



## Locator Protocol API version 2.1

July 2022

### 1 Locator Data Query

Product	Firmware Supporting
TM1000	2.6
TM2000	0.3.3
POE Display (B series)	4.9 (unreleased)
POE Display (C series), Supporting 9 digit display	5.2
WiFi Display (B series)	2.6 (unreleased)
WiFi Display (C series)	3.2

\*The series letter is determined from the first letter of the serial number of the device

This API was original designed primarily for use by TM-Manager, but is available for management and some remote control of the devices. This later release only supports the mo above. See the 1.1 version of this document for models prior to the version above.

#### 1.1 Device Query

The Locator Data Service is a simple UDP/IP protocol that can be used by other network applications to extract status and location information from TM products.

##### 1.1.1 POE, WiFi, and DotMatrix Device Query Format (Clocks)

Requesting information from the clocks is done by sending a 3 byte message to the Clock, using UDP/IP, to port 7372. The three bytes, in hexadecimal, are: 0xA1 0x04 0xB2 The TM1000/2000's will also respond to a broadcast to the same port.

The response packet is 40 bytes and will be formatted as follows:

Bytes	Description
0	Device Type: 0x01=POE, 0x02=WiFi, 0x03=DotMatrix
1 to 4	client IP address
5 to 10	MAC address
11 and 12	firmware version Major:Minor
13 and 14	NTP Sync Count
15 to 17	Displayed Time / Timer Value: HH MM SS in each byte
18	Tenths of a second
19	Display mode: bits 2-0: 000=time 001=Up Timer 010=Down Timer 011=Interval Count Up 100=Interval Count Down bit5 (0x20): display mode 1=D:H:M mode (bit7 cleared) bit6 (0x40): start/stop 0=stopped 1=running bit7 (0x80): display mode 0=H:M:S 1=M:S:Tenths



20	Downtimer Alarm Set Bit0-6: Alarm Duration Bit7: Down timer Alarm Checked 0=unchecked 1=checked
21	Days currently displayed, most significant 8 bits
22	Digits value. 0=4/6 Digits, 1=(D):H:M:S, 2=(H):M:S.Tenths Options 1 and 2 require 9 digit display for () value to show Top 3 bits are the most significant bits of Day value
23	WiFi Signal Strength. 0 for wired, otherwise negative of value in dBm
24 to 39	Device Name as null terminated ASCII string

TM-Manager / TM-Timer uses this protocol to find and monitor clocks on the network. A Wireshark capture of that software can be used to see an example of the data transfer.

### 1.1.2 TM1000/TM2000 Device Query

Requesting information from the TM1000A/TM2000A is done by sending a 3 byte message to the TMX000A, using UDP/IP, to port 7372. The three bytes, in hexadecimal, are: 0xA1 0x04 0xB2 The TMX000A will also respond to a broadcast to the same port.

The response packet is 80 bytes and will be formatted as follows:

Bytes	Description
0	TM1000A response value = 0x04, TM2000A=0x05
1 to 4	client IP address
5 to 10	MAC address
11 and 12	firmware version Major:Minor
13	Lock status 0=No Lock, 1=2D Lock, or 2=3D Lock
14 to 17	NTP Sync count, 32 bits, MSB to LSB
18 to 20	Current Time, H:M:S, UTC
21 to 45	Location of unit 25 bytes, Latitude, Longitude, null terminated
46 to 80	Name of Time Server, null terminated

TM-Manager / TM-Timer uses this protocol to find and monitor TM1000A/TM2000A's on the network. A Wireshark capture of that software can be used to see an example of the data transfer.



## 1.2 Timer Control Sequences

The Up/Down counter timers can be controlled use the same UDP/IP API. Those sequences are documented in the following sections.

