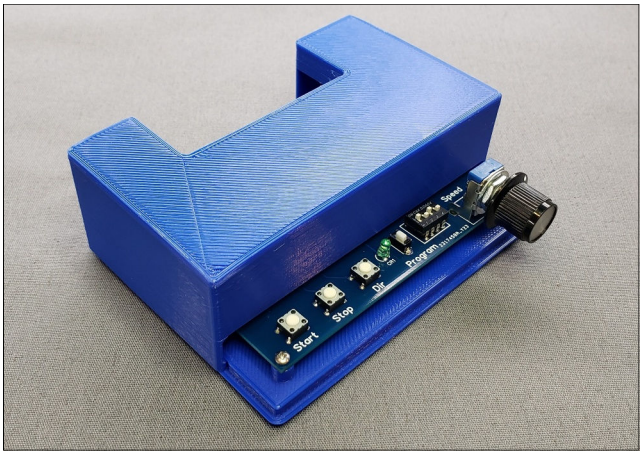
All Purpose Train Control

Auto/Manual Control of Track Power

Operation and Installation Manual



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Overview

All Purpose Train Control (APTC)

APTC is designed for unattended operation in public displays, where either the viewer can start the train with the push of a button, or the train will start automatically at timed intervals. Once running, the train can do automated station stops at random intervals via a track mounted reed switch and loco mounted magnet. The running session will end with a stop at the station upon time out. Programmable user parameters allow for many different modes of operation. Manual speed control is always available for setup at the event, or operator intervention in case of a disaster. The APTC as a great track throttle for use indoors or out.

APTC is a track throttle than goes between an external power source (DC Power Supply, Train Power Pack, or Battery) and the track. It controls the speed of the train, making automated station stops with smooth stops and starts. No “Jack Rabbit” starts and stops, that are hard on gears.

Applications

The APTC can be used in a number of ways …

At Home or Train Shows

Manual track power control with automated station stops or back 'n forth trolley line. Use the Max Speed feature to limit speed when children are at the controls.

- Manual speed control with user programmable momentum
- Automated Random Station Stops via track mounted reed switches and magnets on locos
- Back 'n Forth Trolley operation via track mounted reed switches and magnets on locos
- User Programmable minimum and maximum speed settings
- Direction change locked out until train is stopped to prevent gear damage
- Emergency Stop button

