Maestro Heritage Software Tools

USER MANUAL
Rev. 1.3
REVISION HISTORY

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Details</th>
<th>Originated by</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>1 Mar 2008</td>
<td>First release</td>
<td>Wallace Lee</td>
</tr>
<tr>
<td>1.1</td>
<td>22 Sep 2008</td>
<td>Update for software ver. 091d</td>
<td>Wallace Lee</td>
</tr>
<tr>
<td>1.2</td>
<td>18 May 2009</td>
<td>Update for software ver. 092</td>
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</tr>
<tr>
<td>1.3</td>
<td>3 Dec 2009</td>
<td>Update for software ver. 092f</td>
<td>Wallace Lee</td>
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</tbody>
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This manual is written without any warranty.

Maestro Wireless Solutions Ltd. reserves the right to modify or improve the product and its accessories which can also be withdrawn without prior notice.

Besides, our company stresses the fact that the performance of the product as well as accessories depends not only on the proper conditions of use, but also on the environment around the places of use.

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# TABLE OF CONTENTS

**CHAPTER 1: INTRODUCTION** ................................................ 6

**CHAPTER 2: HERITAGE PLUGIN SETUP AND COMMANDS** 7

1. Selecting Plug-in........................................................................... 7
2. AT commands for I/Os on I/O Plug-in Board and CGPS Plugin Board 8
   a. AT+IOBR command ................................................................... 8
   b. AT+IOBW command .................................................................. 8
   c. AT+IOBOR command .................................................................. 9
3. AT commands for CGPS Plug-in Board........................................ 10
   a. AT+NMEA command ............................................................. 10
   b. AT+CGPSSTART command ..................................................... 10
   c. AT+CGPSSTOP command ...................................................... 11
   d. AT+CGPSSTANDBY command .................................................. 12
   e. AT+AGPS command .............................................................. 12
   f. AT+GPSPOS command .......................................................... 13
4. AT commands for Ethernet Plug-in Board ................................... 14
   a. AT+ETHRST command .......................................................... 14

**CHAPTER 3: GPRS AND TCP/UDP PARAMETERS SETUP** 15

1. GPRS Network Parameters ............................................................ 15
   a. AT+IPGPRS command ........................................................... 15
   b. AT+IPCONNECT command ..................................................... 16
2. TCP/UDP Parameters Setup .......................................................... 16
   a. AT+IPTCP command ............................................................. 16
   b. AT+IPUDP command ............................................................. 18
   c. AT+IPBUFF command ........................................................... 19
3. Extra TCP/UDP Parameters Setup............................................... 20
   a. AT+IPOPT command ............................................................. 20

**CHAPTER 4: AUTOMATIC AND SELF-RECOVERY TCP/UDP CONNECTION** 22

1. Flow diagram of Auto TCP/UDP connection function ..................... 23
2. AT commands for Auto TCP/UDP connection ................................ 24
   a. AT+AUTOTCP command ........................................................ 24
   b. AT+AUTOUDP command ....................................................... 25
3. AT commands for tuning Auto TCP/UDP connection ....................... 26
   a. AT+AUFCM command .......................................................... 26

**CHAPTER 5: AT COMMAND DRIVEN TCP/UDP CONNECTION** 27

1. AT commands for Auto TCP/UDP connection .............................. 27
   a. AT+DLEMODE command ...................................................... 27
   b. AT+AOTCP command ............................................................ 28
   c. AT+AUDP command ............................................................. 28

**CHAPTER 6: PING SERVICE** ................................................. 30

1. AT command for setting up and execute ping............................... 30
   a. AT+IPPING command ........................................................ 30

**CHAPTER 7: DYNAMIC DNS** ................................................. 32

1. Description of the Operation...................................................... 32
2. AT command for configuring Dynamic DNS ................................ 33
   a. AT+IPDDNSERV command .................................................. 33
   b. AT+IPDDNSACCT command ............................................... 33
   c. AT+IPDDNSUPD command .................................................. 34
CHAPTER 8: TCP TERMINAL ............................................................. 36
1. Description of the Operation .................................................. 36
2. AT command for TCP Terminal .............................................. 36
   a. AT+TCPTERM command .................................................. 36

CHAPTER 9: EMAIL SENDING (SMTP) SERVICE ....................... 38
1. Description of the Operation .................................................. 38
2. AT command for email sending ............................................ 38
   a. AT+IPSMTP command .................................................. 38
   b. AT+EMADDR command ............................................... 39
   c. AT+EMSUBJ command ................................................ 40
   d. AT+EMBODY command ............................................... 41
   e. AT+EMSEND command ............................................... 42

CHAPTER 10: REMOTE AT COMMAND BY SMS ....................... 44
1. Description of the operation .................................................. 44
2. AT command for configuring AT command by SMS ................ 45
   a. AT+SMSAT command .................................................. 45
   b. Limitation and caution to be taken when using remote AT command 45

CHAPTER 11: CALL SCREENING .............................................. 46
1. AT commands for configuring call screening .......................... 46
   a. AT+CSRN command .................................................. 46
   b. AT+CSNW command .................................................. 46
   c. AT+CSNR command .................................................. 47
   d. AT+CSND command .................................................. 48

CHAPTER 12: MODEM STATUS CHECK AND MONITORING... 49
1. AT command for Modem Status Check and Monitoring ............ 49
   a. AT+TMODE command .............................................. 49
   b. Operation of Modem Status Check and Monitoring ............... 50

CHAPTER 13: REMOTE PROGRAM UPDATE ............................ 51
1. AT command for remote firmware update ............................. 51
   a. AT+IPFTP command .................................................. 51
   b. AT+FTPDOTA command ............................................ 52
   c. AT+ADDINSTALL command ....................................... 53
   d. Notes and cautions to be taken ................................... 54

CHAPTER 14: COMMAND STRING - INTRODUCTION ............. 55
1. Command String and “Service” Concept ............................... 55

CHAPTER 15: COMMAND STRING – WRITING AND USING .. 56
1. Structure of Command String ............................................. 56
   a. Service type ......................................................... 56
   b. Service Id ......................................................... 56
   c. Operation type and Operation argument .......................... 56
2. Concatenating Command String ......................................... 56
3. Entering and executing Command String .............................. 57
   a. AT+CSTR command ................................................ 57
   b. AT+CSTRSET command ......................................... 57

CHAPTER 16: COMMAND STRING – SERVICES ...................... 59
1. Alarm Service .................................................................. 59
   a. Alarm Service Command String Syntax and explanation ........ 59
   b. Reading Alarm Service status ...................................... 59
2. Counter Service .......................................................... 60
   a. Counter Service Command String Syntax and explanation ..... 60

Confidential, the whole present document is the sole property of Maestro Wireless Solutions Limited.
b. Reading Counter Service status .......................................................... 60

3. Countdown Timer Service ................................................................... 60
   a. Countdown Timer Service Command Syntax and explanation ............................. 60
   b. Reading Count Dow Timer status .......................................................... 61

4. Input Port Service .................................................................................. 61
   a. Input Port Service Command Syntax and explanation ........................................... 61
   b. Input Port operation mechanism (single I/P triggering) ......................................... 62
   c. Input Port operation mechanism (multiple I/P triggering) ....................................... 63
   d. Reading I/P Port status .................................................................................. 63

5. Output Port Service .................................................................................. 64
   a. Output Port Service Command Syntax and explanation ........................................... 64
   b. Reading O/P Port status .................................................................................. 64

6. SMS Service ............................................................................................ 64
   a. SMS Service Command Syntax and explanation .................................................... 64
   b. Using “variable” options within SMS content ......................................................... 65

7. Email Sending Service ............................................................................. 66
   a. Email Sending Service Command Syntax and explanation ........................................ 66
   b. Using “variable” options within additional email content ......................................... 67
   c. Reading Email Sending Service status .............................................................. 67

8. Device Power Control Service ................................................................. 68
   a. Device Power Control Service Command Syntax and explanation .................................. 68
   b. Reading Device Power Control status ............................................................... 69

CHAPTER 17: COMMAND STRING – READING STATUS OF SERVICES ................................................................. 70
1. Command for reading current information of Services ........................................... 70
   a. AT+CSTRSTAT command .................................................................................. 70
   b. Reading Alarm Service ..................................................................................... 70
   c. Reading Counter Service .................................................................................. 71
   d. Reading Countdown Timer Service ................................................................. 71
   e. Reading Input Pin Service ................................................................................ 71
   f. Reading Output Pin Service ............................................................................... 71
   g. Reading Device Power Control Service ............................................................ 71
   h. Reading Email Sending Service .......................................................................... 71

CHAPTER 18: KNOWN ISSUES ........................................................................ 72
1. AT +WIND command ..................................................................................... 72
2. Saving of parameters to non-volatile memory ..................................................... 72
3. Mutually exclusive TCP/UDP functions ............................................................ 72
4. Sending Heritage Software commands over SMS ............................................... 72

CHAPTER 19: QUESTIONS AND ANSWERS .................................................. 73
1. AutoTCP/UDP ............................................................................................... 73
2. AT command driven TCP/UDP connection ......................................................... 73
3. Remote AT command by SMS ........................................................................... 73
4. Command String Feature .................................................................................. 73

CHAPTER 20: EXAMPLES OF HERITAGE SOFTWARE SETUP AND OPERATION ......................................................... 74
1. To setup a Automatic TCP connection ............................................................... 74
2. To make a AT command driven TCP connection ............................................... 74
3. To setup periodic ping ....................................................................................... 75
4. To setup TCP Terminal and Dynamic DNS automatic update ............................. 75

Confidential, the whole present document is the sole property of Maestro Wireless Solutions Limited.
5. Perform Remote program update by sending Command over SMS .76
6. Command String programming example 1..........................76
7. Command String programming example 2..........................76
8. Command String programming example 3..........................77
9. Command String programming example 4..........................77

CHAPTER 21: COMMAND STRING QUICK REFERENCE ........ 78
CHAPTER 1: INTRODUCTION

Heritage Software Tools is a set of software solutions for Maestro Heritage modem. New functions added to increase application range of various industrial and automated applications:

- AT commands specific for individual plug-in boards
- Automatic and self-recovery TCP/UDP socket connection
- AT command driven TCP/UDP socket connection
- Ping Service
- Dynamic DNS (* note)
- Email sending (SMTP)
- Remote AT command through SMS and TCP Terminal (* note)
- Call screening (reject call made by unauthorized phone number)
- Modem status check and monitoring
- Remote program updating
- “Command String” programming scripts
- Remote program updating

Users can configure and use the above features by following this document.

Note: Special GPRS service from network recommended. See Chapter 7 and 8 for details
CHAPTER 2: HERITAGE PLUGIN SETUP AND COMMANDS

Maestro Heritage allows different hardware plug-in boards to be connected to the expansion slot to enhance functionality. In software side there are commands to configure and control different plug-in boards.

1. Selecting Plug-in

AT+HPLUGIN command

Description: This command is used to setup Heritage with individual hardware plug-in board.

Command Syntax: AT+HPLUGIN=<type>
Response Syntax: +HPLUGIN: <type>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ HPLUGIN=?</td>
<td>+HPLUGIN: 1 OK</td>
</tr>
<tr>
<td></td>
<td>Note: show current settings</td>
</tr>
<tr>
<td>AT+ HPLUGIN=2</td>
<td>OK Note: use plug-in #2 (CGPS)</td>
</tr>
<tr>
<td>AT+ HPLUGIN=?</td>
<td>+HPLUGIN: (1-4) OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible values</td>
</tr>
</tbody>
</table>

Defined Values:
<type>
Plug-in type
1 I/O plug-in board (default value)
2 CGPS plug-in board
3 reserved
4 Ethernet plug-in board

Note:
- After changing the <type> value the modem will reset immediately.
- Modem will not detect and check if +HPLUGIN value match with actual plug-in, user should make sure entering is correct
2. AT commands for I/Os on I/O Plug-in Board and CGPS Plug-in Board

NOTE: An optional I/O or CGPS plug-in board is needed to plug to Heritage for using this Service. Contact Maestro Wireless for information. For details please read the I/O Plug-in Board user guide.

a. AT+IOBR command

This command is to read the value of one or all Input Pins on the plug-in board.

**Command Syntax:**
AT+IOBR [(=<pin>)]

**Response syntax:**
+IOBR: <val><val><val><val><val><val>
+IOBR: <pin>,<val>

**Command Possible responses:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IOBR</td>
<td>+IOBR: 000000</td>
</tr>
<tr>
<td></td>
<td>OK (Note: read all input pins values)</td>
</tr>
<tr>
<td>AT+IOBR=1</td>
<td>+IOBR: 1,0</td>
</tr>
<tr>
<td></td>
<td>OK (Note: read the value of input pin #1)</td>
</tr>
<tr>
<td>AT+IOBR=?</td>
<td>+IOBR[: (1-6)]</td>
</tr>
<tr>
<td></td>
<td>OK (Note: possible values)</td>
</tr>
</tbody>
</table>

**Defined Values:**

*<pin>*
- ID of the Input Pin to be read. Valid value is from 1 to 6 for I/O plug-in and 1 to for CGPS plug-in. If omitted all Input Pins will be read

*<val>*
- Current value (status) of the Input Pin:
  - 0: input signal not detected
  - 1: input signal detected

**Note:**
1. Number of displayed or possible Input Pin value depends on plug-in type chose.
2. If no <pin> argument is entered, then all Input Pins values will be read and the result is displayed as a series ‘0’ or ‘1’, representing the value for input #1 to #6 from left to right.
3. Always read Plug-in Board user manual before wiring to avoid permanent damage to the board

b. AT+IOBW command

This command is to set (write) the value of one or all Output Pins on the I/O plug-in or CGPS plug-in.

**Command Syntax:**
AT+IOBW= <val><val><val><val><val><val>
AT+IOBW= <pin>,<val>

**Response syntax:**
OK
c. AT+IOBOR command

This command is to read the last value of one or all Output Pins on the plug-in board.

**Command Syntax:**
AT+IOBOR [(=<pin>)]

**Response syntax:**
+IOBOR: <val><val><val><val><val><val>
+IOBOR: <pin>,<val>

**Command Possible responses:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
</table>
| AT+IOBOR      | +IOBOR: 000000  
|               | OK  
|               | *Note: read all output pins values*                                                |
| AT+IOBOR=1    | +IOBOR: 1,0  
|               | OK  
|               | *Note: read the value of output pin #1*                                            |
| AT+IOBOR=?    | +IOBOR[; (1-6)]  
|               | OK  
|               | *Note: possible values*                                                            |

**Defined Values:**

<pin>
ID of the Output Pin to be read. Valid value is from 1 to maximum number of Output Pin available on the plug-in. If omitted all Output Pins will be read

<val>
Current value (status) of the Output Pin:
0  Output Pin is set to 0 (open)
1  Output Pin is set to 1 (closed)
Note:
1. Number of displayed or possible Output Pin value depends on plug-in type chose.
2. If no <pin> argument is entered, then all Output Pins values will be read and the result is displayed as a series ‘0’ or ‘1’, representing the value of Output from #1 to #last from left to right.
3. Always read Plug-in Board user manual before wiring to avoid permanent damage to the board

3. AT commands for CGPS Plug-in Board

NOTE: An optional C-GPS plug-in board is needed to plug to Heritage for using this Service. Contact Maestro Wireless for information. For details please read the C-GPS Plug-in Board user guide.

a. AT+NMEA command

This command is set if NMEA frames should not be sent out to com port or not.

Command Syntax:
AT+NMEA =<val>

Response syntax:
+NMEA: 1

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+NMEA=1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: enable NMEA frames to be sent</td>
</tr>
<tr>
<td>AT+NMEA?</td>
<td>+NMEA: 1</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: read current value</td>
</tr>
<tr>
<td>AT+NMEA=?</td>
<td>+NMEA: (0-2)</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible values</td>
</tr>
</tbody>
</table>

Defined Values:
<val>
0     no NMEA frames will be sent out
1     NMEA frames will be sent out to the com port
2     Reserved

Note:
1. You can only set the +NMEA value BEFORE starting the CGPS Plug-in otherwise you will get error message. See section of +CGPS command for starting CGPS.
2. The command will not check if CGPS Plug-in is present or not. NMEA frames will come out a while after CGPS is started. If no CGPS Plug-in present no NMEA frame will be come out.

b. AT+CGPSSTART command

This command is to start running CGPS Plug-in Board.

