Before Turning Throttle Off**
> The loco number needs to be an unused number. It can be any number you wish. Most people find 9999 easy to remember. This insures operators won't power up the throttle, crank up the speed causing an unseen locomotive to run off. It also flushes the old loco number from the wireless receiver.

Tips For Best Throttle Performance

The T2x00E throttle operates in an unlicenced band shared by many other transmitters. These transmitters can and will create interference resulting in intermittent locomotive control or complete failure of the locomotive to receive throttle commands. The sources of these external interfering signals can be from other EasyDCC throttles, your own home, from adjacent homes, nearby businesses or noisy electrical motors including your own locomotives.

<u>Interfering Transmitters.</u> Here's a list of devices known to have caused interference to the throttle: other EasyDCC throttles on the same frequency, wireless devices attached to computers, TV remote controls, cordless telephones, wireless home or business 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.

If you find a strong interfering signal on one or more of your frequencies, don't use those frequencies; pick a different frequency and try it.

<u>Keep your hand away from the top edge of the box.</u> The internal antenna is near this area and the presence of your hand can affect the throttle's range.

Operators User Guide: Turn Power On and Off

The solid black banner on this page indicates this is a section for operators. The pictorial instructions are only for basic throttle operation and can be used to explain its operation to your operators. The hidden throttle setup information, starts on page 7.

Power On , Splash Screen

PWR /

T2600 OPS
V01 EASYDCCv6 ©CVP

T2400 OPS
V01 LENZ-EDCCv4 ©CVP
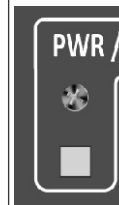
Power Switch   T2600E and T2400E Splash Screens and Software Version Numbers

Turn On The Throttle
Push and release the green key labeled PWR. The splash screen will show briefly followed by the home page display.

The home page shows the loco number (the active loco) to which speed, direction and function commands are being transmitted. If this is the first time the throttle has been turned on, the default factory setting for the loco number is 3. If the throttle has been used, the last used locomotive number will be displayed. It also shows the throttle frequency and its ID number.
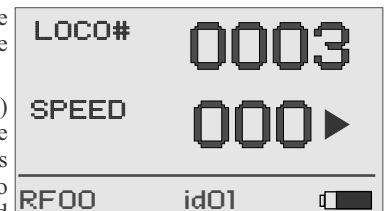
LOCO#   0003
SPEED   000 ▶
RF00   id01
Home Page with Freq# and ID#

> *A flashing speed value, after turning on the throttle, means the speed control is not set fully counterclockwise to the OFF position. The throttle cannot be used until the speed value stops flashing.*

How To Turn Off The Throttle
First, set the speed value to 000 by rotating the pot fully counterclockwise.

1. POWER OFF

Push the green PWR key. The display shows what key to push to power down the throttle. Push the 1 key to turn off the throttle.

Primary Menu

If you accidentally pushed the PWR key, push the red ESC key to cancel the command. The action is cancelled and the display returns to the home page.

Automatic Power Off
The throttle will automatically turn itself off after 15 minutes as long as the speed value is 000. If the speed value is not 000, the throttle will not turn itself off. The speed value must be 000 for the automatic shutoff to activate.

Rechargeable Battery Status
The battery shaped symbol shows the status of the rechargeable battery. When fully charged, the symbol is solid black. As the battery is used, the filled symbol empties out. When the symbol is not filled, there is only a few minutes of life remaining. The message CHARGE BATTERY will appear. Park the train and stop using the throttle. Connect it to the charger and allow it to charge overnight.

Full   Empty

LOCO#   0003
SPEED   000 ▶
CHARGE BATTERY

It is OK to leave the throttle plugged in to the charger between uses.
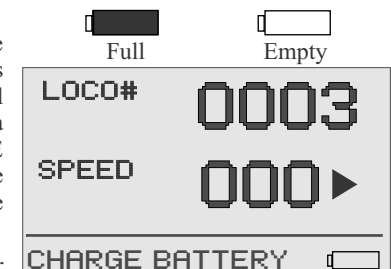
Selecting The Locomotive Number To Control

For this example, the loco number to be used is number 3456.

First press and release the ENT button. This brings up the LOCO number screen.

Now press the 3, 4, 5, 6 keys in sequence. Always verify you have the correct loco number showing in the display before continuing.

