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FALCOM A2D

(Including A2D-A/B/C and A2D-1)

Version 1.10

Contents

Version history:

Version number	Author	Changes
1.00	A. Ulrich	Initial version
1.01	A. Ulrich	Serial link controls, Modem default settings
1.02	A. Ulrich	Additional ERROR codes specified
1.03	A. Ulrich	AT+CPOF, AT+CIMI, AT+CCID, ATDL, A/ added; AT+CREG changed
1.04	A. Ulrich	Outfit changed
1.05	A. Ulrich	AT+CGMI, AT+CGMM changed, Document references changed
1.06	A. Ulrich	AT+CNMI changed; AT+SPEAKER, AT+CCED, AT+CICB, AT+ECHO, AT+SIDET, AT%C, AT+DS, AT+DR, AT\N added
1.07	A. Ulrich	Special functionality pins added; Fax commands added; A2D-1 section renewed
1.08	A. Ulrich	Factory default settings added, SIMPRES explanation added, A2D pin description changed
1.09	A. Ulrich	A2-1 section renewed, Power consumption changed, Graphics for A2D OEM module (C1!) updated, AT+CFUN remarks changed
1.10	A. Ulrich	Description of new A2D-1 added, AT+CGMI changed, 3V_SIM signal checked

0   Introduction

This manual is focussed on the GSM data solutions of the FALCOM A2D series from FALCOM GmbH. It contains information about the FALCOM A2D embedded GSM module and the FALCOM A2D-1 GSM modem and phone. It does not contain special information about the GSM related accessories, as there are the dial-handset, the hands free set, the external battery pack and the mobile data terminals, which are also sold by FALCOM.

Information furnished herein by FALCOM GmbH is believed to be accurate and reliable. However, no responsibility is assumed for its use. Also the information contained herein is subject to change without notice.

Users are advised to quickly proceed to the "Security" chapter and read the hints carefully.

0.1   Used abbreviations

ETSI	European Telecommunications Standards Institute
GSM	Global System for Mobile communications
IMEI	International Mobile station Equipment Identity
ME	Mobile Equipment
PLMN	Public Land Mobile Network
PIN	Personal Identification Number
PUK	Personal Unblocking Key
RP	Receive Protocol
RXQUAL	Received Signal Quality
SIM	Subscriber Identity Module
SMS	Short Message Service
SMS/PP	Short Message Service/Point-to-Point
TA	Terminal Adapter
TE	Terminal Equipment
TP	Transmit Protocol

0.2   Related documents

- ETSI GSM 07.05   "Use of Data Terminal Equipment - Data Circuit terminating Equipment interface for Short Message Service and Cell Broadcast Service"

- ETSI GSM 07.07   "AT command set for GSM Mobile Equipment"

- ITU-T V.25ter   "Serial asynchronous automatic dialling and control"

0.3 Security

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 utilises 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 minimise 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. Unauthorised antennas, modifications or attachments could damage the modem and may contravene local RF emission regulations or invalidate type approval.

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. When applications are prepared for mobile use they should fulfil road-safety instructions of the current law!

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 bodily injury or even death.
Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fuelling 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.

NON-IONISING RADIATION

As with other mobile radio transmitting equipment , users are advised that for satisfactory operation and for the safety of personnel, it is recommended that no part of the human body be allowed to come too close to the antenna during operation of the equipment.
The radio equipment shall be connected to the antenna via a non-radiating 50Ohm coaxial cable.
The antenna shall be mounted in such a position that no part of the human body will normally rest close to any part of the antenna. It is also recommended to use the equipment not close to medical devices as for example hearing aids and pacemakers.

0.4 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 organisations, such as the following :

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

1   GSM 07.05 and 07.07 commands

1.1   Preface

In the following the <err> parameter is sometimes shown. This parameter and its possible values are described in chapter " Error message handling and survey".

1.2   Commands concerning modem and SIM card hardware

1.2.1   AT+CGMI

Command gives manufacturer information.

Command	Possible responses
+CGMI	Falcom_A2D_V1.01
+CGMI=?	OK

Remarks: none
Source: GSM 07.07/5.1
Implementation: complete

1.2.2   AT+CGMM

Command gives GSM model information.

Command	Possible responses
+CGMM	MULTIBAND 900E 1800
+CGMM=?	OK

Remarks: none
Source: GSM 07.07/5.2
Implementation: complete

1.2.3   AT+CGMR

Command gives firmware revision information.

Command	Possible responses
+CGMR	<version number>
+CGMR=?	OK

Remarks: none
Source: GSM 07.07/5.3
Implementation: complete

1.2.4 AT+CGSN

Command gives IMEI information.

Command	Possible responses
+CGSN	<IMEI>
+CGSN=?	OK

Remarks: none
Source: GSM 07.07/5.4
Implementation: complete

1.2.5 AT+CIMI

Command gives IMSI information.

Command	Possible responses
+CIMI	<IMSI>
+CIMI=?	OK

Remarks: none
Source: GSM 07.07/5.6
Implementation: complete

1.2.6 AT+CCID

Command gives EF-CCID file information.

Command	Possible responses
+CCID	+CCID: <id>
+CCID=?	OK

Defined values

   <id>:   EF-CCID file in hexadecimal format

Remarks: none
Source: factory default
Implementation: complete

1.3 Network registration commands

1.3.1 AT+CPIN

Command is used to send the PIN to the modem, which is needed to register into the GSM network.
After three unsuccessful attempts to enter the PIN the PUK is required. As second parameter the user should provide a new PIN. After 10 unsuccessful attempts to enter the PUK the SIM card is damaged.

Command	Possible responses	
+CPIN=<pin>	OK	+CME ERROR: <err>
+CPIN=<puk>,<new pin>	OK	+CME ERROR: <err>
+CPIN?	+CPIN: <code>	+CME ERROR: <err>
+CPIN=?	OK	

Defined values:

<pin>, <newpin>:   4 to 8 digits string type value

<puk>:   8 digits string type value

<code>:   READY   Modem is not pending for any
                        password

             SIM PIN   Modem is waiting SIM PIN to be
                        given

             SIM PUK   Modem is waiting SIM PUK to be
                        given

Remarks: +CME ERROR: 16
                        shows up if wrong PIN is entered.

                   +CME ERROR: 12
                        shows up if wrong PUK number is entered.

                   +CME ERROR: 13
                        SIM card is damaged .

                   +CME ERROR: 10
                        means that no SIM card is inserted.

Source: GSM 07.07/8.3
Implementation: complete

1.3.2   AT+CREG

Command is used to show the network registration status and to control the
presentation of an unsolicited result code +CREG: <stat> when there is a
change in the network registration status.

Command	Possible responses	
+CREG=[<n>]	OK **Unsolicited result codes:** +CREG: <stat> if <n> equals 1 +CREG: <stat>,<lac>,<ci> if <n> equals 2	
+CREG?	+CREG: <n>,<stat> (n=1) +CREG: <n>,<stat>,<lac>,<ci> (n=2)	+CME ERROR: <err>
+CREG=?	+CREG: (list of supported <n>s)	+CME ERROR: <err>

Defined values:

<n>:	0	disable network registration unsolicited result code	
	1	enable network registration unsolicited result code	
	2	enable network registration unsolicited result code with <lac> and <ci>	
<stat>:	0	not registered, ME is not currently searching a new operator to register to	
	1	registered, home network	
	2	not registered, but ME is currently searching a new operator to register to	
	3	registration denied	
	4	unknown	
	5	registered, roaming	
<lac>:		String type; two byte location area code in hexadecimal format (e.g. "00C3" equals 193 in decimal)	
<ci>:		String type; two byte cell ID in hexadecimal format	

Remarks: none
Source: GSM 07.07/7.2
Implementation: complete

1.3.3 AT+COPS

Command is used to show the current and the available PLMN's. It is also used to select a PLMN manually or automatically.

Command	Possible responses	
+COPS=[<mode> [,<format>[,<oper>]]]	OK	+CME ERROR: <err>
+COPS?	+COPS: <mode>[,<format>,<oper>]	+CME ERROR: <err>
+COPS=?	+COPS: list of supported(<stat>, <long alphanumeric oper>, <short alphanumeric oper>, <numeric oper>,)s	+CME ERROR: <err>

Defined values:

<mode>:	0	automatic (<oper> field is ignored)
	1	manual (<oper> field shall be present)
<format>:	2	numeric <oper>
<oper>:		string type; GSM Location Area Identification number which consists of a three BCD digit country code coded as in ITU-T E.212 annex A [10], plus a two BCD digit network code, which is administration specific
<stat>:	0	unknown
	1	available
	2	current
	3	forbidden

Remarks:	none
Source:	GSM 07.07/7.3
Implementation:	complete

1.3.4 AT+CSQ

Command is used to ask for the networks field strength and the current bit error rate.

Command	Possible responses	
+CSQ	+CSQ: <rssi>,<ber>	+CME ERROR: <err>
+CSQ=?	+CSQ: (list of supported <rssi>s),(list of supported <ber>s)	

Defined values:

<rssi>:	0	-113 dBm or less
	1	-111 dBm
	2...30	-109... -53 dBm
	31	–51 dBm or greater
	99	not known or not detectable
<ber> (in percent):	0...7	as RXQUAL values in the table in GSM 05.08 [20] subclause 8.2.4
	99	not known or not detectable

Remarks:	For a reliable online data connection the <rssi> value should be greater than 9. The <ber> value should never exceed 3.
Source:	GSM 07.07/8.5
Implementation:	complete

1.3.5   AT+CCED

This command can be used by the application to retrieve the cell parameters of the main cell and of up to six neighbour cells.
The response will be :

[+CSQ: <rssi>,99 if <requested dump> equals 8 to 15]
+CCED :<value>, ... , <value>
OK

where <value> is the ASCII string of the values (in decimal except LAC and CI values are in hexadecimal) of the parameters. If a field can not be measured - or has no sense - the parameter is not filled (two consecutive commas are then found). The meaning of <value> can be found in GSM ETSI 01.04.
The response could be a single shot or automatically sent to the serial link every 5sec.

Command	Possible responses
AT+CCED=<mode>[, <requested dump>]	OK

Defined values:

<mode>	0	One shot requested
	1	Automatic shots requested
	2	Stop automatic shots

<requested dump>   1   Main Cell
if the Cell Identity is available:
MCC, MNC, LAC, CI, BSIC, BCCH Freq (absolute), RxLev, RxLev Full, RxLev Sub, RxQual, RxQual Full, RxQual Sub,Idle TS
if the Cell Identity is not available:
MCC, MNC, LAC,, BSIC, BCCH Freq (absolute), RxLev, RxLev Full, RxLev Sub, RxQual, RxQual Full, RxQual Sub,Idle TS

2   Neighbour1 to Neighbour6
if the Cell Identity is available
MCC, MNC, LAC, CI, BSIC, BCCH Freq (absolute), RxLev
if the Cell Identity is not available
MCC, MNC, LAC,, BSIC, BCCH Freq (absolute), RxLev

4   Timing Advance

8   Main cell RSSI indications (RxLev) from 0 to 31.

Combination (addition of the values) of the requested dumped are supported.

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Remarks: Notice that in idle mode, only RxLev measures (on
                       the main cell and on the neighbour cells) are done.
                       The value of these RxLev is set in the RxLev Full
                       field for the main cell. Values of MCC/MNC are
                       set to 0 in case of "No service". For the request of
                       RSSI the bit error rate is not measured.
Source: factory default
Implementation: complete

1.4 Serial link control commands

1.4.1 ATE

The setting of this parameter determines whether or not the DCE echoes
characters received from the DTE during command state and online
command state.

Command	Possible responses
E[<value>]	OK

Defined values:

   <value>:   0   DCE does not echo characters during
                                                command state and online command state.
                                       1   DCE echoes characters during command
                                                state and online command state.

Remarks: none
Source: V.25ter/6.2.4
Implementation: complete

1.4.2 ATQ

The setting of this parameter determines whether or not the DCE transmits
result codes to the DTE. When result codes are being suppressed, no portion
of any intermediate, final, or unsolicited result code – header, result text,
line terminator, or trailer – is transmitted. Information text transmitted in
response to commands is not affected by the setting of this parameter.

Command	Possible responses
Q[<value>]	OK

Defined values:

   <value>:   0   DCE transmits result codes.
                                       1   Result codes are suppressed and not
                                                transmitted.

Remarks: none
Source: V.25ter/6.2.5

Implementation: complete

1.4.3   ATV

The setting of this parameter determines the contents of the header and trailer transmitted with result codes and information responses. It also determines whether result codes are transmitted in a numeric form or an alphabetic (or "verbose") form. The text portion of information responses is not affected by this setting.

Command	Possible responses
V[<value>]	OK

Defined values:

    <value>:   0   DCE transmits limited headers and trailers and numeric text.

                        1   DCE transmits full headers and trailers and verbose response text.

Remarks: none
Source: V.25ter/6.2.6
Implementation: complete

1.4.4   AT&C

This parameter determines how the state of circuit 109 (DCD) relates to the detection of received line signal from the distant end.

Command	Possible responses
&C[<value>]	OK

Defined values:

    <value>:   0   DCD always on

                        1   DCD matches the state of the remote modems data carrier

Remarks: none
Source: V.25ter/6.2.8
Implementation: complete

1.4.5   AT&D

This parameter determines how the DCE responds when circuit 108/2 (DTR) is changed from the ON to the OFF condition during online data state.

Command	Possible responses
&D[<value>]	OK
&D?	<value>

Defined values:

<value>:   0   DTR is ignored.
                  1   Upon an on-to-off transition of DTR, the
                       DCE enters online command state and
                       issues an OK result code; the call remains
                       connected.
                  2   Upon an on-to-off transition of DTR, the
                       DCE instructs the underlying DCE to
                       perform an orderly clear-down of the call.

Remarks: none
Source: V.25ter/6.2.9
Implementation: complete

1.4.6   AT&S

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

Command	Possible responses
&S[<value>]	OK

Defined values:

<value>:   0   DSR is always on.
                  1   DSR off in command mode, on in online
                       mode.

Remarks: none
Source: factory default
Implementation: complete

1.4.7   AT+IPR

This numeric extended-format parameter specifies the data rate at which the
DCE will accept commands.

Command	Possible responses
+IPR=<rate>	OK
+IPR?	+IPR:<rate>
+IPR=?	+IPR: [list of auto-bauding-capable <rate> values],[list of fixed-only <rate> values]

Defined values:

<rate>:   Value specified shall be the rate in bits per second.
                      A value of 0 switches into auto-bauding mode.

Remarks: The auto-bauding mode needs to have the
                      characters in capital letters, otherwise they could
                      not be recognised.

Source: V.25ter/6.2.10
Implementation: complete

1.4.8   AT+ICF

This extended-format compound parameter is used to control the asynchronous character framing between the DTE and DCE.

