MTL01

User's Guide
rev. 1.0 09/2002

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PREFACE

The following installation rules should be respected in order to have the best working order of the equipment and for the user's safety

ENVIROMENTAL CONDITIONS

Enviromental temperature	Relative humidity
from -20 a +50°C	from 20 to 80% n.c.

Rapid changes of temperature or humidity should be avoided.
This equipment, including cables, should be installed in an area free from:

- Dust, humidity, heat from direct sun light.
- Objects which irradiate heat. These could cause damage to the container or other problems.
- Objects which produce a strong electtromagnetic field (loudspeakers, etc.)
- Liquids or chemical corrosive substances.

CLEANING THE TERMINAL

Use a clean and soft cloth. Wet the cloth with water or natural detergent if it is necessary to remove any stains. Never use chemical products such as petrol or solvents.

VIBRATIONS OR DROPPING

Caution against vibrations and dropping.

WARNING: This is a class A product.

In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

DECLARATION CE OF CONFORMITY

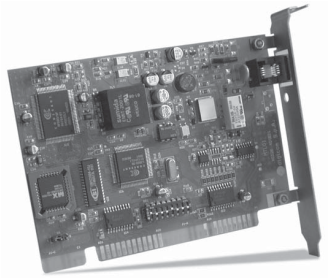
We, Digicom S.p.A. with registered office at: via Volta 39 - 21010 Cardano al Campo (Varese - Italy) declare under our sole responsability that the product:
Name: MTL01
satisfies the basic requirements of the below indicated Directive:

- **1999/5/CE** of March 9 1999, R&TTE.
  As having been designed in conformity with the requirements of following Reference Standards:
  EN 55022, EN 61000-3-2, EN 55024, EN 60950, ETSI TBR 21

1. GENERALITY

Congratulations for choosing Digicom MTL01.

MTL01 is an analog modem projected to be integrated into professional equipments and to be used for data transfer with remote devices.
It is possible to configure MTL01 using a complete AT commands set.



To guarantee the maximum compatibility with the industrial systems, MTL01 has been carried out with an ISA-Bus interface, which is very popular in these environments.
ISA-Bus slots are supported by the most Operating Systems, even by the less recent ones (eg. MSDOS).

1.1. CHARACTERISTICS

- Standard: V90, K56flex, V34, V32bis, V32, V22, V22bis, V21
- Connections up to 33600bit/s with another analog device
- Internet Connections up to 56000bit/s
- DTE speed up to 115200bit/s
- Asynchronous functionality
- MNP5 and V.42bis data compression
- 10 bit Asynchronous support
- AT commands support
- CTR21 International Line Interface
- Autoanswer
- Flash upgradable
- Size: 125x90x15mm
- Power supply: +5Vdc (from the Terminal ISA-Bus socket)
- Power consumption: 1.5W
- Data interface: comb connector for XT/AT bus

1.2. PACKAGE CONTENT

- MTL01
- Phone cord
- Quick Guide

2. INSTALLATION

Before inserting an ISA-Bus modem into the terminal, a COM serial port and an interrupt must be set through the dip-switches and/or jumpers on the card. The Terminal will be able to interface the modem using the COM and IRQ resources.
The same concept is used also for Terminals with Operating System: in this case MTL01 is detected as a serial port; this means that, during the installation it is important to detect the new COM port.

After the installation, you can configure the modem using AT commands or a Windows“ driver (Standard Modem).

For the hardware installation, please follow this procedure:

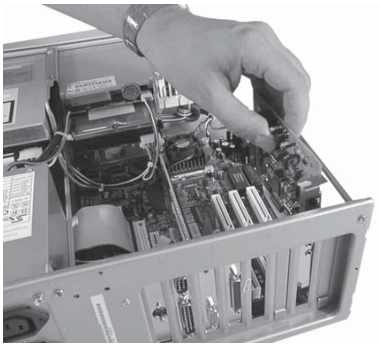
- Remove the modem from its package, and check it is OK.
- Set the dip-switch with COM port and IRQ (see table below).
- Switch-OFF the Terminal, then insert the modem in a free ISA-Bus slot.
- Fix the card modem and close the Terminal.
- Insert the phone line cable using the one supplied in the package.

