STAR★Modem™ CONFIGURATION USING BARCODES





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STAR★Modem™ Configuration Using Barcodes

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This manual refers to software version 1.0 and later

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1 STAR★MODEM™ CONFIGURATION

Once STAR★Modem™ is setup (see Chapter 3 in STAR★Modem™ Reference Manual), you can change the default parameters to meet your application needs by reading the barcodes with a Datalogic RF device and sending them to the modem via radio.
This configuration procedure is particularly advised when working with Pen Emulation/Wedge interface connection.

In this manual, the configuration parameters are divided into logical groups making it easy to find the desired function based on its reference group.
For this configuration procedure follow the steps given at the beginning of each parameter group.

The first three groups are for Standard Interface parameter configuration:

- **RS232**
- **WEDGE**
- **PEN EMULATION**

The following parameter groups are common to all interface applications:

DATA FORMAT parameters regard the messages sent to the Host system for all interfaces except Pen Emulation.

RADIO PARAMETERS allow configuration of radio protocol parameters.



NOTE

Gryphon™ M rel. 2.4, DRAGON™ M rel. 1.1 and RF Terminals loading STAR&Play™ rel. 1.0 do not allow to send via radio some of the configuration parameters to STAR★Modem™.

RS232 PARAMETERS

⊙	***BAUD RATE***	⊙
⊙	***PARITY***	⊙
⊙	***DATA BITS***	⊙
⊙	***STOP BITS***	⊙
⊙	***HANDSHAKING***	⊙
⊙	***ACK/NACK PROTOCOL***	⊙
⊙	***FIFO***	⊙
⊙	***INTER-CHARACTER DELAY***	⊙
⊙	***RX TIMEOUT***	⊙
⊙	***FRAME PACKING***	⊙

1. Read **Enter Configuration** code ONCE, available at the top of each page.

2. Read the configuration codes from the desired groups.

 = Read the code and follow the procedure given

3. Read the **Exit and Save Configuration** code ONCE, available at the top of each page.

RS232

BAUD RATE

150 baud

300 baud

600 baud

1200 baud

2400 baud

4800 baud

◆ 9600 baud

19200 baud

38400 baud

57600 baud

RS232

PARITY

◆ none



even parity



odd parity



DATA BITS

7 bits



◆ 8 bits



9 bits



RS232

STOP BITS

◆ 1 stop bit

2 stop bits

HANDSHAKING

◆ disable

hardware (RTS/CTS)

software (XON/XOFF)

RTS always ON

modem (RTS/CTS)

See par. 2.2.1 for details.

ACK/NACK PROTOCOL

◆ disabled

enable ACK/NACK

enable DATA/NACK

See par. 2.2.2 for details.

FIFO

disable

◆ enable

See par. 2.2.4 for details.

INTER-CHARACTER DELAY

delay between characters transmitted to Host

Read 2 numbers from the Appendix B where:

00 = DELAY disabled
01-99 = DELAY from **1** to **99** milliseconds

◆ delay disabled

RX TIMEOUT

timeout control in reception from Host

Read 2 numbers from the Appendix B where:

00 = TIMEOUT disabled
01-99 = TIMEOUT from **.1** to **9.9** seconds

◆ rx timeout 5 seconds

See par. 2.2.3 and par. 2.2.5 for details.

FRAME PACKING

◆ frame + [CR]



[STX] + Len + frame + [CR]



frame after timeout



See par. 2.2.5 for details.

WEDGE PARAMETERS

- ***KEYBOARD NATIONALITY***
- ***CAPS LOCK***
- ***NUM LOCK***
- ***INTER-CHARACTER DELAY***
- ***INTER-CODE DELAY***
- ***KEYBOARD SETTING***
- ***WEDGE CONTROL CHARACTER EMULATION***

1. Read **Enter Configuration** code ONCE, available at the top of each page.

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 = Read the code and follow the procedure given

3. Read the **Exit and Save Configuration** code ONCE, available at the top of each page.

KEYBOARD NATIONALITY

Belgian

English

French

German

Italian

Spanish

Swedish

◆ USA

CAPS LOCK

◆ caps lock OFF

caps lock ON

Select the appropriate code to match your keyboard caps lock status.

Note: For **PC Notebook** interface selections, the caps lock status is automatically recognized, therefore this command is not necessary.

NUM LOCK

toggle num lock

◆ num lock unchanged

This selection is used together with the Alt Mode interface selection for AT or Notebook PCs. It changes the way the Alt Mode procedure is executed, therefore it should be set as follows:

- if your keyboard Num Lock is normally on use **num lock unchanged**
- if your keyboard Num Lock is normally off use **toggle num lock**

In this way the device will execute the Alt Mode procedure correctly for your application.

INTER-CHARACTER DELAY

delay between characters transmitted to Host

Read 2 numbers from the Appendix B where:

00 = DELAY disabled
01-99 = DELAY from **1** to **99** milliseconds

◆ delay disabled

INTER-CODE DELAY

delay between codes transmitted to Host

Read 2 numbers from the Appendix B where:

00 = DELAY disabled
01-99 = DELAY from **1** to **99** seconds

◆ delay disabled

KEYBOARD SETTING

ALPHANUMERIC KEYBOARD SETTING

The reader can be used with terminals or PCs with various keyboard types and nationalities through a simple keyboard setting procedure.

The type of computer or terminal must be selected before activating the keyboard setting command.
Keyboard setting consists of communicating to the reader how to send data corresponding to the keyboard used in the application. The keys must be set in a specific order.

Press and release a key to set it.

Some characters may require more than one key pressed simultaneously during normal use (refer to the manual of your PC or terminal for keyboard use). The exact sequence must be indicated to the reader in this case pressing and releasing the different keys.

Example:

If one has to press the "Shift" and "4" keys simultaneously on the keyboard to transmit the character "$" to the video, to set the "$", press and release "Shift" then press and release "4".

Each pressed and released key must generate a yellow LED blinking on the device, otherwise repress the key. Never press more than one key at the same time, even if this corresponds to the normal use of your keyboard.

Press "Backspace" to correct a wrong key entry.

Note: "CAPS LOCK" and "NUM LOCK" must be off before starting the keyboard setting procedure. "SHIFT" must be repressed for each character and cannot be substituted by "CAPS LOCK".

setting the alphanumeric keyboard

Read the code above.
press the keys shown in the following table according to their numerical order.

Some ASCII characters may be missing as this depends on the type of keyboard: these are generally particular characters relative to the various national symbologies. In this case:

- **The first 4 characters (Shift, Alt, Ctrl, and Backspace) can only be substituted with keys not used, or substituted with each other.**
- characters can be substituted with other single symbols (e.g. "SPACE") even if not included in the barcode set used.
- characters can be substituted with others corresponding to your keyboard.

WEDGE

01 : **Shift**		
02 : **Alt**		
03 : **Ctrl**		
04 : **Backspace**		
05 : **SPACE**	28 : **7**	51 : **N**
06 : **!**	29 : **8**	52 : **O**
07 : **"**	30 : **9**	53 : **P**
08 : #	31 : **:**	54 : **Q**
09 : **$**	32 : **;**	55 : **R**
10 : **%**	33 : **<**	56 : **S**
11 : **&**	34 : **=**	57 : **T**
12 : **'**	35 : **>**	58 : **U**
13 : **(**	36 : **?**	59 : **V**
14 : **)**	37 : @	60 : **W**
15 : *****	38 : **A**	61 : **X**
16 : **+**	39 : **B**	62 : **Y**
17 : **,**	40 : **C**	63 : **Z**
18 : **-**	41 : **D**	64 : **[**
19 : **.**	42 : **E**	65 : ****
20 : **/**	43 : **F**	66 : **]**
21 : **0**	44 : **G**	67 : **^**
22 : **1**	45 : **H**	68 : _ (underscore)
23 : **2**	46 : **I**	69 : `
24 : **3**	47 : **J**	70 : **{**
25 : **4**	48 : **K**	71 : **|**
26 : **5**	49 : **L**	72 : **}**
27 : **6**	50 : **M**	73 : **~**
		74 : **DEL**

During the keyboard setting the red LED on the modem always blinks, the yellow LED stays on and blinks off only each time a key is pressed, while the green LED stays on and blinks off only each time the Backspace key is pressed. Once the last key has been pressed, the yellow LED stays off indicating the keys have been registered, while the green LED stays on again. Read the “Exit and Save configuration” barcode to end the procedure.

