NOTE: Firmware versions 5.8 and lower only

NYRS

Turntable Indexing That Works

PTC Model 4™

Programmable Turntable Controller

Controller and Motor Assembly

P/N 03-161

4

Installation Instructions

And

Users Manual

NYRS

(817) 233-5068

http://www.nyrs.com

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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.

California Proposition 65 WARNING



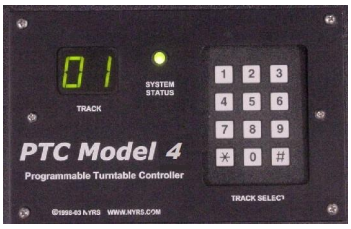
WARNING: Cancer and Reproductive Harm
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Installation Instructions

and Users Manual

PTC Model 4™

Programmable Turntable Controller



INTRODUCTION

Before you begin installation and programming of your turntable controller, be sure to read through these instructions completely. Also, review 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 4 are:

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

PRELIMINARY SYSTEM CHECK-OUT

We suggest that the user set up the system on the benchtop before trying to install it in the layout. As a general guideline go to the System Check-Out section and learn to program and operate the PTC, then proceed with the installation.

MOTOR INSTALLATION

There are two main options for motor installation:

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

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 scratch built 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 misalignment effects related to possible expansion and contraction of the layout or supporting benchwork.
- It should be remembered that the PTC 4 stepper motor has .025 degree resolution. 14,400 steps in the 360 degrees of rotation. Any misalignment, binding or play in the motor to turntable connection will make reliable positioning very difficult if not impossible.

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

CONTROLLER INSTALLATION

Examine the PTC Cover Plate and Controller Module to familiarize yourself with the control panel cutout When selecting a mounting location, be sure that:

- The mounting location is within 5' of the turntable, which is the length of the motor cable. Optional 3', 6', and 10' extension cables are available, if needed.

- Keep in mind that a turntable with 12 tracks is essentially 12 turnouts. You would not put 12 turnouts in a position where you can't reach them, think of a turntable in the same way, keep it within reach of the edge of your benchwork.

Once you have located a suitable spot begin the installation steps are as follows:

1. Locate the Keypad Mounting Plate in the box containing the Keypad Selector. Remove the bubble wrap.
2. Position the Cover Plate on your layout facia, face down. Using it as a template, *lightly* trace the location of the four mounting holes. Put the Cover Plate aside.
3. Using a straightedge, draw 4 lines connecting the *outside edges* of mounting holes you have traced.
4. Drill out the four mounting holes using a 1/16" drill. Use a center punch to mark the hole locations and to prevent the drill from "creeping" as you start the drill.

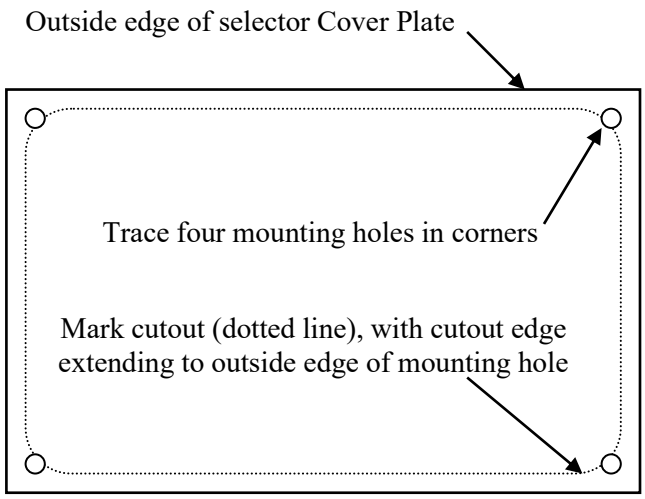
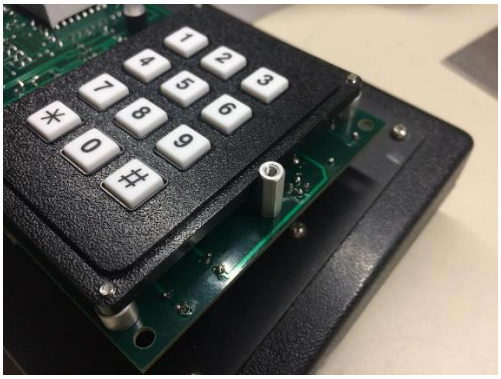