Once the installation of the serial port is over, you can start with the modem configuration using AT commands.

2.1. INSTALLATION - WINDOWS®

Windows® sees MTL01 as a serial port, so you must look for a free COM and IRQ in the Operating System, then set a COM and IRQ in MTL01.
Select the **System** utility in the **Control panel**, then select the **Hardware** folder and click the **Device manager** button. In the most recent Operating Systems use the **System Information** utility present in **Programs/ Accessories/System Utility**.

Now set the dip-switch and the jumper on the modem card. If there are not free COM or IRQ, you can disable COM1 or COM2 (if it is not used) in BIOS.



For the hardware installation, please follow this procedure:
- Remove the modem from its package, and check it is OK.
- Set COM and IRQ by the dip-switch (see table below).
- Switch-OFF the PC, then insert the modem in a free ISA-Bus slot.
- Fix the card modem, and close the PC.
- Insert the phone line cord supplied in the modem package.

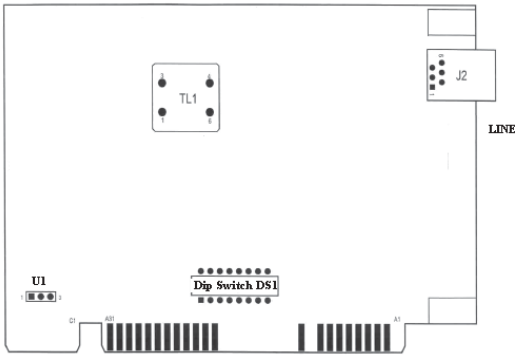
Run Windows®: MTL01 could not automatically detect the new serial port as it is not a Plug&Play (PnP) card. Run the **Add/Remove** Hardware utility in the **Control Panel** and select automatic search: Windows® will detect a new serial port.
After the serial port installation is over, you can configure the modem using AT commands, or with a Windows® driver (Standard Modem).

2.2. HARDWARE SETTING

MTL01 supports a dip-switch (see picture below) for COM and IRQ setting. You can see the configuration in the following table.

	Address	DIP SWITCH DS1								Jumper U1
		1	2	3	4	5	6	7	8	
COM1	3F8	OFF	OFF							
COM2	2F8	OFF	ON							
COM3	3E8	ON	OFF							
• COM4	2E8	ON	ON							
IRQ3				ON	OFF	OFF	OFF	OFF	OFF	Pos. 1-2
IRQ4				OFF	ON	OFF	OFF	OFF	OFF	Pos. 1-2
• IRQ5				OFF	OFF	ON	OFF	OFF	OFF	Pos. 1-2
IRQ7				OFF	OFF	OFF	ON	OFF	OFF	Pos. 1-2
IRQ10				OFF	OFF	OFF	OFF	ON	OFF	Pos. 1-2
IRQ11				OFF	OFF	OFF	OFF	OFF	ON	Pos. 1-2
IRQ14				OFF	OFF	OFF	OFF	OFF	OFF	Pos. 2-3

• ***factory default***



3. MODEM AT COMMAND SET

The modem supports a complete AT commands set to define the configuration, initiate or terminate modem communication, test the modem and the communication link. The modem will work in two basic operations: **command mode** and **data mode**.
COMMAND mode is when the modem is not connected to another modem, therefore “Off Line” or in a idle condition. In this mode the modem will accept commands beginning with AT prefix. DATA mode is when the modem is connected to another modem, that is an “On Line” condition or functioning. In this mode all the characters sent from computer are interpreted as data and they are sent to the remote modem. You may switch from data to command mode by entering an escape sequence. The default escape sequence is +++. To be valid, the sequence must be followed by an AT command, i.e. "+++AT<CR>".