CONTROL CHARACTER EMULATION

◆ Ctrl + Shift + Key

Ctrl + Key

PEN EMULATION

- ***OPERATING MODE***
- ***MINIMUM OUTPUT PULSE***
- ***CONVERSION TO CODE 39 AND CODE 128***
- ***OVERFLOW***
- ***OUTPUT LEVEL***
- ***IDLE LEVEL***
- ***INTER-BLOCK DELAY***

1. Read the **Enter Configuration** code ONCE, available at the top of each page.

2. Read the configuration codes from the desired groups.

 = Read the code and follow the procedure given

3. Read the **Exit and Save Configuration** code ONCE, available at the top of each page.

PEN EMULATION

OPERATING MODE

The operating mode parameters are complete commands and do not require reading the Enter and Exit configuration codes.

◆ interpret mode



Interprets commands without sending them to the decoder.

transparent mode



Sends commands to the decoder without interpreting them.

PEN EMULATION

MINIMUM OUTPUT PULSE

high resolution code emulation

200 µs

400 µs

◆ 600 µs

800 µs

1 ms

1.2 ms

low resolution code emulation

See par. 2.3.1 for details.

OVERFLOW

narrow



◆ medium



wide



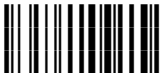
See par. 2.3.2 for details.

CONVERSION TO CODE 39 AND CODE 128

enable conversion to Code 39



enable conversion to Code 128



See par. 2.3.3 for details.

PEN EMULATION

OUTPUT LEVEL

◆ normal
(white = logic level 0)

inverted
(white = logic level 1)

See par. 2.3.4 for details.

IDLE LEVEL

◆ normal
(black level)

inverted
(white level)

See par. 2.3.4 for details.

INTER-BLOCK DELAY

delay between character blocks transmitted to Host

Read 2 numbers from the Appendix B where

00 = DELAY disabled
01-99 = DELAY from **.1** to **9.9** seconds

◆ DELAY disabled

See par. 2.3.5 for details

DATA FORMAT

NOT FOR PEN INTERFACES

⊙	***CODE IDENTIFIER***	⊙
⊙	***CUSTOM CODE IDENTIFIER***	⊙
⊙	***HEADER***	⊙
⊙	***TERMINATOR***	⊙
⊙	***HEADER POSITION***	⊙
⊙	***CODE LENGTH TX***	⊙
⊙	***ADDRESS STAMPING***	⊙
⊙	***ADDRESS DELIMITER***	⊙

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 = Read the code and follow the procedure given

3. Read **Exit and Save Configuration** code ONCE, available at the top of each page.

CODE IDENTIFIER TABLE

CODE	AIM STANDARD	DATALOGIC STANDARD	Custom
2/5 interleaved	] I *y*	N	
2/5 industrial	] X y	P	
2/5 normal 5 bars	] S y	O	
2/5 matrix 3 bars	] X y	Q	
EAN 8	] E 4	A	
EAN 13	] E 0	B	
UPC A	] X y	C	
UPC E	] X y	D	
EAN 8 with 2 ADD ON	] E 5	J	
EAN 8 with 5 ADD ON	] E 6	K	
EAN 13 with 2 ADD ON	] E 1	L	
EAN 13 with 5 ADD ON	] E 2	M	
UPC A with 2 ADD ON	] X y	F	
UPC A with 5 ADD ON	] X y	G	
UPC E with 2 ADD ON	] X y	H	
UPC E with 5 ADD ON	] X y	I	
Code 39	] A y	V	
Code 39 Full ASCII	] A y	W	
CODABAR	] F y	R	
ABC CODABAR	] X y	S	
Code 128	] C y	T	
EAN 128	] C y	k	
ISBT 128	] C4	f	
Code 93	] G y	U	
CIP/39	] X y	Y	
CIP/HR	] X y	e	
Code 32	] X y	X	
Codablock-A	] O 6	n	
Codablock-F Std	] O 4	l	
Codablock-F EAN	] O 5	m	
MSI	] M y	Z	
Plessey Standard	] P 0	a	
Plessey Anker	] P 1	o	
Telepen	] X 0	d	
Delta IBM	] X 0	c	
Code 11	] H y	b	
Code 16K	] K 0	p	
Code 49	] T y	q	
PDF417	] L 0	r	

- AIM standard identifiers are not defined for all codes: the X identifier is assigned to the code for which the standard is not defined. The *y* value depends on the selected options (check digit tested or not, check digit tx or not, etc.).

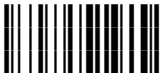
- When customizing the Datalogic Standard code identifiers, 1 or 2 identifier characters can be defined for each code type. If only 1 identifier character is required, the second character must be selected as **FF** (disabled).

- The code identifier can be singly disabled for any code by simply selecting **FF** as the first identifier character.

Write in the Custom character identifiers in the table above for your records.

CODE IDENTIFIER

◆ disable



Datalogic standard



AIM standard



custom



CUSTOM CODE IDENTIFIER

define custom code identifier(s)



① Read the above code.
(Code Identifiers default to Datalogic standard, see table on previous page).

② Select the code type from the code table in Appendix A for the identifier you want to change.

③ You can define 1 or 2 identifier characters for each code type. If only 1 identifier character is required, the second character must be selected as **FF** (disabled). Read the hexadecimal value corresponding to the character(s) you want to define as identifiers for the code selected in step ②: valid characters are in the range **00-FE**.

Example: To define Code 39 Code Identifier = @

Read define custom code identifier(s) + Code 39 + 4 + 0 + F + F

DATA FORMAT

HEADER

no header



one character header



two character header



three character header



four character header



five character header



six character header



seven character header



eight character header



After selecting **one** of the desired Header codes, read the character(s) from the Appendix B.
Valid characters for all readers are in the range: **00-FE**

Example: To define Header = **AB**

Read two character header  + 4  + 1  + 4  + 2 

For more details about default and WEDGE Interface Extended Keyboard values, see par. **2.4.1**.

DATA FORMAT

TERMINATOR

no terminator

one character terminator

two character terminator

three character terminator

four character terminator

five character terminator

six character terminator

seven character terminator

eight character terminator

After selecting **one** of the desired Terminator codes, read the character(s) from the Appendix B.
Valid characters for all readers are in the range: **00-FE**

Example: To define Terminator = **CR LF**

Read two character terminator + 0 + D + 0 + A

For more details about default and WEDGE Interface Extended Keyboard values, see par. **2.4.1**.

HEADER POSITION

◆ first frame field

before message field

See par. 0 for details.

CODE LENGTH TX

◆ code length not transmitted

code length transmitted in variable-digit format

code length transmitted in fixed 4-digit format

The code length is transmitted in the message after the Headers and Code Identifier characters.

The code length is *calculated* after performing any field adjustment operations.

ADDRESS STAMPING

◆ disable address stamping

enable address stamping

See par. 2.4.3 for details.

ADDRESS DELIMITER

◆ disable address delimiter

enable address delimiter and select characters

Read 2 HEX characters in the range **00-FE** from Appendix B.

See par. 2.4.4 for details.