Figure 3: Panel Cutout

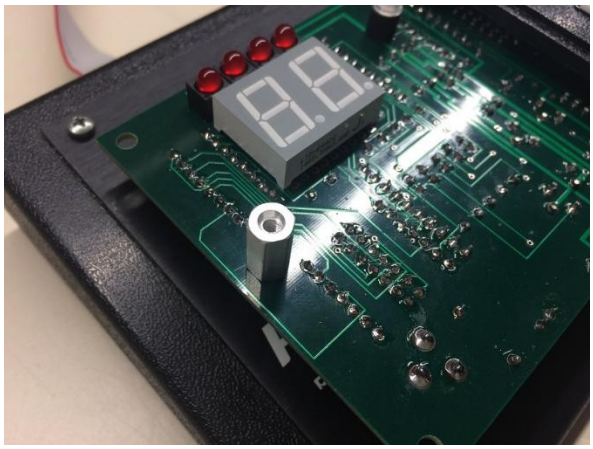
5. Cut out the area defined by the lines you drew in, using an appropriate saw. As you reach each corner, radius the cut from the line you are cutting to the adjoining line. **Important!** Be sure to NOT cut all the way to the mounting holes.
6. Debur the hole and test fit the hole by placing the Cover Plate face down over the hole again. **<u>Caution</u>: Be sure you have deburred the hole completely, and use care when placing the Cover Plate over the hole.** Burrs on the hole can scrape and mar the black anodized finish on the Cover Plate. This is especially true if your facia is aluminum or other metal.

Once you have completed the mounting cutout, complete the final assembly of the PTC module:

7. **Power Switch.** The PTC does not include a power switch but does include a harness and connector to allow the user to choose the power switch and mounting location of their choice. A SPST switch is all that is needed to switch the power on/off. In many installations hobbyists have a master power switch for all or sections of their layout. In this case you may connect the switch wires, plug the power supply into the master and control it with the layout master. Be sure to insulate the wire connection.
8. Locate the Keypad Selector Hardware Kit. Remove the black plastic LED Bezel. Install the bezel into the Keypad Selector Module LED mounting hole.
9. Remove two 4-40 x ¼" Phillips screws from hardware kit along with the ½" standoffs. One of the standoffs is a smaller size. Use this one next to the keypad and attach it to the printed circuit board using the screw as shown below.



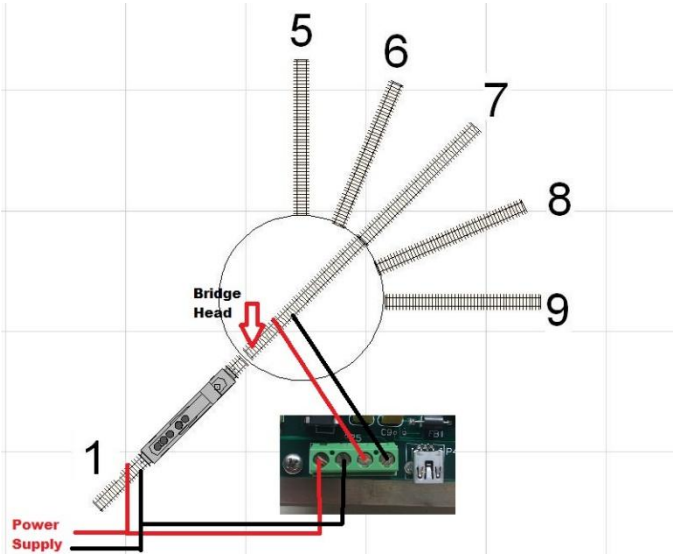
10. Attach larger standoff to the other end of PCB.



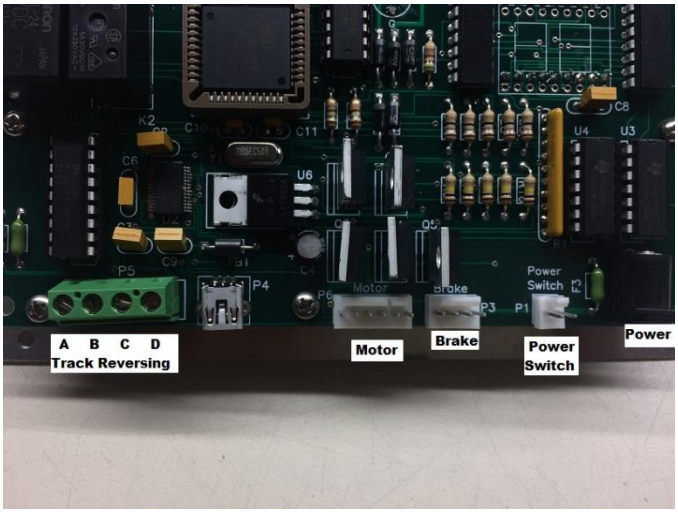
11. Remove the two 4-40 x 1/4" Philips pan heads screws from the hardware kit. Position the Keypad Selector Cover plate over the Keypad Selector Module, resting it on the two hex standoffs mouted to the module PCB. Carefully install the two screws, tightening them securely.

