

New York Railway Supply

Turntable Indexing That Works

PTC Model IIITM

Programmable Turntable Controller

Controller and Motor Assembly

P/N 03-120



Installation Instructions And Users Manual For Rotary Track Selector Models

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WARNING:

The solder used in this product contains lead, a chemical known to the State of California to cause birth defects and other reproductive harm. Please wash hands after handling internal components and circuit boards and avoid inhalation of fumes if heating the solder.

Installation Instructions and Users Manual

PTC Model III™

Programmable Turntable Controller



INTRODUCTION

Before you begin installation and programming of your new turntable controller, be sure to read through these instructions completely. Also, review the *PTC Model III Product Overview* as well as the *Basic Motor Mount Installation Instructions*, if you are using the optional Motor Mount Kit.

The PTC is not difficult to install, but as with any precision mechanism, some time and care will be needed to achieve a neat, reliable installation.

The main steps involved in installing your PTC Model III are:

- Motor Installation,
- Controller Installation,
- Track Selector Installation,
- System Check-Out, and
- Programming.

MOTOR INSTALLATION

There are two options for motor installation:

- Use the optional Motor Mount Kit; or
- Design your own motor mount system.

In general, use of the motor mount kit is recommended unless you have a special situation where the kit is not suitable, or if you are designing a new or scratchbuilt turntable where you

can integrate the motor support system into the turntable design. If using the Motor Mount Kit, refer to the detailed instructions included with the kit and install it before proceeding here.

If you are designing your own motor mount, refer to Figure 1, "Motor Dimensions and Mounting Hole Pattern" to understand the mechanical requirements for attaching the motor to your mounting system. Primary considerations you should keep in mind when designing your system include:

- Do not have the motor actually hanging or otherwise supported by your turntable shaft. The motor can be supported by the turntable pit, if sufficiently strong. The motor is heavy and should not be allowed to stress the turntable bridge or shaft mechanism.
- Be sure the mount is rigid. Since the controller can achieve very small step increments, the motor should not be allowed to move rotationally or laterally.
- Be sure the mount keeps the motor perpendicular to the turntable shaft. Your mount should make sure that the motor and turntable shafts stay in alignment, and do not connect to each other "off angle".
- Design the mount so that it shares a common mounting surface with the turntable, such as the layout surface or supporting benchwork immediately connected to the turntable. Do not use benchwork that otherwise supports the layout. The objective is to minimize mis-alignment effects related to possible expansion and contraction of the layout or supporting benchwork.

If these guidelines are followed, your installation should provide years of reliable service.

CONTROLLER INSTALLATION

Controller installation is simple, and only requires a suitable location under the benchwork to rest the controller. Typically, a small shelf is attached to the benchwork if no other location is available. When selecting a mounting location, be sure that:

- The mounting location is within 24" of the turntable, which is the length of the motor cable. The short cable length is recommended to minimize the potential for the motor to pick up unwanted electrical noise. However, optional 3', 6', and 10' extension cables are available, if needed.
- Be sure the mounting location is within 3' of where you plan to mount the Track Selector panel controls, which is the length of that cable. Again, shorter cables are better, but 6 and 10 foot cables are available if needed.
- Lastly, be sure the front panel of the controller is visible for programming later. You will need to see the front

panel on occasion (not during normal operation, usually), so be sure you can see it without too much trouble.

