



TanTime Technical Document

Title: TTIO Protocol
Subject: Protocol between PC and TT-5, TT-10
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Revision: 1.4
Date: April 20, 1999

TanTime Technical Document

TTIO PROTOCOL

Up to firmware version 1.4

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About this document

This document covers the protocol between a TanTime TT-5-PC and TT-10-PC timer and a personal computer. Physical layer implementation is not covered in this document, see Theory of Operation for further information on physical layer implementation. This information is intended for use by the software designer to develop pc software that will communicate with the timers. All attempts have been made to make this document as accurate and complete as possible. To ensure that you have the most complete and updated information please contact the factory before starting on any project or software update.

Versions Covered

This document covers all firmware versions up to the version listed on the title page. TanTime timers have internal micro processors that each run a version of “firmware” to control the timer and interface with an external computer. The version of the firmware is determined by the factory and is installed at time of manufacture. This may be updated by the factory during repair or at the customers request. Each version contains added features, expanded communication options, and various other changes. Incremental versions I.e.. 1.3a do not include protocol changes and are only for internal operations. Protocol changes are included in major changes 1.2, 1.3, and 1.4. TanTime is committed to ensuring compatibility between all versions of timers. All versions are backward compatible with earlier versions for protocol interface. It is important to determine which version of timer is connected to the pc before sending any commands other than the preliminary set. Determining the version will be covered in a later chapter.

The following firmware versions have been released by TanTime;

- 1.2 Released 2/97
- 1.3 Released 8/98
- 1.4 Released 6/99

TanTime will make all efforts to notify and distribute changes made to the operation of the timer when possible. TanTime, however, reserves the right to change versions, features, and operating characteristics as needed, without prior notification.

Protocol Structure

Communication between the timer and pc is in standard ASCII format. There are no embedded commands, non standard characters, or other variables in the data stream. All letters must be UPPER CASE. Any letters not in upper case will be ignored by the timer. All queries must start with the “attention” character A. All queries must be ended with a carriage return.

There may be more than one unit on a communication line. Each unit must have a unique number assigned to it. This is done by the user on installation of the timer.

The protocol between the timer and the pc is a “query and response” system. The timer will ONLY send data when queried by the pc. The only time the timer will send data unrequested is on power up or reset. The query command is sent to the timer which will then respond. The timer will always respond with something, the format of the response will depend on the query. There are four parts to the query command, Unit number, Timer number, Command, and Variable (if dictated).

Query Structure

The structure of a query is diagrammed below, each part will be highlighted and explained;

A0R2M; This letter is the “attention” character. Every query must begin with this character.

A0R2M; This is the unit number. Each unit, which may contain 5 or 10 individual timers, needs to have a unique number.

A0R2M; This letter indicates if the query is a READ (question) or WRITE (command).

A0R2M; This is the timer number. There may be 5 or 10 timers per unit.

A0R2M; This letter identifies the request type.

A0R2Mxx; This number variable depends on the request type.

Response Structure

The response structure will be diagrammed below and explained.

A0xx.; This letter will always be the “attention character”.

A0xx.; This number will be the unit number. NOTE: for version 1.2 this will be the timer number

A0xx.; These number(s) will depend on the query and will not always be sent.

A0xx.; The response will always end with a period.

Text Format

Query explanation will follow this format. The query letter will be listed first then a description of the query will be listed, then the firmware version it is valid for, the expected response time, a command line example and expected response. If a version number is listed the request is valid for that version and above. The example is shown below.

| Query Letter | Description | Version | Response Time (seconds) | Command Line Example | Expected Response | Read / Write |
|--------------|----------------|------------|-------------------------|----------------------|-------------------|--------------|
| M | Minutes | 1.3 | [.1] | A1R3M20 | (A1.) | R/W |

M is the request type. It would follow the attention letter, unit number, write or read, and timer number. I.e. A0W2Mxx. Minutes is the request identification. 1.3 means this request is valid for this version and all versions following. The bracketed .1 indicates a .1 second response time. This response time is the MAXIMUM expected, the timer usually will respond much quicker. Both R (question) and W (command) options will be explained below. Not all requests use both R and W. If one is not, listed it is not used.

