



## Commercial Modems with SC32A Application Note #2

### **Overview**

Most commercial high-speed modems can be used quite successfully with Campbell Control Modules, such as the CR500/CR510/CR10/CR10X and others, using the guidelines presented in this Application Note. These modems offer the advantage of lower cost over Campbell modems, typically in the \$100-\$150 price range as well as better compatibility with other high-speed modems commonly in use.

There are basically three differences (as it relates to success using these modems with the Campbell Control Modules) between the Campbell modems such as the COM200 and commercial high-speed modems. The first is power, the Campbell modems derive power from the Control Module connection, either 5V (older modems) or 12V (newer modems). The second is handshake, the Campbell modems use a RING line to indicate a call and then a ME (Modem Enable) line to activate the modem (and answer the call). The SC32A (required because of reason #3) does not have facility to pass these signals so hardware handshaking must be disabled. The third reason is the interface type, Campbell modems can accept the digital type I/O directly from the Control Module, commercially available modems must use RS-232 type I/O, as is provided by the SC32A.

### **Wiring**

The SC32A is required when using commercially available modems because the output signals from the Campbell Control Modules are of a digital (0 to 5V) type, the SC32A provides the conversion from these signals to RS-232 (negative to positive voltage, often -9V to +9V).

The key with using the SC32A is that power must be supplied by the modem. See the wiring diagram below.

SC32A	Description	In/Out	Modem DB-9	Modem DB-25
1	Ground		NC	NC
2	Transmit Data (TD)	In	3	3
3	Receive Data (RD)	Out	2	2
4	Request to Send (RTS)	In (power)	6	6
5	Clear to Send (CTS)	Out	NC	NC
6	Data Set Ready (DSR)	Out	NC	NC
7	Ground		5	7
8	Data Carrier Detect (DCD)	Out	NC	NC
20	Data Terminal Ready (DTR)	In (power)	6	6

### **Modem Configuration**

The key to modem configuration is three fold. First the modem must be set to automatically answer the call, second, the modem must have it's DTR handling disabled, third, these settings must be saved to it's non-volatile memory and then set for recall if the modem should be powered down and up, whether intentional or due to loss of power at the site.

Modem settings are adjusted by connecting the phone modem to a computer using a serial port connection. If using Windows, use the HyperTerminal program to connect to the modem. To verify the computer to modem connection type **ATE 1** <ENTER> in the terminal window of HyperTerminal. You should see **OK** returned by the modem.

All modem commands are preceded by the letters **AT**. Minor differences do exist among modems, check the operators manual supplied with your modem to ensure compatibility.

### Modem Configuration – Auto-Answer

The modem must be configured to answer the phone call when it is received. The S register 0 must be set to a number other than 0 (0 usually disables auto-answer) to automatically enable the answer feature. Use the command **ATS0=1 <ENTER>**, you should see returned the **OK** prompt. To verify the contents of register 0 use the command **ATS0? <ENTER>**, the value of the register will be displayed.

### Modem Configuration – DTR Disable

The Data Terminal Ready (DTR) signal is usually used in conjunction with the RING signal (on the DB-25 modem it is pin, DB-9 pin ) to control the modem. When a call is detected the RING signal is activated on the modem, normally the modem expects the DTR to go high to signal answering the call. In this case we do not have the luxury of this hardware handshake, it should be disabled. With the Auto-Answer enabled and DTR disabled the modem will ALWAYS answer an incoming call. This is actually a good way to test the modem before deploying with the SC32A. Connect the modem to a phone line, dial the number and listen for the answer and carrier detect tone, a high pitched tone followed by a garbled sound.

### Modem Configuration – Save Settings for Recall

Unless the Auto-Answer and DTR settings are saved to non-volatile memory they will be lost at the next power-up of the modem. Two commands are used for this, the first **AT&W0** sets the current settings as profile 0, the second, **AT&Y0** sets profile 0 as the default profile, to be used at power-up of the modem. Usually the modem can store more than one profile, i.e. **AT&W1** followed by **AT&Y1**, can be used to store and load profile 1 at power-up.

### Modem Configuration – Summary of Commands

Modem commands can be strung together as part of a single AT command. For example, to enable auto-answer, disable DTR, and then save as the default profile at power-up use the following command:

**AT&FS0=1&D0&W0&Y0 <ENTER>**

**Note:** Check the operators manual supplied with your modem against the commands below, often slight differences exist. For example, some modems use the command **&F0** to reset to factory defaults, or **Y0** (without the ampersand) to set profile 0 as the power-up profile.

<b>Command</b>	<b>Description</b>
&F	Resets the modem to the factory defaults. This is always a good idea to ensure all settings are returned to "normal".
&C1	Set Carrier Detect (CD) for normal operations (usually the default).
&D0	Disable Data Terminal Ready (DTR).
&W0	Writes the current configuration to profile 0.
&Y0	Loads profile 0 at modem power up.
S0=1	Sets the number of rings the modem will listen for before answering the call. This setting usually enables the auto-answer feature of the modem as well.
&V0	Display active configuration and profiles 0 and 1.

Generally speaking there should be no other modem settings that need adjusting. During the connection phase the remaining settings such as bps rate, error control method, etc. are negotiated and agreed upon between the calling modem and the answering modem.