

- GSM and GPRS
- Voice / Fax / SMS and Data
- Dual Band 900 / 1800MHz GSM Transmission
- Full voice call, SMS support
- Accepts Standard SIM Card
- Miniature size 88 x 60 x 26mm
- Can Be Used On Standard GSM Network
- RS232 Interface
- AT command set (GSM 07.05 and 07.07)
- GPRS Class B Class 2 (28.8kbps download/14.4bps upload).
- One user programmable input/Output Port
- Integral SIM Card Holder



### Data/Fax features:

- Data circuit asynchronous, transparent and non transparent up to 14,400 bits/s
- Automatic fax group 3 (Class 1 and Class 2)
- MNP2, V.42bis

### Voice features:

- Telephony
- Emergency calls
- Full Rate, Enhanced and Half Rate
- DTMF Function

### Data/Fax features:

- Data circuit asynchronous, transparent and non transparent up to 14,400 bits/s
- Automatic fax group 3 (Class 1 and Class 2)
- MNP2, V.42bis

### Short Messages Services features:

- Text and PDU
- Point to point (MT/MO)
- Cell Broadcast

### GSM Supplementary Services :

- Call Forwarding -Calling Line Identity
- Call Barring -Advice of Charge
- Multiparty -USSD
- Call Waiting / Hold -Closed User Group
- Explicit Call Transfer

A Miniature "Plug And Play" dual band GSM modem. It can be directly connected to the serial port of a desktop or notebook computer through the RS232 interface. A standard SIM card can be inserted in the integral card holder within the metal enclosure.

The Modems metal casing makes it an appropriate solution for tough applications such as Telemetry, Wireless Local Loop (payphones) or as part of a fleet management system. Its small size makes it simple to integrate in a space constraint environment. The modem is supplied with power cable, other accessories available are antenna (with 1m coax cable), RS232 connecting cable with Telephone interface and a DIN Rail mounting adaptor

**About GPRS:** GPRS stands for General Packet Radio Services. The user can remain "ON" all the time and the data Communication speed can rival with that of a cable modem.

### One Programmable Input / Output Port :

- One user programmable input/Output Port (3V CMOS logic)



## Technical Specifications

Max Storage Temperature -10°C to +70°C,  
 Max Operating Temperature 0°C to +55°C

Dimensions 88mm x 60mm x 26mm  
 Weight 100grams

Electrical Characteristics	Min	Typical	Max	Units
Supply Voltage	5		32	V
Supply Current :				
In Communication		450		mA
peak in communication		2.5		A
idle mode		25		mA
idle mode with RS232 power saving		13		mA

## Interfaces :

- SIM holder (integrated Drawer, accepts standard SIM card)
- 15 pin Sub-D type connector (for serial and audio connection)
- 4-pin power supply connector (micro-FIT™)
- SMA antenna connector (50 ohm)

## Ordering Information

Part No	Description
GSM20	GSM GPRS Modem, dual Band
GSM20-Ant	Antenna for GSM20
GSM20-CAB232	RS232 Cable Interface
GSM20-DINRL	DIN Rail Mount

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# **MAESTRO 20**

**GSM GPRS Modem  
900 / 1800**

***USER MANUAL***

***Rev. 02***

4 Oct 2002

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### *Safety Precautions*

- The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.
- Do not use your phone in aircraft, hospitals, petrol stations or in places where using GSM products is prohibited.
- Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliance, etc.
- Always keep a minimum safety distance of the antenna from human body. Do not put the antenna inside metallic box, containers, etc.
- Check for any regulation or law authorizing the use of GSM in vehicle in your country before installing the modem
- Install the modem by qualified personnel. Consult your vehicle dealer for any possible interference of electronic parts by the modem.
- Be careful when the modem is powered by the vehicle's main battery. The battery may be drained after extended period.

### *Protecting your modem*

- To ensure error-free usage, please install and operate your modem with care. Do remember the following:
- Do not expose the modem to extreme conditions such as high humidity/rain, high temperatures, direct sunlight, caustic/harsh chemicals, dust, or water.
- Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.
- Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating condition.
- Do not pull the antenna or power supply cable. Attach/ detach by holding the connector.
- Connect the modem only according to the instruction manual. Failure to do it will void the warranty.
- In case of problem, please contact authorized dealer.

