

8. USEFUL NOTES

8.1. DIALLING STORED NUMBER

If a phone number is used quite often, it can be pre-stored in the non-volatile memory. Next time you wish to dial that number you will be able to dial it easily and automatically, directly from the memory. There are four commands related to “pre-stored number dialling”:

1. **AT&Z** - To store a number
2. **AT&N** - To display the stored number(s)
3. **ATNn** - To display directory location “n”
4. **ATDn** - To dial the pre-stored number in location “n”

To dial or display numbers in V.25bis see the detailed chapter.

Example 7-1

AT&Z3:0331,263122<CR>; to store the number.

Modem response - **OK**

AT&N<CR> - To display the stored numbers:

#1:
#2:
#3:0331,783409
.
.
#19

Modem response - **OK**

ATDN3<CR> - To dial the number stored in location #3.

8.2. MANUAL CALL ORIGINATION

If the remote side is a modem:

You can use the telephone set, to dial out the remote telephone number. When you hear the answer tone (a high pitched tone of 2100 Hz), type in ATD<CR> command and hang up the handset. The modem will then proceed automatically to go through the handshaking sequence to bring you to data mode.

If the remote side is a person:

You may want to talk before connecting the modems. It is recommended that the answering side modem disables his auto answer feature by setting S0=0. Now you can use the telephone set (connected to TELE) to talk comfortably to that person. After the conversation, you type in the ATD<CR> command, then hang up.

8.3. AUTOMATIC ANSWER

The SNM31 modem has a built-in “ring detection” circuit that provides for the capability to automatically answer an incoming telephone call. The contents of the S-register “S0” determines when this feature is enabled. If S0=0, the auto-answer feature is disabled and the SNM31 will not answer the ringing phone under any conditions.

If the value of S0 is between 1 and 255, the modem will count the rings and send out a ‘RING’ message for each ring counted. Once the ring counts equals the value specified in S0, the SNM31 modem will go off-hook, remain silent for 2.1 seconds, then send out the answer tone. Both modems will begin the handshaking at this point and will continue until they enter the data mode or recognize that they are not compatible.

Note if the value of S0 is too large, the originating modem might give up and drop the line before the answering side sends out an answer tone. This is because the originating side will not usually wait more than 45 seconds. The originating modem “answer tone” stand still period after the dial sequence, is determined by register S7.

8.4. MANUAL ANSWER

In some situations people prefer using the manual answering ability. For example: eliminate the modems automatic answer long distance calls when not available, wasting the caller's time and money. There are two typical applications for using the manual answer feature, through front panel and terminal.

1. When the "auto-answer" option has been selected and there is an incoming call, before the modem answers the call, you can key in "**ANS**" and **ENTER**. By doing this the modem will ignore the ring count, wait 2.1 seconds, then send out an "answer tone" and start the handshaking sequence.
2. When the modem is in idle mode, if you key in **ATA<CR>**, the modem will wait for 2.1 seconds then send out an "answer tone" and look for a handshaking sequence from the originating modem. If the data mode has not been entered within 45 seconds (or the S7 setting), the modem will drop the line and return a 'NO CARRIER' message. In this application, the remote side should prepare for manual originating.

8.5. AUTOMATIC SPEED DETECTION

When answering a call, SNM31 will automatically detect if the calling modem wants to connect at 14400, 9600, 4800, 2400, 1200 or 300 bps. When speed conversion is enabled (in asynchronous mode, default) the modem will maintain a constant DTE rate regardless of the speed of the calling modem. This means that the modem's DTE rate can be set to 14400 or 38400 bps, and should not need to be changed for each caller at a speed different than the previous one. Using either the XON/XOFF or RTS/CTS flow control (see &K and &U commands), the modem buffers the data to adjust to different speeds.

8.6. DISCONNECTING A CALL

When data transmission has been completed you may wish to disconnect from the telephone line and terminate the call. There are a number of ways this can be done. They are the following:

Disconnecting with the ATH command (only asynchronous)

When SNM31 is in asynchronous data mode you can always disconnect by first going into command mode entering the command:

+++

and then after the modem gives an OK, you may enter the command:

ATH<CR>

and the modem will now be disconnected. It will show the response again:

OK

and will be in the idle mode, ready to accept new commands.

8.7. DISCONNECTION FOR LOSS OF DTR

The AT&D2 and AT&D3 commands configure the modem to disconnect after losing DTR.

8.8. DISCONNECTION FOR LOSS OF CARRIER

If a loss of carrier (DCD) is detected for a time greater than that specified in the S10 register, SNM31 will disconnect immediately and return a 'NO CARRIER' message. If S10=255 disconnect on loss of carrier is disabled.

8.9. DISCONNECTION THROUGH MEMBRANE SWITCH

Using the <ENTER> key the modem will disconnect.

