

- 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)
- One user programmable input/Output Port
- Integral SIM Card Holder
- GSM20: GPRS Class B Class 2 (24Kb/s download / 12Kb/s upload)
- GSM100: GPRS Class B Class 10 (36Kb/s download / 24Kb/s upload)
- TCP/IP stack available for data and internet on GSM100 (optional and upon request)



## 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

## One Programmable I/O Port

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

Miniature "Plug And Play" dual band GSM modems 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. The small size makes it simple to integrate in a space constraint environment. The modem is supplied with power cable, other accessories available are an 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 rivals that of a cable modem.

## Supplementary Services :

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



# GSM & GPRS MODEM

**GSM20**  
**GSM100**

## 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 Class 2 Modem, dual Band
GSM100	GSM GPRS Class 10 Modem, dual Band
GSM20-Ant	Antenna for GSM20 or GSM100
GSM20-CAB232	RS232 Cable Interface for GSM20 or GSM100
GSM20-DINRL	DIN Rail Mount for GSM20 or GSM100

For more information or general enquiries, please call;

**R F Solutions Ltd.,**

**Unit 21, Cliffe Industrial Estate,**

**Lewes, E. Sussex. BN8 6JL. England.**

**Email : [sales@rfsolutions.co.uk](mailto:sales@rfsolutions.co.uk)      <http://www.rfsolutions.co.uk>**

**Tel: +44 (0)1273 898 000      Fax: +44 (0)1273 480 661**

*RF Solutions is a member of the Low Power Radio Association.*



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# **GSM20 USERS MANUAL**

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## **USER MANUAL**

Rev. 03, 2 June 2003

## **CONTENTS**

### **SAFETY PRECUTIONS**

CHAPTER 1 INTRODUCTION

CHAPTER 2 INSTALLATION

CHAPTER 3 WORKING WITH MAESTRO 20

CHAPTER 4 TROUBLE SHOOTING

CHAPTER 5 SPECIFICATION

CHAPTER 6 APPENDIX



# GSM20 USERS MANUAL

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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.

## *Using the modem in vehicle*

- Check for regulation or law authorizing the use of GSM in vehicle in the country you intend to use the modem before installing.
- Qualified personnel should only install the modem. Consult your vehicle dealer for any possible risks due to interference by GSM frequencies.
- The modem must be connected to the vehicle's supply system using a fuse-protected terminal.
- Be careful when the vehicles main battery directly powers the modem, as the battery may be drained after an 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.



# GSM20 USERS MANUAL

## CHAPTER 1

### INTRODUCTION

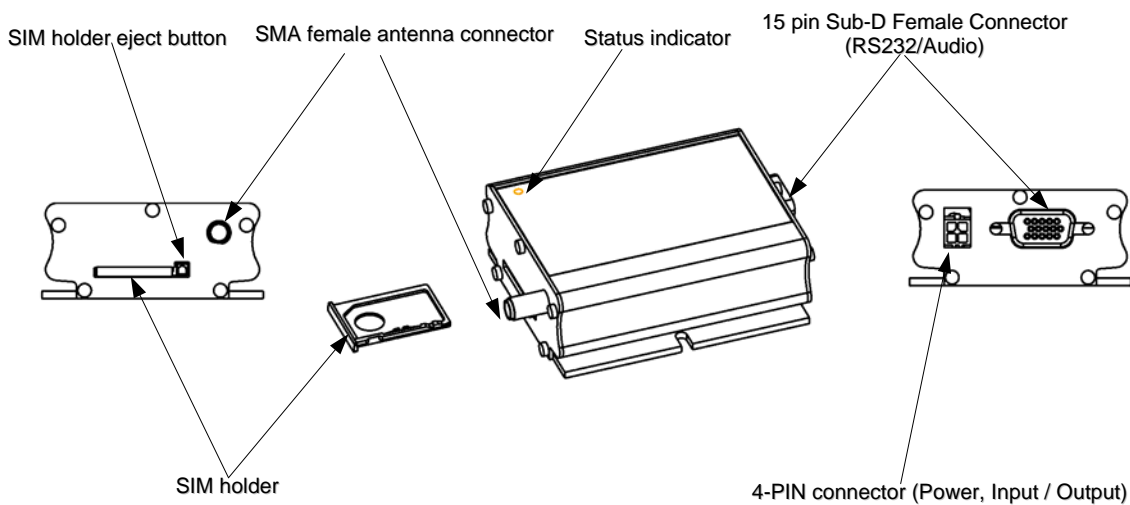
Maestro 20 is a ready-to-use GSM modem for voice, data, fax and SMS services. It also supports GPRS (Class 2) for hi-speed data transfer. Maestro 20 operations are easily controlled by using AT commands. With standard 9-pin RS232 port and telephone-like audio plug the Maestro 20 can be set up with minimal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

#### 1.1. Package

The Maestro 20 package should include the following:

1. Maestro 20 x 1 or Maestro 100 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

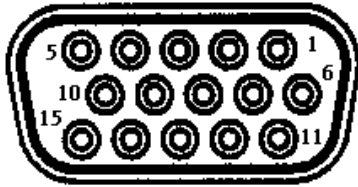
- Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM900/1800 frequency with impedance of 50ohm, and also connector is secured tightly.



