



Trimble

Messenger Ins. & Ops. Manual

Updated TAIP Reference - Appendix A

To: GPS/Cellular Messenger
Resellers and Users

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From: Bob Fultz



Trimble

Trimble Navigation

Limited
645 North Mary Avenue
Sunnyvale, CA 94086

Subject: Changes to Messenger Manual - Appendix A - TAIP Messages

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1. Trimble ASCII Interface Protocol (TAIP) Summary

This document describes the TAIP Message String formats for all messages supported by the GPS/Cellular Messenger.

1.1. Table Summary

The following table lists all the TAIP messages currently defined for the GPS/Cellular Messenger and comments regarding their inclusion in the Messenger platform:

| Message Identifier | Message Name | Comments |
|--------------------|--------------------------------|---|
| AM | Alarm | |
| CS | Connect Status | Messenger Only |
| DA | Destination Address | Messenger V3.10+ |
| DL | Data Logging | Messenger V3.10+ |
| DS | Dial String | Messenger Only |
| ED | Event Define | Messenger V3.10+ |
| EL | Event Report (Long Format) | Messenger V3.10+ |
| EV | Event Report | Messenger V3.10+ |
| FR | Flag Register | Messenger Only (changes occurred in both 3.10 and 4.12) |
| GR | Region | Messenger V4.12+ |
| ID | Vehicle ID | |
| IP | Initial Position | |
| LN | Long Navigation Message | |
| PM | Power Management | Messenger V3.10+ |
| PV | Position/Velocity Solution | |
| PW | Password | Messenger V3.10+ |
| RM | Reporting Mode | |
| RT | Reset | Messenger V3.10+ |
| SS | Signal Status | Messenger V3.10+ |
| ST | Status | |
| TD | Time and Distance Reporting | Messenger V3.10+ |
| TM | Time/Date | |
| TX | Text Message | Messenger Only |
| VA | Authorized Voice Number | Messenger V4.12+ |
| VC | Voice Command | Messenger V4.12+ |
| VR | Version Number | |
| X2 | Extended Diagnostics Message 2 | Messenger Only |
| X3 | Extended Diagnostics Message 3 | Messenger Only |

All TAIP message characters must be in uppercase, except as noted



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2. TAIP Message Detail

2.1. AM Alarm

2.1.1. Data String Format

AAAAABBBCCCCDDDEEEEEFFFFGGGHIJKK{L}

2.1.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|----------------------------------|---------------------------------------|-------|---|
| GPS Time of day | 5 | Sec | AAAAA |
| Latitude | 8 | Deg | BBB.CCCCC |
| Longitude | 9 | Deg | DDDD.EEEEE |
| Speed | 3 | MPH | FFF |
| Heading | 3 | Deg | GGG |
| Alarm Code | 1 | n/a | H (see below) |
| Source | 1 | n/a | I (0 = 2D GPS) (1 = 3D GPS) (2 = 2D DGPS) (3 = 3D DGPS) (6 = DR) (8 = Degraded DR) (9 = Unknown) |
| Age of Data Indicator | 1 | n/a | J (2 = Fresh, <10 sec) (1 = Old, ≥10 sec) (0 = Not available) |
| Length of Optional String (n) | 2 | n/a | KK |
| Optional String | n | n/a | {L} |
| Total | 33 + Length of Optional String | | |

The AM message is generated when an alarm condition is present. The Alarm Code indicates the reason for the generated alarm message. In Messenger, AM messages are generated by the discrete input contact closures when enabled with the DS message. The Alarm Code will indicate which input caused the alarm.

Position is in latitude (positive north) and longitude (positive east) WGS-84. Heading is in degrees from True North increasing eastwardly. The 'GPS time of day' is the time of fix rounded to the nearest second.



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2.2. CS Connection Status

2.2.1. Data String Format

AAAA

2.2.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|---------------|-----------|----------|------------------|
| Call Duration | 4 | 1/10 sec | AAAA (0000-9999) |
| Total | 4 | | |

The Connection Status message is Messenger specific and used to monitor the call duration while a unit is connected over the air.

The CS message can only be issued with the **Q** qualifier, and the Messenger will issue a response with the connect time. When the **Q** qualifier is used to terminate a connection, the message contains a data string consisting of **T** (see examples below).

👉 The timer used to record call duration is free-running, therefore if connection status is requested from the service port, a non-zero call duration will be returned. The user should use the TAIP X2 message to monitor the connection status of the unit from the service port.

👉 The CS message does not support the S qualifier.

2.2.3. Examples

Query the messenger for the current connect time:

>QCS<

Query the Messenger for the connect time, and terminate the connection:

>QCST<

The Messenger will respond with the time of connection and then terminate the connection.

>RCST0348<



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2.3. DA Destination Address

2.3.1. Data String Format

ABC{D}

2.3.2. Data String Detail


| Item | # of Char | UNITS | Format (Value) |
|------------------------|----------------------------|------------|----------------------|
| <i>Index</i> | <i>1</i> | <i>n/a</i> | <i>A (0)</i> |
| <i>Address Type</i> | <i>1</i> | <i>n/a</i> | <i>B (P = Phone)</i> |
| <i>Address Subtype</i> | <i>1</i> | <i>n/a</i> | <i>C</i> |
| <i>Address</i> | <i>varies</i> | <i>n/a</i> | <i>DDD...</i> |
| <hr/> | | | |
| <i>Total</i> | <i>3+length of address</i> | | |

The Destination Address messages indicates where autonomously generated messages (such as EV and EL messages) are to be sent.

The Index can be used to specify up to 10 destination addresses (0-9).

The Address Type and Subtype specify the format of the address field. For phone numbers specified as the P type, the Address Subtype should always be set to 0.

The Adress field specifies the destination address. For phone numbers, the format of the address field is identical to the Dial String field of the DS message.

 For Messenger, the Dial String set with the DS message is identical to index 0 in the Destination Address message. Since Messenger supports both messages, either may be used to set the phone number.

 Messenger only supports Destination Address Index 0.

2.3.3. Example

Sets destination address 0 as a phone number, and set the phone number to 555-1212.

