TELEDYNE
INSTRUMENTS
Advanced Pollution Instrumentation

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Service Note

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USING MODEMS WITH API ANALYZERS

I. BACKGROUND:

API analyzers do not use hardware or software data flow control, also known as "handshaking". This means that if the device that is connected to the API requires a hardware signal to control it, the device will not communicate. With most devices, such as a computer, this is not a problem as the API holds the CTS (clear to send) line true always. Most devices, if they use hardware handshaking, only require the presence of CTS. Modems, however, are different. When using hardware flow control most modems also require the presence of DTR (data terminal ready) or DSR (data set ready). This allows them to be backward compatible with older devices such as teletypes. If this signal is not present, the modem will not send data to the device.

In order to make the API analyzer work with a modem, it is necessary to create a special cable or to program the modem to ignore hardware and software flow control. A definitive service note, covering all types and brands of modems, is beyond the scope of this document. This document is **limited** to programming U.S. Robotics modems. API recommends that you use the U.S. Robotics 14,400 BPS modem or higher. If you are unable to get your modem working and it is not a U.S. Robotics, it may be less expensive to buy a U.S. Robotics verses spending the time to make the one you have work. If you have a different brand of modem, you can try these instructions, however it is advisable to consult your modem manual for the exact commands to enter into your modem for each step below. You can use just about any communications program but for the sake of uniformity we recommend that you use the HyperTerminal program that comes with windows. *NOTE*: You must use a modem that has a faster baud rate than the baud rate you will be using on the analyzer.

II. SCOPE:

This service note will instruct the user in the correct method of programming a U.S. Robotics external modem for use with the API analyzer.

III. TOOLS:

U.S. Robotics Sportster External Modem or U.S. Robotics V.92 External Modem
Computer with communications program (preferably HyperTerminal)
9 pin female to 25 pin male cable

IV. PROCEDURE:

There are three different ways to make the modem work with the API analyzers.

A) Using the modem with the standard type of 9 pin to 25 pin cable. This typically means programming the modem.
B) Using the standard 9 to 25 pin cable with the new "modem aware" API software. This software initializes the modem. This new software is as follows:

M100A	>B.5	AMX
M200A	>D.9	AMX
M300	>A.7	AMX
M400	>C.2	AMX
M700	>C.7	AMX

C) Using the "special" cable that needs to have the 25 pin connector jumpers.

The determining factors which will dictate the setup you will need are the software you are using and the modem you have. If you have software in your analyzer which is "Modem aware", (option #B above), you can usually just plug the modem into the back of the analyzer and use the analyzer to program the modem to work correctly. Proceed to step 18 below.

If you are using software that is not "modem aware", the best method is probably to program the modem if you are using a U.S. Robotics modem (option A above). Proceed to step one of this procedure.

If you are not using a U.S. Robotics modem, we recommend that you build the custom cable (option C above). If you are going to build a custom cable, proceed to step 12 below. If you wish to try programming a non-U.S. Robotics modem, proceed to step 1, but remember you should use your modem's manual to verify all commands.

We would suggest that you test the modems in-house before you take them to the site to install the system. If you have a phone system in-house that uses an exchange system you will want to make sure that you use a dedicated line for the analyzer. If you don't have any dedicated lines in-house, you can use a telephone simulator. We have used the Teltone TLS-3A (see attached information) in-house to do our testing.

1. Connect the computer to the modem using the 9 – 25 pin cable.
2. Start the computer and load a communications program. When you are setting up the communications program set the following items.

Flow control	Xon/Xoff
Comm port	whatever comm. port you are using
Baud rate	the baud rate that the analyzer is going to use
Data bits	8
Stop bits	1
Parity	none

3. If your modem doesn't have switches, skip this step. Locate the dip switches on the modem, set the switches to the following positions:

Set switch #'s 2, 4, and 5   "OFF" (switches in up position).
Set switch #'s 1, 3, 6, 7, and 8   "ON" (switches in the down position).

U.S. Robotics Modem dip switches:
switch 1 on   modem ignores DTR (DTR override)
         off   normal DTR operations: computer must provide DTR signal.
switch 2 on   numeric results
         off   verbal (word) result codes
switch 3 on   enables result codes
         off   suppresses result codes
switch 4 on   suppresses echo
         off   displays keyboard commands
switch 5 on   disables auto answer
         off   auto answer on first ring (or higher if specified in NVRAM)
switch 6 on   carrier detect always on (override)
         off   modem sends CD signal when it connects, drops on disconnect
switch 7 on   loads &f0 from ROM
         off   loads Y or Y1 config. from NVRAM
switch 8 on   smart mode (enables AT command set recognition)
         off   dumb mode (disables AT command set recognition)
                   down = on
                   up = off

4. Turn the modem on.
5. Verify that you have communication with the modem by pressing the Enter key on the computer 2 times, then typing "ATZ" and pressing the Enter key. The modem should respond with "OK" after a second or two.
6. For a U.S. Robotics Sportster type modem, type in the following commands exactly as they appear here. If you have a different brand or model of modem these commands might not be exactly right for your modem you will have to look in the manual for your modem and figure out what the commands are for these functions. After each command the computer should respond with an "OK". If it does not then you will have to try the command again. If it still does not reply with OK check the manual for your modem and find he command that equals the function that you are trying to set.