Commercial Applications

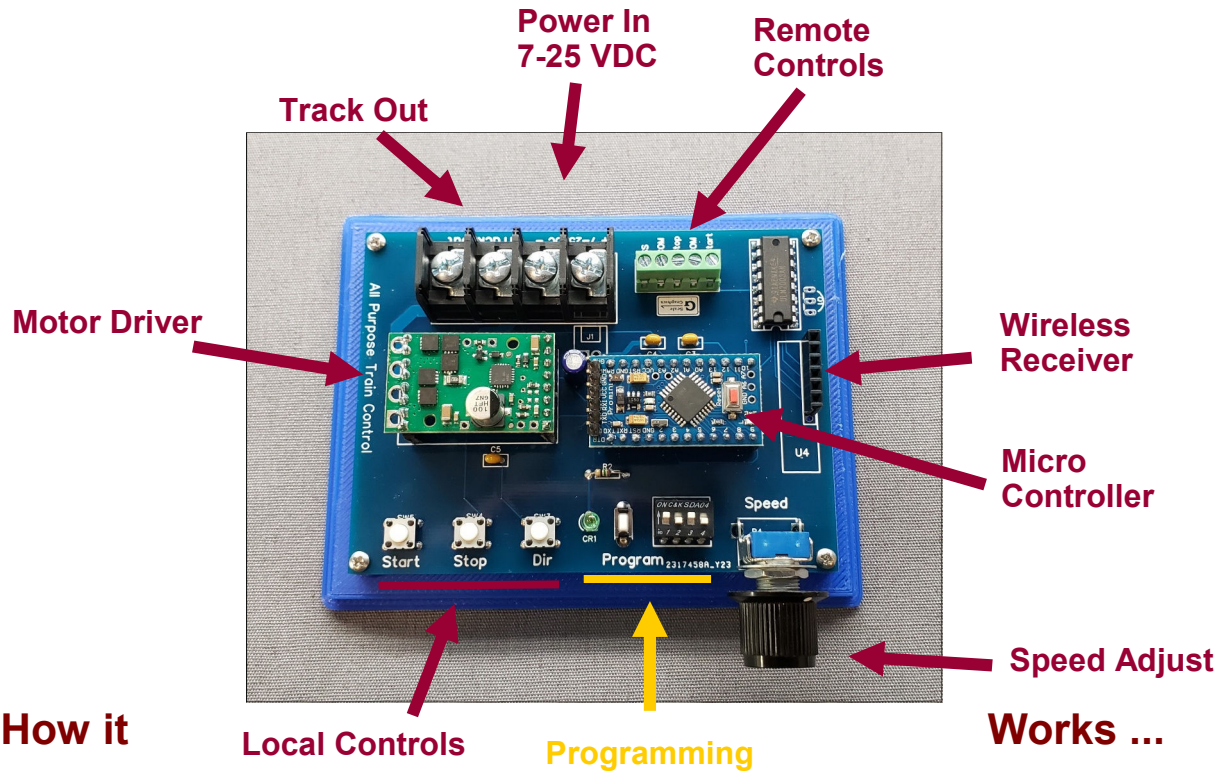
Automated Starts/Stops - Restaurants, Kid’s Dental Offices, or other retail type of environments where you may want to run trains automatically at programmed intervals. Run X times per hour for X minutes per run, or just make one lap.

When running on a loop of track, you can add automated station stops for variety, using track mounted reed switches and a magnet on the loco. Tangent track can be used for back and forth trolley type of operation.

Interactive Displays

User initiated Starts/Auto Stops - Viewer presses a hardwired button (or an optional wireless button) to start the train. Train runs for X minutes or one lap, with or without station stops. The train only runs when viewers are present. It can also be started via an optional motion detector. When the visitors leave, or get tired of playing, the train will stop.

The APTC Board



How it Works ...

Local Controls

Programming

Starting the train

In all operating modes the train is either started by pressing the Start Button (or Start input) or automatically by the programmed Interval Timer.

Start Button

Speed will ramp up at the rate set by the Accel Parameter to the current speed setting of the Speed Pot:

Start Button - Momentary press
Start Input - Momentary contact closure to COM
or a Motion Detected at a PIR sensor connected to the Start Input
Wireless Start Button - Momentary press

Stop Button

Station Stops ...
A momentary contact closure at the Stop Input by a track mounted reed switch and magnet on the loco (or a momentary Stop button press) will initiate a Station Stop. Speed will ramp down at the rate set by the Accel Parameter to minimum speed, wait for the time period set by the Station Stop Time Parameter, and then ramp back up to the current speed setting of the Speed Pot.

Emergency Stop ...
Holding the Stop button or contact closure for more than 1/2 second at any time will initiate a quick stop.

Speed Pot

Adjust the speed pot at any time to change the speed setting. While running, speed will change at the Speed Pot Accel rate. If changed while stopped, speed will accelerate to the new setting upon start.

Direction Button

A momentary press of the Direction button during a stop will cause the direction to change.

Max Speed Setting - While running at greater than 50% speed, hold down the direction button (LED will turn OFF). While holding the button down, set the desired maximum speed. Release the button to save.

Station Stop Speed Setting - Max Speed Setting can also be used to get repeatable station stops at the desired spot, without having to readjust the speed setting each time you run.

Min Speed Setting - While running at less than 50% speed, hold down the direction button (LED will turn OFF).

While holding the button down, set the desired minimum speed. Release the button to save.