# GSM20 USERS MANUAL

## 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	Notes
1	DCD	Data Carrier Detect	Output	Not used
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	Pull low to reset
15	SPEAKER(-)		Output	

For direct connection to a standard 9-pin RS232 port (DTE), use the connections shown below.

Sub-D 15 Male	Sub-D 9 Female	Plug 4P4C
1	1	
2	3	
3		
4		1
5		4
6	2	
7	6	
8	4	
9	5	
10		2
11	8	
12	7	
13	9	
14		
15		3

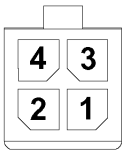


# GSM20 USERS MANUAL

## 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	
er output current 150 Ohm/ 1nF		16mA		
er impedance			32ohm	

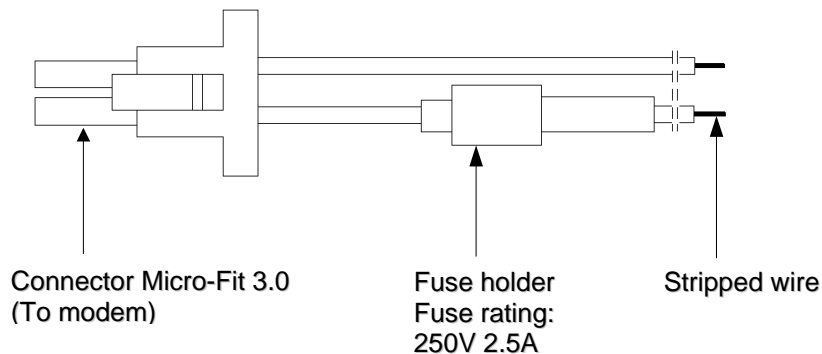
### 1.2.4. 4-PIN connector (Power, Input / Output)



#### 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:





# GSM20 USERS MANUAL

## 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>Triggered by pulling this pin to LOW level ; otherwise leave it open</b>

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





# GSM20 USERS MANUAL

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## CHAPTER 2

### INSTALLATION

#### 2.1 Mounting the modem

Use 4pcs of 3mm diameter 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.

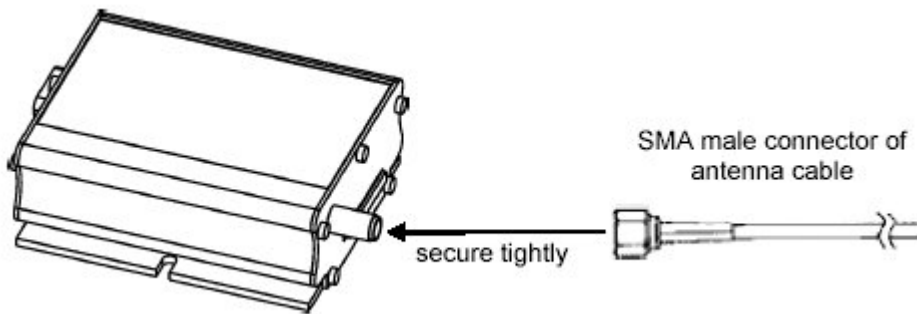
Note : DO NOT pull out the SIM holder without pushing the ejector.

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.