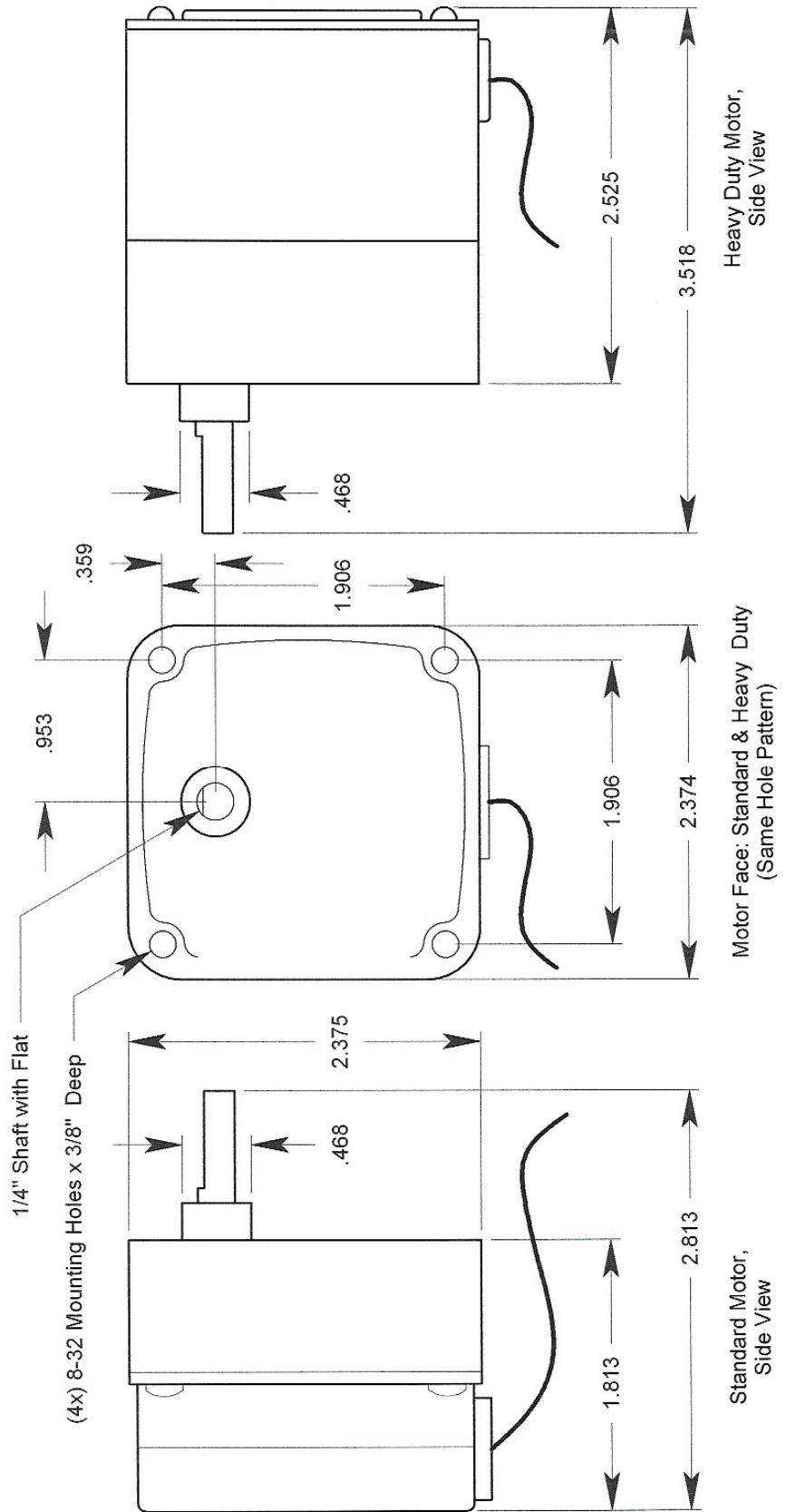


Figure 1: PTC Model III Motor Dimensions
Standard and Heavy Duty Models. Not to Scale.

File: mot2_pat.vim
Rev: 9/16/96

Once you have selected your mounting location:

1. Mount the controller.
2. Connect the Motor to the Controller. Note that the motor cable connector has two small tabs on one side; these tabs should be facing up when you insert it into the Controller.
3. If you have ordered the optional Track Power Reversing capability, connect the bridge track power leads to terminals "A" and "B" on the rear of the Controller. Polarity is not important. Connect the bridge track power feeders to terminals "C" and "D" on the controller:



Figure 2: Controller (Rear View) and Bridge Connections

Note: Do not connect track power through the Controller if you do not have the Track Reversing Feature installed. Power will not be fed through.

After you have double checked the connections so far, continue to installation of the Track Selector Modules.

TRACK SELECTOR INSTALLATION

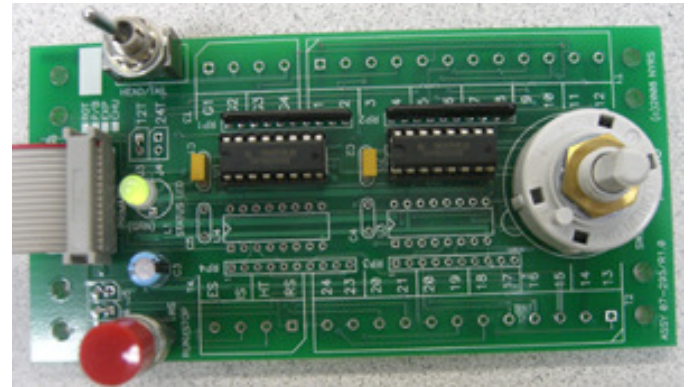
Refer to Figure 3, "Track Selector Mounting Hole Pattern", to familiarize yourself with the layout of the hole patterns and the drills required.