If a wrong number has been pressed, just tap the 0 key until you see 4 zeroes. Then enter the desired numbers. Only the numbers shown in the display are used.
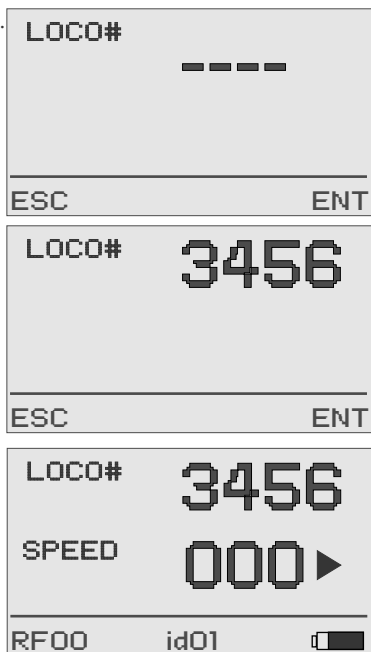
After verifying the numbers are correct, press the ENT key again.

You can also cancel out of the loco number selection mode by pressing the red ESC key. If ESC is pressed before the ENT key, the new number is canceled and the original loco number will be in the display.

When ENT is pressed, the home page will change to show the new loco number. The direction is always forward shown by the right- facing arrow next to the speed value.

If the throttle is turned off, the last loco number used will be restored when the throttle is turned back on.

You can change the loco number at any time.

```
LOCO#
              ----

ESC                ENT
```

```
LOCO#     3456

ESC                ENT
```

```
LOCO#     3456

SPEED     000▶

RF00      id01    ▭
```

Controlling Locomotive Speed and Direction

The single turn "speed" potentiometer (pot) controls the locomotive speed. Turn it clockwise, towards MAX, to increase the locomotive speed. Turn it counterclockwise, towards OFF, to decrease locomotive speed. The speed value in the display represents the DCC speed step number being transmitted. When not using the throttle, always set the speed control to OFF [000].

Push and release the yellow **DIR** key (below the knob) to change the locomotive's direction. Forward is indicated with a right facing arrow next to the speed value. Reverse is indicated with a left facing arrow. The direction arrow doesn't indicate the physical movement of the locomotive. Rather it shows the locomotive movement as if you were sitting in the locomotive's cab.

Sending Function Commands

The throttle can activate decoder functions numbered F0 thru F08 for the T2400E or F0 thru F12 for the T2600E. The loco decoder determines what each function command does.

F0 to F9: When the home page is being displayed, each of the number keys are also the DCC function keys. For example, the 0 key is F0, the 1 key is F1, the 2 key is the F2 function. push the key to send the "activate" function command. Press the key a second time to send the "deactivate" command. When a function key is pressed, the word FUNC# and the number replaces the speed value. A few seconds after the function key is released, the speed value reappears.

F10 to F12: Push the red F1x/ESC key once. The display changes to show FUNC# and F1-. Push the second number, either 0, 1 or 2, to finish the two digit number.

If the ESC key is accidentally pressed, just push it again to cancel the function command.

F2 is special: By convention, F2 is almost universally assigned to a horn or whistle "momentary" function. Pressing and holding the F2 key activates the horn or whistle. The activate or "blow" command is sent as long as the key is pressed. Releasing F2 turns off the horn or whistle off.

```
LOCO#     3456

FUNC#     1 -    ▶

RF00      id01    ▭
```
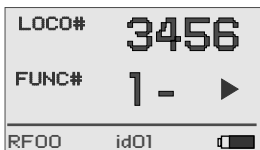
Select Throttle Frequency

Each wireless throttle must be on its own unique frequency. If two throttles share the frequency, they will jam each other. This is a one time setting. The throttle will remember the frequency setting even if the battery fails.

The selected frequency is always visible on the home page.

To change the frequency, first get into the hidden setup menu.

From the SETUP Screen, push and release the 3 key to enter the frequency select mode.

For this example, the frequency will be set to 3.

Push 3 followed by ENT. When the ENT is pressed, the throttle is immediately change to frequency 3 and the home screen will show RF03.

Once a frequency is changed, verify the frequency number, shown next to "RF" on the lower left corner of the home page, is correct.

```
FREQ#
              - -

ESC                ENT
```

```
LOCO#     3456

SPEED     000▶

RF03      id02    ▭
```

Frequency Groups and ID Numbers

Associated with each EasyDCC wireless receiver is a range of available frequencies and a range of ID numbers. For the T2600E wireless throttle to work correctly, it must be assigned to a frequency and an ID number associated with the receiver's group number. Lenz owners can use any ID number on any of the available frequencies.

Group 1 [ID# 1 to 8]		Group 2 [ID# 9 to 16]	
Freq #	Freq MHz	Freq #	Freq MHz
0	903.37	8	904.87
1	906.37	9	910.87
2	907.87	10	913.62
3	909.37	11	916.87
4	912.37	12	918.12
5	915.37	13	923.12
6	919.87	14	924.62
7	921.37	15	926.12

Reset Throttle To Original Factory Settings

There are several throttle settings that are remembered, when the power is turned off or if the battery is unplugged. But, at any time, you may force the throttle back to its original factory settings, just as you received it. When the FACTORY RESET command is issued, all memory and settings inside the throttle are erased and restored back to the original factory settings.