Command Syntax:
AT+CGPSSTART=<type>

Response syntax:
OK
### AT+CGPSSTART Command

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CGPSSTART</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: start running CGPS Plug-in (default is HOT start)</td>
</tr>
<tr>
<td>AT+CGPSSTART=&quot;COLD&quot;</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: start running CGPS Plug-in (COLD start)</td>
</tr>
<tr>
<td>AT+CGPSSTART=?</td>
<td>+CGPSSTART:</td>
</tr>
<tr>
<td></td>
<td>(HOT,WARM,COLD,FACTCOLD,SIMCOLD),(AGPSON,AGPSOF F)</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible values</td>
</tr>
<tr>
<td>AT+CGPSSTART?</td>
<td>+CGPSSTART: HOT, AGPSON</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: read current value</td>
</tr>
</tbody>
</table>

#### Defined Values:

<table>
<thead>
<tr>
<th>&lt;type&gt;</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;HOT&quot;</td>
<td>start with all previous run data (previous run should end with AT+CGPRSSTANDBY command). This will expect the fastest fixing.</td>
</tr>
<tr>
<td>&quot;WARM&quot;</td>
<td>start with previous run data, except position sigma is high (prev. run should end with AT+CGPSSTOP command)</td>
</tr>
<tr>
<td>&quot;COLD&quot;</td>
<td>start with NO previous run data, except drift estimate</td>
</tr>
<tr>
<td>&quot;FACTCOLD&quot;</td>
<td>start with Factory Defaults instead of previous run data (almanac data, no drift estimate)</td>
</tr>
<tr>
<td>&quot;SIMCOLD&quot;</td>
<td>start with no change to previous run data area - needed for Simulator runs</td>
</tr>
</tbody>
</table>

**Note:**

1. The argument will be saved automatically, and CGPS will be restarted automatically after power-off/on cycle. To prevent CGPS start running on next power up please use AT+CGPSSTOP command.

### c. AT+CGPSSTOP Command

This command is to stop running CGPS Plug-in Board.

**Command Syntax:**

AT+CGPSSTOP

**Response syntax:**

OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CGPSSTOP</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: stop running CGPS Plug-in</td>
</tr>
<tr>
<td>AT+CGPSSTOP?</td>
<td>+CGPSSTOP: STATE IS OFF</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: check current CGPS state</td>
</tr>
</tbody>
</table>

**Note:**

1. This command will stop CGPS clock and next CGPS start need to be "WARM" or "COLD" type. If want to re-start CGPS with "HOT" option please use AT+CGPSSTANDBY command.

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d. AT+CGPSSTANDBY command

This command is to set CGPS Plug-in Board in standby mode. This consumes slightly more power, but allows for faster restarts when the CGPS plug-in is restarted with the CGPSSTART command. Note: when doing a "HOT" start (see +CGPSSTART command), the previous session should be stopped with this command.

**Command Syntax:**
AT+CGPSSTANDBY

**Response Syntax:**
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CGPSSTANDBY</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set CGPS Plug-in in standby mode</td>
</tr>
<tr>
<td>AT+CGPSSTANDBY?</td>
<td>+CGPSSTANDBY: IN STANDBY MODE</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: check current CGPS standby state</td>
</tr>
</tbody>
</table>

**Note:**
1. This command will NOT stop CGPS clock and next CGPS start can "HOT" type (faster to fix). If want to stop CGPS to save more power please use AT+CGPSSTOP command.

e. AT+AGPS command

This command is to enable or disable using AGPS feature for faster GPS fix. When enabled Heritage will use GPRS service to download Satellite data thru Internet (about 3Kbyte each time) to shorten GPS fix time. Make sure the +IPGPRS setting is properly set before using AGPS feature.

**Command Syntax:**
AT+AGPS=<val>

**Response Syntax:**
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+AGPS=1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: enable AGPS feature</td>
</tr>
<tr>
<td>AT+AGPS=1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: disable AGPS feature</td>
</tr>
<tr>
<td>AT+AGPS?</td>
<td>+AGPS: 1</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: check current APS standby state</td>
</tr>
</tbody>
</table>

**Defined Values:**
<val>

0   AGPS is disabled
1   AGPS is enabled

**Note:**
1. The +AGPS setting should be made before starting running CGPS by +CGPSSTART command.

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2. Make sure the GPRS service is available and the +IPGPRS setting is properly set.
3. The program will self-control the AGPS functionality. Once AGP is needed it will try downloading new satellite data (about 3Kbytes) thru GPRS. The need of downloading is determined by internal program and may be taken time to time.
4. AGPS operation is silent: e.g. if GPRS is not available it will not should any message
5. User can use AT+AGPSSTATUS command to check current AGPS status.

f. AT+GPSPOS command

This command allows getting the last position information received.

**Command Syntax:**

AT+GPSPOS

**Response Syntax:**

+GPSPOS:<fix>, <time>, <date>, <latitude>, <longitude>, <altitude>, <hdop>, <speed>, <course>, <nbsat>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+GPSOPS</td>
<td>+GPSPOS: 1,225454,192294,4916.45N,12311.12W,111.1,0,9,25.5,180.0,06 OK</td>
</tr>
<tr>
<td></td>
<td>Note: see defined values</td>
</tr>
<tr>
<td>AT+GPSPOS</td>
<td>+GPSPOS: -1,,,,,,,,,0 OK</td>
</tr>
<tr>
<td></td>
<td>Note: see defined values</td>
</tr>
</tbody>
</table>

**Defined Values:**

- **<fix>**
  0 Invalid Fix
  1 2D fix
  2 3D fix
  -1 It is not possible to define a position

- **<time>**
  hhmmss time of fix, ranges of values: hh (hour) 00 to 23, mm (minute) 00 to 59, ss (second) 00 to 59
  Example: 225454 means 22:54:54 UTC

- **<date>**
  ddmmyy date of fix, ranges of values: dd (day) 01 to 31, mm (month) 01 to 12, yy (year) 2000 to 2099
  Example: 191194 means November 19th of 1994

- **<latitude>**
  ddm.mmmm(N/S) ranges of values: dd (degree) 00 to 90, mm.mmmm (minute) 00,0000 to 59.9999, (N/S) North or South
  Example: latitude of the fix- 4916.45N means 49 degree 16.45 min North

- **<longitude>**
  dddmm.mmmm(E/W) ranges of values: dd (degree) 00 to 180, mm.mmmm (minute) 00,0000 to 59.9999, (E/W) East or West
  Example: longitude of the fix – 12.311.12W means 123 degree 11.12 min West

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4. AT commands for Ethernet Plug-in Board

NOTE: An optional Ethernet plug-in board is needed to plug to Heritage for using this Service. Contact Maestro Wireless for information. For details please read the Ethernet Plug-in Board user guide.

a. AT+ETHRST command

This command is to configure the periodic reset function of Heritage and Ethernet Plug-in board. If set the Heritage will perform a soft reset periodically with period set with this command.

**Command Syntax:**
AT+ETHRST =<min>

**Response syntax:**
+ETHRST: 1

**Possible responses:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Response</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ETHRST=0</td>
<td>OK</td>
<td>Note: disable periodic reset function</td>
</tr>
<tr>
<td>AT+ETHRST=360</td>
<td>OK</td>
<td>Note: enable periodic reset function with period of 360 minutes</td>
</tr>
<tr>
<td>AT+ETHRST=?</td>
<td>+ETHRST: 360</td>
<td>Note: read current value</td>
</tr>
<tr>
<td>AT+ETHRST=?</td>
<td>+ETHRST: (0-1500)</td>
<td>OK</td>
</tr>
</tbody>
</table>

**Defined Values:**

**<min>**
Period of reset in minutes. If set to 0 the periodic reset is disabled. Default value is 1440 (24 hours).

**Note:**
1. This reset function and AT+ETHRST command is function only when Ethernet Plug-in is selected (+HPLUGIN=4).
2. Once enabled this reset is unconditional. Make sure the device connected to the Ethernet Plug-in is able to handle the disconnection of Ethernet connection and can reconnect automatically.
CHAPTER 3: GPRS AND TCP/UDP PARAMETERS SETUP

The Automatic and AT command driven TCP/UDP connection, PING service, DDNS support (described in Chapter 4,5,6,7 and 8) requires GPRS connection and TCP / UDP parameters setup. This chapter will describe those required setups.

1. GPRS Network Parameters

User need to enter the following parameters for GPRS connection:
- Access point name (APN)
- User name
- Password

They are to be entered by using AT+IPGPRS command. Contact your network operator for these parameters.

a. AT+IPGPRS command

Description:
This command is used to setup GPRS network parameters for the TCP/UDP connection feature.

Command Syntax
AT+IPGPRS=<Cid>,<APN>,<UN>,<PW>

Response Syntax
+IPGPRS: <Cid>,<APN>,<UN>,<PW>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ IPGPRS?</td>
<td>+IPGPRS: 1,&quot;INTERNET&quot;,&quot;&quot;,&quot;&quot; OK</td>
</tr>
<tr>
<td></td>
<td>Note: show current settings</td>
</tr>
<tr>
<td>AT+ IPGPRS=1,</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set Cid value to 1</td>
</tr>
<tr>
<td>AT+ IPGPRS =1,&quot;INTERNET&quot;</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set the PDP value to 1 and APN to &quot;INTERNET&quot;</td>
</tr>
<tr>
<td>AT+ IPGPRS=?</td>
<td>+IPGPRS: (1-4),(100),(50),(50) OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible values</td>
</tr>
</tbody>
</table>

Defined Values:

<Cid>
PDP context identifier
Note: to use with TCP/UDP connection feature this value must be set to 1.

<APN>
Access point name of the GPRS network. Max 100 characters.

<UN>
User name to access the GPRS service. Max 50 characters.

<PW>
Password used to access the GPRS service. Max 50 characters.
b. AT+IPCONNECT command

This command is to make the modem to activate or deactivate GPRS connection. Once IPCONNECT is success you can perform TCP/UDP connection as described on other chapters. Please read note below on using this command.

**Command Syntax**

AT+IPCONNECT = <Bearer>,<Connect>

**Response Syntax**

+IPCONNECT: <Bearer>,<Connect>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPCONNECT=1,1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: Activate GPRS connection success</td>
</tr>
<tr>
<td>AT+IPCONNECT=1,0</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: Deactivate GPRS connection success</td>
</tr>
</tbody>
</table>

**Defined Values:**

- **<Bearer>**
  0: using GSM Bearer (Note: do NOT use this)
  1: using GPRS Bearer.

- **<Connect>**
  0: to stop connection
  1: to start connection.

**Note:** Before you connect to GPRS by this command make sure you have finished the following first:

1. Entered APN settings by AT+IPGPRS command Chapter 3.1.a)
2. It is suggested after modem power up wait about 20 seconds before making GPRS connection.

---

2. TCP/UDP Parameters Setup

For using automatic or AT command driven TCP/UDP connection (described in Chapter 5 and 6), you need to first enter the target TCP/UDP peer parameters. There are:

- AT+IPTCP
- AT+IPUDP
- AT+IPBUFF

a. AT+IPTCP command

This command specifies the TCP socket parameters and mode that to be used by automatic or AT command driven TCP connection (described in Chapter 4 and 5).
**Command Syntax**

`AT+IPTCP=<port>,<mode>,<server>,<TCPTxDelay>`

**Response Syntax**

`+IPTCP: <port>,<mode>,<server>,<TCPTxDelay>`

**Defined Values:**

- `<port>`
  The port number has to be used for the TCP socket connection. Default value is 0. Valid range is 0 to 65535.

- `<mode>`
  Mode of TCP operation. Default value is “S”.

  “S” Server (Listening) mode. This configures Maestro Heritage to open a listening TCP connection on the specified `<port>` . The TCP connection will be active upon getting socket connection request from the allowed remote TCP peer (see `<address>`).

  “C” Client (caller) mode. This configures Maestro Heritage to request opening a TCP connection to the server with the specified `<address>` and `<port>`.

  Note: This parameter is used by Auto TCP connection (see Chapter 4) only.

- `<address>`
  The address of the TCP server (or host). Default value is empty. Legal values could be 32-bit in dotted-decimal notation (i.e. xxx.xxx.xxx.xxx) or alphanumeric ASCII test string up to 120 characters (only if DNS is available on the GPRS network)

  Note: In “Server” (Listening) mode the modem will only accept TCP connection request for the caller with address specified in the `<address>` field. Yet if it is set to “255.255.255.255” the modem will accept request from ANY address.

- `<TCPTxDelay>`
  This parameter determines if there is time delay introduced before sending a TCP frame that has not been entirely filled with user data. If it is set to 0 initiates the sending of a TCP frame as soon as possible after the reception of a single character value from the host. If it is set to 1 initiate a delay will be introduced before the sending of a TCP frame

  The default value is 0.
b. AT+IPUDP command

This command specifies the UDP socket parameters and mode that to be used by automatic or AT command driven UDP connection (described in Chapter 4 and 5).

**Command Syntax**

AT+IPUDP=<port>,<mode>,<server>,<UDPTxDelay>

**Response Syntax**

+IPUDP: <port>,<mode>,<server>,<UDPTxDelay>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ IPUDP?</td>
<td>+IPUDP: 0,&quot;S&quot;,&quot;&quot;,0OK</td>
</tr>
<tr>
<td></td>
<td>Note: show current settings</td>
</tr>
<tr>
<td>AT+ IPUDP =23</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set the UDP port to 23</td>
</tr>
<tr>
<td>AT+ IPUDP =23,&quot;C&quot;,202.144.111.222&quot;,0</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: to set the modem to connect UDP socket Client (caller) mode to target : address 202.144.111.222 and port 23</td>
</tr>
<tr>
<td>AT+ IPUDP =23,&quot;S&quot;,255.255.255.255&quot;,0</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>to set the modem to wait for UDP socket connection request (Server (listening) mode) any calling IP address allowed, port 23</td>
</tr>
<tr>
<td>AT+ IPUDP=?</td>
<td>+IPUDP: (0-65535),(&quot;C&quot;,&quot;S&quot;),(120),(0-1)OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible argument</td>
</tr>
</tbody>
</table>

**Defined Values:**

**<port>**
The port number has to be used for the UDP socket connection. Default value is 0. Valid range is 0 to 65535.

**<mode>**
Mode of UDP operation. Default value is “S”.
“S” Server (Listening) mode. This configures Maestro Heritage to open a listening UDP connection on the specified <port>. The UDP connection will be active upon getting socket connection request from the allowed remote UDP peer (see <address>)
“C” Client (caller) mode. This configures Maestro Heritage to request opening a UDP connection to the server with the specified <address> and <port>.

**Note:** This parameter is used by Auto UDP connection (see Chapter 3) only.

**<address>**
The address of the UDP server (or host). Default value is empty. Legal values could be 32-bit in dotted-decimal notation (i.e. xxx.xxx.xxx.xxx) or alphanumeric ASCII test string up to 120 characters (only if DNS is available on the GPRS network)

**Note:** In “Server” (Listening) mode the modem will only accept UDP connection request for the caller with address specified in the <address> field. Yet if it is set to “255.255.255.255” the modem will accept request from ANY address.
<UDPTxDelay>
This parameter determines if there is time delay introduced before sending a UDP frame that has not been entirely filled with user data. If it is set to 0 initiates the sending of a UDP frame as soon as possible after the reception of a single character value from the host. If it is set to 1 initiate a delay will be introduced before the sending of a UDP frame. The default value is 0.

c. AT+IPBUFF command

This command specifies the number of bytes of payload data from remote peer buffered inside the modem when automatic or AT command driven TCP / UDP connection is made.
- If the quantity of buffered data reaches this value, the whole buffered data will be sent out to the serial port.
- If the data from remote is large enough at one time, only multiple of this value data will be sent out to the serial port remainder will be kept inside buffer.

Example: AT+IPBUFF=5

Command Syntax
AT+IPBUFF = <buff>

Response Syntax
+IPBUFF: <buff>

Command Possible responses:
+IPBUFF: 0-100
OK
Note: display possible values

AT+IPBUFF=?
+IPBUFF: 0
OK
Note: display current status

AT+IPBUFF=5
OK
Note: Set IPBUFF value to 5

18 bytes of data sent from TCP or UDP socket to modem

15 bytes (multiple of 5) data sent out to serial port, remaining data buffered inside
Defined Values:
<buff>
The number of bytes of data to be buffered. Default value is 0 (i.e. no buffering). Valid range is 0 to 100.

Note: If the TCP or UDP socket connection is broken, buffered data will be lost.

3. Extra TCP/UDP Parameters Setup
User can set additional parameters of TCP/UDP connection, including “keep alive” packet, maximum packet size and TTL.

a. AT+IPOPT command

This command specifies the extra TCP/UDP socket parameters.