Orientation of the Track Selector Module is not important. For example, you can mount the rotary switch in the center of your turntable layout schematic, and place the switch and LED holes to the left or right, above or below the rotary switch.

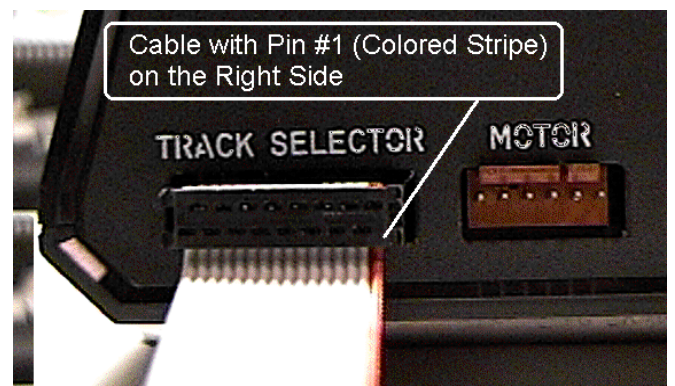
After you have determined the desired location and orientation:

- 1) Drill the required hole pattern (the large hole and the three medium sized holes).
- 2) Connect the flat ribbon Track Selector Cable to the Selector Module. The cable should be connected to the J1

connector, noted as "Primary" on the Selector Module PCB. The marked edge of the cable must be oriented to line up with the Pin 1 location of J1. Pin 1 is near the *Head/Tail* switch (noted as "SW2" on the PCB). See following figure.



