Wavecom GSM MODEM WMO1-G900

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5.0	29-07-96	P	RMA	Add of new commands
5.1	25-09-96	P	RMA	Modification of commands
5.2	03-10-96	P	RMA	Add of new commands
5.3	21-10-96	P	RMA	Add of V25 ter commands
6.0	16-01-97	P	RMA	Add of new commands
6.1	10-02-97	P	RMA	Modifications of +CBST, +CRLP, +SIDET
7.0	29-05-97	P	RMA	Add of new commands
7.1	24-07-97	P	RMA	Modifications for error codes
7.2	16-10-97	P	FDE	Add Network & SIM lock (+CLCK, +CPWD)
7.3	21-12-97	P	FDE	Add phonebook management (+CPBS, +CPBR, +CPBF, +CPBW) Add Fax management

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WMO1-G900

USER MANUAL

CONTENTS

1. Introduction

1.1. Scope of this document

This document describes the messages exchanged between an external application module and the WMO1-G900 GSM mobile station, based on AT commands in order to control incoming and outgoing calls.
This document presents the AT-commands implemented for the voice call tele-service, the data tele-service and the short message tele-service.

1.2. GSM reference documents

The following GSM reference documents are recommended:

ETSI   GSM 03.40

GSM 03.45

GSM 04.11

GSM 04.21

GSM 05.08

GSM 07.01

GSM 07.02

GSM 07.05

GSM 07.07

1.3. ETSI contact

The Technical Specifications can be ordered from the following address:

European Telecommunications Standards Institute

ETSI Secretariat

Postal Address: F-06921 Sophia AntipolisCEDEX - FRANCE

Office Address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE

X.400:   c=fr, a=atlas, p=etsi, s=secretariat

Internet: secretariat@etsi.fr

Tel.:+33 (0)4 92 94 42 00 - Fax: +33 (0)4 93 65 47 16

ETSI http://www.etsi.fr

1.4. Definitions

In the GSM vocabulary, a call from GSM mobile to the Network is named "mobile originated call" or „outgoing call", and a call from fixed network to a GSM mobile is called „mobile terminated call" or „incoming call".

1.5. Technical Data

* **Dimensions:**   B x H x T   115mm x 54mm x 33mm
* **Weight:**   130g
* **Power Supply:**   10,8...31,2 V/DC (worst case, including application board on
basis DS 87C520/PLCC44)
325 mA transmit mode 10,8V
47 mA idle mode 10,8V

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110 mA transmit mode 31,2V
25 mA idle mode 31,2V

* **Temperature Range:** Storage: -20°C to +70°C
  Use: -20°C to +55°C

* **Interface A:** Antenna 50Ω FME Male

* **Interface B:** RS232 / V24 9 pin D-Sub to DIN 41652

  pin 1 DCD
  pin 2 TXD
  pin 3 RXD
  pin 4 DTR
  pin 5 SND
  pin 6 DSR
  pin 7 RTS
  pin 8 CTS
  pin 9 RI
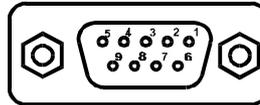
* **Interface C:** RJ 45 8 pin shielded for hand set, RX, TX, Power and ground
  (pin 1, 2, 3, 4 not used)

  pin 1 10,8-31,2V / 6V / 5V (option)
  pin 2 RXD
  pin 3 TXD
  pin 4 GND
  pin 5 SPK +
  pin 6 SPK -
  pin 7 MIC +
  pin 8 MIC -
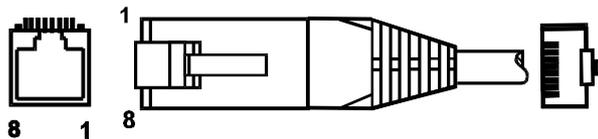
* **Interface D:** Power supply
  RJ11 connector white +10,8 - 31,2V
  yellow, green not used
  brown ground

∗ **SIM-Card interface**: for small SIM-Cards

∗ **Digital interface**: V24 (9 pole D-Sub)
V28
AT-commands according to ETSI GSM 0707 and GSM 0705
Extended AT-commands List

∗ **Data communication**: asynchronous, transparent and not transparent
GSM 07.01, 07.02, 04.21
- 2400 BPS V22 bis
- 2400 BPS V26 ter
- 4800 BPS V32
- 9600 BPS V32
- 2400 BPS V110
- 4800 BPS V110
- 9600 BPS V110

Routes:	MOC and MTC
INFO transf. mode:	3,1Khz audio ex PLMN (analogue) or UDI/V.110 (ISDN)
Clock mode:	Asynchronous
Connection elem.:	Transparent/Non Transparent
Structure:	Unstructured/Structured
Layer 2 protocol:	NAV
Data bits:	8
Parity bits:	None
Bits/char.:	Always 10 bits/char.
Stop bits:	1
Radio channel:	Full rate
Intermed. rate:	16 kbit/s
User rate:	2400, 4800 or 9600 bit/s
Modem type:	V.22bis, V.26ter, Auto-baud, V.32
Bearer service:	Bs 24, BS 25, Bs 26

∗ **Short Message Service:**
GSM 03,40, 07.05
- SMS mobile originated
- SMS mobile terminated
- CBS   Text mode /PDM mode

7 bit user data / 8 bit user data

Routes:	SMS MO and MT
MODE:	Text mode, PDU, 7/8 bits user data
Teleservice:	TS22, TS21

∗ **Fax:**

	Group 3 /Class I
CCITT Rec.:	CCITT T.30, T.4
Routes:	MOC and MTC
Info. transf. mode:	Synchronous
Connection elem.:	Transparent
Structure:	Unstructured
Radio channel:	Full rate
Intermed. rate:	16kbit/s
User rate:	2400,4800 or 9600 bit/s
Teleservice:	TS 62

∗ **Audio interface:**

- Electret-Microphone recommended :
  Impedance 100kΩ / Sensitivity of the inputs : 4 - 40mV p.p
  (gain set with AT+VGT)
- Loudspeaker :
  Impedance 150Ω / Outputs level : 0 - 2.5V p.p max
- Power 6V regulated DC
- ground
- shield

2. AT commands features

2.1. WAVECOM line settings

Currently, WAVECOM's handler is set to 9600 bps, 8 bits data, 1 bit stop, no parity, RTS/CTS flow control. Please use the commands +IPR, +IFC, +ICF to change these settings.

2.2. Command line

Commands always finish with a <CR> character.

2.3. Information responses and result codes

Responses always start with <CR><LF> and end with <CR><LF>.

•If the syntax command is wrong, the string **ERROR** is sent.

•If the syntax command is correct but with some incorrect parameters, the string **+CME ERROR : XX** is sent with different error codes.

•If the command line has been performed successfully, the string **OK** is sent.

Please note that in the some cases like "AT+CPIN?", "AT+EXPKEY?", incoming events etc... the mobile does not finish its response with the string **OK**.

Examples :   AT+CGSN<CR>
                    <CR><LF>123456789<CR><LF>
                    <CR><LF>OK<CR><LF>

In the following examples <CR> and <CR><LF> will be intentionally omitted.

3. AT commands for Call Control

3.1. Dial command D

This AT command is used by the external application to establish a call.

For a data call, the application sends to the GSM module the following ASCII string : (the bearer has to be selected before with the +CBST command)

ATD<xyz>   where <xyz> is the called phone number.

For a voice call, the application sends to the GSM module the following ASCII string : (the bearer may be selected before, if not a default bearer is used)

ATD<xyz>;   where <xyz> is the called phone number.

The answer to the command is the following :

OK	if the call succeeds, for voice call only
CONNECT <speed> if	tthe call succeeds, for data call only, <speed> takes the value negotiated by the GSM module.
BUSY	if the called party is in communication
NO ANSWER	if no hang up is detected after a fixed network time-out

Please, notice that in case of international number, the local international prefix has not to be set (usually 00) but need to be replaced by the '+' character.

Example : to establish a voice call to Wavecom from another country, the AT command shall be :

ATD+33146290800;

Notice that some country can have particular numbering rules for their GSM handset numbering.

Direct dialling from a phonebook location (stored in SIM card) can be done with the following command :

ATD>17 ;   or   ATD>SIM17 ;   (voice call here)

3.2. Hang-Up command   H

This command is used by the application to disconnect the remote user. The application sends :

Application to GSM	ATH	*ask for disconnection*
GSM to application	OK	*even if there is no communication established*

3.3. Answer a call   A

When the GSM module receives a call, it set the **RingInd** signal and sends to the application the ASCII string RING. Then it waits for the application to accept the call.