Program Button
A momentary press at any time will enter program mode and cause an emergency stop if pressed while running. In program mode, the LED will blink the Option Code of the Parameter currently selected by the DIP switch. A momentary button press after the code will increment the Option Code. When the desired option has been reached, hold down the Program Button for about 3 seconds until the LED starts flashing rapidly, indicating the new option has been saved. Change more options by changing the DIP switch to the desired parameter, and repeat above. To exit program mode, power down and restart.

LED

Power:	LED should be ON when power is applied.
Diagnostics:	LED will turn OFF while a button is pressed: Start, Stop, Dir
	LED will turn OFF while the Start input, or Stop input goes low (connected to common).
Programming:	LED will turn start blinking Option Codes when the Program button is pressed.
	LED will flash rapidly while the Program button is held down to save the option.

While Running ...
Automated station stops can be done using a track mounted reed switch, and a magnet located on the locomotive. When the loco passes over the reed switch, a station stop will be performed as programmed by Station Stop Percentage Parameter 2; i.e. it will only stop a certain percentage of the time, or with the use of two reed switches, one at each end of a track, and Parameter 2 Option 6, it will run in back and forth trolley mode.

Stopping the train
A running train can be stopped automatically after running for One Lap or after a Time Period of X minutes (See Run Mode Parameter 3.) If a station stop reed switch in used, the train will stop at the station and wait for the next start command. Otherwise it will just stop wherever it is when time runs out.

The train can also be stopped at any time by holding down the Stop Button.

Installation

Power Input
Power input to the APTC can be any DC power source, 7-25 VDC, connected to the Vin +,- terminals. The most economical and best power source is an industrial power supply; e.g. the Meanwell LRS-150-24, which is rated for 24 VDC, 6.5 amps, and can be purchased on-line for around $19.

You can also use any train power pack with suitable voltage and current ratings, by setting the throttle for up to 25 VDC max.

Track Output
Connect the “Track Out” terminals to the track. The APTC output is rated for up to 10 amps. Output voltage will be determined by the power input source and the speed pot on the APTC. Voltage can be adjusted from 0 to 100% of the power input voltage. To change the direction the train runs at power up, swap the Track Out wires.

Remote Controls

Remote Start Pushbutton - Connect a momentary push button, normally open, across the Start and Com terminals. Momentary contact closure initiates a start.

Track Mounted Reed Switch - Connect this to the Stop and Com terminals to initiate an automated station stop.

Motion Detector - An optional PIR Motion Detector Module can be used to start the train when a visitor’s pres-

ence is detected. Connect PIR(IN+) to APTC(SS), PIR(Out) to APTC(Start), PIR(IN-) to APTC(Com).

Wireless Start Button - This optional button transmits a start command to the APTC's internal receiver.

Wireless Track Reed Switch - Connect the track mounted reed switch to this module to eliminate long wire runs between the track reed switch and the APTC. This module can be powered from track connections or a 9V battery (A 200mah 9V battery will last for approximately 30 days). It transmits a stop command to the APTC. Its LED should turn ON when the track switch is activated by a magnet.

The green APTC LED will blink OFF whenever a start or stop command is received, whether it is hardwired or wireless.

The red LED on the APTC wireless receiver will turn ON whenever a wireless signal is detected.

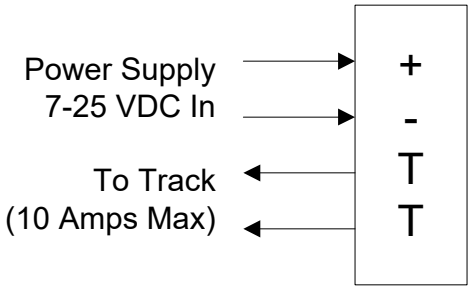
Linking Wireless Start Button and Wireless Track Switch to the APTC

This will be done prior to shipping, but in the event these devices are not working, you should follow this procedure.