RADIO PARAMETERS

⊙	***RF BAUD RATE***	⊙
⊙	***TRANSMISSION MODE***	⊙
⊙	***RADIO PROTOCOL TIMEOUT***	⊙
⊙	***SINGLE STORE***	⊙
⊙	***ACK/NACK FROM REMOTE HOST***	⊙
⊙	***BEACON***	⊙

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 = Read the code and follow the procedure given

3. Read the **Exit and Save Configuration** code ONCE, available at the top of each page.

RF BAUD RATE

Not for USA Model

9600 baud

◆ 19200 baud

See par2.5.1 for details.

TRANSMISSION MODE

Client Only

◆ 1 way mode

2 way mode

See par. 2.5.2 for details.

RADIO PROTOCOL TIMEOUT
Client Only

radio protocol timeout

Read a number from the Appendix B where:

01-19 = timeout from **1** to **19** seconds

◆ 2 seconds

See par. 2.5.3 for details.

ACK/NACK FROM REMOTE HOST
Client Only

◆ disabled

enable ACK/DATA/NACK

See par. 2.5.5 for details.

SINGLE STORE
Client Only

◆ disable

one attempt

two attempts

three attempts

four attempts

five attempts

six attempts

seven attempts

eight attempts

continuous

See par. 2.5.4 for details

BEACON
Client Only

◆ disable

beacon every 2 seconds

beacon every 3 seconds

beacon every 4 seconds

beacon every 5 seconds

beacon every 6 seconds

beacon every 8 seconds

beacon every 10 seconds

beacon every 20 seconds

beacon every 30 seconds

See par. 2.5.6 for details

2 REFERENCES

2.1 RADIO AND SERIAL COMMUNICATION CONTROLS

STAR★Modem™ communication (both radio and serial) can be controlled by several parameters depending on whether it is a Client or Server. STAR★Modem™ can act as both Client and Server in each of the Stand Alone and STAR-System™ Modes.

In the STAR-System™ Mode, bi-directional communication means that STAR★Modem™ can dynamically switch from being Client to Server and vice versa.

The following table summarizes which parameters are controlled by the Client and which ones are controlled by the Server.

Client (Transmitter) controlled parameters:	**Server (Receiver) controlled parameters**
Transmission Mode	ACK/NACK Protocol
ACK/NACK From Remote Host	Handshaking
FIFO	
Handshaking	
Single Store	



NOTE

To avoid incorrect interpretation of ACK characters, ACK/NACK Protocol and ACK/NACK from Remote Host cannot be simultaneously enabled on the same STAR★Modem™.

To help understand the various communication control possibilities among the different communication modes, we will analyze the communication control parameter settings for the following 4 cases:

1) STAR★Modem™ in Stand Alone Mode acting as Server (like an OM-cradle)
2) STAR★Modem™ in Stand Alone Mode acting as Client (like an RF device)
3) STAR★Modem™ in STAR-System™ Mode
4) STAR★Modem™ in Stand Alone Mode acting as Server (for an intelligent printer)

Case 1 – STAR★Modem™ in Stand Alone Mode as Server (like an OM-cradle)

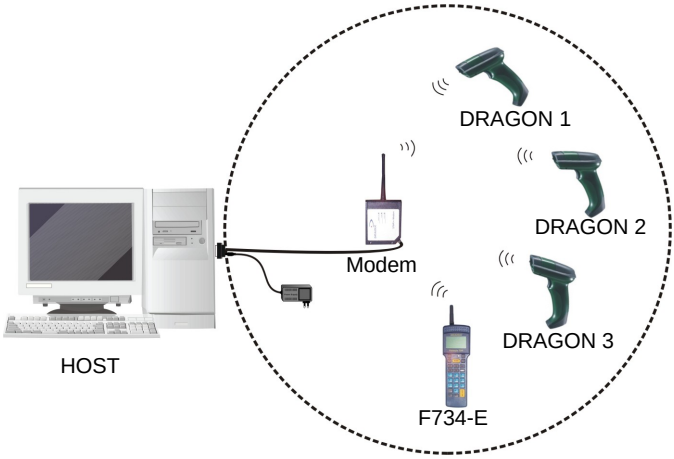


Figure 1 – Stand Alone Mode with STAR★Modem™ Server

STAR★Modem™ is in Stand Alone Mode as a dedicated **Server** receiving (like an OM-cradle). The ACK/NACK Protocol parameter can be set to assure correct communication between STAR★Modem™ and the local Host.

Assuming the RF devices are setup for 2 way transmission we can analyze the following ACK/NACK protocol selections:

RF devices - *Transmission Mode = 2 ways*
The Host must respond to a 2 way transmission

- If Modem - *ACK/NACK = disabled*
  there is no control of the communication between STAR★Modem™ and the Local Host. STAR★Modem™ answers the RF device which initiated the 2 way transaction with DATA received from the Local Host.

- If Modem - *ACK/NACK = enabled*
  when the Local Host receives a message correctly, it answers STAR★Modem™ with the ACK character. Only then does STAR★Modem™ acknowledge the RF device which initiated the 2 way transaction with an Empty Answer.

- Modem - *DATA/NACK = enabled*
  when the Local Host receives a message correctly, it answers STAR★Modem™ with DATA. STAR★Modem™ then answers the RF device which initiated the 2 way transaction with this DATA (i.e. command to RF device display).

Case 2 – STAR★Modem™ in Stand Alone Mode as Client (like an RF device)

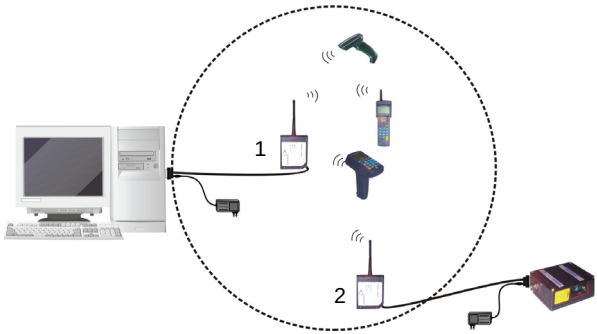


Figure 2 – Stand Alone Mode with STAR★Modem™ 2 Client

In the figure above, STAR★Modem™ 2 is in Stand Alone Mode as a dedicated **Client** (as an RF device). The following parameters may be set depending on the application:

Modem 1 - *ACK/NACK = enabled*
Scanner - *Handshaking= RTS/CTS*

- If Modem 2 - *Transmission Mode = 1 way*
  ACK/NACK from Remote Host = disabled
  FIFO = disabled
  Handshaking = Modem (RTS/CTS)

  In this case, Modem 2 sends data (messages) to the Remote Host. The special case of FIFO disabled blocks transmission of the scanner until an acknowledgement is received from Modem 1. Because ACK/NACK is enabled for Modem 1, only after Modem 1 has received an ACK from the Remote Host does it acknowledge reception (Empty Answer to Modem 2).

Case 3 – STAR★Modem™ in STAR-System™ Mode as Server

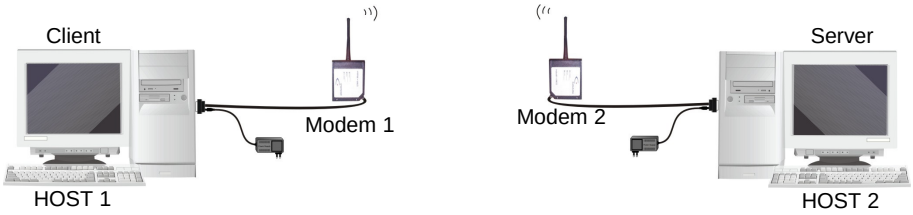


Figure 3 – STAR-System™ Mode

Both STAR★Modems™ are in STAR-System™ Mode and are therefore able to communicate bi-directionally. For analysis purposes only, we assume the situation where Host 1 is Client and Host 2 is Server. It is clear that the situation is analogous in the opposite direction:

- If Modem 1 - *Transmission Mode = 1 way*
  ACK/NACK from Remote Host = disabled
  FIFO = enabled
  Handshaking = any

  The Client, (Host 1) sends a message to the Remote Host (Host 2), but no control exists upon reception and even if ACK/NACK Protocol is implemented on the Server side (Remote Host), no answer is returned from Modem 2 to Modem 1 (except for a single blink from the red LED on Modem 1). This is not a secure communication.