Application to GSM	ATA	
GSM to application	OK	*normal case*
Application to GSM	ATA	
GSM to application	NO CARRIER	*if ATA is sent when no incoming call was indicated (operation not allowed)*

3.4. Remote disconnection

This message is used by the GSM module to indicate to the application that the communication has been released by the remote user.

The GSM module sends "NO CARRIER" to the application, and set the DCD signal.

3.5. DTMF signals   +VTD, +VTS

The GSM module offers the user application to send DTMF tones. One command shall be used for defining the duration of the tones (default value is 70 ms), the other for sending the Tones.

For defining the duration, the application uses :

AT+VTD=<n>   where <n>*100 gives the duration in ms.

Application to GSM	AT+VTD=1	for defining 100 ms tone duration
GSM to application	OK	command valid
Application to GSM	AT+VTD=100000	
GSM to application	+CME ERROR: 3	if the duration is too long (the limit is to define for each application)
Application to GSM	AT+VTD=0	for setting the manufacturer default value
GSM to application	OK	

For sending DTMF tones, the application uses :

AT+VTS=<Tone>   where <Tone> is in {0-9,*,#,A,B,C,D}

Application to GSM	AT+VTS=A	
GSM to application	OK	command valid
Application to GSM	AT+VTS=11	
GSM to application	+CME ERROR: 4	if the <Tone> is wrong
Application to GSM	AT+VTS=4	
GSM to application	+CME ERROR: 3	if there is no communication

Exemple : to send the Tone sequence 13#, the application shall send :

AT+VTS=1   and then wait for
OK
AT+VTS=3   and then wait for
OK
AT+VTS=#   and then wait for
OK

3.6. Operator selection   +COPS

To select the operator, two possibilities exist :

The mobile enters the manual mode, and then try to find an operator which is indicated by the application. If it finds and registers correctly, then the mobile stays in idle mode.

The mobile enters the automatic mode, and then try to find the home operator. If it finds and registers correctly, then the mobile stays in idle mode ; if not, the mobile looks itself automatically for another network.

To force an attempt to select and register a GSM network operator, the application must send the following command :

AT+COPS=<mode>, <format>, <oper>

The first parameter indicates either automatic (value 0) or manual (value 1). The second parameter indicates the format of the third parameter. The only format supported by Wavecom module is the numerical format (value 2). The third parameter is the operator identifier (MCC3 MCC2 MCC1 MNC2 MNC1).

Application to GSM	AT+COPS?	*ask for current plmn*
GSM to application	+COPS: 0,2,20801 OK	*Home plmn is France telecom*
Application to GSM	AT+COPS=?	*ask for plmn list*
GSM to application	+COPS: (2,20801), (0,20810) OK	*Home plmn is France Telecom* *SFR network has been seen*
Application to GSM	AT+COPS=1,2,20810	*ask for registration on SFR network*
GSM to application	+CME ERROR: 3	*failed*
Application to GSM	AT+COPS=1,1,20810	*ask for registration on SFR network*
GSM to application	+CME ERROR: 4	*wrong parameters*
Application to GSM	AT+COPS=0,2	*ask for registration on home network*
GSM to application	OK	*succeeded*

3.7. Redial last number   ATDL

This command is used by the application to redial the last number used in the command ATD. The application sends :

Application to GSM	ATDL	*redial last number*
GSM to application	0146290800; OK	*last call was a speech call* *command valid*

3.8. Signal Quality   +CSQ

This command shall be used to know the signal strength indication.

Application to GSM	AT+CSQ	
GSM to application	+CSQ: <rssi>,<ber> OK	<rssi> and <ber> as defined in the GSM TS 07 07

3.9. Network registration +CREG

This command is used by the application to know the registration status of the mobile.

Application to GSM	AT+CREG?	
GSM to application	+CREG: 0,<stat> OK	*as defined in the GSM TS 07 07*
Application to GSM	AT+CREG=1	*automatically shots on*
GSM to application	OK	*command valid*

3.10. Automatic answer   ATS0

This S-parameter controls the automatic answering feature of the mobile.

Application to GSM	ATS0=2	*automatic answer after 2 rings*
GSM to application	OK	
Application to GSM	ATS0?	*Current value*
GSM to application	002 OK	*always 3 characters with leading* *zeros*
Application to GSM	ATS0=0	*no automatic answer*
GSM to application	OK	*command valid*

3.11. Gain control   +VGR, +VGT

This command shall be used by the application to tune the receive gain of the speaker and transmit gain of the microphone. The application shall send

AT+VGR=<val>	for the receive gain	AT+VGT=<val>	for the transmit gain
0 to 15	+6 db	0 to 31	+14 db
16 to 31	+4 db	32 to 63	+17 db
32 to 47	+2 db	64 to 95	+20 db
48 to 63	0 db	96 to 127	+23 db
64 to 79	-2 db	128 to 159	+26 db
80 to 95	-4 db	160 to 191	+29 db
96 to 111	-6 db	192 to 223	+32 db
112 to 127	-8 db	224 to 255	+35 db
128 to 143	-10db		
144 to 159	-12 db		
160 to 175	-14 db		
176 to 191	-16 db		
192 to 207	-18 db		
208 to 223	-20db		
224 to 239	-22 db		
240 to 255	-24 db		

16 levels for receive gain are provided and 8 levels for transmit gain.

Application to GSM	AT+VGR=25	
GSM to application	OK	command valid
Application to GSM	AT+VGT=45	
GSM to application	OK	command valid

3.12. SideTone modification   +SIDET

The syntax of the command is :

AT+SIDET=<val1>,<val2>

This command is used to get an echo of the voice in the speaker (to hear what is said in the speaker).

<val2>	level	<val1>	presence
0	0 db	0	SideTone is disabled
1	- 6 db	1	SideTone is enabled
2	-12 db		
3	-18 db		

Application to GSM	AT+SIDET=1,0	
GSM to application	OK	command valid
Application to GSM	AT+SIDET?	current value
GSM to application	+SIDET: 1,0 OK	command valid

3.13. Echo canceler   +ECHO

The syntax of the command is :

AT+ECHO=<val1>,<val2>

This command is used for car kit applications to reduce the echo effects than can occur in a car.

<val2>	attenation	<val1>	presence
0	- 18 db	0	Echo is disabled
1	- 24 db	1	Echo is enabled
2	-30 db		
3	- 36 db		

Application to GSM	AT+ECHO=1,0	
GSM to application	OK	command valid
Application to GSM	AT+ECHO?	current value
GSM to application	+ECHO: 1,0 OK	command valid

4. AT commands for SIM, E2prom

4.1. Product Serial Number   +CGSN

This command allows the user application to know the IMEI of the GSM module. The application sends :

Application to GSM	AT+CGSN	*request IMEI*
GSM to application	135790248939 OK	*IMEI present in E2PROM*
Application to GSM	AT+CGSN	*request IMEI*
GSM to application	+CME ERROR: 22	*IMEI not found in E2PROM*

4.2. Request model identification   +CGMM

This command is used to get the hardware version.

Application to GSM	AT+CGMM	*get hardware version*
GSM to application	GSM P 900 OK	*command valid*

4.3. Request revision identification   +CGMR

This command is used to get the software version.

Application to GSM	AT+CGMR	*get software version*
GSM to application	V2.74 OK	*command valid*

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4.4. Manufacturer identification   +CGMI

This command gives the manufacturer identification.

Application to GSM	AT+CGMI	*get manufacturer identification*
GSM to application	WELCOME OK	*command valid (« WELCOME » is not a manufacturer identification !)*

4.5. Capabilities list   +GCAP

This command gives the complete capabilities list.

Application to GSM	AT+GCAP	*get capabilities list*
GSM to application	+CGSM OK	*supports GSM commands*

4.6. Phone activity status   +CPAS

This command returns the activity status of the mobile.

Application to GSM	AT+CPAS	*Current activity status*
GSM to application	+CPAS: "x" OK	*"x" as defined in the GSM TS 07 07*

4.7. Power off   +CPOF

This command stops the GSM software stack and then the hardware layer.

Application to GSM	AT+CPOF	
GSM to application	OK	*command valid*

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4.8. Set phone functionality   +CFUN

This command selects the level of functionality in the mobile station.

• When the application wants to stop the module for making a power off, or if the application wants to force the module for executing a IMSI DETACH procedure, then it has to send :

AT+CFUN=0

This command executes a IMSI DETACH and makes a backup of some internal parameters in the SIM and the EEPROM.