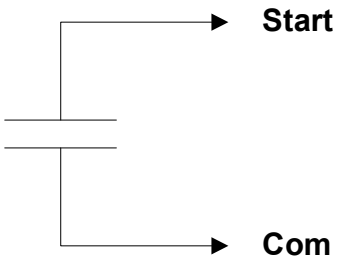
The wireless receiver inside the APTC has a button on it. Press the button once and wait for LED to turn ON. Then either press the Remote Start Button, or activate the Track Mounted Switch with a magnet to complete the link.

All Purpose Train Control

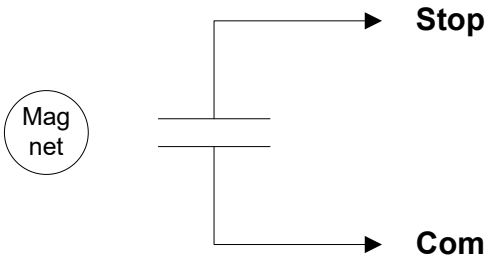
Wiring Diagram



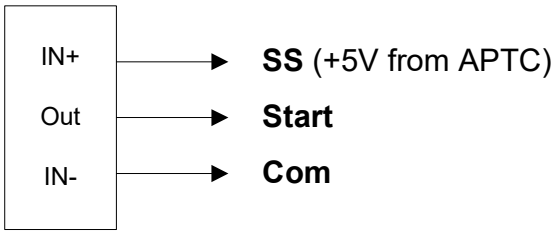
APTC



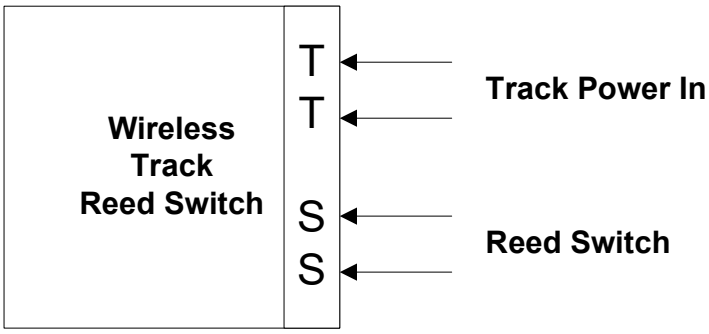
Remote Start Switch



Track Reed Switch



Motion Sensor



User Programming via the DIP Switch & Push Button

Operating parameters of the APTC can be modified to meet your individual needs.

User configurable parameters can be programmed using the 4-position DIP switch, the on-board push-button next to the DIP switch, and the on-board LED. The DIP switch selects the parameter to be programmed, and the LED flashes the currently selected option. See the programming chart following this discussion for specific instructions.

Parameter 0

Accel/Decel Rate

The time it takes to accelerate to running speed after a start, or decelerate to a full stop.

Parameter 1

Station Stop Time

The elapsed time spent from a full stop at the station to departure.

Parameter 2

Station Stop Percentage

This adds randomness to the operation. The train will only stop at the station X % of the time.

Option 6 is Back 'n Forth Trolley mode. **This r*equires a reed switch at each end of the track!*** In this case, your trolley/train will reverse at each end of the run after crossing the reed switch connected in parallel to the Stop input.

Parameter 3

Run Mode

Train will run for X minutes until it times out.

One Lap: ***Requires a station stop reed switch!*** Upon start, train will leave the station, make one lap, returning to the station. Option 5 can be used for Continuous Running (no time out).

Parameter 4

Auto Start Interval Timer

Sets the amount of time between automated starts; e.g. if set for 60 minutes, the train will start running every 60 minutes, and run until it either times out or completes one lap, depending on your setting in Parameter 3.

Parameter 5

Speed Pot Momentum

Determines the response time when changing speed via the speed setting pot (Potentiometer/knob). This simulates the slow response of a train due to throttle changes.

