



DT80 series fixed format mode

When automated systems extract data from a dataTaker it is necessary to have a predictable, consistent response. This is what fixed format mode is designed for.

Fixed format mode, as its name suggests, consists of a fixed message structure that can be identified and easily parsed by a software algorithm. It also contains a CRC consistency check to ensure that all data that is being returned from the logger is valid.

1 General Message Structure

All messages have a general format with four sections separated by semi-colons as follows:

Message Header; Message Details; Character Count; CRC

- The **message header** includes the type of message.
- The **message details** contains data and varies based on the message type.
- The **character count** is a count of all characters up to the and including the semi-colon prior to the actual character count value.
- The **CRC** is a standard 16-bit CRC16.

2 Message Header

The Message Header consists of the following:

- Message ID
- Serial number
- Job name (job-related messages only)
- Date
- Time
- Sub seconds
- Message ID subtype

The only part of the message header that may not be present is the Job name. For this reason it is important to interpret the message ID before attempting to parse the job name. The messages that contain the job name will be made clear in the later sections of this document.

2.1 Message ID

The *Message ID* reports the type of message being returned. Message identifiers include:

- **D** = Returned Data message
- **A** = Alarm message
- **C** = Program change message
- **E** = Error message
- **P** = Parameter message
- **S** = Status message
- **T** = Test message
- **W** = Password query message
- **Z** = CHARAC message
- **J** = Job message (returned from DIRJOB command)

2.2 Message ID Subtype

The *Message ID Subtype* is specific to each type of message; these will be identified in the later sections of this document.



3 Message Types

3.1 “D” (Returned data message)

The returned data message appears when data is returned to the host. It has the following format:

`D,092568,"",2011/06/02,14:02:50,0.168212,INDEX;*,0,1;0049;57B6`

Where **INDEX** is the subtype and can be one of the following:

- **0** = real time data
- **1** = logged data
- **3** = end of data return (end of unload)
- **5** = end of schedule data

The details section of the returned data message contains:

- **Schedule** → The letter of the schedule (* if it is an immediate command)
- **Channel offset** → Always = zero
- **Data** → A list of returned data values (comma separated)

3.2 “A” (Alarm message)

The alarm message appears only when an alarm has been triggered. It has the following format:

`A,092568,"",2011/06/02,15:45:39,0.126098,INDEX;*,0,1,"MSG";0065;1792`

Where **INDEX** is the subtype and can be one of the following:

- **0** = real time data
- **1** = logged data
- **3** = end of data return (end of unload)
- **5** = end of schedule data

The details section of the alarm message contains:

- **Schedule** → The letter of the schedule (* if it is an immediate command)
- **Transition Type** → Is the alarm transition (typically 1, from false to true)
- **Alarm Number** → Always = zero
- **Alarm Text** → The alarm text which was programmed into the alarm

3.3 “C” (Program change message)

The program change message appears when channels are entered into a job (or immediately) and has the following format:

`C,092568,2011/06/02,16:02:43,0.435791,CHANGE;124,"JOB";0057;48A5`

Where **CHANGE** is the subtype and is the change message number. A list of what these change numbers are can be found in Appendix A.

The details section of the Returned Data message contains:

- **Sequence Number** → Increments each time the program is changed
- **Job Name** → Is the text that represents the jobs name



3.4 “E” (Error message)

The error message has the following format:

```
E,092568,2011/06/02,16:35:41,0.354003,ERR;"Command error..";0083;CE15
```

Where **ERR** is the subtype and is the error number (see the DT8x user manual for details about each error).

The details section of the error message contains a brief description of the error.

3.5 “P” (Parameter message)

The parameter message appears when a parameter is read (not changed). It has the following format:

```
P,092568,2011/06/02,16:42:13,0.281250,PARAMETER; 0;0044;E8A1
```

Where **PARAMETER** is the subtype and is the parameter being read.

The details section of the parameter message contains the current value for the parameter being read

3.6 “S” (Status message)

The status message appears when the status command is issued. It has the following format:

```
S,092568,2011/06/02,16:49:19,0.223144,STATUS#;80,8.08.0001;0053;D6B9
```

Where **STATUS#** is the subtype and is the parameter being read and can be one of the following:

- 1 = return model name and firmware version
- 2 = return active schedules and halted schedules
- 3 = return the number of alarms in active and halted schedules
- 4 = return the number of polynomial/spans defined
- 5 = return schedules with logging enabled/disabled
- 6 = return total free/used space (kbytes) on internal file system
- 7 = return total free/used space (kbytes) on inserted USB memory device
- 9 = return current settings for all switches
- 14 = return internal details about the current job (see Appendix B)

The details section of the status message contains the current value for the value being read. The number of fields that are returned varies depending on the status subtype.