If the mobile is not powered off after this command, it shall received another command to re-start the whole GSM process.

If the mobile is turned off after this command, then the power on will automatically execute the start of the whole GSM process.

• When the application wants to re-start the module (after having done a AT+CFUN=0 command, and without having cut the power supply), it has to send :

AT+CFUN=1,1

This command starts again all the GSM stack and GSM functionality.

Application to GSM	AT+FUN?	*ask for current functionality*
GSM to application	+CFUN: "x" OK	*"x" as defined in the GSM TS 07 07*
Application to GSM	AT+CFUN=0	*set minimum functionality*
GSM to application	OK	*command valid*
Application to GSM	AT+CFUN=1	*set full functionality*
GSM to application	OK	*command valid*
Application to GSM	AT+CFUN=1,0	*set full functionality without reset*
GSM to application	OK	*command valid*
Application to GSM	AT+CFUN=1,1	*set full functionality with reset*
GSM to application	OK	*command valid*

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4.9. Enter PIN/PUK code   +CPIN

This command is used to validate the PIN code, or to validate the PUK code (and define a new PIN code).

If the user application try to establish an outgoing call before having validated the SIM PIN code, then the GSM module will refuse the "ATD" command with a "+CME ERROR: 11" (SIM PIN required).

It's up to the application to validate the PIN after each reset or power on. The application shall therefore use the command :

AT+CPIN="<pin>"

Application to GSM	AT+CPIN=1234	*enter PIN*
GSM to application	OK	*PIN correct*
Application to GSM	AT+CPIN=5678	*enter PIN*
GSM to application	+CME ERROR: 16	*incorrect password*

After 3 unsuccessful codes, the PUK will then be required. The PUK validation forces the user to enter as a second parameter a new PIN code which will be the future PIN code if the PUK validation succeeds. The application shall therefore use the command :

AT+CPIN="<puk>","<new pin>"

Application to GSM	AT+CPIN=1234,5896	*enter PUK and new PIN*
GSM to application	OK	*PUK correct*
Application to GSM	AT+CPIN=5000,5896	*enter PUK and new PIN*
GSM to application	+CME ERROR: 16	*incorrect password*

To know which code has to be entered (or not), the following interrogation command will be implemented :

AT+CPIN?

The possible responses are :

+CPIN: READY	No PIN is needed
+CPIN: SIM PIN	PIN is required
+CPIN: SIM PUK	PUK is required
+CME ERROR: <err>	SIM failure, SIM absent etc.

Please note that in this case the mobile does not finish its response with the OK string.

Example : 3 failed PIN validations + 1 successful PUK validation

AT+CPIN?	the application asks for PIN status
+CPIN: SIM PIN	the GSM module requires PIN
AT+CPIN="1235"	the application enters the PIN
+CME ERROR: 16	bad PIN
AT+CPIN="1236"	Second attempt
+CME ERROR: 16	bad PIN
AT+CPIN="1238"	last attempt
+CME ERROR: 16	bad PIN
AT+CPIN?	and now ?
+CPIN: SIM PUK	the GSM module requires PUK
AT+CPIN="99999999","5678"	the PUK is entered, the new PIN shall be 5678 PUK
OK	validation is OK. New Pin is 5678
AT+CPIN?	and now ?
+CPIN: READY	GSM module is ready

4.9.1. Remark

In the way Application to GSM, an "h" character shall be added before the PIN value if cyphering mode (with D.E.S algorithm) is on. See +EXPKEY command.

Same remark for +CLCK and +CPWD commands.

4.10. Facility lock   +CLCK

This command shall be used by the application to change a facility status.

The "SC" facility means SIM PIN facility.

The "PS" facility is used for SIM lock facility with a 8 digits password.

The "WNL" facility is used for network lock with a 8 digits password (NCK).

"1" locks the facility, "0" unlocks the facility. The password length is given with the AT+CPWD= ? command.

Application to GSM	AT+CLCK?	Read PIN status
GSM to application	+CLCK: ("SC", 0) OK	PIN is disabled
Application to GSM	AT+CLCK="SC",1,1234	enable PIN
GSM to application	OK	PIN iwas good
Application to GSM	AT+CLCK?	Read PIN status
GSM to application	+CLCK: ("PS", 0), ("SC", 1), ("AO", 0), ("OI", 0), ("OX", 0), ("AI", 0), ("IR", 0), ("AB", 0), ("AG", 0), ("AC", 0), ("WNL", 0) OK	PIN is enabled, all other facilities are disabled
Application to GSM	AT+CLCK="SC",0,5555	disable PIN
GSM to application	+CME ERROR: 16	PIN was wrong
Application to GSM	AT+CPIN=1234	Enter PIN
GSM to application	OK	PIN was good
Application to GSM	AT+CLCK= ?	request supported facilities
GSM to application	+CLCK : ("PS","SC","AO","OI", "OX", "AI", "IR","AB", "AG","AC", "WNL") OK	supported facilities
Application to GSM	AT+CLCK="WNL",1,12345678	Activate network lock
GSM to application	OK	Network lock activated

4.11. Change password   +CPWD

This command shall be used by the application to change the PIN

The facility "SC" means SIM card. Other network facilities (Call barring, SIM or network lock) will use the same AT command.

For the network lock ("WNL"), the unlock is forbidden after 10 failed attempts to disable (unlock) the network lock with an incorrect password.

Application to GSM	AT+CPWD=?	Possible values
GSM to application	+CPWD: ("PS", 8),("SC", 8),("AO", 4),("OI", 4), ("OX", 4),("AI", 4),("IR", 4), ("AB", 4), ("AG", 4), ("AC", 4), ("WNL", 8) OK	PIN must be on 8 digits maximum
Application to GSM	AT+CPWD="SC",1234,5555	change PIN
GSM to application	OK	PIN iwas good
Application to GSM	AT+CPWD="SC",1234,5555	Change PIN
GSM to application	+CME ERROR: 16	PIN was wrong
Application to GSM	AT+CPIN=5555	Enter PIN
GSM to application	OK	PIN was good
Application to GSM	AT+CPWD="WNL",12345678, 00000000	change NCK
GSM to application	OK	NCK changed for net lock

4.12. Select phonebook memory storage +CPBS

This command selects phonebook memory storage. The only available phonebook is the SIM phonebook (" SM ")

Application to GSM	AT+CPBS=?	Possible values
GSM to application	+CPBS: ("SM") OK	SIM phonebook supported
Application to GSM	AT+CPBS ?	Status
GSM to application	+CPBS : "SM",10,20 OK	SIM phonebook selected, 10 used locations, 20 locations

4.13. Read phonebook entries +CPBR

This command returns phonebook entries for a location range from the current phonebook memory storage selected with +CPBS.

Application to GSM	AT+CPBR=?	*Test command*
GSM to application	+CPBR: (1-50), 20,10 OK	*50 locations (from 1 to 50), max length of 20 for phone 10 characters max for the associated text*
Application to GSM	AT+CPBR=12,14	*Read entries from 12 to 14*
GSM to application	+CPBR : 12,"112",129,"Emergency" +CPBR : 13,"+331290909",145, "Fred" +CPBR : 14, "0146290808",129, "Zazi" OK	*Display locations 12,13,14 with Location, Number, Type, Text*
Application to GSM	AT+CPBR=10	*Read entry 10*
GSM to application	+CPBR :10,"0146290921",129,"Rob" OK	*Display location 10*
Application to GSM	AT+CPBR=52	*Read entry 52 (wrong)*
GSM to application	+CME ERROR: 21	*Invalid index*

4.14. Find phonebook entries +CPBF

This command returns phonebook entries wich alphanumeric field start with a given string.

Application to GSM	AT+CPBF=?	*Test command*
GSM to application	+CPBF: 20,10 OK	*max length of 20 for phone 10 characters for the text*
Application to GSM	AT+CPBF= "E"	*Read entries with "E"*
GSM to application	+CPBF : 12,"112",129,"Emergency" +CPBF : 15,"+331290101",145, "Eric" OK	*Display locations with text field starting with "E"*
Application to GSM	AT+CPBF="H"	*Read entries with "H"*
GSM to application	+CME ERROR: 22	*Entry not found*

4.15. Write phonebook entiy +CPBW

This command writes phonebook entry in location number *<index>* in the current phonebook memory storage.