Command	Possible responses
+ICF=[<format> [,<parity>]]	OK
+ICF?	+ICF: [<format>[,<parity>]]
+ICF=?	+ICF: list of supported <format>s, list of supported <parity>s

Defined values:

<format>:	1	8 Data 2 Stop
	2	8 Data 1 Parity 1 Stop
	3	8 Data 1 Stop
	4	7 Data 2 Stop
	5	7 Data 1 Parity 1 Stop
	6	7 Data 1 Stop

<parity> :	0	Odd
	1	Even
	4	None

Remarks: none
Source: V.25ter/6.2.11
Implementation: complete

1.4.9   AT+IFC

This extended-format compound parameter is used to control the operation of local flow control between the DTE and DCE.

Command	Possible responses
+IFC=<DCE_DTE>, <DTE_DCE>	OK
+IFC?	+IFC: <DCE_DTE>,<DTE_DCE>
+IFC=?	+IFC: list of supported < DCE_DTE >,<DTE_DCE> settings

Defined values:

<DCE_DTE>:	0	None
	2	RTS line

<DTE_DCE>:	0	None
	2	CTS line

Remarks: none
Source: V.25ter/6.2.12
Implementation: complete

1.5 Call control commands

1.5.1 AT+CICB

Command is used to set the bearer type if no bearer is transmitted on an incoming call.

Command	Possible responses
AT+CICB=<n>	OK
AT+CICB?	+CICB: <n>
AT+CICB=?	+CICB: list of supported <n>s

Defined values:

    <n>   Simulated incoming bearer.

                    0   Data
                    1   Fax
                    2   Voice

Remarks: If a wrong bearer is transmitted, the CICB setting has no effect**.**
Source: factory default
Implementation: complete

1.5.2 ATD;

Command is used to establish a voice call.

Command	Possible responses	
ATD<number>;	OK	If call is established
	BUSY	If called party is in another call
	NO ANSWER	If called party does not accept a call
	NO CARRIER	If there are problems to establish a call

Defined values:

    <number>:   Telephone number to dial.

Remarks: In case of international number, the local international prefix (usually 00) could be replaced by the '+' character.
For phonebook dialling please see phonebook commands section.
Source: GSM 07.07/V.25ter/6.3.1
Implementation: complete

1.5.3   AT+SPEAKER

Command is used to s witch between the internal speaker and microphone lines for the A2D-A/B/C series or to switch them on and off for the A2D-1.

Command	Possible responses
AT+SPEAKER=<n>	OK
AT+ SPEAKER?	+ SPEAKER: <n>
AT+ SPEAKER =?	+SPEAKER: (list of supported <n>s)

Defined values:

<n>	0	Speaker 1 and Microphone 1are active.
	1	Speaker 2 and Microphone 2 are active.

Remarks:	The A2D-1 series has got no Speaker 2 and Microphone 2 audio lines, so AT+SPEAKER=1 turns the Audio section off.
Source:	factory default
Implementation:	complete

1.5.4   AT+VGR

Command is used to set the attenuation of the modules loudspeaker.

Command	Possible responses
AT+VGR=<n>	OK
AT+VGR?	+VGR: <n>
AT+VGR=?	(list of supported <n>s)

Defined values:

<n>	Integer , range 0...255, where 128 is nominal gain.

Remarks:	none
Source:	GSM 07.07/C.4
Implementation:	complete

1.5.5   AT+VGT

Command is used to set the amplification of the modules microphone.

Command	Possible responses
AT+VGT=<n>	OK
AT+VGT?	+VGT: <n>
AT+VGT=?	(list of supported <n>s)

Defined values:

<n>	Integer , range 0...255, where 128 is nominal gain.

Remarks: none
Source: GSM 07.07/C.5
Implementation: complete

1.5.6   AT+VTS

Command is used to transmit DTMF tones.

Command	Possible responses
AT+VTS=<tone>	OK
AT+VTS=?	(list of supported <tone>s)

Defined values:

   <tone>   A single ASCII character in the set 0-9, #,*,A-D.

Remarks: none.
Source: GSM 07.07/C.11
Implementation: complete

1.5.7   AT+VTD

Command is used to set the length of DTMF tones emitted.

Command	Possible responses
AT+VTD=<n>	OK
AT+VTD?	+VTD: <n>
AT+VTD=?	(list of supported <n>s)

Defined values:

   <n>   Tone of duration <n>*100 milliseconds.

Remarks: If n < 4 the tone duration is 300 ms.
Source: GSM 07.07/C.12
Implementation: complete

1.5.8   AT+SIDET

Command is used to set the availability and attenuation of the microphone signal in the speaker.

Command	Possible responses
AT+ SIDET =<n>,<m>	OK
AT+ SIDET?	+ SIDET: <n>,<m>
AT+ SIDET =?	(list of supported <n>s), (list of supported <m>s)

Defined values:

   <n>   0   Side tone is disabled.
                     1   Side tone is enabled.

	<m>	0	±0dB
		1	-6dB
		2	-12dB
		3	-18dB

Remarks:	none
Source:	factory default
Implementation:	complete

1.5.9   AT+ECHO

Command is used to enable and set the echo cancellation or the switch attenuation parameters for the audio lines.

Command	Possible responses
AT+ECHO= <mode>, [<Taps>,<ConvTh>,<DbtS>, <FarS>,<EcDelay>] (for echo cancellation) [<Volout>,<Step>,<PcmThrel>, <PcmThmax>,<EcGain>] (for switch attenuation)	OK
AT+ECHO?	+ECHO: <Status>,<Taps>,<ConvTh>,<DbtS>, <FarS>, <EcDelay> +ECHO: <Status>,<Volout>,<Step>,<PcmThrel>, <PcmThmax>,<EcGain>

Defined values:

<mode>	0	Deactivate Echo
	1	Activate Echo
	2	Configure echo cancellation (automatically stored in E2P)
	3	Deactivate switch attenuation
	4	Activate switch attenuation
	5	Configure switch attenuation (automatically stored in E2P)

<Taps>   This parameter specifies the number of taps of the adaptive filter used for echo cancellation. The allowed range is [2 ; 255].

<ConvTh>   This parameter specifies the level of needed convergence. A low value provides a high convergence and a high value a high stability. The allowed range is [0 ;4095].

<DbtTalk >   A negative value provides a high sensivity and a positive value a low one. The allowed range is [0;10].

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\<FarS\>	If Far-end speaker detection = 0, the algorithm will always adjust the filter. For other values, adaptation runs only if far end speaker energy is greater than Far end speaker detection value. The allowed range is [0 ;1000].
\<EcDelay\>	Number of samples used to compute energy for algorithm convergence evaluation. The allowed range is [0 ;63].
\<Volout\>	This parameter specifies the maximum attenuation of the switch.

0	31 db
1	29 db
2	27 db
3	25 db
.	
.	
14	3 db
15	1 db

\<Step\>	This parameter specifies the attenuation step between attenuation and no attenuation.

0	1 db
1	2 db
2	3 db
3	4 db

\<PcmThRel\>	This parameter specifies the relative threshold between max and min energy information. The allowed range is [0 ; 31].
\<PcmThMax \>	This parameter specifies threshold of max energy information. The allowed range is [0 ; 31].
\<EcGain\>	This parameter specifies the attenuation for switch when echo algorithm has converged. This parameter is used by echo algorithm when echo and switched are activated together.

0	14 db
1	12 db
2	10 db
3	8 db
4	6 db
5	4 db
6	2 db
7	1 db

<Status>	0	Echo Deactivated.
	1	Echo Activated for Mic1/Speaker1 .
	2	Echo Activated for Mic2/Speaker 2.

Remarks: For the A2D-1 there is no Microphone2 and Speaker2 available.
Source: factory default
Implementation: complete

1.5.10 ATD

Command is used to establish a data call.

Command	Possible responses	
ATD<number>	CONNECT<speed>	If call is established
	BUSY	If called party is in another call
	NO ANSWER	If called party does not accept a call
	NO CARRIER	If there are problems to establish a call

Defined values:

<speed>: Link baud rate between modem and network.

Remarks: Bearer type should be selected before (see AT+CBST). For phonebook dialling please see phonebook commands section.
Source: GSM 07.07/V.25ter/6.3.1
Implementation: complete

1.5.11 ATDL

Command is used to redial the last dialled number.

Command	Possible responses	
ATDL	CONNECT<speed>	If data call is established
	OK	If voice call is established
	BUSY	If called party is in another call
	NO ANSWER	If called party does not accept a call
	NO CARRIER	If there are problems to establish a call

Defined values:

<speed>: Link baud rate between modem and network.

Remarks: Command uses the same type of connection (voice or data) as the last dialled connection.
Source: factory default
Implementation: complete

1.5.12 ATA

Command is used to accept an incoming call.

Command	Possible responses		
ATA	OK	If incoming call is a voice call	ERROR
	CONNECT <speed>	If incoming call is a data call	

Defined values:

<speed>   See ATD command.

Remarks: User should use command only if ATS0 equals zero.

Source: GSM 07.07/V.25ter/6.3.5

Implementation: complete

1.5.13 ATS0

The S0 parameter controls the automatic answering of an incoming call.

Command	Possible responses
ATS0=<n>	OK
ATS0?	<n>

Defined values:

<n>:   Automatic answer after <n> rings. A value of 0 disables automatic answering.

Remarks: none.

Source: GSM 07.07/V.25ter/6.3.5

Implementation: complete

1.5.14 ATH

Command is used to end a call.

Command	Possible responses	
ATH	OK	ERROR

Remarks: none

Source: GSM 07.07/V.25ter/6.3.6

Implementation: complete

1.5.15 +++

Sequence is used to switch from on-line data mode to on-line command mode while in a data call.

Command	Possible responses	
+++	OK	

Remarks: No <CR> is needed after the sequence. For another
                    way to disconnect see AT&D command.
Source: factory default
Implementation: complete

1.5.16 ATO

Command is used to switch back from on-line command mode to on-line
command data while in a data call.

Command	Possible responses	
ATO	CONNECT <speed>	ERROR

Remarks: none
Source: GSM 07.07/V.25ter/6.3.7
Implementation: complete

1.5.17 AT+CBST

Command is used to select the bearer service type and the transparent or
non-transparent mode for a data connection.

Command	Possible responses
+CBST=[<speed>,0,[,<ce>]]	OK
AT+CBST?	+CBST: <speed>,0,<ce>
AT+CBST=?	+CBST: (list of supported <speed>s),0,(list of supported <ce>s)

Defined values:

<speed>:   0   Autobauding (automatic selection of the
                              speed)
                      1   300 bps (V.21)
                      2   1200 bps (V.22)
                      4   2400 bps (V.22bis)
                      6   4800 bps (V.32)
                      7   9600 bps (V.32)
                      8   specific
                      12   9600 bps (V.34)
                      14   14400 bps (V.34)
                      65   300 bps (V.110)
                      66   1200 bps (V.110)
                      68   2400 bps (V.110)
                      70   4800 bps (V.110)
                      71   9600 bps (V.110)
                      75   14400 bps (V.110)

<ce>:   0   Transparent

1	Non-transparent	
2	Transparent preferred	
3	Non-transparent preferred	

Remarks: none
Source: GSM 07.07/6.7
Implementation: complete

1.5.18 AT%C

This command enables or disables data compression negotiation.

Command	Possible responses
AT%C<n>	OK
AT%C?	<n>

Defined values:

<n>:	0	no compression
	2	V.42 compression, if supported

Remarks: none
Source: factory default
Implementation: complete

1.5.19 AT+DS

This command enables or disables V.42 data compression.

Command	Possible responses
AT+DS=<dir>,<neg>,<P1>,<P2>	OK
AT+DS?	+DS: <dir>,<neg>,<P1>,<P2>
AT+DS=?	+DS: list of supported <dir>s,<neg>s,<P1>s,<P2>s

Defined values:

<dir>   Specifies the desired direction(s) of operation of
                 the data compression function; from the DTE point
                 of view, (default is 3),

                 0   Negotiated ... no compression
                 1   Transmit only
                 2   Receive only
                 3   Both directions, accept any direction

<neg>   Specifies whether or not the DCE should continue
                 to operate if the desired result is not obtained,
                 (default is 0),

<table>
<tr><td>0</td><td>Do not disconnect if V.42bis is not negotiated by the remote DCE as specified in <dir></td></tr>
</table>

0	Do not disconnect if V.42bis is not negotiated by the remote DCE as specified in <dir>
1	Disconnect if V.42bis is not negotiated by the remote DCE as specified in <dir>
<P1>	Specifies the maximum number of dictionary entries which should be negotiated, range 512-4096, (default is 4096),
<P2>	Specifies the maximum string length to be negotiated, range 6-250, (default is 250),

Remarks: none
Source: factory default
Implementation: complete

1.5.20 AT\N

This command controls the preferred error correcting mode in a data connection. It can only be used for transparent data transmission.
If V42 feature is provided, the module authorises the LAPM error correction mode.
If MNP2 feature is provided, the module authorises the MNP error correction mode.

Command	Possible responses
AT\N<n>	OK
AT\N?	

Defined values:

<n>	0	Disables error correction mode
	2	Selects an auto reliable mode (LAPM connection, then MNP connection)
	4	Selects LAPM error correction mode
	5	Selects MNP error correction mode

Remarks: 2 and 4 are not implemented up to now.
Source: factory default
Implementation: complete

1.5.21 Remote disconnection

When the called party has ended a call the modem shows the final result code NO CARRIER.

1.6 Call information commands

1.6.1 AT+CR

Command controls whether or not intermediate result code +CR: <serv> is returned from the modem during connect negotiation of a data call.

Command	Possible responses
+CR=[<mode>]	OK
AT+CR?	+CR: <mode>
AT+CR=?	+CR: (list of <modes>s)

Defined values:

<mode>:	0	Disables reporting
	1	Enables reporting
<serv>:	ASYNC	Asynchronous transparent
	REL ASYNC	Asynchronous non-transparent

Remarks: none
Source: GSM 07.07/6.9
Implementation: complete

1.6.2 AT+CRC

Command controls whether or not the normal RING message of an incoming call is replaced by an extended call indication using unsolicited result code +CRING: <type>.

Command	Possible responses
+CRC=[<mode>]	OK
AT+CRC?	+CRC: <mode>
AT+CRC=?	+CRC: (list of <modes>s)

Defined values:

<mode>:	0	Disables reporting
	1	Enables reporting
<type>:	ASYNC	Asynchronous transparent
	REL ASYNC	Asynchronous non-transparent
	VOICE	Normal voice

Remarks: none
Source: GSM 07.07/6.11
Implementation: complete

1.6.3   AT+ILRR

Command is used to report the local DCE-DTE rate in extended format in any incoming or outgoing call before the CONNECT message. Intermediate result code +ILRR: <rate> is shown.

Command	Possible responses
+ILRR=[<mode>]	OK
AT+ILRR?	+ILRR: <mode>
AT+ILRR=?	+ILRR: (list of <modes>s)

Defined values:

<mode>:	0	Disables reporting
	1	Enables reporting

Remarks: none
Source: GSM 07.07/4.3
Implementation: complete

1.6.4   AT+DR

Command determines whether or not the use of V42bis is informed in a data incoming or outgoing call. Intermediate result code +DR: <comp> is returned from the modem during connect negotiation of a data call.

