Application:

The Taco Plumb n' Plug (PNP) circulators, models 003-PNP and 006-PNP, are designed to increase comfort and conserve water and energy by decreasing the delivery time of hot water to outlet fixtures. An average residence can save up to 25 gallons of water per day, 9,000 gallons a year. A 6 foot line cord is pre-wired on all PNP models providing an easy installation. Simply plumb-it-in then plug-it-in.

Pump Control Options:

1. The basic PNP with line cord is designed for constant circulation where the pump runs 24 hours a day.

2. An optional aquastat kit (#563-2) can be added to control pump operation to maintain water temperature between 95°F – 115°F.

   Two automatic timer options are available to control pump operation and increase total energy savings.

3. A 24 hour/15 minute interval analog timer controls pump operation for the same time settings every day, usually early morning and early evening.

4. The digital 7 day programmable timer can be set for up to 10 different on/off time settings, with a cycle time as short as 1 minute, to match homeowners' weekly schedules and maximize energy savings.

Benefits:

- **Water Conservation:** The average residence can save up to 25 gallons of water per day, 9000 gallons per year.

- **Comfort and Convenience:** Hot water is always available in seconds.

- **Efficiency:** 24 hour analog timer can be set to control daily pump operation and increase energy savings. 7 day digital timer allows for different settings each day to match homeowners weekly schedule, for even greater convenience and savings.

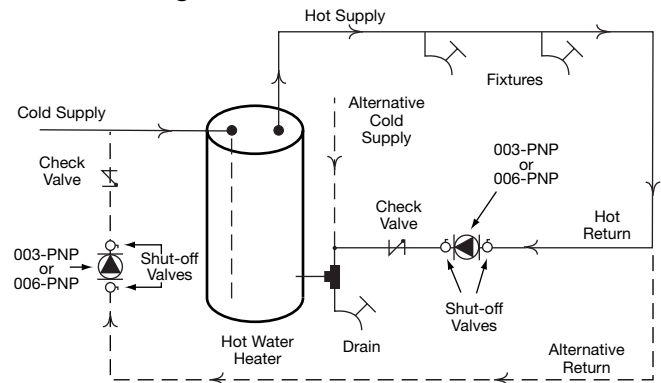- **Reliability:** Unique cartridge design runs quietly and is easy to replace.

Sizing:

- 003-PNP should be used when the total run of pipe (supply and return) is under 200 feet of ¾" pipe.

- 006-PNP should be used when the total run of pipe (supply and return) is from 200 to 400 feet of ¾" pipe.

Suggested Plumbing Installation Procedure:

1. Remove sill cock drain from water heater.

2. Install a tee to accept the drain sill cock and a return line.

3. Provide a 115 volt outlet (3 prong plug) within 6 feet of the circulator.

4. Install shut-off isolation valves on each side of the pump (recommended).

5. Install the PNP circulator with Integral Flow Check (IFC) or a separate in-line flow check valve on the discharge side of the pump.

6. Open shut-off valves and fill system piping. Do not operate pump without water.

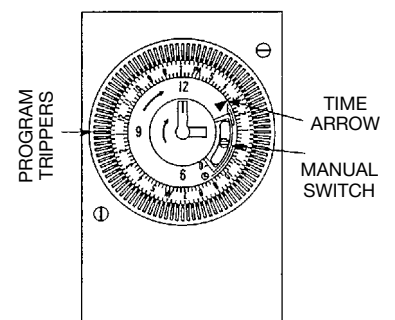7. Program timer settings (see below).

Installation Diagram:

Analog 24 Hour Timer Programming:

1. Set clock to the exact time of day using the clock face minute hand. Pay special attention to the corresponding AM and PM settings.

2. Plug the circulator in. Test the circulator by moving the timer switch into the ON position. See "**Manual Switch Settings**" below.

3. Set the desired ON/OFF times by pushing the trippers away from the clock face for ON operation. Leave the trippers toward the clock face for OFF operation. Each tripper represents a 15 minute interval.

4. Set switch in the middle position for automatic operation.

Analog Timer Manual Switch Settings:

1. Up = On, Constant circulation   I

2. Middle = Automatic operation   🕐

3. Down = Off   O

Analog Timer Diagram

Digital 7 Day Programmable Timer:

The Plumb n' Plug digital timer features a large LCD display and unique "circular programming" with large keys for easy setting and adjustments. A 100 hour capacitor backup retains program memory during power outages.

Note: Although the Plumb n' Plug digital timer contains some degree of spike and electrical noise protection, as with all electronic devices, these units can be affected by electrical noise. It is recommended that they be powered from a voltage source that has no switching devices or inductive loads connected.