## CHAPTER 1

### INTRODUCTION

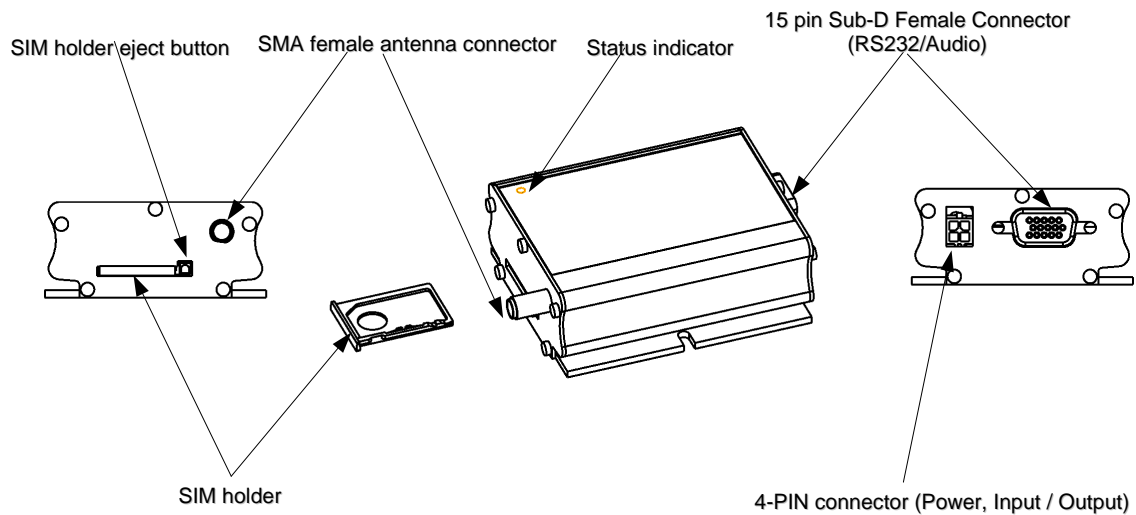
Maestro 20 is a ready-to-use GSM modem for voice, data, fax and SMS services. It also supports GPRS (Class 2) for hi-speed data transfer. Maestro 20 can be easily controlled by using AT command for all kinds of operations. With standard 9-pin RS232 port and telephone-like audio plug the Maestro 20 can be set up with minimal effort.

#### 1.1. Package

The Maestro 20 package should include the following:

1. Maestro 20 x 1
2. Power cord with fuse x 1
3. Safety note x 1

#### 1.2. INTERFACES



### 1.2.1. Status indicator

The LED will indicate different status of the modem:

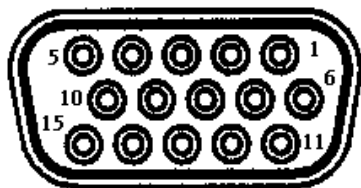
- off Modem switched off
- on Modem is connecting to the network
- flashing slowly Modem is in idle mode
- flashing rapidly Modem is in transmission/communication (GSM only)

### 1.2.2. SMA female antenna connector

- Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM900/1800 frequency with impedance of 50ohm, and also connector is secured tightly.

### 1.2.3. 15-PIN D-SUB Female connector (RS232 / Audio)

The connector provides serial link and audio link to the modem.

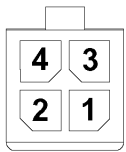


Pin number	Name	EIA designation	Type
1	DCD	Data Carrier Detect	Output
2	TX	Transmit Data	Input
3	BOOT		Input
4	MICROPHONE (+)		Output
5	MICROPHONE (-)		Output
6	RX	Receive Data	Output
7	DSR	Data Set Ready	Output
8	DTR	Data Terminal Ready	Input
9	GND	Ground	Ground
10	SPEAKER(+)		Output
11	CTS	Clear to Send	Output
12	RTS	Request to Send	Input
13	RI	Ring Indicator	Output
14	RESET		Input
15	SPEAKER(-)		Output

### Specification of microphone and speaker to be connected :

Parameters	Min	Typical	Max	Remark
phone current @2V / 2K Ohm		0.5 mA		
phone input level			100 mVpp	
speaker output current 150 Ohm/ 1nF		16mA		
speaker impedance			32ohm	