- If Modem 1 - *Transmission Mode = 1 way*
  ACK/NACK from Remote Host = enabled
  FIFO = enabled
  Handshaking = any

  The Client, (Host 1) sends a message to the Remote Host (Host 2). Modem 2 acknowledges good radio reception but no control is made on Remote Host reception. If Modem 2 acknowledges radio reception within the Radio Protocol Timeout, Modem 1 sends ACK to its local Host, otherwise it sends NACK.

- If Modem 1 - *Transmission Mode = 2 ways*
  ACK/NACK from Remote Host = enabled
  FIFO = enabled
  Handshaking = any
  Single Store = enabled

  The Client, (Host 1) sends a message to the Remote Host (Host 2) and expects an answer from Host 2. Host 2 answers with DATA (a string of up to 238 characters). If Modem 2 sends this DATA answer within the Radio Protocol Timeout, Modem 1 sends it to its local Host (Host 1), otherwise Modem 1 sends NACK. In addition, the Single Store parameter upon Radio Protocol timeout, causes Modem 1 to retry transmission of the same message the defined number of times, before responding to its local Host (Host 1) with NACK.

  Host 1 - *Handshaking = RTS/CTS*

- If Modem 1 - *Transmission Mode = any*
  ACK/NACK from Remote Host = enabled
  FIFO = disabled
  Handshaking = Modem (RTS/CTS)

  The Client, (Host 1) sends a message to the Remote Host (Host 2). Modem 1 after receiving the message, blocks transmission of Host 1 until communication is completed according to the other communication control parameter settings as described above.



NOTE

The most secure settings for bi-directional communication in STAR-System™ Mode is to have ACK/NACK from Remote Host enabled and Two-way transmission at both ends. In addition, in case the first transmission fails, the Single Store parameter automatically repeats transmission of the same data packet up to the number of specified attempts.



NOTE

*When STAR★Modem™ acts as Client and **STARGATE™** acts as Server, FIFO disabled only works if two-way transmission mode is set.*

Case 4 – STAR★Modem™ in Stand Alone Mode as Server (for an intelligent printer)

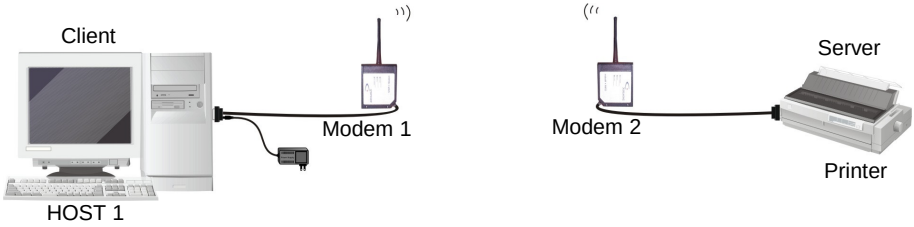


Figure 4 – Stand Alone Mode with STAR★Modem™ 2 Server

The two STAR★Modems™ in this case can be configured in Stand Alone Mode, however this limits one to be the dedicated Client and the other to be the dedicated Server. Bi-directional communication is not possible in Stand Alone modes.

Assuming that Host 1 is Client we can analyze the following transmission parameters from both STAR★Modem™ 1 and STAR★Modem™ 2's point of view :

Modem 1 **Client**
Transmission Mode = 2 way
ACK/NACK from Remote Host = enabled
FIFO = enabled
Handshaking = any

The Client, (Host 1) sends a message to the Remote Host (Printer) and expects an answer from the Printer. If the answer doesn't arrive before Radio Protocol Timeout, Modem 1 sends NACK to the Local Host.

- If Modem 2 **Server**
  ACK/NACK Protocol = enabled as ACK/NACK

  When STAR★Modem™ 2 receives a new message, it sends it to the Printer. The Printer answers with ACK. If Modem 2 acknowledges within the Radio Protocol Timeout, Modem 1 sends an Empty Answer to its Local Host (Host 1), otherwise it sends NACK.

- If Modem 2 **Server**
  ACK/NACK Protocol = enabled as DATA/NACK

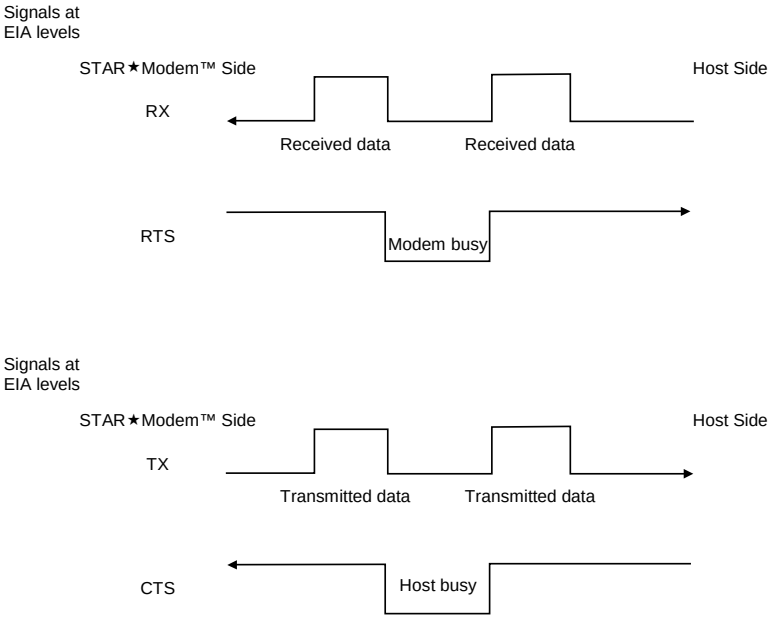
  When STAR★Modem™ 2 receives a new message, it sends it to the Printer. The Printer answers with DATA (a string of up to 238 characters). If Modem 2 sends this DATA answer within the Radio Protocol Timeout, Modem 1 sends it to its local Host (Host 1), otherwise Modem 1 sends NACK.

2.2 RS232 PARAMETERS

2.2.1 Handshaking

Modem: (RTS/CTS)

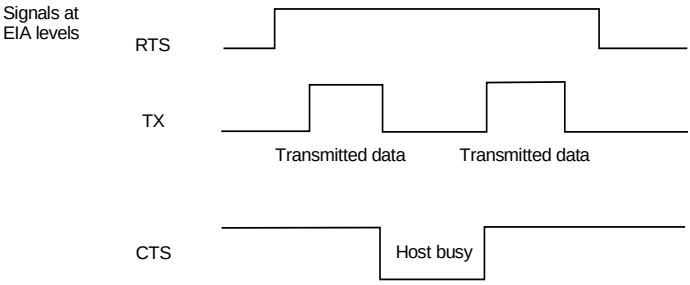
STAR★Modem™ deactivates the RTS line when it cannot receive a character from the Host. STAR★Modem™ can transmit data only if the CTS line (controlled by the Host) is active.



RTS/CTS Modem Handshaking

Hardware handshaking: (RTS/CTS)

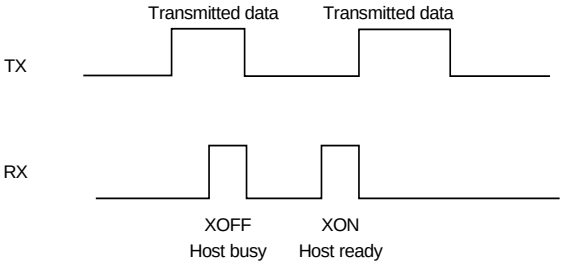
The RTS line is activated by STAR★Modem™ before transmitting a character. Transmission is possible only if the CTS line (controlled by the Host) is active.