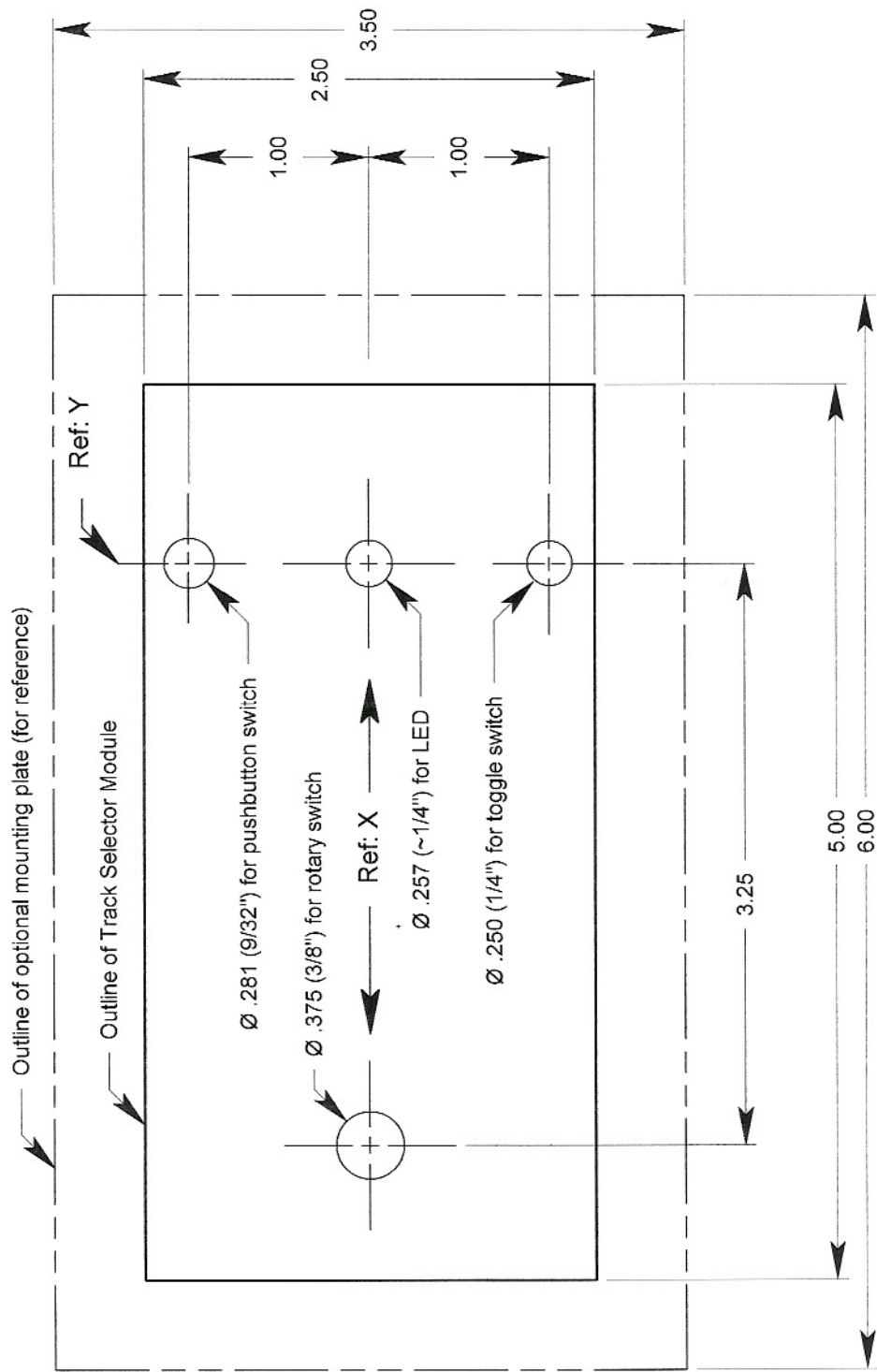
- 3) Mount the Selector Module through the control panel:
 - A) Remove the rotary switch knob, red pushbutton cap, LED bezel, and all switch hardware (nuts and washers) *except* one nut on the toggle switch.
 - B) Install the LED bezel through the front of the control panel.
 - C) Install the Track Selector through the control panel. The rotary switch and the pushbutton switch should rest flush against the back of the control panel. The LED should protrude slightly through the LED bezel. Adjust the nut on the toggle switch so the Track Selector is level with respect to the rear of the control panel.
 - D) Install the lock washer and nut on the toggle switch. Install the knurled nut on the pushbutton switch; discard extra nut and lock washer if not needed. Install the lock washer and nut on the rotary switch. Tighten all nuts. *Note:* Tighten the rotary switch nut carefully, *do not overtighten*.
 - E) Install the pushbutton cap.
- 4) Connect the Track Selector Cable to the Controller:



Important! Be sure the marked edge of the cable is on the RIGHT as you view the rear of the controller. **Installing the Selector Cable in backwards may damage the**

Selector Module. Be sure it is correctly installed before turning the system power on.

- 5) After you have installed the Track Selector Module(s), double check your connections. Be sure the main power switch is on the down (off) position. Plug the Power Supply cable into the Controller, and then plug the Power Supply into the wall outlet. You are now ready to test and program the Controller.



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 Rev 1/99
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Figure 3: Track Selector Mounting Hole Pattern
 (Scale = 1 : 1)

SYSTEM CHECK-OUT

Testing the installation involves turning on the Controller in "Index Mode". While in Index Mode, the Controller will continually turn the motor (and the bridge) clockwise until you tell it to stop.

1. Locate the switch block on the bottom of the controller. Confirm that Switch #8, the *Run/Learn* switch, is set to *Run* ("ON").
2. With the Controller Power Switch in the down (OFF) position, press and hold the *Run/Stop* switch on the Control Panel. You may need a helper for this, if it is not possible for you to reach the Controller and Control panel at the same time.
3. While holding down the *Run/Stop* button, turn the Power switch to ON (the UP position).
4. Let go of the *Run/Stop* switch.

The power-on LED on the Controller should be lit, the bridge should begin turning clockwise, and the *Status Indicator* (LED) on the control panel should be alternately flashing red and yellow. If this does not happen, turn off the power and re-check your connections.

While the bridge is turning, carefully observe the bridge's movement throughout its full circular rotation. No binding or "stuttering" should be evident. If there is, turn off the power and examine the motor installation for any misalignment. Correct any problems and re-start the Controller in Index Mode to verify the fix.

