Synchronous Operation & Manual Control

Chapter 5

SYNCHRONOUS OPERATION & MANUAL CONTROL

The "SA" models of the SmartModem family are all supplied with switches on the front panel. These switches enable you to control the SmartModem the "old" (conventional) way in both synchronous and asynchronous modes.

All models except 2123A support full "AT" smart operation as well, for mixed synchronous and asynchronous operation.

The following sections describe the various controls for synchronous operation and how to operate the modem manually.

NOTE: *SmartModem "SA" models are preferred for synchronous applications*

WARNING: This chapter is really only for expert use in connecting to Synchronous hosts or terminals.

Front Panel Switches

On the front of the SmartModem "SA" models there are 3 to 5 toggle switches. These switches support manual control over the modem.

WARNING: The settings of the front panel switches are only operational when the rear DIP switch 6 is Down (Dumb Mode), otherwise these switches are ignored.

The switches are:

2123 & 22 SWITCH (123, 1234 only):

UP	CCITT V.21/V.23	300 or 1200/75 bps Full Duplex or 1200 Half Duplex
DOWN	CCITT V.22/ V.22 bis	1200 or 2400 bps Full Duplex

The '22' switch is called '22+' on the 1234SA models. It will be referred to as the '22(+)' switch.

LO & HI SWITCH (Not on 1200):

If 2123/22(+) switch is UP (2123) then LO/HI switch functions as follows:

UP	300 Full Duplex (V.21) Operation.

DOWN	1200/75 Full Duplex (V.23) 1200 Half Duplex (V.23 Mode 2 Synchronous)

If 2123/22(+) switch is DOWN (22 or 22+) then LO/HI functions as:

UP	1200 Full Duplex (V.22)
DOWN	2400 Full Duplex (V.22bis)

NOTE: 2400 bps is not available on the SmartModem 123SA version.

ANS & ORIG SWITCH:

UP	Answer:	Connect with remote modem which is in Originate mode (Normally used when answering a call.)
DOWN	Originate:	Connect with remote modem which is in Answer mode (Normally used when originating [dialling] a call.)

ASYNC & SYNC SWITCH:

UP	Asynchronous	Modem will only connect on-line to asynchronous hosts or terminals.
DOWN	Synchronous	Modem will only connect on-line to synchronous hosts or terminals.

TALK & DATA SWITCH:

UP	Talk	Modem will not go on-line until switched to DATA. Used when manually dialling host or manually answering a call.
DOWN	Data	When rear DIP switch 5 is also down (Manual Connect), the modem goes on line. This is used for manually connecting calls. When rear DIP switch 5 is up (Auto Answer) the modem will automatically answer calls.

NOTE: The front panel switch settings are read ONLY when the SmartModem is in "dumb" mode, ie: switch 6 on the rear Dip switch must be down. In "Dumb Mode" the switches, front and rear, override any software controlled parameters.

Synchronous Speed Range

There are three speeds supported by the SmartModem Family for synchronous operation. These are:

CCITT V.23 Mode 2	1200 Half Duplex only (2123SA, 123 and 1234)
CCITT V.22	1200 Full Duplex (1200, 2400, 123 and 1234)
CCITT V.22 bis	2400 Full Duplex (2400 and 1234)

These speeds are selectable through the front panel switches on "SA" models, see the section Front Panel Switches above.

They are selectable through the "B" command on "A" models. See Chapter 4.

Half Duplex Synchronous Operation

The term "half duplex", in this manual, refers to non-simultaneous bi-directional or "two way alternate" communication.

- V23 Mode 2 -

  The SmartModem operates synchronously at 1200 half duplex in V23 Mode 2.

- V22, V22bis, HALF DUPLEX -

  The SmartModem can simulate half duplex operation at these speeds. It does not switch the transmit carrier on and off, therefore in this mode, there is no line turnaround time, ie: there is instantaneous turnaround. There is no Request-to-Send (RTS) to Clear-to-Send (CTS) delay.