8.10. DISCONNECTION FOR POOR SIGNAL QUALITY

If poor signal quality is received and the AT*Q is greater or equivalent to 1, SNM31 will disconnect.

8.11. MODE SELECTION

The SNM31 has two basic operational modes, synchronous and asynchronous. The modem can be set up to operate in various combinations of command and data modes using synchronous or asynchronous formats. The AT&M command selects the format and data mode. The membrane keys in the front panel allow you to choose between the AT command set or V.25 bis commands.

When operating in synchronous data mode, no start or stop bits are required. Instead a transmission and reception clock is responsible for periodically shifting data to and from the modem.

NOTE:

When asynchronous mode operation is enabled, the MNP or LAPM error correction, flow control, and speed conversion option are disabled.

8.12. CLOCK SELECTION

The source of transmission and reception clocks is that the need for synchronous operation is different for every system. Before selecting the appropriate clock you should consult the computers manual for each particular computer or terminal and understand the way it expects to see the modem's clock operate. Then you will be able to select the correct clocking scheme for your system.

SNM31 provides three choices for the clock source:

- | | | |
|----|-----------------|---|
| a. | INTERNAL | The modem is responsible for supplying its own transmission and reception clocks. |
| b. | EXTERNAL | The modem supplies the reception clock but uses the terminal or computer's transmission clock. |
| c. | SLAVE | The modem uses its own reception clock that is locked onto from the remote modem, and uses that for its transmission data clock, too. |

To select the clock source you wish you can either enter AT&X or use the membrane keys on the front panel (see front panel menu).

8.13. DIALLING IN SYNCHRONOUS MODE

Dialling with synchronous modems has been a typical problem for many modems. However SNM31 provides four different dialling alternatives.

MANUAL	By using the TELE phone jack, you can connect a normal telephone and dial the number manually and then use the membrane keys to initiate the handshake.
ATD	You can use the AT command set to do the auto dialling before switching to sync in data mode (See AT&M1 command).
V.25bis	The V.25bis protocol is designed for synchronous computers to be able to command modems to autodial (see chapter 7).
DTR	AT&M2 commands the modem to dial the number stored in memory location 1 when DTR goes from a Low to High transmission.

8.14. LEASED LINE OPERATION

8.14.1. Installation of 2-wire connections

The SNM31 is capable of working over private leased line networks. Using 2-wire leased lines instead. The leased line transmission level is adjustable through dip-switch from -1 to -16dBm.

To set your modem up to 2-wire you must follow these instructions:

- ❶ For 2-wire plug the cable into the "LEASED connector."
- ❷ Using the front panel menu to help you select the "LINE" option. Select the correct type of leased line for your network (you can also use AT commands).

8.14.2. Operation on 2-wires

To set up SNM31 for leased line operations, there are some initial steps that must be taken:

- ❶ Using the front panel membrane keys, or the AT&L command, select 2-wire operation.
- ❷ Use the AT&H command to enable or disable the automatic leased line

handshake feature. When enabled the modem will automatically try to re-handshake after being disconnected. This also pertains to dial back-up. After the leased line becomes disconnected, the modem will try once to reconnect before switching to the dial line. This is the factory default. If this feature is disabled, then after each leased line disconnection, the handshake must be manually re-initiated.

- ③ In leased line operations it is necessary to force the modulation standard on both modems.
- ④ Each modem in the leased line link must be designated as either the originate modem or the answer modem. This can be done by enabling auto answer with the ATSO=1 command or enabling auto answer from the front panel. The originate modem can be set up by first disabling auto answer with the ATSO=0 command or also from the front panel. Do not forget to store the modem's configuration.
- ⑤ Finally, both modems have the handshake initiated. This may be done by simply recycling the power, or by using the ATD and ATA commands for originate and answer respectively, or using the front panel keys as described in the quick reference card.

NOTE:

One modem must be programmed as ANSWER modem and the other as ORIGINATE modem.

For a simple use of the modem in leased line operations, use the factory configurations 6 and 7. Remember to store the active configuration before starting the operation.

8.14.3. Automatic Dial Line Back-up

The SNM31 modem includes the ability to detect when the leased line has become non-operational and automatically switch to the dial line. The dial line must be connected to the "SWITCHED" jack in the rear of the modem. The modem will then dial the number(s) pre-stored from memory location 0 on, and connect in a dial fashion with the remote modem at location 0.

8.14.4.Back-up with More Telephone Numbers

SNM31 has a unique feature: it can recall a sequence of 10 numbers when the connections fail. It works like this:

NOTE: If the number stored in location 0 is engaged, the modem provides to verify the leased line again. If this one is still out of service, the modem will dial the number stored in location 1 and so on, until it finds a free memory location.

Using only one telephone number it is compulsory to store it in memory location 0 (see AT&Z command).

ATTENTION:

Remember to store the back-up number starting from memory location 0. Other back-up numbers must be inserted following the increasing order location.