Digital Timer Technical Data:

Channels: 1
Programs: 20
Daylight time changeover: Manual
Manual 3-way override: On-Auto-Off
Shortest switching time: 1 minute
Reserve carryover: 100 hrs.
Input voltage: 120 VAC
Switching Output: SPDT relay
Switch ratings: 500 W @ 125 VAC
Input draw: 4 VA
Input frequency: 50 or 60 Hz
Wiring connections: ¼" quick connect
Ambient temperature: -20°F to 140°F (-28°C to 60°C)
UL and Canadian UL recognized: File E83486

Keypad Description:

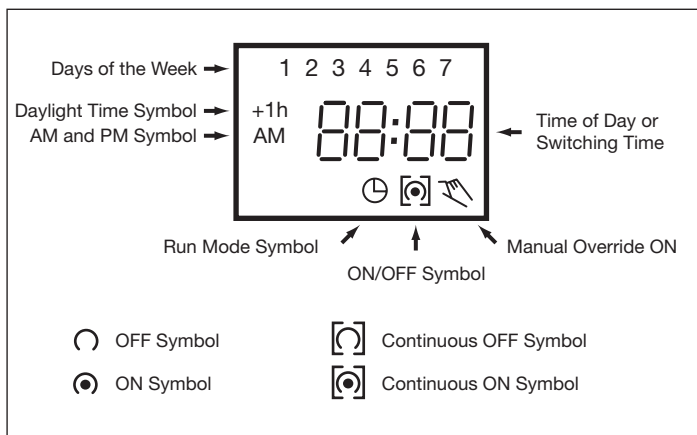|	
⏱	Setting the Time/Automatic Run Mode
Prog.	Program Mode
Res.*	Reset: Clears all programs and time
🖐	Select ON or OFF in Prog. Mode, Manual Override in Run Mode
±1h*	Manual Daylight Change Key
h	Setting the Hour (12:-- AM)
m	Setting the Minute (12:01 AM)
Day	Set Day(s) for time and programs (Mon = 1, Tues = 2, . . . Sun = 7)

* Recessed keys; use a pen point to press

LCD Display Elements:

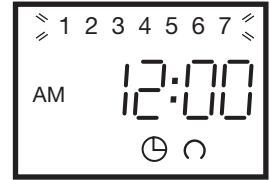The LCD incorporates a number of different elements to display various data and information.

Programs:

The PNP digital timer will accept up to 20 programs. A program consists of:

1. An ON or OFF command
2. Time of day (Hour and Minute)
3. Single day or multiple days

A program is required for each ON event, and a program is required for each OFF event.

IMPORTANT: BEFORE PROCEEDING WITH SETTING THE TIME AND PROGRAMMING THE UNIT, PRESS THE RESET KEY TO CLEAR ALL DATA FROM MEMORY.

Selecting AM/PM or Military Time:

After pressing reset, the display may show AM (right). The numbered day symbols will be flashing on and off.

If the display does not show AM, it is in military time mode (24:00 hr.). To change to AM/PM mode, press and hold the **h** key and press the **±1h** key once. AM will appear in display.

If display is in AM mode and military mode is desired, press and hold the **h** key, press the **±1h** key once.

Setting the Time:

NOTE: If the **h** and **m** keys are held down longer than 2 seconds, the numbers will advance rapidly.

Press and hold the ⏱ key during the following: (If Daylight Savings Time is in effect, press **±1h first.**)

1. Press **h** to advance to the current hour (while holding down the ⏱ key).
2. Press **m** to advance to the current minute (while holding down the ⏱ key).
3. Press **Day** repeatedly to advance to current day (while holding down the ⏱ key).
   (Mon = 1, Tues = 2, . . . Sun = 7)

NOTE: If the days are flashing, it indicates the day of the week was not set when setting the time. The timer cannot be programmed unless the day of the week is entered.

Manual Daylight Time Changeover:

Each year, in the Spring, press **±1h** to advance the time an hour. In the Fall, press **±1h** to set back an hour.

Digital 7 Day Programmable Timer

Programming 24 Hour or 7 Day Schedules:

Note: It is helpful to write out the program schedules *before* beginning. See last page.

IMPORTANT: THE CURRENT TIME OF DAY AND DAY OF WEEK MUST BE SET PRIOR TO PROGRAMMING. SEE "SETTING THE TIME".

EXAMPLE (see back page)
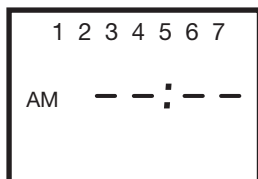
Program 1: ON at 7:00 AM Monday thru Friday

Program 2: OFF at 8:00 AM Monday thru Friday

Program 3: ON at 8:00 AM Saturday and Sunday

Program 4: OFF at 9:00 AM Saturday and Sunday

Four programs need to be entered.