Command Line Example Explanation

A1R3M20, Attention, 1 Unit number, Read, 3 Timer number, Minutes, **20**

Expected Response Explanation

A1., Attention, 1 Unit number, **.** End of string.

Global Commands

Determining Version

The timer will send a text message upon power up and reset. To determine the version of the firmware you may view this message. If the message is displayed in a window the user may read the version number, or you may search the text for the key. A sample message is listed below. For versions 1.3 and above the request V may be used. The request is listed in Timer Commands.

Sample text message sent upon reset or turn on.

| |
|--|
| TTIO Version 1.3c Copyright (C) 1998, Electronic Programming And Design All Rights Reserved. Box Address #: 0 |
|--|

Determining Timer Model

On the bottom, rear, or front of the timer the label will state the Timer Model. Example; TT-10-PC.

Timer Commands

A Hours Accumulator 1.2 [4] AOROA (A0 00345.) R

READ:

This will read the hour accumulator for that timer. This accumulator is a permanent meter and can not be reset by the user. The example above has three hundred and forty five hours on its hour accumulator.

B Buzzer Status 1.0 [.1] AOROB (A0 ON. / OFF.) R

READ:

This will return the status of the buzzer, either ON or OFF.

C Sessions Accumulator 1.3 [4] AOROC (A0 00155.) R

READ:

This will read the session accumulator for that timer. This accumulator is a permanent meter and can not be reset by the user. The example above has one hundred and fifty five session on the accumulator.

NOTE: A session is recorded each time a timer is started regardless of time used.

H Maximum Session Time 1.2 [4] AOROH (A0 20.) R

READ:

This will return the maximum session time set for that timer. The example above is set for twenty minutes maximum session limit.

| | | |
|----------|---|----------|
| M | Minutes on Timer 1.0 [.1] AOR1M (AO 12.) | R |
|----------|---|----------|

READ:

This will return the time displayed on the timer. The example above has twelve minutes displayed on the timer.

QQ22QW

| | | |
|----------|--|----------|
| M | Minutes on Timer 1.0 [.1] AOW1Mxx (AO.) | W |
|----------|--|----------|

WRITE:

This will enter the written time “xx” on the timer. For example, writing AOW1M15, will enter 15 minutes on the timer display. Writing a time greater than the maximum session time will not be ignored by the timer, the display will remain at its last display state. To ensure that the time has been written to the timer by reading the minutes after sending this command.

SPECIAL CASE FOR TURNING OFF TIMER

| | | |
|----------|--|----------|
| M | On / Off Status 1.0 [.1] AOWM00 (A2.) | W |
|----------|--|----------|

WRITE:

Writing M with two zeros will turn off the timer. This command may also be used to clear the timer display. You must read the status of the timer to see if the timer has turned off.

| | | |
|----------|--|----------|
| N | Minutes Accumulator 1.2 [4] AORON (12.) | R |
|----------|--|----------|

This will read the minute accumulator for that timer. This accumulator is a permanent meter and can not be reset by the user. The example above has three hundred and twelve minutes on its minutes accumulator.

| | | | | | | |
|----------|-----------------|-----|------|-------|-----------------|---|
| O | On / Off Status | 1.0 | [.1] | AOR2O | (A2 ON. / OFF.) | R |
|----------|-----------------|-----|------|-------|-----------------|---|

READ:

This will return the status of that timer. ON indicates that the timer is running. OFF indicates that the timer is not running. NOTE; When the timer is in pre-start delay the returned status will be OFF.

| | | | | | | |
|----------|-----------------|-----|------|--------|-------|---|
| O | On / Off Status | 1.0 | [.1] | AOW2O1 | (A2.) | W |
|----------|-----------------|-----|------|--------|-------|---|

WRITE:

Writing a one after the letter O will turn on the timer. You must read the status of the timer to see if the timer is running after writing this command. The timer will only start if one or more minutes is displayed. To turn the timer off see the special case below.