>SDA0P0555-1212<



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2.4. DL Data Logging

2.4.1. Data String Format

ABBBBBB

2.4.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-------------|-----------|--------|---|
| Command | 1 | n/a | A (L = data logged) (A = data available) (R = request data) (S = send data) (E = erase data) |
| Data length | 6 bytes | BBBBBB | |
| Total | 7 | | |

The DL message is used to request, examine, and erase data stored in the Messenger’s data logging memory. One of five commands must be specified:

- L** - Return the amount of data logged.
- A** - Return the number of bytes available in the data logging memory.
- R** - Request data, do not erase data from memory after transmission.
- S** - Send data, data erased from memory after transmission.
- E** - Erase, erase data from memory without sending it.

Each of these commands must be used with the **Q** prefix. When the **R** or **S** commands are used, a data length must follow as an argument. The Messenger will respond by transmitting complete TAIP messages stored in the data logging area until the next message transmitted would cause the total number of bytes transmitted to be greater than the argument, or until no more data is available. After the data has been transmitted a response message with the **R** prefix followed by the number of bytes actually sent will be transmitted. If the **R** or **S** command is issued without a data length argument, it will be ignored.

If the **E** command is used without an argument the entire contents of the data logging memory will be erased. If the data length argument is used, complete TAIP messages will be erased from the data logging memory until the next message to be erased would cause the total number of bytes erased to be greater than the argument.

The Data length is specified as a hexadecimal number.

2.4.3. Examples

Examples of the DL message can be found in the *GPS/Cellular Messenger Firmware Version 3.10 Release Notes*.



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2.5. DS Dial String

2.5.1. Data String Format

{A};BCDE

2.5.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|----------------|-----------|-------|----------------|
| Dial String | varies | n/a | AAAA... |
| Input 1 enable | 1 | n/a | B (0-1) |
| Input 2 enable | 1 | n/a | C (0-1) |
| Input 3 enable | 1 | n/a | D (0-1) |
| Input 4 enable | 1 | n/a | E (0-1) |
| <hr/> | | | |
| Total | 5+n | | |

The DS message is used to set the dial string of the Messenger (the number the unit will dial when it needs to report), and to enable the discrete input lines.

The dial string format is "Hayes-compatible." It may contain the digits 0 -9 and the characters * and #. Other characters (such as "-" can be included, but will be ignored. The Dial String may be null, e.g., >SDS;0000<. This will disable automatic reporting.

The length of the dial string is limited to 32 characters total.

A value of "0" disables an input, "1" enables it. An enabled input generates an AM message when a valid switch closure is seen on that input.

2.5.3. Example

Enable the unit to call 555-1212 whenever it has a message to report, also enable an alarm message if a valid switch closure is seen on input 2.

>SDS555-1212;0100<



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2.6. ED Event Definition

2.6.1. Data String Format

AABCD;EEE{[EEE][F]}G

2.6.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|---------------------|-----------|-------|---|
| Event ID | 2 | n/a | AA (00-19) |
| Event Handling | 1 | n/a | B (N = Normal) (L = Data Log) (A = Alarm) (X = Auxiliary Port) (S = Signal Only) (U = Undefined) |
| Message | 1 | n/a | C (L = EL message) (V = EV message) |
| Destination Address | 1 | n/a | D (0-9) |
| Signal | 3 | n/a | EEE |
| Logical Operator | 1 | n/a | F |
| Event Sense | 1 | n/a | G (+ = Rising Edge) (- = Falling Edge) |
| <hr/> | | | |
| Total | varies | | |

The ED message is used to link signals to an event. The event number is specified in the Event ID field, and must be a decimal number between 00 and 49.

The Message field defines which type of event message (EL or EV) will be generated.

The Event Handling field specifies how the event message will be routed. There are 6 possible values:

- N - Route the event based on the value of the DL Flag.
- L - Log the event to the data logging area.
- A - Alarm, queue the event.
- S - Signal only, don't generate a message.
- X - Output the event to the auxiliary or service port.
- U - Undefined, no event definition for this ID.

The Destination Address field specifies the address the event message will be sent to. The value for this field is the index of the Destination Address (DA) message that specifies the address. Currently the Messenger only supports index 0 in this field.

The Signal field(s) specify which signal(s) will cause the event report to be generated and the Logical Operator field specifies the logical operation that should be used to combine signals to produce complex events. The Event Sense field specifies which edge of the signal (or complex signal) will cause the event report to be generated. A detailed explanation and examples of the ED message can be found in the *GPS/Cellular Messenger Firmware Version 3.10 Release Notes*.



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2.7. EL Event Message (Long Format)

2.7.1. Data String Format

AABBBCDDDDDEEEFFFGGGGGGGHHHHIIIIIIJJJJJJKKLLLMNNNNOPPPQRR{SSTT}UV

2.7.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|--------------------|-----------|-------|----------------|
| Event Code | 2 | n/a | AA (00-99) |
| GPS Week | 4 | weeks | BBBB |
| Day of Week | 1 | days | C (0 = Sunday) |
| GPS Time of Day | 8 | sec | DDDDD.EEE |
| Latitude | 10 | Deg | FFF.GGGGGGG |
| Longitude | 11 | Deg | HHHH.IIIIII |
| Altitude above MSL | 9 | Ft | JJJJJJ.KK |
| Horizontal Speed | 4 | MPH | LLL.M |
| Vertical Speed | 5 | MPH | NNNN.O |
| Heading | 4 | Deg | PPP.Q |
| Number of SVs used | 2 | n/a | RR |

The following two entries (4 characters) are repeated for each SV used:

| | | | |
|--------------------|---|-----|----|
| SV Id | 2 | n/a | SS |
| IODE (2 digit hex) | 2 | n/a | TT |

| | | | |
|-----------------------|---|-----|--|
| Source | 1 | n/a | U (0 = 2D GPS) (1 = 3D GPS) (2 = 2D DGPS) (3 = 3D DGPS) (6 = DR) (8 = Degraded DR) (9 = Unknown) |
| Age of Data Indicator | 1 | n/a | V (2 = Fresh, <10 sec) (1 = Old, ≥10 sec) (0 = Not available) |

Total 62 times 4) + (Number of SV's used

Position is in latitude (positive north) and longitude (positive east) WGS-84. Heading is in degrees from True North increasing eastwardly. The GPS time of day is the time of fix rounded to the nearest second. GPS week is the number of weeks since 0:00AM January 6, 1980.