    Caution! Do not let the screwdriver "jump" from the screwhead, as this can scrape and mar the black anodized finish on the Cover Plate.

12. Track Reverser – Connect the supply lines from your power pack (DCC or conventional) to terminals A&B. Use terminals C&D to route power to your bridge rails. In the home position (track 1) terminal A will be connected to terminal B. When the bridge rotates 90 degrees the polarity will reverse which will connect terminal B to C and A to D. Wire as shown below.



13. Feed the wires from the motor, power supply, optional bridge power and optional shaft brake thru the fascia cutout and connect them to the labelled connectors.



Caution! The clearance between the facia cutout and the Keypad Selector Cable/PCB Assembly may be very close, depending on how big you actually made the cutout. If needed, add additional clearance by filing the hole where the cable needs to clear the cutout. Be careful not to make the hole *too* big, such that the Keypad Selector Cover Plate can't cover the hole properly!

14. Locate the four 4-40 x 3/8" Philips self tapping screws in the Hardware Kit. Mount the module to the fascia.

After you have installed the Keypad Track Selector Module, double-check your connections. Be sure the main power switch is in the 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.

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. Ensure that the Controller Power is OFF, press and hold the **"*"** key on the Keypad Selector.
2. While holding down the **"*"** key, turn the Power switch to ON.
3. Let go of the **"*"** key. The power-on LED on the Controller should be lit, the Dual Digit Display should momentarily display the software version display and two horizontal dashes. Let the '*' key up at this time and the display will show "Ad" (for "**Advancing**"):

Ad

The bridge should begin turning clockwise, and the *Status Indicator* (LED) 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 **"*"** key again. Each new push of the **"*"** key will result in the bridge advancing one step. The *Status Indicator* will also alternate between solid red and solid green 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. ***Note****:* Since the bridge is taking very small individual steps, it may not be immediately evident that the scale and smaller HO scale bridges (<9 inches). Observe the alternately flashing *Status Indicator* to confirm bridge movement.

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

PROGRAMMING

Programming the PTC involves the following steps to teach the PTC where your lead and service track locations are. Programming should take about 5-10 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.

Your first consideration will be to select a track that you will identify to the controller as your primary reference track.



Usually, this will be your primary lead track to the bridge. If you have two or more lead tracks to your turntable, identify one as your primary lead track. This track will be identified to the controller as "Track #1".

Next, consider which end of the bridge you would like to identify as the "head end" of the bridge for programming. Since turntable bridges are typically not *perfectly* symmetrical at both ends (even though they might look it), you will proceed by programming all of the "head end" locations first, then the "tail ends". Frequently, the head end of the bridge is the end with the operator's shack. If your bridge does not have such a distinction, be sure that you can otherwise determine which end of the bridge is which.

◆**Tip:** If your bridge is basically identical at each end, consider marking your bridge's head end with a water barrel or other object to make the head end easy to identify from a distance.

◆**Tip:** Most users find it helpful to diagram their turntable, numbering their service and lead tracks before they sit down to program their controller. They then "check off" the tracks the've programmed as they proceed with the programming session. Note that your primary lead track (the system reference track) must be numbered "1".

◆**Tip:** When numbering your lead and service tracks, it is not necessary to number them in any specific order after programming Track #1. Any numbers in the range from 2 to 99 may be used, in any order. For example, you may number your primary lead tracks 1, 2, and 3; tracks into the roundhouse 11, 12, 13, 14, 15; outdoor storage tracks 20, 21, and 22, etc.

To begin programming:

1. **Initialize the controller.** With the power off:
   1.1. Turn on the Controller

   1.2. **To access the *Function Programming Mode:*** With the controller in standby (ready) mode, enter the track code for "0-0-tail", which is:

 # 0 0 #

Entering this track select code tells the controller you are requesting the *Function Programming Mode.* Once requested, the Dual Digit Display will indicate a Function Prompt:

F -

Program Mode	9	1 or 9 –

To enter learn mode you would press #00#, The display will indicate F-. Then enter a '9'.

After a brief delay the display will indicate P0

1.1. At this point enter ' #1', display will indicate '88' and then 'Ln'. It is now in learn mode.

◆Tip: If a #5 is entered rather than a #1 the system will self program itself to a programmed setting every 30 degrees.

1.2. The *Status Indicator* on the control panel will be red briefly (about 1 or 2 seconds), then will change to a solid yellow. The Dual Digit Display will display "Ln" (for "**Learn**").