Application to GSM	AT+CPBW=?	*Test command*
GSM to application	+CPBW: (1-50),20,(129,145),10 OK	*50 locations, phone length=20, TON/NPI of 129 or 145, text length=10*
Application to GSM	AT+CPBW=3	*Erase location 3*
GSM to application	OK	*Location 3 erased*
Application to GSM	AT+CPBW=5,"112",129 ,"SOS"	*Write at location 5*
GSM to application	OK	*Location 5 written*
Application to GSM	AT+CPBW=5,"01290917",129,"Jacky"	*Overwrite location 5*
GSM to application	OK	*Location 5 is overwritten*
Application to GSM	AT+CPBW=,"+33145221100",145,"SOS"	*Write at the first free location*
GSM to application	OK	*Free location is written*
Application to GSM	AT+CPBW=,"0345221100",129,"SOS"	*Write at the first free location*
GSM to application	+CME ERROR: 20	*Phonebook full*
Application to GSM	AT+CPBW=57,"112",129 ,"WM"	*Write at loc 57 (wrong)*
GSM to application	+CME ERROR: 21	*Invalid index*
Application to GSM	AT+CPBW=7,"012345678901234567890",129 ,"WAVE"	*Write at loc 7 a long Phone number (21 digits)*
GSM to application	+CME ERROR: 26	*Phone too long*
Application to GSM	AT+CPBW=7,"0122334455",129 ,"WAVECOM TEL"	*Write at loc 7 a long Text (11 characters)*
GSM to application	+CME ERROR: 24	*Text too long*

5. AT commands for short messages

5.1. Parameters definition

<da> is the destination address.

<dcs> is the data coding scheme and is coded like in document [5].

<dt> is the discharge time.

<fo> is coded like first octet of SMS-SUBMIT in document [4].

<index> is the place of storage in memory.

<length> is the number of characters in text mode or the length of data binary string in PDU mode.

<mr> is the message reference.

<oa> is the originator address.

<pid> is the protocol identifier.

<pdu> is the binary string coded as specified in document [4]

<ra> is the recipient address.

<sca> is the address of the service center.

<scts> is the service center time stamp.

<st> is the status.

<stat> is the status of message in memory.

<tooa> is the integer format of <oa>.

<tora> is the integer format of <ra>.

<tosca> is the integer format of <sca>.

<vp> is the validity period of the message.

5.2. Select message service   +CSMS

The supported services are GSM originated and terminated short message services. The Cell broadcast service is not supported yet.

Application to GSM	AT+CSMS?	*Current service*
GSM to application	+CSMS: 0, 1, 1, 0 OK	*GSM 03.40 et 03.41,* *SMO and SMT supported,* *SMCB not supported*
Application to GSM	AT+CSMS=?	*Possible service*
GSM to application	+CSMS: (0) OK	*Only GSM 03.40 et 03.41* *is possible*

5.3. Preferred Message Storage   +CPMS

The incoming messages are automatically stored in the SIM.

Application to GSM	AT+CPMS?	*Read it*
GSM to application	+CPMS: "SM", 3, 10 OK	*3 messages are stored in* *SIM. 10 is the total* *available SIM memory.*
Application to GSM	AT+CPMS=?	*Possible storage*
GSM to application	+CPMS: "SM" OK	*Only SIM is possible*

5.4. Preferred Message Format +CMGF

The formats implemented are the text mode and the PDU mode.

In PDU mode, a complete SMS Message including all header information is passed as a binary string (document *[4]* for the format of the binary string).

In Text mode, every commands and responses are in ASCII characters.

The chosen format is stored in E2PROM by the command +CSAS.

Application to GSM	AT+CMGF ?	*current message format*
GSM to application	+CMGF: 1 OK	*Text mode*
Application to GSM	AT+CMGF=?	*Possible message format*
GSM to application	+CMGF: (0-1) OK	*Text or PDU modes are available*

Example to send a SMS Message in PDU mode

Application to GSM	AT+CMGF=0	*PDU message format*
GSM to application	OK	*PDU mode valid*
Application to GSM	AT+CMGS=14<CR>01F60691214365 000004C9E9340B	*Send MSG*
GSM to application	+CMGS: 246 OK	*MSG correctly sent*

14 is the length of **octets** of the PDU buffer coded as GSM 03.40 . In this case this buffer is 0x01 0xF6 0x06 0x91 0x21 0x43 0x65 0x00 0x00 0x04 0xC9 0xE9 0x34 0x0B which means regarding to GSM 03.40 :

TP-MTI : 0x01 (SMS-SUBMIT)

<mr>: 0xF6

<da>: 0x06 0x91 0x21 0x43 0x65 (+123456)

<pid>: 0x00

<dcs>: 0x00 (Data coding scheme : 7 bits alphabet chosen)

TP-UDL : 0x04 (User data length)

TP-UD : 0xC9 0xE9 0x34 0x0B (User data : ISSY)

TPDU in hexadecimal format must be converted into two ascii characters. E.G octet with hexadecimal value 0x2A is presented to the mobile as two characters '2' (ascii 50) and 'A' (ascii 65).

5.5. Save settings   +CSAS

All settings specified in command +CSCA, +CMGF, +CSMP, +CNMI, +CSDH are stored in E2PROM if the SIM card is phase 1 or in the SIM card if this one is phase 2.

Application to GSM	AT+CSAS	*Store*
GSM to application	OK	*command correct*

5.6. Restore settings   +CRES

All settings specified in command +CSCA, +CMGF, +CSMP, +CNMI, +CSDH are restored from E2PROM if the SIM card is phase 1 or from the SIM card if this one is phase 2.

Application to GSM	AT+CRES	*Restore*
GSM to application	OK	*command correct*

5.7. Show text Mode Parameters   +CSDH

This commands gives more informations in text mode result codes. These informations are in brackets in commands +CMTI, +CMT, +CDS, +CMGR, +CMGL.

Application to GSM	AT+CSDH?	*current value*
GSM to application	+CSDH: 0 OK	*do not show header values*

5.8. Select TE character set   +CSCS

This commands informs the ME which character set is used by the TE. ME is then able to convert character strings correctly. This is used for commands +CMGS in text mode.

Application to GSM	AT+CSCS="GSM"	*GSM default alphabet*
GSM to application	OK	*Command valid*
Application to GSM	AT+CSCS="PCCP437"	*PC character set Code Page 437*
GSM to application	OK	*Command valid*

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5.9. New message indication   +CNMI

This command selects the procedure how receiving the message from the network.The application must send the following command :

AT+CNMI=<mode>,<mt>,<bm>,<ds>,<bfr>

<mode> (controls the processing of unsolicited result codes) :

0	Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other place or the oldest indications may be discarded and replaced with the new received indications.
1	Discard indication and reject new received message unsolicited result codes when TA-TE link is reserved. Otherwise forward them directly to the TE.
2	Buffer unsolicited result codes in the TA when TA-TE link is reserved and flush them to the TE after reservation. Otherwise forward them directly to the TE
3	Forward unsolicited result codes directly to the TE. TA-TE link specific inband used to embed result codes and data when TA is in on-line data mode.

<mt> (sets the result code indication routing for SMS-DELIVERs) :

0	no SMS-DELIVER indications are routed.
1	SMS-DELIVERs are routed using unsolicited code : +CMTI : « SM », <index>
2	SMS-DELIVERs (except class 2 messages) are routed using unsollicited code : +CMT : <pdu> (if PDU mode chosen) or +CMT : <oa>,<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]<CR><LF><data>
3	class 3 SMS-DELIVERS are routed directly using code in <mt>=2 ; message of other classes result in indication <mt>=1

<bm> (the rules for storing received CBMs Types depend on its coding scheme, the setting of Select CBM Types (+CSCB) and this value) :

0	no CBM indications are routed to the TE.

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1	If CBM is stored into ME/TA, indication of the memory location is routed to the TE using unsolicited result code : +CBMI : <mem>, <index>
2	New CBMs are routed directly to the TE using unsolicited result code. +CBM : <length><CR><LF><pdu> (if PDU mode chosen) or +CBM :<sn>,<mid>, <dcs>,<page>,<pages><CR><LF><data> (text mode-enabled)
3	class 3 SMS-DELIVERS are routed directly using code in <mt>=2 ; message of other classes result in indication <mt>=1

<ds> (for SMS-STATUS-REPORTs) :

0	no SMS-STATUS-REPORTs are routed.
1	SMS-STATUS-REPORTs are routed using unsolicited code : +CDS : <pdu> (if PDU mode chosen) or +CDS : <fo>,<mr>[,<ra>,<tora>],<scts>,<dt>,<st>

<bfr>

0	TA buffer of unsolicited result codes defined within this command is flushed to the TE when <mode> 1...3 is entered (OK response shall be given before flushing the codes)
1	TA buffer of unsolicited result codes defined within this command is cleared when <mode> 1...3 is entered.