The data in this message is to be considered invalid and should not be used, if the "Age of Data Indicator" is equal to 0 (signifying data not available).



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2.8. EV Event Message

2.8.1. Data String Format

AABBBBCDDDDDEEEFFFFFGGGGHHHHHHIIIJJKL

2.8.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-----------------------|-----------|-------|---|
| Event Code | 2 | n/a | AA (00-99) |
| GPS Week | 4 | weeks | BBBB |
| Day of Week | 1 | days | C (0 = Sunday) |
| GPS Time of Day | 5 | sec | DDDDD |
| Latitude | 8 | Deg | EEE.FFFFF |
| Longitude | 9 | Deg | GGGG.HHHHH |
| Speed | 3 | MPH | III |
| Heading | 3 | Deg | JJJ |
| Source | 1 | n/a | K (0 = 2D GPS) (1 = 3D GPS) (2 = 2D DGPS) (3 = 3D DGPS) (6 = DR) (8 = Degraded DR) (9 = Unknown) |
| Age of Data Indicator | 1 | n/a | L (2 = Fresh, <10 sec) (1 = Old, ≥10 sec) (0 = Not available) |
| <hr/> | | | |
| Total | 37 | | |

Position is in latitude (positive north) and longitude (positive east) WGS-84. Heading is in degrees from True North increasing eastwardly. The GPS time of day is the time of fix rounded to the nearest second. GPS week is the number of weeks since 0:00AM January 6, 1980.

The data in this message is to be considered invalid and should not be used, if the "Age of Data Indicator" is equal to 0 (signifying data not available).



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2.9. FR Flag Register

2.9.1. Data String Format

ABCDEFGHIJKKKKKK

2.9.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|----------|-----------|-------|--------------------|
| ID Flag | 1 | n/a | A |
| CS Flag | 1 | n/a | B |
| EC Flag | 1 | n/a | C |
| FR Flag | 1 | n/a | D |
| CR Flag | 1 | n/a | E |
| DL Flag | 1 | n/a | F (added in V3.10) |
| PW Flag | 1 | n/a | G (added in V3.10) |
| UU Flag | 1 | n/a | H (added in V4.12) |
| IN Flag | 1 | n/a | I (added in V4.13) |
| Reserved | 7 | n/a | JJJJJJ |
| <hr/> | | | |
| Total | 16 | | |

The FR Message allows the user to examine and set flag values internal to the sensor. It operates on a superset of the flags supported by the RM message. Descriptions of those flags (ID, CS, EC, FR, and CR) can be found under the RM message. The remaining flags are described below.

DL Flag indicates if events defined with normal handling and TX messages are to be queued or logged. See the ED message for more details.

PW Flag dicates whether a password is required before the an information can be obtained from the sensor. See the PW message for more details.

The UU Flag is a general purpose flag that sets the mode for Voice usage of the Messenger unit. See the GPS/Cellular Messenger Firmware Version 4.12 release notes for more details.

The IN Flag supports Inverted Differential GPS. When the IN Flag is set the TAIP LN message will contain the necessary information to allow Inverted Differential corrections to be made to the position.

When the S prefix is used to set these flags, a character must be sent for each flag (including the reserved locations). Possible charater values are:

- 1** - Set the flag to True
- T** - Set the flag to True
- 0** - Set the flag to False
- F** - Set the flag to False
- X** - Do not alter the flag value

Any other characters are invalid and the message will be ignored.



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2.9.3. Example

Set the ID and CR Flags to True, PW flag to False, and leave the other flag values unchanged:

```
>SFRTXXXTFXXXXXXXXXX<
```

2.10. GR Region

2.10.1. Data String Format

```
AABCCCCCDDDDDDDEEEEEFFFFF
```

2.10.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-------------|-----------|--------|---|
| Region ID | 2 | n/a | AA |
| Active Flag | 1 | n/a | B 0 = "outside" 1 = "inside" X = "disable" |
| Origin-Lat | 7 | deg | CCCCCC (± 90.0000) |
| Origin-Lon | 8 | deg | DDDD.DDDD (± 180.0000) |
| Extent-1 | 6 | meters | EEEEEE (1-999999) |
| Extent-2 | 6 | meters | FFFFFF (0,1-999999) |
| Total | 30 | | |

If the Region ID has already been defined, the existing region's parameters will be changed to those in the message. Attempting to define more than the maximum number of regions is not possible since the message parsing will interpret the third digit of the ID as the active flag.

When Active Flag is "1" the constraint becomes "active" when the Messenger moves within the defined region. When Active Flag is set "0" the constraint becomes "active" when Messenger moves "outside" the defined region. The Messenger applies a hysteresis function of approximately 4 seconds to the region threshold. To change from *inside*-to-*outside* the Messenger must remain in the new state for at least 4 seconds before the transition is detected..

If Active Flag is "X" then the rest of the message will be ignored. This disables the region constraint. The region will not be deleted from the database.

Extent-1 and Extent-2 define the shape and size of the region. If Extent-2 is 0, then Extent-1 is the radius of a circular region centered at Origin(lat,Lon). If Extent-2 is non-zero it is the North-South extent of a rectangular region whose SW (lower-left) corner is at Origin(Lat,Lon) and whose East-West extent is determined by Extent-1.

Attempting to set parameters to invalid values causes the Messenger to respond with the following data string:

```
RGRAAX
```

The following parameter validity checks are made: 1) ID not a number; 2) Active Flag other than "0", "1", or "X"; 3) Latitude, Longitude or Extent-1 or -2 missing; 4) Latitude < -90° or > +90°; 5) Longitude < -180° or > +180°; 6) Extent-1 = 0.



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Although it is possible to define regions smaller than 100m across, the inherent inaccuracies of GPS coupled with the spatial hysteresis applied by the Messenger may prevent accurate detection of regions smaller than this.