RTS/CTS Handshaking

Software handshaking: (XON/XOFF)

During transmission, if the Host sends the XOFF character (13 Hex), the modem interrupts the transmission with a maximum delay of one character and only resumes when the XON character (11 Hex) is received.



XON/XOFF handshaking

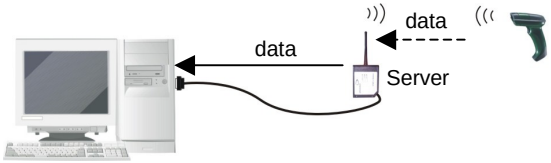
2.2.2 ACK/NACK Protocol

This parameter sets a transmission protocol which takes place between STAR★Modem™ (Server) and Local Host in RS232. An RF device (such as a hand-held reader) passes its data (code read) to the modem which sends it to the Host. The Host sends an ACK character (06 HEX) to the modem in the case of good reception; a NACK character (15 HEX) requesting re-transmission is sent to the modem in case of bad reception.

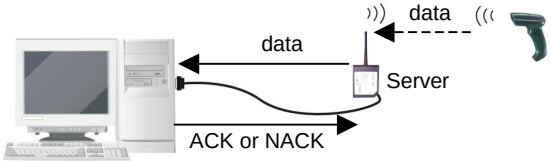
In the particular case where the RF device is configured for 2 way transmission and therefore requires an answer, it is advised to set STAR★Modem™ with the DATA/NACK protocol. The DATA answer from the Local Host is implicitly considered an ACK and is sent to the RF device. If instead ACK/NACK is used, the modem generates an Empty Answer to the RF device.

CAUTION

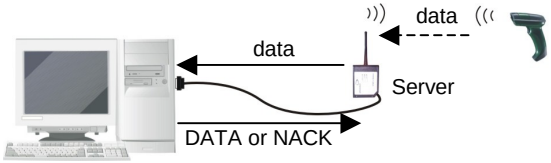
Before selecting this parameter ensure that "ACK/NACK from Remote Host" is disabled (see par. 2.5.5).



ACK/NACK Disabled



ACK/NACK Enabled



DATA/NACK Enabled

If the modem does not receive an ACK, DATA or NACK, transmission is ended after the RX Timeout (see par. 2.2.3). See also Radio Protocol Timeout, par. 2.5.3, for radio transmission to RF devices.

For ACK/NACK selection when STAR★Modem™ as Client, is transmitting to a destination device connected to a Remote Host refer to par. 2.1.

2.2.3 RX Timeout

This parameter can be used to automatically end data reception from the Local Host after the specified period of time.

If no character is received from the Local Host, after the timeout expires, any incomplete string is flushed from the modem buffer.

Refer to par. 2.2.5 for RX Timeout functioning when defining the frame packing.

2.2.4 FIFO

If enabled, the Destination Device collects all messages sent by STAR★Modem™ and sends them in the order of acquisition to the connected Remote Host.

If disabled, STAR★Modem™ blocks the message transmission from the Local Host until an answer signaling the right/wrong message transmission has been received from the RF Destination Device (1 way) or the Remote Host (2 way). Once the answer has been received, the Local Host is allowed to send a new message.

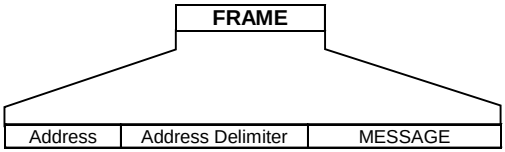
This command requires the Modem (RTS/CTS) handshaking to be enabled.

For more details about the Transmission Mode refer to par. 2.5.2.

2.2.5 Frame Packing

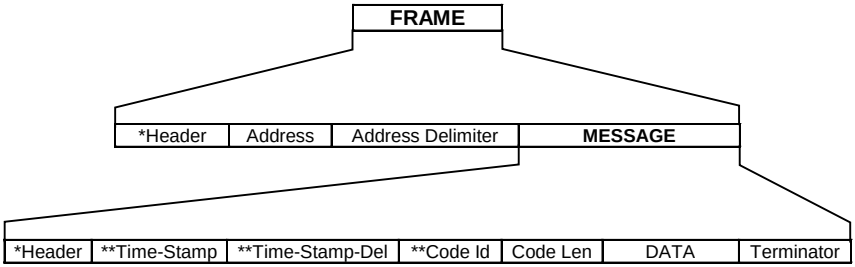
This parameter defines the format of the frame to be transmitted between STAR★Modem™ and the Host.
The frame received by STAR★Modem™ may contain a maximum of 238 characters. All characters not included within this number will be transmitted from the Host in a new frame.

Frame from Host to STAR★Modem™



The Address field has different meanings depending on if the FRAME is sent as a 2 way answer to an RF device, or if it is a new message that the STAR★Modem™ Client sends to a destination device. See par. 2.4.3 for details.

Frame from STAR★Modem™ to Host



* There is only one header whose position can be defined through the related parameter (see par. 0).

** These are optional fields which can be configured depending on the type of RF device used.

The Address field has different meanings depending on if the FRAME is a 2 way answer to a previous 2 way transaction initiated by a STAR★Modem™ Client, or if it is a new message that an RF device sends to the STAR★Modem™ Server. See par. 2.4.3 for details.

Correct FRAME identification is managed by frame packing. Three different types of frame packing can be selected:

- **Frame+ [CR]** ***(default)***: the frame sent to STAR★Modem™ is terminated by [CR]. This means you cannot use the [CR] character within the frame.
  In Frame + [CR] mode, make sure the FRAME does not contain [*CR]*, nor begin with *$+* or #+ characters.

FRAME	**[CR]**

  The frame transmitted by STAR★Modem™ has no additional field. In this case the end of the FRAME is either DATA or Terminator if any.

FRAME

- **[STX]+LEN+Frame+[CR]**: both frames sent to and by STAR★Modem™ are preceded by [STX], LEN and terminated by [CR], where LEN is a field of 4 digits and indicates the FRAME length in number of characters, that is FRAME +CR.

[STX]	**LEN**	FRAME	**[CR]**

  The [STX], [CR] and [ESC] characters contained in the frame must be preceded by the [ESC] character for a correct transmission.

- **Frame after Timeout**: if the delay between two consecutive characters is more than the selected timeout, the modem considers the frame completed. The timeout corresponds to 1/10 of the value defined for RX Timeout (see par. 2.2.3). Therefore, the timeout for frame packing is calculated in ms (from 10 ms to 990 ms).



NOTE

It is <u>not</u> possible to <u>disable</u> this timeout, therefore possible values are in the range 10 - 990 ms. If RX Timeout is disabled, Frame after Timeout is 10 ms.

  Both the frames sent to and by STAR★Modem™ have no additional fields:

FRAME

  All commands to be sent using this frame packing must be preceded by the string below, which substitutes the $+ character:

#+++PROG_REQ+++#

  This string is always transmitted in a single frame preceding the one containing the configuration command, as shown in the following examples:

Example 1

Sending the $+$![CR] command to transmit the modem software release:
1st Frame = #+++PROG_REQ+++#
2nd Frame = $![CR]

Example 2

Sending the $+ML0$-[CR] command to set the default frame packing configuration:
1st Frame = #+++PROG_REQ+++#
2nd Frame = ML0$-[CR]

2.3 PEN EMULATION PARAMETERS

2.3.1 Minimum Output Pulse

This parameter sets the duration of the output pulse corresponding to the narrowest element in the barcode. In this way the code resolution is controlled by the signal sent to the decoder, independently from the physical resolution of the code read.