Data Length
Digicom's modems can manage the following ASCII code formats:

CASE	START BIT	DATA BIT	PARITY	STOP BIT	TOT
1	1	7	1	1	10
2	1	8	0	1	10
3	1	7	0	2	10

The modem will accept even, odd, mark, or space.

3.1. AT COMMAND SET DESCRIPTION

NOTE: "●" ***default factory commands***

AT **Attention**
All the characters following the letters ‘AT’ are commands. In AT command mode the modem automatically detects the computer speed and parity format. The modem will response using the same speed and parity format of AT command.

ATA **Answer incoming data call**
Cause the modem to go off hook and attempt a handshake in answer mode.

A/ **Repeat last command**
Cause the modem to repeat the last AT command. This command must not be preceded by AT and followed by CR.

ATD	**Dial Command**
0:9	Dial numbers
*	DTMF digits
#	DTMF digits
A..D	DTMF digits
P	Pulse dial
T	Tone dial
S=n	Select a number stored in the modem internal book (see AT&Z command)
!	Flash
W	Wait for dial tone
@	Wait for five seconds of silence
,	Pause
L	Recall the last number dialed
;	Return to Command state. Added to the end of the dial string, this causes the modem to return to the command state after it processes the portion of the dial string preceding the “;”. The modem will enter call progress only after an additional dial command is issued without the “;” terminator.

ATE **Commands Echo**

	E0	Commands echo disabled.
●	E1	Commands echo enabled.

ATH DISCONNECTION

H0 Modem disconnects
H1 Modem connects to the line and remain in command mode for the time defined in S7.

ATI IDENTIFICATION

I0 Maximum line speed
I1 Product type
I3 Product name
I4 Software release
I5 Active Country Code

ATO RETURN ON LINE

O0 On line state when during connection the modem is in command mode.
O1 Like previous plus equalizer retrain.

ATP SET PULSE DIAL DEFAULT

This command forces pulse dialling.

ATQ QUIET RESULT CODES

- Q0 Answer codes enabled.
Q1 Answer codes disabled.

ATS READ/WRITE REGISTER

Sn=vvvWrite the vvv value in the n Register.
Sn? Display the value stored in the n Register.

ATT SET TONE DIAL DEFAULT

This command forces tone DTMF dialling.

ATV RESULT CODE FORMAT

V0 Result code display as digit (short form).
- V1 Result code display as words (extened form).

RESULT CODE SHORT & EXTENDED FORM SUMMARY

SHORT	EXTENDED
0	OK
1	CONNECT
2	RING0
3	NO CARRIER
4	ERROR
5	CONNECT 1200
6	NO DIALTONE
7	BUSY
8	NO ANSWER
10	CONNECT 2400
11	CONNECT 4800
12	CONNECT 9600
13	CONNECT 7200
14	CONNECT 12000
15	CONNECT 14400
59	CONNECT 16800
16	CONNECT 19200
61	CONNECT 21600
62	CONNECT 24000
63	CONNECT 26400
64	CONNECT 28800
91	CONNECT 31200
84	CONNECT 33600
17	CONNECT 38400
19	CONNECT 115200
22	CONNECT 1200TX/75RX
23	CONNECT 75TX/1200RX
40	CARRIER 300
44	CARRIER 1200/75
45	CARRIER 75/1200
46	CARRIER 1200
47	CARRIER 2400
48	CARRIER 4800
49	CARRIER 7200
50	CARRIER 9600
51	CARRIER 12000
52	CARRIER 14400
53	CARRIER 16800
54	CARRIER 19200