Command Syntax
AT+IPOPT=<CMDType>,<parameter>[,action>

Response Syntax
+ IPOPT: <CMDType>,<parameter>[,<action>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ IPOPT?</td>
<td>+IPOPT: 1, 0</td>
</tr>
<tr>
<td></td>
<td>+IPOPT: 2, 536</td>
</tr>
<tr>
<td></td>
<td>+IPOPT: 3, 64</td>
</tr>
<tr>
<td></td>
<td>+IPOPT: 4,0,0</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: display current settings</td>
</tr>
<tr>
<td>AT+ IPOPT=1,1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: enable the keep alive packet feature</td>
</tr>
<tr>
<td>AT+IPOPT=2,512</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set the size of maximum packet that to be</td>
</tr>
<tr>
<td></td>
<td>sent to 512 bytes</td>
</tr>
<tr>
<td>AT+ IPOPT=3,128</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set TTL to 128</td>
</tr>
<tr>
<td>AT+ IPOPT=4,60,1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: Enable Ping action every 60 seconds, if</td>
</tr>
<tr>
<td></td>
<td>ping fail then disconnect GPRS</td>
</tr>
<tr>
<td>AT+ IPOPT=?</td>
<td>+IPOPT: (1-4),(0-65535)[,(0-2)]</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible argument</td>
</tr>
</tbody>
</table>

Defined Values:
<CMDType>
1 setup “keep alive” packet feature:
When <parameter> is 0, the feature is disabled
When <parameter> is 1 and a TCP socket connected, every 7200 seconds (2 hours) an empty “keep alive” packet will be sent out from the modem to avoid socket being closed because of idle timeout.
2 Specifies the maximum size of the outgoing packet to <parameter>. The size can be set from 1 to 65535(0xFFFF) default value is 65535.
3   Specifies the TTL value of the socket connection to <parameter>. The value can be set from 1 to 255.
    Default value is 128.

4   Specify whether to use ping function to check Internet connectivity:

<parameter> is the period in second of calling ping function after GPRS connected (+IPCONNECT)

<action>
to specify the action will be taken if a set of ping action fail:
0   do nothing (default)
1   disconnect GPRS (+IPCONNECT=1,0)
2   reset Maestro Heritage
CHAPTER 4: AUTOMATIC AND SELF-RECOVERY TCP/UDP CONNECTION

The Auto TCP/UDP connection feature is defined for accessing serial devices over the Internet. Heritage can be configured that after power up it will connect to a remote TCP/UDP socket (client mode) or to wait for the TCP/UDP socket connection request from remote peer (server mode). If the socket connection is unsuccessful or disconnected it will repeat the connection request and back to waiting stage. This make remote peer can access serial device connected to Maestro Heritage.

Direct serial connection

TCP Socket connection via the Internet /GPRS network

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1. Flow diagram of Auto TCP/UDP connection function

Modem Power on/restart

Is AutoTCP/UDP enabled?

Yes
Wait for 20 secs

No
Stop

GPRS attach OK?

Yes
GPRS activation OK?

Yes
OK to open pre-defined TCP/UDP socket?

Yes
Open TCP/UDP socket, connect to serial port

No
OK to open pre-defined TCP/UDP socket?

Yes
Open TCP/UDP socket, connect to serial port

No
Dealy 2 seconds

GPRS attachment OK?

Yes
Re-activate GPRS

No
Re-attach GPRS

GPRS attachment OK?

Yes
Client mode?

No
Open TCP/UDP socket, connect to serial port

GPRS attachment fail?

Yes
GPRS activation fail?

Yes
TCP/UDP disconnected or closed?

No

TCP/UDP disconnected or closed?

Yes
GPRS attachment fail?

Yes
GPRS activation fail?

Yes

No

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2. **AT commands for Auto TCP/UDP connection**

a. **AT+AUTOTCP command**

This command controls the Heritage to start TCP socket connection automatically
Before using **AT+AUTOTCP** TCP and GPRS settings MUST be setup properly using
AT+IPTCP and AT+IPGPRS command respectively.

**Command Syntax**

AT+AUTOTCP=<mode>

**Response syntax:**

+AUTOTCP: <mode>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+AUTOTCP=0</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: disable AutoTCP</td>
</tr>
<tr>
<td>AT+AUTOTCP=1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Enable AutoTCP</td>
</tr>
<tr>
<td>AT+ AUTOTCP?</td>
<td>+AUTOTCP : 1</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note display current status</td>
</tr>
<tr>
<td>AT+AUTOTCP=?</td>
<td>+AUTOTCP : (0-1)</td>
</tr>
<tr>
<td></td>
<td>Note: possible argument</td>
</tr>
</tbody>
</table>

**Defined Values:**

<mode>

1   enable auto TCP
0   disable auto TCP

**Note:**

- Before enabling Auto TCP, it **MUST** be properly set the GPRS settings by **AT+IPGPRS**
command and TCP settings by **AT+IPTCP** command (see Chapter 3)
- **ONLY** GPRS PDP context # 1 will be used. So please setup +IPGPRS settings with
<cid>=1
- Once AutoTCP is enabled, it will start the TCP socket connection automatically after 20
seconds.
- Once the TCP connection is established successfully, the serial port will go to data mode,
al data entered to the serial port will be sent to remote TCP peer. No more AT commands
will be accepted then.
- In TCP connected data mode, the DSR and DCD signals of the serial port will go to high.
- If the TCP connection is broken the modem will try to reconnect automatically. During
re-connection period serial port will go back to command mode, and DSR/DCD signal
back to low.
- The setting will be saved, and after power off, the AUTOTCP will be restarted with the 20
seconds delay after power up.
- To stop auto TCP connection, you need to enter the command **AT+AUTOTCP=0** by
either 1: within 20 seconds after power up, or 2: during reconnection (serial port back to
command mode), or 3: by SMS (see Chapter, SMS AT commands)
- Auto TCP connection is exclusive to other TCP/UDP feature. See Chapter 12 (Q&A)
b. AT+AUTOUDP command

This command controls the Heritage to start UDPacket connection automatically. Before using AT+AUTOUDP TCP and GPRS settings MUST be setup properly using AT+IPUDP and AT+IPGPRS command respectively.

Command Syntax
AT+AUTOUDP=<<mode>>

Response syntax:
+AUTOUDP: <mode>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+AUTOUDP=0</td>
<td>OK&lt;br&gt;Note : disable AutoUDP</td>
</tr>
<tr>
<td>AT+AUTOUDP=1</td>
<td>OK&lt;br&gt;Note: Enable AutoUDP</td>
</tr>
<tr>
<td>AT+ AUTOUDP?</td>
<td>+AUTOUDP : 1&lt;br&gt;OK&lt;br&gt;Note: display current status</td>
</tr>
<tr>
<td>AT+AUTOUDP=?</td>
<td>+AUTOUDP : (0-1)&lt;br&gt;Note : possible argument</td>
</tr>
</tbody>
</table>

Defined Values:
<mode>
1 enable auto UDP
0 disable auto UDP

Note:
- Before enabling Auto UDP, it MUST be properly set the GPRS settings by AT+IPGPRS command and UDP settings by AT+IPUDP command.
- ONLY GPRS PDP context # 1 will be used. So please setup +IPGPRS settings with <cid>=1.
- Once AutoUDP is enabled, it will start the UDP socket connection automatically after 20 seconds.
- Once the UDP connection is established successfully, the serial port will go to data mode, all data entered to the serial port will be sent to remote UDP peer. No more AT commands will be accepted then.
- In UDP connected data mode, the DSR and DCD signals of the serial port will go to high.
- If the UDP connection is broken the modem will try to reconnect automatically. During re-connection period serial port will go back to command mode, and DSR/DCD signal back to low.
- The setting will be saved, and after power off, the AUTOUDP will be restarted with the 20 seconds delay after power up.
- To stop auto UDP connection, you need to enter the command AT+AUTOUDP=0 by 1: within 20 seconds after power up, or 2: during reconnection (serial port back to command mode) or 3: by SMS (see Chapter , SMS AT command).
- Auto TCP connection is exclusive to other TCP/UDP feature. See Chapter 18 (Q&A).
- Due to the nature of UDP socket connection, AT+AUTOUDP=0 may not be able to disconnection. in this case you may send command AT+IPCONNECT=1,0 to disconnect GPRS connection.

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3. **AT commands for tuning Auto TCP/UDP connection**

   a. **AT+AUFCM command**

   This command controls the buffering time of TDP/UDP data sent to remote peer. Data coming towards UART will be buffered for a “delay” period before being sent out.

   **Command Syntax**
   
   AT+AUFCM=<delay>

   **Response syntax:**
   
   +AUFCM: <delay>

   **Command Possible responses:**

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+AUFCM=1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: set the +AUFCM value to 1</td>
</tr>
<tr>
<td>AT+AUFCM?</td>
<td>+AUFCM: 2</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: display current status</td>
</tr>
<tr>
<td>AT+AUFCM=?</td>
<td>+AUFCM: (1-255)</td>
</tr>
<tr>
<td></td>
<td>Note: possible argument</td>
</tr>
</tbody>
</table>

   **Defined Values:**

   <delay>

   Default value: 0

   Possible value: 1 to 255

   Delay units between sending buffered data to TCP/UDP peer. The actual delay time is calculated by the value of <delay> times 18.5 ms. So if <delay> is equal to 2 that means data will be sent to remote peer every 39ms (or immediately if internal buffer is full). Increasing this value can make the data packet size bigger especially when data flow is slow, thus reducing overhead.

   **Note:**

   If the value is set too high the maximum data transfer speed may be decreased.
CHAPTER 5: AT COMMAND DRIVEN TCP/UDP CONNECTION

This feature let user to make a TCP or UDP connection upon the AT+OTCP or AT+OUDP command.

This socket connection feature does support DLE/ETX character coding. See 5.1.a

The AT+OTCP and AT+OUDP operation is similar to AT#OTCP and AT#OUDP function provided original IP Connectivity. See IP connectivity document.

Make sure you have made the GPRS connection by AT+IPCONNECT command before making socket connection (see Chapter 17, setup examples).

1. AT commands for Auto TCP/UDP connection
   a. AT+DLEMODE command

When performing the AT command driven TCP or UDP socket connection, the attached host has the choice to code or not the ETX character.

When DLEMODE is set to 0, no specific process is needed on ETX characters. It means that it is not possible for a host to request an end of connection or to receive a clear indication of end of connection from the TCP/IP stack.

When DLEMODE is set to 1, the ETX character means a request or an indication of end of connection.

As a consequence, ETX characters that belong to the payload data must be sent by the host on the serial port preceded by a DLE character. Similarly ETX characters received by the TCP/IP stack from the Internet are sent to the host through the serial port preceded by a DLE character. “ETX” is character hex 03, “DLE” character is hex 10 (Dec 16)

Default value is 0.

Command Syntax
AT+DLEMODE=<mode>

Response syntax:
+DLEMODE: <mode>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ DLEMODE =0</td>
<td>OK</td>
</tr>
<tr>
<td>AT+ DLEMODE =1</td>
<td>OK</td>
</tr>
<tr>
<td>AT+ DLEMODE?</td>
<td>+DLEMODE : 1</td>
</tr>
<tr>
<td>AT+ DLEMODE =?</td>
<td>+DLEMODE : (0-1)</td>
</tr>
</tbody>
</table>

Defined Values:
<mode>
1 enable DLEMODE
0 disable DLEMODE

Note:
DLEMODE is not available for Automatic TCP/UDP connection.
b. AT+AOTCP command

This command is sent by the attached host to open a TCP connection to the TCP server specified by the AT+IPCTP command. If socket connection is made successfully it will response CONNECT 115200 and the serial port will go to data mode, all data entered to the serial port will be sent to remote TCP/UDP peer.

If socket connection is unsuccessful or socket is disconnected afterwards the modem will send out NO CARRIER message and back to command mode.

**Command Syntax:**
AT+AOTCP

**Response Syntax:**
CONNECT 115200

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+O TCP</td>
<td>CONNECT 115200 Note: TCP connection made successfully</td>
</tr>
<tr>
<td>AT+O TCP</td>
<td>+CME ERROR 3 Note: fail, either IPCONNECT is not ready or socket service is used already</td>
</tr>
<tr>
<td>AT+O TCP</td>
<td>NO CARRIER Note: possibly remote server no response</td>
</tr>
</tbody>
</table>

**Note:**

AT+O TCP connection is exclusive to other TCP feature. See Chapter (Q&A) If TCP connection is unsuccessful or broken after connection the GPRS connection will also be disconnected. (+IPCONNECT: 1,0). So please enter AT+IPCONNECT=1,1 to reconnect GPRS before entering AT+O TCP.

c. AT+OUDP command

This command sent by the attached host to open a UDP connection to the UDP server specified by the AT+IPUDP command. If socket connection is made successfully it will response CONNECT 115200 and the serial port will go to data mode, all data entered to the serial port will be sent to remote UDP peer.

If socket connection is unsuccessful or socket is disconnected afterwards the modem will send out NO CARRIER message and back to command mode.

**Command Syntax:**
AT+OUDP

**Response Syntax:**
CONNECT 115200

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+O UDP</td>
<td>CONNECT 115200 Note: UDP connection made successfully</td>
</tr>
<tr>
<td>AT+O UDP</td>
<td>+CME ERROR 3 Note: fail, either IPCONNECT is not ready or socket service is used already</td>
</tr>
<tr>
<td>AT+O UDP</td>
<td>NO CARRIER Note: possibly remote server no response</td>
</tr>
</tbody>
</table>

Confidential, the whole present document is the sole property of Maestro Wireless Solutions Limited.
Note:
- AT+OUDP connection is exclusive to other TCP/UDP feature. See Chapter 18 (Q&A)
- If UDP connection is unsuccessful or broken after connection the GPRS connection will also be disconnected. (+IPCONNECT: 1,0). So please enter AT+IPCONNECT=1,1 to reconnect GPRS before entering AT+OUDP.
- Due to the nature of UDP socket connection, sending ETX characters (when DLEMODE is 1) may not be able to make disconnection.
CHAPTER 6: PING SERVICE

This feature is to make a ping (ICMP Echo Request) to a specified IP address and get back the echo result. Ping service can also be called by IPCONNECT as a tool to check Internet connection. See AT+IPOPT command in Chapter 3 for details.

1. AT command for setting up and execute ping

   a. AT+IPPING command

   **Command Syntax:**
   AT+SMSAT=<mode>(,<key>)
   AT+IPPING= <mode>,<address>, <nb>, <delay>, <timeout>

   **Response syntax:**
   +IPPING : <address>, time=<echo time>

   **Command Possible responses:**
   AT+IPPING=2, ”210.103.11.18”,3,1,15
   OK
   Note : configure ping target (210.103.11.18), 3 ping trials total, 1 second between each trial, timeout limit 15

   AT + IPPING
   +IPPING : ”210.103.11.18”, time=562ms
   +IPPING : ”210.103.11.18”, time=662ms
   +IPPING : ”210.103.11.18”, time=762ms
   OK
   Note: Execute ping action (no argument)

   AT+IPPING=?
   +IPPING: (0-2),(15),(1-10),(1-10),(1-60)
   OK
   Note : Possible arguments

   AT+IPPING?
   +IPPING : ”210.103.11.18”, 3, 1, 15
   OK
   Note: Display current status

   **Defined Values:**
   <mode>
   0,1 reserved
   2 configure ping address and parameters below

   <address>
   IP address of the target to be pinged. Must be in form of dot-decimal notation (xxx.xxx.xxx.xxx).

   <nb>
   Numbers of ping trials for each ping action. E.g. if the value is 3 will ping the target for 3 times. Default value is 3. Valid range is 1 to 10. (When used with IPCONNECT check the ping is assumed fail if all ping trials fail.)

   <delay>
   Time in second between each ping trial. Default value is 3. Valid range is 1 to 10.
Note:

- Ping target must be in dot-decimal notation format, URL format is not supported.
- Before making command driven ping action (AT+IPPING w/o argument) make sure GPRS is connected (+IPCONNECT: 1,1) and ping target and parameters are set properly.
CHAPTER 7: DYNAMIC DNS

To use this feature, we strongly suggest getting special GPRS service from your network operator:

a. Network will assign a true public IP address to Heritage upon GPRS activations, and

b. that GPRS connection allows incoming access from public Internet to Heritage

This feature lets Heritage to login to certain Dynamic DNS service providers, to update the hostname with Heritage current IP address. So user can access Heritage with pre-registered hostname. User can use this function together with “TCP Terminal” (see Chapter 8 ) and can use Telnet to access Heritage and send AT command over Internet.

Maestro Wireless Solution Ltd does not have affinity with any Dynamic DNS service providers. Maestro Wireless Solution Ltd does not guarantee any service provided by DDNS service providers and not liable to any loss or damage caused by such service.