Examples :

Application to GSM	AT+CNMI=0,1,0,0,0	*<mt>=1*
GSM to application	OK	
GSM to application	+CMTI : « SM », 1	*Message received*
Application to GSM	AT+CNMI=0,2,0,0,0	*<mt>=2*
GSM to application	OK	
GSM to application	+CMT :"123456","13/01/96 12h30m00s",129,4,32,240,"15379",129,5<CR><LF> HELLO	*Message received*
Application to GSM	AT+CNMI=0,0,0,1,0	*<ds>=1*
GSM to application	OK	

Application to GSM	AT+CMGS="+33146290800"<CR> Hello, how are you ?^Z	*Send a message in text mode*
GSM to application	+CMGS : 116 OK	*Successful transmission*
GSM to application	+CDS : 2,116, "+33146290800",145, "13/01/96 12h30m00s","14/01/96 20h51m05s",16	

5.10. Read message   +CMGR

This command allows the application to read incoming stored messages.

AT+CMGR=<index>

+CMGR=<stat>,<oa>,<scts>[,<tooa>,<fo>,<pid>,<dcs>,<sca>,<tosca>, <length>]<CR><LF><data>   (for SMS-DELIVER only)

This command is also available in PDU mode.

+CMGR=<stat>,<length<CR><LF><pdu>

Example :

GSM to application	+CMTI: "SM",1	*New message received*
Application to GSM	AT+CMGR=1	*read the message*
GSM to application	+CMGR: "REC UNREAD", "43322449"<CR> To be or not to be! OK	
Application to GSM	AT+CMGR=1	*read again the message*
GSM to application	+CMGR: "REC READ", "43322449",20<CR> To be or not to be! OK	
Application to GSM	AT+CMGR=2	*read + bad index*
GSM to application	+CMS ERROR: 321	*error : invalid index*
Application to GSM	AT+CMGR=1	*in PDU mode*
GSM to application	+CMGR: "REC READ", <length><CR><LF><pdu> OK	

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5.11. List message   +CMGL

This command allows the application to read stored messages, by indicating the type of the message to read.

AT+CMGL=<stat>

<stat> (status of message in memory) :

0	"REC UNREAD" (received unread message)
1	"REC READ"(received read message)
2	"STO UNSENT"(stored unsent message)
3	"STO SENT"(stored sent message)
4	"ALL"(all messages)

+CMGL=<index>,<stat>,<da/oa>[,<alpha>,<scts>,<tooa/toda>,<length>]
<CR><LF><data>

This command is also available in PDU mode.

+CMGL=<index>,<stat>,<length<CR><LF><pdu>

Examples :

Application to GSM	AT+CMGL=0	*read the message*
GSM to application	+CMGL: 1, "REC UNREAD", "43322449"<CR> To be or not to be! +CMGL: 3, "REC UNREAD", "46290800"<CR> Be happy! OK	
Application to GSM	AT+CMGL=1	*read again the message*
GSM to application	+CMGL: 2, "REC READ", "43322449",20<CR> Keep cool OK	
Application to GSM	AT+CMGL=2	*read + bad index*
GSM to application	+CMS ERROR: 321	*error : invalid index*

5.12. Send message   +CMGS

The <address> field is the address of the terminal network to whom the message is sent ; <exitmethod> is ^Z : ASCII 26. The text can contain all existing character except ^Z.

Example of use :

Application to GSM	AT+CMGS="+33146290800"<CR> Hello, how are you ?^Z	*Send a message in text mode*
GSM to application	+CMGS : <mr> OK	*Successful transmission*
Application to GSM	AT+CMGS=<length><CR> <pdu>^Z	*Send a message in PDU mode*
GSM to application	+CMGS : <mr> OK	*Successful transmission*

The message reference <mr> which is returned back to the application is allocated by the GSM module. This number begins with 0 and is incremented by one for each outgoing message (successful and failure case) ; it is cyclic on one byte (0 follows 255).

Note : this number is not a storage number - outgoing messages are not stored.

5.13. Set Text Mode Parameters   +CSMP

This command shall be used to select value for the <vp>, <pid>, the <dcs>. The application must send the following command :

AT+CSMP=<fo>, <vp>, <pid>,<dcs>

In text mode <vp> is coded only in "*relative"* format. This means one octet (see document [4] for more details).

Application to GSM	AT+CSMP?	*current values*
GSM to application	+CSMP: 0,0,0,0 OK	*no validity period* *dcs = PCCP437 alphabet* *(8 bits -> 7 bits)*
Application to GSM	AT+CSMP=16,32,64,244	*validity period = 32* *dcs = GSM 8 bits alphabet*
GSM to application	OK	*command correct*

5.14. Delete message +CMGD

This command shall be used after a read-command in order to delete the received stored message.

For example :

GSM to application	+CMTI: "SM",3	*New message received*
Application to GSM	AT+CMGR=3	*Read it*
GSM to application	+CMGR: "REC UNREAD", "43322449",20<CR> To be or not to be! OK	
Application to GSM	AT+CMGD=3	*Delete it*
GSM to application	OK	

5.15. Service center address +CSCA

This command shall be used to indicate to which service center the message has to be sent.

The GSM module has no default value for this address. If the application tries to send a message without having indicated the service center address, an error will be generated.

So, the application has to indicate this address at initialization. This address is then valid all the time. The application may change it if needed.

For example, let us suppose that no AT+CSCA has been already sent.

Application to GSM	AT+CMGS="+33146290800"<CR> Hello, how are you ?^Z	*Send a message*
GSM to Application	+CMS ERROR : 330	*Service center unknown*
Application to GSM	AT+CSCA="96741234"	*Service center initialization*
GSM to application	OK	
Application to GSM	AT+CMGS="+33146290800"<CR> Hello, how are you ?^Z	*Send again the same message*
GSM to application :	+CMGS : 1 OK	*Successful transmission*

6. AT commands for Supplementary Services

6.1. Call forwarding   +CCFC

This commands allows control of the call forwarding supplementary service. The command to manage this functionality is :

AT+CCFC=<reason>,<mode>[, <number>]

* <reason> :

0	unconditional
1	mobile busy
2	no reply
3	not reachable
4	all call forwarding
5	all conditional call forwarding

* <mode> :

2	interrogate
3	registration
4	erasure

Application to GSM	AT+CCFC=0,3,146290800	register call forwarding unconditional
GSM to application	OK	command valid
Application to GSM	AT+CCFC=0,2	interrogate call forwarding unconditional
GSM to application	+CCFC=1,7,146290800 OK	call forwarding active
Application to GSM	AT+CCFC=0,4	erase call forwarding unconditional
GSM to application	OK	command valid

6.2. Call barring   +CLCK

This commands allows control of the call barring supplementary service. The command to manage this functionality is :

AT+CLCK=<fac>,<lock>, <password>

* <fac> :

AO	barring all outgoing calls
AI	barring all incoming calls
OI	barring outgoing international calls
OX	barring outgoing international calls except those to home country
IR	barring incoming calls when roaming outside home country
AG	all outgoing barring services
AC	all incoming barring services
AB	all barring services

*<lock>

0	unlocks the facility
1	locks the facility

Password code must be on 4 digits maximum.

Application to GSM	AT+CLCK="AO",1,1234	
GSM to application	OK	*command valid*
Application to GSM	AT+CLCK="AO",0,5555	
GSM to application	+CME ERROR: 16	*wrong password*
Application to GSM	AT+CLCK="AO",0,1234	
GSM to application	OK	*command valid*

6.3. Modify SS password   +CPWD

This command shall be used by the application to change the supplementary service password. The command to manage this functionality is :

AT+CPWD=<fac>,<oldpassword>, <newpassword>

for <fac> see +CLCK command.

Application to GSM	AT+CPWD="AO",1234,5555	*change password*
GSM to application	OK	*Password was good*
Application to GSM	AT+CPWD="AO",1234,5555	*Change password*
GSM to application	+CME ERROR: 16	*password wrong*
Application to GSM	AT+CPWD="AO",5555,1234	*change password*
GSM to application	OK	*Password was good*

6.4. Call waiting   +CCWA

This command allows control of the call waiting supplementary service. The module supports only one communication. If a call waiting call happens, the module will disconnect it.