From the SETUP menu, select option 3 T2x00 RESET. The moment 3 is pushed, the throttle is immediately reset.

Item	Default	Item	Default
Active Loco	0001	Frequency	0
Swap Loco	9999	ID number	1
Speed Steps	32	Direction	Forward

Set Or Change Throttle ID Number

Each throttle used on the EASYDCC or Lenz System must have a unique ID number. For wireless throttles, the ID number range is 1 to 8 for a Group-1 wireless receiver and 9 to 16 for a Group-2 wireless receiver. The original factory setting for the ID number is 01. Changing the ID number is easy and only takes a couple keystrokes. This only needs to be done once. The ID number is always visible on the home page. Add a sticker on the throttle showing the selected ID number and the frequency number. This will make it easier to know the original numbers in case somebody accidentally changes one or both.

Step 1: From the hidden setup menu, push 1 for ID select.

Step 2: Enter the ID number and then push ENT. Leading zeroes are not required.

After pushing ENT, the home page appears. The bottom line of the home page shows the "id" symbol followed by the number. Verify that the ID number showing is the one desired.

Speed Step Considerations

A speed step (SS) value is an arbitrary number transmitted from the throttle to the locomotive decoder. It does not contain actual speed information. Inside the decoder is a table that interprets the speed step and calculates the appropriate motor voltage.

Your throttle can be set to transmit any one of the 3 available speed step settings.

For the 16 speed step setting, the single turn pot is divided into 17 steps (0-16). For the 32 speed step setting, the single turn pot is divided into 32 steps (0-32). For the 128 speed step setting, the single turn pot is divided into 128 steps (0-128). The factory default speed setting is 32 steps. With rare exceptions, this will be the best setting.

Change Speed Step Setting

In this example, the speed step setting will be changed to 128 steps. To change to 128 steps, use the following key sequence to change the transmitted speed steps to 128.

Get into SETUP MENU first.

Select option 2 for SS SELECT.

The screen shows the 3 available settings. Push the 3 key to change to 128 steps. The change takes effect immediately.

```
1. 16 STEPS
2. 32 STEPS
3. 128 STEPS
_____
ESC
```

To confirm the change, rotate the speed knob and check that it goes up to 128 when at the MAX setting.

Software Version Numbers

The power-on splash screen will always have the software version number displayed after the V. The nn will be the version number.

V2x   EasyDCC version 6 system [6xx EPROM]

V1x   EasyDCC version 4 system [4xx EPROM]

       Lenz Systems with ALR900 receiver

The x will be a number on your throttle

```
EasyDCC

Vnn ©CVP PRODUCTS
```

Go Back To Last Loco Number

The SWAP key allows the previously used loco number to be restored as the active locomotive. For example, if loco number 42 was last used, and then loco number 567 was entered, pressing the SWAP key restores locomotive 42. Press it again and locomotive 567 is restored.

The swap key only remembers the very last used loco number. The last number is remembered even with the power turned off.

SWAP with A Running Locomotive

An active loco can be running when the swap key is pressed. When the swap key is pressed, the loco number, its current speed value and its direction are saved. But what if the speed value doesn't match the speed knob position?

If the active locomotive's stored speed value doesn't match the present setting of the speed knob, the speed value will be flashing. A message will be displayed below the black line saying MATCH SPEED VALUE!

```
LOCO#   0567
SPEED   015 ▶
_____
MATCH SPEED VALUE!
```

The flashing speed value is the value to which the pot must be set to. Since 15 is about halfway to max speed, the pot must be rotated clockwise. Once the pot position matches the speed value, the flashing stops and normal throttle operation resumes. T*o avoid having to match the pot position with a saved speed value, we recommend that swap be done with stopped locomotives.*

Accessory Decoder Control

The accessory decoder number must be known before it can be controlled. Check with the owner if unsure what the accessory decoder numbers are.

Push and release the ACCY key. For this example, the accessory decoder number is 2.

Key in the desired accessory number which is 2 for this example, and press ENT again.

The display shows the active accessory decoder number as well as the two activation keys which are 1 and 3.

1 R-OFF means "reverse" or curved when referring to a turnout's direction of travel. If using ON/OFF accessories, this will turn OFF the accessory.

3 N-ON means "normal" or straight when referring to a turnout's direction of travel. If using ON/OFF accessories, this will turn ON the accessory.

```
ACCY#   0002


1 R-OFF      3 N-ON
_____
ESC           ENT
```

To activate the turnout in the normal direction, tap the 3 key. A short tap is best; a long tap sends an F3 function command. **To activate the turnout in the reverse direction**, tap the 1 key. Short tap is best; long tap sends the F1 function command.