1. Description of the Operation

1. User need to create an account on DDNS service providers and register a hostname. Following providers are tested working correctly:
   www.dyndns.com
   www.no-ip.com
2. Use AT+IPDDNSSERV command to enter DDNS update server URL and port no. Use AT+IPDDNSACCT to enter own account login, password and hostname.
3. When IPCONNECT is ready, use AT+IPDDNSUPD command to update the above hostname with modem’s current IP address.
4. User can also use AT+IPDDNSUPD command to configure automatic DDNS update upon each time of IPCONNECT established

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2. AT command for configuring Dynamic DNS

a. AT+IPDDNNSERV command

**Command Syntax:**
AT+IPDDNNSERV= <serv_url>,<serv_port>

**Response Syntax:**
+IPDDNNSERV: <serv_url>,<serv_port>
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
</table>
| AT+IPDDNNSERV="members.dyndns.org",80 | OK  
  *Note: enter DDNS service provider’s update server information* |
| AT+IPDDNNSERV?         | +IPDDNNSERV: “members.dyndns.org”,80  
  *OK*  
  *Note: display current status* |
| AT+IPDDNNSERV=?        | +IPDDNNSERV: (64),(0-65535)  
  *OK*  
  *Note: Possible arguments* |

**Defined Values:**

- **<serv_url>**
  - URL of the update server. For example it is “members.dyndns.org” for www.dyndns.com. Check with your DDNS service provider for correct name.

- **<serv_port>**
  - Port number of the update server. For example it is 80 or 8080 for www.dyndns.com. Check with your DDNS service provider for correct port number.

List of parameters of verified DDNS service providers

<table>
<thead>
<tr>
<th>Provider</th>
<th>&lt;serv_url&gt;</th>
<th>&lt;serv_port&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.dyndns.com">www.dyndns.com</a></td>
<td>members.dyndns.org</td>
<td>80</td>
</tr>
<tr>
<td><a href="http://www.no-ip.com">www.no-ip.com</a></td>
<td>dynupdate.no-ip.com</td>
<td>80</td>
</tr>
</tbody>
</table>

b. AT+IPDDNNSACCT command

**Command Syntax:**
AT+IPDDNNSACCT=<hostname>,<login>,<psswd>

**Response Syntax:**
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
</table>
| AT+IPDDNNSACCT="12345678.dyndns.org", "maestro", "maestro" | OK  
  *Note: enter DDNS account and host name info* |
| AT+IPDDNNSACCT?        | +IPDDNNSACCT: “12345678.dyndns.org”, “maestro”, “maestro”  
  *OK*  
  *Note: display current status* |
| AT+IPDDNNSACCT=?       | +IPDDNNSACCT: (64),(32),(32)  
  *OK*  
  *Note: Possible arguments* |
Defined Values:

<hostname>
Hostname to be associated with M100’s IP address. Should register the hostname in your account and verified it on your DDNS service provider. Maximum length is 64 characters.

<login>
Login name of the DDNS service account. Maximum length is 32 characters.

<psswd>
Login password of the DDNS service account. Maximum length is 32 characters.

c. AT+IPDDNSUPD command

Command Syntax:
AT+IPDDNSUPD
AT+IPDDNSUPD= <auto_upd>

Response syntax:
OK
+IPDDNSUPD: <result>, <ret_code>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPDDNSUPD=1</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPDDNSUPD=0</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPDDNSUPD</td>
<td>+IPDDNSUPD: 1, “good 203.111.111.111”</td>
</tr>
<tr>
<td>AT+IPDDNSUPD</td>
<td>+IPDDNSUPD: 3, “badauth”</td>
</tr>
<tr>
<td>AT+IPDDNSUPD?</td>
<td>+IPDDNSUPD: 3, “badauth”</td>
</tr>
<tr>
<td>AT+IPDDNSUPD=?</td>
<td>+IPDDNSUPD: (0-1)</td>
</tr>
</tbody>
</table>

Defined Values:

<auto_upd>
0 disable automatic DDNS update
1 enable automatic DDNS update (see notes for details)

<result>
result of DDNS update process. it is related to the return code of DDNS update server. if <result> is 1 or 2 the update is assumed successful.

<ret_code>
return code of DDNS update server.
Following table list the relationship between <result> and <ret_code>.

<table>
<thead>
<tr>
<th>Result</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ret_code</td>
<td>good</td>
<td>no_chg</td>
<td>badauth</td>
<td>donator</td>
<td>notfqdgn</td>
<td>NOhost</td>
<td>numhost</td>
<td>abuse</td>
<td>badagent</td>
<td>dnserr</td>
<td>911</td>
</tr>
</tbody>
</table>

Visit Website of DDNS service providers for the explanation of return code.

**Note:**
- If the DDNS update process fails because of failure to get server response the <result> maybe a negative value, contact Heritage to get details.
- Before making command driven ping action (AT+IPPING w/o argument) make sure GPRS is connected (+IPCONNECT: 1,1) and ping target and parameters are set properly.
- If automatic DDNS update enabled, Heritage will detect GPRS connection and start DDNS update once connection is established. If update is fail it will retry for 3 times maximum. User can enter AT+IPDDNSUPD? to check the result of last update result.
CHAPTER 8: TCP TERMINAL

To use this feature, we strongly suggest getting special GPRS service from your network operator:

a. Network will assign a true public IP address to Heritage upon GPRS activations, and

b. that GPRS connection allows incoming access from public Internet to Heritage

This feature lets Heritage 100 can be connected through TCP channel, and AT commands can be sent over this channel. User can use Telnet type terminal service to “login” to M100 and control it by sending AT commands through the telnet.

1. **Description of the Operation**

![Telnet Terminal and Dynamic DNS Diagram]

1. Uses AT+TCPTERM command to configure password port for the TCP terminal, and enable TCP terminal function.
2. After about 20 seconds Heritage will connect to the Internet automatically. And then it will check the TCP port.
3. User from outside Internet can use Telnet application to connect the port of Heritage TCP terminal. User need to know the IP address of the Heritage. Or with the aid of Dynamic DNS (Chapter) user can use the hostname associated the Heritage for connections.
4. Once connected user need to enter password. If password is correct user can send AT command to the Heritage on Telnet program.

2. **AT command for TCP Terminal**

   a. **AT+TCPTERM command**

   **Command Syntax:**
   AT+TCPTERM =<mode>[,<pswrd>,<port>,<timeout>]

   **Response Syntax:**
   +TCPTERM =<stat>,<pswrd>,<port>,<timeout>
   OK

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### Command Possible responses:

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
</table>
| AT+TCPTERM=2, “123456”,23,30 | OK
  *Note: configure TCP Terminal, password: 123456, port: 23, timeout:30(secs)* |
| AT+TCPTERM=1 | OK
  *Note: enable TCP terminal* |
| AT+TCPTERM=0 | OK
  *Note: disable TCP terminal* |
| AT+TCPTERM=? | +TCPTERM: 1,“123456”,23,30
  *Note: display current status* |
| AT+TCPTERM=? | +TCPTERM: (0-1),(16),(1-65535),(1-65535)
  *OK
  *Note: possible argument* |

**Defined Values:**

#### <mode>
- 0: disable TCP Terminal.
- 1: enable TCP Terminal.
- 2: configure TCP Terminal parameters.

#### <psswd>
Login password for TCP Terminal. When user opens the Heritage TCP Terminal port it will prompt "password". User need to enter the password set with this parameter. User has 3 times of chance to enter correct password. If password is correct user can enter AT command otherwise TCP connection will be closed.

It can be consisting 1 to 16 alphanumeric characters. Default is “000000” (6 zeros).

#### <port>
Port number of TCP Terminal. Please do not set to the same value of port number in +IPTCP and +IPUDP command. Default is 23. Valid value is 1 to 65535.

#### <timeout>
Maximum time in second TCP terminal will wait for an entry after TCP terminal opened. If no data received in this period the connection will be closed. Default is 30. Valid value is 1 to 65535.

**Note:**
- If TCP terminal is enabled the Heritage will connect to GPRS (+IPCONNECT=1,1) about 15 seconds after power up.
- Only one TCP terminal connection can be made at a time. Any further connection requested will be refused.
- Not all AT commands could be executed. If un-allowed command is entered “command not allowed” message will be returned.
- Command echo feature is always enabled (except entering password).
- Unsolicited codes like “RING”, “+CMTI”, etc will not be displayed on TCP terminal.
- Never send ‘interactive’ AT command by SMS, e.g. AT+CMGS=…. This feature cannot return the prompt to the sender for second input.
- Always think twice before you send AT command. For example if you send AT+CPOF it will turn off the modem, and you need to go to access the modem to reset it.
CHAPTER 9: EMAIL SENDING (SMTP) SERVICE

To use this feature, make sure there is a SMTP server which can serve you. The network service provider may have her own dedicated SMTP server. For using other SMTP server, please check if the service connection is possible or not.

This feature Heritage to send an email via a SMTP server. This feature can save parameters like of SMTP sever name, address of sender and recipient, email subject and email body (content). Then with AT command this function will construct and email using the above stored Information. The above information will also be used by Command String email sending service (Chapter 16.7).

1. Description of the Operation

1. Enter the following information by AT commands (see following sections)
   - SMTP server Information (address, port, login Info)
   - Email addresses of sender; recipient (s)
   - Email subject
   - Email body (content)
   Valid “minimal” emails contain sender address and one recipient address with no subject and no content (empty email).
2. Make IP connection (see Chapter 3.1.b).
3. Use AT+EMSEND command to send out email.
4. An email can contain
   - maximum up to 1024(pre-stored)+128(command line additional) characters,
   - three (sets of) recipient: "To","cc" and "bcc". Each set have 64 characters of email address(es)
   - Subject (title) up to 128 characters, from a choice 10 pre-store subject record.

2. AT command for email sending

   a. AT+IPSMTP command

This command is to set SMTP server parameters

Command Syntax:
AT+IPSMTP= <port>,<auth >,<server>,<id>,<pwd>

Response syntax:
+IPSMTP= <port>,<auth >,<server>,<id>,<pwd>
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
</table>
| AT+IPSMTP=25,1,“smtp.networ k.com”,“login”,“pssd”   | OK
| Note : setup SMTP parameter (using authentication with no encryption) |
| AT+IPSMTP=25,0,“smtp.networ k.com”                    | OK
| Note : setup SMTP parameter (no authentication)        |
| AT+IPSMTP?                                             | +IPSMTP: 25,0,“smtp.network.com”                        |
| Note : display current setting                         |

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AT+IPSMTP=?  +IPSMTP: (0-65535),(0-2),(120),(64),(64)
OK
Note: Possible arguments

Defined Values:

<port>
Port number of the SMTP server. Default value is 25.

<auth>
Authentication type used for authentication:
0  no authentication required (default)
1  authentication with no encryption
2  authentication used with encrypted username/password in MIME64 during AUTH LOGIN phase

<server>
IP address of SMTP server (in xxx.xxx.xxx.xxx format) or an alpha numeric string format (e.g. smtp.server.com)
Maximum 120 characters
Note: if alpha numeric string format is used, make sure the GPRS network has proper DNS service available.

<id>
Login name of the user. Maximum 64 characters.

<pwd>
Password for the user. Maximum 64 characters.

b. AT+EMADDR command

This command is to save, read and delete email addresses of sender, recipient, cc recipient and bcc recipient.

Command Syntax:
AT+EMADDR= <oper>,<id>,<address>

Response Syntax:
+EMADDR : <oper><id>,<addr>
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses</th>
</tr>
</thead>
</table>
| AT+ EMADDR=0,0,"a@abc.com" | OK  
|               | Note: store email address id 0 (sender address)       |
| AT+ EMADDR=0,1,"b@abc.com" | OK  
|               | Note: store email address id1                         |
| AT+ EMADDR=1,1 | +EMADDR: 1, "b@abc.com"  
|               | Note: read stored address id 1                        |
| AT+ EMADDR=2,1 | OK  
|               | Note: erase email address id1                        |
| AT+ EMADDR=?  | +EMADDR: (0-2),(0-50), (64)  
|               | Note: possible argument                              |

Defined Values:

<oper>
Type of operation:
0  store email address to flash
1  read email address from flash
2  erase email address from flash
c. AT+EMSUBJ command

This command is to save, read and delete email subject (title).

**Command Syntax:**
AT+EMSUBJ= <oper>,<id>,<subj>

**Response syntax:**
+EMSUBJ : <oper><id>,<subj>
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
</table>
| AT+ EMSUBJ=0,1,"This is subj #1" | OK  
  *Note: store email subject #1* |
| AT+ EMSUBJ=1,1 | +EMSUBJ: 1,"This is subj #1"  
  *Note: read stored email subject with <id>=1* |
| AT+ EMSUBJ=2,1 | OK  
  *Note: erase email subject with <id>=1* |
| AT+ EMSUBJ=?   | +EMSUBJ: (0-2),(1-10), (128)  
  *Note: possible argument* |

**Defined Values:**

**<oper>**
Type of operation:
0  store email subject to flash
1  read email subject from flash
2  erase email subject from flash

**<id>**
Identification number (id) of the email subject. Valid value is 1 to 10

**<subj>**
Email subject to be stored. Maximum 128 characters for each subject.

**Note:**
- It is recommend using only alpha-numeric characters (ASCII value 32 to 127) for email subject content.
d. AT+EMBODY command

This command is to save, read and delete pre-stored email body (content). Up to 3 email bodies with 1024 characters max can be stored. The <id> field is the id number of the email body to be stored. To save email body, first enter AT+EMBODY=0,<id> then <ENTER> and wait for ">" prompt. Then simply type email body content, <ctrl-Z> (ASCII 26) to finish. This command can be aborted using the <ESC> (ASCII 27) character when entering text.

**Command Syntax:**

```
AT+EMBODY= <oper>,<id>,<BODY>
text is entered <ctrl-z / ESC>
```

**Response Syntax:**

```
+EMBODY : <oper><id>,<BODY>
Email body entered
OK
```

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ EMBODY=0,1</td>
<td>&gt;</td>
</tr>
<tr>
<td>This is email body #1&lt;ctrl-Z&gt;</td>
<td></td>
</tr>
<tr>
<td>Note: enter email body with &lt;id&gt;=1</td>
<td></td>
</tr>
<tr>
<td>+EMBODY: 1,21</td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Note: successful stored 21 characters as email body with &lt;id&gt;=1</td>
<td></td>
</tr>
<tr>
<td>AT+ EMBODY=0,1</td>
<td>&gt;</td>
</tr>
<tr>
<td>This is email &lt;ESC&gt;</td>
<td></td>
</tr>
<tr>
<td>Note: press &lt;ESC&gt; to abort email body entry</td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Note: abort to store email body with &lt;id&gt;=1</td>
<td></td>
</tr>
<tr>
<td>AT+ EMBODY=1,1</td>
<td>+EMBODY: 1</td>
</tr>
<tr>
<td>This is email body #1</td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Note: read stored email body with &lt;id&gt;=1</td>
<td></td>
</tr>
<tr>
<td>AT+ EMBODY=2,1</td>
<td>OK</td>
</tr>
<tr>
<td>Note: erase email body with &lt;id&gt;=1</td>
<td></td>
</tr>
<tr>
<td>AT+ EMBODY=?</td>
<td>+EMBODY: (0-2),(1-3)</td>
</tr>
<tr>
<td>Note: possible argument</td>
<td></td>
</tr>
</tbody>
</table>

**Defined Values:**

- **<oper>**
  Type of operation:
  0 store email body to flash
  1 read email body from flash
  2 erase email body from flash

- **<id>**
  Identification number (id) of the email body. Valid value is 1 to 3
**Note:**
- As a standard smtp type email, the body should contain alpha-numeric characters only.
- Each email body can contain up to 1024 characters. If data entered is more than 1024 it will stop getting and saved to
- On save email body to a same <id> old body will be over written.

### e. AT+EMSEND command

This command is send an email with pre-saved email subject(using AT+EMSUBJ command); pre-saved email body (content) (using AT+E PMBODY command), plus and additional email body to pre-saved email address(es) (using AT+EMADDR command). Maximum three (group of) reipent(s) can be sent for a single email:
- standard recipient,
- carbon copy (cc) recipient,
- blind carbon copy (bcc) recipient.

GPRS connection (+IPCONNECT=1,1) must to be made and smtp parameters have to be entered properly before sending email otherwise will return +CME ERROR: 3. When finishing a result code will be returned. Result code "0" means email transferred success, otherwise there is error. See following for more explanation.