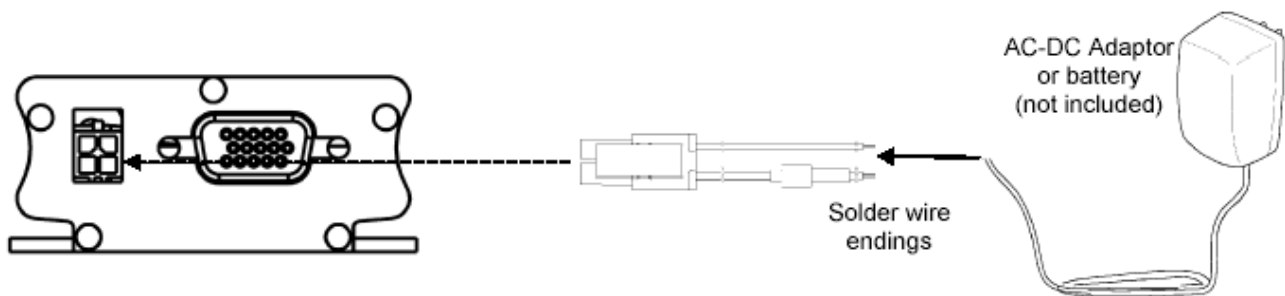


## 2.4 Connect the DC power supply

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

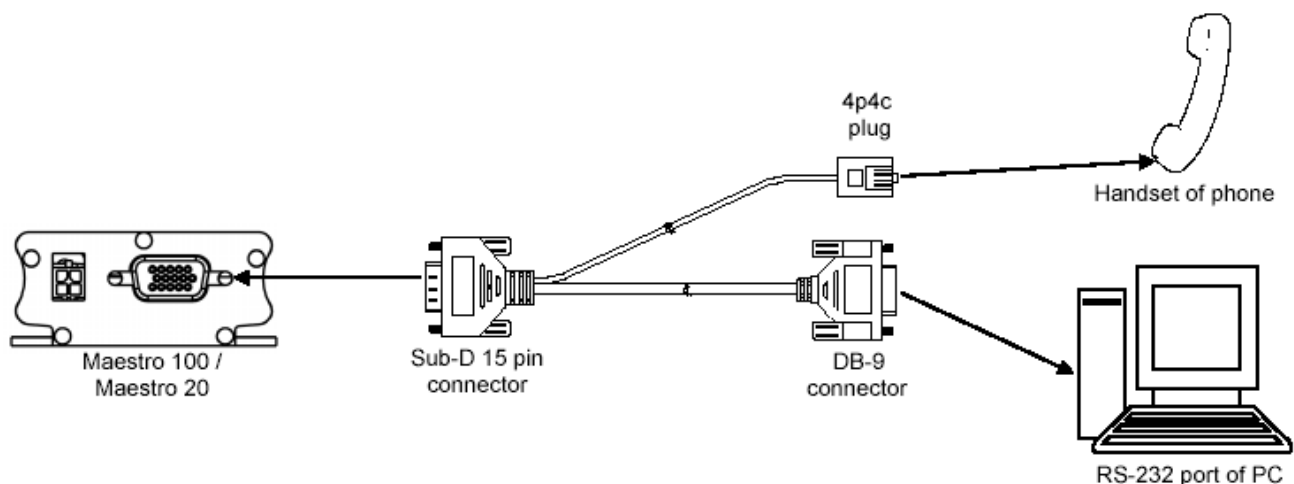


Connect the connector to the modem. The modem will turn on automatically.

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 in Microsoft Windows™ environment.



Connection shown using an optional 'Y' cable and connections given in section 1.2.3 above.



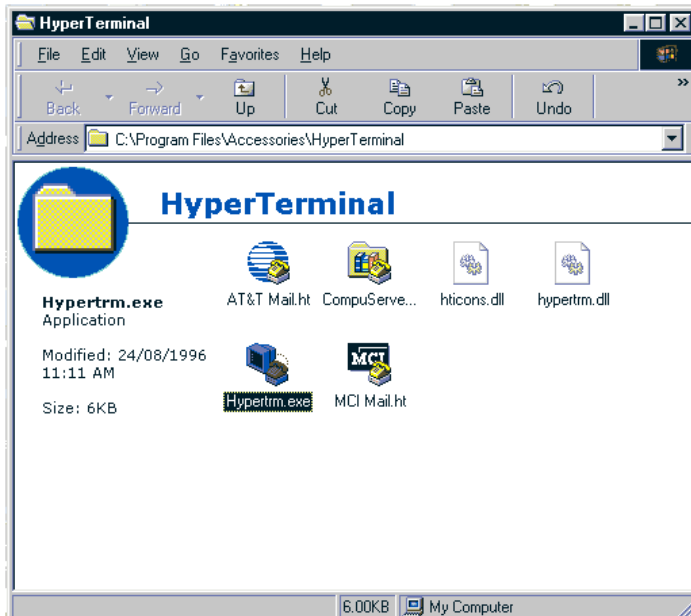
# GSM20 USERS MANUAL

## 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.



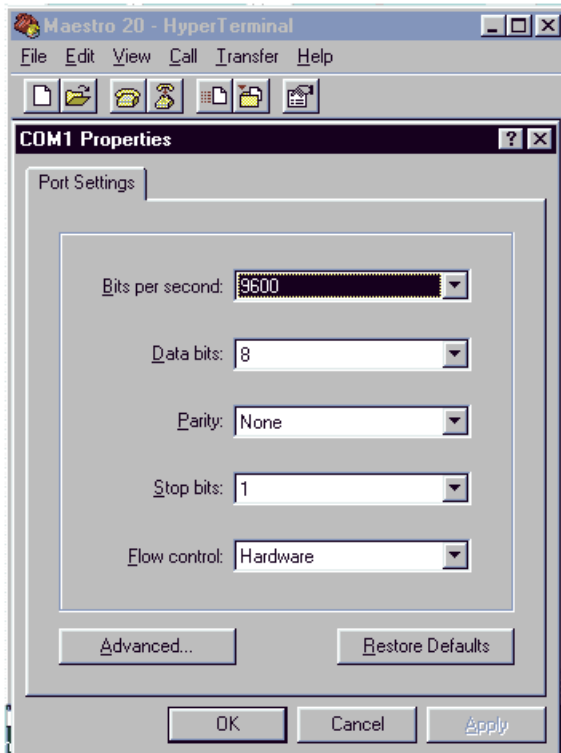
**3.1.2.** On Windows 98, start the HyperTerminal program. Assign a name for a new session.