The command to manage this functionality is :

AT+CCWA=<n>,<mode>[, <class>]

* <n> : (result code presentation status in the TA)

0	disable
1	enable

* <mode> :

0	disable
1	registration
2	interrogate

Application to GSM	AT+CCWA=1,1	*enable call waiting*
GSM to application	OK	*command valid*
Application to GSM	AT+CCWA=1,2	*interrogate call forwarding unconditional*
GSM to application	+CCWA="x",7 OK	*"x" = 1 active* *"x" = 0 not active*
GSM to application	RING +CCWA: +146290800,145,7 NO CARRIER	*incoming call* *number of the incoming call* *incoming call is disconnected*
Application to GSM	AT+CCWA=1,0	*erase call waiting*

GSM to application	OK	*command valid*

6.5. Calling line identification restriction   +CLIR

This command allows control of the calling line identification restriction supplementary service.

AT+CLIR=<n>

* <n> : (temporary mode status in the TA)

0	set presentation indicator according to the subscription of the CLIR service
1	CLIR invocation
2	CLIR suppression

Application to GSM	AT+CLIR=2	
GSM to application	OK	*command valid*
Application to GSM	AT+CLIR?	*Ask for current functionality*
GSM to application	+CLIR: <n>,"y" OK	*"y" as defined in the GSM TS 07 07*

6.6. Calling line identification presentation   +CLIP

This command allows control of the calling line identification presentation supplementary service :   AT+CLIP=<n>

* <n> : (result code presentation status in the TA)

0	disable
1	enable

Application to GSM	AT+CLIP=1	*CLIP on*
GSM to application	OK	*command valid*
Application to GSM	AT+CLIP?	*ask for current functionality*
GSM to application	+CLIP: 1,"x" OK	*"x" = 0 CLIP not provisionned* *"x" = 1 CLIP provisionned* *"x" = 2 unknown (no network ...)*

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GSM to application	RING +CLIP: 146290800,145	*incoming call*
Application to GSM	AT+CLIP=0	*CLIP OFF*
GSM to application	OK	*command valid*

6.7. Connected line identification presentation   +COLP

This command allows control of the connected line identification presentation supplementary service.

AT+COLP=<n>

* <n> : (result code presentation status in the TA)

0	disable
1	enable

Application to GSM	AT+COLP=1	*COLP on*
GSM to application	OK	*command valid*
Application to GSM	AT+COLP?	*ask for current functionality*
GSM to application	+COLP: 1,"x" OK	*"x" = 0 COLP not provisionned* *"x" = 1 COLP provisionned* *"x" = 2 unknown (no network ...)*
Application to GSM	ATD146290800;	*outgoing call*
GSM to application	+COLP: 146290928,145 OK	
Application to GSM	AT+COLP=0	*COLP OFF*
GSM to application	OK	*command valid*

7.   AT commands for data

7.1.   Bearer type selection +CBST

The syntax of the command is AT+CBST=<speed>,0,<ce>

The selection of the bearer impacts both incoming and outgoing calls. No data compression is provided and only asynchronous modem is supported.

<speed>	Modem type	transmission mode
0 :autobauding	None	asynchronous MODEM
4 :2400 bps,	V22bis	asynchronous MODEM
5 :2400 bps	V26ter	asynchronous MODEM
6 :4800 bps	V32	asynchronous MODEM
7 :9600 bps	V32	asynchronous MODEM
68 :2400 bps	V110	asynchronous MODEM
70 :4800 bps	V110	asynchronous MODEM
71 :9600 bps	V110	asynchronous MODEM

<ce>	connection element
0	Transparent only
1	Non transparent only
100	Transparent preferred
101	Non transparent preferred

Application to GSM	AT+CBST=7,0,1	ask for a bearer
GSM to application	OK	bearer supported
Application to GSM	AT+CBST=81,0,0	ask for a bearer

GSM to application	+CME ERROR : 4	*bearer not supported*

7.2. Report control   +CR, +CRC

7.2.1. Outgoing call   +CR

This command enables a more detailed service reporting, in case of data outgoing call. Before sending the CONNECT response to the application, the GSM module will precise the type of data connection that have been established.

These report types are :

+CR: ASYNC	for asynchronous transparent
+CR: REL ASYNC	for asynchronous non-transparent

Application to GSM	AT+CR=0	*extended reports disabled*
GSM to application	OK	*command valid*
Application to GSM	AT+CR=1	*extended reports enabled*
GSM to application	OK	*command valid*

Default value is stored in E2PROM.

7.2.2. Incoming call   +CRC

This command enables a more detailed ring indication, in case of incoming call (voice or data). Instead of the string "RING", an extended string is used to indicate which type of call is ringing.

These extended indications are :

+CRING: ASYNC	for asynchronous transparent
+CRING: REL ASYNC	for asynchronous non-transparent
+CRING: VOICE	for normal speech.
+CRING : FAX	for fax calls

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Application to GSM	AT+CRC=0	*extended reports disabled*
GSM to application	OK	*command valid*
Application to GSM	AT+CRC=1	*extended reports enabled*
GSM to application	OK	*command valid*

Default value is stored in E2PROM.

7.3. Echo   E

Determines whether the mobile echoes (sends) the commands you enter to your computer screen as you type them..

Application to GSM	ATE0	*no local echo*
GSM to application	OK	*command valid*
Application to GSM	ATE1	*local echo*
GSM to application	OK	*command valid*

7.4. Fixed DTE rate   +IPR

This commands specifies the data rate at which the DCE will accept commands.

Application to GSM	AT+IPR?	
GSM to application	+IPR: 9600 OK	*current rate is 9600 bps*
Application to GSM	AT+IPR=?	
GSM to application	+IPR:(),(2400,9600,19200,38400,5760 0,115200) OK	*possible values. No autodectable rate supported*
Application to GSM	AT+IPR=38400	
GSM to application	OK	*new rate is 38400 bps*

7.5. Back to online mode   O

If you have established a connection and the mobile is in online command mode, this command allows to return to online data mode.

Application to GSM	ATO	
GSM to application	OK	*command valid*

7.6. DTE-DCE character framing   +ICF

This command is used to determine the local serial port start-stop (asynchronous) character framing that the DCE shall use.

AT+ICF=<format>,<parity>

* <format> :

0	autodetect	not supported
1	8 Data 2 Stop	supported
2	8 Data 1 Parity 1 Stop	supported
3	8 Data 1 Stop	supported
4	7 Data 2 Stop	supported
5	7 Data 1 Parity 1 Stop	supported
6	7 Data 1 Stop	supported

* <parity> :

0	Odd	supported
1	Even	supported
2	Mark	supported
3	Space	supported
4	None	supported

Application to GSM	AT+ICF?	
GSM to application	+ICF: 3,4 OK	*current values*
Application to GSM	AT+ICF=?	
GSM to application	+ICF: (0-6),(0-3) OK	*possible values.*
Application to GSM	AT+ICF=0,0	
GSM to application	OK	*new values*

7.7. Repeat last command   A/

Application to GSM	A/	*repeat last command*

7.8. Default configuration   Z

Restores the configuration profile.

Application to GSM	ATZ	
GSM to application	OK	*command valid*

7.9. DTE-DCE local flow control   +IFC

This command is used to control the operation of local flow control between the DTE and DCE.

AT+IFC=<DCE_by_DTE>,<DTE_by_DCE>

* < DCE_by_DTE > :

0	none	not supported
1	Xon/Xoff local circuit 103	not supported
2	RTS	supported
3	Xon/Xoff global on circuit 103	not supported

* < DTE_by_DCE > :

0	none	not supported
1	Xon/Xoff circuit 104	not supported
2	CTS	supported

Application to GSM	AT+IFC?	
GSM to application	+IFC: 2,2 OK	*current values*
Application to GSM	AT+IFC=?	
GSM to application	+IFC: (0-3),(0-2) OK	*possible values.*
Application to GSM	AT+IFC=0,0	
GSM to application	OK	*new values*

7.10. Set DCD signal   &C

This commands controls the Data Carrier Detect (DCD) signal.

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Application to GSM	AT&C0	*DCD always on*
GSM to application	OK	*command valid*
Application to GSM	AT&C1	*DCD matches state of the remote modem's data carrier*
GSM to application	OK	*command valid*

7.11. Set DTR signal &D

This commands controls the Data Terminal Ready (DTR) signal.