NOTE: The term "half duplex" is sometimes used (in the context of asynchronous communications) to refer to a condition where characters, transmitted from a data terminal, are echoed back to the terminal by the host computer. Avoid the use of this term; use "echoplex" instead.

Clocking Source:

The SmartModems provide synchronous clocks. The transmit and receive clock signals are output to your PC/terminal on two of the pins of the RS232 connection.

Transmit clocks are output on pin 15, while the receive clock is derived from the receive carrier and output on pin 17.

See &X command for transmit clock source.

Quiet Mode:

In asynchronous mode the SmartModem outputs messages such as "CONNECT" or "NO CARRIER" and echoes the commands which you type in. When operating synchronously these messages and echoing may not be required.

NOTE: It is strongly recommended that you select QUIET mode before you set the SmartModem into synchronous mode and save this mode in the SmartModem's non-volatile RAM memory.

To turn off echo and set the SmartModem into quiet mode the following steps should be taken. From an asynchronous terminal connected to the modem, type in:

i) AT&F<CR> This resets the SmartModem to its factory default settings. Use this only if you want the factory default settings restored.

ii) ATE0Q1<CR> Sets the SmartModem into Quiet and No Echo mode.

iii) AT&W<CR> Stores the new settings away in the SmartModem's non-volatile RAM. When the SmartModem is powered on in the future it will operate using these settings until new parameters are stored in the non-volatile RAM.

These commands may be entered as "AT&FE0Q1&W<CR>".

NOTE: *<CR> means the command must be followed by a Carriage Return/Enter key.*

Synchronous/Asynchronous Command - "&M"

In dumb mode SmartModem "A" models will use the preset &M command for determining Asynchronous or Synchronous operation while on line. The "SA" models in dumb mode will use the front switch.

In smart mode this command is used to select between Synchronous and Asynchronous mode when the modem goes on line.

Format:

&M0 or &M Operate in Asynchronous mode.

&M1 Operate in Asynchronous mode while off-line (for command recognition) and in Synchronous mode while on-line. This allows the asynchronous command "AT&M1Dnnnnnnn<CR>" to subsequently cause on-line operation in synchronous mode.

When the &M0 (or &M) command has been issued the SmartModem operates in the asynchronous mode. ie: the modem responds to the "AT" commands as specified in Chapter 4. Automatic dialling and answering are standard features in this mode.

The "&M1" form of this command sets the SmartModem to operate synchronously when it goes on-line. However, until the modem goes on-line it will respond to all of the "AT" commands. This feature therefore allows the SmartModem to autodial the host asynchonously but to operate synchronously when connected to the remote station.

Many remote stations may not be expecting messages generated by the modem, so it is suggested that the SmartModem is set to quiet, no echo mode. Send the command "ATE0Q1<CR>" before dialling; this stops PC/terminals/remote stations becoming confused by messages such as "CONNECT".

NOTE: *Your PC or terminal must be capable of switching from Asynchronous to Synchronous operation on completion of the "ATD" command.*

Manual Operation

Control of the SmartModem manually relies on both the front panel and rear DIP switches. From an operational viewpoint the only difference between synchronous and asynchronous modes, when setting up the modem, is the setting of the ASYNC/SYNC front panel switches.

NOTE: *Remember that manual operation is only available when the SmartModem is in "dumb" mode. Rear DIP switch 6 must be down.*

USING THE FRONT PANEL SWITCHES TO DIAL:

Table 5-1 describes the correct switch settings to manually dial using the SmartModem, taking advantage of the differing speeds and standards.

DIP switch 5 must be down (Auto Answer disabled - Manual Dial) and DIP switch 6 must be down (Dumb - use Front Switches).

When the front panel switches have been selected pick up the telephone handset and dial the remote station. The remote modem should answer. Raise DTR on your terminal if not already active. At this stage put the modem on-line by moving the Talk/Data switch to DATA. Hang up the telephone handset immediately to avoid data corruption from noise in the local environment.