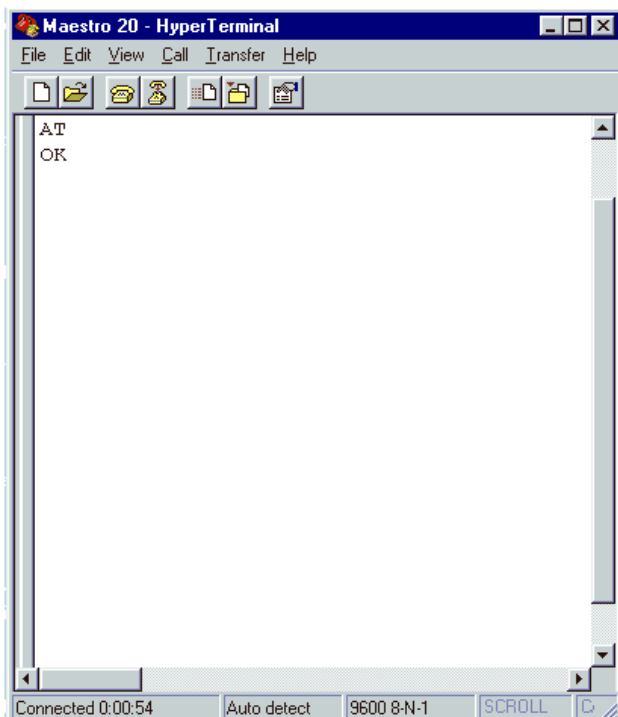


# GSM20 USERS MANUAL

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



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





# GSM20 USERS MANUAL

## 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



# GSM20 USERS MANUAL

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## CHAPTER 4

### *Troubleshooting*

#### **4.1. 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's LED lights but does not blink after a period of time**

Check if a valid SIM card has been inserted properly

Check if the SIM card has been locked (refer to AT+CPIN in command guide)

Check if antenna has been securely connected to the modem

Check that the network coverage is available

#### **4.3 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

#### **4.4 No voice could be heard from the modem's speaker output when a call is answered**

Make sure a voice call has been made (refer to AT command guide)

Enter the AT+SPEAKER=1 command



# GSM20 USERS MANUAL

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## CHAPTER 5

### **Specifications**

- Dual band 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)
- GSM20: GPRS Class B Class 2 (2Rx+1Tx) (28.8kbps download/ 14.4kbps upload) at maximum speed.
- GSM100: GPRS Class B Class 10 (4Rx+1Tx or 3Rx+2Tx) 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



# GSM20 USERS MANUAL

## 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+WIOV=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+WIOV=2,1 will turn it on and it will drain current to ground. The current is recommended not to exceed 10 mA. Issue AT+WIOV=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+WIOV=4,1.





# **GSM20 WIN98 GPRS SET-UP GUIDE**

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## **Windows 98 GPRS Connection Set-up Guide**

Rev. 0, 20 Nov 2002

### **CONTENTS**

1. INTRODUCTION	2
2. CONFIGURATING MAESTRO 20	2
3. ADDING A MODEM TO WINDOWS 98	2
4. MAKING A DIAL-UP NETOWRKing	4
5. TROUBLE SHOOTING	9



# GSM20 WIN98 GPRS SET-UP GUIDE

## 1. INTRODUCTION

This document describes how to use Maestro 20 and a PC with Windows 98 to make a GPRS Internet Dial-up.

### 1.1 Set-up requirement

The following items are necessary for the set-up:

- **MAESTRO-20 with PC cable and power supply**
- PC with Windows 98 installed, and a free RS-232 port
- A SIM card with GPRS service subscribed

## 2. CONFIGURATING MAESTRO 20

### 2.1 Setting up HyperTerminal

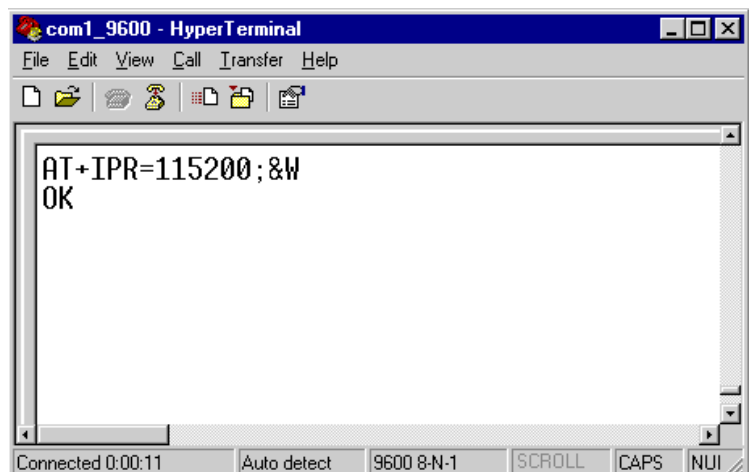
Refer to Chapter 2 and 3 of MAESTRO 20 USER GUIDE, set up MAESTRO 20 and Windows98 HyperTerminal. Make sure the modem is ready to receive commands.

### 2.2 Setting serial port speed

On the HyperTerminal, enter command:  
**AT+IPR=115200; &W<ENTER>**

Note: after entering this command the modem serial port speed will be permanently set at 115200bps.