Command	Possible responses
+DR=[<mode>]	OK
AT+DR?	+DR: <mode>
AT+DR=?	+DR: (list of <modes>s)

Defined values:

<mode>:	0	Disables reporting
	1	Enables reporting

<comp>:	NONE	Data compression is not in use.
	V42B	RecV.42bis is in use in both directions.
	V42B RD	Rec. V.42bis is in use in receive direction only.
	V42B TD	Rec. V.42bis is in use in transmit direction only.

Remarks: The +DR intermediate result code, if enabled, is issued before the final result code, before the +ILRR intermediate report, and after the service report control +CR.

Source: factory default
Implementation: complete

1.7   Call setting commands

1.7.1   AT+CCFC

Command is used to set the call forwarding service.

Command	Possible responses	
+CCFC=<reason>,<mode> [,<number>]	OK **When <mode>=2:** +CCFC: <status>,<class>	+CME ERROR: <err>
AT+CCFC=?	+CCFC: (list of supported <reason>s)	

Defined values:

<reason>:   0   Unconditional
                1   Mobile busy
                2   No reply
                3   Not reachable
                4   All call forwarding
                5   All conditional call forwarding

<mode>:   0   Disable
                1   Enable
                2   Query status
                3   Registration
                4   Erasure

<number>:   Telephone number to forward to.

<class>   Is a sum of integers each representing a class of information (default 7 equals to all classes):

                1   Voice
                2   Data
                4   Fax

<status>:   0   Not active
                1   Active

Remarks: none
Source: GSM 07.07/7.10
Implementation: complete

1.7.2 AT+CCWA

Command is used to set the call waiting supplementary service.

Command	Possible responses	
+CCWA=[<n>[,<mode> [,<class>]]]	OK **When <mode>=2:** +CCWA: <status>,<class>	+CME ERROR: <err>
AT+CCWA?	+CCWA: <n>	
AT+CCWA=?	+CCWA: (list of <n>s)	

Defined values:

    <n>   (Sets/shows the result code presentation status):

          0   Disable
          1   Enable

    <mode>   (When <mode> parameter is not given, network is not interrogated):

          0   Disable
          1   Enable
          2   Query status

    <class>   Is a sum of integers each representing a class of information (default 7 equals to all classes):

          1   Voice
          2   Data
          4   Fax

    <status>:   0   Not active
          1   Active

Remarks: none
Source: GSM 07.07/7.11
Implementation: complete

1.7.3 AT+CLIP

Command is used to set and request the status of the calling line identification presentation service. Depending on the setting the number of the calling party will be shown as result code +CLIP: <number>,<type> on incoming calls (after every RING).

Command	Possible responses
+CLIP=[<n>]	OK
AT+CLIP?	+CLIP=<n>,<m>
AT+CLIP=?	+CLIP: (list of supported <n>s)

Defined values:

<n>   (Parameter sets/shows the result code presentation status):

0   Disable
1   Enable

<m>   (Parameter shows the subscriber CLIP service status in the network):

0   CLIP not provisioned
1   CLIP provisioned
2   Unknown (e.g. no network, etc.)

<number>:   String type phone number of format specified by <type>.

<type>:   Type of address octet in integer format.

Remarks: none
Source: GSM 07.07/7.6
Implementation: complete

1.7.4   AT+CLIR

Command is used to set and request the status of the calling line identification restriction service. Depending on the setting the own number is presented to the called party or not.

Command	Possible responses
+CLIR=[<n>]	OK
AT+CLIR?	+CLIR=<n>,<m>
AT+CLIR=?	+CLIR: (list of supported <n>s)

Defined values:

<n>   (Parameter sets the adjustment for outgoing calls):

0   Presentation indicator is used according to the subscription of the CLIR service (as with the SIM card contract)

1   CLIR invocation   (number will not be transmitted)

2   CLIR suppression   (number will be transmitted)

     <m>   (Parameter shows the subscriber CLIR service status in the network):

            0   CLIR not provisioned
            1   CLIR provisioned in permanent mode
            2   Unknown (e.g. no network, etc.)
            3   CLIR temporary mode presentation restricted

            4   CLIR temporary mode presentation allowed

Remarks: none
Source: GSM 07.07/7.7
Implementation: complete

1.7.5 AT+COLP

Command is used to set and request the status of the connected line identification presentation. Depending on the setting the number of the called party will be shown as result code +COLP: <number>,<type> on outgoing calls.

Command	Possible responses
+COLP=[<n>]	OK
AT+COLP?	+COLP=<n>,<m>
AT+COLP=?	+COLP: (list of supported <n>s)

Defined values:

     <n>   (Parameter sets/shows the result code presentation status):

            0   Disable
            1   Enable

     <m>   (Parameter shows the subscriber COLP service status in the network):

            0   COLP not provisioned
            1   COLP provisioned
            2   Unknown (e.g. no network, etc.)

     <number>:   String type phone number of format specified by <type>.

     <type>:   Type of address octet in integer format.

Remarks: not available in most networks
Source: GSM 07.07/7.8
Implementation: complete

1.8 Phonebook commands

1.8.1 AT+CPBS

Command selects phonebook memory storage. The SIM card is the only storage in the A2D module.

Command	Possible responses	
+CPBS=<storage>	OK	+CME ERROR: <err>
+CPBS?	+CPBS: <storage>[,<used>,<total>]	+CME ERROR: <err>
+CPBS=?	+CPBS: (list of supported <storage>s)	

Defined values:

<storage>:	"SM"	SIM abbrev. dialling phonebook
	"FD"	SIM fixed dialling phonebook
	"ON"	SIM own numbers phonebook

<used>:   Integer type value indicating the number of used locations in selected memory.

<total>:   Integer type value indicating the total number of locations in selected memory.

Remarks: none
Source: GSM 07.07/8.11
Implementation: complete

1.8.2 AT+CPBR

Command is used to read a special entry or a range of entries from the phonebook memory storage.

Command	Possible responses	
+CPBR=<index1> [,<index2>]	+CPBR: <index1>,<number>,<type>,<text> <CR><LF> +CPBR: <index2>,<number>,<type>,<text>]	+CME ERROR: <err>
+CPBR=?	+CPBR: (list of supported <index>s),<nlength>,<tlength>	+CME ERROR: <err>

Defined values:

<index1>, <index2>, <index>:   Integer type values in the range of location numbers of phonebook memory.

<number>:   String type phone number of format <type>.

<type>:	Type of address octet in integer format.
<text>:	String type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS.
<nlength>:	Integer type value indicating the maximum length of field <number>.
<tlength>:	Integer type value indicating the maximum length of field <text>.

Remarks: none
Source: GSM 07.07/8.12
Implementation: complete

1.8.3   AT+CPBF

Command is used to find a phonebook entry using a search-string.

Command	Possible responses	
+CPBF=<findtext>	+CPBF: <index1>,<number>,<type>,<text> <CR><LF>+CPBF: <index2>,<number>,<type>,<text>]	+CME ERROR: <err>
+CPBF=?	+CPBF: <nlength>,<tlength>	+CME ERROR: <err>

Defined values:

<index1>, <index2>:	Integer type values in the range of location numbers of phonebook memory.
<number>:	String type phone number of format <type>.
<type>:	Type of address octet in integer format.
<findtext>,<text>:	String type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS.
<nlength>:	Integer type value indicating the maximum length of field <number>.

| <tlength>: | Integer type value indicating the maximum length of field <text>. |

Remarks: none
Source: GSM 07.07/8.13
Implementation: complete

1.8.4   AT+CPBW

Command is used to write a phonebook entry to a special place in the phonebook memory storage.

Command	Possible responses	
+CPBW=[<index>] [,<number> [,<type>[,<text>]]]	OK	+CME ERROR: <err>
+CPBW=?	+CPBW: (list of supported <index>s), <nlength>, (list of supported <type>s),<tlength>	+CME ERROR: <err>

Defined values:

<index>:	Integer type values in the range of location numbers of phonebook memory.
<number>:	String type phone number of format <type>.
<type>:	Type of address octet in integer format.
<text>:	String type field of maximum length <tlength>; character set as specified by command Select TE Character Set +CSCS.
<nlength>:	Integer type value indicating the maximum length of field <number>.
<tlength>:	Integer type value indicating the maximum length of field <text>.

Remarks: none
Source: GSM 07.07/8.14
Implementation: complete

1.9 Message handling commands

1.9.1 AT+CSCA

Command is used to set the service centre address. Mobile originated messages are transmitted through these service centre.

Command	Possible responses
+CSCA=<sca>[,<tosca>]	OK
+CSCA?	+CSCA: <sca>,<tosca>
+CSCA=?	OK

Defined values:

<sca>:	GSM 04.11 RP service centre address Address-Value field in string format
<tosca>:	GSM 04.11 RP service centre address Type-of-Address octet in integer format
Remarks:	In PDU mode (at+cmgf=0) this command is needed only when the length of the SMSC address coded into <pdu> parameter equals zero.
Source:	GSM 07.05/3.3.1
Implementation:	complete

1.9.2 AT+CMGL

Command is used to read selected messages from the SIM card storage.

- Text mode:

Command	Possible responses	
+CMGL[=<stat>]	+CMGL: <index>,<stat>,<oa/da> „[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[<CR><LF> +CMGL: <index>,<stat>,<da/oa> „[<scts>][,<tooa/toda>,<length>]<CR><LF><data>[...]]	+CMS ERROR: <err>
+CMGL=?	+CMGL: (list of supported <stat**s**)	

Defined values:

<stat>	String type (default "REC UNREAD");indicates the status of message in memory:	
	"REC UNREAD"	Received unread message (i.e. new message)
	"REC READ"	Received read message

	"STO UNSENT"	Stored unsent message
	"STO SENT"	Stored sent message
	"ALL"	All messages

<table>
<tr><td><index></td><td>Integer type; value in the range of location numbers supported by the associated memory</td></tr>
<tr><td><oa></td><td>GSM 03.40 TP-Originating-Address Address-Value field in string format</td></tr>
<tr><td><da></td><td>GSM 03.40 TP-Destination-Address Address-Value field in string format</td></tr>
<tr><td><scts></td><td>GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format</td></tr>
<tr><td><toda></td><td>GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)</td></tr>
<tr><td><tooa></td><td>GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)</td></tr>
<tr><td><length></td><td>Integer type value indicating the length of the message body <data> in characters</td></tr>
<tr><td><data></td><td>GSM 03.40 TP-User-Data in text mode responses</td></tr>
</table>

- PDU mode:

Command	Possible responses	
+CMGL[=<stat>]	+CMGL: <index>,<stat>,,<length><CR><LF> <pdu> [<CR><LF>+CMGL:<index>,<stat>,,<length><CR><LF><pdu>[...]]	+CMS ERROR: <err>
+CMGL=?	+CMGL: (list of supported <stat>s)	

Defined values:

<stat>	Integer type (default 0) indicates the status of message in memory:

0	Received unread message (i.e. new msg.)
1	Received read message
2	Stored unsent message
3	Stored sent message
4	All messages

<index>   See text mode

<length>   Integer type value the length of the actual TP data
                   unit in octets (i.e. the RP layer SMSC address
                   octets are not counted in the length);

<pdu>   GSM 04.11 SC address followed by GSM 03.40
                   TPDU in hexadecimal format

Remarks: none
Source: GSM 07.05/3.4.2,4.1
Implementation: complete

1.9.3   AT+CMGR

Command is used to read one messages from the SIM card storage.

- Text mode:

Command	Possible responses	

+CMGR=<index>	if SMS-DELIVER:
	+CMGR: <stat>,<oa>,,<scts>[,<tooa>,
	<fo>,<pid>,<dcs>,<sca>,<tosca>,<length>]
	<CR><LF><data>
	if SMS-SUBMIT:
	+CMGR: <stat>,<da>,[,<toda>,<fo>,<pid>
	,<dcs>,[<vp>],<sca>,<tosca>,<length>]
	<CR><LF><data>
		+CMS ERROR:
		<err>

+CMGR=?	OK	

Defined values:

<stat>   String type (default "REC UNREAD");indicates
                   the status of message in memory:

                   "REC UNREAD"   Received   unread   message
                                   (i.e. new message)
                   "REC READ"   Received read message
                   "STO UNSENT"   Stored unsent message
                   "STO SENT"   Stored sent message
                   "ALL"   All messages

<index>   Integer type; value in the range of location
                   numbers supported by SIM memory

<oa>   GSM 03.40 TP-Originating-Address Address-
                   Value field in string format

<da>   GSM 03.40 TP-Destination-Address Address-
                   Value field in string format

<scts>	GSM 03.40 TP-Service-Centre-Time-Stamp in time-string format
<toda>	GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)
<tooa>	GSM 04.11 TP-Originating-Address Type-of-Address octet in integer format (default refer <toda>)
<fo>	First octet of GSM 03.40 SMS-DELIVER or SMS-SUBMIT (default 17)
<pid>	GSM 03.40 TP-Protocol-Identifier in integer format (default 0)
<dcs>	GSM 03.38 SMS Data Coding Scheme (default 0)
<vp>	Depending on SMS-SUBMIT <fo> setting: GSM 03.40 TP-Validity-Period either in integer format (default 167) or in time-string format
<length>	Integer type value indicating the length of the message body <data> in characters
<data>	GSM 03.40 TP-User-Data in text mode responses

- PDU mode:

Command	Possible responses	
+CMGR=<index>	+CMGR: <stat>,,<length><CR><LF><pdu>	+CMS ERROR: <err>
+CMGR=?	OK	

Defined values:

<stat>	Integer type (default 0) indicates the status of message in memory:

	0	Received unread message (i.e. new message)
	1	Received read message
	2	Stored unsent message
	3	Stored sent message
	4	All messages

<index>	See text mode

	<length>	Integer type value the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length);

	<pdu>	GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format

Remarks: none
Source: GSM 07.05/3.4.3,4.2
Implementation: complete

1.9.4 AT+CMGS

Command is used to send a message to the service centre.

- Text mode:

Command	Possible responses	
+CMGS=<da>[,<toda>]<CR> **text is entered**<ctrl-Z/ESC>	+CMGS: <mr>	+CMS ERROR: <err>
+CMGS=?	OK	

Defined values:

	<da>	GSM 03.40 TP-Destination-Address Address-Value field in string format

	<toda>	GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

	<mr>	GSM 03.40 TP-Message-Reference in integer format

- PDU mode:

Command	Possible responses	
+CMGS=<length><CR> **PDU is given** <ctrl-Z/ESC>	+CMGS: <mr>	+CMS ERROR: <err>
+CMGS=?	OK	

Defined values:

	<length>	Integer type value the length of the actual TP data unit in octets (i.e. the RP layer SMSC address octets are not counted in the length);

	<pdu>	GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format
	<mr>	See text mode

Remarks: When the length octet of the SMSC address equals zero, the SMSC address set with command Service Centre Address +CSCA is used.

Source: GSM 07.05/3.5.1,4.3

Implementation: complete

1.9.5 AT+CMSS

Command is used to send a message from the SIM card storage to the service centre.