Ln

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" of the bridge for programming. Following the procedure below, rotate the head end of the bridge to the location of the lead track:

2.1. Press and release the **"*"** key. The bridge will now begin turning in a clockwise direction. The status LED will flash yellow, and the Dual Digit Display will show "Ad" (for "**advancing**"):

Ad

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 **"*"** key again.

2.2. When the bridge gets within a few degrees of the lead track, press the **"*"** key again. The bridge will stop rotating. The status indicator will be red or green, depending on where you happened to stop. The Dual Digit Display will not change.

2.3. Tap the **"*"** key again; the bridge will take a single step and stop. Keep tapping the **"*"** key until the bridge lines up with the lead track. The status indicator will alternate between red and green to confirm each step.

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

◆Tip: When single stepping the bridge in the forward direction a single step is only .025 degree. Barely visible to the eye. If you think it hasn't moved, make a reference point at the current location and step it 10 times. You will see that it is moving.

3. When you have lined up the bridge to the lead track, enter the track number of the lead track, which must be "1":

3.1. Press the **"#"** key. The Dual Digit Display will show **" - - "** to indicate that the controller is ready for you to enter a track number. The status indicator will show a steady green.

3.2. Press the "1" key.

3.3. Complete the track number entry by pressing the **"*"** key. The sequence of keys, in summary, would be the following:

1 *

3.4. After you have typed in the **"*"** key, the *Status Indicator* will flash red for a short time to acknowledge the key entry and to indicate that the location is being programmed into the system's memory.

4. **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:

4.1. Press and release the **"*"** key to start the bridge turning slowly again.

4.2. When the bridge gets within a few degrees of the next track, press the **"*"** key to stop the bridge.

4.3. Tap the **"*"** key until the bridge lines up with the next track.

4.4. Press and hold the **"*"** key for 3 seconds to back up the bridge, if you overshoot the spot you want.

4.5. When you have lined up the bridge to the track, press the **"#"** key, then enter the track number you've decided you'd like to use for that track, then the **"*"** key to terminate the entry sequence. For example, if you wanted to program the head end of the bridge as location "2", type the following:

2 *

Note: Track number **"0 0"** may not be used, as this is reserved for other functions (discussed later).

4.6. After you have typed in the **"*"** key, the *Status Indicator* will again flash red. This is your indication that the controller has learned the next track's location.

◆Tip: Remember that it is not necessary to number your lead and service tracks in any specific order after programming track #1. Any numbers in the range from 2 to 99 may be used, in any order. For example, you may number your primary lead tracks 1, 2, and 3; tracks into the roundhouse 11, 12, 13, 14, 15; outdoor storage tracks 20, 21, and 22, etc.

◆Tip: If you enter the wrong track number, for example, you entered "25" when you wanted "23", re-enter "2", and then "3". Each new number you enter simply results in the previous numbers being "shifted over". You may continue entering

numbers as long as you wish. When you have track number you want, indicate you are done by pressing the **"*"** key.

◆**Tip:** If you enter the **"#"** key twice in a row, the Dual Digit Display will briefly display an error code, "E1". This is to remind you that the next key expected is a number, not the **"#"** key again. At any time you enter a key that the controller does not expect, don't worry. The controller will briefly display an error code in the range "E1" through "E8" to prompt you with the information the controller expects. Refer to Tables 2 and 3, ("Mode Definition Summary" and "Error Definition Summary") in the *Troubleshooting* section for a summary of these codes. The *Troubleshooting* section can be found at the end of this manual.

5. **Program the rest of the track head locations**. Repeat Step 4 to program the rest of your head track locations.

6. **Program the bridge tail end positions**. Although many 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 Step 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 aligning the tail end of the bridge with the lead track programmed earlier in Step 1:

6.1. Press and release the **"*"** key to start the bridge turning slowly again.
6.2. When the tail end of the bridge gets within a few degrees of the reference (lead) track, press the **"*"** key to stop the bridge.
6.3. Tap the **"*"** key until the tail end of the bridge lines up with the lead track.
6.4. Press and hold the **"*"** key for 3 seconds to back up the bridge, if you overshoot the lead track.
6.5. When you have lined up the tail end of the bridge to the lead track, press the **"#"** key, followed "1", **then the "#" key again:**

```
# 1 #
```

6.6. The *Status Indicator* will again flash red. This is your indication that the controller has learned the lead track's "tail" location.