8.14.5.Back-up Sequence Procedure

When a loss of carrier is detected the originate modem will begin dialling the answer modem number; the last one will monitor for ring indication before switching to the dial line.

If the dial line becomes disconnected the modems will attempt a return to the leased line and toggle between the leased and dial lines at each disconnection.

If you wish to configure or modify any of the modem's settings, simply abort the handshake by pressing the ENTER key during the handshake. You can then give AT commands or use the front panel to select new options.

ATTENTION:

During "dial line back-up" mode, the ON-LINE led has the following functions: when On indicates that the modem is working ON-LINE (the led is always on when the modem is configured for leased line). If a back-up is detected the led will Flicker 1 sec. ON and 1 sec. OFF. If failed the led will flicker at a higher frequency, 100ms ON and 100 ms OFF.

8.14.6. Different configuration set by the Originate modem

Several applications require use of lower speed during the back-up operations compared to the speed used in leased line because the dial up lines generally have a lower quality than leased ones.

Then it is possible to force the modulation standard for the back-up operations; it is sufficient to associate a different configuration (user defined or factory configuration) with the phone number to dial.

EXAMPLE:

Modem A: Originate

Modem B: Answer

Modem A

Configure modem A with factory configuration number 7 which allows the modem to work on leased line at a speed of 9600 bit/s with active back-up in Originate mode:

AT&F7<CR>

The modem responds

OK

Modify this configuration to use V.22bis standard during the back-up on dial up line and store the new configuration in the user defined configuration number 1:

ATF5&W1<CR>

The modem responds

OK

Now associate the phone number stored in the memory position 0 the user defined configuration number 1:

ATN0&Z0,2634^Z<CR>

where ^Z is <CTRL-Z>.

The modem responds

USER CONFIGURATION Nr:

Now enter:

1

The modem responds:

OK

Then it is necessary to load the factory configuration number 7 store it as user

configuration number 0. This configuration for leased line must always be the last stored one if you want it is load also after switch off and on of the modem.

AT&F7&W0<CR>

The modem responds

OK

Modem B

Load on modem B the factory configuration number 6 (same as number 7 but with enabled auto answer):

AT&F6&W<CR>

The modem responds:

OK

Press ENTER on both modems to start the connexion in leased line at 9600 bps speed.

If the leased line drops, the modem A will start dialling the number 0,1234 and will make an handshake in V.22bis.

If the calling has not succes, the modem A will test again the leased line and if it is not ready will call the number in the second position of the dial memory; the number stored can be the same as before, but the associated configuration can be different (for example could force the V.22 modulation standard).

When the leased line will return in good conditions the modem A will drop the dial up line and the two modems will return in leased line with a speed of 9600 bps.

8.14.7. Different configuration set by the Answer modem

In this situation the Answer modem during a back-up uses a different configuration.

This is done writing in S60 register the number of configuration to be used during the back-up. If S60=255 (default) the modem will be in Multistandard mode and will connect as required by the remote one.

EXAMPLE:

Modem A: Originate

Modem B: Answer

Modem A

Load on modem A the factory configuration 7 and store it as user defined configuration number 0. This configuration allows to work on leased line at 9600 bps with active back-up in Originate mode.

AT&F7&W<CR>

The modem responds

OK

Now one must memorize a telephone number and associate a configuration, which when in a back-up phase brings the modem to a multistandard mode. Lets memorize therefore the new configuration of user 1:

ATF0&W1<CR>

Answer:

OK

Re-position in the configuration of the user 0:

ATZ0&W<CR>

Answer:

OK

Lets memorize number and configuration of user 1 in the memory area #0:

ATN0&Z2634^Z

Answer:

USER CONFIGURATION Nr:

Enter:

1

Modem B

Load on modem B the factory configuration number 6 (same as 7 but with active Auto Answer mode):

AT&F6<CR>

The modem responds

OK

Modify this configuration so to use V.22bis modulation standard during back-up and store it as user defined configuration number 1:

ATF5&W1<CR>

The modem responds

OK

Store the factory configuration number 6 in the user defined configuration number 0 because it is the working configuration. It is necessary to store it if we want it to be loaded everytime we switch off and on the modem.

AT&F6&W0<CR>

The modem responds

OK

Write in the S60 register the number of configuration which must be loaded during the back-up operations (in our example the number 1):

ATS60=1<CR>

Now the modems can work like in the previous example.

ATTENTION

The last configuration stored with &W command “must” always be the configuration for leased line. It is better to use an alternative configuration for back-up operations only on one of the two modems.

8.14.8. Automatic Leased Line Lookback

Automatic leased line lookback can work in two different ways:

Leased Line Monitoring

The SNM31 can be configured to automatically “lookback” and detect when the leased line is operational again. This is accomplished by using a timer that triggers the modem to disconnect the dial line and attempt to connect on the original leased line. This feature is used only when a data carrier is detected.