Command	Possible responses	
+CMSS=<index>[,<da>[,<toda]]	+CMSS: <mr>	+CMS ERROR: <err>
+CMSS=?	OK	

Defined values:

<index>   integer type; value in the range of location numbers supported by SIM memory

<da>   GSM 03.40 TP-Destination-Address Address-Value field in string format

<toda>   GSM 04.11 TP-Destination-Address Type-of-Address octet in integer format (when first character of <da> is + (IRA 43) default is 145, otherwise default is 129)

<mr>   GSM 03.40 TP-Message-Reference in integer format

Remarks: none

Source: GSM 07.05/3.5.2

Implementation: complete

1.9.6 AT+CMGW

Command is used to write a message to the SIM card storage.

- Text mode:

Command	Possible responses	
+CMGW=<oa/da>[,<tooa,toda>[,<stat>]] <CR>**text is entered**<ctrl-Z/ESC>	+CMGW: <index>	+CMS ERROR: <err>
+CMGW=?	OK	

Defined values:

<oa>   GSM 03.40 TP-Originating-Address Address-
                  Value field in string format

<tooa>   GSM 04.11 TP-Originating-Address Type-of-
                  Address octet in integer format (default refer
                  <toda>)

<da>   GSM 03.40 TP-Destination-Address Address-
                  Value field in string format

<toda>   GSM 04.11 TP-Destination-Address Type-of-
                  Address octet in integer format (when first
                  character of <da> is + (IRA 43) default is 145,
                  otherwise default is 129)

<index>   Integer type; value in the range of location
                  numbers supported by SIM memory

<stat>   String type (default "REC UNREAD");indicates
                  the status of message in memory:

                  "REC UNREAD"   Received unread message
                                  (i.e. new message)
                  "REC READ"   Received read message
                  "STO UNSENT"   Stored unsent message
                  "STO SENT"   Stored sent message
                  "ALL"   All messages

- PDU mode:

Command	Possible responses	
+CMGW=<length>[,<stat>]<CR>	+CMGW:	+CMS ERROR: <err>
PDU is given <ctrl-Z/ESC>	<index>	
+CMGW=?	OK	

Defined values:

<length>   Integer type value the length of the actual TP data
                  unit in octets (i.e. the RP layer SMSC address
                  octets are not counted in the length);

<stat>   Integer type (default 0) indicates the status of
                  message in memory:

                  0   Received unread message (i.e. new msg.)
                  1   Received read message
                  2   Stored unsent message
                  3   Stored sent message
                  5   All messages

<index>	See text mode
<pdu>	GSM 04.11 SC address followed by GSM 03.40 TPDU in hexadecimal format

Remarks: When the length octet of the SMSC address equals zero, the SMSC address set with command Service Centre Address +CSCA is used.

Source: GSM 07.05/3.5.3,4.4

Implementation: complete

1.9.7 AT+CMGD

Command is used to delete a message from the SIM card storage.

Command	Possible responses	
+CMGD=<index>	OK	+CMS ERROR: <err>
+CMGD=?	OK	

Defined values:

<index>   integer type; value in the range of location numbers supported by SIM memory

Remarks: none

Source: GSM 07.05/3.5.4

Implementation: complete

1.10 Message setting commands

1.10.1 AT+CSMS

Command is used to select messaging services. It also shows supported services, where <mt> stands for mobile terminated messages, <mo> for mobile originated messages and <bm> stands for broadcast type messages.

Command	Possible responses	
+CSMS=<service>	+CSMS: <mt>,<mo>,<bm>	+CMS ERROR: <err>
+CSMS?	+CSMS: <service>,<mt>,<mo>,<bm>	
+CSMS=?	+CSMS: (list of supported <service>s)	

Defined values:

<service>:   0   GSM   03.40   and   03.41   (GSM standards for SMS, Cell Broadcast)

                    1...127   Reserved

                    128...   Manufacturer specific

<mt>, <mo>, <bm>:

                    0   Type not supported

1   Type supported

Remarks: none
Source: GSM 07.05/3.2.1
Implementation: complete

1.10.2 AT+CPMS

Command is used to select memory storage that will be used for reading <mem1> and writing <mem2> short messages to and for writing broadcast <mem3> to.

Command	Possible responses	
+CPMS=<mem1>[,<mem2>[,<mem3>]]	+CPMS: <used1>,<total1>, <used2>,<total2>,<used3>, <total3>	+CMS ERROR: <err>
+CPMS?	+CPMS: <mem1>,<used1>,<total1>, <mem2>,<used2>,<total2>, <mem3>,<used3>,<total3>	+CMS ERROR: <err>
+CPMS=?	+CPMS: (list of supported <mem1>s) ,(list of supported <mem2>s) ,(list of supported <mem3>s)	

Defined values:

<mem1>   String type; memory from which messages are read and deleted (commands List Messages +CMGL, Read Message +CMGR and Delete Message +CMGD); defined values:

"SM"   SIM message storage
"BM"   Broadcast message storage

<mem2>   String type; memory to which writing and sending operations are made (commands Send Message from Storage +CMSS and Write Message to Memory +CMGW)

<mem3>   String type; memory to which received SMs are preferred to be stored (unless forwarded directly to TE; refer command New Message Indications +CNMI); refer <mem1> for defined values

<total1>   Integer type; total number of message locations in <mem1>

<total2>   Integer type; total number of message locations in <mem2>

<total3>   Integer type; total number of message locations in <mem3>

<used1>	Integer type; number of messages currently in <mem1>
<used2>	Integer type; number of messages currently in <mem2>
<used3>	Integer type; number of messages currently in <mem3>

Remarks: None
Source: GSM 07.05/3.2.2
Implementation: complete

1.10.3 AT+CMGF

Command is used to select format for incoming and outgoing messages.

Command	Possible responses
+CMGF=[<mode>]	OK
+CMGF?	+CMGF: <mode>
+CMGF=?	+CMGF: (list of supported <mode>s)

Defined values:

<mode>:	0	PDU mode
	1	Text mode

Remarks: none
Source: GSM 07.07/3.2.3
Implementation: complete

1.10.4 AT+CSMP

Command is used to set additional parameters for text mode messages.

Command	Possible responses
+CSMP=[<fo>[,<vp>[,<pid>[,<dcs>]]]]	OK
+CSMP?	+CSMP: <fo>,<vp>,<pid>,<dcs>
+CSMP=?	OK

Defined values:

<fo>:	First octet of GSM 03.40 SMS-DELIVER, SMS-SUBMIT in integer format (default 17)
<vp>:	GSM 03.40 TP-Validity-Period either in integer format (default 167) or in time-string format
<pid>:	GSM 03.40 TP-Protocol-Identifier in integer format (default 0)

<dcs>:	GSM 03.38 SMS Data Coding Scheme (default 0) in integer format

Remarks: none
Source: GSM 07.05/3.3.2
Implementation: complete

1.10.5 AT+CSDH

Command controls whether detailed header information is shown in text mode result codes.

Command	Possible responses
+CSDH=[<show>]	OK
+CSDH?	+CSDH: <show>
+CSDH=?	+CSDH: (list of supported <show>s)

Defined values:

<show>:	0		Do not show header values defined in commands +CSCA and +CSMP (<sca>, <tosca>, <fo>, <vp>, <pid> and <dcs>) nor <length>, <toda> or <tooa> in +CMT, +CMGL, +CMGR result codes for SMS/PP text mode
	1		Show the values in result codes

Remarks: none
Source: GSM 07.05/3.3.3
Implementation: complete

1.10.6 AT+CSCS

Command is used to set and request the implemented character set. Incoming characters are converted to the current used set.

Command	Possible responses
+CSCS=[<chset>]	OK
+CSCS?	+CSCS: <chset>
+CSCS=?	+CSCS: (list of supported <chset>s)

Defined values:

<chset>:	(conversion schemes listed here are supported by the Falcom A2D) "GSM" GSM default alphabet (GSM 03.38) "PCCP437" PC character set Code Page 437

Remarks: none
Source: GSM 07.07/5.5
Implementation: complete

1.10.7 AT+CNMI

Command selects the procedure, how receiving of new messages from the network is indicated to TE is active (e.g. DTR signal ON). If TE is inactive (e.g. DTR signal is OFF), message receiving should be done as specified in GSM 03.38. <mode> controls the processing of unsolicited result codes specified within this command, <mt>sets the result code indication routing for SMS DELIVERs, <bm>for CBMs and <ds> for SMS STATUS REPORTs. <bfr> defines the handling method for buffered result codes when <mode> 1, 2 or 3 is enabled. If ME does not support requested item (although TA does) final result code +CMS ERROR: <err> returned. Look at chapter Message Service Failure Result Code for a list of <err>values. Test command gives the settings supported by the TA as compound values.

NOTE: Command selects message service +CSMS should be used to detect ME support of mobile terminated SMS and CBM.

Command	Possible responses
+CNMI=[<mode>[,<mt>[,<bm>[,<ds>[,<bfr >]]]]]	+CMS Error: <err>
+CNMI?	+CNMI: <mode>,<mt>,<mb>,<ds>,<bfr>
+CNMI = ?	+CNMI: (list of supported <mode>s, (list of supported <mt>s), (list of supported < bm>s), (list of supported < ds >s), (list of supported <bfr>s)

Defined Values:

Only <mode>=2 is supported.

Any other value for <mode> (0,1 or 3) is accepted (return code will be *OK*), but the processing of unsolicited result codes will be the same than for <mode>=2.

<mode>:   0   Buffer unsolicited result codes in the TA. If TA result code buffer is full, indications can be buffered in some other places 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 (e.g. in online data mode). Otherwise forward them directly to the TE.

                           2   Buffer unsolicited result codes in the TA when TA TE link is reserved (e.g. in online data mode) 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
technique used embed result codes and data
when TA is in on-line data mode.

<mt>:   (**NOTE**: the rules for storing received SMS depend on
message class, preferred   memory storage (+CPMS)
setting and this value)

0   No SMS-DELIVER indications are routed
to the TE.

1   Indication of SMS-DELIVER is routed to
the TE using unsolicited result code:

+ CMTI: <mem>, <index>

2   SMS-DELIVERs (except class 2 messages)
are routed directly to the TE unsolicited
result code:

- PDU mode enabled:

+ CMT: [<alpha>],<length>
<CR><LF> <pdu>

- Text mode enabled (about parameters in
italics, refer command Show Text Mode
Parameters +CSDH):

+CMT: <oa>,[<alpha>],<scts>
[,<tooa>,<fo>,<pid>,<dcs>,<sca>,
<tosca>,<length>]<CR><data>

Class 2 messages result in indication as
defined in <mt>=1.

3   Class 3 SMS-Delivers are routed directly to
TE using unsolicited result codes defined in
<mt> = 2.
Messages of other classes result in
indication as defined in <mt>= 1.

<mt>	Receiving procedure for different message classes (GSM 03.38 SM Data Coding Scheme)
0	Class 0: as in GSM 03.38, but use <mem> as preferred memory if message is tried to be stored Class 1: as in GSM 03.38 but use <mem3> as preferred memory Class 2: as in GSM 03.38 Class 3: as class1

1	As \<mt\> = 0 but send indication if message stored successfully
2	Class 0: as in GSM 03.38, but always route message to TE do not try to store it in memory Class 1: route message to TE Class 2: as in GSM 03.38, but also send indication if message stored succesfull message stored successfully Class 3: route message to TE
3	Class 0,1,2: as \<mt\> = 1 Class 3: route message to TE

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

        0   No CBM indications are routed to the TE

        1   Indication of new CBM 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

          • PDU mode enabled:

            + CBM: \<length\>\<CR\>\<LF\>\<pdu\>

          • Text mode enabled:

            + CBM: \<sn\>,\<mid\>,\<dcs\>,\<page\>, \<CR\>\<LF\>\<data\>

        3   Class 3 CBMs are routed directly to TE using unsolicited result codes defined in \< bm\> = 2. Messages of other classes result in indication as defined in \<bm\>= 1.

\<bm\>	Receiving procedure for different message classes (GSM 03.38 CBM Data Coding Scheme)
0	Store message to "BM" (or some manufacturer specific memory
1	As \<bm\>= 0 but send indication if message stored successfully
2	Route message to TE
3	Class 0,1,2: as \< bm\> = 1 Class 3: route message to TE

    \<ds\>:   0   No SMS- STATUS-REPORTs are routed to the TE

1   SMS-STATUS-REPORTs are routed to the
         TE using unsolicited result code

- PDU mode enabled:

  +CDS: <length><CR><LF><pdu>

- Text mode enabled:

  +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.

Remarks: none
Source: GSM 07.05/3.3.3
Implementation: complete

1.10.8 AT+CSCB

Command is used to set parameters of how broadcast messages are to be
received.

Command	Possible responses
+CSCB=[<mode>[, <mids>[,<dcss>]]]	OK
+CSCB?	+CSCB: <mode>,<mids>,<dcss>
+CSCB=?	+CSCB: (list of supported <modes>s)

Defined values:

<mode>:   0   Message types specified in <mids> and
                      <dcss> are accepted

             1   Message types specified in <mids> and
                      <dcss> are not accepted

<mids>:   String type; all different possible combinations of
                      CBM message identifiers (refer <mid>) (default is
                      empty string); e.g. "0,1,5,320-478,922"

<dcss>:	String type; all different possible combinations of CBM data coding schemes (refer <dcs>) default is empty string); e.g. "0-3,5"

Remarks: none
Source: GSM 07.05/3.3.4
Implementation: complete

1.11 Fax class 1 commands

The fax service provided by the module is class 1 compatible. However only the core commands defined by ITU T.31 are supported. It means that commands like AT+FAR, +FCC, etc are not supported. **Autobauding has to be enabled to set up the module for fax**. All set commands below (except AT+FCLASS) return an ERROR response code if they are not issued during the communication.

1.11.1 AT+FCLASS

This command puts the module into a particular mode of operation (data or fax).

Command	Possible responses
AT+FCLASS= <n>	OK
AT+FCLASS?	+FCLASS: <n>
AT+FCLASS=?	+FCLASS: (list of supported <n>s)

Defined values:

<n>	0	Data
	1	Fax class 1
	2	Fax class 2

Remarks: none
Source:
Implementation: complete

1.11.2 AT+FTM

This command sets the fax transmit speed.

Command	Possible responses
AT+FTM=<speed>	OK
AT+FTM=?	(list of supported <speed>s)

Defined values:

<speed>	24	2400 bps (Modem type : V.27ter)
	48	4800 bps (Modem type : V.27ter)
	72	7200 bps (Modem type : V.29)
	73	7200 bps (long) (Modem type : V.17)

	74	7200 bps (short) (Modem type : V.17)
	96	9600 bps (Modem type : V.29)
	97	9600 bps (long) (Modem type : V.17)
	98	9600 bps (short) (Modem type : V.17)
	121	12000 bps (long) (Modem type : V.17)
	122	12000 bps (short) (Modem type : V.17)
	145	14400 bps (long) (Modem type : V.17)
	146	14400 bps (short) (Modem type : V.17)

Remarks: none
Source:
Implementation: complete

1.11.3 AT+FRM

This command sets the fax receive speed. The speed values are the same than these of +FTM command.