**Command Syntax:**
AT+EMSEND= <to_id>,<cc_id>,<bcc_id>,<subj_id>,<body_id>,<add_body>

**Response syntax:**
+EMSEND : <result>
OK
+CME EORR 3

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ EMSEND=1</td>
<td>+EMSEND: 0</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: minimum email (no subject and body) successfully</td>
</tr>
<tr>
<td></td>
<td>sent email to email address stored &lt;id&gt;=1</td>
</tr>
<tr>
<td>AT+ EMSEND=0,0,2</td>
<td>+EMSEND: 0</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: minimum email (no subject and body) successfully</td>
</tr>
<tr>
<td></td>
<td>sent email to email address stored &lt;id&gt;=1 as “bcc”</td>
</tr>
<tr>
<td></td>
<td>recipient</td>
</tr>
<tr>
<td>AT+ EMSEND =1,2,3,1,1,&quot;extra&quot;</td>
<td>+ EMSEND: 0</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: email with subject stored with &lt;id&gt;=1; body stored</td>
</tr>
<tr>
<td></td>
<td>with &lt;id&gt;=1 and additional body “extra” is sent to:</td>
</tr>
<tr>
<td></td>
<td>Address with &lt;id&gt;=1 as recipient,</td>
</tr>
<tr>
<td></td>
<td>Address with &lt;id&gt;=2 as cc recipient,</td>
</tr>
<tr>
<td></td>
<td>Address with &lt;id&gt;=3 as bcc recipient</td>
</tr>
<tr>
<td>AT+ EMSEND=1,2,3,1,1,&quot;extra&quot;</td>
<td>+CME ERROR:3</td>
</tr>
<tr>
<td></td>
<td>Note: email sending fail (possible reason : IP not</td>
</tr>
<tr>
<td></td>
<td>connected)</td>
</tr>
<tr>
<td>AT+ EMSEND=1,2,3,1,1,&quot;extra&quot;</td>
<td>+EMSEND: 550</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>email sending fail (smtp reply code: No such user here)</td>
</tr>
</tbody>
</table>

Confidential, the whole present document is the sole property of Maestro Wireless Solutions Limited.
Defined Values:
<to_id>
Identification number (id) of the email address(es) that as a normal email recipient. Valid value is 0 to 50. ('0' or missing parameter means no recipient for this email)

<cc_id>
Identification number (id) of the email address(es) that as a "carbon copy" (cc) email recipient. Valid value is 0 to 50. ('0' or missing parameter means no cc recipient for this email)

<cc_id>
Identification number (id) of the email address(es) that as a "blind carbon copy" (cc) email recipient. Valid value is 0 to 50. ('0' or missing parameter means no recipient for this email)

<subj_id>
Identification number (id) of the email subject. Valid value is 0 to 10. ('0'or missing parameter means no subject for this email).

<body_id>
Identification number (id) of the email body (content). Valid value is 0 to 3. '0'or missing parameter means no saved body will be used for this email.

<add_body>
Additional email body (content) to be sent. Maximum 128 characters can be sent. Identification <add_body> will be added just after body indicated by <body_id>(if available).

?id>
Identification number (id) of the email body. Valid value is 1 to 3

<result>
Result code of the email sending process:

<table>
<thead>
<tr>
<th>Result code</th>
<th>explanation</th>
<th>Comments / countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Email sending successful</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>Reserved</td>
<td>Contact Maestro Wireless</td>
</tr>
<tr>
<td>-2</td>
<td>Reserved</td>
<td>Contact Maestro Wireless</td>
</tr>
<tr>
<td>-3</td>
<td>Smtp setup fail</td>
<td>Check +IPSMTMP parameters</td>
</tr>
<tr>
<td>-4</td>
<td>Cannot resolve smtp server/server not found</td>
<td>Check +IPSMTMP parameters</td>
</tr>
<tr>
<td>-5</td>
<td>Connect smtp server timeout</td>
<td>Retry later</td>
</tr>
<tr>
<td>-99</td>
<td>Other error</td>
<td>Contact Maestro Wireless</td>
</tr>
<tr>
<td>4xx – 5xx</td>
<td>SMTP protocol reply code</td>
<td>Check SMTP document (RFC 821) for explanation</td>
</tr>
</tbody>
</table>

Note:
- As a standard SMTP type email, the body should contain alpha-numeric characters only.
- A "minimum" email contains at least sender's email address and one recipient address. Subject and body can be left empty.
- On save email body to a same <id> old body will be over written.
- When one email is being sent you cannot send another email. To put a queue of emails please use Command String "EM" (email sending) service.

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CHAPTER 10: REMOTE AT COMMAND BY SMS

This feature is to control the modem to interpret AT command from incoming SMS, executing it, and return the result to sender by SMS.

The user can enable the modem to receive AT command by incoming SMS. See following about AT+SMSAT command.

1. Description of the operation

Step 1: send AT command to modem by SMS

```
000000AT+CSQ
```

Step 2: modem execute and return response by SMS

```
+CSQ: 17,0 OK
```

5. When enabled, the modem will treat the incoming SMS as a source of AT command only if all of the following conditions (a, b and c) are fulfilled:
   a. The content of SMS sent to the modem is using standard 7-bit GSM data decoding scheme,
   b. The first 6 characters of the SMS content matches the <key> parameter set by AT+SMSAT command, (default key is “000000”)
   c. The 7th and 8th characters of the SMS content is “AT” (in capital letters)

6. If SMSAT is enabled, the modem will read each incoming SMS, if the conditions mentioned in 1 are matched the message will be executed, even it is an invalid AT command

7. When using SMSAT feature, only +CNMI:x,1,x,x,x setting could be used (i.e. incoming message will be stored in SIM card).

8. The maximum length of the AT command is limited by length of SMS, i.e. 160-6 = 154 characters

9. When the SMS AT command is executed, all intermediate and final responses will be buffered recorded, then return to the sender’s phone number in one single SMS.

10. If response(s) of the AT command is (are) more than 160 characters, only the first 160 characters will be returned.

11. In case the modem cannot get terminal response within 26 seconds, the modem will then abort the command, and return intermediate responses (if present).

12. If the SMSAT feature is enabled, all incoming SMS, either with valid AT command or not, will be erased. This is to prevent SIM card memory from fully filled; such the modem will not receive new SMS.
2. AT command for configuring AT command by SMS

a. AT+SMSAT command

**Command Syntax:**
AT+SMSAT=<mode>(,<key>)

**Response syntax:**
+SMSAT: <mode>,<key>

**Command Possible responses:**
- AT+SMSAT=0 OK
  Note: disable remote AT command by SMS
- AT+SMSAT=1 OK
  Enable remote AT command by SMS
- AT+SMSAT=? +SMSAT: 1,000000
  OK
  Note display current status
- AT+SMSAT=2,123456 OK
  Note: set the <key> value
- AT+SMSAT=? +SMSAT: (0-2),(6)
  OK
  Note: possible argument

**Defined Values:**

- **<mode>**
  0 disable remote AT command by SMS
  1 enable remote AT command by SMS
  2 change the value of the <key>

- **<key>**
  A 6-digit numeric character key from 000000 to 999999. Only incoming SMS with the first 6 characters matching with this key will be treated as a valid source of remote AT command.

3. Limitation and caution to be taken when using remote AT command

This feature will not ‘judge’ the result of executing the command, so care has to be taken not to enter improper command that make the modem becoming out of control:

1. Never send ‘interactive’ AT command by SMS, e.g. AT+CMGS=…. This feature cannot return the prompt to the sender for second input
2. Always wait for the return SMS with AT responses before you send another SMS AT command.
3. It could be in some case (e.g. network failure) the modem cannot return response SMS. The modem will try sending response SMS for three times max. If still not successful it will abort.
4. Always think twice before you send AT command by SMS. For example if you send AT+CPOF it will turn off the modem, and you need to go to access the modem to reset it.
5. Some AT commands can be sent over SMS. See Chapter 17.
CHAPTER 11: CALL SCREENING

This feature enables Heritage to reject incoming call if the phone number does not match one of the entries of authorized phone number list. Unauthorized incoming call will be hanged up within one ring. Up to 10 authorized phone numbers can be stored. Each number can be as long as characters Waiting call can also be rejected.

1. **AT commands for configuring call screening**

   a. **AT+CSRN command**

   This command is to enable or disable call screening feature.

   **Command Syntax:**
   AT+CSRN=<mode>

   **Response syntax:**
   +CSRN: <mode>

   **Command Possible responses:**
   AT+CSRN=0 OK
   Note: disable call screening
   AT+CSRN=1 OK
   Enable call screening
   AT+CSRN=? +CSRN: 1
   Note display current status
   AT+CSRN=? +CSRN: (0-1)
   Note: possible argument

   **Defined Values:**
   <mode>
   0 disable call screening
   1 enable call screening

   **Note:**
   - To use call screening make sure Caller ID service is enabled otherwise all incoming call will be rejected.
   - To apply call screening to waiting call please first enable Call waiting indication by command AT=CCWA=1,1
   - Rejected incoming will not be diverted to voice mail.

   b. **AT+CSNW command**

   This command is to enter authorized phone number.

   **Command Syntax:**
   AT+CSNW=<id>,<num>

   **Response syntax:**
   OK
Command Possible responses:
AT+CSNW=1,"12345678" OK
Note: enter authorized number to location 1
AT+CSNW=11,"12345678" +CME ERROR: 3
Note: location out of range
AT+CSNW=3,"1qaaa" +CME ERROR: 3
Note: non-numeric characters not allowed
AT+CSNW=? +CSRN: (1-10),(20)
Note: possible argument

Defined Values:

<i>id</i>
Location of the authorized phone number to be stored. Valid range is from 1 to 10

<i>num</i>
Authorized phone number. First digit can be “+”, others must be numeric digits. Maximum length is 20

Note:
- Enter phone number exactly same as the incoming one, especially if entering International phone number. Use AT+CLIP command to check incoming call number first.
- Enter empty phone number in the <i>num</i> field will erase the record of that location.

c. AT+CSNR command

This command is to read authorized phone number entered.

Command Syntax:
AT+CSNR=<id1>In,(,<id2>)

Response syntax:
+CSNR: <id>,<num>….

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CSNR=1</td>
<td>+CSNR: 1,&quot;12345678&quot; OK</td>
</tr>
<tr>
<td>AT+CSNR=?</td>
<td>+CSNR:=(1-10),(1-10) OK</td>
</tr>
</tbody>
</table>

Defined Values:

<i>id1</i>
Beginning location of the authorized phone number to be read. Valid range is from 1 to 10.

<i>id2</i>
Ending location of the authorized phone number to be read. Valid range is from 1 to 10.
d. AT+CSND command

This command is to erase authorized phone number entered.

**Command Syntax:**
AT+CSND=<id1>(,<id2>)

**Response syntax:**
+CSNR: <id>,<num>…..

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CSND=1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: erase authorized number in location 1</td>
</tr>
<tr>
<td>AT+CSNR=1,8</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: erase authorized number in from location 1 to 8</td>
</tr>
<tr>
<td>AT+CSND=?</td>
<td>+CSND=(1-10),(1-10)</td>
</tr>
<tr>
<td></td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: possible argument</td>
</tr>
</tbody>
</table>

**Defined Values:**

<id1>
Beginning location of the authorized phone number to be erased. Valid range is from 1 to 10.

<id2>
Ending location of the authorized phone number to be erased. Valid range is from 1 to 10. AT+CSRN command.
CHAPTER 12: MODEM STATUS CHECK AND MONITORING

The Modem Status Check and Monitoring feature makes the modem can check the status of the modem in either “one shot” or periodic (per minute) mode. Modem will also report check result by SMS if result is beyond preset limit, and reset automatically if losing network connection.

Following items will be checked:
- network registration (periodic mode only, triggering reset)
- rom test
- signal strength (can trigger reporting)
- IP address of modem (only when GPRS connection activated).

1. **AT command for Modem Status Check and Monitoring**

   a. **AT+TMODE command**

This command is to perform and setup modem status check and monitoring feature

**Command Syntax:**
AT+TMODE (=<mode>(,<para>))

**Response syntax:**
+TMODE: <test1>,<test2>....

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+TMODE</td>
<td>+TMODE: 1, 15, “10.111.222.33”, 3814 OK Note: execute status check (“one shot” mode)</td>
</tr>
<tr>
<td>AT+TMODE=?</td>
<td>+TMODE: (0-4), (15) Note: possible argument</td>
</tr>
<tr>
<td>AT+TMODE?</td>
<td>+TMODE: 1, 1234567, 10, 3500 OK Note: display current setting</td>
</tr>
<tr>
<td>AT+TMODE=0</td>
<td>OK Note: disable periodic mode check</td>
</tr>
<tr>
<td>AT+TMODE=1</td>
<td>OK Note: enable periodic mode check</td>
</tr>
<tr>
<td>AT+TMODE=2,”1234567”</td>
<td>OK Note: set telephone number for periodic mode reporting</td>
</tr>
<tr>
<td>AT+TMODE=3,10</td>
<td>OK Note: set network signal trigger level for remote reporting</td>
</tr>
<tr>
<td>AT+TMODE=4,3450</td>
<td>OK Note: set input voltage trigger level for remote reporting</td>
</tr>
</tbody>
</table>

**Defined Values:**
- `<mode>`
  - 0 disable periodic mode check
  - 1 enable periodic mode check
  - 2 to set the number in `<para>` field as telephone number for periodic mode check reporting. See section 7.1.2 for details
  - 3 to set the number in `<para>` field as network signal trigger level for periodic mode check reporting. See section 1b for details

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b. Operation of Modem Status Check and Monitoring

“One Shot” mode:
When user enters AT+TMODE command the modem will perform a single check and will send back the result like this:

+TMODE: 1, 15, “10.111.222.33”, 3814
OK

Meaning of parameters:

<table>
<thead>
<tr>
<th>Check item</th>
<th>Result field #</th>
<th>Result</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>rom data checksum</td>
<td>1</td>
<td>0 fail</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 pass</td>
<td></td>
</tr>
<tr>
<td>network signal strength</td>
<td>2</td>
<td>Range from 1-32 (or 99)</td>
<td>same as AT+CSQ</td>
</tr>
<tr>
<td>modem IP address</td>
<td>3</td>
<td>In xxx.xxx.xxx.xxx format</td>
<td>Only shown when GPRS session is activated</td>
</tr>
<tr>
<td>Input voltage</td>
<td>4</td>
<td>Voltage to the modem's internal module (times 1000)</td>
<td>See * below</td>
</tr>
</tbody>
</table>

* Note. This is not for end customer use.

“Periodic” mode:
When user enters AT+TMODE=1 command the modem will perform periodic check every one minute:

- Firstly it will check if the modem is registered to the network; if the modem is not registered to the network it will increase a counter by one. If the counter reach 5 (i.e. not registered for consecutive 5 minutes) the modem will reset
- If the modem is registered to the network the counter will be reset to 0 and perform check same as “one shot” mode
- If the result of the network signal strength is lower than the setting of AT+TMODE=3,x the test result will be sent over SMS to the telephone number set by AT+TMODE=2,xxxxxxx (max number of digit is 20)
- If the result of the input voltage is lower than the setting of AT+TMODE=4,x the test result will be sent over SMS to the telephone number set by AT+TMODE=2,xxxxxxx
- If 3 consecutive checks fail (i.e. 3 SMS sent) then the periodic mode check will be disabled automatically.

Network signal trigger level range is from 1-31.
CHAPTER 13: REMOTE PROGRAM UPDATE

By using this feature, user can download the new version of Maestro Heritage program from a FTP server and upgrade the program. By combining Remote AT command by SMS feature user can control the Maestro to complete the program downloading and updating process remotely.

To perform the whole program update process, several AT commands (steps) have to be sent:
1. AT+IPGPRS to set network parameters (APN)
2. AT+IPFTP to set FTP server parameters (name, user id, password)
3. AT+FTPDOTA to set filename and FTP path and start downloading (*)
4. AT+ADINSTALL to install the downloaded new program (*)

(*) Note: by adding one extra parameter after step 3 complete, step 4 will be executed automatically. See following sections for details

1. AT command for remote firmware update
   a. AT+IPFTP command

This command is to set FTP server parameters

Command Syntax:
AT+IPFTP =<port>,<type>,<mode>,<server>,<id>,<pwd>

Response syntax:
OK

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPFTP=</td>
<td>OK</td>
</tr>
<tr>
<td>21,&quot;I&quot;,&quot;A&quot;,&quot;201.123.222.222&quot;,&quot;userid&quot;,&quot;pwd&quot;</td>
<td>Note: setup FTP parameter</td>
</tr>
<tr>
<td>AT+IPFTP=?</td>
<td>+IPFTP: (0-65535),</td>
</tr>
<tr>
<td></td>
<td>(&quot;A&quot;,&quot;I&quot;,&quot;E&quot;),(&quot;P&quot;,&quot;A&quot;),(120),(64),(64)</td>
</tr>
<tr>
<td>AT+IPFTP?</td>
<td>+IPFTP: 21,&quot;I&quot;,&quot;A&quot;,&quot;201.222.222.222&quot;,&quot;userid&quot;,&quot;pwd&quot;</td>
</tr>
<tr>
<td></td>
<td>Note: display current setting</td>
</tr>
</tbody>
</table>

Defined Values:

<port>
Port number of the FTP server. Default value is 21

$type$
Translation of carriage return, valid values are:
- I image (no translation, default),
- A ASCII
- E EBCDIC

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b. AT+FTPDOTA command

This command is to inform the modem the filename and FTP path. The modem will login to the FTP server, download the update file, and optionally execute the update process.