2.11. ID Identification Number

2.11.1. Data String Format

AAAA

2.11.2. Data String Detail

| Item | # of Char | UNITS | Format |
|------------|-----------|-------|--------|
| Vehicle ID | 4 | n/a | AAAA |
| Total | 4 | | |

This message is used to report or set the Messenger's unique, four position numeric, user assigned ID. The default at cold start is '0000'.

2.11.3. Examples

Set the vehicle ID to 101:

>SID0101<

Query for vehicle ID:

>QID<

Messenger responds with:

>RID0101<



The sensor will always check incoming messages for ID and compare with the vehicle ID set in the sensor's memory. If no ID is included in the message, the sensor will assume a match and accept the message. If the message sent to the sensor does contain a vehicle ID but that ID does not match the ID previously set in the sensor, the message will be ignored. This process is followed even when the ID_Flag is turned off (refer to the message RM).



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2.12. IP Initial Position


2.12.1. Data String Format


AAABBBBCCCCC

2.12.2. Data String Detail

| Item | # of Char | UNITS | Format |
|-------------------|-----------|-----------|--------|
| Initial Latitude | 3 | Deg | AAA |
| Initial Longitude | 4 | Deg | BBBB |
| Initial Altitude | 5 | 10 Meters | CCCCC |
| Total | 12 | | |

This is a very coarse initial position that the user can provide to aid the sensor in obtaining its first fix. This is specially useful with sensors that do not have non-volatile (Battery Backed-up) memory. In such cases, every time the unit is powered up, it goes through a complete cold-start and it has absolutely no knowledge of where it is. Providing this message improves performance by decreasing the time to first fix and enhances the accuracy of the initial two dimensional navigation solutions by providing a reference altitude. In case of units with non-volatile memory, sending this message is only helpful if the unit has moved more than 1,000 miles since its previous fix. In either case, the sensor can initialize itself appropriately without any data from the user; It merely requires more time.

 For all the above values, the first character specifies the sign (+/-).

 Messenger does not support setting the initial position.

2.12.3. Example

Query the initial position of 37° North, 122° West, altitude 10 meters.

>QIP<



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2.13. LN Long Navigation Message

2.13.1. Data String Format

AAAAABBBCCDDDDDDDEEEEEFFFFFGGGGGGGHHIIJKKKKLMMMNOO{PPQQ}RRRRRRRRRST

2.13.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|--------------------|-----------|-------|----------------|
| GPS Time of day | 8 | Sec | AAAAA.BBB |
| Latitude | 10 | Deg | CCC.DDDDDDD |
| Longitude | 11 | Deg | EEEE.FFFFFFF |
| Altitude above MSL | 9 | Ft | GGGGGGG.HH |
| Horizontal Speed | 4 | MPH | III.J |
| Vertical Speed | 5 | MPH | KKKK.L |
| Heading | 4 | Deg | MMM.N |
| Number of SVs used | 2 | n/a | OO |

The following two entries (4 characters) are repeated for each SV used:

| | | | |
|--------------------|---|-----|----|
| SV Id | 2 | n/a | PP |
| IODE (2 digit hex) | 2 | n/a | QQ |

| | | | |
|-----------------------|----|-----|--|
| Reserved | 10 | n/a | RRRRRRRRRR |
| Source | 1 | n/a | S (0 = 2D GPS) (1 = 3D GPS) (2 = 2D DGPS) (3 = 3D DGPS) (6 = DR) (8 = Degraded DR) (9 = Unknown) |
| Age of Data Indicator | 1 | n/a | T (2 = Fresh, <10 sec) (1 = Old, ≥10 sec) (0 = Not available) |

Total 65 + (Number of SV's used times 4)

Position is in latitude (positive north) and longitude (positive east) WGS-84. Heading is in degrees from True North increasing eastwardly. The GPS time of day is the time of fix rounded to the nearest second.

The data in this message is to be considered invalid and should not be used, if the "Age of Data Indicator" is equal to 0 (signifying data not available).



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2.14. PM Power Management

2.14.1. Data String Format

ABBBBCCCCDDDDDEEEE

2.14.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-------------------------|-----------|------------|---|
| <i>Command</i> | <i>1</i> | <i>n/a</i> | <i>A</i> (D = Disable) (A = Active) (G = GPS on) (R = Reset) |
| <i>Wakeup Interval</i> | <i>4</i> | <i>sec</i> | <i>BBBB</i> |
| <i>Wakeup Epoch</i> | <i>4</i> | <i>sec</i> | <i>CCCC</i> |
| <i>Wakeup Length</i> | <i>4</i> | <i>sec</i> | <i>DDDD</i> |
| <i>Interrupt Length</i> | <i>4</i> | <i>sec</i> | <i>EEEE</i> |
| <i>Total</i> | <i>17</i> | | |

The PM message is used to enable the power management features of the Messenger. There are four possible commands which can issued with the S qualifier:

- D** - Disabled, all power management features are inactive
- A** - Enable active power management
- G** - Enable GPS on power management
- R** - Reset power management

The Wakeup Interval defines the length of time between wakeups.

The Wakeup Epoch gives the number of seconds past midnight Saturday UTC time on which to begin the interval calculation.

The Wakeup Length defines how long the unit will stay on during the wakeup period before going back to sleep.

The Interrupt Length defines two timers: (1) how long the unit will stay on after an interrupt has been received from the discrete inputs and (2) how long the unit will stay on after ignition has been turned off (added in firmware version 4.12). For (1), a value of 0 will keep the unit on until reset by the R command (this is the default). For (2), a value of 0 will turn the unit off immediately after ignition is turned off.

A more detailed explanation of Power Management and examples of the PM message can be found in the *GPS/Cellular Messenger Firmware Version 3.10 and 4.12 Release Notes*.



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2.15. PV Position/Velocity Solution

2.15.1. Data String Format

AAAAA BBBCCCCC DDDDEEEEE FFFGGGHI

2.15.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-----------------------|-----------|-------|---|
| GPS Time of day | 5 | Sec | AAAAA |
| Latitude | 8 | Deg | BBB.CCCCC |
| Longitude | 9 | Deg | DDDD.EEEEE |
| Speed | 3 | MPH | FFF |
| Heading | 3 | Deg | GGG |
| Source | 1 | n/a | H (0 = 2D GPS) (1 = 3D GPS) (2 = 2D DGPS) (3 = 3D DGPS) (6 = DR) (8 = Degraded DR) (9 = Unknown) |
| Age of Data Indicator | 1 | n/a | I (2 = Fresh, <10 sec) (1 = Old, ≥10 sec) (0 = Not available) |
| Total | 30 | | |

Position is in latitude (positive north) and longitude (positive east) WGS-84. Heading is in degrees from True North increasing eastwardly. The GPS time of day is the time of fix rounded to the nearest second.