Command	Possible responses
AT+FRM=<speed>	OK
AT+FRM=?	(list of supported <speed>s)

Remarks: none
Source:
Implementation: complete

1.11.4 AT+FTH

This command sets the fax transmit speed, using the HDLC protocol.

Command	Possible responses
AT+FTH=<speed>	OK
AT+FTH=?	(3)

Remarks: <speed> can only take the value 3, which corresponds to V.21 channels 300 bps.

Source:
Implementation: complete

1.11.5 AT+FRH

This command sets the fax receive speed, using the HDLC protocol.

Command	Possible responses
AT+FRH=<speed>	OK
AT+FRH=?	(3)

Remarks: <speed> can only take the value 3, which corresponds to V.21 channels 300 bps.

Source:
Implementation: complete

1.11.6 AT+FTS

This command stops the transmission for the specified period.

Command	Possible responses
AT+FTS=<n>	OK
AT+FTS=?	(list of supported <n>s)

Defined Values:

    <n>   silence period (units of 10 ms).

Remarks: none
Source:
Implementation: complete

1.11.7 AT+FRS

This command causes the modem to stop listening from the network and report back to the DTE after the specified period. It is aborted if any character is received from the application.

Command	Possible responses
AT+FRS=<n>	OK
AT+FRS=?	(list of supported <n>s)

Defined Values:

    <n>   units of 10ms

Remarks: none
Source:
Implementation: complete

1.12 Fax class 2 commands

If the feature is present, the commands +FDT, +FDR, +FET, +FPTS and +FK have to be used in communication only.
The other commands +FBOR, +FBUF, FCQ, +FCR, +FDCC, +FDIS, +FLID and +FPHCTO can not be used in communication.

1.12.1 AT+FDT

This command prefixes data transmission.

Command	Possible responses
AT+FDT	OK

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Remarks: none
Source:
Implementation: complete

1.12.2 AT+FDR

This command initiates data reception.

Command	Possible responses
AT+FDR	OK

Remarks: none
Source:
Implementation: complete

1.12.3 AT+FET

This command punctuates page and document transmission after +FDT commands. It indicates that the current page is complete, and whether or not there are additional pages to be sent.

Command	Possible responses
AT+FET=<ppm>	OK

Defined values:

<ppm>	0	Another page next, same document
	1	Another document next
	2	No more pages or documents
	3	Another partial page next
	4	Another page, procedure interrupt
	5	Another document, procedure interrupt
	6	All done, procedure interrupt

Remarks: The remote station should respond with:
                          +FPTS, <ppr>.
Source:
Implementation: complete

1.12.4 AT+FPTS

This command sets post page transfer response.

Command	Possible responses
AT+FPTS=<ppr>	OK

Defined values:

<ppr>	1	Page good
	2	Page bad: retrain requested
	3	Page good: retrain requested

| 4 | Page bad: interrupt requested |
| 5 | Page good: interrupt requested |

Remarks: none
Source:
Implementation: complete

1.12.5 AT+FK

This command causes the module to terminate the session.

Command	Possible responses
AT+FK	OK

Remarks: none
Source:
Implementation: complete

1.12.6 AT+FBOR

This command sets the bit order for negotiation and fax page transfer. The order is related to the bit order or radio link.

Command	Possible responses
AT+FBOR=<n>	OK
AT+FBOR=?	(list of supported <n>s)

Defined values:

<n>	0	Same bit order for negotiation and page transfer
	1	Same bit order for negotiation, Reserved bit order for page transfer
	2	Reserved bit order for negotiation, Same bit order for page transfer
	3	Reserved bit order for negotiation and page transfer

Remarks: none
Source:
Implementation: complete

1.12.7 AT+FBUF

This command request the size of the exchange buffer between the modem and the fax application. Only the read command is supported.

Command	Possible responses
AT+FBUF?	<current value>

Remarks: none

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Source:
Implementation: complete

1.12.8 AT+FCQ

This command controls the Copy Quality checking for receiving faxes.

Command	Possible responses
AT+FCQ=<n>	OK
AT+FCQ=?	(0)

Remarks: none
Source:
Implementation: complete

1.12.9 AT+FCR

This commands controls the capability of the modem to accept incoming faxes.

Command	Possible responses
AT+FCR=<n>	OK
AT+FCR=?	(list of supported <n>s

Defined values:

    <n>   0   The modem will not accept incoming faxes.
                       1   The modem will accept incoming faxes.

Remarks: none
Source:
Implementation: complete

1.12.10 AT+FDIS

This command allows the DTE to parameter the capabilities used for the current session. This command accepts eight numeric parameters (of the T30 standard).

Command	Possible responses
AT+FDIS=<vr>, , <wd>, <ln>, <df>, 0, <st>	OK
AT+FDIS?	<vr>, , <wd>, <ln>, <df>, 0, <st>
AT+FDIS=?	list of supported (<vr>s), (s), (<wd>s), (<ln>s), (<df>s),0 , (<st>s)

Defined values:

    <vr>   Vertical Resolution,

                                  0   Normal: 98 lpi

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| | 1 | Fine: 196 lpi |

                         Bit Rate,

0	2400bps (Modem type: V.27ter)
1	4800bps (Modem type: V.27ter)
2	7200bps (Modem type: V.29)
3	9600bps (Modem type: V.29,V.17)
4	12000bps (Modem type: V.33,V.17)
6	14400bps (Modem type: V.33,V.17)

<wd>   Page Width,

0	1728 pixels in 215mm
1	2048 pixels in 255mm
2	2432 pixels in 303mm.

<ln>   Page Length,

0	A4, 297mm
1	B4, 364mm
2	Unlimited

<df>   Data compression Format,

0	1-D modified huffman
1	2-D modified read
2	2-D uncompressed mode
3	2-D modified modified read

<ec>   Error Correction,

0	Disable Fax ECM
1	Enable Fax ECM, 64 bytes/frame
2	Enable Fax ECM,256 bytes/frame

<st>   Scan time per line,

<st>	Description <vr>=0	Description <vr>=1
0	0 ms	0 ms
1	5 ms	5 ms
2	10 ms	5 ms
3	10 ms	10 ms
4	20 ms	10 ms
5	20 ms	20 ms
6	40 ms	20 ms
7	40 ms	40 ms

Remarks: none
Source:

Implementation: complete

1.12.11 AT+FDCC

This command allows the DTE to parameter the capabilities used for any sessions. The parameters and default values are the some as these of +FDIS command.

Command	Possible responses
AT+FDCC=<vr>, ,<wd>,<ln>,<df>,<ec>,0 ,<st>	OK
AT+FDCC=?	<vr>, ,<wd>,<ln>,<df>,<ec>,0 ,<st>
AT+FDCC=?	list of supported (<vr>s), (s), (<wd>s), (<ln>s), (<df>s),0 , (<st>s)

Remarks: none
Source:
Implementation: complete

1.12.12 AT+FLID

This command allows to define the local ID string. The string has a limited size, and accepts any characters between 32 and 127.

Command	Possible responses
AT+FLID=”<string>”	OK
AT+FLID=?	(20),(32-127)

Remarks: none
Source:
Implementation: complete

1.12.13 AT+FPHCTO

This command sets the period the modem waits for another page before it assumes there are no more pages and aborts.

Command	Possible responses
AT+FPHCTO=<n>	OK
AT+FPHCTO=?	(list of supported <n>s

Defined values:

   <n>   0-255sec

Remarks: none
Source:
Implementation: complete

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1.12.14 Fax Class 2 indication messages

The following messages are used to indicate DCE Responses.
They are used in communication only.

+FCON:
This response indicates connection with a fax machine.

+FDCS <vr>, <br>, <wd>, <ln>, <df>, <ec>, <bf>, <st>:
This response reports current session capabilities. The parameters are the
same than those of AT+FDIS command.

+FDIS <vr>, <br>, <wd>, <ln>, <df>, <ec>, <bf>, <st>:
This response reports remote capabilities. The parameters are the same than
those of AT+FDIS command.

+FCFR:
This response indicates confirmation to receive.

+FTSI "<string>":
This response reports the received transmit station ID string.

+FCSI "<string>":
This response reports the received called station ID string.

+FPTS <ppr>:
This response reports received page transfer status. The parameter
Is the same than one of AT+FPTS command.

+FET <ppm>:
This response reports post page message response. The parameter is the
same than the one of AT+FET command.

+FHNG <cause>:
This response reports the hang-up cause. It indicates that the call has been
terminated.

<cause>	0	Normal end of connection
	10	Unspecified transmit phase A error.
	20	Unspecified transmit phase B error.
	40	Unspecified transmit phase C error.
	50	Unspecified transmit phase D error.
	70	Unspecified receive phase B error.
	90	Unspecified receive phase C error.
	100	Unspecified receive phase D error.

1.13 Functionality commands

1.13.1 A/

Command repeats last given command.

Remarks:	No <CR> is needed.
Source:	factory default
Implementation:	complete

1.13.2 AT+GCAP

Command gives GSM capabilities information.

Command	Possible responses
+GCAP	+GCAP: +CGSM +FCLASS

Remarks:	none
Source:	GSM 07.07/5.6
Implementation:	complete

1.13.3 AT+CLCK

Command is used to set and request the status of the modem or network facilities. Special calls could be barred and passwords could be changed.

Command	Possible responses	
+CLCK=<fac>,<mode> [,<passwd>[,<class>]]	OK **when <mode>=2** +CLCK: <status>[,<class1> [<CR><LF>+CLCK: <status>, <class2>[...]]	+CME ERROR: <err>
+CLCK=?	+CLCK: (list of supported <fac>**s**)	+CME ERROR: <err>

Defined values:

<fac>	"SC"	SIM lock
	"AO"	Barr all outgoing calls
	"OI"	Barr outgoing international calls
	"OX"	Barr outgoing international calls except to home country
	"AI"	Barr all incoming calls
	"IR"	Barr incoming calls when roaming outside the home country
	"AB"	All barring services
	"AG"	All outgoing barring services
	"AC"	All incoming barring services

<mode>:	0	Unlock
	1	Lock

	2	Query status

<status>:	0	Not active
	1	Active

<passwd>:	String type; shall be the same as password specified for the facility from the ME user interface or with command Change Password +CPWD

<class x>	Is a sum of integers each representing a class of information (default 7 equals to all classes):

	1	Voice
	2	Data
	4	Fax

Remarks: none
Source: GSM 07.07/7.4
Implementation: complete

1.13.4 AT+CPWD

Command is used to set or change passwords for the facility locks of the command AT+CLCK.

Command	Possible responses	
+CPWD=<fac>,<oldpwd>,<newpwd>	OK	+CME ERROR: <err>
+CPWD=?	+CPWD: (list of supported <fac>,<pwdlength>**s**)	+CME ERROR: <err>

Defined values:

<fac>	Refer AT+CLCK

<oldpwd>, <newpwd>:	String type; <oldpwd> shall be the same as password specified for the facility from the ME user interface or with command Change Password +CPWD and <newpwd> is the new password; maximum length of password can be determined with <pwdlength>.

<pwdlength>:	Integer type maximum length of the password for the facility.

Remarks: none
Source: GSM 07.07/7.5
Implementation: complete

1.13.5 AT+CFUN

Command is used to set the functionality of the modem. It switches between two power consumption levels.

Command	Possible responses	
+CFUN=[<fun>[,<rst>]]	OK	+CME ERROR: <err>
+CFUN?	+CFUN: <fun>	+CME ERROR: <err>
+CFUN=?	+CFUN: (list of supported <fun>**s**),(list of supported <rst>**s**)	+CME ERROR: <err>

Defined values:

<fun>:	0	Minimum functionality
	1	Full functionality
<rst>:	0	Do not reset the ME before setting it to <fun> power level
	1	Reset the ME before setting it to <fun> power level

Remarks:	The execution of AT+CFUN=0 is different with the A2D OEM module and the A2D-1 modem. (See SOFT_ON description for the A2D OEM module or Ignition Line description for the A2D-1 modem.) AT+CFUN=1,1 is used to reset the GSM software.
Source:	GSM 07.07/8.2
Implementation:	complete

1.13.6 AT+CPAS

Command is used to request the phone activity status.

Command	Possible responses	
+CPAS	+CPAS: <pas>	+CME ERROR: <err>
+CPAS=?	+CPAS: (list of supported <pas>**s**)	+CME ERROR: <err>

Defined values:

<pas>:	0	Ready (ME allows commands from TA/TE)
	1	Unavailable (ME does not allow commands from TA/TE)
	2	Unknown (ME is not guaranteed to respond to instructions)
	3	Ringing (ME is ready for commands from TA/TE, but the ringer is active)
	4	Call in progress (ME is ready for commands from TA/TE, but a call is in progress)

> 5   Asleep (ME is unable to process commands from TA/TE because it is in a low functionality state)

Remarks: none
Source: GSM 07.07/8.1
Implementation: complete

1.13.7 AT+CPOF

Command is used to switch off the module. The modem will perform an IMSI detach procedure before switching off all the internal circuitry. This is highly recommended, because of possible problems at the next registration attempt of a module that was never de-registered.

Command	Possible responses
+CPOF	OK

Remarks: The execution of this command is different with the A2D OEM module and the A2D-1 modem. (See SOFT_ON description for the A2D OEM module or Ignition Line description for the A2D-1 modem.)
Source: factory default
Implementation: complete

1.14 Storing/restoring commands

1.14.1 AT&W

Command is used to store modem settings. Stored settings will be available after reset or power off.

Command	Possible responses
&W	OK

Remarks: none
Source: GSM 07.07/V.25ter
Implementation: complete

1.14.2 AT&F

Command restores the factory configuration. Restored settings will be available after reset or power off.

Command	Possible responses
&F	OK

Remarks: none

1.14.3 AT+CSAS

Command is used to save special SMS settings.

Command	Possible responses	
+CSAS	OK	+CME ERROR: <err>
+CSAS=?	OK	

Remarks: none
Source: GSM 07.05/3.3.5
Implementation: complete

1.14.4 AT+CRES

Command is used to restore the settings saved by AT+CSAS.