Application to GSM	AT&D0	*the DTR signal is ignored*
GSM to application	OK	*command valid*
Application to GSM	AT&D1	*Modem switches from data to command mode when DTR switches from on to OFF*
GSM to application	OK	*command valid*
Application to GSM	AT&D2	*Upon DTR switch from on to OFF, the call is cleardown*
GSM to application	OK	*command valid*

7.12. Set DSR signal &S

This commands controls the Data Set Ready (DSR) signal.

Application to GSM	AT&S0	*DSR always on*
GSM to application	OK	*command valid*
Application to GSM	AT&S1	*DSR off in command mode, DSR on in data mode*
GSM to application	OK	*command valid*

7.13. Save configuration &W

This commands writes the active configuration to nonvolatile RAM.

Application to GSM	AT&W	*writes current configuration to E2prom*
GSM to application	OK	*command valid*

WAVECOM

7.14. Radio link protocol parameters   +CRLP

This command allows to change the radio link protocol parameters used for non transparent data transmission.

AT+CRLP=<up-window size>,<down-window size>,<acknowledgement timer>,<retransmission attempts>,<reset allowed>

Application to GSM	AT+CRLP=10,10,90,10,0	*set new parameters*
GSM to application	OK	*command valid*
Application to GSM	AT+CRLP?	*current values*
GSM to application	AT+CRLP: 10,10,90,10 OK	*command valid*

8. Other AT commands

8.1. V.25 ter recommandation

All the remaining basic commands are implemented in WAVECOM's AT parser. An "OK" string will be sent back but no further software treatment will happen.

All commands about modulation control, error control and data compression are not recognized. An "ERROR" string will be sent back.

8.2. GSM 07.05 recommandation

All the remaining commands are implemented in WAVECOM's AT parser. An "+CMS ERROR : 303" string will be sent back but no further software treatment will happen.

8.3. GSM 07.07 recommandation

All the remaining commands are implemented in WAVECOM's AT parser. An "+CME ERROR : 4" string will be sent back but no further software treatment will happen.

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9. Failure result codes

9.1. Report Mobile Equipement errors   +CMEE

This command disables or enables the use of result code +CME ERROR : <xxx> or +CMS ERROR :<xxx>

Application to GSM	AT+CMEE=0	disable « +CME ERROR : <xxx> » and use « ERROR » instead
GSM to application	OK	
Application to GSM	AT+CMEE=1	enable « +CME ERROR : <xxx> »
GSM to application	OK	

9.2. Extended error report   +CEER

If the last call setup (originating or answering) fails, this command gives the reason of the call release.

Application to GSM	ATD123456789 ;	outgoing voice call
GSM to application	NO CARRIER	
Application to GSM	AT+CEER	ask for reason of release
GSM to application	+CEER : Error <xxx> OK	<xxx> is the cause information element values from GSM recommandation 04.08

The cause information element from GSM 04.08 is given below.

9.3. Mobile equipment error result code : +CME ERROR: xxx

xxx is defined as below :

0	Phone failure
3	Operation not allowed
4	Operation not supported
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
16	Incorrect password
22	Not found
24	Text string too long
26	Dial string too long
30	No network service
256	protocol stack bad state
257	Bad cell (not in the synchronized ones
258	Lost cell (due to DSF...)

9.4. Message service failure result code: +CMS ERROR : xxx

xxx is defined as below :

1 to 127	error cause values from the GSM recommendation 04.11 Annex E-2
301	SMS service of ME reserved
302	operation not allowed
303	operation not supported
305	invalid text mode parameter
313	SIM failure
321	Invalid memory index
322	SIM memory full
330	SC address unknown

Error cause values from GSM 04.11 are given below.

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9.5. Cause information element values from GSM recommandation 04.08

Cause value	Diagnostic
1	Unassigned (unallocated) number
3	No route to destination
6	Channel unacceptable
8	Operator determined barring
16	Normal call clearing
17	User busy
18	No user responding
19	User alerting, no answer
21	Call rejected
22	Number changed
26	Non selected user clearing
27	Destination out of order
28	Invalid number format (incomplete number)
29	Facility rejected
30	Response to STATUS ENQUIRY
31	Normal, unspecified
34	No circuit/channel available
38	Network out of order
41	Temporary failure

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42	Switching equipment congestion
43	Access information discarded
44	requested circuit/channel not available
47	Resources unavailable, unspecified
49	Quality of service unavailable
50	Requested facility not subscribed
55	Incoming calls barred with in the CUG
57	Bearer capability not authorized
58	Bearer capability not presently available
63	Service or option not available, unspecified
65	Bearer service not implemented
68	ACM equal to or greater than ACMmax
69	Requested facility not implemented
70	Only restricted digital information bearer capability is available
79	Service or option not implemented, unspecified
81	Invalid transaction identifier value
87	User not member of CUG
88	Incompatible destination
91	Invalid transit network selection
95	Semantically incorrect message
96	Invalid mandatory information

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97	Message type non-existent or not implemented
98	Message type not compatible with protocol state
99	Information element non-existent or not implemented
100	Conditional IE error
101	Message not compatible with protocol state
102	Recovery on timer expiry
111	Protocol error, unspecified
127	Interworking, unspecified
252	Call barring on outgoing calls
253	Call barring on incoming calls
254	Call impossible
255	Lower layer failure

All other values in the range 0 to 31 shall be treated as cause 31.
All other values in the range 32 to 47 shall be treated as cause 47.
All other values in the range 48 to 63 shall be treated as cause 63.
All other values in the range 64 to 79 shall be treated as cause 79.
All other values in the range 80 to 95 shall be treated as cause 95.
All other values in the range 96 to 111 shall be treated as cause 111.
All other values in the range 112 to 127 shall be treated as cause 127.

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9.6. GSM 04.11 Annex E-2: Mobile originating SM-transfer

Cause no 1: "Unassigned (unallocated) number"

This cause indicates that the destination requested by the Mobile Station cannot be reached because, although the number is in a valid format, it is not currently assigned (allocated).

Cause no 8: "Operator determined barring"

This cause indicates that the MS has tried to send a mobile originating short message when the MS's network operator or service provider has forbidden such transactions.

Cause no 10: "Call barred"

This cause indicates that the outgoing call barred service applies to the short message service for the called destination.

Cause no 21: "Short message transfer rejected"

This cause indicates that the equipment sending this cause does not wish to accept this short message, although it could have accepted the short message since the equipment sending this cause is neither busy nor incompatible.

Cause no 27: "Destination out of service"

This cause indicates that the destination indicated by the Mobile Station cannot be reached because the interface to the destination is not functioning correctly. The term "not functioning correctly" indicates that a signalling message was unable to be delivered to the remote user; e.g., a physical layer or data link layer failure at the remote user, user equipment off-line, etc.

Cause no 28: "Unidentified subscriber"

This cause indicates that the subscriber is not registered in the PLMN (i.e. IMSI not known)

Cause no 29: "Facility rejected"

This cause indicates that the facility requested by the Mobile Station is not supported by the PLMN.

Cause no 30: "Unknown subscriber"

This cause indicates that the subscriber is not registered in the HLR (i.e. IMSI or directory number is not allocated to a subscriber).

Cause no 38: "Network out of order"

This cause indicates that the network is not functioning correctly and that the condition is likely to last a relatively long period of time; e.g., immediately reattempting the short message transfer is not likely to be successful.

Cause no 41: "Temporary failure"

This cause indicates that the network is not functioning correctly and that the condition is not likely to last a long period of time; e.g., the Mobile Station may wish to try another short message transfer attempt almost immediately.

Cause no 42: "Congestion"

This cause indicates that the short message service cannot be serviced because of high traffic.

Cause no 47: "Resources unavailable, unspecified"

This cause is used to report a resource unavailable event only when no other cause applies.

Cause no 69: "Requested facility not implemented"

This cause indicates that the network is unable to provide the requested short message service.

Cause no 81: "Invalid short message transfer reference value"

This cause indicates that the equipment sending this cause has received a message with a short message reference which is not currently in use on the MS-network interface.

Cause no 95: "Invalid message, unspecified"

This cause is used to report an invalid message event only when no other cause in the invalid message class applies.

Cause no 96: "Invalid mandatory information"

This cause indicates that the equipment sending this cause has received a message where a mandatory information element is missing and/or has a content error (the two cases are undistinguishable).