The shortest pulse (200 µs) corresponds to a high resolution code emulation and therefore a shorter transfer speed to the decoder (for decoders able to work on high resolution codes). Likewise, longer pulses correspond to low resolution code emulation and therefore a longer transfer time to the decoder.

2.3.2 Overflow

This parameter generates a white space before the first bar and after the last bar of the code. The selections are as follows:

narrow = space 10 times the minimum output pulse.

medium = space 20 times the minimum output pulse.

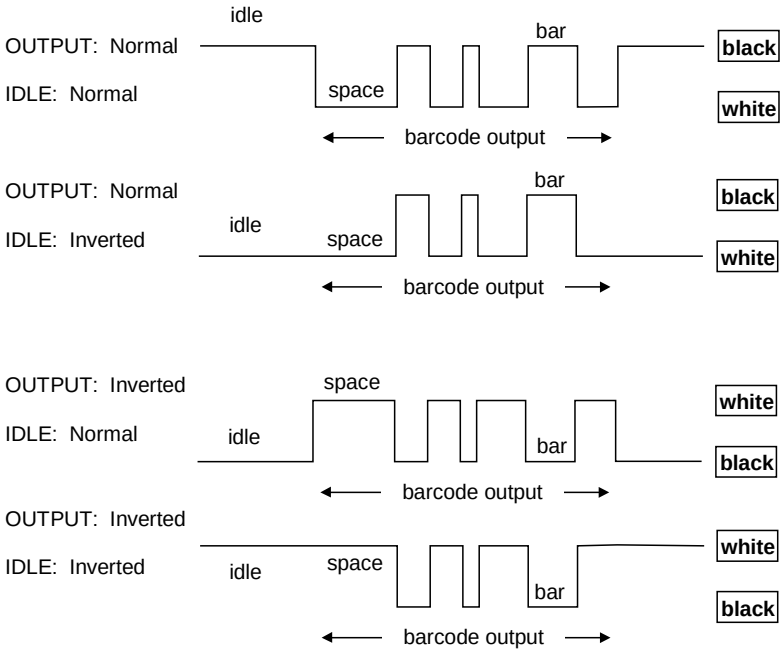
wide = space 30 times the minimum output pulse.

2.3.3 Conversion to Code 39 and Code 128

This parameter allows converting the decoded codes into either Code 39 format or Code 128 format. It is not possible to disable conversion.

2.3.4 Output and Idle Levels

The following state diagrams describe the different output and idle level combinations for Pen emulation:



Output and Idle Levels

2.3.5 Inter-Block Delay

For the PEN Emulation interface, data are sent to the Host in fixed size blocks of 20 characters each. The inter-block delay parameter allows setting a delay between each block sent to the Host.

2.4 DATA FORMAT

2.4.1 Header/Terminator Selection

The header/terminator selection is not effected by restore default command. In fact, header and terminator default values depend on the interface selection:

RS232: no header, terminator CR-LF

WEDGE: no header, terminator ENTER

These default values are always restored by sending the RS232 or WEDGE interface selection string, see par. 3.2.1 in STAR★Modem™ Reference Manual.

For the WEDGE interface, the following extended keyboard values can also be configured:

EXTENDED KEYBOARD TO HEX CONVERSION TABLE				
	IBM AT IBM 3153 APPLE ADB	**IBM XT**	**IBM 31xx, 32xx, 34xx, 37xx**	**Wyse Digital**
HEX	KEY	KEY	KEY	KEY
83	ENTER	ENTER	FIELD EXIT	RETURN
84	TAB	TAB	TAB	TAB
85	F1	F1	F1	F1
86	F2	F2	F2	F2
87	F3	F3	F3	F3
88	F4	F4	F4	F4
89	F5	F5	F5	F5
8A	F6	F6	F6	F6
8B	F7	F7	F7	F7
8C	F8	F8	F8	F8
8D	F9	F9	F9	F9
8E	F10	F10	F10	F10
8F	F11	ESC	F11	F11
90	F12	BACKSPACE	F12	F12
91	HOME	HOME	ENTER	F13
92	END	END	RESET	F14
93	PG UP	PG UP	INSERT	F15
94	PG DOWN	PG DOWN	DELETE	F16
95	↑	↑	FIELD -	UP
96	↓	↓	FIELD +	DOWN
97	←	←	ENTER (Paddle)	LEFT
98	→	→	PRINT	RIGHT
99	ESC	ESC		ESC
9A	CTRL (Right)	CTRL (Right)		CTRL (Right)
9B	Euro	Space	Space	Space

For all devices using Wedge interface, all values from **9C** to **FE** send the Space character

SET CUSTOM EXTENDED HEADER/TERMINATOR KEYS

The extended Header/Terminator keys for **Wedge Interface users** can be customized by defining them through a simple keyboard setting procedure.

For example, the Numeric Keypad keys can be set for use as Headers or Terminators by substituting the default extended keys using this procedure.

The type of computer or terminal must be selected before activating the keyboard setting command.

Press and release a key to set it.

Some characters may require more than one key pressed simultaneously during normal use (refer to the manual of your PC or terminal for keyboard use). The exact sequence must be indicated to the reader in this case pressing and releasing the different keys.

Example:

If one has to press the "Shift" and "4" keys simultaneously on the keyboard to transmit the character "$" to the video, to set the "$", press and release "Shift" then press and release "4".

Each pressed and released key must generate a yellow LED blinking on the device, otherwise repress the key. Never press more than one key at the same time, even if this corresponds to the normal use of your keyboard.

Press "Back space" to correct a wrong key entry.

Note: "CAPS LOCK" and "NUM LOCK" must be off before starting the keyboard setting procedure. "SHIFT" must be repressed for each character and cannot be substituted by "CAPS LOCK".

Set Custom Extended Header/Terminator Keys



Type the string above.

- **If the first 4 KEYS (Shift, Alt, Ctrl, and Backspace) are not available on your keyboard, you can only substitute them with keys not used, or substitute them with each other.**
- Keys 5 to 28 must be defined

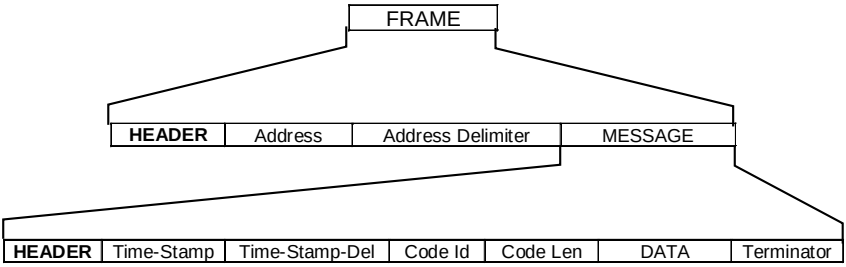
Press the desired keys in the following order:

CUSTOM EXTENDED KEYBOARD SETTING TABLE		
		Custom
Order	HEX	KEY
01	**-**	Shift
02	**-**	Alt
03	**-**	Ctrl
04	**-**	Backspace
05	**83**	
06	**84**	
07	**85**	
08	**86**	
09	**87**	
10	**88**	
11	**89**	
12	**8A**	
13	**8B**	
14	**8C**	
15	**8D**	
16	**8E**	
17	**8F**	
18	**90**	
19	**91**	
20	**92**	
21	**93**	
22	**94**	
23	**95**	
24	**96**	
25	**97**	
26	**98**	
27	**99**	
28	**9A**	

During the keyboard setting the red LED on the modem always blinks, the yellow LED stays on and blinks off only each time a key is pressed, while the green LED stays on and blinks off only each time the Backspace key is pressed. Once the last key has been pressed, the yellow LED stays off indicating the keys have been registered, while the green LED stays on again. Read the “Exit and Save configuration” barcode to end the procedure.