SHORT	EXTENDED
55	CARRIER 21600
56	CARRIER 24000
57	CARRIER 26400
58	CARRIER 28800
78	CARRIER 31200
79	CARRIER 33600
66	COMPRESSION: CLASS 5
67	COMPRESSION: V42 bis
69	COMPRESSION: NONE
76	PROTOCOL: NONE
77	PROTOCOL: LAP
80	PROTOCOL: ALT
150	CARRIER 32000
151	CARRIER 32000
152	CARRIER 36000
153	CARRIER 38000
154	CARRIER 40000
155	CARRIER 42000
156	CARRIER 44000
157	CARRIER 46000
158	CARRIER 48000
159	CARRIER 50000
160	CARRIER 52000
161	CARRIER 54000
162	CARRIER 56000
165	CONNECT 32000
166	CONNECT 34000
167	CONNECT 36000
168	CONNECT 38000
169	CONNECT 40000
170	CONNECT 42000
171	CONNECT 44000
172	CONNECT 46000
173	CONNECT 48000
174	CONNECT 50000
175	CONNECT 52000
176	CONNECT 54000
177	CONNECT 56000

Note: The commands in the above list can be followed by \ARQ message

ATW REPORT AT CONNECTION

	W0	When connected the modem displays:CONNECT and the digital rate.
	W1	When connected the modem displays:Line Speed,Error Correction Protocol (if any),Digital rate
●	W2	When connected the modem displays:CONNECT and line speed.

ATX DIAL TONE DETECTION

	X0	No control on dial tone.
●	X1	Busy and dial tone are ignored.
	X2	Dial tone detected.
	X3	Busy tone detected.
	X4	All messages enabled.

ATZ RESET AND LOAD USER PROFILE

Z0	Reset and load user profile 0.
Z1	Reset and load user profile 1.

AT+MS= MODULATION FORMAT

This extended-format command selects the modulation, optionally enables or disable automode, and optionally specifies the lowest and highest rates using one to four subparameters. the command format is:

AT+MS=[mod],[automode],[min_rate],[max_rate]

[mod] = modulation type
[automode] = automode enable or disable
[min_rate] = min. line speed
[max_rate] = max.line speed

- **Modulation type** (see the table below)

MOD	MODULATION	POSSIBLE RATE bps
0	V.21	300
1	V.22	1200
2	V.22bis	2400 or 1200
3	V.23	1200
9	V.32	9600 or 4800
10	V.32bis	from 14400 to 4800
11	V.34	from 33600 to 2400
12	V.90	from 56000 to 28800
56	K56Flex	from 56000 to 32000

- **Automode**: see the ATN command
- **Line speed min/max**: These parameters permit to define, within a modulation standard, the minimum and maximum connection rate.
  The AT+MS? command shows the currently modem configuration, the default value is: 12,1,300,56000

Some configuration examples

- Modem set up with automode enabled and connection speed between 300 bps and 56000 bps:

  AT+MS=12,1,300,56000

  The modem will connect at the maximum speed available if the interface speed is equal or higher than the max rate (56.000bps).
  If the computer speed is less than the max rate, the modem will connect at the computer speed.
- Modem set up in V.34 with automode disabled and speed fixed at 33.600

  AT+MS=11,0,33600,33600

  In this case the modem will connect only if the computer speed is equal or higher than the speed setup in the AT+MS command.

  AT+MS=9,1,300,9600

  The modem can handshake from V.32 (9600 bps) to V.21 (300 bps).

Standard	Available speeds
V.90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
K56Flex	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000
V.34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, 2400
V.32bis	14400, 12000, 9600, 7200, 4800
V.32	9600, 4800
V.22bis	2400, 1200
V.22	1200
V.21	300
Bell 103	300
Bell 212	1200

AT%C DATA COMPRESSION CONTROL

%C0 Compression disabled.
%C1 MNP5 enabled only.
%C2 V42bis enabled only.
- %C3 MNP5 and V42bis enabled.