◆**Tip:** While the bridge is turning in Index Mode, you can make the bridge stop turning and go into "Single Step Mode" by pushing the *Run/Stop* button again. Each new push of the *Run/Stop* button will result in the bridge advancing one step. The *Status Indicator* will also alternate between solid red and solid yellow to confirm each individual step. Use this feature to single-step the turntable through any problem areas of rotation you want to examine closely. To resume continuous rotation, repeat Steps 1 through 3.

◆**Tip:** You can change the speed that the bridge turns during Indexing, Programming, or normal operation by changing the PTC speed settings (Switches #1 and #2 on the switch block).

After you have completed the system check out, proceed to programming!

PROGRAMMING

Programming the PTC involves the following simple steps to teach the PTC where your lead and service track locations are. Programming should take about 5 minutes; take your time. Feel comfortable while programming; you can't hurt anything.

If you are in doubt about making a mistake at any point, don't worry about it... you can simply restart the programming process.

1. Initialize the controller.

With the power off:

- 1a. Turn the rotary *Track Selector* switch to point to *any* track that is *NOT* the lead track to the turntable (if you have more than one lead track, identify one as the main lead). The lead track, or your main lead track, will be the reference track that the controller will remember as the starting location.
- 1b. Locate the switch block on the bottom of the Controller. Locate the Configuration Switch Block on the bottom of the controller. Set switch #8, the *Run/Learn* switch, to the "OFF" ("LEARN") position. **Momentum DIP switches, positions 3 & 4 must be "OFF"!**
- 1c. Turn on the Controller power (front panel switch to "ON").
- 1d. The *Status Indicator* on the control panel will be red briefly (about 1 or 2 seconds), then will change to a solid yellow. This indicates that the controller has powered-up in the "LEARN" mode. *Note:* If you had previously programmed the PTC during another session, all previously programmed settings will be erased at this point.

2. Program the location of the lead track.

Determine which end of the turntable bridge you would like to be the "head end", or reference point, for programming. Set the *Head/Tail* switch to the position you would like it to be to indicate "Head" (usually up or to the left, depending on how you installed it in your layout control panel). The controller will learn your preference. Following the procedure below, rotate the head end of the bridge to the location of the lead track:

- 2a. Press and release the *Start/Stop* button on the control panel. The bridge will now begin turning in a clockwise direction. The status LED will flash yellow. At this point, it does not matter where the bridge is pointing or what track it is lined up with. The bridge will keep turning until you press the *Start/Stop* button again.

◆**Tip:** You can change the speed that the bridge turns during Indexing, Programming, or normal operation by changing the PTC speed settings (switches #1 and #2 on the bottom of the controller).

- 2b. When the bridge gets within a few degrees of the lead track, press the *Start/Stop* button again. The bridge will stop rotating. The status indicator will be red or green, depending on where you happened to stop.
- 2c. Tap the *Start/Stop* again; the bridge will take a single step and stop. Keep tapping the *Start/Stop* button until the bridge lines up with the lead track. The status indicator will alternate between red and green to confirm each step.

2d. If you pressed the *Start/Stop* too many times (you overshoot the location you want), press and hold the *Start/Stop* for at least 3 seconds, then release. The bridge will reverse and back up about 2°. Tap the *Start/Stop* to single step the bridge, lining it up with the lead.

2e. When you have lined up the bridge to the lead track, turn the *Track Selector* switch to its correct position to indicate the lead track. The status indicator will flash green to indicate it has acknowledged the track selection. Note: If you initially select the wrong track, the rotary switch can be repositioned during the period the LED is flashing green.

2f. After about 5 seconds, the *Status Indicator* will flash red to indicate it has confirmed the selection and is in the process of programming it into memory.

3. Program the location of the next track. After the *Status Indicator* stops flashing red, it will go back to a solid yellow. This is to tell you that it is ready to learn the location of the next track, rotating clockwise. To do this, repeat the same basic steps:

3a. Press and release the *Start/Stop* button on the control panel, to start the bridge turning slowly again.

3b. When the bridge gets within a few degrees of the next track, press the *Start/Stop* button to stop the bridge.

3c. Tap *Start/Stop* button until the bridge lines up with the next track.

3d. Press and hold the *Start/Stop* button for 3 seconds to back up the bridge, if you overshoot the spot you want.

3e. When you have lined up the bridge to the next track, turn the *Track Selector* switch to its correct position for selecting that track.