Command	Possible responses	
+CRES	OK	+CME ERROR: <err>
+CRES=?	OK	

Remarks: none
Source: GSM 07.05/3.3.6
Implementation: complete

1.14.5 What is stored where? What are the defaults?

Command	AT&W (E2P)	AT+CSAS	AT&F (SIM, E2P)	Initial values
+CMEE	X		X	0
+CSCS	X		X	"PCCP437"
ATS0	X		X	0 (no auto-answer)
+CICB	X		X	2 (speech)
+VGR	X		X	64 (all speakers)
+VGT	X		X	64 (all microphones)
+SPEAKER	X		X	0 (Spk 0 & Mic 0)
+SIDET	X		X	1,1
+CREG	X		X	0
+CMGF	X		X	1 (text)
+CSDH	X		X	0
+CNMI		X	X	0, 1, 0, 0, 0
+CSMP		X	X	1, 167, 0, 0
+CSCA		X		SIM dependant (phase 2)
+CCWA	X		X	0
+CLIP	X		X	0
+COLP	X		X	0
+CBST	X		X	0, 0, 1
+CRLP	X		X	61, 61, 48, 6, 1

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+CR	X		X	0
+CRC	X		X	0
+IPR	X			9600
+IFC	X			2,2
+ICF	X			3,4
E	X			1
&C	X			1
&D	X			1
&S	X			1
Q	X		X	0
V	X		X	1
%C	X		X	2
\N	X		X	0
+DS	X		X	3,0,4096,20
+DR	X		X	0
+FDCC,+FIDS	X		X	0,5,0,0,2,0,0,0,0
+FCQ	X		X	0
+FCR	X		X	1
+FPHCTO	X		X	30
+FBOR	X		X	0
+ECHO	Command		X	0,255,1000,5,500,63 (Echo cancel) 0,0,3,10,7,0 (Switch Attenuation)

1.15 Error message handling and survey

1.15.1 AT +CMEE

Command is used to set the indication of GSM functionality errors.

+CMEE=[<n>]	OK
+CMEE?	+CMEE: <n>
+CMEE=?	+CMEE: (list of supported <n>s)

Defined values:

<n>:   0   Disable +CME ERROR: <err> result code and use
              ERROR instead

        1   Enable +CME ERROR: <err> result code and use
              numeric <err> values

Remarks: none
Source: GSM 07.07/9.1
Implementation: complete

1.15.2 Mobile equipment error result code : +CME ERROR: <err>

<err> is defined as below :

3	Operation not allowed
4	Operation not supported
5	PH-SIM PIN required (SIM lock)
10	SIM not inserted
11	SIM PIN required
12	SIM PUK required
13	SIM failure
16	Incorrect password
17	SIM PIN2 required
18	SIMPUK2 required
20	Memeory full
21	Invalid index
22	Not found
24	Text string too long
26	Dial string too long
30	No network service
32	Network not allowed – emergency calls only
40	Network personalisation PIN required (Network lock)

1.15.3 Message service failure result code: +CMS ERROR: <err>

<err> is defined as below :

1 to 127	Error cause values from the GSM recommendation 04.11 Annex E-2 (see below)
301	SMS service of ME reserved
302	Operation not allowed
303	Operation not supported
304	Invalid PDU mode parameter
305	Invalid text mode parameter
310	SIM not inserted
311	SIM PIN required
312	PH-SIM PIN required
313	SIM failure
316	SIM PUK required
317	SIM PIN2 required
318	SIM PUK2 required
321	Invalid memory index
322	SIM memory full
330	SC address unknown

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

Cause no 1: "Unassigned (unallocated) number"

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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 re-attempting 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 indistinguishable).

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 recognise 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
  recognised 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.

1.15.4 Specific error result codes +CMS ERROR or +CME ERROR: <err>

<err> is defined as below :

512	MM establishment failure (for SMS)
513	Lower layer failure (for SMS)
514	CP error (for SMS)
515	Please wait, init or command processing in progress
516	USSD error

1.15.5 AT +CEER

Command is used to show the cause of a failure in the last call-setup or call-modification.

+CMER	+CEER: <report>
+CMEE=?	OK

Defined values:

<report>:   cause as written below (imformation element as stated in GSM recommendation 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

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
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 expire
111	Protocol error, unspecified
127	Interworking, unspecified

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.

240	FDN is active and number is not in FDN
241	Call operation not allowed
252	Call barring on outgoing calls
253	Call barring on incoming calls
254	Call impossible
255	Lower layer failure

Remarks: none
Source: GSM 07.07/6.10
Implementation: complete

2   A2D-A / A2D-B

2.1   Technical data

GSM capability:

E-GSM and DCS (GSM ETSI Phase I and II)

GSM data services:

300 ... 14400 BPS, asynchronous, transparent and non-transparent
(V.21, V.22, V.23, V.22bis, V.26ter, V.32, V.34, V.110)

Dimensions (L x W x H in mm):

83,0 x 50,5 x 10,5   for the A2D-A (module with mounting brackets)
72,0 x 50,5 x 10,5   for the A2D-B (module without mounting
                     brackets)

Weight (in g):

54   for the A2D-A (module with mounting brackets)
52   for the A2D-B (module without mounting
                     brackets)

Temperature range (in °C):

Operation

-20...   +55

Transportation

-40...   +70

Storage

-25...   +70

RF characteristics:

Receiver
EGSM Sensitivity   :   <-104dBm
DCS Sensitivity   :   < -100dBm
Selectivity @ 200 kHz   :   > +9dBc
Selectivity @ 400 kHz   :   > +41dBc
Dynamic range   :   62 dB
Intermodulation   :   > -43dBm
Co-channel rejection   :   >= 9dBc

Transmitter

Maximum output power (EGSM)	:	33dBm +/- 2dB
Maximum output power (DCS)	:	30dBm +/- 2dB
Minimum output power (EGSM)	:	5dBm +/- 5dB
Minimum output power (DCS)	:	0dBm +/- 5dB
H2 level	:	< -30dBm
H3 level	:	< -30dBm
Noise in 925 - 935 MHz	:	< -67dBm
Noise in 935 - 960 MHz	:	< -79dBm
Noise in 1805 - 1880 MHz	:	< -71dBm
Phase error at peak power	:	< 5 ° RMS
Frequency error	:	+/- 0.1ppm max

Supply voltage (in V):

4.0 to 7.0   absolute maximum ratings

Average current (in mA at 5V nominal):

0,015	in OFF mode 2 (EN pulled to LOW, the internal regulator is switched off)
17*	in OFF mode 1 (AT+CPOF was issued and SOFT_ON was set to LOW, the internal regulator is still working)
30*	in idle mode (base station sends at –85 dBm)
260*	in transmit mode at power level 7
350*	in transmit mode at power level 5 (Maximum)

       * Serial interface is applied and working.

SIM card Reader:

Internal, for small SIM cards (5/3V)

RS 232:

+/-12V	RxD, TxD only
2.8V	RX, TX, RTS, CTS, DTR, DSR, DCD, RI
300..115200	Baud rates for serial link (2400..19200 with auto-bauding)

2.2 Possible external devices:

Audio:

|	
2KΩ differential	Microphone 1 impedance
2V	Microphone 1 bias voltage
0,5mA	Microphone 1 input current
2KΩ differential	Microphone 2 impedance
2V	Microphone 2 bias voltage
0,5mA	Microphone 2 input current
>50Ω (<1nF)	Speaker 1 impedance
>50Ω (<1nF)	Speaker 2 impedance

Ringer:

80mA max. current

SIM card reader:

External, 10 .. 15cm maximum cable length

2.3 Connectors at the A2D

In the following pictures the connectors of the A2D module are to be seen.
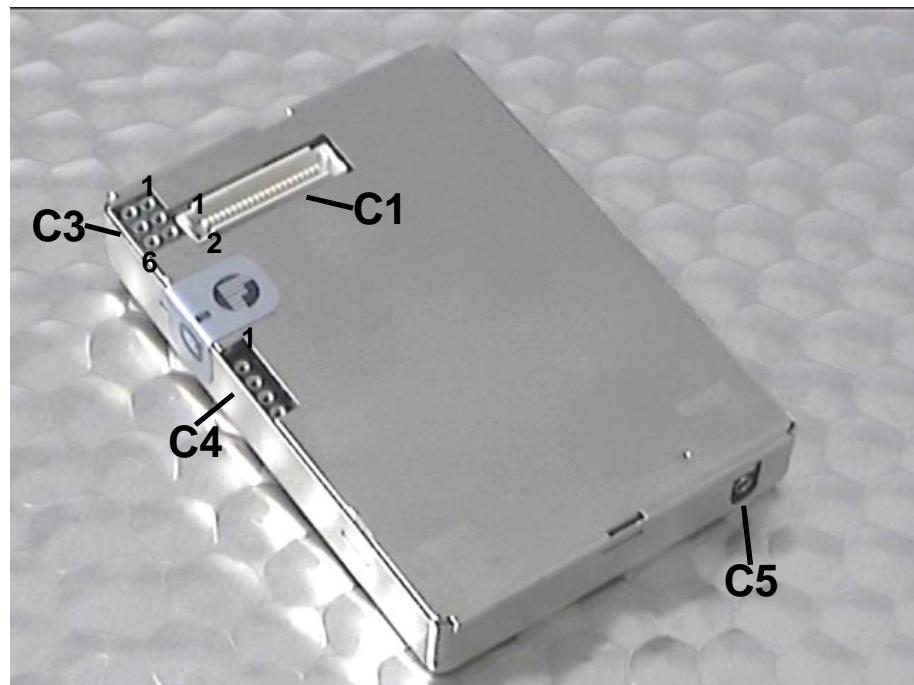
C1 :
   40-pin connector SMD Type: FH (AMP-Part No.:0-177984-1)
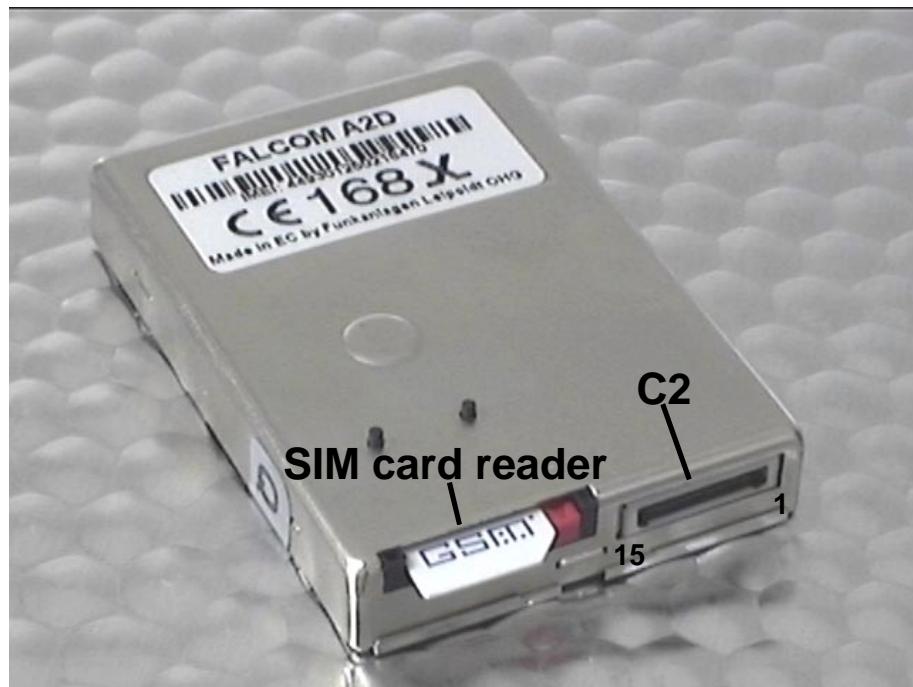   →   Counterpart for application 0-177983-1

C3 :
   6 pin connector; 2,54mm double row
   0,45mm pin diameter
   (CAB –Part No.:712-97-103)
            →   Counterpart for application 1102-171-006

C4 :
   4 pin connector; 2,45mm single row
   0,45mm pin diameter
   (CAB-Part-No.:315-97-104-41-003)
            →   Counterpart for application 1101-191-004

C5:
   RF-connector Type: MC-Card (RADIALL-Part No.: 199005801)
            →   Counterpart for application 199005250

C2 :

15 pin connector Type: PCCC (AMP-Part No.:5-558556-1)

→   Counterpart for application 5-558556-1,
0-558666-1,0-558665-1 and 0-558709-2

2.4 Pin-out of the A2D module

The following table shows the 40-pin connector that has changed from the original A2 single band module.

In the red marked fields there are "new" signals shown, that are not pin-compatible with the A2 single band module.

In these tables CMOS means 2.8V. You may use a 3V or 3.3V CMOS level logic (never 5V) on the 2.8V I/O's. However, it is required to add serial resistance on all the lines you will use (typical value: from 4.7 to 10 KΩ).

As long as the 3V_SIM signal is left untouched the SIM signals on C3 and C1 are compatible to 3V and 5V (except SIMPRES on C1, which is CMOS). Otherwise they are 3V only.

C1			40-pin
1	SIMRST	Input	3V or 3/5V	SIM Reset
2	SIMCLK	Output	3V or 3/5V	SIM Clock
3	SIMDATA	In/Out	3V or 3/5V	SIM Data
4	SIMVCC	In/Out	3V or 3/5V	SIM Card power supply
5	SIMCARD	In/Out	3V or 3/5V	SIM Card programming power supply
6	GND	Power ground		Battery power ground
7	GND	Power ground		Battery power ground
8	GND	Power ground		Battery power ground
9	GND	Power ground		Battery power ground
10	GND	Power ground		Battery power ground
11	GPI	Input	CMOS	General purpose Input
12	EN	Input	CMOS	Internal power enable (HIGH=enable)
13	GPIO 1	In/Out	CMOS	General purpose Input/Output (Flash LED)
14	VBAT	Power supply		Battery power supply
15	VBAT	Power supply		Battery power supply
16	VBAT	Power supply		Battery power supply
17	VBAT	Power supply		Battery power supply
18	VBAT	Power supply		Battery power supply
19	SIMPRES	Input	CMOS	SIM present (SIM card detection)
20	BRSF	Input	CMOS	Flash update – not used anymore
21	GPIO 0	In/Out	CMOS	General purpose Input/Output
22	GPO 1	Output	CMOS	General purpose Output
23	GPIO 4	In/Out	CMOS	General purpose Input/Output
24	VCCRTC	In/Out	SUPPLY	RTC back-up battery supply (not used)
25	3V SIM	Input	SUPPLY	SIM power supply (HIGH = 3V only SIM)
26	RSTF	Input	SCHMITT	Reset - Active Low (see next chapter)
27	TX	Output	CMOS	RS-232 Transmit Data
28	RX	Input	CMOS	RS-232 Receive Data
29	SOFT_ON	Input	CMOS	Turn phone on (see next chapter)
30	RING	Output	CMOS	Ringer Interface
31	RI	Output	CMOS	RS-232 Ring Indicator
32	DCD	Output	CMOS	RS-232 Data Carrier Detect
33	DSR	Output	CMOS	RS-232 Data Set Ready
34	RTS	Input	CMOS	RS-232 Ready To Send
35	DTR	Input	CMOS	RS-232 Data Terminal Ready
36	CTS	Output	CMOS	RS-232 Clear To Send
37	SPKR1_P	Differential Output		Speaker 1 positive
38	SPKR1_N	Differential Output		Speaker 1 negative
39	MIC1_P	Differential Input		Microphone 1 positive
40	MIC1_N	Differential Input		Microphone 1 negative

A short description of the use of the non-common signals can be found in the next chapter.

All unused signals can be left open.

