TS-Modem User's Manual

Technologic
S Y S T E M S

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All modifications from previous versions are listed in the appendix.

Limited Warranty

Technologic Systems warrants this product to be free of defects in material and workmanship for a period of one year from date of purchase. Technologic Systems will repair or replace the defective unit during this warranty period in accordance with the following instructions:

- Contact Technologic Systems and obtain a Return Material Authorization (RMA) number and a copy of the RMA form.

- Fill out the RMA form completely and include it and dated proof of purchase with the defective unit being returned. Clearly print the RMA number on the outside of the package.

This limited warranty does not cover damages resulting from lighting or other power surges, misuse, abuse, abnormal conditions of operation, or attempts to alter or modify the function of the product.

This warranty is limited to the repair or replacement of the defective unit. In no event shall Technologic Systems be liable or responsible for any loss or damages, including but not limited to any lost profits, incidental or consequential damages, loss of business, or anticipatory profits arising from the use or inability to use this product.

Repairs made after the expiration of the warranty period are subject to a flat rate repair charge and the cost of return shipping. Please contact Technologic Systems to arrange for any repair service.

FCC Part 15

This equipment complies with Part 15 of the FCC rules. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Plug the equipment into an outlet on a circuit different from that to which the receiver is connected.

FCC Part 68

This equipment complies with Part 68 of the FCC rules. On the modem is a label that contains the FCC registration number of the modem and the Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this equipment to your telephone company. Excessive RENs on the telephone line may result in the device not ringing in response to an incoming call. In most, but not all, areas the sum of the RENs should not exceed 5.0. FCC prohibits connecting this device to party lines or coin-telephone services.

This modem should be connected to a telephone network using a compatible modular jack that is part 68 compliant. If this equipment fails to operate correctly, disconnect this device from the phone network and verify that it is the source of the problem. Should one experience any trouble with the device itself, please contact Technologic Systems.

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1 Introduction

The TS-Modem is an add-on PC/104 modem daughter board. It adds one AT-command style compatible Modem that can be directly connected to a dial-up telephone line. The modem interface is a 16C550A compatible UART with 16 byte TX/RX FIFOs. The I/O port address and the IRQ used can be set with jumper blocks on the board itself.

Typically, the TS-Modem comes with a 33K baud modem, though it can be purchased with the optional feature of a 56K baud modem. The TS-Modem can also be purchased with the optional 16-bit PC/104 connector, which is required if using IRQ 10, 11, 12,14, or 15. The TS-Modem can also be purchased with the optional on-board speaker, which is useful during development to monitor call progress. The modem speaker can be turned off by removing a jumper.

The TS-Modem comes with the following features.

- Data Modem at line speeds of 33.6Kbps (optional 56Kbaud upon request)
- Uses industry standard AT style commands.
- NVRAM directory and profile storage.
- Tone and Pulse dialing
- Optional Speaker can be disabled/enabled with Jumper
- COM PORT Jumper Selectable as COM1 thru COM6.
- Uses IRQ 3-7, 9-12, 14-15
- +5V operation
- RJ11C (telephone line) connector

1.1 Specifications

- **Bus**: PC/104 8-bit or 16-bit
- **Flow Control**: XON/XOFF (Software), RTS/CTS (hardware)
- **Interface**: Serial 16C550A UART with 16 byte FIFOs
- **Power**: (typical) +5V @ 200 mA.
- **Operating Temperature**: 0-70° C
- **Dimensions**: 3.6 x 3.8 inches
- **Non condensing relative humidity**: 20%-90%
- **Data modes supported**: ITU-V.90, K56flex ; ITU-T V.34 enhanced, V.34, V.34bis, V.34, V.22 bis, V.22; Bell 212A and 103/133; ITU-T V.21 & V.23
- **Error Correction/Compression**: ITU-T V.42 (LAP-M or MNP 2-4)