**Command Syntax:**
AT+FTPDOTA =<filename>[,<path>],[,<update>]

**Response syntax:**
+FTPDOTA : 0, <filename>, <filesize>
+FTPDOTA : <result>
+ADINSTALL : <adinstall result>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+FTPDOTA=&quot;update.dwl&quot;</td>
<td>+FTPDOTA: 0, update.dwl, 17000 OK</td>
</tr>
<tr>
<td></td>
<td>Note: download &quot;update.dwl&quot; file from FTP root directory, file size is 17000 bytes</td>
</tr>
<tr>
<td>AT+FTPDOTA=&quot;update1.dwl,&quot;sub&quot;</td>
<td>+FTPDOTA: 0, update.dwl, 17001 OK</td>
</tr>
<tr>
<td></td>
<td>Note: download &quot;update1.dwl&quot; file from FTP &quot;sub&quot; directory, file size is 17001 bytes</td>
</tr>
<tr>
<td>AT+FTPDOTA=&quot;update1.dwl,&quot;sub&quot;,1</td>
<td>+ADINSTALL: 2 M100 VAF_094d_OAT316_32 Nov 11 200718:01:42</td>
</tr>
<tr>
<td></td>
<td>Note: download &quot;update1.dwl&quot; file from FTP &quot;sub&quot; directory, and perform program update successfully</td>
</tr>
<tr>
<td>AT+FTPDOTA?</td>
<td>+FTPDOTA: update.dwl, 17001 OK</td>
</tr>
<tr>
<td></td>
<td>Note: check downloaded file ready for update</td>
</tr>
<tr>
<td>AT+FTPDOTA?</td>
<td>+FTPDOTA: OK</td>
</tr>
<tr>
<td></td>
<td>Note: no downloaded file</td>
</tr>
<tr>
<td>AT+FTPDOTA=&quot;update1.dwl&quot;</td>
<td>+FTPDOTA: -3 OK</td>
</tr>
<tr>
<td></td>
<td>Note: error on downloading file (FTP open fail)</td>
</tr>
<tr>
<td>AT+FTPDOTA=?</td>
<td>+FTPDOTA: (128)(128)</td>
</tr>
<tr>
<td></td>
<td>Note: possible argument</td>
</tr>
</tbody>
</table>

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Defined Values:

- **<filename>**
  File name of the file to be downloaded. Maximum 128 characters.

- **<path>**
  Path (directory) name where the file is placed. Maximum 128 characters. If `<path>` is omitted, program will try to download from FTP’s root (entry) directory. Maximum 128 characters.

- **<update>**
  If a third parameter ‘1’ is entered, the program will execute the AT+ADINSTALL command if the download process is successful. This is useful for sending update commands over SMS, so that one SMS is saved in this case. See next section for the details of AT+ADINSTALL command.

- **<result>**
  Result code of the downloading process:

<table>
<thead>
<tr>
<th>Result code</th>
<th>explanation</th>
<th>Comments / countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Download successful</td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>SIM card problem</td>
<td>Check SIM card and PIN</td>
</tr>
<tr>
<td>-2</td>
<td>Internal memory problem</td>
<td>Try reset modem</td>
</tr>
<tr>
<td>-3</td>
<td>FTP connection fail</td>
<td>Check network signal, check FTP status, check FTP address</td>
</tr>
<tr>
<td>-4</td>
<td>Reserved</td>
<td></td>
</tr>
<tr>
<td>-5</td>
<td>Download file size not same as FTP reported</td>
<td>Retry downloading</td>
</tr>
<tr>
<td>-6</td>
<td>Not enough space for downloading</td>
<td>Contact Maestro Wireless</td>
</tr>
<tr>
<td>-7</td>
<td>File format incorrect</td>
<td>Check file for downloading</td>
</tr>
<tr>
<td>-8</td>
<td>Error writing flash</td>
<td>Contact Maestro Wireless</td>
</tr>
<tr>
<td>4xx – 5xx</td>
<td>FTP protocol return code</td>
<td>Check FTP document (RFC 959) for explanation</td>
</tr>
</tbody>
</table>

**c. AT+ADDINSTALL command**

This command is perform the program update process. File downloaded by AT+FTPDOTA command will replace the existing Heritage program. Modem will restart and then restart result and version will be displayed.

**Command Syntax:**
AT+ADINSTALL

**Response syntax:**
+ADINSTALL: <result>, <ver>

<table>
<thead>
<tr>
<th>Command</th>
<th>Possible responses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+ADINSTALL</td>
<td>+ADINSTALL: 2&lt;br&gt; HERITAGE_090b_OAT422a_32 Feb 26 200811:42:36&lt;br&gt; <em>Note: update successful, show existing program version</em></td>
</tr>
<tr>
<td>AT+ADINSTALL</td>
<td>+ADINSTALL: 3&lt;br&gt; HERITAGE_090a_OAT422a_32 Jan 26 200811:42:36&lt;br&gt; <em>Note: update unsuccessful, show existing program version</em></td>
</tr>
<tr>
<td>AT+ADINSTALL</td>
<td>+CEE ERROR: 3&lt;br&gt; <em>Note: update unsuccessful, no update file available</em></td>
</tr>
</tbody>
</table>

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Defined Values:

\(<result>\)
- 2  update process successful
- 3  update process unsuccessful (original program will be loaded)

Note: for other result code please contact Maestro Wireless Solutions

\(<ver>\)
Version number of existing running Software Tools.

d. Notes and cautions to be taken

1. **This feature is ONLY for updating new program for Heritage. Do not use it for downloading other things.** Always contact Maestro Wireless or distributor for correct update file and information.
2. If you want to perform update for modem at remote site by AT command over SMS, make sure the feature is enabled by command AT+SMSAT=1 is entered.
3. Make sure you have setup GPRS settings by AT+IPGPRS command. When entering AT+FTPDOTA command the program will make GPRS connection automatically if not connected before.
4. It is recommended to stop other Software Tools such as AutoTCP/UDP connection during program downloading and updating.
5. Depending on the file size and network condition the download time could be a few minutes up to 30 minutes. Be patient to wait for response after entering AT+FTPDOTA command.
6. Do not use “~” character on file path because it cannot be transferred correctly over SMS.
7. No resume function on FTP downloading. The whole file has to be downloaded at one time otherwise the downloaded data will be discarded.
CHAPTER 14: COMMAND STRING - INTRODUCTION

“Command String” is a set of programmable scripts for Maestro Heritage mode. User can input sets of Command Strings to control various kinds of “Service”. Unlike AT command, Command strings can be stored inside heritage and can be executed upon output of certain services.

1. Command String and “Service” Concept

   - Command String
   - Input port
   - Alarm
   - Counter
   - Timer
   - Command String
   - Command String
   - Command String
   - Stored in flash
   - Output port
   - SMS
   - Email sending
   - Power Ctrl
   - “Trigger capable” Services
   - Non “Trigger capable” Services

   **“Command String” and “Service” operation mechanism**

1. Use AT command to enter preset Command Strings
2. Command strings can be executed upon power up or directly by AT commands
3. Executed Command Strings will drive some Services to be done (e.g. sending SMS or setting output pins)
4. Executed Command Strings can also configure and control some Services that have “trigger” capability.
5. These Services, when a certain pre-defined condition is matched (e.g. timer reach zero) can “trigger” a stored Command String.
6. Execute stored Command String to control Services again

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CHAPTER 15: COMMAND STRING – WRITING AND USING

1. **Structure of Command String**
   A single Command String is a text string composed with four fields, for example:

   ![Diagram of Command String structure]

   Each field is separated by a space (ascii value 32)

   a. **Service type**

   This field has two capital characters indicates the type of Service to be chosen:

<table>
<thead>
<tr>
<th>Field entry</th>
<th>AL</th>
<th>CT</th>
<th>TM</th>
<th>IP (*)</th>
<th>OP (*)</th>
<th>SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>alarm</td>
<td>Counter</td>
<td>Countdown timer</td>
<td>input ports</td>
<td>output ports</td>
<td>SMS</td>
</tr>
<tr>
<td>See Chapter</td>
<td>13.1</td>
<td>13.2</td>
<td>13.3</td>
<td>13.4</td>
<td>13.5</td>
<td>13.6</td>
</tr>
</tbody>
</table>

   (*) Services need optional I/O plug-in board

   See further chapters for the explanation of each service.

   b. **Service Id**

   Each type of Service there has more than one unit; e.g. there are 5 counters available so the id range is 1 to 5

   c. **Operation type and Operation argument**

   For each type of Service there are few kinds of operations; e.g. “TM 1 ST 100” means to set the value or countdown timer #1 to 100 seconds. See further chapters for the explanation of each service.

2. **Concatenating Command String**

   You can concatenate Command Strings update 128 bytes long totally (including space). They will be executed sequentially. However, if one Command String is incorrect or invalid execution will be stopped and successive Command Strings will not be executed.

   For example:

   ![Example of Concatenated Command String]

   Confidential, the whole present document is the sole property of Maestro Wireless Solutions Limited.
First String “TM 1 ST 100” will be executed
Second String “TM 1 TR 99” will not be executed because “99” is out of range
Third String “TM 1 SW 1” is correct but will not be executed because execution is stopped on 2nd String

3. Entering and executing Command String
You can use the following AT commands to store and execute Command String

a. AT+CSTR command

Description:
This command is used to execute a Command String directly.

Command Syntax:
AT+CSTR= <string>

Response Syntax:
OK
+CME ERROR : 3

Command Possible responses:
AT+CSTR=“TM 1 ST 3” OK
Note: entire Command String executed successfully
AT+CSTR=“TM 1 ST 3 TM 30 ST 4” +CME ERROR: 3
Note: one Command String cannot be executed

Defined Values:
<string>
Command String
Note: When there is error in between concatenated Command String +CME ERROR: 3 will be returned. See 2.2.

b. AT+CSTRSET command

Description:
This command is used to store, read and delete Command String. It can also be used to execute stored Command String.

Command Syntax:
AT+CSTRSET= <oper>,<id>,[,<string>]

Response Syntax:
OK
+CME ERROR: 3

Command Possible responses:
AT+CSTRSET=0,1,”TM 1 ST 3” OK
Note: store Command String with String id = 1
AT+CSTRSET=0,99,”TM 1 ST 3” +CME ERROR: 3
Note: id out of range
AT+CSTRSET=1,1 +CSTRSET : 1, “TM1 ST 3”
Note: read stored Command String id 1

Confidential, the whole present document is the sole property of Maestro Wireless Solutions Limited.
<table>
<thead>
<tr>
<th>Command Sequence</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CSTRSET=3,1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: execute stored Command String id 1</td>
</tr>
<tr>
<td>AT+CSTRSET=2,1</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>Note: erase Command String id 1 from flash memory</td>
</tr>
<tr>
<td>AT+CSTRSET=3,1</td>
<td>+CME ERROR: 3</td>
</tr>
<tr>
<td></td>
<td>Note: id 1 is empty</td>
</tr>
</tbody>
</table>

**Defined Values:**

**<oper>**

Define type of operation:

0  store Command String to flash
1  read Command String from flash
2  erase Command String from flash
3  execute Command String stored in flash

**<id>**

Identification number (id) of the Command String. Valid value is 1 to 50, and 80; i.e.

- up to 51 Command Strings can be stored.
- Command String with id = 80 will be executed when modem power up

**<string>**

Command String

**Note:**

- Each Command String is limited to 128 bytes.
- The program will NOT check if the input Command String is valid or not.
CHAPTER 16: COMMAND STRING – SERVICES

“Service” is a kind function or tool that can be made use by Command String. There are two kinds of Services:

- **Trigger capable**
  When a certain pre-defined condition is matched (e.g. timer reach zero) “trigger” a stored Command String.
  These Services include: Alarm, Counter, Input Port, and Countdown Timer

- **Non-Trigger capable**
  Can only perform job when called by Command String.
  These Services include: Output Port, SMS

1. **Alarm Service**

Alarm is used to execute a Command String when the real-time clock of the Heritage meets the set time of the Alarm.

To use Alarm it is required to set the real-time clock of the modem properly, see AT+CCLK in AT command manual. There are total of 5 Alarms can be used

a. **Alarm Service Command String Syntax and explanation**

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AL</td>
<td>(1 to 5)</td>
<td>ST</td>
<td>09/10/10,12:00:00</td>
<td>Set alarm date/time yy/mm/dd,hh:mm:ss format</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST</td>
<td>0</td>
<td>Cancel preset</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TR</td>
<td>(1 to 50)</td>
<td>Set Command String to be run, 0 to cancel setting</td>
</tr>
</tbody>
</table>

Example: Set alarm #1 to execute Command String #20 at 01OCT2008, 01:00:00

AL 1 TR 1 AL 1 ST 08/10/01,01:00:00

Example: Cancel #1 Alarm setting

AL 1 ST 0

Example: Cancel #1 Alarm executing Command String

AL 1 TR 0

**Note:**

- The Alarm date time input MUST to fulfill the following requirements:
  1. In yy/mm/dd,hh:mm:ss format, program will also check if input date/time is valid or not
  2. At least 4 minutes later than current modem’s real-time clock time (check by AT+CCLK command)

- Do not concatenate after ST operation; set time operation should be at the last part of Command String

- After alarm time, the ST setting of that Alarm will be lost

- This service will make use of Heritage internal alarm command (AT+CALA) so please avoid using AT+CALA command by yourself when Alarm Service is used.

- If the modem is restarted, date time setting of each Alarm will be checked against real-time clock time. If time is passed the setting will be cancelled.

- Alarm Service is “one-shot” type. There is no periodic alarm like “daily” or “weekly”

b. **Reading Alarm Service status**

See Chapter 17 for details.
2. Counter Service

Counter is used to execute a Command String when the Counter value equals a preset value. There are total of 5 Counters.

a. Counter Service Command String Syntax and explanation

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>(1 to 5)</td>
<td>DE</td>
<td>1 TO 255</td>
<td>Decrement the value of Counter with argument value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IN</td>
<td>1 TO 255</td>
<td>Increment the value of Counter with argument value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RS</td>
<td>0</td>
<td>Reset the Counter value to zero</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ST</td>
<td>-32768 to 32767</td>
<td>Set the “trigger” value If Counter value equal this value, will execute Command String</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TR</td>
<td>(1 to 50) to 0</td>
<td>Set Command String to be run, 0 to cancel setting</td>
</tr>
</tbody>
</table>

Example: Set Counter #1 to execute Command String #10 if Counter value equal 100

CT 1 ST 100 CT 1 TR 10

Example: Increase Counter #1 value by 20

CT 1 IN 20

Example: Reset Counter #1 value to 0

CT 1 RS 0

Note:
- Initial Counter and trigger values are zero.
- The Counter is recorded by a signed 16 bit register, if the Counter value is 32767 and you increase it by 1, the value will change to -32768
- There is no limit on no. of times of triggering. E.g. If you first set trigger value to 2 and reset Counter to 0, then you increment counter by 2, then decrement by 2 and increment by 2 again. Then the associated Command String will be executed twice

b. Reading Counter Service status

See Chapter 17 for details.

3. Countdown Timer Service

Countdown Timer is used execute a Command String when the Timer value reach zero. Counting period is 1 second. There are total of 10 Countdown Timers.

a. Countdown Timer Service Command String Syntax and explanation

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM</td>
<td>(1 to 10)</td>
<td>ST</td>
<td>1 TO 2147483647</td>
<td>Initial value of Countdown Timer (in seconds)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SW</td>
<td>0 TO 1</td>
<td>Start (1) or Stop (0) Timer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TR</td>
<td>(1 to 50) to 0</td>
<td>Set Command String to be run, 0 to cancel setting</td>
</tr>
</tbody>
</table>

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Example: Set Countdown Timer #1 to execute Command String #10 and start 600 seconds countdown

```
TM 1 ST 600 TM 1 SW 1 TM 1 TR 10
```

Example: Stop Countdown Timer #1

```
TM 1 SW 0
```

Example: Cancel Countdown Timer #1 to trigger Command String

```
TM 1 TR 0
```

**Note:**

- When the Countdown Timer expires (reach 0) it will stop automatically (SW 0).
- If two or more Timers expire at the same timer, Timer with smaller id has higher priority, i.e. Command String related to that Timer will be executed first.
- These are not precision Timers, if the Modem is busy (e.g. with network communication). The execution time may be delayed

**b. Reading Countdown Timer status**

See Chapter 17 for details.