3.7 “T” (Test message)

The test message appears after the test command is issued. It has the following format:

```
T,083672,2011/06/03,09:19:35,0.078613,TEST#;"DT85G-2";0051;EOFD
```

Where **TEST#** is the subtype and identifies the test for which data is being returned. The subtype can be one of the following (other results can be found in Appendix C):

- 0 = Firmware Version
- 1 = Serial Number



- **2** = Supply Voltage
- **3** = Internal Battery Voltage
- **5** = System Voltage
- **6** = Internal Lithium Backup Battery Voltage
- **29** = Product Number

The details section of the test message contains the current value for the test being read and a Boolean result for whether the test passes (1) or fails (0). It should be noted that some test messages will only have one detail field and no pass/fail result.

3.8 “W” (Password query message)

The password query message appears after the PASSWORD command has been issued to the logger. It has the following format:

W, 083672, 2011/06/07, 15:50:21, 0.367919, 0; 0; 0042; 1F05

There is no subtype for the password query message

The details section of the password query message contains a boolean result for whether a password has been set (1) or has not been set (0)

3.9 “Z” (Charac message)

The charac message appears after the CHARAC command has been issued to the logger. It has the following format:

Z, 083672, 2011/07/16, 15:07:50, 0.789672, CHARAC#; 100.035; 0049; 8D3F

Where **CHARAC#** is the subtype and identifies the characterisation field for which data is being returned. These types are for internal use only.

The details section of the charac message contains the data for the characterisation point.



4 Appendix A - Full program change message subtype list

- 1 BEGIN detected
- 10 Job cleared
- 11 /w (work flag) cleared.
- 12 /W (work flag) set.
- 13 END detected. BEGIN END block seen
- 14 Job data deleted
- 15 Job deleted
- 16 Job set to run on reset
- 20 B:\INI\USER.INI deleted
- 21 ONRESET.DXC ("on reset" job) deleted
- 22 DELONINSERT processed. A:\SNxxxxxx\ONINSERT.DXC deleted.
- 23 Job locked
- 24 Job unlocked
- 100 Internal error in mapping schedules
- 101 Channel list for immediate schedule changed
- 102 Channel list for X schedule changed
- 103 Channel list for A schedule changed
- 104 Channel list for B schedule changed
- 105 Channel list for C schedule changed
- 106 Channel list for D schedule changed
- 107 Channel list for E schedule changed
- 108 Channel list for F schedule changed
- 109 Channel list for G schedule changed
- 110 Channel list for H schedule changed
- 111 Channel list for I schedule changed
- 112 Channel list for J schedule changed
- 113 Channel list for K schedule changed
- 200 Internal error in mapping schedules
- 201 A change has been made to the X schedule
- 202 A change has been made to the A schedule
- 203 A change has been made to the B schedule
- 204 A change has been made to the C schedule
- 205 A change has been made to the D schedule
- 206 A change has been made to the E schedule
- 207 A change has been made to the F schedule
- 208 A change has been made to the G schedule
- 209 A change has been made to the H schedule
- 210 A change has been made to the I schedule
- 211 A change has been made to the J schedule
- 212 A change has been made to the K schedule
- 300 All schedules halted (H issued).
- 301 Schedule X halted (HX)
- 302 Schedule A halted (HA)
- 303 Schedule B halted (HB)
- 304 Schedule C halted (HC)
- 305 Schedule D halted (HD)
- 306 Schedule E halted (HE)
- 307 Schedule F halted (HF)
- 308 Schedule G halted (HG)
- 309 Schedule H halted (HH)
- 310 Schedule I halted (HI)