Important! Note that the key sequence for programming tail locations is the **"#"** key, followed by the track number, **then terminated with the "#" key again.** The Dual Digit Display will display the track you programmed, along with a ***decimal point*** in the lower right hand corner, to indicate that the ***tail end*** of the bridge is aligned at the track location shown. For example, after programming the location above, the Dual Digit Display will show:

```
01.
```

Or, as another example, if one of the tail end track location you program is "39", the display would show:

```
39.
```

◆**Tip:** If you enter the wrong track number, for example, you entered "32" when you wanted "39", follow the same corrective steps as when doing the head track locations: re-enter "3", and then "9". You may continue entering numbers as long as you wish, and they will shift over. When you have the tail track number you want, indicate you are done by pressing the **"#"** key (recall that head track locations are terminated with the **"*"** key).

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

8. **Prepare the controller for normal operation**. After the remaining bridge tail locations have been programmed, configure the controller for normal use:

8.1. Turn off the power.
8.2. **Re-index** the bridge to bring the head end of the bridge back to the lead track location:
8.2.1. As in Step 1, hold down the **"*"** key while turning on the power. While you are holding down the **"*"** key, the Dual Digit Display will display the version number and then **"- -"**.
8.2.2. Release the **"*"** key, and the bridge will begin turning. When you release the **"*"** key, the Dual Digit Display will show **"Ad"**.
8.2.3. When the head end of the bridge approaches the lead track, press the **"*"** key again and single step it into proper position. The Dual Digit Display will show **"01"**, reminding you that you should be lining up to Track #1.

9. **When the bridge is re-indexed, turn off the power**.

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 and go back to

the first programming step to re-enter programming mode. This will erase any settings you have made while in "LEARN" mode. If one track is slightly mis-aligned just make a note of it and after programming is complete see the 'Track Editing' section.

- 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, when 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. 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 re-index the unit after reinstallation of the motor.

OPERATING THE PTC

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

1. Power-up the controller in "RUN" mode. To do this, be sure the power switch is OFF. Turn on the power. The controller will go through its power-on self test sequence:
   - The Dual Digit Display will briefly illuminate all display segments to confirm they are all operational:

     8.8.

   - The *Status Indicator* on the control panel will 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 motion self test" function to confirm proper operation. This wags the bridge clockwise about 10°, then counterclockwise, then back again.

2. To select a track, press the **"#"** key, followed by the track number, then either:
   - The **"*"** key for aligning the head end of the bridge, or
   - The **"#"** key for aligning the tail end of the bridge.

For example, if you want to align the head end of the bridge at location "7", type the following:

7 *

Or, to align the tail end of the bridge to track "43", enter the following:

4 3

After entering the track number, the Dual Digit Display will show the track number, plus a decimal point in the lower right corner of the display if the requested location indexed is a bridge "tail end" location:

43.

3. After entering the track location, 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, 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 any key on the keypad. 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 Dual Digit Display will display Error Code "E0":

  E0

  The PTC will stay in pause until the any key is pressed, at which time the PTC will continue its progress. (in software versions prior to 11.5 the '*' key must be pressed to resume rotation.

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. The Dual Digit Display will also display "nP", to indicate that the system is "Not Programmed":

  nP

- 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 3°, 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.
- If you request a track location that has not been programmed, the Dual Digit Display will briefly display the error code "E3":

  E3

The Dual Digit Display will then revert to displaying the bridge's current location, and the controller will return to "standby" (ready) mode.

- 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. If re-indexing is necessary, the Dual Digit Display will show "E2" and *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 may get warm to the touch. This is normal since the motor draws nearly 1 amp of current, even while stationary.
- If you want to cancel a track move after you have started by pressing the **"#"** key, cancel the entry by entering "00" followed by the **"*"** key:

0 0 *

The Dual Digit Display will revert to indicating the current bridge position, and the controller will return to "standby" (ready) mode.

- Track Redirection - If you change your mind or make an error on the stop that the bridge is rotating to, - **simply hit any keypad button as if doing an emergency stop. Hit '*' to continue to the original location, or '#' to enter a new track number.**

Changing the Momentum and Maximum Speed Settings:

The Keypad Selector enables a broader selection of speed, momentum, and power reversing relay options than the standard Rotary and Pushbutton Track Selectors. They are accessed by entering special command sequences on the keypad.

The user accesses the speed, momentum, and power reversing options by putting the controller in the *Function Programming Mode* to retrieve and modify the variables of interest.