2.4.2 Header Position

This parameter defines the header position within the frame to be transmitted from STAR★Modem™ to the Host. The header can be positioned in either the first field of the frame or in the field preceding the message:



The Address field has different meanings depending on if the FRAME is a 2 way answer to a previous 2 way transaction initiated by a STAR★Modem™ Client, or if it is a new message that an RF device sends to the STAR★Modem™ Server. See par. 2.4.3 for details.

2.4.3 Address Stamping

If enabled, this command includes the RF device or STAR★Modem™ address in the message/answer transmitted. It is advised to enable this parameter when STAR★Modem™ is a Server for more than one Client in 2 way transmission. In this way the Host knows to which Client the answer must be sent.

If receiving data from an RF device working in 1 way mode, STAR★Modem™ (Server) automatically includes the RF device address in the message to be sent to the Host.

If receiving data from an RF device working in 2 way mode, STAR★Modem™ (Server) automatically includes the RF device address in the message to be sent to the Host. It is required to set the Host application to include the same address in the answer to be transmitted back to the RF device.

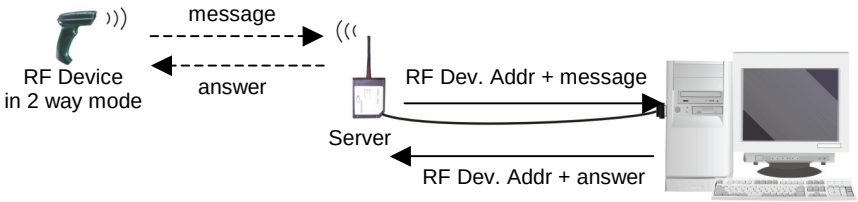


Figure 5 - Receiving a Message from RF Device in 2 Way Mode

If STAR★Modem™ as Client, is transmitting to more than one destination device in 1 way mode, it is necessary to set the Host application to include the modem address in the message to be transmitted to the destination devices of the system.

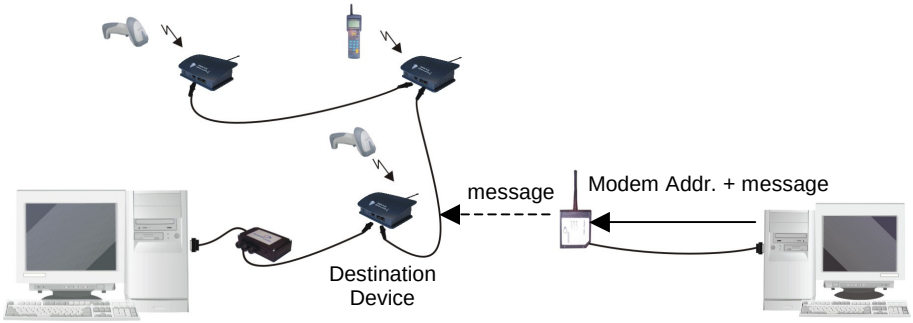


Figure 6 - Transmitting a Message in 1 Way Mode

If STAR★Modem™ as Client, is transmitting to more than one destination device in 2 way mode, it is necessary to set the Host application to include the modem address in the message to be transmitted to the destination devices of the system. STAR★Modem™ will include the same address in the answer which sends back to the Host.

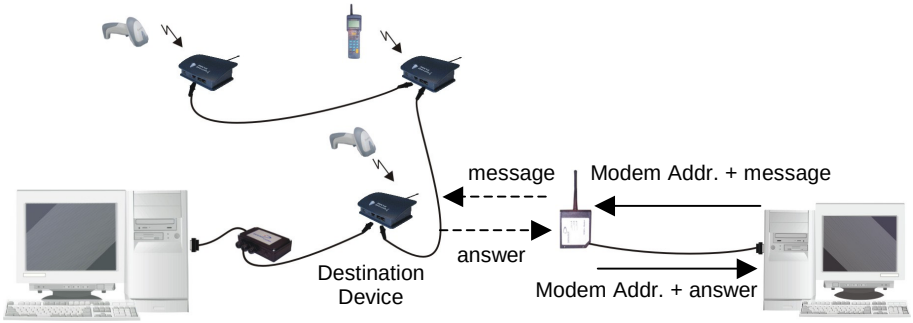


Figure 7 - Transmitting a Message in 2 Way Mode

The Address Stamping parameters consist of a 4-digit number in the range 0000-1999.

NOTE

When the modem receives data in 2 way mode from more than one RF device, it is advised to enable Address Stamping for correct radio transaction management.



NOTE

If communicating with only one RF device in 2 way mode, Address Stamping is not required, since the data/answer generated by the Host is only sent to that device. In this case STAR★Modem™ can receive data (messages) via radio only after sending the 2 way answer.

2.4.4 Address Delimiter

The Address Delimiter allows a character to be included to separate the Address stamping fields from the next fields in the message. Once enabled, it is required to set the Host application to include the Address Delimiter character in the message. Any character can be included in the hexadecimal range from 00 to FE.

2.5 RADIO PARAMETERS

2.5.1 RF Baud Rate (not for USA Model)

This parameter defines the baud rate used for radio communication. For STAR★Modem™ USA model the baud rate value is always set to 36800, while for European models it can be set to 9600 or 19200 according to the device communicating with STAR★Modem™.

2.5.2 Transmission Mode (Client only)

STAR★Modem™ Client can communicate within the system using two different transmission modes:

- 1 way mode: (default) STAR★Modem™ transmits data without requiring an acknowledgement answer from the Remote Host (see par. 2.1 for details).
- 2 way mode: STAR★Modem™ transmits data requiring an acknowledgement answer from the Remote Host (see par. 2.1 and par. 2.5.5 for details). When the destination device is connected to the Remote Host through the Wedge Interface, it considers the transmission successful after data has been sent. Therefore, an Empty Answer is generated and passed back to the modem.

2.5.3 Radio Protocol Timeout (Client only)

This parameter sets the valid time to wait before radio transmission between STAR★Modem™ and a destination device is considered failed.

This parameter should be set taking into consideration the radio traffic (number of devices in the same area).

If the RS232 interface connecting the Remote Host and the destination device is used with ACK/NACK enabled, this parameter should be at least equal to the RX Timeout parameter for low traffic environments. It should be increased if there are many devices in the same area.

2.5.4 Single Store (Client only)

This command is active when STAR★Modem™ transmits messages/data to a destination device.
It guarantees a secure control to prevent the transmission of duplicated data.
If Single Store is enabled and STAR★Modem™ does not receive any answer of good transmission from the destination device, it enters a special operating mode that stops sending new messages. When such operating mode is entered, the modem retries transmission itself for the number of attempts selected in the configuration. Once the transmission is successful, the modem continues to send new messages. If transmission is not successful after the number of configured attempts, the message is lost.
To be absolutely sure that messages are received by the destination device, set Single Store to continuous. A new message will not be sent unless the previous one is received. If using Single Store as continuous, and the transaction is not received, check that the Server is active and that the STAR★Modem™ configuration is correct.
If your application requires an acknowledgement from the Remote PC, you must define Single Store and enable ACK/NACK From Remote Host (see par. 2.5.5).

2.5.5 ACK/NACK From Remote Host (Client only)

This parameter sets a transmission protocol which takes place between the STAR★Modem™ (Client) Host and the destination device Host (Remote Host). The transmission is influenced by the transmission mode selected (see par. 2.5.2).