C2			15-pin		
1	TxD	Output	V.24	RS-232 Transmit Data	
2	RxD	Input	V.24	RS-232 Receive Data	
3	SOFT_ON	Input	CMOS	Turn phone on (see next chapter)	
4	RING	Output	CMOS	Ringer Interface	
5	BRSF	Input	CMOS	Flash update – not used anymore	
6	SPKR2_P	Differential Output		Speaker 2 positive	
7	SPKR2_N	Differential Output		Speaker 2 negative	
8	MIC2_P	Differential Input		Microphone 2 positive	
9	MIC2_N	Differential Input		Microphone 2 negative	
10	V_EXT	Power		Connected to VEXT of C4*	
11	V_EXT	Power		Connected to VEXT of C4*	
12	V_EXT	Power		Connected to VEXT of C4*	
13	GND	Power		Ground	
14	GND	Power		Ground	
15	GND	Power		Ground	

C3			6-pin	
1	SIMRST	Input	3V or 3/5V	SIM Reset
2	SIMGND	In/Out	3V or 3/5V	SIM Power ground
3	SIMCLK	Output	3V or 3/5V	SIM Clock
4	SIMVCC	In/Out	3V or 3/5V	SIM Power supply
5	SIMDATA	In/Out	3V or 3/5V	SIM data
6	SIMVCC	In/Out	3V or 3/5V	SIM Power supply

C4			4-pin
1	VEXT	Ext. Power supply	Connected to VEXT of C2*
2	VBAT	Power supply	Battery power supply
3	GND	Power ground	Battery power ground
4	GND	Power ground	Battery power ground

* For supplying power over the VEXT pin of C2 a connection has to be made from pin 1 to pin 2 of C4. VEXT is a connection from C2 to C4 only, it does not touch any signal or power plane inside the A2D!

2.5 Special functionality pins

There are a few pins needed for the operation of the module. The handling of that pins is described as follows.

2.5.1 Pin 12 on C1 (EN)

This signal is an input of the internal voltage regulator.

- Pull to LOW to switch the voltage regulator off (for minimum current consumption).

- Pull to HIGH or leave the signal open if EN is not used.

2.5.2   Pin 13 on C1 (GPIO 1 → Flash_LED)

This signal can be used to show the current status of the module:

- If GPIO 1 is LOW then the module is off.

- If it is continuously HIGH then module is on, but not registered into a network.

- If GPIO 1 is flashing in a 2sec period then the module is on and registered into a network.

- If it flashes in a 1sec period then the module is on and a call is in progress (incoming or outgoing).

GPIO 1 can be an input into a controller (here it needs to be driven by an open collector circuit) or used together with a LED (see picture below):
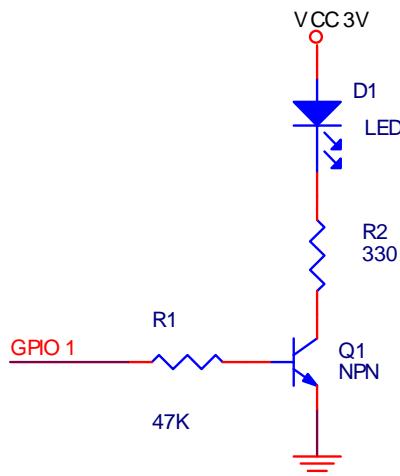
2.5.3   Pin 19 on C1 (SIMPRES)

This signal needs to be driven by an open collector circuit. It is used by the modules firmware to detect a SIM card exchange when the module is online. A low to high transition means SIM card is inserted and the module will be able to accept the AT+CPIN command. A high to low transition means SIM card has been removed, the module will de-register from the network and show the unsolicited error code CME ERROR: 10.
If 3V logic level is used the signal could be driven directly (2.8V CMOS!, see chapter before for handling hints). If 5V logic level is used the figure below shows an example for the circuitry needed.
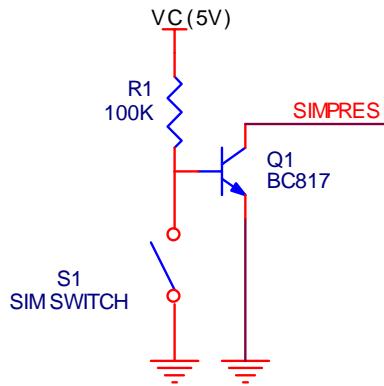
2.5.4   Pin 25 on C1 (3V SIM)

This signal needs to be driven by an external open collector circuit.

- Pull this signal to HIGH to work wit a **3V only (!)** SIM. The SIM power supply will switch to 3V SIMVCC.

- Pull to LOW or leave signal open to use 5V or 5/3V SIM. SIMVCC will be 5V for the use of normal 5V or 5/3V-tolerant SIM cards.

2.5.5   Pin 26 on C1 (RSTF)

This signal needs to be driven by an external open collector circuit.

- To issue a hardware reset pull the signal to LOW for a minimum of 100ms.

- Pull the signal to HIGH or leave it open for normal operation.

2.5.6   Pin 29 on C1, Pin 3 on C2 (SOFT_ON)

This signal needs to be driven by an external open collector circuit.

- For switching the module on (external power must be connected!) set the SOFT_ON signal to HIGH for approx. 3 sec. The signal could be left HIGH until module shall be switched off.

- For switching the module off the commands AT+CPOF or AT+CFUN=0 have to be issued.

  - If SOFT_ON is HIGH then only the RF part of the module is off, but the AT command set is still working (AT+CFUN=1 can be used to wake up the RF part again) → the Flash_LED stays HIGH.
  - If SOFT_ON is LOW then the complete GSM engine goes OFF → the Flash_LED goes LOW. Some small power consumption will be still there, use the EN pin to avoid that.

It is not recommended to switch the module on and off via the power supply (e.g. by tying the SOFT_ON constantly to HIGH). The module will then have no possibility to de-register correctly from the network and this will cause problems at the next attempt to register.

2.6 Firmware Download Procedure

The download procedure will be documented with the firmware release on the FALCOM Homepage (www.falcom.de).

2.7 Resetting the A2D OEM module via AT+CFUN=1,1

If the GSM software is still running, while the user feels the need to reset the module, AT+CFUN=1,1 could be used. This will de-register the modem from the network and bring it into the state before the PIN could be entered. The Flash_LED pin will shortly toggle to OFF and back to ON again to show the progress.

3   A2D-1 Modem (first version)

3.1   Remarks

The first version of the A2D-1 modem was sold until September 2000. It can be recognised by looking at the label at the backside of the modem. Holding the modem with the 9-pin serial interface B pointing to the left, the label can be read from left to right. The Reset button hole is located above the label at the edge of the modem. For a view please see pictures later in this chapter.

3.2   Technical Data

Dimensions: 115mm x 54mm x 33mm (B x H x L)

Weight: 160g

Power Supply: 10,8...31,2 V DC
                         235mA (max.)12V EGSM*
                         190mA (max.)12V DCS*
                         48mA (idle)   12V*

IF MODEM IS SWITCHED OFF (BY AT+CPOF OR AT+CFUN=0), BUT POWER IS STILL SUPPLIED:
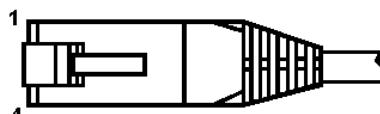
                         25mA (off)   12V*

* Serial interface is applied and working.

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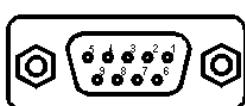   Use: -20°C to +55°C

Interface A: Power supply, Cable Reference

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

Interface C: RJ 45   8 pin shielded for Audio, RS232 and
                          power supply for further devices.

pin 1   10,8 .. 31,2V (optional 5V)
pin 2   TXD
pin 3   RXD
pin 4   GND
pin 5   SPK +
pin 6   SPK -
pin 7   MIC +
pin 8   MIC -

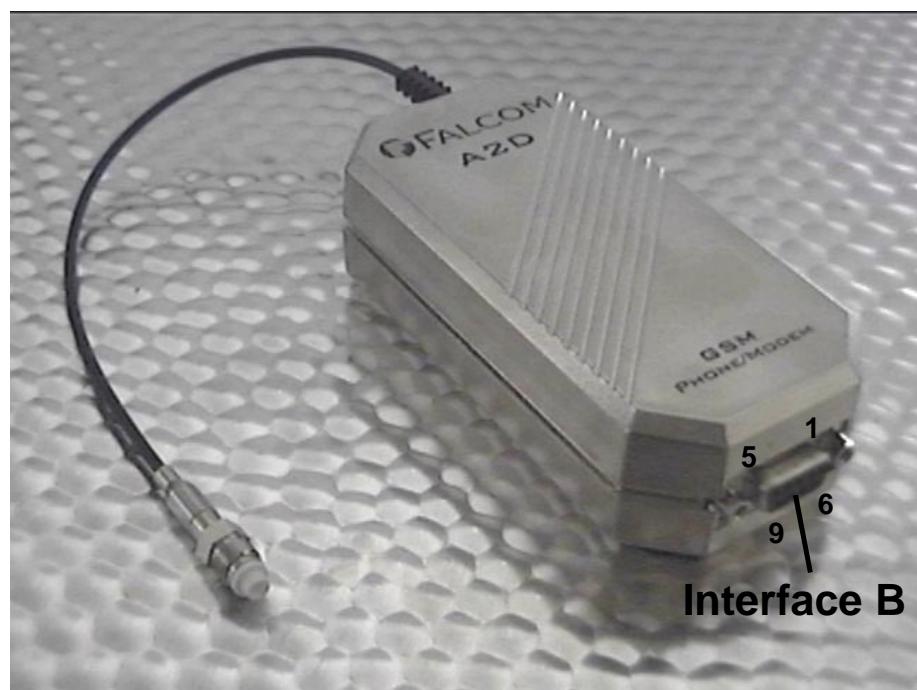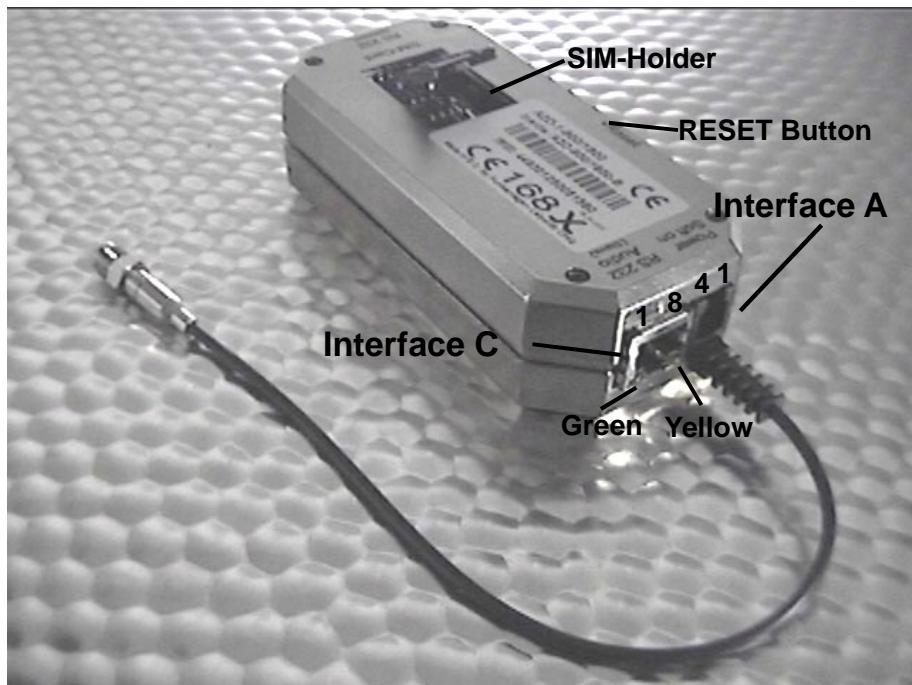**Interface D:**   Antenna 50Ω FME female

SIM-Card interface: for small SIM-Cards 3V and 5V

Audio interface: Electret-Microphone
                          Loudspeaker >50Ω
                          Ground

3.3   Connectors at the A2D-1

Interface B

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3.4 Functional description

The GSM modem FALCOM A2D-1 is a mobile station for the transmission of voice, data and fax calls as well as SMS in GSM networks.
The GSM modem FALCOM A2D-1 consists of the following components:

- GSM transceiver
- Power supply unit
- Serial link (V.24) for data transmission and control

If the GSM modem FALCOM A2D-1 is registered in the network, it acts just like a regular fax/data modem. To control the GSM modem there is an advanced set of AT-commands according to GSM ETSI 07.07 and 07.05 implemented. The two LED's on the Interface A are showing the state of the FALCOM A2D-1. The yellow LED signals power connection and the green LED signals a "RESET" function, "SOFT_ON " procedure.

3.4.1 Ignition line

The Ignition Line on Interface A uses an internal processor to control the timing of the "SOFT_ON" procedure of the internal A2D GSM modem (refer to the A2D section of this manual).
To switch the modem on the Ignition Line has to be toggled from Ground to a high voltage level (10,8V-31,2V). The green LED on interface C shows the progress of the "SOFT_ ON" procedure. After the green LED goes out the procedure is ready (this takes approx. 5sec).
To switch the modem off the commands AT+CPOF or AT+CFUN=0 (see AT commands section) has to be issued. To switch the modem on again see above. **The modem could never be switched off by pulling the Ignition Line to ground !!!**

3.4.2   Serial handling

The GSM modem FALCOM A2D-1 allows control of the GSM modem over the interface B or interface C. The interface B is a implementation of a serial interface corresponding EIA-RS232-C. See table for details:

CCITT V24	Pin	Description	Direction
102	5	Signal Ground (GND)	
103	3	Transmitted Data (TxD)	IN
104	2	Received Data (RxD)	OUT
105	7	Request To Send (RTS)	IN
106	8	Clear To Send (CTS)	OUT
107	6	Data Set Ready (DSR)	OUT
108	4	Data Terminal Ready (DTR)	IN
109	1	Data Carrier Detect (DCD)	OUT
125	9	Ring Indicator (RI)	OUT

Both interface B and C are not independent usable. The interface B has the highest priority. If you don't want to use the interface B you must deactivate the signals RTS and DTR (or remove connection). With the interface C you have the audio and control functionality on one interface.
See table for connections:

Pin	Description	Direction
1	Power Supply (input voltage/option 5V)	OUT
2	Transmitted Data (TxD)	IN
3	Received Data (RxD)	OUT
4	Ground	
5	SPK+	
6	SPK-	
7	MIC+	
8	MIC-	

3.4.3   Reset configuration

In case of malfunction the GSM modem FALCOM A2D-1 offers various RESET possibilities.
If the GSM modem is currently running the green LED on interface C shows the RESET procedure. For a RESET of the GSM modem please use the following ways:

- "RESET" switch at the backside of the GSM modem.
- Ignition removed and supplied again to high voltage level (10,8V-31,2V).
- "Break" on serial interfaces B or C (Transmit Data [TxD] set to "LOW" for >100ms).

If the GSM software is still running, while the user feels the need to reset the modem, AT+CFUN=1,1 could be used. This will de-register the modem from the network and bring it into the state before the PIN could be entered.

3.4.4 Firmware update

The download procedure will be documented with the firmware release on the FALCOM Homepage (www.falcom.de).