The data in this message is to be considered invalid and should not be used, if the "Age of Data Indicator" is equal to 0 (signifying data not available).



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2.16. PW Password

2.16.1. Data String Format

{A};{B}

2.16.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-------------------------|---------------|------------|----------------|
| <i>Current Password</i> | <i>varies</i> | <i>n/a</i> | <i>AAA....</i> |
| <i>New Password</i> | <i>varies</i> | <i>n/a</i> | <i>BBB....</i> |
| <i>Total</i> | <i>varies</i> | | |


The password message is used to set and verify the Messenger password. When the password is set with the S prefix, both the current password and the new password arguments are required. When the password is required for an over-the-air session, the Q prefix is used with the PW message and the second argument is omitted.

When the password flag (PW Flag) is set, the Messenger will expect to see a >QPWpassword< message to initialize a data session over the air. If the password is not sent or invalid an >RPW?< message will be returned by the unit (if an invalid password is sent the unit will send the response and terminate the connection). The valid password only need be sent once at the start of a data session with the Messenger, and the unit will refuse to respond to any other messages until the valid password is sent.

Valid passwords may be composed of any ASCII text characters except ‘;’ and ‘?’, may not be any longer than 16 characters, and are case sensitive.

Passwords are not required to communicate via the service port of the Messenger, and it is always possible to query for the current password via the service port.

Examples of the PW message can be found in the *GPS/Cellular Messenger Firmware Version 3.10 Release Notes*.

 All Messenger units are shipped with no password, and the password should be set to some non-zero value during the configuration process.



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2.17. RM Reporting Mode

2.17.1. Data String Format

[;ID_FLAG=A][;CS_FLAG=B][;EC_FLAG=C] [;FR_FLAG=D] [;CR_FLAG=E]

2.17.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) | |
|---------|-----------|-------|----------------|-----------------------|
| ID Flag | 1 | n/a | A | (T = True, F = False) |
| CS Flag | 1 | n/a | B | (T = True, F = False) |
| EC Flag | 1 | n/a | C | (T = True, F = False) |
| FR Flag | 1 | n/a | D | (T = True, F = False) |
| CR Flag | 1 | n/a | E | (T = True, F = False) |
| <hr/> | | | | |
| Total | varies | | | |

ID Flag dictates whether the unit is to include the vehicles ID with each report.

CS Flag dictates whether the unit is to include a checksum as part of each message.

EC Flag , when set, will cause the unit to echo back all complete and properly formatted set messages, except for DC and DD, with a "Response" qualifier. This provides an easy way to verify that the unit did in fact receive the intended data.

FR Flag indicates whether the unit is to report messages automatically per their individually scheduled frequency. When set to false, the unit will only respond when queried for a specific message.

CR Flag, when set to True, will cause the sensor to append a carriage return and line feed [CR] [LF] to the end of each message output. This is useful when viewing the unencoded sensor responses on a terminal or a PC.

The default value at start-up for ID flag and the CR flag is false; the default for CS, EC and FR flags is true.

2.17.3. Example

The following message will turn checksums off and carriage return on:

```
>SRM;CS_FLAG=F;CR_FLAG=T<
```

A semicolon is used before the first flag name.



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2.18. RT Reset

2.18.1. Data String Format

No Arguments

2.18.2. Data String Detail

The RT message will force a hardware reset of the GPS/Cellular Messenger, equivalent to power cycling the Messenger using the power source. It must be used with the S prefix (i.e. >SRT<). If >SRT< is sent to the Messenger over the air, it will cause the cellular connection to terminate.



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2.19. SS Signal Status

2.19.1. Data String Format

AAABCDDDD

2.19.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|----------------------|-----------|----------|---------------------|
| Signal ID | 3 | n/a | AAA (see notes) |
| Instantaneous Status | 1 | n/a | B (0-1) |
| Register Status | 1 | n/a | C (0-1) |
| Toggle Time | 4 | 1/10 sec | DDDD (.1-599.9 sec) |
| <hr/> | | | |
| Total | 5 | | |

The SS message allows for the inspection of all signal states and the setting of certain signals.

The Messenger supports four discrete input signals with Signal Ids IP0, IP1, IP2, and IP3. Signal ID IGN is used for the ignition input. FIX for the first fix signal, and PWR for the power on signal. Four discrete outputs are supported with Signal Ids XP0, XP1, XP2, and XP3. Any additional signals supported will be listed in the release notes for the Messenger.

When Signal ID refers to a discrete input line, Instantaneous Status represents the current state of the input. If the input is low, as 0 will be returned. If the input is driven by a pulsing or periodic signal, the Register status should be examined instead. For all other Signal ID s this character is identical to the register status.

The Register Status field represents the internally stored value of the signal. A 1 indicates the signal is active, 0 indicates the signal is inactive. In the case of discrete outputs, the status is 1 when the driver is enabled (i.e. driving low), 0 when the driver is disabled. For discrete inputs the status represents the debounced register state of the input (1 when a valid low signal is seen on the line for more than 200 ms), and will remain latched unless the Alarm Message is enabled for that output. Only the generation of an Alarm message resets the Register Status for discrete inputs. For the ignition input, this character will be a 1 to indicate the ignition is on.

The S prefix is supported for only the discrete outputs. When the S prefix is used, the instantaneous status and register status values must be identical and the Toggle Time field represents the amount of time the output is to remain in the state specified. At the end of the Toggle time period the output will be reset to its previous state. The toggle field is optional, so omitting the toggle time field or passing a zero value will cause the output to be set to the value specified by the Register Status and not toggled. In Messenger, the maximum toggle time possible is 600 seconds.