Now you can close the HyperTerminal



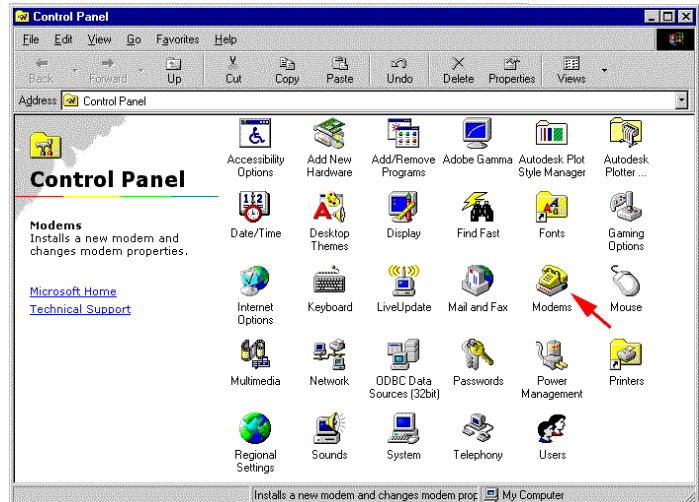


# GSM20 WIN98 GPRS SET-UP GUIDE

## 3. ADDING A MODEM TO WINDOWS 98

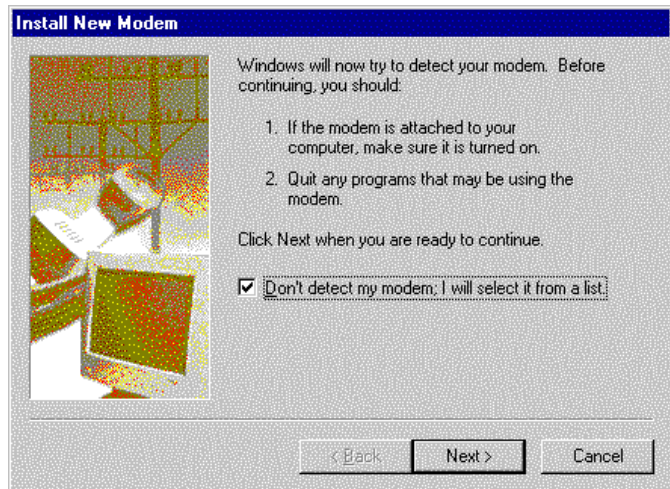
3.1 On Windows 98, Choose “**Start**”, then choose “Control Panel folder

3.2 Double click the ‘**Modem**’ icon

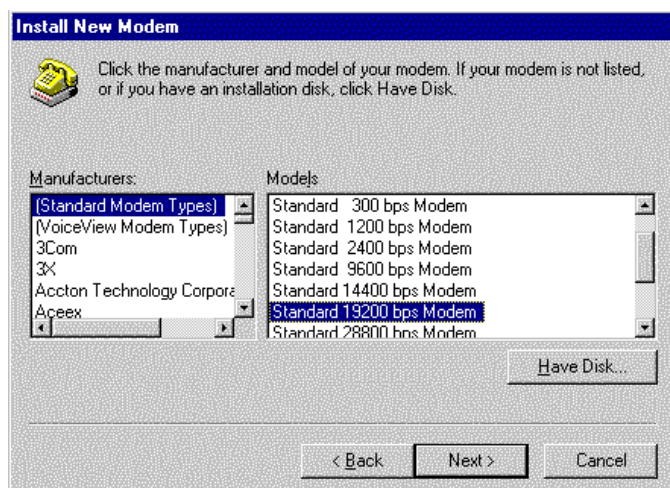


3.3 If your system have no modem installed it will show the ‘**Install New Modem**’ dialogue box, otherwise it will show ‘**Modem Properties**’ (see) You can then press ‘Add’ button

3.4 On ‘**Install New Modem**’ dialogue box, click ‘**Don’t detect my modem**’. Then press ‘**Next**’



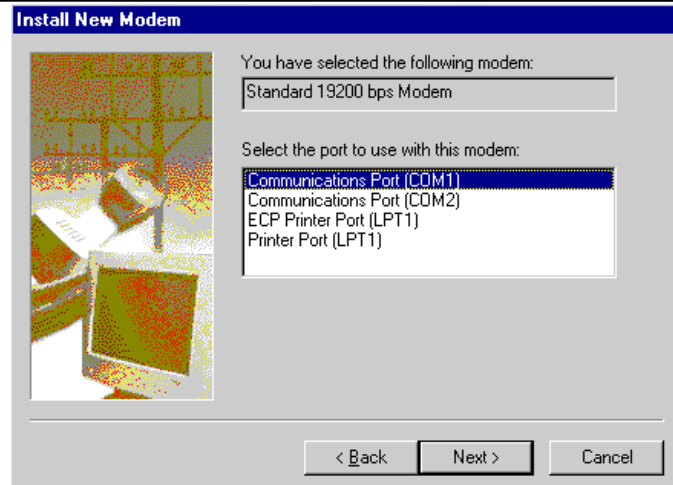
3.5 Choose ‘**Standard 19200bps Modem**’, then press ‘**Next**’