To access the *Function Programming Mode:* With the controller in standby (ready) mode, enter the track code for "0-0-tail", which is:

0 0

Entering this track select code tells the controller you are requesting the *Function Programming Mode.* Once requested, the Dual Digit Display will indicate a Function Prompt:

F –

Enter the function number you are interested in:

Function Name	*Function Number*	*Function Range*
Speed	1	0 – 9
Momentum	2	0 – 9
ATR Mode	3	0 – 1
ATR Enable	4	0 – 1
Track Edit	5	00-99

Table 5: Function Names and Numbers

After you enter the Function Number, the controller will retrieve the current Programmed Value from memory and display it on the Dual Digit Display, using a "P" followed by the value. For example, if you entered "1" at the Function Prompt, the controller will respond with the default speed range value, which is set at the factory as "6":

P 6

After reviewing the value, you may elect to keep the value or change it:

- To accept the value without changing it, press the **"*"** key to cancel, or
- Press the **"#"** key to proceed.

If you accept the value and press the **"*"** key, the *Function Programming Mode* will be canceled and the Dual Digit Display will revert to displaying the current track location.

If you pressed the **"#"** key to proceed, the Dual Digit Display will display a Programming Prompt:

P –

Enter the value you want:

- **Speed**: Range is "0" through "9", where "0" is the slowest speed (approximately 0.19 RPM) and "9" is the fastest speed (approximately 0.50 RPM). The factory default speed setting is "6" (medium speed).
- **Momentum**: Range is "0" through "9", where "0" is no momentum, "1" is the shortest momentum period, and "9" is the longest momentum period. The momentum periods are scaled to depend on the maximum speed variable you have selected. The momentum range you may prefer will largely depend on the size and scale of your turntable bridge. The best way to find the range you like is to first determine the maximum speed you prefer, then experiment with different momentum range variables. The factory default momentum setting is: "0" (no momentum).

- **Automatic Track Power Reversing ("ATR") Mode**: The ATR Mode instructs the controller on how you want it to execute the optional track power reversing function, if your controller is so equipped. The two modes are *Standard Mode* (split ring rail emulation) and *Optional Mode* (toggle switch emulation). See the section on *"Using the Automatic Track Power Reversing Feature",* below, for full details on the two ATR modes. At the Programming Prompt, enter "0" for Standard Mode, or "1" for Optional Mode. The factory default ATR Mode setting is: "0" (Standard Mode).
- **Automatic Track Power Reversing ("ATR") Enable**: The ATR Enable function simply turns the power reversing feature on or off. Enter "0" to *enable* the ATR, or "1" to disable it. The factory default ATR Enable setting is: "0" (enabled).

- **Track Edit**: To edit a track setting, rotate the bridge to the track in question. Hit #00#. When the display indicates F-, enter a 5. At this point, hit the '*' sign to advance a click or hold the '*' key down for 3 seconds to retreat a few clicks, then use the '*' key to advance to where you want the track to be. Exactly like the programming and indexing modes. Hit any key to exit the edit mode and then new position is saved. Track #1 can not be edited and you will receive an E8 error.

Function Programming Hints:

- If your system is equipped with the Optional Automatic Track Power Reversing ("ATR") feature, be sure to turn it on when you are ready to use it; the system default is off. Once you turn it on, it stays enabled unless you explicitly turn it off again.
- If you *do not* have the ATR feature installed, you can still change the values of the ATR Mode and ATR Enable, but they will have no effect.
- If you enter a function value that is not appropriate (for example: entering "5" at the Function Prompt), the Dual Digit Display will briefly display error code "E7",

E 7

meaning: "Not a valid function code value". The Dual Digit Display will then revert to the Function Prompt, where you can enter a correct function value.
- If you enter a range value that is not appropriate for the function you have requested (for example: entering "3" for the ATR Mode, or "#" when a number was expected), the Dual Digit Display will briefly display error code "E8",

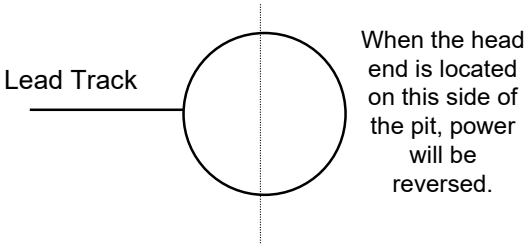
E 8

meaning: "Programming value not in correct range". The Dual Digit Display will then revert to the Programming Prompt, where you can enter a correct range value.
- 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 system power off for your new settings to take effect.
- 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.

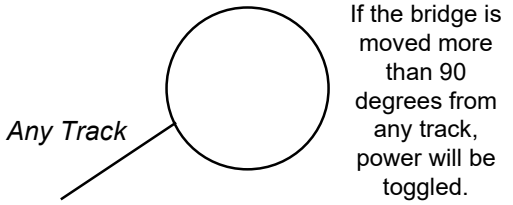
Using the Automatic Track Power Reversing Feature.