3f. The *Status Indicator* will again flash green, then red. This is your indication that the controller has learned the next track's location.

4. Program the rest of the track locations.

Repeat Step 3 to program Tracks "3" through "12".

5. Program the tail end positions.

Although most bridges are identical at both ends, most are not-- the tracks do not line up *exactly* through the center of the turntable, and are sometimes offset. In addition, most turntables have concentricity errors that must be compensated for. This is achieved by repeating programming steps 2 through 4 while teaching the PTC where the correct locations are for positioning the *tail end* of the bridge. In this way, the PTC treats the head and tail end of the bridge locations "separately" and their respective concentricity and offset errors are accounted for automatically. Begin by teaching the controller the correct position for the aligning the tail end of the bridge with the lead track programmed in Step 1:

5a. Flip the *Head/Tail* switch to the "tail" position. The *Status Indicator* will not change. Leave the rotary track selector switch in its current position, whatever that might be.

5a. Press and release the *Start/Stop* button on the control panel, to start the bridge turning slowly again.

5b. When the tail end of the bridge gets within a few degrees of the reference (lead) track, press the *Start/Stop* button to stop the bridge.

5c. Tap *Start/Stop* button until the bridge lines up with the lead track.

5d. Press and hold the *Start/Stop* button for 3 seconds to back up the bridge, if you overshoot the lead track.

5e. When you have lined up the tail end of the bridge to the lead track, turn the *Track Selector* switch to its correct position for selecting that track.

5f. The *Status Indicator* will again flash green, then red. This is your indication that the controller has learned the lead track's location.

Repeat these steps to program the rest of the tail end bridge locations.

6. Prepare the controller for normal operation.

After the bridge tail locations have been programmed, configure the controller for normal use:

6a. Turn off the power.

6b. Set Configuration Switch #8, the *Run/Learn* switch, to "RUN".

6c. Re-index the bridge to bring the head end of the bridge back to the lead track location: As in Step 1, hold down the *Run/Stop* switch while turning on the power. Release the *Run/Stop* switch, and the bridge should begin turning. When the head end of the bridge approaches the lead track, single step it into proper position.

Important! Be sure the Run/Learn switch is set to "Run" prior to turning on the power! When the controller is powered-up in the "Learn" mode, the controller erases any previously programmed locations in preparation for new locations.

6d. When the bridge is re-indexed, turn off the power.

6e. Reposition rotary switch to lead track position and position *Head/Tail* switch to the "head" position.

Your controller is now fully programmed and ready to go! Refer to "**Operating the PTC**" for instructions on using your newly programmed turntable controller.

Programming hints. Follow these simple guidelines to assure proper programming of the PTC controller:

- Program all locations you are using in one programming session.
- If you think you have made a mistake during programming or want to start over, just turn the power off and then on again to reset the controller. This will erase any settings you have made while in "LEARN" mode. Important: When turning off the power, wait at least 5 full seconds before turning it back on.
- Since most bridges are identical at both ends, be sure you can identify which end of the bridge is the head end so

you can re-index the table later on, if necessary. Use the Index Mode described in the "System Check Out Section" to re-orient the head end of the bridge to the lead track.

◆**Tip:** Mark your bridge's head end with a water barrel or other object to make the head end easy to identify from a distance.

- If you have fewer tracks than the number of positions available on the rotary *Track Selector* switch, you can "skip" switch positions when programming. For example: if you have 4 tracks, you can use something like positions 1, 2, 3, and 7. In this example, selecting 4, 5, 9, or any other non-programmed location won't have any effect.
- If you add more tracks to your turntable later on, reprogram the PTC from Step 1.
- Avoid removing the motor and/or bracket after you program the unit, unless you really need to. Although not a problem, it is an inconvenience because you will not likely be able re-align the motor exactly where you had it before. You will have to reindex the unit after reinstallation of the motor. *Note: Reindexing is not the same as reprogramming.* When you are reindexing, you are simply re-orienting the head end of the bridge to your lead track, *not* reprogramming all of your track locations.