2.19.3. Examples

Query for the state of discrete input 2:

>QSSIP2<

Set output driver 1 to be active for 1.5 seconds:

>SSSXP1110015<




Trimble

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More examples of the SS message can be found in the *GPS/Cellular Messenger Firmware Version 3.10 Release Notes*.

 The *Q* qualifier may be used to inspect the state of any signal output. The signal or input name must be supplied (i.e. `>QSSIP0<`). If the signal or input is undefined or unsupported, the following string will be returned: `>RSS??<`.



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2.20. ST Status

2.20.1. Data String Format

AABCDDEFGG

2.20.2. Detail String Detail

| Item | # of Char | UNITS | Format |
|------------------------|-----------|-------|-------------------------|
| Tracking Status Code | 2 | n/a | AA (see table below) |
| Error Codes - Nibble 1 | 1 | n/a | B (see table below) |
| Error Codes - Nibble 2 | 1 | n/a | C (see table below) |
| Machine ID | 2 | n/a | DD |
| Error Codes - Nibble 3 | 1 | n/a | E (not currently used) |
| Error Codes - Nibble 4 | 1 | n/a | F (see table below) |
| (reserved) | 2 | n/a | GG (not currently used) |
| <hr/> | | | |
| Total | 10 | | |

 This message provides information about the satellite tracking status and the operational health of the sensor. This information is contained in five status bytes which are output as five 2 digit hexadecimal values. The data format and the meanings of the hex characters are given in the following tables.

2.20.3. Tracking Status Code Detail

| Value of AA | Meaning |
|-------------|--|
| 00 | Doing position fixes |
| 01 | Don't have GPS time yet |
| 02 | Not used |
| 03 | PDOP is too high |
| 08 | No usable satellites |
| 09 | Only 1 usable satellite |
| 0A | Only 2 usable satellites |
| 0B | Only 3 usable satellites |
| 0C | 6-Ch units only: the chosen satellite is unusable. |



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In the tables below, an X in a column means that fault is being reported.

2.20.4. Error Codes Detail – Nibble 1

| V a l u e o f B | Meaning | |
|--|---------|----------------------|
| | 0 | No Problems Reported |
| 1 | X | |
| 2 | X | |
| 3 | X | X |

Antenna feedline fault (Note 2)

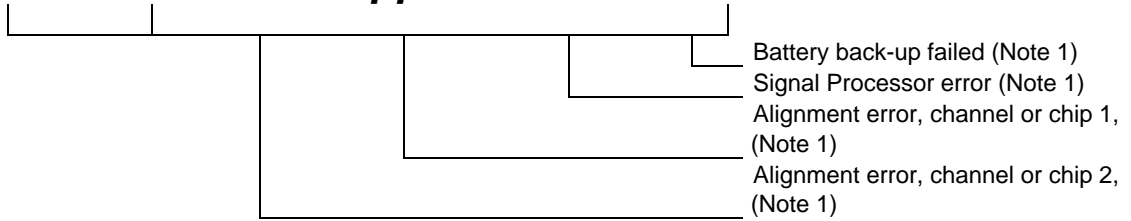
Excessive ref freq error (Note 3)

2.20.5. Error Codes Detail – Nibble 2

| V a l u e o f C | Meaning | | | |
|--|---------|----------------------|---|---|
| | 0 | No Problems Reported | | |
| 1 | | | | X |
| 2 | | | X | |
| 3 | | | X | X |
| 4 | | X | | |
| 5 | | X | | X |
| 6 | | X | X | |
| 7 | | X | X | X |
| 8 | X | | | |
| 9 | X | | | X |
| A | X | | X | |
| B | X | | X | X |
| C | X | X | | |
| | X | X | | X |
| D | | | | |
| E | X | X | X | |
| F | X | X | X | X |

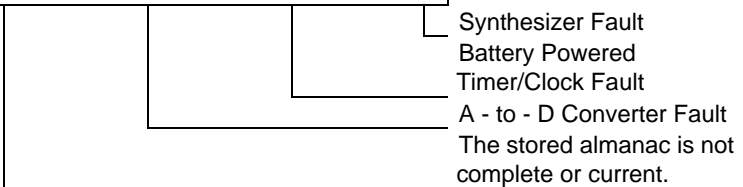


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2.20.6. Error Codes Detail – Nibble 4

| V a l u e o f F | <i>Meaning</i> | | | |
|--|-----------------------------|---|---|---|
| 0 | <i>No Problems Reported</i> | | | |
| 1 | | | | X |
| 2 | | | X | |
| 3 | | | X | X |
| 4 | X | | | |
| 5 | X | | | X |
| 6 | X | | X | |
| 7 | X | | X | X |
| 8 | X | | | |
| 9 | X | | | X |
| A | X | | X | |
| B | X | | X | X |
| C | X | X | | |
| D | X | X | | X |
| E | X | X | X | |
| F | X | X | X | X |



- (1) After this error is detected, its bit remains set until the sensor is reset.
- (2) Messenger and the SVeeSix family of OEM modules do not support antenna feed line fault detection.
- (3) This bit is "1" if the last computed reference frequency error indicated that the reference oscillator is out of tolerance.



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2.21. TD Time and Distance Reporting Parameters

2.21.1. Data String Format

ABBBBCCCCDDDDDEEEE

2.21.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-------------------------|-----------|----------------|---------------------|
| <i>TDR Index</i> | 1 | <i>n/a</i> | A (0-9) |
| <i>Min. Report Time</i> | 4 | | <i>seconds</i> BBBB |
| <i>Max. Report Time</i> | 4 | <i>seconds</i> | CCCC |
| <i>Distance</i> | 4 | <i>meters</i> | DDDD |
| <i>Epoch</i> | 4 | <i>seconds</i> | EEEE |
| <i>Total</i> | 13 | | |

The DL message may be used to set or query for the time and distance reporting (TDR) parameters. There are 10 sets of TDR parameters (0-9) which operate independently. The TDR index 0 parameters are equivalent to TDR parameters set with the F and D prefixes on PV and LN messages, with one important difference: the TD message only enables EV messages, and only when properly configured by the TAIP ED message. If TDR with PV and LN messages is desired, the F and D prefixes must be used.