### 4. Input Port Service

**NOTE:** An optional I/O plug-in board is needed to plug to Heritage for using this Service. Contact Maestro Wireless for information.

Input Port Service can use the signal of I/O board’s input ports to control the execution of Command String.

You can control the change of single or multiple Input Port signals as a condition to trigger Command String execution.

**a. Input Port Service Command String Syntax and explanation**

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP</td>
<td>1 to 6, 101 to 106</td>
<td>DR</td>
<td>0 to 1 if IP# is 1 to 6</td>
<td>Direction of I/P signal change to trigger</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 TO 63 if IP# is 101 to 106</td>
<td>Binary sum value of multiple I/P to trigger</td>
</tr>
<tr>
<td>MS</td>
<td>1 TO 63</td>
<td></td>
<td></td>
<td>“Mask” value to select multiple I/Ps for triggering</td>
</tr>
<tr>
<td>TH</td>
<td>1 to 255</td>
<td></td>
<td></td>
<td>Duration of the I/P state to trigger, unit in 0.1s</td>
</tr>
<tr>
<td>TR</td>
<td>(1 to 50)</td>
<td></td>
<td>0</td>
<td>Set Command String to be run, 0 to cancel setting</td>
</tr>
</tbody>
</table>

Example: Configure Input Port #1 with detection “high to low” and threshold value 0.1s, and trigger Command String #5 if signal condition match:

```
IP 1 DR 1 IP 1 TH 1 IP 1 TR 5
```
Example: Configure Input Port #4 is high and Port#6 is low and threshold value 0.1s, and trigger Command String #5 if signal condition match:

\[ IP\ 101\ MS40\ DR8\ IP\ 101\ TH\ 1\ IP\ 1\ TR\ 5 \]

Example: cancel Input Port#1 to trigger Command String

\[ IP\ 1\ TR\ 0 \]

b. **Input Port operation mechanism (single I/P triggering)**

![Diagram of DC voltage to Input Port]

The Input Port will give out a high or low signal depending on the input voltage to the port. The Command String can check the change of Input port Signal (operation “DR”):

- IP 1 DR 0 → detect a low-to-high input voltage change
- IP 1 DR 1 → detect a high-to-low input voltage change

To prevent transient noise signal, a threshold value can be set (operation “TH”). This is the time period required for the detected state to trigger Command String execution. Unit is in 1 millisecond. Valid value from 1 to 50 (0.1 sec to 5 sec)

E.g. TH 10 → Threshold value is 1 sec.

E.g. When set as low-to-high triggering and threshold 1 second: IP 1 DR 0 IP 1 TH 10 IP 1 TR 5

When \( T = 1 \) second the Command String #5 will be executed.

E.g. when set as high-to-low triggering and threshold 1 sec IP 1 DR 1 IP 1 TH 10 IP 1 TR 5

When \( T = 1 \) second the Command String #5 will be executed.

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c. Input Port operation mechanism (multiple I/P triggering)

For multiple I/P triggering each I/P port will be assigned with a numerical value:

<table>
<thead>
<tr>
<th>I/P#</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>value (decimal)</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>value (binary)</td>
<td>1</td>
<td>10</td>
<td>100</td>
<td>1000</td>
<td>10000</td>
<td>100000</td>
</tr>
</tbody>
</table>

To select I/P Ports use the "MS" operation with value equal to the sum of values according to the above table, for example:

IP 101 MS 40 → I/P Port #4 and 6 signal is selected for Id 101 (8+32)
IP 102 MS 3 → I/P Port #1 and #2 signals is selected for Id 102 (1+2)

And operation “DR” is now used to determine the state(s) (not direction) of I/P Ports to trigger. If the I/P is “low” (0) state the value is 0, otherwise the valuing method is same as “MS” operation, for example:

IP 101 DR 32 → both I/P Port #4 and #6 with high ‘1’ signal will trigger (0+32)
IP 102 DR 2 → both I/P Port #1 is low (0) and #2 is high ‘1’ signal will trigger. (0+2)

"TH" operation is same as single I/P triggering

Note:
- Due to product limitation the modem cannot detect switching action with period less than 100ms. If the input signal change is less than 100ms this feature will not be able to detect accurately.
- Always uses Id#101 to 106 for multiple I/P triggering application.
- If two or more I/P Ports change at the same timer, I/P Port smaller id have higher priority, i.e. Command String related to that I/P Port will be executed first.
- It is possible that a single I/P Port can be included into two or more multiple I/P Port groups.
- In case of multiple I/P triggering it will NOT check the direction of signal change of each included I/P; just check the combined state value against DR value. (0+2)

d. Reading I/P Port status

See Chapter 17 for details.
5. Output Port Service

NOTE: An optional I/O plug-in board is needed to plug to Heritage for using this Service. Contact Maestro Wireless for info.

Output Port Service can control the state of I/O board’s output ports by Command String.

a. Output Port Service Command String Syntax and explanation

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP</td>
<td>(1 to 6)</td>
<td>SW</td>
<td>0 TO 1</td>
<td>Set the state of Output Port</td>
</tr>
</tbody>
</table>

Example: Set the Output Port #1 with logic state “ON” (1)

OP 1 SW 1

Input Port operation mechanism:

OP 1 SW 1 → Output Port #1 will short
OP 1 SW 0 → Output Port #1 will open

Note:
Read I/O board plug-in documentation for the connecting and specifications of Output Ports. When power up or reset, ALL Output Ports are set to logic 0 (open). Previous output state will NOT be kept.

b. Reading O/P Port status

See Chapter 17 for details.

6. SMS Service

This service is used to send out a SMS to phone number recorded in the first 10 phonebook records in SIM card.

a. SMS Service Command String Syntax and explanation

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM</td>
<td>(1 to 10)</td>
<td>SN</td>
<td>%CTn %IP %TMn</td>
<td>Send out the SMS to phone number inside SIM card</td>
</tr>
</tbody>
</table>

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Example: Send a message “ALERT” to phone number store in SIM phonebook #1:

**SM 1 SN ALERT**

Example: Send a message “Counter#2_value_is_20” to phone number store in SIM phonebook #1:

**SM 1 SN Counter#2_value_is_%CT2**

b. Using “variable” options within SMS content

In the SMS content field you can use “%” and Service type to insert the current value of Service into the SMS content:

<table>
<thead>
<tr>
<th>Variable</th>
<th>%CTn</th>
<th>%TMn</th>
<th>%IP</th>
<th>%OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Current value of counter Id#n</td>
<td>Current value of Timer Id#n</td>
<td>Current I/P Ports’ summing value</td>
<td>Current O/P Ports’ summing value (calculation same as I/P Ports)</td>
</tr>
<tr>
<td>Range of ‘n’</td>
<td>1 to 5</td>
<td>1 to 10</td>
<td>(See Chap 13.4.c for calculation)</td>
<td>(See Chap 13.4.c for calculation)</td>
</tr>
</tbody>
</table>

Invalid Service name or Id will be ignored.

**Note:**

1. Due to modem/SIM initialization it is recommended to send SMS 30 seconds after power up.
2. Only send SMS with “normal” characters. If SMS content has character with ASCII value outside the range between 11 and 127, the SMS may not be sent properly.
3. In case of sending SMS failure (e.g. network problem) the program will delay 0.5 second and try to resend the SMS. If the second time retry (i.e. 3 times total) fails this SMS delivery will be aborted.
4. The maximum length of the SMS content is limited by the maximum length of Command String (128 bytes). The more of Command Strings, the less of SMS length.
7. Email Sending Service

This service is used to send out an Email to one or more email saved address, with saved email subject and saved plus variable email content. Please read Chapter 9 for entering email address, subject and body. Up to 10 set of groups (service type EM, id 1 to 10) can be set with different combinations of "elements" : recipient(to,cc,bcc), subject and body.

a. Email Sending Service Command String Syntax and explanation

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id</th>
<th>3rd field Operation type</th>
<th>4th field Operation argument</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM</td>
<td>(1 to 10)</td>
<td>TO</td>
<td>(0-50)</td>
<td>Id of recipient email address (see Chapter 9.2b) 0 : no recipient</td>
</tr>
<tr>
<td>CC</td>
<td>(0-50)</td>
<td></td>
<td></td>
<td>Id of “cc&quot; recipient email address (see Chapter 9.2b) 0 : no cc recipient</td>
</tr>
<tr>
<td>BC</td>
<td>(0-50)</td>
<td></td>
<td></td>
<td>Id of “bcc&quot;recipient email address (see Chapter 9.2b) 0 : no bcc recipient</td>
</tr>
<tr>
<td>SU</td>
<td>(0-10)</td>
<td></td>
<td></td>
<td>Id of email subject (see Chapter 9.2c) 0 : no subject</td>
</tr>
<tr>
<td>BD</td>
<td>(0-3)</td>
<td></td>
<td></td>
<td>Id of email body (see Chapter 9.2c) 0 : no body</td>
</tr>
<tr>
<td>SN</td>
<td>(additional content)</td>
<td></td>
<td>%CTn %IP %OP %TMn</td>
<td>Send out the email with above setting plus additional content &quot;%&quot; to indicate “variable” options in SMS additional content</td>
</tr>
</tbody>
</table>

Example: Setting up EM set #1 with elements: recipient #1, cc #3, bcc #4, subject #1, content #2:

EM 1 TO 1 EM 1 CC 3 EM 1 BC 4 EM 1 SU 1 EM 1 BD 1

Example: Sending email EM set#1 with additional content "HELLO_WORLD":

EM 1 SN HELLO_WORLD

Example: Setting up EM set #2 with elements: recipient bcc #3, no subject and content only "0", and send out immediately:

EM 2 BC 3 EM 2 SN 0

Example: Send a message “Counter#2_value_is_20" to phone number store in SIM phonebook #1:

SM 1 SN Counter#2_value_is_%CT2

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b. Using “variable” options within additional email content

In the Email additional content field you can use “%” and Service type to insert the current value of Service into the additional content:

<table>
<thead>
<tr>
<th>Variable</th>
<th>%CTn</th>
<th>%TMn</th>
<th>%IP</th>
<th>%OP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Current value of counter Id#n</td>
<td>Current value of Timer Id#n</td>
<td>Current I/P Ports’ summing value</td>
<td>Current O/P Ports’ summing value (calculation same as I/P Ports)</td>
</tr>
<tr>
<td>Range of ‘n’</td>
<td>1 to 5</td>
<td>1 to 10</td>
<td>(See Chap 13.4.c for calculation)</td>
<td>(See Chap 13.4.c for calculation)</td>
</tr>
</tbody>
</table>

Invalid Service name or Id will be ignored.

Note:
1. To use Email Sending Service make sure all parameters has been setup properly first:
   - APN (+IPGPRS)
   - SMTP server (+IPSMTP)
   - Sender and recipient address (+EMADDR)
   - Subject (+EMSUBJ)
   - Body (+EMBODY)
   It is strongly suggested you have tested the email sending function by using AT+EMSEND command to send test emails first before using EM Command Sting.
2. If Operation argument of TO, CC, BC, SU and BD is set to 0 (default), the associated Email set will not contain that element
3. A minimum email contains one recipient (either TO, CC or BC) and one character of additional email content.
4. Unlike AT+EMSEND command, sending email use EM service will automatically making GPRS connection (+IPCONNECT=1,1)
5. In case email sending is unsuccessful due to any reason, the same email will be resent for max 2 more times. If all retries are fail that Email will be aborted.
6. When using EM service maximum 10 emails can be put on sending queue, further Email sending requests will be aborted. Buffered email queue is volatile and will be lost If modem Is power off or reset. Also when there is EM service in queue AT+EMSEND command will not be allowed.
7. The maximum length of the SMS content is limited by the maximum length of Command String (128 bytes). The more of Command Strings, the less of SMS length.

c. Reading Email Sending Service status

See Chapter 17 for details.
8. Device Power Control Service

By using Device Power Control Service user can control on/off state of certain component of the Heritage, in order to save power consumption. A single Service id field can be set to control four parts of the Heritage.

a. Device Power Control Service Command String Syntax and explanation

<table>
<thead>
<tr>
<th>1st field Service type</th>
<th>2nd field Service id (0 to 15)</th>
<th>3rd field Operation type (don’t care)</th>
<th>4th field Operation argument (don’t care)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW</td>
<td></td>
<td></td>
<td></td>
<td>Service Id to decide component’s on/off state</td>
</tr>
</tbody>
</table>

Example: Enable low clock mode and disable LEDs :

PW 3 0 0

Example: Enable low clock mode; disable LEDs, UART and deregister from Network

PW 15 0 0

The value of Service Id is the sum of the values each of which is related to a particular Device Power Control operation:

<table>
<thead>
<tr>
<th>value</th>
<th>Function</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Turn off LEDs except network status LED</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Enable power down mode (W32K mode) Same as AT+W32K=1 command</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Deregister from network (&quot;Flight mode&quot;) Same as AT+COPS=2 command</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Turn off UART Com port will not get any data</td>
<td></td>
</tr>
</tbody>
</table>

The larger the id value of PW, the more power saving of the Heritage. For example user can set e.g. the Heritage to register to network only once per day, sending out SMS, then de-register.

Note:
- BE VERY CAREFUL to use with id #8 (Turn off UART). This will make Heritage Com port switched off and cannot accept AT command. NEVER program the Heritage to enable this once power up.
- Although "Operation type" and "Operation argument" fields are ignored, "dummy" entries are needed for consistent Command String Syntax. Use may write "PW" Command String like this ("0" as dummy entry) :

PW 15 0 0

- Refer to AT command manual for the details of power down (W32K) mode.
- It is recommended to use "PW" service some time after power on. So user can have time to change setting.
- Each time when "PW" Command String is executed. Refer to AT command manual for the details of power down (W32K) mode.
- Refer to AT command manual for the details of power down (W32K) mode.

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This Device Power Control setting is not saved by itself, so each time when power on the status should be 0 (without any "PW" Command String executed)

b. **Reading Device Power Control status**

See Chapter 17 for details.
CHAPTER 17: COMMAND STRING – READING STATUS OF SERVICES

1. Command for reading current information of Services

You can use AT command to read the info of trigger capable Services.

a. AT+CSTRSTAT command

Description:
This command is to read current parameter or status of a particular service.

Command Syntax:
AT+CSTRSTAT="<type> <id>"

Response Syntax:
OK
+CME ERROR: 3

Command Possible responses:
AT+CSTRSTAT="AL 1"  AL 1: ST 01/01/01,12:00:00 TR 2
OK
Note: read current setting of Alarm #1
AT+CSTRSTAT="TM 10" TM 10: CV 66 SW 1 TR 20
OK
Note: read current info of countdown timer #10
AT+CSTRSTAT="IP 9"  +CME ERROR: 3
Note: id out of range

Defined Values:

<type>
Define type of Service:
AL  alarm
CT  counter
IP  Input Port
CT  Countdown timer
PW  Device Power Control

$id$
Service id

b. Reading Alarm Service

Enter AT+CSTRSTAT = "AL 1" will get Alarm #1 info:

AL 1: ST 01/01/01,12:00:00 TR 3
   a   b          c
a. Service id
b. datetime set (space if not set)
c. Command String id to be executed if trigger (0 if not to trigger)
c. Reading Counter Service
Enter AT+CSTRSTAT = “CT 1” will get Counter #1 info:

<table>
<thead>
<tr>
<th>CT 1</th>
<th>ST 300</th>
<th>CV 20</th>
<th>TR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
</tr>
</tbody>
</table>

a. Service id
b. trigger value of the counter
c. current value of the counter
d. Command String id to be executed if trigger (0 if not to trigger)


d. Reading Countdown Timer Service
Enter AT+CSTRSTAT = “TM 1” will get Countdown Timer #1 info:

<table>
<thead>
<tr>
<th>TM 1</th>
<th>CW 90</th>
<th>SW 0</th>
<th>TR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
</tr>
</tbody>
</table>

a. Service id
b. current value of the timer
c. timer is running (1) or stop (0)
d. Command String id to be executed if trigger (0 if not to trigger)

e. Reading Input Pin Service
Reading Enter AT+CSTRSTAT = “IP 1” will get Input Port #1 info:

<table>
<thead>
<tr>
<th>IP 1</th>
<th>MS 1</th>
<th>DR 0</th>
<th>TH 5</th>
<th>TR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
</tr>
</tbody>
</table>

a. Service id
b. Mask value (valid for multiple I/P trigger)
c. direction of detection
d. threshold value of the detection
e. Command String id to be executed if trigger (0 if not to trigger)

f. Reading Output Pin Service
Enter AT+CSTRSTAT = “OP 1” will get Device Power Control info:

<table>
<thead>
<tr>
<th>OP 1</th>
<th>SW 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
</tr>
</tbody>
</table>

a. Service id
b. State (0: low, 1: high)

g. Reading Device Power Control Service
Enter AT+CSTRSTAT = “PW 1” will get Device Power Control info:

<table>
<thead>
<tr>
<th>PW 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
</tr>
</tbody>
</table>

a. Current Service id (mode)

h. Reading Email Sending Service
Reading Enter AT+CSTRSTAT = “EM 1” will get Email set #1 info:

<table>
<thead>
<tr>
<th>EM 1</th>
<th>TO 1</th>
<th>CC 0</th>
<th>BC 5</th>
<th>SU 3</th>
<th>BD 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
</tr>
</tbody>
</table>

a. Service id
b. id of TO recipient
c. id of CC recipient
d. id of BC recipient
e. id of email subject
f. id of email body

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CHAPTER 18: KNOWN ISSUES

The Heritage Softtools will affect certain other AT commands operation. Please note.