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4 A2D-1 Modem (second version)

4.1 Remarks

The second version of the A2D-1 modem we have sold since September 2000. It can be recognised by looking at the label at the backside of the modem. Holding the modem with Interface B pointing downward, the label can be read from left to right. The Reset button hole is located above the label in the upper middle of the backside of the modem. For a view please see pictures later in this chapter.

4.2 Technical Data

Dimensions:	115mm x 54mm x 33mm (B x H x L)

Weight: 160g

Power Supply: 10,8...31,2 V DC
235mA (max.)12V EGSM*
190mA (max.)12V DCS*
48mA (idle)   12V*

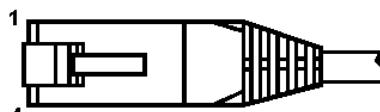**IF MODEM IS SWITCHED OFF (BY AT+CPOF OR AT+CFUN=0), BUT POWER IS STILL SUPPLIED:**

25mA (off)   12V*

* Serial interface is applied and working.

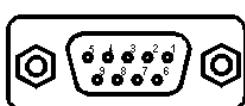**Temperature Range:**   Storage: -20°C to +70°C
Use: -20°C to +55°C

Interface A: Power supply, Cable Reference


```
pin 4   brown   10,8 .. 31,2V
pin 3   green    Ignition
pin 2   yellow
pin 1   white   Gnd

LED   green   SIM ACC
LED   yellow  Power
```

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   GND
pin 6   DSR
pin 7   RTS
pin 8   CTS
pin 9   RI    ( optional 10,8 .. 31,2V/5V )
```

Interface C: RJ 45   8 pin shielded for Audio, RS232 and
                            power supply for further devices.

pin 1   10,8 .. 31,2V (optional 5V)
pin 2   TXD
pin 3   RXD
pin 4   GND
pin 5   SPK +
pin 6   SPK -
pin 7   MIC +
pin 8   MIC -
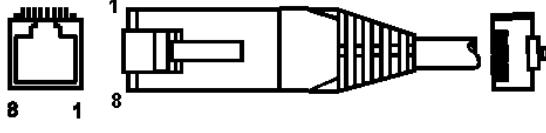
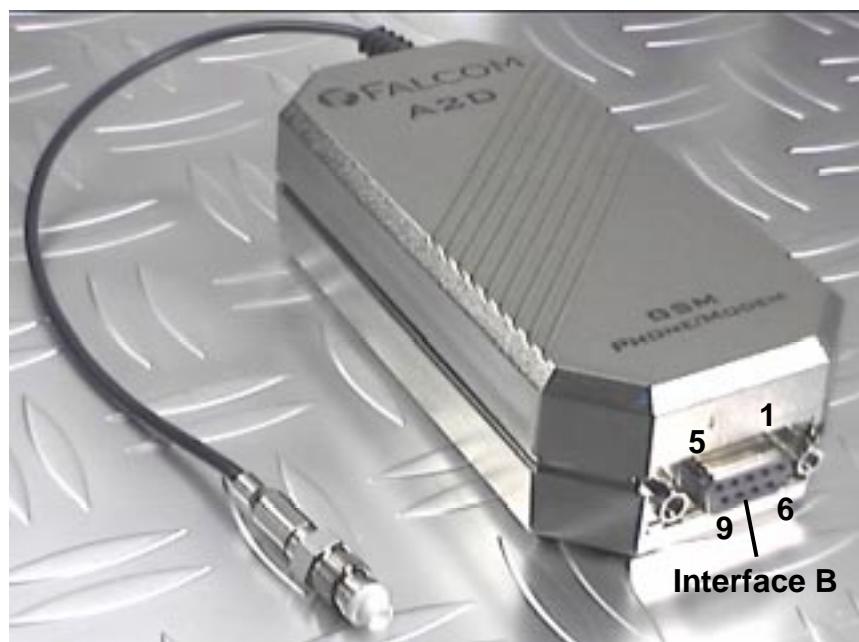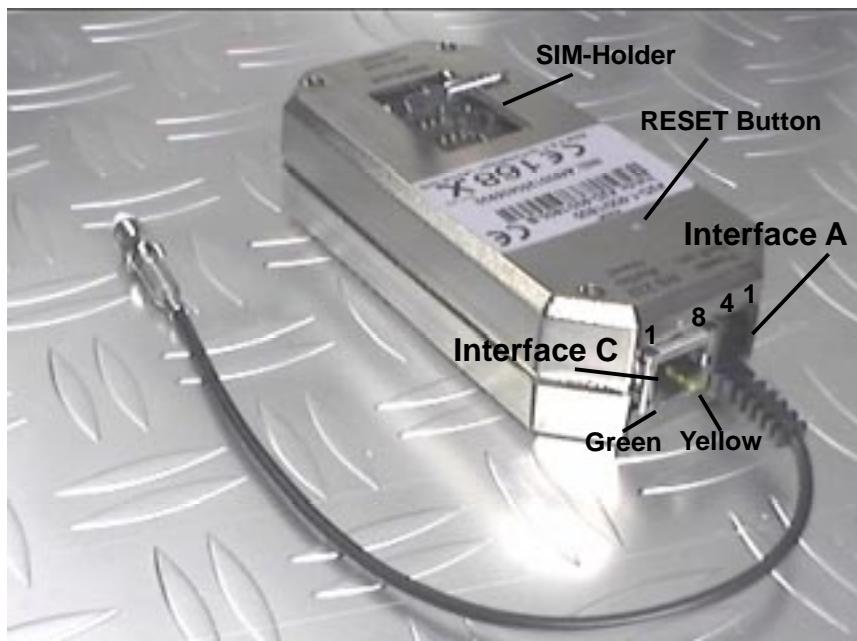**Interface D:**   Antenna 50Ω FME female

SIM-Card interface: for small SIM-Cards 3V and 5V

Audio interface: Electret-Microphone
                            Loudspeaker >50Ω
                            Ground

4.3   Connectors at the A2D-1

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4.4   Functional description

The GSM modem FALCOM A2D-1 is a mobile station for the transmission of voice, data and fax calls as well as SMS in GSM networks.
The GSM modem FALCOM A2D-1 consists of the following components:

- GSM transceiver
- Power supply unit
- Serial link (V.24) for data transmission and control

If the GSM modem FALCOM A2D-1 is registered in the network, it acts just like a regular fax/data modem. To control the GSM modem there is an advanced set of AT-commands according to GSM ETSI 07.07 and 07.05 implemented. The two LED's on the Interface A are showing the state of the FALCOM A2D-1. The yellow LED signals power connection and the green LED signals that the SIM is read and accepted.

4.4.1   Ignition line

The Ignition Line on Interface A uses an internal processor to control the timing of the "SOFT_ON" procedure of the internal A2D GSM modem (refer to the A2D section of this manual).
To switch the modem on the Ignition Line has to be toggled from Ground to a high voltage level (10,8V-31,2V). The green LED on interface C shows the progress of the "SOFT_ ON" procedure. After the green LED goes on the procedure is ready (this takes approx. 5sec).
To switch the modem off the commands AT+CPOF or AT+CFUN=0 (see AT commands section) has to be issued. To switch the modem on again see above. **The modem could never be switched off by pulling the Ignition Line to ground !!!**

4.4.2   Serial handling

The GSM modem FALCOM A2D-1 allows control of the GSM modem over the interface B or interface C. The interface B is a implementation of a serial interface corresponding EIA-RS232-C. See table for details:

CCITT V24	Pin	Description	Direction
102	5	Signal Ground (GND)	
103	3	Transmitted Data (TxD)	IN
104	2	Received Data (RxD)	OUT
105	7	Request To Send (RTS)	IN
106	8	Clear To Send (CTS)	OUT
107	6	Data Set Ready (DSR)	OUT
108	4	Data Terminal Ready (DTR)	IN
109	1	Data Carrier Detect (DCD)	OUT
125	9	Ring Indicator (RI)	OUT

Both interface B and C are not independent usable. The interface B has the highest priority. If you don't want to use the interface B you must deactivate the signals RTS and DTR (or remove connection). With the interface C you have the audio and control functionality on one interface.
See table for connections:

Pin	Description	Direction
1	Power Supply (input voltage/option 5V)	OUT
2	Transmitted Data (TxD)	IN
3	Received Data (RxD)	OUT
4	Ground	
5	SPK+	
6	SPK-	
7	MIC+	
8	MIC-	

4.4.3   Reset configuration

In case of malfunction the GSM modem FALCOM A2D-1 offers various RESET possibilities.
If the GSM modem is currently running the green LED on interface C shows the RESET procedure. For a RESET of the GSM modem please use the following ways:

- "RESET" switch at the backside of the GSM modem.
- Ignition removed and supplied again to high voltage level (10,8V-31,2V).
- "Break" on serial interfaces B or C (Transmit Data [TxD] set to "LOW" for >100ms).

If the GSM software is still running, while the user feels the need to reset the modem, AT+CFUN=1,1 could be used. This will de-register the modem from the network and bring it into the state before the PIN could be entered.

4.4.4   SIM ACC LED

The SIM ACC LED show the acceptation of the SIM card by the modem. After the modem is switched on, the LED lights permanently, until the PIN is entered successfully. In case of having the PIN disabled, this will happen automatically. After the acceptation the LED will flash in a 2sec interval.
If an incoming or outgoing call is in progress, the LED will flash in a 1sec interval.

4.4.5   Firmware update

The download procedure will be documented with the firmware release on the FALCOM Homepage (www.falcom.de).

5   Appendix

5.1   Recommendations for power supply layout (A2D-A/B/C)

The FALCOM A2D is specified for a power supply voltage in the range of 4 to 7 VDC. It is recommended to design the power supply so that even current bursts of up to 3A (for 577µs, rise time 10µs, period 4.615ms, caused by GSM-typical radio transmission) do not cause ripple voltages higher than 100 ... 150mV.
If the power supply is using input-voltages of more than 50Vrms or 75 VDC it is the response of the applicant to conform with the safety requirements of Telecommunication Terminal Equipment (such as 73/23/EEC).
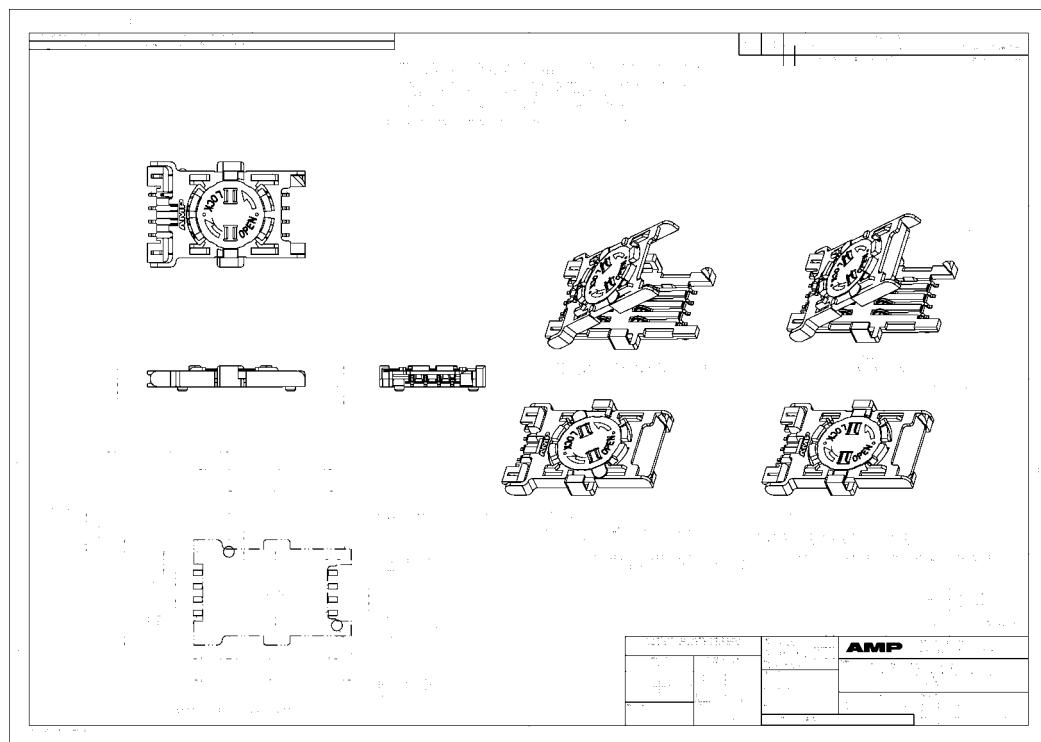
5.2   Recommendations for power supply (A2D-1)

It is recommended to use the FALCOM A2 PS002 power supply. Also any other power supply in the range of 10.7 ... 31 VDC can be used. It should be able to deliver 2A peak current (for 577µs, rise time 10µs, period 4.615ms, caused by GSM-typical radio transmission), where the ripple voltage of the power supply is recommended to be lower than 300mV.
If the power supply is using input-voltages of more than 50Vrms or 75 VDC it is the response of the applicant to conform with the safety requirements of Telecommunication Terminal Equipment (such as 73/23/EEC).
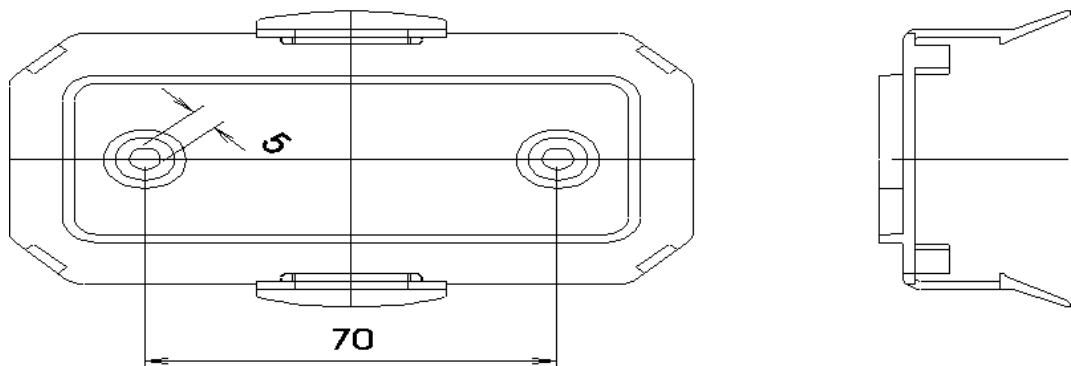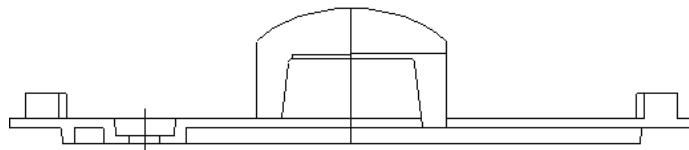
5.3   SIM-card reader from AMP

An example of an external SIM-card reader to be connected to the A2D-A/B/C is shown in the following schematics:

5.4 Device holder for A2D-1

Halterung Falcom A1/A2

5.5 Mounting clamps for A2D-A/B/C

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