- 311 Schedule J halted (HJ)
- 312 Schedule K halted (HK)
- 350 Logging turned off for all schedules
- 351 Logging turned off for X schedule
- 352 Logging turned off for A schedule
- 353 Logging turned off for B schedule
- 354 Logging turned off for C schedule
- 355 Logging turned off for D schedule
- 356 Logging turned off for E schedule
- 357 Logging turned off for F schedule
- 358 Logging turned off for G schedule
- 359 Logging turned off for H schedule
- 360 Logging turned off for I schedule
- 361 Logging turned off for J schedule
- 362 Logging turned off for K schedule
- 400 All schedules (re)started
- 401 Schedule A (re)started
- 402 Schedule B (re)started
- 403 Schedule C (re)started
- 404 Schedule D (re)started
- 405 Schedule E (re)started
- 406 Schedule F (re)started
- 407 Schedule G (re)started
- 408 Schedule H (re)started
- 409 Schedule I (re)started
- 410 Schedule J (re)started
- 411 Schedule K (re)started
- 450 Logging turned on for all schedules
- 451 Logging turned on for X schedule
- 452 Logging turned on for A schedule
- 453 Logging turned on for B schedule
- 454 Logging turned on for C schedule
- 455 Logging turned on for D schedule
- 456 Logging turned on for E schedule
- 457 Logging turned on for F schedule
- 458 Logging turned on for G schedule
- 459 Logging turned on for H schedule
- 460 Logging turned on for I schedule
- 461 Logging turned on for J schedule
- 462 Logging turned on for K schedule
- 600 Dollar string changed. n\$ results in change message number 600 + n
- 700 Paramter changed. Pn results in change message number 700 + n
- 800 Polynomial or span changed. Yn or Sn results in change message 800 + n.
- 900 Thermistor changed. Tn results in change message number 900 + n.



5 Appendix B – STATUS14 Return Data

The data returned for the STATUS14 command is in the format:

Job Header, Schedule details

For example:

19,1989,1,0,"UNTITLED","\$",<X>,<A>,,<C>,<D>,...,<J>,<K>,<*>,<S>

5.1 Job Header

The Job Header consists of a comma separated list of the following six values:

- Program Check Code
- Base Year
- Time Resolution
- USB memory State
- Job Name
- Text Identifier

5.1.1 Program Check Code

The Program Check Code identifies program changes. It increments by one every time a change message is issued, indicating that the STATUS14 has changed in some way. This way a host can check this code to determine if the STATUS14 has changed since last checked.

5.1.2 Base Year

The Base Year for timestamps in offset form. The value for the base year is always 1989. The dataTaker hence counts time from midnight (12:00am) on 01/01/1989.

5.1.3 Time Resolution

The Time Resolution is the resolution of the timestamps from the dataTaker and is always equal to 1.

5.1.4 USB Memory State

The USB Memory State indicates whether a USB memory device is presently attached to the dataTaker. Possible values are 0 (No USB memory), 2 (USB device not recognised) or 3 (USB memory inserted)

5.1.5 Job Name

The Job Name is simply the 8 (max) character name of the currently active job on the DT80. This does not necessarily mean that the job is running.

5.1.6 Text Identifier

The Text Identifier is now redundant and is always "\$".

5.2 Schedule Details

Details for each schedule are returned to the host as groups of values contained within angular brackets "< >". For example:



<X>, <A, "A", "10s", G, <"REFT", "REFT", "degC", 0, 0, 0, 8, 1, 3>>, , <C>, ..., <S>

Schedules are returned in the order:

X A B C D E F G H I J K * S

Where:

- * = the immediate "on logger activation" schedule
- S = the statistical schedule

Each schedule contains a Schedule Header and (if any exist) Channel Details in the following format:

<Schedule Header,Channel Details>

NOTE: When a schedule contains no channels, the Channel Details are omitted.

5.2.1 Schedule Header

The Schedule Header contains a group of comma separated values, including (in order):

- Schedule ID (Character that identifies the schedule)
- Schedule Name (Name assigned to the schedule when defined in the job)
- Schedule Trigger (Current trigger rate, eg. 10S)
- Schedule Run State (H = Halted, G = Go/Running)

The Schedule Name, Trigger and State are only displayed if the schedule has been created in the job. In the example shown above in section 5.2 only the "A" schedule has been created in the job, all other schedules contain just the schedule ID.