OPERATING THE PTC

After programming, the PTC is ready for use. Operation is simple:

- ❑ Power-up the controller in "RUN" mode. To do this, be sure the power switch is OFF. Confirm that Configuration Switch #8 (the *Run/Learn* switch) is set to "RUN". Turn on the power. The controller will also go through its power-on self test sequence:
 - The *Status Indicator* on the control panel should glow red briefly, then convert to a steady green to indicate that the controller has powered-up in the normal "RUN" mode.
 - The controller will do a "power-on self test" function to confirm proper operation. This wags the bridge clockwise about 10°, then counterclockwise, then back again.
- ❑ Turn the *Track Selector* to the desired track.
- ❑ Set the *Head/Tail* switch to indicate which end of the bridge you want lined up at the desired track.
- ❑ Press the *Start/Stop* switch. The *Status Indicator* will flash green. If momentum is turned on (see later section), the bridge will start to ramp up speed. Depending on the track selected and the present position of the bridge's head end, the controller will automatically rotate the bridge clockwise or counter-clockwise the shortest distance needed to line up the desired end of the bridge up with the selected track location. As the bridge approaches the desired track, it will start to slow down (if momentum is enabled), then stop.
- ❑ To stop the bridge in an emergency. If it is necessary to "panic stop" the bridge during rotation, simply hit the *Start/Stop* button again. The bridge will stop *immediately*,

with no momentum. The controller will place itself in a "PAUSE" mode and the *Status Indicator* will glow red. The PTC will stay in pause until the *Start/Stop* button is pressed again, at which time the PTC will continue its progress.

Operating hints:

- The PTC will not operate prior to programming. If turned on, it will not perform any functions and the control panel *Status Indicator* will flash yellow to indicate programming is required.
- When the new track destination you have selected is counter-clockwise from the bridge's current location, the controller will overshoot the target track approximately 2°, then slowly backtrack clockwise to the desired track. This is normal: although the PTC gearhead utilizes very high quality gears, this move is necessary to compensate for the very small amount of backlash that exists in the gear train.
- Important: After turning off the power, let the Controller sit for a full 5 seconds before turning it back ON. This will assure that the Controller starts up in the proper reset mode.
- Do not turn off the controller power when it is in "Pause" mode between track locations. Although it is not a problem, it is an inconvenience since you will have to re-index (reference) the controller to a known starting point. If re-indexing is necessary, the *Status Indicator* will flash a "double red" after power-up in "RUN" mode (instead of green) to indicate that the controller does not "remember" where the bridge is and needs to be re-indexed.
- The stepper motor will get quite warm to the touch. This is normal since the motor draws nearly 1 amp of current, even while stationary.
- If momentum is enabled, the maximum momentum achievable is limited by the maximum speed selected. In other words, at maximum speed, maximum momentum is possible. The controller automatically reduces the momentum to suit the maximum speed, if the momentum selected is higher than allowable.

Changing the Momentum and Maximum Speed Settings.

The controller comes preset with speed set at "medium" (switch #1 on, #2 off) and no momentum (switches #3 and #4 set to off). The range of speed for the PTC is about 0.3 RPM on "X-Slow" to about 1 RPM on "Fast".

To change these settings, locate configuration switches #1 through #4 on the bottom of the controller. Modify the position of the individual switches to get the desired momentum and maximum speed:

Switch	X-Slow	Slow	Med	Fast
1 Max Speed A	Off	Off	On	On
2 Max Speed B	Off	On	Off	On
	None	Short	Med	Long
3 Momentum A	Off	Off	On	On
4 Momentum B	Off	On	Off	On
5 TP Enable	On = Enable		Off = Disable	
	Mode1	Mode2	Mode3	Mode4
6 Factory A	Off	Off	On	On
7 Factory B	Off	On	Off	On
8 Run/Learn	On = Run		Off = Learn	

Important! Switches #6 and #7 are factory set, do not change them.

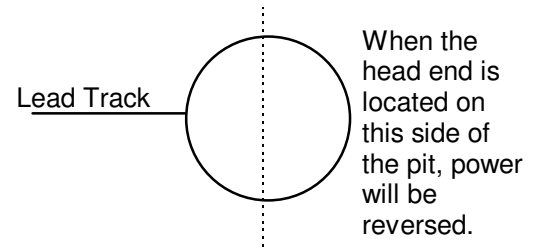
Notes on setting speed and momentum:

- Momentum is not available if you set the Speed to the X-SLOW setting. In this case, the Momentum settings will have no effect.
- The Speed settings effect both the indexing speed and the controller's normal operating speed. **◆Tip:** You can use a slower speed for programming, and a different speed for normal operation.
- The changes you make in these settings will take effect the next time the controller starts a bridge move. It is not necessary to turn the power off for your new settings to take effect.