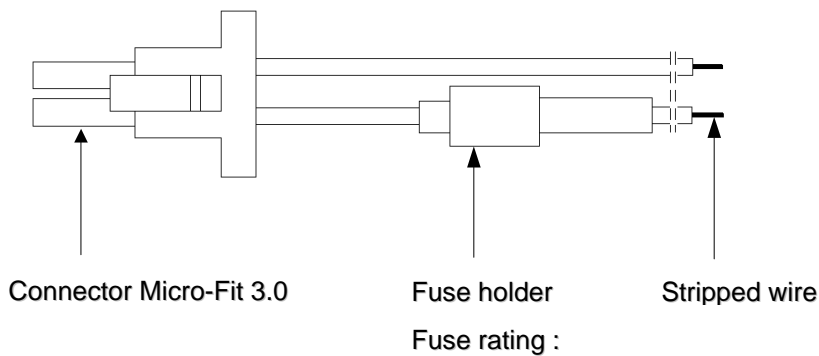
#### 1.2.4. 4-PIN connector (Power, Input / Output)



#### Pin assignment of 4-pin connector

Pin number	Name	Functions
1	I/O	Input / Output port
2	~INTR	Interrupt function triggered by pulling this pin to ground or LOW level; reserved for additional functions with new firmware
3	POWER -	DC power negative input
4	POWER+	DC power positive input

A cable, included in the package shall be used for power supply connection:





**I/O**

Parameters	Min	Typical	Max	Remark
<b>LOW voltage</b>			<b>0.5V</b>	
<b>HIGH voltage</b>	<b>3V</b>		<b>5V</b>	
<b>t max. sink current</b>			<b>10mA</b>	

**INTR**

Parameters	Min	Typical	Max	Remark
<b>LOW voltage</b>	<b>0</b>		<b>0.5V</b>	<b>tered by pulling this pin to LOW otherwise leave it open</b>

\* Please refers to Chapter 6 Appendix for using I/O and INTR signals.

## CHAPTER 2

### INSATLLATION

#### 2.1 Mounting the modem

Use 4pcs of 3mm dia meter screw to mount the modem

When using optional DIN rail mounting bracket :

Insert the mounting bracket to the grooves of the modem. Then mount the modem with screws on the hole of bracket.

#### 2.2 Install the SIM card

Use a ball pen or paper clip to press the SIM holder eject button. The SIM holder will come out a little. Then take out the SIM holder.

Note : DO NOT pull out the SIM holder without pushing the ejector.

Put the SIM card to the tray, make sure it has completely sit on the tray. Put the tray back into the slot.

#### 2.3 Connect the external antenna (SMA type)

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM900/1800 frequency with impedance of 50ohm, and also connector is secured tightly.

Note : Please use antenna designed for GSM 900/1800 Mhz operation. Incorrect antenna will affect communication and even damage the modem.

#### 2.4 Connect the DC power supply

Connect the open ending of the included power cord to a DC supply. Refer to the following for power supply requirement.

##### Power Supply Requirement:

Parameters	Min	Typical	Max
Supply voltage	5V	13.2V	32V
Peak current at 5V supply			2.5A
Average current at 5V supply in idle mode			35mA
Average current at 5V supply in idle mode & RS232 power saving activated			13mA

Connect the connector to the modem. The modem will turn on automatically.

The status indicator on the modem will be lit when power on. After a few seconds it will go flashing slowly (registered to the network successfully refer 1.2.1).

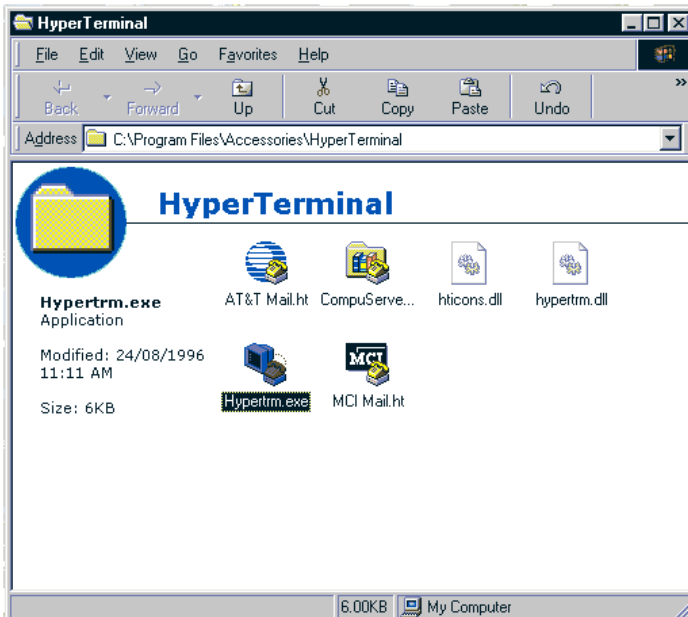
## **2.5 Connect the modem to external device**

You can use the optional RS-232 cable to connect the modem's SUB-D connector to external controller/computer. Chapter 3 describes how to communicate with the modem soft in Microsoft Windows™ environment.