1. **AT +WIND command**
   
   AT+WIND command will be disabled

2. **Saving of parameters to non-volatile memory**
   
   You cannot save the settings of the following AT commands by concatenating the &W command:
   
   AT+CREG
   AT+CGREG
   AT+CGEREP
   
   To save the above settings please enter AT&W separately.

3. **Mutually exclusive TCP/UDP functions**
   
   Following functions are exclusive to each other, i.e. if either is enabled others could not be then:
   
   AT+AUTOTCP=1
   AT+AUTOUDP=1
   AT+OTCP

4. **Sending Heritage Software commands over SMS**
   
   You can use the remote AT command by SMS feature to send Heritage Software AT commands mentioned in this document except the followings:
   
   AT+OTCP
   AT+OUDP
   AT+IPCONNECT
   AT+EMBODY
   AT+ETHRST
CHAPTER 19: QUESTIONS AND ANSWERS

1. AutoTCP/UDP

Q. Can I specify <server> by URL (e.g. xxxx.com) rather than IP address?
A. Yes, but only if your GPRS network have proper DNS service. You cannot specify your own DNS server

Q. If I enabled AutoTCP or AutoUDP, how can I stop it?
A. You need to enter the command AT+AUTOTCP=0 or AUTOUDP=0 by either 1: within 20 seconds after power up, or 2: during reconnection (serial port back to command mode), or 3: by SMS (see Chapter 6)

2. AT command driven TCP/UDP connection

Q. Why I see three “OK” coming after entering AT+IPCONNECT=1,1 command?
A. The Software Tools program is issuing internal AT command for GPRS setup, so extra “OK” responses will be seen.

Q. After the TCP/UDP connection is stopped I wan to enter AT+OTCP or AT+OUDP to reconnect but I get message “+CME ERROR: 3”. Why?
A. After TCP/UDP socket connection the GPRS connection session will also be disconnected. So please enter AT+IPCONNECT=1,1 to reconnect GPRS first.

3. Remote AT command by SMS

Q. Can I send any AT command by SMS to control other features described in this document?
A. Yes. Please refer to Chapter 18.

4. Command String Feature

Q. Are the status of Services settings and status will be saved when power is cut?
A. All Services status will be saved into non-volatile memory, so e.g. like Countdown timer will resume counting when power recover. But all Output Ports will be set to logic 0 when power up.

Q. Can I check the status out Output Ports?
A. Yes. You can use AT+CSTRSTAT command to check

Q. What should be noted with the execution priority of concatenated Command String?
A. During executing concatenated Command String, if the 1st part of the CS leading to another no. of the CS to be triggered, then the triggered CS will be executed first, e.g.

“CT 1 IN 1 CT 1 DE 1”

If the first CS (counter #1 increment by 1) will let the Counter#1 to trigger CS #2, then CS #2 will be executed BEFORE executing “CT 1 DE 1”
CHAPTER 20: EXAMPLES OF HERITAGE SOFTWARE SETUP AND OPERATION

1. **To setup a Automatic TCP connection**

To setup Auto connect to TCP server with IP 61.167.60.1 port 23 (client mode)

<table>
<thead>
<tr>
<th>Commands to be entered</th>
<th>Modem response</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPGPRS=1,&quot;INTERNET&quot; (APN is INTERNET)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPCTP = 23,&quot;C&quot;,&quot;61.167.60.1&quot;,1 (target TCP is 61.167.60.1, port 23, client mode, TxDelay is enabled)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+AUTOTCP=1 (open TCP socket connection)</td>
<td>OK</td>
</tr>
<tr>
<td>(TCP connection will start after 20 secs)</td>
<td></td>
</tr>
</tbody>
</table>

To setup Auto connect to remote TCP client request with any IP address, port 23 (server mode)

<table>
<thead>
<tr>
<th>Commands to be entered</th>
<th>Modem response</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPGPRS=1,&quot;INTERNET&quot; (APN is INTERNET)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPCTP = 23,&quot;S&quot;,&quot;255.255.255.255&quot;,1 (to accept TCP connection from any IP address, port 23, client mode, TxDelay is enabled)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+AUTOTCP=1 (open TCP socket connection)</td>
<td>OK</td>
</tr>
<tr>
<td>(Modem will start to monitor TCP port 23 after 20 secs)</td>
<td></td>
</tr>
</tbody>
</table>

2. **To make a AT command driven TCP connection**

IP Connectivity (AT# feature) user can follow the following steps to make OTCP connection

To connect to TCP server with IP 61.167.60.1 port 23

<table>
<thead>
<tr>
<th>Commands to be entered</th>
<th>Modem response</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPGPRS=1,&quot;INTERNET&quot; (APN is INTERNET)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPCTP = 23,&quot;C&quot;,&quot;61.167.60.1&quot;,1 (target TCP is 61.167.60.1, port 23, TxDelay is enabled)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+DLEMODE=1 (GPRS connection)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+CGATT=1</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPCONNECT=1,1 (GPRS connection)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+OTCP (open TCP socket connection)</td>
<td>CONNECT 115200</td>
</tr>
</tbody>
</table>
3. **To setup periodic ping**

To setup to ping an IP address every 30 minutes, disconnect GPRS if fail

<table>
<thead>
<tr>
<th>Commands to be entered</th>
<th>Modem response</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPGPRS=1,&quot;INTERNET&quot; (APN is INTERNET)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPPING = 2,&quot;61.167.60.1&quot;, 3,2,15 (ping is 61.167.60.1,no. of trial is 3, delay between pin is 2 secs, timeout is 15 secs)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPOPT=4,1800,1 (enable Ping every 1800secs, if ping fail then disconnect GPRS )</td>
<td>OK</td>
</tr>
</tbody>
</table>

4. **To setup TCP Terminal and Dynamic DNS automatic update**

Open TCP Terminal with port 1024, and enable DDNS update with hostname "mymodem.dyndns.org"

<table>
<thead>
<tr>
<th>Commands to be entered</th>
<th>Modem response</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPGPRS=1,&quot;INTERNET&quot; (APN is INTERNET)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPDDNSSERV=&quot;members.dyndns.org&quot;,80 (set DDNS server settings)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPDDNSACCT=&quot;mymodem.dyndns.org&quot;,&quot;mylogin&quot;,&quot;mypsswd&quot; (set DDNS account settings)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+IPDDNSUPD=1 (enable automatic DDNS update)</td>
<td>OK</td>
</tr>
<tr>
<td>AT+TCPTERM=2,&quot;mypsswd&quot;,1024,30 (set TCP Terminal password to &quot;mypsswd&quot;,port 1024 and timeout 30 secs )</td>
<td>OK</td>
</tr>
<tr>
<td>AT+TCPTERM=1 (enable TCP Terminal)</td>
<td>OK</td>
</tr>
</tbody>
</table>
5. **Perform Remote program update by sending Command over SMS**

To download update file from ftp.maestro.com, directory “update”, filename “MSP.dwl”, login id: USER, password: PASSWORD

(Remember to enter AT+SMSAT=1 to enable AT command over SMS first, default key = “000000”)

---

**SMS Flow and response (min three SMS to be sent):**

- 000000AT+IPGPRS=1,”sgprs”
- OK
- OK
- 000000AT+FTPDOTA=“MSP.dwl”, “update”, 1

---

6. **Command String programming example 1**

**Output port power-up status settings**

To set Output Port #1, #3 and #6 to logic 1 (short) 1 minute after power up:

<table>
<thead>
<tr>
<th>Command String to be entered</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CSTRSET=0,80,”TM 1 ST 60 TM 1 TR 1 TM 1 SW 1“</td>
<td>Set timer #1 60 seconds countdown on power up and set to trigger Command String #1</td>
</tr>
<tr>
<td>AT+CSTRSET=0,1,”OP 1 SW 1 OP 3 SW 1 OP 6 SW 1“</td>
<td>Command String #1 switch Output Port 1,3 and 6 to logic 1</td>
</tr>
</tbody>
</table>

---

7. **Command String programming example 2**

**Input Port signal counting and triggering**

To set if Input Port #1 has a low-to-high signal for three times within 30 seconds, set Output Port #5 to high

Services used: IP #1, CT #1, TM #2, OP #5 (“CS” = Command String)

<table>
<thead>
<tr>
<th>Command String to be entered</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CSTRSET=0,6,”OP 5 SW 1 CT 1 RS 0”</td>
<td>CS6 : OP #5 set to 1, Counter#1 reset 0</td>
</tr>
<tr>
<td>AT+CSTRSET=0,5,”CT 1 RS 0 TM 2 ST 30 TM 2 SW 0”</td>
<td>CS5: Counter#1 reset 0, set Timer #2 to 30 sec and stops it.</td>
</tr>
<tr>
<td>AT+CSTRSET=0,4,”CT 1 IN 1 TM 2 SW 1”</td>
<td>CS4: increment Counter #1 by 1, switch Timer#2 on</td>
</tr>
<tr>
<td>AT+CSTR=“IP 1 DR 1 IP 1 TH 1 IP 1 TR 4 CT 1 ST 3 CT 1 TR 6 TM 2 ST 30 TM 2 TR 5”</td>
<td>Set Input#1 low-to-high, 100mS threshold, trigger CS4, Set Counter #1 trigger value to 3, trigger CS#6 Set Timer#2 to 30 secs, trigger CS5</td>
</tr>
</tbody>
</table>

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8. **Command String programming example 3**

**Input Port signal SMS triggering**

To set if Input Port #1 has a low-to-high signal and last for 0.5 seconds, send a SMS to phone book number 1 to tell Input Pins status

Services used: IP #1  (“CS” = Command String)

<table>
<thead>
<tr>
<th>Command String to be entered</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+CSTRSET=0,2,”SM 1 SN PIN 1_HIGH_IP_STATUS: %IP”</td>
<td>CS2 : send SMS to phone #1 with content “PIN_1…”</td>
</tr>
<tr>
<td>AT+CSTR=“IP 1 DR 0 IP 1 TH 5 IP 1 TR 2”</td>
<td>Input#1 low-to-high, 50mS threshold, trigger CS2,</td>
</tr>
</tbody>
</table>

9. **Command String programming example 4**

**Input Port signal counting and triggering**

To set if Input Port #1 has a low-to-high signal and last for 0.5 seconds, send an email with config set with EM#1

Services used: EM #1, IP #2  (“CS” = Command String)

<table>
<thead>
<tr>
<th>AT Cmd/Cmd String to be entered</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT+IPGPRS=1,”INTERNET”</td>
<td>Setup GPRS</td>
</tr>
<tr>
<td>AT+IPSMTMP=25,0,”smtp.netowrk.com”</td>
<td>Setup SMTP server</td>
</tr>
<tr>
<td>AT+EMADDR=0,0,”<a href="mailto:me@netowrk.com">me@netowrk.com</a>”</td>
<td>Setup sender address</td>
</tr>
<tr>
<td>AT+EMADDR=0,1,<a href="mailto:to_1@netowrk.com">to_1@netowrk.com</a> , <a href="mailto:to_2@network.com">to_2@network.com</a>”</td>
<td>Setup recipient address</td>
</tr>
<tr>
<td>AT+EMADDR=0,2,”<a href="mailto:cc_1@netowrk.com">cc_1@netowrk.com</a> , <a href="mailto:cc_2@network.com">cc_2@network.com</a>”</td>
<td>Setup cc recipient address</td>
</tr>
<tr>
<td>AT+EMADDR=0,3,”<a href="mailto:bcc_1@netowrk.com">bcc_1@netowrk.com</a> , <a href="mailto:bcc_2@network.com">bcc_2@network.com</a>”</td>
<td>Setup bcc recipient address</td>
</tr>
<tr>
<td>AT+EMSUBJ=0,1,”Email subj #1”</td>
<td>Setup email subject</td>
</tr>
<tr>
<td>AT+CSTR=“EM 1 TO 1 EM 1 CC 2 EM 1 BC 3 EM 1 SU 1”</td>
<td>Set EM#1 using TO#1, CC#2, BCC #3, Subj #1</td>
</tr>
<tr>
<td>AT+CSTRSET=0,3,”EM 1 SN PIN 1_HIGH_IP_STATUS: %IP”</td>
<td>CS3: send out email with setting using EM#1 with add’l content “PIN_1…”</td>
</tr>
<tr>
<td>AT+CSTR=“IP 2 DR 0 IP 2 TH 5 IP 2 TR 3”</td>
<td>Set Input#2 low-to-high, 50mS threshold, trigger CS3</td>
</tr>
</tbody>
</table>
### CHAPTER 21: COMMAND STRING QUICK REFERENCE

#### ALARM “AL”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5</td>
<td>ST</td>
<td>yy/mm/dd, hh:mm:ss (Date time, 0 to cancel)</td>
</tr>
<tr>
<td></td>
<td>TR</td>
<td>0 to 50 (CS to trigger, 0 to cancel)</td>
</tr>
</tbody>
</table>

#### COUNTER “CT”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5</td>
<td>DE</td>
<td>1 to 255 (Decrement)</td>
</tr>
<tr>
<td></td>
<td>IN</td>
<td>1 to 255 (Increment)</td>
</tr>
<tr>
<td></td>
<td>RS</td>
<td>0 (Reset)</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>-32768 to 32768 (value to trigger)</td>
</tr>
<tr>
<td></td>
<td>TR</td>
<td>0 to 50 (CS to trigger, 0 to cancel)</td>
</tr>
</tbody>
</table>

#### COUNTDOWN TIMER “TM”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 10</td>
<td>ST</td>
<td>1 to 2147483647 (Timer initial value)</td>
</tr>
<tr>
<td></td>
<td>SW</td>
<td>0 to 1 (Stop or start timer)</td>
</tr>
<tr>
<td></td>
<td>TR</td>
<td>1 to 50 (CS to trigger, 0 to cancel)</td>
</tr>
</tbody>
</table>

#### INPUT PORT “IP”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 6</td>
<td>DR</td>
<td>0 to 1 (1-63 (trigger direction or I/P sum, multiple I/P))</td>
</tr>
<tr>
<td></td>
<td>MS</td>
<td>1 to 63 (Mask value for multiple I/P, Id 101-106 only)</td>
</tr>
<tr>
<td></td>
<td>TH</td>
<td>1 to 255 (Duration state to trigger unit in 0.1s)</td>
</tr>
<tr>
<td></td>
<td>TR</td>
<td>1 to 50 (CS to trigger, 0 to cancel)</td>
</tr>
</tbody>
</table>

#### OUTPUT PORT “OP”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 6</td>
<td>SW</td>
<td>0 to 1 (state of Output port)</td>
</tr>
</tbody>
</table>

#### SMS “SM”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 10</td>
<td>SN</td>
<td>(SMS CONTENT) (variable: %CTn counter value, %IP input port value, %OP output value, %TMn countdown timer value)</td>
</tr>
</tbody>
</table>
### EMAIL “EM”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 10</td>
<td>TO</td>
<td>0-50 (recipient id, 0 to cancel)</td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>0-50 (cc recipient id, 0 to cancel)</td>
</tr>
<tr>
<td></td>
<td>BCC</td>
<td>0-50 (bcc recipient id, 0 to cancel)</td>
</tr>
<tr>
<td></td>
<td>SU</td>
<td>0-10 (subject id, 0 to cancel)</td>
</tr>
<tr>
<td></td>
<td>BD</td>
<td>0-3 (body/content id, 0 to cancel)</td>
</tr>
<tr>
<td></td>
<td>SN</td>
<td>(additional email content)</td>
</tr>
</tbody>
</table>

(variable: %CTn counter value, %IP input port value, %OP output value, %TMn countdown timer value)

### DEVICE POWER CONTROL “PW”

<table>
<thead>
<tr>
<th>Service Id</th>
<th>Operation Type</th>
<th>Argument and Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 15</td>
<td>1 (dummy)</td>
<td>1 (dummy)</td>
</tr>
</tbody>
</table>