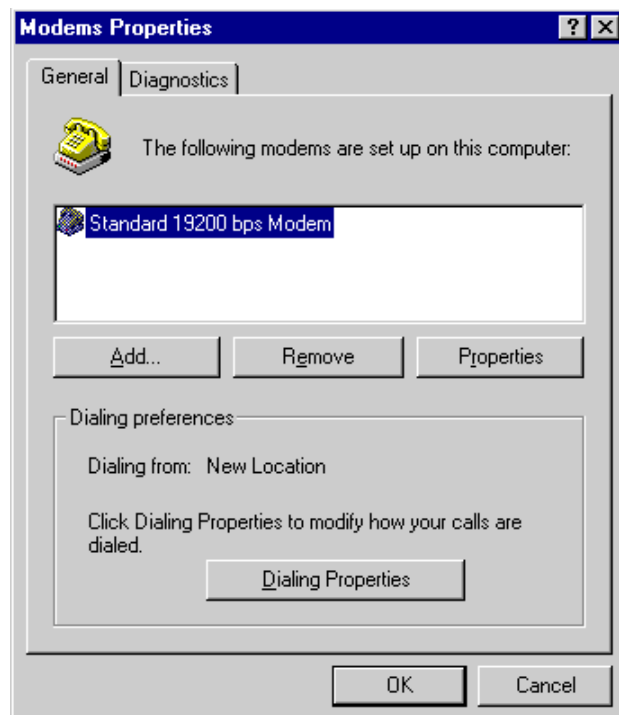


## GSM20 WIN98 GPRS SET-UP GUIDE

3.6 Choose the COM port where the MAESTRO 20 connected, then press **'Next'**



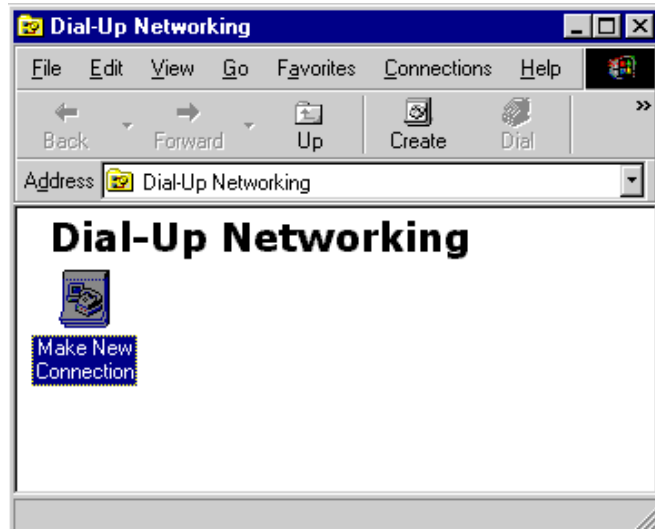
3.5 Now the modem has been installed. You can press **'OK'**



## 4. MAKING A DIAL-UP NETWORKING

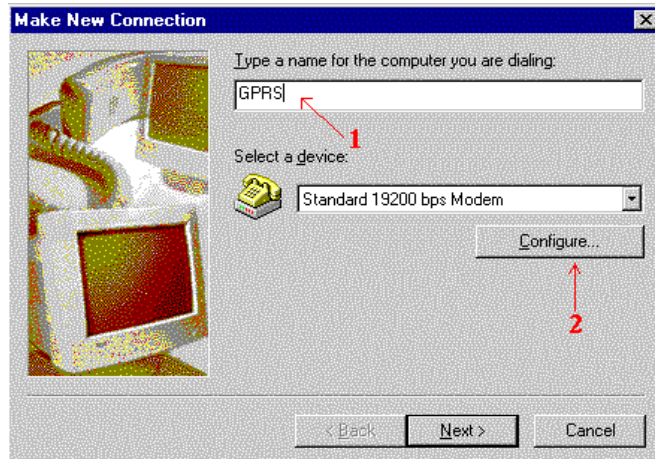
4.1 On Windows 98, go to 'Accessories' → 'Communication' → 'Dial-up Networking'

4.2 Double click 'Make a New Connection'



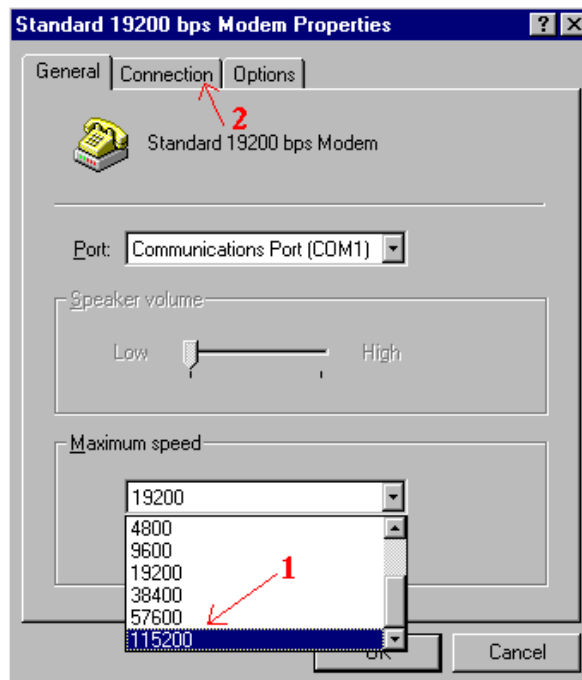
4.3 Type the name of the dial-up profile as you want