Using the Automatic Track Power Reversing Feature.

The purpose of the Automatic Track Power Reversing ("ATPR") feature is to eliminate the need to use a split ring rail, split commutator, or DPDT switch to reverse the track power during operation.

The ATPR works by remembering where your starting (index) point is, and then automatically reversing the bridge track power whenever the head end moves more than 90 degrees either direction from that point. Refer to Figure 4, below:



If you have the automatic Track Power Reversing Feature and want to turn it off for any reason, turn configuration switch #5, "TP Enable" to the OFF (disable) position. In this setting, the Controller will still provide power to the bridge rails, but it will not reverse it. The change will take effect the next time the controller does a bridge move.

Troubleshooting.

The PTC Model III Controller has been enhanced to provide the user with more feedback, so corrective action can be taken if the controller detects that something is wrong.

All feedback is provided by the *Status Indicator* by use of different combinations of colors and flash patterns. Note that the meaning of the different indications depend on if you currently have the controller in RUN or LEARN modes. Refer to the table below for a brief description of the different indications and their meanings:

LEARN Mode LED Flash Pattern Summary:	
(Y)	Normal power-on, controller ready for programming.
Y-Y- ,...	Normal bridge "learn" move in progress.
(R) or (G)	When "single stepping" at the end of a bridge learn move, the indicator will alternate between (R) and (G) as you take each step.
G-G- ,...	New track selection detected: For Rotary Track Selectors, this means you have turned the selector to the new location you wish to program. For Pushbutton Track Selectors, this means you have pushed the button indicating the new location you wish to program. <i>Note:</i> For Pushbutton Selectors, continue pressing the pushbutton until the Controller indicator flashes red (see below).
R-R- ,...	The controller has confirmed the new track selected and is programming it into memory.

RUN Mode LED Flash Pattern Summary:	
(G)	Normal power on, controller ready.
G-G- ,...	Normal bridge move in progress.
R-Y- ,...	Index mode: normal bridge index movement in progress. <i>Note:</i> When "single stepping" at the end of the indexing movement, the indicator will alternate between (R) and (Y) as you take each step.
(Y)	Applicable to Pushbutton Track Selection configurations only: Controller has acknowledged that one of the track select pushbuttons has been pressed. Push the <i>Run/Stop</i> button to confirm selection; controller will proceed with bridge move. Wait until (Y) goes back to (G) to cancel track selection.
Y-Y- ...	Power-on self test: The controller is set to "RUN", but it is not programmed. Turn off controller, set <i>Run/Learn</i> switch to learn. Turn on power and program track locations.
(R)	Controller in PAUSE mode during bridge move. Push <i>Run/Stop</i> button to resume bridge movement.
R-R- ,...	Power-on self test: Controller needs to be reindexed. Hold down <i>Run/Stop</i> button while turning on power to go to INDEX mode.
R-R-Y- ,...	Power-on self test: The rotary <i>Track Selector</i> switch is in the wrong position (changed while power was off). Note current bridge position and turn rotary switch to proper location. Controller will recognize correction at end of flash cycle.
R-R-Y-Y- ,...	Power-on self test: The <i>Head/Tail</i> switch is in the wrong position (changed while power was off). Flip switch to other position. Controller will recognize correction at end of flash cycle.
R-R-Y-Y-Y- ,...	Power-on self test: The Controller has detected that a button is being pushed during power on (if using the pushbutton track selector). Verify that nothing is resting on the control panel to push the buttons. If nothing is resting on the buttons, then the Controller is indicating that a short circuit exists in the pushbutton wiring. Check the pushbutton wiring for any shorts.

Table Legend:

- R is red, G is green, Y is yellow, "-" means LED is off
- () means a solid, steady on
- ,... means the pattern repeats

Examples:

(R) means the indicator is a solid, steady red

R,G,... means the indicator flashes red, green, red, green, etc. (no off)

R-R- ,... means the indicator flashes red twice, goes off, and then repeats.

FOR MORE INFORMATION

We are interested in your comments and suggestions. For answers to your questions or for more information on the **PTC Model III**, call or write New Your Railway Supply, Inc., or email us at sales.support@nyrs.com.

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