1.2 Modem Features

- Caller ID (United States configuration only)
- TIA-602 command compatibility
- Autodial, redial, Auto-answer
- Pulse or Tone dialing
- Automatic detection of optimal modem speed/standard upon connection
- DTMF detection
- Auto-parity and data rate selections
- DTR dialing
- NVRAM storage for user-defined parameter
- Call status display
- Full Duplex over dial-up lines
- 50 character command buffer

2   Configuration of the TS-Modem

The TS-Modem can be configured to operate on one of COM1 to COM6, and to use an IRQ of 3-7, 9-12, 14-15. The default shipping of the unit is to use COM4 on IRQ7 with the speaker set to on.

Removing JP SPKR can turn disable the optional on-board speaker.

To select which COM port the unit will use, the jumpers labeled COM1 to COM6 are used. The selected COM port is determined by the "sum of" installed COM jumpers. To use COM 1, 2, or 3 put *one* jumper the labeled jumper of your choice. To use COM4, put one jumper on COM1 and another jumper on COM3 (1+3=COM4). To select COM5, put jumpers on COM2 and COM3, and to select COM6, put jumpers on COM 1, 2, and 3.

The same method is used when selecting the desired IRQ. To select IRQ7 for example, put jumpers on both IRQ3 and IRQ4.

The following tables illustrate how to select an IRQ and COM port.

	JP COM1	JP COM2	JP COM3
COM 1	X		
COM 2		X	
COM 3			X
COM 4	X		X
COM 5		X	X
COM 6	X	X	X

Table 1: JP configuration of COM port

	JP IRQ3	JP IRQ4	JP IRQ5	JP IRQ6
IRQ 3	X			
IRQ 4		X		
IRQ 5			X	
IRQ 6				X
IRQ 7	X	X		
IRQ 9	X			X
IRQ 10		X		X
IRQ 11			X	X
IRQ 12	X	X	X	
IRQ 14	X		X	X
IRQ 15		X	X	X

Table 2: JP configuration of IRQ port

Table 3 shows the IO location that each COM port uses.

COM port	Base I/O location (In hex)
COM1	0x3F8
COM2	0x2F8
COM3	0x3E8
COM4	0x2E8
COM5	0x3A8
COM6	0x2A8

Table 3: Base IO location of COM ports

3   Communicating with the modem

For a complete set of AT commands, please contact us, or see our web site for a PDF.

The modem uses AT-style commands. All commands start with an "*AT*" when in command mode, and when in data mode, start with "+++". For example, to dial out, the command "*ATDT* (phone number)" is used. To hang up after the modem has connected, use the command "+++*ATH*".

The modem can be used with any operating system, such as Linux or DOS. Any typical modem program can be used. In Linux, for example, minicom works quite well. Be sure to use setserial for setting which IRQ minicom and Linux should use.

The following C source code demonstrates how to directly talk to the modem from within DOS. This program puts into the modem's UART whatever characters passed to the program. For example, to test the modem and the phone line connected to it by dialing out to a known good number, one would invoke the program as such:
```
Minit.exe ATDT5555555
```
This would dial out to the number 555-5555.
 This program assumes the TS-Modem is jumpered to use COM4 for the modem's I/O location. This program was written in Turbo C 3.0.

```c
#include <stdio.h>
#include <dos.h>
#include <io.h>
#define COM1 0x3F8
#define COM2 0x3E8
#define COM3 0x2F8
#define COM4 0x2E8

int main (int argc, char *argv[] ) {
  int I=0;
while (argv[1][I] != '\0' ) {
   if ( (inportb(COM4+0x05 ) & 0x32) !=0) //is com x LSR
bit5 zero?
   {
     printf ("char %c\n", argv[1][I];
     outportb (COM4, argv[1][I]);
     I++;
}
}
delay (1);
outportb(COM4, 13);
return 0;
}
```

Appendix A - Manual Revisions

Date	Revision
8.16.02	• Document Created
8.19.2002	• Added section "Communicating with the Modem"