The Automatic Track Power Reversing ("ATR") feature is an optional capability whose purpose is to eliminate the need to use a split ring rail, split commutator, or DPDT switch to reverse the track power during bridge rotation and operation. The ATR has two modes of operation, *Standard* and *Optional*:

Standard Mode: In this mode, sometimes called "split ring" mode, the ATR works by remembering where your reference track is (Track #1), and then automatically reversing the bridge track power whenever the head end of the bridge moves more than 90 degrees either direction from that point. This simulates what would happen if you used a split ring rail to carry power to the bridge, with the split made 90 degrees each direction from the lead track. Refer to Figure 4, below:



Optional Mode: In this mode, sometimes called "toggle" mode, the ATR operates by remembering where you start each move, and *toggles* the power if you move more than 90 degrees in either direction from the starting point of that particular move. For example, if you were to turn a locomotive 180 degrees from any track location, the controller will toggle the power as if you had done manually it with an auxiliary toggle switch:



Put another way, if the bridge is moved less than 90 degrees (for example, between two tracks located close to each other), the power will not be reversed.

***Note**:* When you first program the controller, the power reversing relay is initialized to feed power "straight through", meaning, not reversed. From that point, the controller remembers each move and toggles the power as needed.

◆**Tip:** If you have the automatic Track Power Reversing Feature and want to turn it off for any reason, follow the Function Programming instructions (above) to disable it. If ATR is turned off, the Controller will still provide power to the bridge rails, but it will not reverse or toggle it. The change will take effect the next time the controller does a bridge move.

◆**Tip:** If you change the ATR Mode, it will not take affect (the relay will not change state, if needed) until the next bridge move.

Troubleshooting.

The PTC Model 4 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.

Feedback is primarily provided by the *Dual Digit Display*. The Status Indicator provides secondary feedback by use of different combinations of colors and flash patterns. Note that in the case of the *Status Indicator,* the meaning of the different indications depends on if you currently have the controller in RUN or LEARN modes. Refer to the tables below for a brief description of the different indications and their meanings:

TABLE 2, Mode Definition Summary (Dual Digit Display)	
nP	Normal power-on, but controller is "**N**ot **P**rogrammed". Program your track locations.
Ln	Normal power-on, controller is ready and is in "**L**ear**n**" mode
Ad	Normal bridge learn move in progress, the bridge is "**Ad**vancing":
--	Number entry prompt. Enter desired track number, followed by the **"*"** key for head end alignment, or the **"#"** key for tail end alignment. The controller will also display this pattern when first entering *Index Mode* upon start up.
F-	Function Prompt. Enter desired function value.
P-	Programming Prompt. Enter programming value for the function selected. For Speed and Momentum, the value will be in the range of "0" to "9". For ATR Mode and ATR Enable, the programming value will be "0" or "1". For track edit the value will be the currently selected track number;

TABLE 3, Error Definition Summary (Dual Digit Display)	
E 0	Error Code 0: The controller is in Emergency Stop (Pause) mode. Emergency Stop mode is entered by hitting any key on the keypad while the bridge is moving. Depress '*' to continue to the original location, or '#' to enter a new track number.
E 1	Error Code 1: Not a valid key pressed, a number (0 through 9) expected.
E 2	Error Code 2: Indexing required. This is usually the result of turning off the controller in the middle of a bridge movement, or turning off the bridge while it was in a pause or emergency stop mode. This will also occur if the unit has been programmed but not indexed to track #1. See section 8.3. To index: While holding down the **"*"** key, turn on the system power. Release the **"*"** key to start bridge movement, then single step the bridge to align it with your primary lead track (track #1).
E 3	Error Code 3: Not a valid track (the track selected is not a programmed location). Enter a programmed location.
E 4	Error Code 4: Not a valid key pressed, the **"#"** key is expected. Press the **"#"** key to start track entry sequence.
E 5	(Not used)
E 6	Error Code 6: Track ID selected ("00") is reserved. Enter a track and head/tail value that is not "00".
E 7	Error Code 7: Not a valid Function entry; enter a Function value in the range "1" through "4", corresponding to Speed, Momentum, ATR Mode, and ATR Enable respectively.
E 8	Error Code 8: Not a valid Programming value; enter a Programming value in the range "0" through "9" is setting Speed or Momentum values; "0" or "1" if setting ATR Mode or ATR Enable.
E 9	(Not used)

TABLE 4, LEARN Mode LED Flash Pattern Summary	
(Y)	Normal power-on, the controller is 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.
R-R- ,...	The controller has confirmed the new track selected and is programming it into memory.