Changing the Min or Max Speed Settings-

You may want to limit the maximum speed to prevent children from over speeding your trains. The minimum speed setting is useful to eliminate delays in starting. If the min speed is 0, and your loco doesn't start moving until 10% speed, there will be a delay between the time a start command is given and actual train movement.

While running at any speed, holding down the DIR button for more than 3 seconds will cause the LED to turn OFF and restore the full speed setting range. While you continue to hold down the DIR button, set either the desired Min or Max speed with the speed pot. Release the DIR button to save the setting.

If you are running at less than 50% speed, a new Minimum speed will be saved. If greater than 50%, a new Maximum speed will be saved.

All Purpose Train Control
User Programming

User configurable parameters can be programmed using the 4-position DIP switch, the on-board push-button next to the DIP switch, and on-board LED.

Enter Programming Mode
Press the Program button. The LED will begin flashing the option code of the selected parameter.

Select Parameter
Select the parameter you wish to view or program using the DIP switch. (the white square indicates position of the switch; e.g. for parameter 0, all switches are in the down or off position.

View Current Option Code
The LED will repeatedly flash the option code for the currently selected parameter; e.g. two flashes followed by a pause indicates option 2.

Change the Option Code
Momentarily press the push-button during the pause to advance the option to the next higher number, until you get the desired number of flashes.

Save the Option Code
During the pause between code flashes, press and hold down the Program button for about 4 seconds until the LED starts flashing rapidly, which indicates the save is complete.

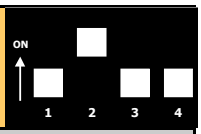
Select the next Parameter
Repeat the above as needed to view or make changes to other parameters using the DIP switch to select.

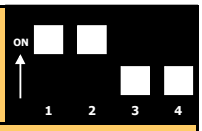
Exit Programming Mode
Turn off power. The new settings will take effect at next power up.

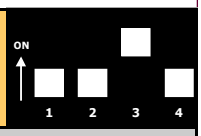
Option	Parameter 0 - Accel/Decel Rate 
1	Fastest
2	Fast
3	Medium
4	Slow
5	Slowest

Option	Parameter 1 - Station Stop Time 
1	5 Secs
2	10 Secs
3	15 Secs
4	20 Secs

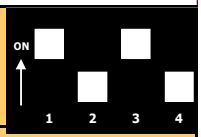
The number of LED flashes indicates the Option Number for the Parameter selected by the DIP switch.

Option	Parameter 2 - Station Stop Percentage 
1	100%
2	75%
3	50%
4	25%
5	0% - Disabled
6	Back 'n Forth Trolley Mode (Two Reed switches Required)

Option	Parameter 3 - Run Mode 
1	1 Min Time Out
2	2 Mins Time Out
3	5 Mins Time Out
4	10 Mins Time Out
5	Continuous Running
6	One Lap & Stop (At least one Reed Switch Required)

Option	Parameter 4 - Auto Start Interval Timer 
1	Disabled
2	15 Mins
3	20 Mins
4	30 Mins
5	60 Mins

Factory settings

Option	Parameter 5 - Speed Pot Momentum 
1	Fastest Response
2	Fast
3	Medium
4	Slow
5	Slowest Response

APTC Hardware Specifications

Mechanical

Enclosure: PETG or ABS plastic. 4.5”W X 3.5”D X 1.6”H with snap-on lid.
Speed pot: Knob protrudes 0.5”
User Connections:
Barrier Strip for Power In, Track Out, accepts 12-22 AWG terminal lugs.
Screw Terminals for Start, Stop, accept 26-20 AWG wire.

Electrical

Power Input: 7-25VDC, reverse polarity protection (prevents damage, but will not operate).

Track Output: Up to 10 amps. Short circuit protection. PWM (Pulse Width Modulation), 20 KHZ.

Control Inputs: Normally Open switch contacts,
Momentary close to common (COM) to activate Start/Stop.