The Minimum Report Time specifies the minimum amount of time that must pass between reports. To enable just time reporting, this is the only parameter that needs to be set, the others should be set to 0.

The Maximum Report Time specifies the maximum amount of time that may pass between reports. This parameter is only relevant when distance reporting is desired. If set to 0, there will be no limit to the amount of time that may pass between reports.

The Distance parameter specifies the distance the unit must travel between reports.

The Epoch parameter specifies the number of seconds past midnight Saturday GPS time on which to start the reporting interval, but in Messenger is ignored and will always return 0.

Scaling Factors may be used with all time and distance parameters.

Examples of the TD message can be found in the *GPS/Cellular Messenger Firmware Version 3.10 Release Notes*.



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2.22. TM Time/Date

2.22.1. Data String Format

AABBCCDDDEEFFGGGGHHIIJKLLLLL

2.22.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|------------------------|-----------|-------|---|
| <i>UTC Time of Day</i> | | | |
| Hours | 2 | Hour | AA |
| Minutes | 2 | Min | BB |
| Seconds | 5 | Sec | CC.DDD |
| Date; Day | 2 | Day | EE |
| Date; Month | 2 | Month | FF |
| Date; Year | 4 | Year | GGGG |
| GPS/UTC Time Offset | 2 | Sec | HH |
| Current Fix Source | 1 | n/a | I (0 = 2D GPS) (1 = 3D GPS) (2 = 2D DGPS) (3 = 3D DGPS) (6 = DR) (8 = Degraded DR) (9 = Unknown) |
| Number of Usable SVs | 2 | n/a | JJ |
| GPS/UTC Offset Flag | 1 | n/a | K (1 = Valid) (0 = Invalid) |
| Reserved | 5 | n/a | LLLLL |
| Total | 28 | | |

This message outputs the time and date as computed by the GPS sensor. The time is most accurate when the unit is doing fixes. It is less accurate but still usable when the unit is not doing fixes but the Number of Usable SVs field is one or more.

The TM message is supported under the Set qualifier which allows you to download time to a GPS receiver that does not have a real-time clock. Fields AA through GGGG must be downloaded but the remaining fields may be filled with zeros (0) to create a total data stream of 28 characters. For warm-start performance, downloaded time must only be accurate to ±5 minutes so the entire field may be filled with zeros. However if you wish to specify seconds, use a format such as 08150 to represent 8.15 seconds. The reserved field, should be filled with zeros.

For example, when the >STM1925000002806199400000000000< message is sent to the GPS receiver, it specifies that the receiver should set its internal time to 19:25 (7:25 PM) UTC, 28 June 1994. The time downloaded to the receiver should be accurate to ±5 minutes (use UTC, not local time) for optimum warm start or hot start acquisition.

GPS/UTC Time Offset is the difference between GPS and UTC time standards in seconds. The 'UTC time of Day' is only valid if the 'GPS/UTC Offset Valid Flag' is indicating valid.



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2.23. TX Text Message

2.23.1. Data String Format

{A}

2.23.2. Data String Detail

| Item | # of Char | UNITS | Format |
|-------------|-----------|-------|--------|
| Text String | varies | n/a | {A} |
| Total | varies | | |

This message is used to transfer plain-text messages between Messenger's local (Service) port and its base station via a cellular data link. Messages received via the cellular link are transferred to the local port, and messages input at the local port are sent over the cellular data link.

A TX message issued to the Messenger at the local port will be either queued or logged based on the value of the DL Flag (see the FR message description). If the DL Flag is true, the message will be logged, and no cellular connection will be activated. If the DL Flag is false, the message will be queued and will cause the Messenger to activate a cellular connection using the "dial string" configured with the DS message.

The data string format is free-field. It may contain any printable character (including blanks) except ';', '<' and '>'. These characters, and other non-printing characters, are "escaped" using the following character sequences:

| | | | |
|----|------------------|----|------------------------|
| \a | 0x07 (alert) | \t | 0x09 (tab) |
| \b | 0x08 (backspace) | \r | 0x0D (carriage return) |
| \e | 0x1B (escape) | \s | 0x3B (';') |
| \f | 0x0C (form feed) | \y | 0x3E ('>') |
| \n | 0x0A (linefeed) | \z | 0x3C ('<') |
| \\ | 0x5C ('\') | | |

In addition, the character sequence \XX (where XX is a two-digit hex constant) can be used to represent any character, printable or not.

The message specifier **S** is used to "send" a text message. The message specifier **R** indicates a received text message. The **Q** specifier is not valid for TX messages.

If the EC flag is set (see RM message), then STX messages received at the service port of the Messenger will be acknowledged with a >RTX< message. This blank TX message is used to indicate that the message has been queued or logged. Failure to receive this message is an indication that the internal memory buffer of the Messenger is full, and the message should be re-submitted to the Messenger at a later time.

2.23.3. Examples

| | |
|-------------------|---|
| >STXHello World< | (blanks & lower-case allowed) |
| >STX\e[2J< | (clears a remote ANSI terminal display) |
| >STXMsg2;ID=1234< | (ID & checksum fields allowed) |



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2.24. VA Authorized Voice Number

2.24.1. Data String Format

AAB{C}

2.24.2. Data String Detail


| Item | # of Char | UNITS | Format (Value) | |
|-----------------|-----------|-------|----------------|---|
| Number Index | 2 | n/a | A | (00-19) |
| Connection Type | 1 | n/a | B | (V = Voice) (L = LN message) (P = PV message) |
| Number | n | n/a | {C} | |
| <hr/> | | | | |
| Total | 3+n | | | |

The VA message is used to set or query for authorized voice numbers. Voice numbers are accessible from the menu of the external voice handset. If the Connection Type is V, a the number is assumed to be a voice only connection. Connection Types L and P are data to voice transition numbers. Transition numbers will cause a data connection to occur, followed by the transmission of a position report, and then finally a data to voice transition request (VC message).

Any number dialed at the handset will be checked against the authorized voice number list to determine if it should be a voice only or data to voice connection, regardless of the state of the UU flag. If the UU flag is set to False and the number is not found in the list, then user will be informed that the call is unauthorized. 611, 911, and phone numbers beginning with the * prefix are always allowed regardless of the value of the UU Flag.