SPECIAL CASE FOR TURNING OFF TIMER

| | | | | | | |
|----------|-----------------|-----|------|--------|-------|---|
| M | On / Off Status | 1.0 | [.1] | AOWM00 | (A2.) | W |
|----------|-----------------|-----|------|--------|-------|---|

WRITE:

Writing M with two zeros will turn off the timer. This command may also be used to clear the timer display. You must read the status of the timer to see if the timer has turned off.

| | | | | | | |
|----------|------------------|------|-----|-------|---------------|---|
| R | Bed Ready Status | [.1] | 1.4 | AOROR | (AO YES /NO.) | R |
|----------|------------------|------|-----|-------|---------------|---|

This will return the status of the “dirty bed” indicator. NO indicates the dirty bed indicator is on and the bed is NOT ready. YES indicates that the dirty bed indicator is off and the bed is ready to use. To clear the indicator use command M to WRITE any number to the timer.

| | | | | | | |
|----------|--------------------|------------|-------------|--------------|----------------|----------|
| S | Preset time | 1.2 | [.1] | A1R4S | (A120.) | R |
|----------|--------------------|------------|-------------|--------------|----------------|----------|

This will read the preset time for that timer. This time may be different that the maximum time. The preset time is determined by the last full session recorded. For example the preset time may be, as above, 20 minutes. If the next completed session for 15 minutes the preset time would change to 15 minutes.

| | | | | | | |
|----------|---------------------------|------------|-------------|--------------|-----------------|----------|
| : | Seconds on Display | 1.3 | [.1] | AOR3: | (A0 59.) | R |
|----------|---------------------------|------------|-------------|--------------|-----------------|----------|

This will return the seconds remaining on the timer. For example the timer above has fifty nine seconds on the display.

| | | | | | | |
|----------|-------------------------|------------|-------------|--------------|-------------------|----------|
| V | Firmware Version | 1.2 | [.2] | AOROV | (A0 1.2b.) | R |
|----------|-------------------------|------------|-------------|--------------|-------------------|----------|

This will return the version of the firmware for the timer console. This is the firmware for the console not an individual timer. For example the above version is 1.2b. This should be read before sending commands not applicable to all versions. The timer number is not read but must be included.

| | | | | | | |
|----------|-----------------------|------------|-------------|--------------|---------------------------------------|----------|
| X | Model of Timer | 1.2 | [.2] | AOROX | (A0DB5S001. / A0DB10S001.) | R |
|----------|-----------------------|------------|-------------|--------------|---------------------------------------|----------|

This will return the model of the timer console. There are currently two models manufactured, TT-5-PC and TT-10-PC. The return will either be DB5 for TT-5-PC or DB10 for TT-10-PC. This may be used to determine the maximum number of timers addressable per unit.

Command list, Alphabetical

| Command | Meaning | Version |
|---------|-----------------------|---------|
| 1. A | Hours accumulator. | 1.2 |
| 2. B | Buzzer status. | 1.0 |
| 3. C | Sessions accumulator. | 1.3 |
| 4. H | Maximum session time. | 1.2 |
| 5. M | Minutes on timer. | 1.0 |
| 6. N | Minutes accumulator. | 1.2 |
| 7. O | On / Off status. | 1.0 |
| 8. R | Bed ready status. | 1.4 |
| 9. S | Preset time | 1.2 |
| 10. : | Seconds on timer | 1.3 |
| 11. V | Firmware version. | 1.2 |
| 12. X | Model of timer. | 1.2 |

Command list, By version

| Command | Meaning | Version |
|---------|-----------------------|---------|
| 1. B | Buzzer status. | 1.0 |
| 2. M | Minutes on timer. | 1.0 |
| 3. O | On / Off status. | 1.0 |
| 4. A | Hours accumulator. | 1.2 |
| 5. H | Maximum session time. | 1.2 |
| 6. N | Minutes accumulator. | 1.2 |
| 7. S | Preset time | 1.2 |
| 8. V | Firmware version. | 1.2 |
| 9. X | Model of timer. | 1.2 |
| 10. : | Seconds on timer | 1.3 |
| 11. C | Sessions accumulator | 1.3 |
| 12. R | Bed ready status. | 1.4 |