Speed Required	2123 22+	LO HI	ANS ORIG	ASY SYNC	TALK DATA
300 V21 ASYNC	UP	UP	DOWN[1]	UP	UP[2]
1200/75 V23 ASYNC	UP	DOWN	DOWN[1]	UP	UP[2]
1200/HDX V23 SYNC	UP	DOWN	*	DOWN	UP[2]
1200/1200 V22 ASYNC	DOWN	UP	DOWN[1]	UP	UP[2]
1200/1200 V22 SYNC	DOWN	UP	DOWN[1]	DOWN	UP[2]
2400/2400 V22bis ASYNC	DOWN	DOWN	DOWN[1]	UP	UP[2]
2400/2400 V22bis SYNC	DOWN	DOWN	DOWN[1]	DOWN	UP[2]

* = Ignored.
1 = Normally, however, when originating (dialling) a call. if the remote modem is in "originate" mode then this switch needs to be UP.
2 = UP during manual dial, then DOWN when answer tone heard.

Table 5-1. Manual Dialing Using Front Panel Switches

MANUALLY ANSWERING A CALL USING THE FRONT PANEL SWITCHES

Security is a prime reason to manually answer an incoming call, ie: verbally establishing the identity of your caller before allowing access to your computer.

NOTE: *Don't forget to put DIP switch 5 down and switch 6 down when operating in this mode.*

The front panel switches can be configured to allow for manual answering and connection. Table 5-2 shows how the switches should be configured.

Having set up the front panel switches, when the phone rings pick up the handset and establish the caller's identity if required. Raise DTR on your terminal. Put the modem on line by switching the Talk/Data switch to DATA. Hang up the telephone handset immediately after switching to DATA. (This avoids corruption of the data from noise in the surrounding environment.)

Speed	21/23 22(+)	LO/ HI	ANS/ ORIG	ASYNC/ SYNC	TALK/ DATA
V21 Async	UP	UP	UP[1]	UP	UP[2]
V23 Async (Viatel Only = Asymmetric Full Duplex, ie 1200/75)	UP	DOWN	UP[1]	UP	UP[2]
V23 Sync	UP	DOWN	UP[1]	DOWN	UP[2]
V22 Async	DOWN	UP	UP[1]	UP	UP[2]
V22 Sync	DOWN	UP	UP[1]	DOWN	UP[2]
V22bis Async	DOWN	DOWN	UP[1]	UP	UP[2]
V22bis Sync	DOWN	DOWN	UP[1]	DOWN	UP[2]

1 = Normally, however, when answering a call, if the remote modem is in answer mode this switch needs to be DOWN
2 = UP until call received, then DOWN when answer tone is heard.

Table 5-2. Manual Answering Using The Front Panel Switches

AUTOMATIC ANSWER IN DUMB MODE:

DIP switch 5 on the rear panel of the SmartModem indicates whether the modem is to automatically answer an incoming call, when the SmartModem is in dumb mode. When Switch 5 is UP, this indicates the SmartModem will automatically answer an incoming call. Table 5.3 shows how the front panel switches should be set.

For the SmartModem to automatically answer in dumb mode check that:

- The front panel switches are set as required (see Table 5-3);
- DIP switch 5 is up (automatic answer enabled);
- DIP switch 6 is down (dumb mode set on);
- The Talk/Data switch is set to DATA;
- DTR is raised for the incoming call to be connected.

The setting of DIP switch 5 is only checked when DIP switch 6 is DOWN, ie: when the SmartModem is in dumb mode. The position of the front panel switches is checked when the connection is established.

Note: DUMB MODE Means Switch 6 DOWN and Switch 5 UP

Speed	21/23 22(+)	LO/ HI	ANS/ ORIG	ASYNC/ SYNC	TALK/ DATA
V21 Async	UP	UP	UP	UP	DOWN
V23 Async	UP	DOWN	UP	UP	DOWN
(Viatel Only = Asymmetric Full Duplex, ie 1200/75)					
V23 Sync	UP	DOWN	UP	DOWN	DOWN
V22 Async	DOWN	UP	UP	UP	DOWN
V22 Sync	DOWN	UP	UP	DOWN	DOWN
V22bis Async	DOWN	DOWN	UP	UP	DOWN
V22bis Sync	DOWN	DOWN	UP	DOWN	DOWN