5.2.2 Channel Details

The Channel Details section contains a list of channels within the current schedule. Each channel detail "group" is enclosed within angled brackets as follows:

<Channel 1 Detail><Channel 2 Detail>...<Channel n Detail>

Within each channel details group are nine values presented in a comma separated format. For example (two channels):

<"REFT", "REFT", "degC", 0, 0, 0, 8, 1, 3><"VEXT", "VEXT", "V", 0, 0, 0, 8, 1, 3>

Where the values represent (in order):

- Channel ID
- Channel User Name
- Channel Units Text
- Scaling Type
- Returned Data Format
- Returned Data Sub-format
- Significant Digits
- Decimal Places
- Realtime/logged



5.2.2.1 Channel ID

The Channel ID is the name of the channel (eg 1V)

5.2.2.2 Channel User Name

The Channel User Name is the user assigned name for the channel. This is the same as Channel ID if not set by the user.

5.2.2.3 Channel Units

The Channel Units is the defined text of the units (eg degC)

5.2.2.4 Scaling Type

The Scaling Type gives information on the type of scaling used. It can be one of:

- 0 = no scaling applies
- Sn = span n applies
- Tn = thermistor scaling n applies
- Yn = polynomial n applies
- In = intrinsic function n applies

5.2.2.5 Returned Data Format

The Returned Data Format is a number which represents the type of data being returned by the channel. It can be one of:

- 0 = Numeric
- 1 = Time
- 2 = Date
- 3 = Text
- 4 = Time Instance
- 5 = Time Interval
- 6 = Alarm

5.2.2.6 Returned Data Sub-format

The Returned Data Sub-format gives more details on the format of the returned data. It can be one of:

- Numeric Formats
 - 0 = Fixed 32bit Floating Point
 - 1 = Exponential 32bit Floating Point
 - 2 = Mixed 32bit Floating Point
 - 3 = Integer types (Int32,Byte,Hex)
- Time Formats
 - 0 = HH:MM:SS
 - 9 = Decimal hours
 - 11 = Seconds
 - 12 = Decimal minutes
 - 13 = Decimal days
- Date Formats
 - 4 = MM/DD/YYYY
 - 10 = DD/MM/YYYY
 - 11 = YYYY/MM/DD



- 12 = Decimal days (or decimal seconds!)
 - 17 = Days Since Base Date
- Text Formats
 - 0 = Text
- Time Instance Formats
 - 0 = Time and Date
 - 1 = Date and Time
 - 2 = Decimal Seconds
 - 3 = Decimal Minutes
 - 4 = Decimal Hours
 - 5 = Decimal Days
- Time Interval Formats
 - 0 = Time with Postfix Decimal Days
 - 1 = Time with Prefix Decimal Days
 - 2 = Decimal Seconds
 - 3 = Decimal Minutes
 - 4 = Decimal Hours
 - 5 = Decimal Days

5.2.2.7 Significant Digits

The Significant Digits value represents the number of significant digits that will be returned to the host.

5.2.2.8 Decimal Places

The Decimal Places value is the number of decimal places that will be displayed on the LCD.

5.2.2.9 Realtime/Logged Option

The Realtime/Logged Option identifies whether the channel is logged and/or returned to the host as with realtime data. It can be one of:

- 0 = Not logged or returned or real-time (Working channel)
- 1 = Logged but not returned to the host
- 2 = Returned to the host but not logged
- 3 = Logged and returned in real-time to the host



6 Appendix C - Full test message subtype list

- 0 = Firmware Version
- 1 = Serial Number
- 2 = Supply Voltage
- 3 = Internal Battery Voltage
- 4 = Internal Battery Current
- 5 = System Voltage
- 6 = Internal Lithium Backup Battery Voltage
- 7 = Internal VDD
- 8 = Internal VANA
- 9 = Internal VRELAY
- 10 = Internal VREF
- 11 = Internal Ics I
- 12 = Internal Ics II
- 13 = Internal Vos diff
- 14 = Internal Vos 3W I
- 24 = Internal Vos 3W II
- 15 = Internal Vos shunt
- 16 = Internal Vos +
- 17 = Internal Vos -
- 18 = Internal Vos *
- 19 = Internal Vos #
- 20 = Internal Term. factor
- 21 = Internal 100 ohm Shunt Resistance
- 22 = Internal CMRR
- 23 = Internal Overall health
- 25 = Internal Vos diff attenuation
- 26 = Internal Vos + attenuation
- 27 = Internal Vos - attenuation
- 28 = Internal Vos * attenuation
- 29 = Product Number