Radio: 433MHZ

Warranty

12 months from date of purchase. Post warranty repairs can be made for a modest fee.

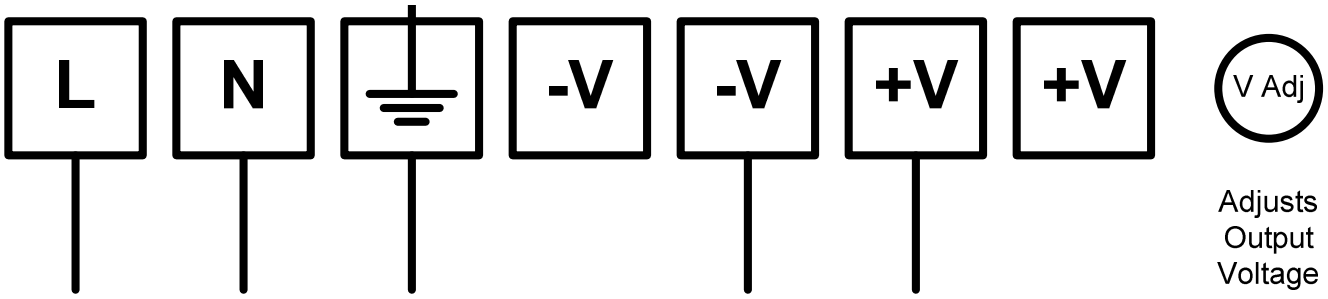
Made by G-Scale Graphics in Windsor, Colorado, USA

Meanwell Power Supplies

You will need to provide or purchase your own AC power cord and connect it to your Meanwell power supply. Any 3-wire power cord will work. Set the power input switch on the side of the power supply for 115 VAC U.S.

Output voltage should be 24 VDC maximum for use with the G-Scale Graphics Trackside R/C or other Track Throttles. But no adjustment should be necessary as received.

Meanwell Power Supply



Black or Brown | **White or Blue** | **Green or Yellow with green stripe**

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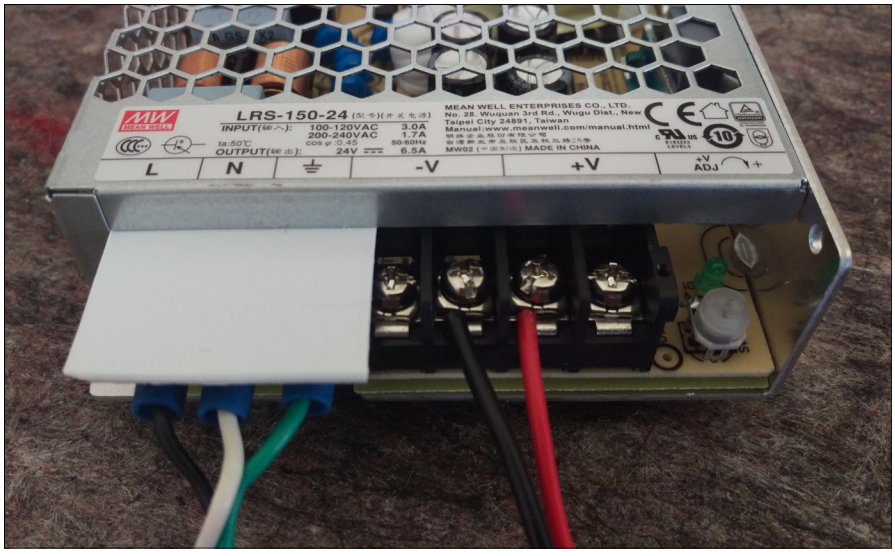
115 VAC Input

(Set switch on side of power supply for 115 VAC in U.S.)

VDC Output(s) to Track Throttle(s)



Crimp some spade connectors on the wire ends for a nice neat connection. The AC input terminals on your power supply may be exposed, so you may want to insert a piece of styrene over them for added safety.