## CHAPTER 3

**Working with Maestro 20****3.1. Checking the modem (using Microsoft Windows™ HyperTerminal as example)**

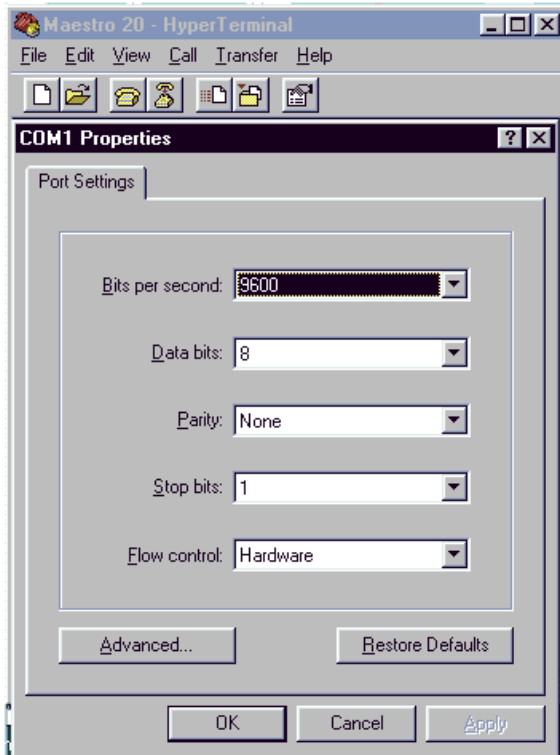
**3.1.1.** On the first time power-up you can use terminal software to communicate with the modem through an RS-232 serial Port. Following Examples are using the HyperTerminal in Windows 98.



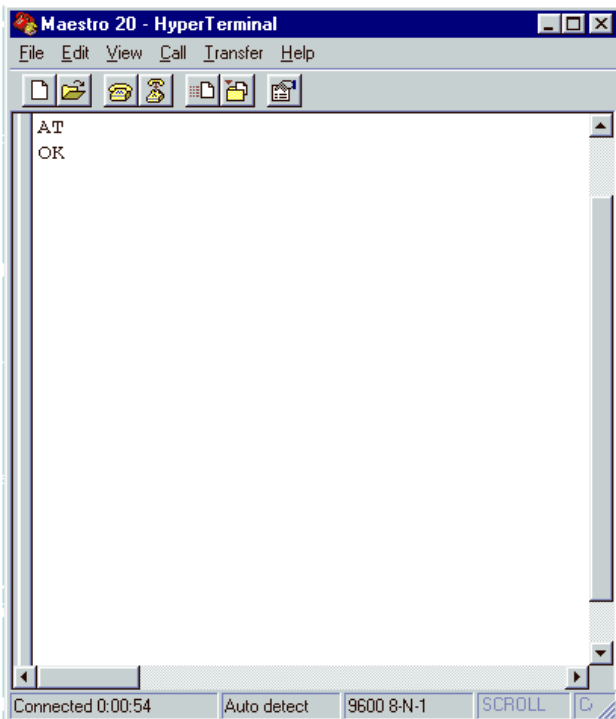
**3.1.2.** On Windows 98, start the HyperTerminal program. Assign a name for a new session.



**3.1.3.** Choose the correct Com port and baud rate settings (9600bps, 8bits, no paritybit, 1 stop bit)



**3.1.4.** On the terminal screen, type "AT" to check the "OK" response from the modem



### 3.2. Basic Operation :

Followings are examples of some AT commands. Please refer to the AT Command document for a full description.