### 1.2.1 Use UpTimer

This command puts the clock into the UpTimer Mode. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA2
1	Timer Display Mode: 0x00=MIN:SEC.Tenths, 0x01=HH:MM:SS
2	0x00

### 1.2.2 UpTimer Start/Pause

Toggles the UpTimer between running and paused. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA3
1	0x00=Pause 0x01=Count Up **New in version 1.1
2	0x00

### 1.2.3 Uptimer Reset

Resets the UpTimer back to zero. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA4
1	Timer Display Mode: 0x00=MIN:SEC.Tenths, 0x01=HH:MM:SS
2	0x00

### 1.2.4 Use DownTimer

Sets DownTimer Mode on the clock. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA5
1	Timer Display Mode: 0x00=MIN:SEC.Tenths, 0x01=HH:MM:SS
2	Starting Hour value for countdown
3	Starting Minute value for countdown
4	Starting Second value for countdown
5	Starting Tenths of a second value for countdown
6	End of countdown Alarm Enable. 0=Disabled, 1=Enabled
7	Alarm duration in seconds
8	Starting Days value for countdown, LSB (optional, zero if omitted)
9	Starting Days value for countdown, MSB (optional, zero if omitted)



### 1.2.5 DownTimer Start/Pause

Toggles the DownTimer between running and paused. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA6
1	0x00=Pause 0x01=Count Up **New in version 1.1
2	0x00

### 1.2.6 DownTimer Reset

Resets the DownTimer back to starting value. Must already be in DownTimer Mode. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA7
1	Timer Display Mode: 0x00=MIN:SEC.Tenths, 0x01=HH:MM:SS
2	Starting Hour value for countdown
3	Starting Minute value for countdown
4	Starting Second value for countdown
5	Starting Tenths of a second value for countdown
6	End of countdown Alarm Enable. 0=Disabled, 1=Enabled
7	Alarm duration in seconds
8	Starting Days value for countdown, LSB (optional, zero if omitted)
9	Starting Days value for countdown, MSB (optional, zero if omitted)

### 1.2.7 Set Clock to TimeMode

Returns the clock from the Up/Down Timer modes to regular time display. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA8
1	0x01
2	0x00

### 1.2.8 Set DotMatrix Text

Sets the text string on the DotMatrix display. Scrolling direction and Justification are controlled as well. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xA9
1	ESC Character for Formatting: 0x1B
2	Bits 3:2=Scroll Direction ( 0=No Scroll, 1=Right to Left, 2=Bottom to Top Bits 1:0=Justification of Text (1=Left, 2=Center, 3=Right)
3	Scroll Speed
4	Text to display starts here, null terminated. 250 chars maximum with null



### 1.2.9 Set UpTimer Time While Running

Instantaneously changes the time of the UpTimer while it is running. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xAA
1	New HOUR value
2	New MINUTE value
3	New SECOND value
4	New TENTHS of a second value
5	New HUNDREDTHS of a second value
6	New DAYS value, LSB (optional, if not present zero will be assumed)
7	New DAYS value, MSB (optional, if not present zero will be assumed)

### 1.2.10 Set DownTimer Time While Running

Instantaneously changes the time of the DownTimer while it is running. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xAB
1	New HOUR value
2	New MINUTE value
3	New SECOND value
4	New TENTHS of a second value
5	New HUNDREDTHS of a second value
6	New DAYS value, LSB (optional, if not present zero will be assumed)
7	New DAYS value, MSB (optional, if not present zero will be assumed)





### 1.2.11 Countdown to Date Timer Reset

Resets the Date Timer back to starting value. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xB9
1	Display Mode: 0x00=(HR):MIN:SEC.Tenths 0x01=(DAY):HH:MM:SS 0x02=DD:HH:MM
2, 3	Ending Year value for count down to date (ie. 2022). LSB, MSB
4	Ending Month value for count down to date
5	Ending Day value for count down to date
6	Ending Hour for count down to date
7	Ending Minute for count down to date
8	Ending Second for count down to date
9	End of countdown Alarm Enable. 0=Disabled, 1=Enabled
10	Alarm duration in seconds

### 1.2.12 Countdown to Date Start/Pause

Toggles the DownTimer between running and paused. A single character 'A' Acknowledge is sent back.