ate1q0v1   enter   modem displays keyboard commands (echo on)
                           Displays result codes
                           Verbal codes
aty0   enter   default is profile 0 setting in NVRAM
at&d0   enter   DTR override
at&h0   enter   flow control disabled
at&i0   enter   software flow control disabled
ats0=2   enter   sets auto answer to 2 rings
at&b0   enter   sets serial port rate to follow the connection rate of the mode.
at&n10   enter   sets connect speed of the modem to 19,200. If you are using an analyzer that cant goto 19,200 set this to at&n6 for 9600 or at&n4 for 2400

at&m0	enter	normal mode, sets error control to off
ate0q1&w0	enter	echo off
		Does not display result codes (quiet mode)
		writes current configuration to NVRAM 0 template

YOU WILL NOT GET AN OK AFTER TYPING THIS COMMAND

7. Power off the modem and disconnect it from the computer. Connect the modem to the analyzer
8. If your modem does not have dip switches, skip this step. Change the dip switches to the following positions

    Set switch #'s 2, 3, 5, and 7 "OFF", (switches in up position).
    Set switch #'s 1, 4, 6, and 8 "ON" (switches in the down position).

9. Turn on the modem and then turn on the analyzer
10. If both the green and red LEDS on the rear panel are not on then you will have to change the analyzer from DCE to DTE or vice versa. To do this there will be a switch on the rear panel (on the outside of the analyzer), or there will be jumpers (on the inside of the analyzer). Change the position of the switch on the analyzer and the green led should come on. If you have jumpers you will want to change them from both vertical to both horizontal or vice versa.
11. If you are not going to build a custom cable, you can skip to step 15.
12. To construct a custom cable you will need a 5 conductor, shielded coax cable of the appropriate length. You will also need 2 solder cup style connectors: a 9 pin Female, "D" type connector and a 25 pin male, "D" type connector.
13. Make the following connections between the 9 pin and 25 pin connectors:

9 Pin Connector	25 Pin Connector
Pin 2	Pin 3
Pin 3	Pin 2
Pin 5	Pin 7

14. On the 25 pin connector, you must connect pins 4, 5 and 20 together. This completes the connections for the custom cable.
15. With the modem connected to the analyzer press the following buttons on the front of the analyzer "SETUP_MORE_VARS_NEXT to RS232 MODE_EDIT". Write down the number that is being displayed, then change the number to 8 if it is not already 8.
16. Next change the baud rate in the communications menu to the highest baud rate of the slowest analyzer that will be on this phone line. Press "SETUP_MORE_COMM_BAUD_ENTER".
17. Change the RS232 mode back to what you had it set to if it was not 8 to begin with.
18. If you are using the new "modem aware" software you will want to do the following steps.
19. If your modem doesn't have switches, skip this step. Locate the dip switches on the modem, set the switches to the following positions:
    Set switch #'s 2, 4, and 5   "OFF" (switches in up position).
    Set switch #'s 1, 3, 6, 7, and 8 "ON" (switches in the down position).
20. Hook the modem to the analyzer and turn the modem on.

21. Turn on the analyzer and allow the analyzer to get to the sample menu.
22. Turn off the modem.
23. Change the dip switches to the following positions
    Set switch #'s 2, 3, 5, and 7 "OFF" (switches in up position).
    Set switch #'s 1, 4, 6, and 8 "ON" (switches in the down position).
24. Turn on the modem proceed the next step.
25. Now that you have the modem connected to the analyzer you should be able to hook it to the phone system and call it. With your computer hooked to the phone system call the analyzer. The modem will ring and answer on the second ring. Once the modem has established communication with your computer push the following buttons on the computer:

    Enter
    Ctrl "t"
    "?" enter

26. You should get a menu of the commands for the API. If you do not then you will want to check the setup again and make sure that everything is correct. If you can't make the computer talk to the analyzer try to go into the DIAG menu on the analyzer and push NEXT to get to the RS 232 output and push ENTR. You should see a long string of "W's". If you have a bunch of garbage on the computer screen then you probably have a baud rate problem.

If you have questions about this or any API equipment, please contact an API Customer Service Representative. If you are having problems with this setup procedure and are going to contact API, please have the manual for the modem, the software rev of the analyzer, and the name of the communications program you are using on the computer.
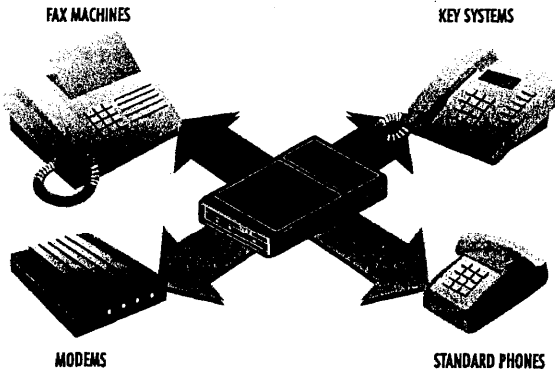
TELTONE®

User Manual
40-400-00010, Rev. A
Covers Model TLS-3A-01

TLS-3A

Telephone Line Simulator

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MODEMS

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USING MODEMS WITH API ANALYZERS
98-020 Rev B