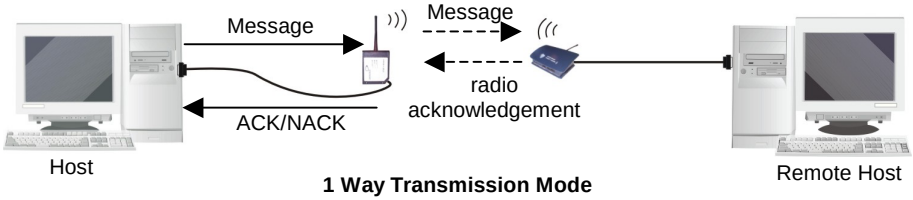


CAUTION

Before selecting this parameter ensure that "ACK/NACK Protocol" is disabled (see par. 2.2.2).

One way mode:

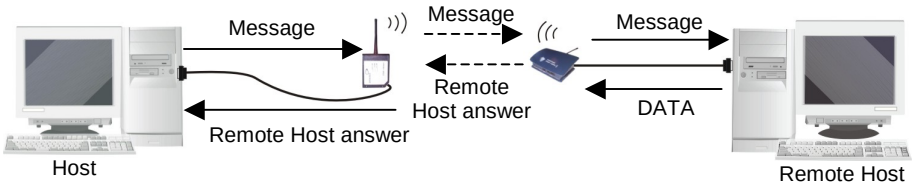
Host sends a message to STAR★Modem™ which passes it to the destination device via radio. In case of good transmission, the destination device transmits a radio acknowledgement back to the modem. If received before the Radio Protocol Timeout expires, STAR★Modem™ sends an ACK character to the Host. If the timeout expires before receiving any acknowledgement, the modem transmits a NACK character.



1 Way Transmission Mode

Two way mode:

Host sends a message to STAR★Modem™ which passes it to the destination device via radio. The destination device transmits the message to the Remote Host which responds with DATA. This answer is sent to STAR★Modem™ through the destination device. Then, the modem transmits it to the Host.
If the Radio Protocol Timeout expires before the answer from Remote Host is received by STAR★Modem™ or in case the Remote Host does not respond, STAR★Modem™ sends a NACK character to the Host.



2 Way Transmission Mode

NOTE

If the Host continues to send new messages before receiving any answer from the Remote Host, it is strongly suggested to enable the handshaking on the Host connected to STAR★Modem™ for a correct functioning.

2.5.6 Beacon (Client only)

This parameter is available only when STAR★Modem™ is used in STAR-System™ applications and is connected to a device (Local Host) without transmitting or responding capability. It is particularly useful when STAR★Modem™ Client transmits data to a STAR-System™ Server (never sending data back to STAR★Modem™ in asynchronous mode. If the modem does not receive any command from the Host for the defined period of time (intervals of 2..30 seconds), it starts a 2 way transmission towards the system waiting for data to be sent to the connected Host (refer to the example in par. A.4).
The selection of this parameter does not influence the modem normal radio transaction. This means that it does not modify the transmission of data sent by the Local Host.

A CODE IDENTIFIER TABLE

2/5 Interleaved



2/5 normal 5 bars



EAN 8



UPC A



EAN 8 with 2 ADD ON



EAN 13 with 2 ADD ON



UPC A with 2 ADD ON



2/5 Industrial



2/5 matrix 3 bars



EAN 13



UPC E



EAN 8 with 5 ADD ON



EAN 13 with 5 ADD ON



UPC A with 5 ADD ON



UPC E with 5 ADD ON



Code 39 Full ASCII



ABC CODABAR



EAN 128



CIP/39



Code 32



UPC E with 2 ADD ON



Code 39



CODABAR



Code 128



Code 93



CIP/HR



ISBT 128



CODABLOCK-A



CODABLOCK-F EAN



Plessey Anker



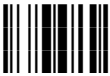
Delta IBM



Code 16K



PDF417



CODABLOCK-F Standard



MSI



Plessey Standard



Telepen



Code 11



Code 49



B HEX AND NUMERIC TABLE

CHARACTER TO HEX CONVERSION TABLE					
char	**hex**	**char**	**hex**	**char**	**hex**
NUL	**00**	*	**2A**	U	**55**
SOH	**01**	+	**2B**	V	**56**
STX	**02**	,	**2C**	W	**57**
ETX	**03**	-	**2D**	X	**58**
EOT	**04**	.	**2E**	Y	**59**
ENQ	**05**	/	**2F**	Z	**5A**
ACK	**06**	0	**30**	[	**5B**
BEL	**07**	1	**31**	\	**5C**
BS	**08**	2	**32**	]	**5D**
HT	**09**	3	**33**	^	**5E**
LF	**0A**	4	**34**	_	**5F**
VT	**0B**	5	**35**	`	**60**
FF	**0C**	6	**36**	a	**61**
CR	**0D**	7	**37**	b	**62**
SO	**0E**	8	**38**	c	**63**
SI	**0F**	9	**39**	d	**64**
DLE	**10**	:	**3A**	e	**65**
DC1	**11**	;	**3B**	f	**66**
DC2	**12**	<	**3C**	g	**67**
DC3	**13**	=	**3D**	h	**68**
DC4	**14**	>	**3E**	i	**69**
NAK	**15**	?	**3F**	j	**6A**
SYN	**16**	@	**40**	k	**6B**
ETB	**17**	A	**41**	l	**6C**
CAN	**18**	B	**42**	m	**6D**
EM	**19**	C	**43**	n	**6E**
SUB	**1A**	D	**44**	o	**6F**
ESC	**1B**	E	**45**	p	**70**
FS	**1C**	F	**46**	q	**71**
GS	**1D**	G	**47**	r	**72**
RS	**1E**	H	**48**	s	**73**
US	**1F**	I	**49**	t	**74**
SPACE	**20**	J	**4A**	u	**75**
!	**21**	K	**4B**	v	**76**
"	**22**	L	**4C**	w	**77**
#	**23**	M	**4D**	x	**78**
$	**24**	N	**4E**	y	**79**
%	**25**	O	**4F**	z	**7A**
&	**26**	P	**50**	{	**7B**
'	**27**	Q	**51**	|	**7C**
(	**28**	R	**52**	}	**7D**
)	**29**	S	**53**	~	**7E**
		T	**54**	DEL	**7F**



0



2



4



6



8



A



C



E



1



3



5



7



9



B



D



F

Backspace



Cancels an incomplete configuration sequence

GLOSSARY

1 way transmission	a radio transmission in which STAR★Modem™ transmits data without requiring an acknowledgement answer from the remote Host.
2 way transmission	a radio transmission in which STAR★Modem™ transmits data requiring an acknowledgement answer from the remote Host.
Client	a radio device which can initiate a 1 way or 2 way transmission to a Server. The Client is also defined as Transmitter. STAR★Modem™, RF terminals or RF hand-held readers function as Clients.
Server	a radio device which is continuously waiting for a 1 way or 2 way transmission initiated by a Client. The Server is also defined as Receiver. STAR★Modem™ or OM-cradles function as Servers.
Bi-directional Communication	the ability to both receive radio messages as a Server and to initiate radio transmission as a Client.
Destination Device	the radio device to which a message must be sent or to which an answer to a previously received message must be given.
DATA	a string of up to 238 characters sent as an answer from a Remote Host to a Client.
Empty Answer	a radio acknowledgement containing no information (data) content.
Local Host	the Host to which STAR★Modem™ is physically connected through a cable. This can be a PC, a device such as a scanner, or other peripheral device such as a printer.
Remote Host	the Host to which a transmitting STAR★Modem™ Client sends a message via radio.

STAR-System™

a Datalogic radio communication system that uses a Narrow Band RF radio and Datalogic proprietary CSMA/CA protocol to automatically link and manage all the RF devices in the system. In this system STAR★Modem™ can perform bi-directional communication.

Stand Alone

a system in which STAR★Modem™ acts as a dedicated Server (receiver only - like an OM-cradle) or as a dedicated Client (transmitter only – like an RF hand-held reader). In this system STAR★Modem™ implements a different Narrow Band radio protocol than STAR-System™.