4.4 Choose the '19200 bps modem' and press 'Configure'



4.5 Choose the 'Maximum speed' to '115200'

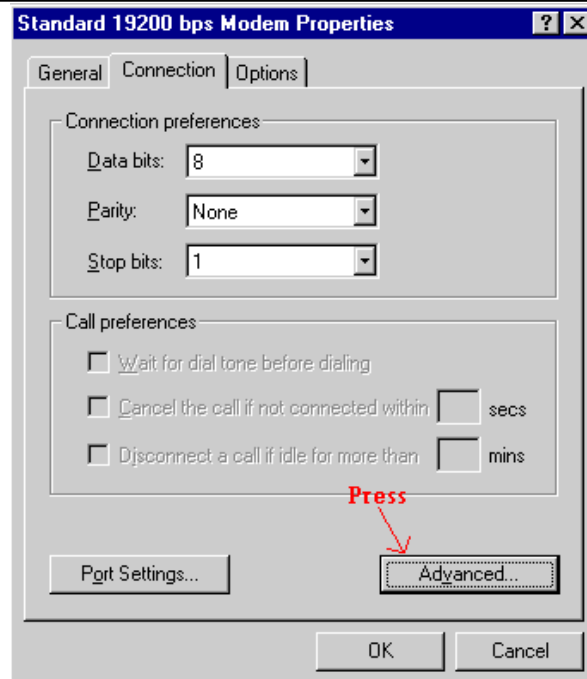
4.6 Click 'Connection' tab





# GSM20 WIN98 GPRS SET-UP GUIDE

4.7 Press 'Advanced' button



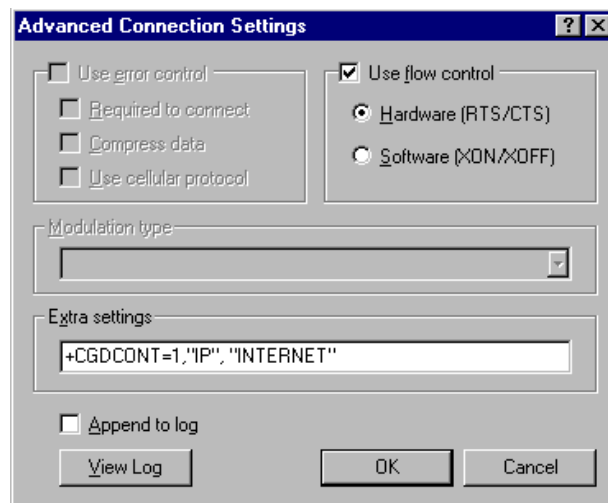
4.8 On 'Extra settings', type the APN information here. (Consult your Network Operator for the correct APN settings)

Common setting is :

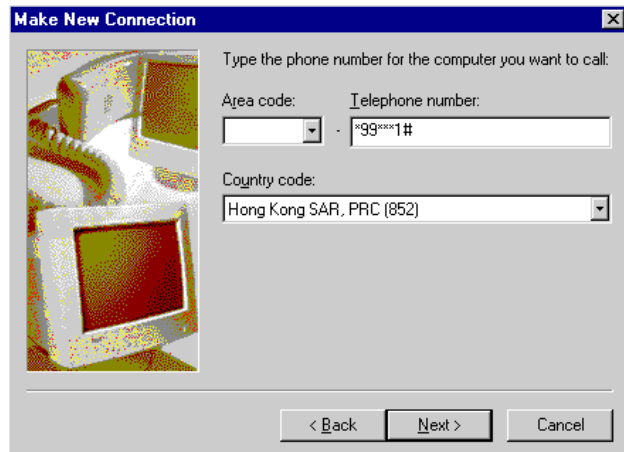
**+CGDCONT=1,"IP","INTERNET"**

4.9 Use Hardware flow control, then press 'OK'

4.10 Close all modem properties dialog box by pressing 'OK's and go back to the 'Make new connection' (sec. 4.3). Then press 'Next '



4.10 On the 'Telephone number' type '\*99\*\*1#'. Then press 'Next'

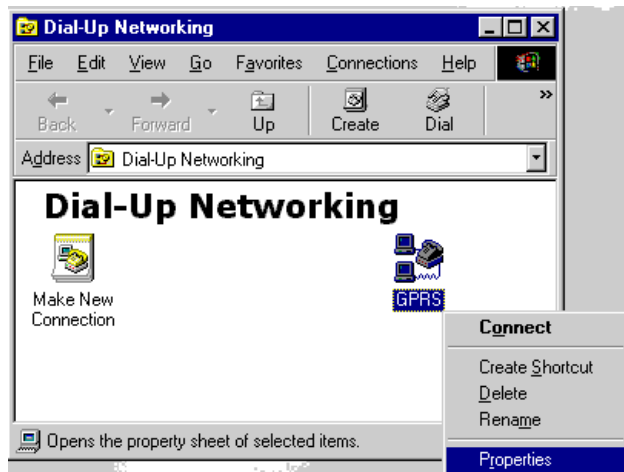


4.11 Press 'Finish' and you have made a GPRS dial-up profile.

However you need to edit some more settings.