The number string may be up to 30 characters long, and should include only characters that may be dialed on the handset (0-9, #, and *).

A more detailed explanation of Voice features and examples of the VA message can be found in the *GPS/Cellular Messenger Firmware Version 4.12 Release Notes*.

 Authorized voice numbers are different from data only numbers set with the DS or DA messages.



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2.25. VC Voice Command

2.25.1. Data String Format

{A}

2.25.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|-----------------------|-----------|------------|--|
| <i>Response Field</i> | 2 | <i>n/a</i> | AA (<i>OK = Accepted</i>) (<i>NA = Not Available</i>) |
| <i>Total</i> | 2 | | |

The VC message requests a transition from a data session to a voice session. A >QVC< message is used to initiate the transition and may be originated from either Messenger or base station. The response must contain the Response Field with an OK if the request is accepted, or NA if voice features are not available. After the >RVCOK< is received by the initiator, the modem should be disabled and no further data communication may take place.

A more detailed explanation of Voice features and examples of the VC message can be found in the *GPS/Cellular Messenger Firmware Version 4.12 Release Notes*.



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2.26. VR Version Number

2.26.1. Data String Format


{A};VERSION B.BB(CC/CC/CC); CORE VERSION C.CC(EE/EE/EE); {F}


2.26.2. Data String Detail

| Item | # of Char | UNITS | Format |
|-----------------------------|---------------|------------|-------------------------------------|
| <i>Product Name</i> | <i>n</i> | <i>n/a</i> | <i>{A}</i> |
| <i>Major Version number</i> | <i>4</i> | <i>n/a</i> | <i>B.BB</i> |
| <i>Major Release Date</i> | <i>8</i> | <i>n/a</i> | <i>CC/CC/CC</i> (month/day/year) |
| <i>Core Version number</i> | <i>4</i> | <i>n/a</i> | <i>D.DD</i> |
| <i>Core Release Date</i> | <i>8</i> | <i>n/a</i> | <i>EE/EE/EE</i> (month/day/year) |
| <i>Copyright Text</i> | <i>m</i> | <i>n/a</i> | <i>{F}</i> |
| <i>Total</i> | <i>51+n+m</i> | | |

The VR message is used to give the product name and release dates of the embedded firmware of the Messenger.

The current product name string for Messenger should be **WATSON**.

 *The length of this message is variable based upon copyright text string and product name string.*

 *The phrase CORE VERSION refers to the bootloader version in Mesenger units.*



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2.27. X2 Extended Diagnostic Message 2

2.27.1. Data String Format

ABCDE;{F}.G.HH II/JJ/KK LL:MM:NN

2.27.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|------------------|-----------|-------|---|
| Response Event | 1 | n/a | A (0 = query) (1 = power-up) |
| Power-up Status | 1 | n/a | B (0 = normal) (1 = watchdog) (2 = soft failure) (9 = fault) |
| GPS Status | 1 | n/a | C (0 = OK) (1 = position old) (2 = position n/a) (9 = fault) |
| Cellular Status | 1 | n/a | D (0 = OK) (1 = no service) (2 = data error) (9 = fault) |
| Active | 1 | n/a | E (0 = Idle) (1 = In Use) (9 = Connected) |
| Platform Name | n | n/a | {F} (see below) |
| Firmware Release | 4 | n/a | G.HH |
| Release Date | 8 | n/a | II/JJ/KK |
| Release Time | 8 | n/a | LL:MM:NN |
| <hr/> | | | |
| Total | 25+n | | |

This X2 message is issued automatically to the local service port upon startup, as well as in response to a query. This string identifies the operational status of the Messenger and the firmware revision installed.

The Messenger platform name is currently **CELLAVL.WATSONP2**. This will change to reflect updates to the Messenger hardware platform.



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2.28. X3 Extended Diagnostic Message 3


2.28.1. Data String Format

AAAABBBB{C}

2.28.2. Data String Detail

| Item | # of Char | UNITS | Format (Value) |
|---------------|-----------|---------|----------------|
| Error number | 4 | hex | AAAA |
| Line Number | 4 | decimal | BBBB |
| Module String | n | n/a | {C} |
| <hr/> | | | |
| Total | 8+n | | |

This message reports firmware errors logged in the Messenger unit. One error is reported per message, so in order to report all the logged errors the unit must be queried until it responds with a blank response. After this blank response, the next X3 query will report the first logged system error. Units with no system errors logged will always return blank X3 messages.

 Any X3 messages found logged in a Messenger unit should be reported to Trimble Service.



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3. The Trimble FTP Site

3.1. How to get to it

ftp.trimble.com\pub\tracking\messenger

3.2. What you will find

The ftp.trimble.com\pub\tracking area uses product name to group the information, as follows:

- ...\00index.txt = what each sub-dir contains available
- ...\message = FTP signon message
- ...\fleetvis = Product: FleetVision
- ...\placer = Products: Placer GPS 450/455/455DR
- ...\messenger = Product: Messenger *****This is the one you want*****
- ...\general = General information that applies to all products

Under each product, you will find some or all of the following topics:

- ...\00index.txt = what each sub-dir contains
- ...\message = FTP signon message
- ...\faq = Contains frequently asked questions
- ...\doc = Contains docs, including manuals & application notes
- ...\software = Contains software/firmware updates and patches
- ...\util = Contains program utilities
- ...\demo = Contains demonstration programs, if any are available

3.3. How to get to the Messenger Firmware Files

The GPS/Cellular Messenger firmware files are at:

ftp.trimble.com\pub\tracking\messenger\software

This directory contains a list of self extracting zip files containing the latest firmware releases.

3.4. How to get the Messenger Documentation

The GPS/Cellular Messenger documentation files are at:

ftp.trimble.com\pub\tracking\messenger\doc

This directory contains a list of self extracting zip files containing manuals, release notes, applications notes etc.

3.5. How to get the Messenger Utilities

The GPS/Cellular Messenger utilities are at:

ftp.trimble.com\pub\tracking\messenger\util

Here you'll find the Messenger Wizards, the Data Logging download programs and the terminal files such as MESSNGR.TRM, MENU8800.TRM & MENU8801.TRM.