TABLE 5, 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. *Note:* When "single stepping" at the end of the indexing movement, the indicator will alternate between (R) and (G) as you take each step.
Y-Y- ...	Power-on self test: The controller is set to "RUN", but it is not programmed. Turn off controller, set *Run/Learn* switch to learn. Turn on power and program track locations.
(R)	Controller in PAUSE mode during bridge move. Push the **"*"** key to resume bridge movement.
R-R- ,...	Power-on self test: Controller needs to be re-indexed. To enter the *Index Mode,* hold down the **"*"** key while turning on the system power switch.

Table Legend:

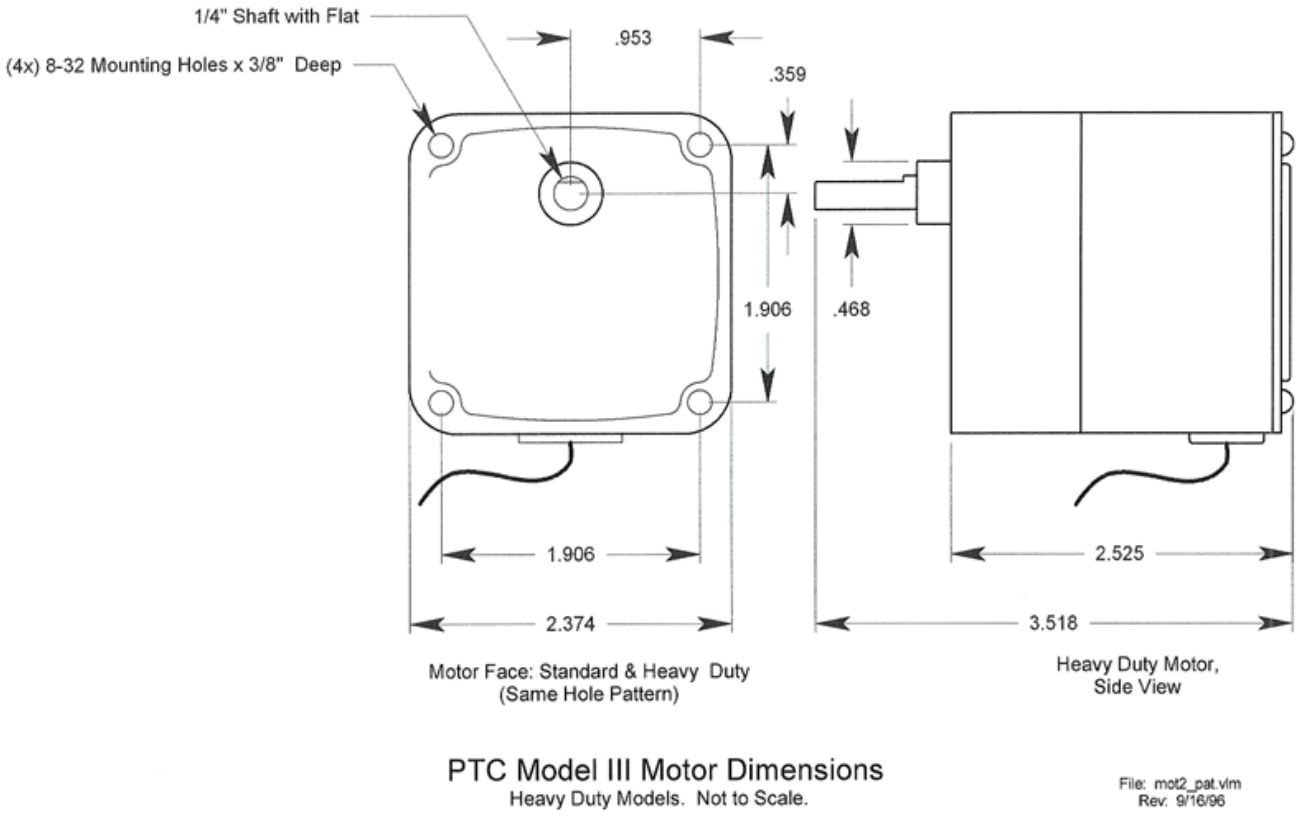
- R is red, G is green, Y is yellow, "-" means LED is off
- ( ) means a solid, steady on
- ,... means the pattern repeats

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.

Note: Flash pattern definitions depend on whether you have the controller in RUN or LEARN modes.

APPENDIX A – Motor Dimensions



PTC Model III Motor Dimensions
Heavy Duty Models. Not to Scale.

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

FOR MORE INFORMATION

We are interested in your comments and suggestions. For answers to your questions or for more information on the **PTC Model 4,** call or write New Your Railway Supply, Inc., attention *Technical Support,* or email us at *sales.support@nyrs.com*.

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