AT%E AUTORETRAIN CONTROL

%E0 Autoretrain disabled.
%E1 Autoretrain enabled.
● %E2 Fallback/fallforward enabled. Enabled only in error corrector or buffer mode.

AT%L DISPLAY RECEIVE LEVEL IN DBM

Returns a value which indicates the received signal level.
Example *009 = -9 dBm, 043 = -43 dBm.*

AT%Q LINE SIGNAL QUALITY

From 000 (good quality) to 127 (poor quality, troubled signal).

AT&C CARRIER DETECT OPTION

&C0 Carrier detect always ON. When modem disconnect DCD (C109) goes OFF for 1 sec.; function 109 wink.
● &C1 Carrier detect is ON when remote carrier is present.

AT&D DATA TERMINAL READY OPTION

&D0 DTR signal is ignored.
&D1 Modem return to Command Mode upon detecting ON to OFF transition on DTR.
● &D2 Modem hangs up and disables auto-answer upon detecting ON to OFF transition on DTR.
&D3 Modem reset upon detecting ON to OFF transition on DTR.

AT&F FACTORY CONFIGURATION

&F0 Load factory configuration 0.
&F1 Load factory configuration 1.

AT&K DATA FLOW CONTROL

&K0 Flow control disable.
● &K3 Hardware flow control (RTS/CTS) enabled (Default for data modem modes).
&K4 Software flow control (Xon/Xoff) enabled.
&K5 Software flow control (Xon/Xoff) in trasparent mode enabled.
&K6 Hardware and software flow control enabled (default for fax modem modes).

AT&P MAKE/BREAK RATIO

● &P0 39%-61% make/break ratio with 10 pulses per second.
&P1 33%-67% make/break ratio with 10 pulses per second.

AT&Q OPERATING MODE SELECTION

● &Q5 Operations with error corrector. It is automatically selected with \N command (different from 0 and 1).
&Q6 Asynchronous with buffer enabled (AT\N0).

AT&R C106

&R0 In asynchronous mode, C106 is controlled according to V25 handshake reccomandation.
● &R1 In synchronous mode, C106 follows the flow control.

AT&S C107 (DATA SET READY OPTION)

● &S0 DSR will remain ON all the time.
&S1 DSR will become active after answer tone has been detected and inactive after the carrier has been lost.

AT&V VIEW ACTIVE AND STORED PROFILES

AT&W STORE ACTIVE PROFILE

&W0 Store active profile as Profile 0.
&W1 Store active profile as Profile 1.

AT&Y DEFINE DEFAULT PROFILE AFTER POWER ON

● &Y0 Use profile 0 after power on.
&Y1 Use profile 1 after power on.

AT\N	ERROR CORRECTION AND BUFFER CONTROL (MNP AND V42)
\N0	Selects normal speed buffered mode (disables error correction mode). Forces &Q6.
\N1	Serial interface selected. Selects direct mode and is equivalent to &M0, &Q0 mode operation. Forces &Q0.
\N2	Selects reliable (error correction) mode. The modem will first attempt a LAPM connection and then an MNP connection. Failure to make a reliable connection results in the modem hanging up. Forces &Q5.
● \N3	Selects auto reliable mode. This operates the same as \N2 except failure to make a reliable connection results in the modem falling back to the speed buffered normal mode.
\N4	Selects LAPM error corrector mode. Failure to make an LAPM error-correction connection results in the modem hanging up. Forces &Q5.
\N5	Selects MNP error corrector mode. Failure to make an MNP error-correction connection results in the modem hanging up. Forces &Q5.

Note: Error correction starting from V22 standard

AT\V	MESSAGE COMPOSITION
\V0	Messages are managed over several lines, according to X, W and S95 commands.
\V1	Messages are managed over a single line, according to V and Q commands.