Press **Prog.** key only once. Display shows:

```
1 2 3 4 5 6 7

AM   — —:— —
```

Program 1: ON at 7:00 AM Monday thru Friday

Press ✍ key once	ON symbol ⊙ appears
Press **h** key	To 07 AM
Press **m** key once	To 00
Press **Day** key 2 times	1 2 3 4 5 is displayed
Press **Prog.** key to enter	

Program 2: OFF at 8:00 AM Monday thru Friday

Press ✍ key twice	OFF symbol ⌒ appears
Press **h** key	To 08 AM
Press **m** key once	To 00
Press **Day** key 2 times	1 2 3 4 5 is displayed
Press **Prog.** key to enter	

Program 3: ON at 8:00 AM Saturday and Sunday

Press ✍ key once	ON symbol ⊙ appears
Press **h** key	To 08 AM
Press **m** key once	To 00
Press **Day** key 3 times	until only 6 & 7 is displayed
Press **Prog.** key to enter	

Program 4: OFF at 9:00 AM Saturday and Sunday

Press ✍ key twice	OFF symbol ⌒ appears
Press **h** key	To 09 AM
Press **m** key once	To 00
Press **Day** key 3 times	until only 6 & 7 is displayed
Press **Prog.** key to enter	

Program additional settings as desired (maximum of 10 ON/OFF programs). When all programs are complete, press 🕐 key to enter Run Mode

IMPORTANT: IF AN "ON" TIME WAS PROGRAMMED THAT IS EARLIER IN THE DAY THAN THE CURRENT TIME, PRESS ✍ ONCE TO TURN THE TIMER "ON". (IT DOES NOT "LOOK BACK" TO DETERMINE IF IT SHOULD BE ON OR OFF AFTER PROGRAMMING.)

NOTE: If 24 hour time control (same schedule every day of the week) is desired, ignore Day key.

If an ON or OFF symbol is not entered, the ON symbol will flash, and program will not be accepted.

Day Key Selections:

Press Day Key	Display Shows							Days
0 times	1	2	3	4	5	6	7	Every Day
1 time	1	2	3	4	5	6		Mon - Sat
2 times	1	2	3	4	5			Mon - Fri
3 times						6	7	Sat & Sun
4 times	1							Monday
5 times		2						Tuesday
6 times			3					Wednesday
7 times				4				Thursday
8 times					5			Friday
9 times						6		Saturday
10 times							7	Sunday

Reviewing Programs:

To review the programs at any time, press **Prog.** key. Programs will appear in the order they were entered with repeated presses of the **Prog.** key. After all programs have been reviewed, the blank display will appear to allow entering another program. Another press of the **Prog.** key will display the number of free programs available, such as **Fr 16** if 4 programs have been entered.

Manual Override:

TEMPORARY: While in the Run Mode,

- Pressing the ✍ key once will reverse the output; ON to OFF or OFF to ON. The ✍ symbol appears in the display to indicate a temporary override. At the next scheduled switching time, automatic control resumes, eliminating the override.

CONTINUOUS: While in the Run Mode,

- Pressing the ✍ key twice will turn the output to ON permanently. ⊙ symbol appears in display.

- Pressing the ✍ key three times will turn the output OFF permanently. ⌒ symbol appears in display.

- To terminate a continuous override, press the ✍ key until 🕐 appears in the display.

Changing a Program:

Select the program to be changed with the **Prog.** key. A new set of days may be selected with the **Day** key just as in initial programming. Hour and minute can be changed with the **h** and **m** keys.

Press **Prog.** or 🕐 key to store the new program.

Deleting a Program:

To delete only one or a few programs:

Press **Prog.** key until the desired program is displayed.

Press **m** key to **:59** and press once more to blank out.

Press **h** key to **11PM** and press once more to blank out.

Press 🕐 key, display will flash for several seconds and then enter the Run Mode.

Using the reset key will delete ALL programs, the time of day, and day of the week.

Troubleshooting:

PROBLEM: Days are flashing, pressing any key does nothing except ✍ key turns output On and OFF.

SOLUTION: **Time of Day** and **Day of Week** have not been set. See **"Setting the Time"**.

A second, but very unlikely cause of loss of program, is a power failure with the backup capacitor low or dead. Check by disconnecting power and monitoring how long the capacitor keeps the time of day in the display. Typically, the capacitor will maintain the time and programs for 4 days, but not more than 5 days.

———————————

PROBLEM: Time of day was set while holding the ⏰ key down, but days are still flashing.

SOLUTION: Current day of week was not set **while holding down the ⏰ key**. See **"Setting the Time"**.

———————————

PROBLEM: It is 10 AM and an ON program for 8 AM was entered, but the output is not ON. Display shows the ⏰ and ⌒ symbols.

SOLUTION: After programming, the timer does not "look back" to determine if it should be ON. Press the ✍ key (temporary override) to turn the output ON; ✍ ⊙ appears in display. The timer will assume automatic operation at the next programmed event.

———————————

PROBLEM: A program for 8 AM Monday thru Friday was entered, but it will not accept it and ⊙ is flashing.

SOLUTION: The ON ⊙ or OFF ⌒ was not entered as part of the program. On or OFF **must be selected**.

PNP Digital Timer Program Schedules

Program	ON/OFF	h	m	Day(s)
1	On	7 AM	00	Mon., Tue., Wed., Thurs., Fri.
2	Off	8 AM	00	Mon., Tue., Wed., Thurs., Fri.
3	On	8 AM	00	Saturday and Sunday
4	Off	9 AM	00	Saturday and Sunday