Table 5-3. Automatic Answering Using The Front Panel Switches

DISCONNECTING FROM YOUR CALL:

When you have completed your on-line session your phone line will be automatically hung up when you set the Talk/Data switch to TALK, on loss of the remote Carrier signal or on DTR dropping from your PC/terminal

When DIP Switch 5 is DOWN and if the SmartModem is left in DATA mode and DTR (from your PC/terminal) remains high then the modem will stay on-line when carrier is lost. Dropping DTR or moving the Talk/Data switch to TALK will hang up the line. If Switch 5 is UP (Auto Answer on) then the modem will Auto Disconnect.

NOTE: You can tell if DTR is high when the TR light on the SmartModem is on. DTR is low if the TR light is off.

Automatic Synchronous Mode For Answering An Incoming Call

The SmartModems are capable of operating synchronously without the operation of the front panel switches. Dialling must still be carried out using the telephone handset.

The appropriate parameters must have been previously set up using an asynchronous terminal or PC. When the configuring is complete the parameters must then be saved in the modem's non-volatile RAM. The SmartModem can then be connected to a synchronous terminal for future use.

NOTE: DIP switch 6 must be set UP for the SmartModem to operate in Automatic synchronous mode. If DIP switch 6 is down then the SmartModem will look at the settings of the front panel on "SA" models switches to determine its mode of operation.

NOTE: Make sure that the telephone handset is on-hook (hung-up) while the SmartModem is on line.

The steps below detail how to configure the SmartModem for automatic synchronous mode:

i) Select the appropriate mode using the "B" command, eg: "B5" selects CCITT V.23 Mode 2, see Chapter 4.

ii) Set the SmartModem into quiet mode, ie: 'Q1', see Chapter 4.

iii) Turn off command echo, ie: "E0", see Chapter 4.

iv) Issue the synchronous mode command, ie: "&M1", see earlier in this chapter.

v) Save these configuration changes to non-volatile RAM, ie: "&W", see Chapter 4.

These commands may be incorporated into one command string, ie: "ATB5Q1E0&M1&W<CR>", should set up your SmartModem to operate at 1200 bps half-duplex synchronous.

Now, when this SmartModem is connected to a synchronous terminal or computer and DTR is raised by the terminal or computer the modem will be ready to automatically answer.

Disconnection and Hang up of a Call

In Automatic Synchronous mode a call is disconnected and hung up automatically when carrier is lost or DTR is lowered.

RTS/CTS Signals in Synchronous Mode:

The SmartModem raises the RS232 signal Clear to Send (CTS) when a successful connection is established with the remote modem and the RS232 signal Request to Send (RTS) is raised, ie: if RTS is raised before the connection is established then CTS will be raised by the SmartModem once a successful connection is made.

Register S18, RTS (Request to Send) Loss Time Register

This register controls the time that RTS may be low before carrier is lost and the call is terminated.

When operating synchronously, at CCITT V.23 1200 Half Duplex, register S18 waits for up to the number of seconds specified, between two blocks of data, before terminating the connection. The default value for register S18 (in seconds) is 60. S18 may take values from 0-255.

If the time between two blocks being transmitted is greater than the value of S18, then S18 must be adjusted to be greater than this "interblock" time. This is applicable if the modem is at the remote or host end of the system.

Leased Line Operation

The suggested method of connection of a SmartModem to a leased line is as described below:

i) Configure the front panel switches as appropriate for your connection.

i) Set DIP switch 5 & 6 down, ie: put the SmartModem into 'Dumb' mode.

iii) Put the Voice/Data switch to DATA. Make sure that the telephone handset is in the hung-up position.

v) Raise DTR on the PC/terminal, to put the SmartModem on-line.

While DTR is raised the SmartModem will attempt to stay on-line. While the above conditions are in force the SmartModem will remain connected to the line and will attempt to re-establish the communications link if it should be temporarily disconnected.