4.12 Right-click the just-made GPRS dial-up icon. Then choose 'Properties'

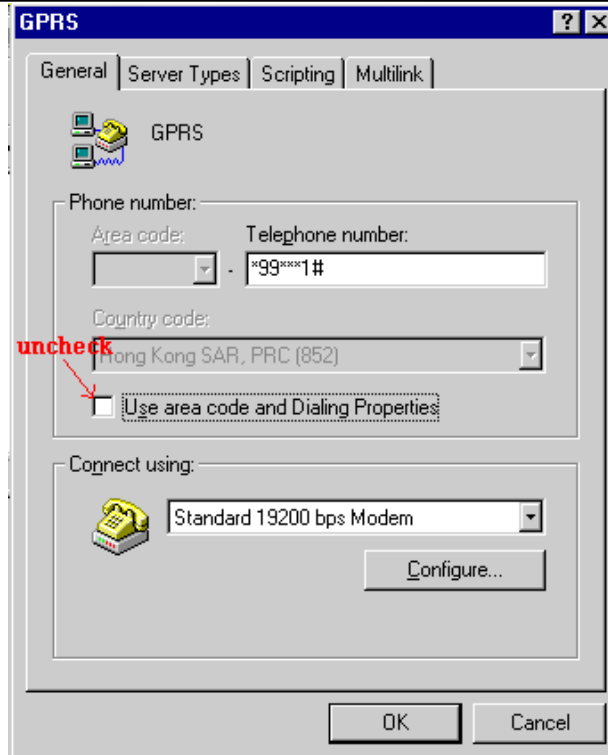




## GSM20 WIN98 GPRS SET-UP GUIDE

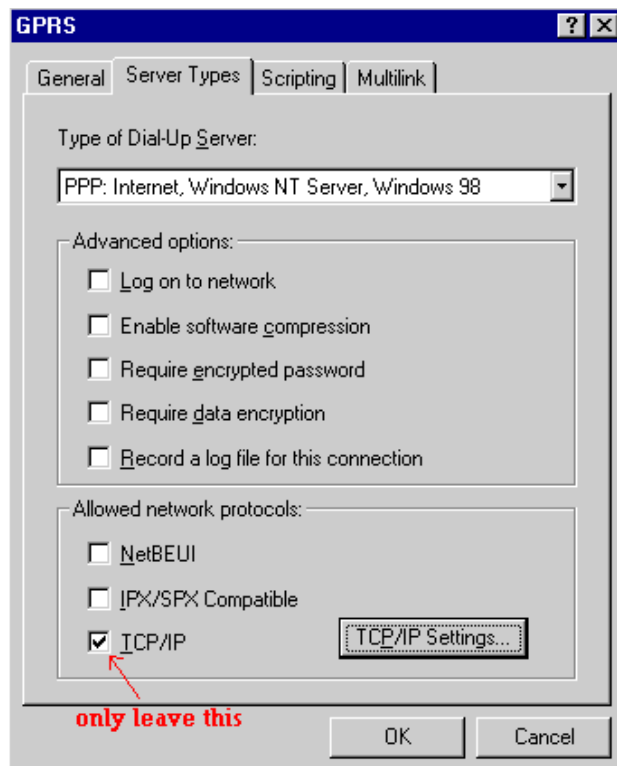
4.13 Uncheck the 'Use area code' option

4.14 Press 'Server Types' tab



4.15 Uncheck ALL options EXCEPT 'TCP/IP' option

4.16 Press the 'TCP/IP Settings' button





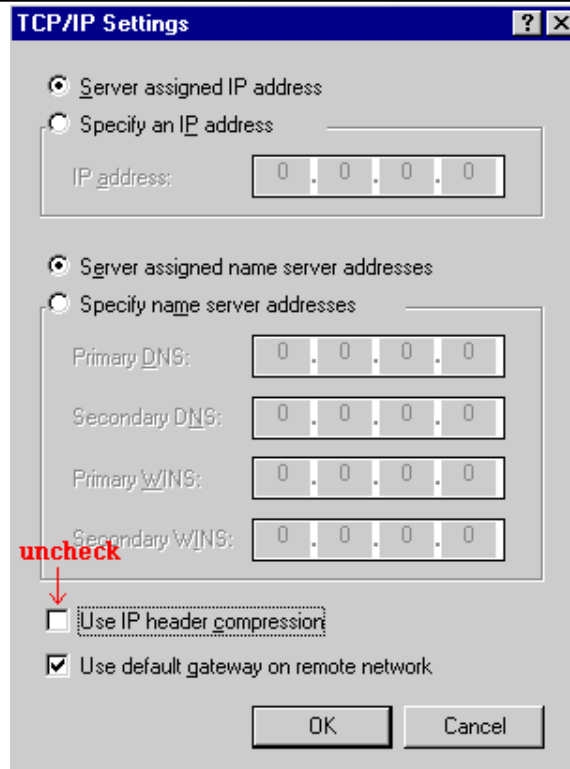


## GSM20 WIN98 GPRS SET-UP GUIDE

4.17 Uncheck the 'Use IP header compression' option

4.18 Then close all dialog boxes by pressing 'OK's.

Now you have finished the set-up of GPRS DUN.



4.19 Now you can make a GPRS dial-up by double-click the GPRS icon.

Remember to leave User name and password blank on connection (or refer to your network operator's instruction)





# GSM20 WIN98 GPRS SET-UP GUIDE

## 5. Trouble shooting

<b>Problem</b>	<b>Action</b>
Dial-up Networking reports modem is not responding	Check if the modem is ready, LED is flashing slowly  Check the serial port setting of Maestro and Windows modem device  Check connection cable  Check if the modem is used by another program
Dial-up not successful	Check if GPRS service ready from the network  Try entering command: AT+CGQREQ=1,0,0,3,0,0 by using HyperTerminal
Dial-up successful, but disconnect immediately	Check APN setting, consult your network operator
Dial-up successful, but cannot access the Internet	Check your Windows' Internet settings  Check signal strength Note: Dial-up Networking will NOT drop even signal is lost; it will try to recover soon