Bytes	Description
0	Command Byte: 0xBA
1	0x00=Pause 0x01=Count Up
2	0x00

### 1.2.13 Execute Stored Program

Tells the clock to load a particular stored timer program from the flash memory, and begin executing it. This is the same mechanism used by the Alarm system in the displays to trigger a stored program at a given time.

Bytes	Description
0	Command Byte: 0xB8
1	Program Number: 0-9



## 1.3 Misc Control Sequences

### 1.3.1 Relay Close

Immediately close the relay on the display for X seconds.

Bytes	Description
0	Command Byte: 0xB4
1	Number of seconds to close
2	0x00

### 1.3.2 Relay Toggle

Set the relay to either the closed or open position indefinitely. This condition is not checked by other events which could change the position of the relay. For example, if a timer ended with a triggered relay closure, that would change the state of the relay independent of this command.

Bytes	Description
0	Command Byte: 0xBC
1	0=open, 1=closed
2	0x00

### 1.3.3 Revert to Time Timeout

Prior to this release of the API, there was a hard-coded 30 minute timeout that would revert the clock from a non-running, un-used timer back to time display on the clock. This command allows this value to be changed. A value of 0, disables the revert timer. This value is not saved to non-volatile memory and will need to be updated any time power is lost.

Bytes	Description
0	Command Bytes: 0xBB
1	Timeout in Minutes, LSB
2	Timeout in Minutes, MSB

### 1.3.4 Dimmer Set

Immediately change the dimming level of the display. This setting is not saved to non-volatile memory and is thus only active until changed or the clock reboots.

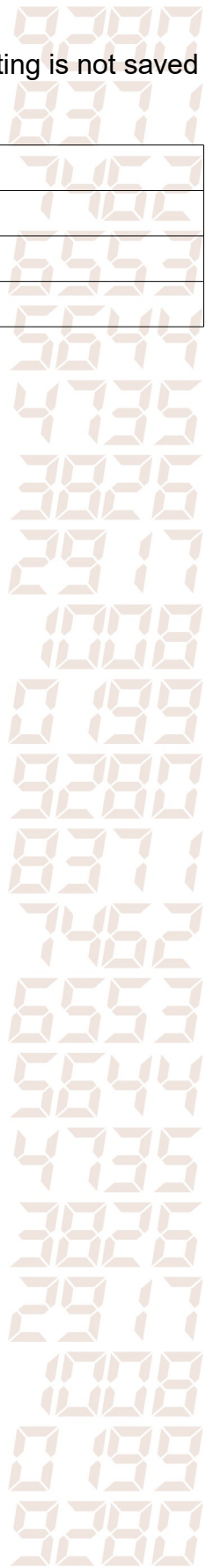
Bytes	Description
0	Command Byte: 0xB5
1	Digit Brightness: 0-100
2	AM/PM/Colon dot brightness: 0-100



### 1.3.5 Color Set

On RGB equipped displays, immediately change the colors being displayed. This setting is not saved to non-volatile memory and is thus only active until changed or the clock reboots.

Bytes	Description
0	Command Byte: 0xB6
1, 2, 3	MM:SS Digit Color RGB components: 0-255
4, 5, 6	HH Digit Color RGB components: 0-255







## 2 Revision History

### 2.1 Version 1.0

*Initial Release Feb 9, 2018*

### 2.2 Version 1.1

*Updated March 22, 2018*

- UpTimer and DownTimer Start/Pause commands were updated such that the second byte of each now has meaning in the command. This prevented repeated packets from negating the previous packets meaning. Support for this started in version 2.3 of the WiFi clock, 4.5 of the POE clock, and 1.1 of the DotMatrix.
- Support for TM2000A locator protocol.

### 2.3 Version 2.0

*Updated March 2021*

- Changed format of general Locator response for clocks to allow displays to report timer function in real time
- Added direct relay control, dimmer control, RGB color set

### 2.4 Version 2.1

- Added support for countdown to date
- Added support for 9 digit clock displays
- Added option to toggle relay on and off