To select a different accessory decoder number, 5 for example, push ENT followed by a 5.

To exit from ACCY mode, tap the red ESC key.

The locomotive will continue to respond to direction, speed and function commands while in the accessory mode. However, for F1 and F3, just push and hold the key to send the function command. All other function key actions remain the same and a short tap is all that is needed. But, for functions 1 and 3, you must **push and hold** the 1 or the 3 key to activate the function.

```
ACCY#   0002


1 R-OFF      3 N-ON
_____
ESC    F1x    ENT
```

For functions **F10 to F12,** push and hold the ESC key until the F1x appears below the line. Then enter the second number. After the second number, the F1x disappears. Push ESC to cancel F1x.

The throttle cannot be turned off while in ACCY mode. Exit the ACCY mode first.

Backlight Control

When the throttle is turned on, the built-in backlight will always turn on.

Usually, the backlight is not needed when operating outdoors during the day or in normal room light.

To turn off the backlight, tap the yellow key labeled CMEM/LIGHT.

To turn on the backlight, tap the yellow key labeled CMEM/LIGHT.

The battery life will be about 10% longer with the backlight off.
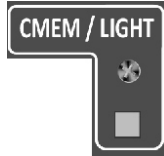
Recharging The Battery

The charging jack is a microUSB style jack. It is located on the left side of the throttle.

The charging jack is fragile. The jack and plug are polarized so the plug fits only one way.

Do not force the plug into the jack.

Do not yank the plug out.

Don't pickup the throttle by the charging cable.

Appears Only If Throttle Is On

If the throttle is on when the charging cable is plugged in and the charger is plugged into the wall outlet, the T2x00E will show the charging symbol. After 15 seconds, the throttle shuts off for faster battery charging. The symbol will not appear if the throttle is off. Also, the throttle cannot be used with the charging cable plugged in. Disconnect it to use the throttle.

Connecting The Charger Cable and Charger

The CVP Products supplied universal USB charger plugs into any source of AC voltage from 90VAC to 240VAC. Output is 5VDC.

Plug one end of the supplied adapter cable into the USB charger and the other end into the throttle. The plugs are polarized and can only be inserted one way. Don't force them.

You may use any 5V USB charger. The throttle has an internal smart Li-Ion charge management chip.

To Throttle   To Charger
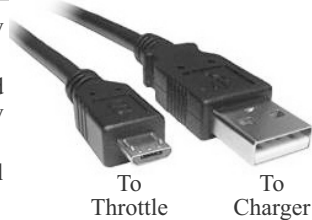
Simple Battery Status Check

If the charger is connected, simply push the green PWR key. If the battery is fully charged, the charge symbol will not appear.

If the charge symbol does appear, then the battery is not fully charged. The throttle will turn off in about 15 seconds.

The appearance of the charging symbol verifies the battery is not fully charged, the charger is working, and the cable and throttle are properly connected.

You may use the throttle regardless of the current battery charge status. It doesn't have to be fully charged to use it.

The throttle cannot be used when the charger is connected.

Throttle Cannot Be Used While Charging

If the throttle is being charged, it cannot be used. If the PWR key is pressed, the charging symbol will appear, and the throttle turns off in about 15 seconds.

Owner's Setup Guide For T2x00E Throttle

Note 1: Never Drill Into The Box

There is risk that the battery will be compromised which might result in battery failure, fire and/or explosion. Please review the battery precautions on page 15.

Note 2: Fully Charge Battery Before First Use

The internal Lithium-Ion battery is only partially charged. Be sure to charge it overnight before using the throttle. Treat the charging jack with care. Do not force the cable; it fits in only one way.

Note 3: Getting Into The T2x00E Setup Mode Requires Special Key Sequence

To prevent operators from accidentally getting into any of the throttle setup modes, there is a special key sequence to use.

Consider instructing operators how to cancel the setup menu should it be accidentally activated. Just push ESC key to cancel setup.

Getting Into The T2x00E Hidden Setup Menu

The hidden setup menu requires entering a unique keystroke sequence. This will keep most of your operators from accidentally changing the throttle setup.

To enter the setup menu, first turn on the throttle. Now press and release the PWR/MENU key. Now push **and hold** the ENT key. The setup menu will now appear. This sequence must be used any time there is need to change the throttle setup.

Push ESC to cancel the setup mode.

```
1. ID SELECT
2. SS SELECT
3. FREQ SELECT
4. T2x00 RESET
```

Hidden Setup Menu

T2x00 Throttle Setup Information

EVERY throttle must have its own <u>unique</u> ID number and <u>unique</u> frequency. These are set once and usually never changed. We recommend attaching a sticker to the throttle as a reminder of the assigned ID number and frequency. If one of your operators accidentally changes it, you'll know what it is supposed to be.