3.1.1. MNP10 COMMAND

AT-K	MNP10 SERVICE MANAGEMENT
● -K0	Disable MNP10 service. The modem negotiates V42bis only.
-K1	Enable MNP10 service using detection phase
-K2	Enable MNP10 service without using detection phase

3.2. S REGISTERS

REG.	RANGE	UNIT	DEF.	DESCRIPTION	SAVED
S0	0,2-5	Ring	0	Ring to answer on	●
S1	0-255	Ring	0	Ring count	
S2	0-255	ASCII	43	Escape character	●
S3	0-127	ASCII	13	Carriage return character	
S4	0-127	ASCII	10	Line Feed character	
S5	0-127	ASCII	8	Back Space character	
S6	3-10	1 sec.	4	Wait for dial tone	●
S7	0-90	1 sec.	60	Wait for data carrier	●
S8	0-255	1 sec.	2	Pause time for "," character	●
S9	0-255	100ms	6	Answer tone detection time	●
S10	0-255	100ms	14	Lost carrier to hang up delay	●
S12	0-255	20ms	50	Escape sequence code guard	●
S18	0-255	1 sec.	0	Test timer	●
S29	0-255	10ms	10	Flash time	
S30	0-255	1 min	0	Inactivity timer on data (cannot be stored)	
S32	0-255	ASCII	17	Xon character	
S33	0-255	ASCII	19	Xoff character	
S91	10-15	dB	10	Adjust transmission level	
S92	10-15	dB	10	Adjust transmission level in fax mode	
S95	0-255	ASCII	2	Connection messages management	●

3.2.1. SPECIAL S REGISTER DESCRIPTION

ATS9 DETECTION TIME FOR ANWER TONE

0 - 255 100ms Answer tone detection before handshake

Default = 6

ATS10 CARRIER DETECT RESPONSE TIME

0-255 100ms Sets the length of time, in thenths of a seconds, that the modem waits before hanging up after a loss of carrier.

255 10ms The modem doesn't disconnect for a loss of carrier

Default = 14

ATS30 INACTIVITY DISCONNECT TIMER

0 The modem doesn't disconnect as no data is sent or received.

0-255 Sets the length of time, in tens of seconds, that the modem will stay online before disconnectiong when no data is sent or received. The timer is inoperative in synchronous mode.

Default = 0 (cannot be stored)

ATS91 ADJUST TRANSMISSION LEVEL IN SWITCHED LINE

10-15 dB This register checks the modem transmission level in switched line

Default=10

ATS92 ADJUST TRANSMISSION LEVEL IN FAX MODE

10-15 dB This register checks the modem transmission level in fax mode.

Default=10

Note: Each change of S91 and S92 is automatically stored into the modem non volatile memory.

3.3. CONNECTION MESSAGES

S95	ATW0	ATW1	ATW2
0	CONNECT Dte	CARRIER Dce PROTOCOL: Prot. CONNECT Dte	CONNECT Dce
1	CONNECT Dce	CARRIER Dce PROTOCOL: Prot. CONNECT Dce	CONNECT Dce
2	CONNECT Dte/ARQ	CARRIER Dce PROTOCOL: Prot. CONNECT Dte/Arq	CONNECT Dce/ARQ
4	CARRIER Dce CONNECT Dte	CARRIER Dce PROTOCOL: Prot. CONNECT Dte	CARRIER Dce CONNECT Dce
8	PROTOCOL: Prot. CONNECT Dte	CARRIER Dce PROTOCOL: Prot. CONNECT Dte	PROTOCOL: Prot. CONNECT Dce
32	COMPRESSION: Comp. CONNECT Dte	CARRIER Dce PROTOCOL: Prot. COMPRESSION:Comp CONNECT Dte	COMPRESSION: Comp. CONNECT Dce

Dce = Line Speed
Dte = Interface Speed
Comp. = V.42bis - MNP5 - NONE
Prot. = V.42 - LAPM - NONE

COMMAND	DESCRIPTION
ATX	List of available messages
ATW	Answer message Format
ATS95	Connection message management

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