Note : Issue AT+CMEE=1 to have extended error code (+CME ERROR)

Description	AT commands	Modem response	Comments
Network Registration Checking	AT+CREG?	CREG=<mode>,1	Modem registered to the network
		CREG=<mode>,2	Registration lost, re-registration attempt
		CREG=<mode>,0	Modem not registration on the network, no registration attempt
Receiving signal strength	AT+CSQ	+CSQ: 20,0	The first parameter has to be at least 15 for normal communication
Receiving an incoming call		RING	An incoming call is waiting
	ATA		Answer the call
		OK	
Make a call	ATD1234567;		Don't forget the « ; » at the end for « voice » call
		OK	Communication established
		CME ERROR : 11	PIN code not entered (with + CMEE = 1 mode)
		CME ERROR : 3	AOC credit exceeded or a communication is already established
Make an emergency call	ATD 112;		Don't forget the « ; » at the end for « voice » call
		OK	
Communication loss		NO CARRIER	
Hang up	ATH		
		OK	
Enter PIN code	AT+CPIN=1234		
		OK	PIN Code accepted
		+CME ERROR : 16	Incorrect PIN Code (with +CMEE = 1 mode)
		+CME ERROR : 3	PIN already entered (with +CMEE = 1 mode)
Saves parameters in non-volatile memory	AT&W		
		OK	The configuration settings are stored

## **CHAPTER 4**

### ***Troubleshooting***

#### **4.1 The modem's LED does not light :**

Check if the modem has connected to a 6-32V power supply properly

Check if the power connector is properly inserted

Check the fuse on the power cord

#### **4.2 The modem does not response to the terminal program**

Check if the RS-232 cable has been connected properly

Check if your program has proper setting. Factory setting of the modem is:

9600bps

8 data bits

no parity bit

1 stop bit

## **CHAPTER 5**

### **Specifications**

- Dualband GSM 900 / 1800 Mhz
- Support Data, SMS, Voice and Fax
- Max Power Output: 2W(900Mhz), 1W(1800Mhz)
- Group 3 FAX support (Class 1 and 2)
- GPRS Class B Class 2 (28.8kbps download/ 14.4kbps upload) at maximum speed.
- SimToolKit Class 2
- AT command set (GSM 07.05, GSM 07.07 and WAVECOM proprietary)

### **Power requirement :**

Input Voltage: 5V to 32V DC

MAX Current at 5V : 450mA in communication

2.5A peak in communication

35mA in idle mode

13mA in idle mode with RS232 power saving

### **Interfaces :**

- SIM holder
- 15 pin Sub-D connector (serial and audio connection)
- 4-pin power supply connector
- SMA antenna connector (50 ohm)

### **Dimensions:**

- Overall size :                   88mm x 60mm x 26mm
- Weight :                           100g
- Temperature range:           -15°C to +50°C operating  
   -20°C to +65°C storage



## CHAPTER 6

### Appendix

#### 6.1 Factory settings

The modem has the following factory settings. Please refer to the AT command document for the meaning of each setting.

Related AT commands	Factory Settings	Description
AT+IPR	9600	DTE-DCE data rate
AT+IFC	2,2	DTE-DCE flow control
AT+ICF	3,4	DTE-DCE character framing
ATE	0	ECHO
AT&C	1	DCD signal
AT&D	1	DTR signal
ATQ	0	Result code suppression
ATV	1	Response format
AT&S	1	DSR signal
ATS0	0	Auto answer
AT+CLIP	0	Calling line ID presentation
AT+CRLP		Calling line ID restriction
AT+CSCS	"PCCP437"	
AT+CMGF	1	Message format
AT+CSMP	1,67,0,0	Test mode parameters
AT+CNMI	0,0,0,0	New message indication

#### 6.2 Input / Output port

This port can be configured as either an input one or an output one.

To configure it as an input port, first issue AT+WIOW=2, 0 to disable the output port. Use AT+WIOR=1 to read the status of this input port. Response +WIOR: 0 represent Logic HIGH (>3V); Response +WIOR: 1 represent Logic LOW (<0.5V) To use it as an output port, issue AT+WIOW=2,1 will turn it on and it will drain current to ground. The current is recommended not to exceed 10 mA. Issue AT+WIOW=2,0 will turn it off.

#### 6.3 RS232 AUTO-ONLINE mode (power saving)

When being in the AUTO-ONLINE, the RS232 transceiver will shutdown most of its hardware to save power if it does not detect a valid input for more than 100uS. The RS232 transceiver will wake up when valid input is detected again.

By default, the RS232 transceiver is put in AUTO-ONLINE. This mode can be turned off by issuing AT+WIOW=4,1.