Cause no 97: "Message type non-existent or not implemented"

This cause indicates that the equipment sending this cause has received a message with a message type it does not recognize either because this is a message not defined or defined but not implemented by the equipment sending this cause.

Cause no 98: "Message not compatible with short message protocol state"

This cause indicates that the equipment sending this cause has received a message such that the procedures do not indicate that this is a permissible message to receive while in the short message transfer state.

Cause no 99: "Information element non-existent or not implemented"

This cause indicates that the equipment sending this cause has received a message which includes information elements not recognized because the information element identifier is not defined or it is defined but not implemented by the equipment sending the cause.

However, the information element is not required to be present in the message in order for the equipment sending the cause to process the message.

Cause no 111: "Protocol error, unspecified"

This cause is used to report a protocol error event only when no other cause applies.

Cause no 127: "Interworking, unspecified"

This cause indicates that there has been interworking with a network which does not provide causes for actions it takes; thus, the precise cause for a message which is being send cannot be ascertained.

10. Fax management

The firmware you have been provided with includes the fax service (Group3, Class1)

The fax functionalities of this version have been tested and they are fully functional in several countries with the following fax softwares : Delrina Winfax, Trio, MS Winfax. However, the fax functions might work in other countries and with other fax softwares.

10.1. Setting up the module for fax

The GSM unit as well as the PC fax application have to be properly set up prior to send/receive faxes.

The only thing to do is to change the serial link rate as follows:

a) Launch any terminal application on PC and set it up to 9600 baud.

b) From the terminal application type in: **AT+IPR = 2400; &W <enter>**

The GSM unit should reply OK (if not, type in 'AT<enter>' as long as it does not answer 'OK' and start again stage b).

10.2. Setting up the PC fax application:

The recommended fax application is ***Delrina WinFax v4.0***.

It should be configured as follows (menu Setup/Fax Modem Setup) :

♦ Port: com 1

♦ Model: Generic Class 1 (HARDWARE FLOW CONTROL). Above all, do not select « Generic Class 1 » (Software flow control).

♦ Init: clear default string

♦ Reset: clear default string

♦ Maximum Transmit Rate: 9600 baud.

Others settings are of no interest for the GSM unit: they can be modified.

10.3. Restoring the module's default profile for data call.

If the module is configured as stated in 1/ then the serial rate is 2400 baud which of course limits the overall thoughput in support of 4800/9600 data calls.

Therefore, the serial rate should be set back to 9600 (or better 19200) baud by issueing: **AT+IPR = 9600; &W <enter>**

11. Security advises and Warnings!

11.1. Limitation of Responses

The indicated dates are used as description of the product alone. They cannot be
taken as characteristics assured within the meaning of the act. In the event of
any claims for compensation against us, whatever the reason may be, it is not possible
to raise them, if there is not to see intention or culpable negligence of our part.
Technical dates are subject to change without notice.
This documents is copyrighted. Duplications are not allowed.

11.2. Attention for Users!

In the direct near to RF - Transmitters or other powerful transmitting sources, it may effect a
reduction of acoustic Quality. The call will not be interrupted and the transfer of data will not
be disturbed.
With a certain distance to the RF - source, there influences will be rapidly reduced.
Because of the main target of Car - applications the following EMC tests are not
implemented:

* fast transients / burst immunity test
* surge - voltage immunity test
* voltage dips short interrupts and voltage variations immunity test

If the WMO1-G900 is power supplied by a separate 230V /15V DC/AC adapter it is
possible, that the powernet causes interrupts, which can cause interrupts of a call, but the
call is immediately possible to be repeated again.

It is a matter of the chosen power supply to protect the GSM - Set against these influences.

11.3. RF SAFETY

IMPORTANT

FOR THE EFFICIENT AND SAFE OPERATION OF

YOUR GSM MODEM

READ THIS INFORMATION BEFORE USE

Your GSM modem is one of the most exciting and innovative electronic products ever developed. With it you can stay in contact with your office, your home, emergency services, and others, wherever service is provided.

GENERAL

Your modem is based on the GSM standard for cellular technology. GSM is a newer radio frequency (« RF ») technology than the current FM technology that has been used for radio communications for decades. The GSM standard has been established for use in the European community and elsewhere.

Your modem is actually a low power radio transmitter and receiver. It sends out and receives radio frequency energy. When you use your modem, the cellular system handling your calls controls both the radio frequency and the power level of your cellular modem.

EXPOSURE TO RF ENERGY

There has been some public concern about possible health effects of using GSM modem. Although research on health effects from RF energy has focused for many years on the current RF technology, scientists have begun research regarding newer radio technologies, such as GSM. After existing research had been reviewed, and after compliance to all applicable safety standards had been tested, it has been concluded that the product is fit for use.

If you are concerned about exposure to RF energy there are things you can do to minimize exposure. Obviously, limiting the duration of your calls will reduce your exposure to RF energy. In addition, you can reduce RF exposure by operating your cellular modem efficiently by following the below guidelines.

EFFICIENT MODEM OPERATION

For your modem to operate at the lowest power level, consistent with satisfactory call quality :

If your modem has an extendible antenna, extend it fully. Some models allow you to place a call with the antenna retracted. However your modem operates more efficiently with the antenna fully extended.

Do not hold the antenna when the modem is « IN USE ». Holding the antenna affects call quality and may cause the modem to operate at a higher power level than needed.

ANTENNA CARE AND REPLACEMENT

Do not use the modem with a damaged antenna. If a damaged antenna comes into contact with the skin, a minor burn may result. Replace a damaged antenna immediately. Consult your manual to see if you may change the antenna yourself. If so, use only a manufacturer-approved antenna. Otherwise, have your antenna repaired by a qualified technician.

Use only the supplied or approved antenna. Unauthorized antennas, modifications or attachments could damage the modem and may contravene local RF emission regulations or invalidate type approval.

11.4. GENERAL SAFETY

DRIVING

Check the laws and regulations on the use of cellular devices in the area where you drive. Always obey them. Also, when using your modem while driving, please :

- give full attention to driving,

- pull off the road and park before making or answering a call if driving conditions so require.

ELECTRONIC DEVICES

Most electronic equipment, for example in hospitals and motor vehicles is shielded from RF energy. However RF energy may affect some malfunctioning or improperly shielded electronic equipment.

VEHICLE ELECTRONIC EQUIPMENT

Check your vehicle manufacturer's representative to determine if any on board electronic equipment is adequately shielded from RF energy.

MEDICAL ELECTRONIC EQUIPMENT

Consult the manufacturer of any personal medical devices (such as pacemakers, hearing aids, etc...) to determine if they are adequately shielded from external RF energy.

Turn your modem **OFF** in health care facilities when any regulations posted in the area instruct you to do so. Hospitals or health care facilities may be using RF monitoring equipment.

AIRCRAFT

Turn your modem **OFF** before boarding any aircraft.

- Use it on the ground only with crew permission.

- Do not use in the air.

To prevent possible interference with aircraft systems, Federal Aviation Administration (FAA) regulations require you to have permission from a crew member to use your modem while the plane is on the ground. To prevent interference with cellular systems, local RF regulations prohibit using your modem whilst airborne.

CHILDREN

Do not allow children to play with your modem. It is not a toy. Children could hurt themselves or others (by poking themselves or others in the eye with the antenna, for example). Children could damage the modem, or make calls that increase your modem bills.

BLASTING AREAS

To avoid interfering with blasting operations, turn your unit **OFF** when in a « blasting area » or in areas posted : « turn off two-way radio ». Construction crew often use remote control RF devices to set off explosives.

POTENTIALLY EXPLOSIVE ATMOSPHERES

Turn your modem **OFF** when in any area with a potentially explosive atmosphere. It is rare, but your modem or its accessories could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bidily injury or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fueling areas such as petrol stations ; below decks on boats ; fuel or chemical transfer or storage facilities ; and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

Do not transport or store flammable gas, liquid, or explosives, in the compartment of your vehicle which contains your modem or accessories.

Before using your modem in a vehicle powered by liquefied petroleum gas (such as propane or butane) ensure that the vehicle complies with the relevant fire and safety regulations of the country in which the vehicle is to be used.

11.5. SAFETY STANDARDS

THIS CELLULAR MODEM COMPLIES WITH ALL APPLICABLE RF SAFETY STANDARDS.

This cellular modem meets the standards and recommendations for the protection of public exposure to RF electromagnetic energy established by governmental bodies and other qualified organizations, such as the following :

- Directives of the European Community, Directorate General V in Matters of Radio Frequency Electromagnetic Energy