Automatic Train Control for Track Powered Interactive Public Displays

Operation and Installation Manual

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Overview

Automatic Train Control (ATC)
ATC 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.

ATC is an automatic track throttle than goes between a 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, like you would get using a simple timer or on/off switch.

Applications
The ATC can be used in a number of ways ...

Interactive Displays
Perhaps you have a public train display at a museum or a hospital where you only want the trains to run when visitors are present. You can provide a push-button for them to use, or you could use a motion detector. The ATC can be programmed to run for One-Lap or Time Out, so when the visitors leave, or get tired of playing, the train will stop.

Automated Displays
Restaurants, Kid’s Dental Offices, or other retail type of environments may want to run the trains automatically at programmed intervals, e.g. once every 10 minutes, or only once an hour. You can use the ATC’s interval timer, or you could connect a Timer Relay to the start input for precise running, every hour on the hour.

At each time interval the train will run as programmed for either Time Out, or One Lap.

When running on a loop of track, you can add automated station stops for variety. Tangent track can be used for back and forth trolley type of operation.

The ATC Board
Remove the snap-on cover for access to wiring terminals and programming.
How it Works ...

Starting the train
In all operating modes the train is either started by pressing a Start Button or automatically by the programmed Interval Timer.

Start Button
The momentary push button mounted on the enclosure will start the train running. This is primarily for use by train staff, behind the scenes. An optional push button is installed in the public space for use by visitors. Any time the start button is pressed, the timers are reset.

Interval Timer
If the Interval Timer is enabled, a stopped train will automatically start again every X minutes.

If you require real time starts, you can connect a programmable timer relay to the start button input. This will allow you to start the train precisely every hour on the hour, etc.

Internal or external timer, you will always have smooth starts and stops based on your Accel/Decel rate setting.

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 User Parameter 5; 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, 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. 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.

An optional push button connected in parallel with the reed switch input (Decel/Stop) can be used by train staff for emergency stops. Hold it closed until the train stops. This will also stop all timers.

Installation
**Power Input**
Power input to the ATC can be any DC power source, 7-25 VDC, connected to the Vin +,- terminals. The most economical 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 ATC output is rated for 10 amps max. Output voltage will be determined by the power input source and the “Speed” pot on the ATC. Voltage can be adjusted from 0 to 100% of the power input voltage. To change direction, swap the Track Out wires.

**Start Input**
A built-in Start Button is included on the ATC, but this is usually only used by the train staff. An external, normally open, momentary push-button can be installed for use by the public to start the trains. The two buttons are connected in parallel to the ATC “STR” and “COM” terminals.

**Decel Input (Optional)**
A track mounted reed switch connected to ATC terminals “DEC” and “COM”, in combination with a magnet mounted under the locomotive, is used to initiate automated station stops. As the loco passes over the reed switch, it will start to decelerate. Where the train stops is determined by three things; position of the reed switch on the track, the deceleration rate set by parameter 0, and the running speed of the train.

The reed switch needs to be mounted just under the top of the rail. The magnet needs to be just above the top of the rail. The gap between the two, should be about 1/8” to 1/4” max.

Setup your station stop in this order:
- Set the desired running speed of the train using the ATC “Speed” adjustment.
- Set parameter 0 for the desired Accel/Decel rate.
- Move the reed switch to the track position that results in the train stopping at the desired spot.
- Then you can tweak in the stop, if needed, using the “Speed” adjustment.

**Emergency Stop**
A momentary, normally open, push button switch can be connected in parallel with the Decel/Reed Switch input for use as a stop button. Holding the button closed for about 1 sec with make the loco do a quick stop. This will also terminate the session, and stop timers. Press the Start Button to get going again.

**LED**
Indicates power is on, and is used during user programming. You may also see the internal timer blink the LED about once per minute while running at speed.
User Programming via the DIP Switch & Push Button

Operating parameters of the ATC 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**
Run Mode
Time Out: Train will run for the amount of time set in Time Out Parameter 4.
One Lap: **Requires a station stop reed switch!** Upon start, train will leave the station, make one lap, returning to the station.

**Parameter 3**
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 2. (This time is approximate, and will usually be a bit longer. Stations stops, and Accel/decal times add to the total.)

**Parameter 4**
Time Out
Determines how long the train will run after a start. (This time is approximate, and will usually be a bit longer. Stations stops, and Accel/decal times add to the total.)

Option 5 can be used for Continuous Running (no time out). This can be used to temporarily disable the ATC without having to actually disconnect it.

**Parameter 5**
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 requires 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 Decel/Stop input.
Automatic 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**
Hold the button (next to the DIP switch) down until the LED goes out. Release the 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 indicate 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 push-button for about 4 secs 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.

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

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### Table of Options

<table>
<thead>
<tr>
<th>Option</th>
<th>Parameter 0 - Accel/Decel Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fastest</td>
</tr>
<tr>
<td>2</td>
<td>Fast</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
</tr>
<tr>
<td>4</td>
<td>Slow</td>
</tr>
<tr>
<td>5</td>
<td>Slowest</td>
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<table>
<thead>
<tr>
<th>Option</th>
<th>Parameter 1 - Station Stop Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5 Secs</td>
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<tr>
<td>2</td>
<td>10 Secs</td>
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<tr>
<td>3</td>
<td>15 Secs</td>
</tr>
<tr>
<td>4</td>
<td>20 Secs</td>
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<table>
<thead>
<tr>
<th>Option</th>
<th>Parameter 2 - Run Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Time Out</td>
</tr>
<tr>
<td>2</td>
<td>One Lap (Reed switch Required)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option</th>
<th>Parameter 3 - Interval Timer</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Disabled</td>
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<tr>
<td>2</td>
<td>10 Mins</td>
</tr>
<tr>
<td>3</td>
<td>20 Mins</td>
</tr>
<tr>
<td>4</td>
<td>30 Mins</td>
</tr>
<tr>
<td>5</td>
<td>60 Mins</td>
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<table>
<thead>
<tr>
<th>Option</th>
<th>Parameter 4 - Time Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 Min</td>
</tr>
<tr>
<td>2</td>
<td>2 Mins</td>
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<tr>
<td>3</td>
<td>5 Mins</td>
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<tr>
<td>4</td>
<td>10 Mins</td>
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<tr>
<td>5</td>
<td>None - Continuous Running</td>
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<table>
<thead>
<tr>
<th>Option</th>
<th>Parameter 5 - Station Stop Percentage</th>
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</thead>
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<tr>
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<td>3</td>
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<td>25%</td>
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<td>5</td>
<td>0% - Disabled</td>
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<tr>
<td>6</td>
<td>Back ‘n Forth Trolley Mode (Two Reed switches Required)</td>
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</tbody>
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The number of LED flashes indicates the Option Number for the Parameter selected by the DIP switch.