Leased Line Timer

The “lookback timer” value is programmable by the S28 register. Here the number of minutes between lookback attempts is stored. The default value is **30 minutes**.

During the dial back-up lookback sequence, the CTS goes low but DCD can be optioned to be normal RS-232 or be forced on during this period.

To activate these functions select FORCED ON circuits.

8.15. SIGNAL QUALITY ACTION

8.15.1. Understanding Signal Quality

Embedded in the signal processing of a modem is the ability to extract out of the received analog signal, the bit flow that was transmitted by the remote modem. The modulation used to do this is Quadrature Amplitude Modulation (**QAM**).

As the received analog signal becomes distorted or weakened, the modem must work harder to extract an accurate signal. Thus the term “Signal Quality” was born to define the quality of the input analog signal to the receiver of the modem.

SNM31 provides the user with an indication of the signal quality for each connection. Once in data mode, the LCD will display an “SQ” reading that will range from 0 to 7. Where **SQ=7** is the “Optimum” or highest signal quality level and **SQ=0** is the **lowest** level of signal quality. If optioned, the modem will retrain at the following levels:

OPERATING MODE	Retr.	S.Q.	S/N	Hysteresis
14400	24	3	25.5	-
12000	20	3	22.5	3
9600 (without Trellis)	20	3	21	3
9600 (with Trellis)	17	3	18	3
7200	13	3	15	3
4800	12	3	13.5	3
2400	12	3	15	3
1200	12	3	8.5	3

Tab.:5. *Signal Quality Action*

Retrain is the S/N value for retrain.
S.Q. is the SQ value equal to Retr. shown in the table.
Hysteresis is the S/N hysteresis to go back to the high standard.

SNM31 is adaptive to line changes during the data phase, but abrupt discontinuities in the received signal can result in the modem having to retrain. During this period the two connected modems perform a handshake similar to that which initially takes place. During a retrain, no data is transmitted to or from the DTE. The data flow resumes only after the retrain has been successfully completed.

ATTENTION

*To select a signal quality action, see AT*Q commands.*

8.16. CALL-BACK SECURITY

8.16.1. Function Description

SNM31 can activate a protection when it is configured in auto answer mode. The modem, after answering a call, disconnects and calls immediately the number in the location indicated by the S43 register. The call-back can be used for security access to host applications operating in synchronous or asynchronous mode. You can activate this function with autologon and remote access control.

Example:

enable the function and enter:

ATS43=7 <CR>

the modem will prompt:

OK

enter

ATN0&Z^C

the modem will prompt:

CALL-BACK:

Enter the required telephone number sequence using the appropriated dial modifier and end with <CR>.

Now the modem is ready for the call-back. If the modem receives a ring it will connect, disconnect and call the number stored in location 7 of the memory directory.

You can activate an autologon sequence with a password exchange. To activate this function use the S43 register. The range of this register is between 0 and 19, the default value 255 is equivalent to a disabled procedure. Assigning a value between 0 and 19 at register 43 you will indicate a memory location.

Example:

Site 1234 calls site 4321; when a connection is active after a correct logon sequence site 4321 will disconnect and recall 1234. The password used in this example is SITE "SMITH".

Configuring the modem 1234:

enter:

ATN0&Z4321^T

the modem will prompt:

SEND:

enter:

SITE SMITH <CR>

the modem will prompt:

OK

Configuring the modem 4321:

enter:

ATN0&Z^R

the modem will prompt:

RECEIVE:

enter:

SITE SMITH^C

the modem will prompt;

CALL-BACK

enter:

1234<CR>

the modem will prompt:

OK

Now the configuration is over. Activate a call using the command:

ATDN0

To control the correct functioning replace the numbers 1234 and 4321 with your site numbers.

8.16.2.Extended Call-Back

A special feature in SNM31 activates an extended call-back.

See the following example:

Site A 1234 auto-answer

Site B 4321 originate

Configuring the Answering Modem:

Enter:

ATN0&Z^N

the modem will prompt:

CALL-BACK ESTESO:

the modem will prompt:

OK

Configuring the Originate Modem:

No configuration is needed when in manual call origination mode.

Activate a connection dialling 1234. After the connection the terminal will display the message:

CONNECT 9600

Enter your telephone number in less than 30 seconds; infact elapsed this time the answering modem (A) drops the line if a number is not received.

Then type:

4321!

The modem A drops the line receiving the character “!” (dec. 124, Hex 7C) and call the modem B.

enter your telephone number:

Then type:

4321!

When receiving ! (Hex 7C = 124) the modem disconnects and waits for a call.

ATTENTION

*It is possible to use this function also in synchronous mode.
To send the telephone number you must store it in a memory location
with the autologon procedure using ^T command to send the number.*