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Codenet Communications Protocol

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D			Added dotcode commands
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1. Purpose of document

This document sets out to specify the protocol for communication between a remote controller and the A-Series, A-Series **plus** and A-Series **plus** duo printers using CODENET protocol. This protocol is a subset of the 51000-Series Codenet protocol. Due to fundamental differences in the technologies it is not possible to support all 51000-Series commands. This document will also set out which commands are not supported and which commands will respond differently. See the command summary for the commands that respond differently. In some cases commands have become handlers that return the parameters sent by the host taking no action on the data.

2. References

2.1. Glossary

Term	Definition
Duo message	The message for an A-Series plus Duo printer which contains the information for both jets.
Jet 1 / Jet 2	On a Duo printer, “Jet 1” / “Jet A” is the jet on the left with the wiring box at the top and the mounting plate at the back

2.2. Document References

Reference	Title	Version

2.3. Explanation of printers

Printer name or abbreviation	Explanation
MJ	Macrojet – valvejet drop on demand printer
CC	Casecoder – valvejet drop on demand
CB2	Codebox 2 – Developed from Codebox 1 which was the industries first continuous ink jet with viscosity control. Uses pocket terminal to communicate to it via codenet commands.
CB3	Codebox 3 – A major upgrade of the Codebox 2 with a user interface
Solo	Similar to CB3 but in a stainless steel cabinet that can be washed down. Can have more than one head.
A-Series	Launched in 1998 as a major upgrade to the CIJ printer. Replaced CB3 and Solo printers.
A-Series plus	Launched in 2008
A-Series Plus Duo	Launched in 2009 it has two jets in a single head.

3. Hardware

The Codenet protocol can be used on

- A-Series via a serial RS232 interface
- A-Series **plus** and A-Series **plus** duo either RS232 or Ethernet TCP/IP interface.

3.1. Serial Connection for MJ, CC, CB2, CB3, Solo

The data communication channel is based on a full duplex signalling RS232C serial interface. Serial Input pin connections as follows:

25 way D-type Connector Pin-out (RS232C)

Pin No	Function
1	0v Shield, (protective ground)
2	Rx Data input to printer
3	Tx Data output from printer
4	RTS to printer (input)
5	CTS from printer (output)
7	0v Signal ground
9	+5v (supply to data terminal)
13	Internal control

Note : (pin 13 should be linked to pin 24 to disable current loop)

3.2. Serial Connection for A-Series and A-Series **plus**

Serial Input pin connections as follows...

Bulgin Pin No	Signal Function	D-Type Pinout
1		1
2	Tx Data output from printer	2
3	Rx Data input to printer	3
4	DSR Input	4
5	0v Signal ground	5
6	DTR Output	6
7	CTS Input	7
8	RTS Output	8
9	Screen	Shell

3.2.1. Baud Rates

Using the codenet command 'B' 42h part 'FF', the baud rate can be set to any one of those listed below, provided that communication is initially established at one of the default rates set by switches 1 and 2 on the serial interface DIL switches. The alternative rate is retained in battery-backed memory and will only be reset to the switch settings following a clearing of the battery backed memory.

Note

- Various types of A-Series printers have different sets of Baud Rates so check on the printer before setting the baud rate to see if it is acceptable.
- All A-Series **plus** can handle 38400, 57600, 115200. There will be no jumper links for the A-Series **plus**. The default Baud rate, 9600, will be set in the UI.

Available rates are as follows:-

Baud Rate	Printer	DIL Switches 1, 2 MJ, CC, CB2, CB3 Only
75	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	
150	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	
300	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	Off Off
600	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	
1200	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	
2400	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	On Off
4800	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	
9600	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	Off On
19200	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	On On
110	MJ, CC, CB2, CB3, Solo, A-Series, A-Series plus ,	
38400	A-Series, A-Series plus	
57600	A-Series plus	

3.2.2. Data Word

The Data Word is made up as follows:

- 8 Data Bits
- 1 Stop Bit
- No Parity

3.3. TCP/IP connection

A-Series **plus** supports Codenet over TCP/IP. The default Port ID for connecting to an A-Series **plus** printer is 7000.

A-Series **plus** has the following available ports: 3001, 3002, 9100, 9101, 9102, 9103, 7000, 7001, 7002, and 7003

Note: A-Series **plus** only supports 6 connections at any one time.

3.4. User Ports Codebox 2, Codebox 3 and Solo

- Pin "J" Forward/Reverse printing
- Pin "K" Spare Input
- Pin "L" Spare Output
- Pin "M" Spare Output
- Pin "N" Spare Output
- Pin "P" Spare I/O

3.5. User Ports Macrojet and Casecoder

- Pin "J" Print go # 1
- Pin "K" Print go #2
- Pin "L" Spare Output
- Pin "M" Spare Output
- Pin "N" Forward/Reverse Printing
- Pin "P" Spare I/O

4. Flow Control

This section is for MJ, CC, CB2, CB3 and Solo printers. Flow control is provided in either software or hardware and is switch selected.

4.1. Hardware handshake.

Data entry.

The RTS output line will be asserted (+12V) whenever the printer is ready to receive data. The RTS output line will be de-asserted (-12V) whenever the printer is not ready for data entry.

Data output.

Whenever the CTS input line is asserted (+12V), the printer will be enabled for the sending of data. Whenever the CTS input line is de-asserted (-12V), the printer will suspend data **output**.

4.2. Software handshake.

Data entry.

The printer will send a single ASCII <XOFF> (013H) character whenever it requires data entry to be suspended. The printer will send a single ASCII (011H) character whenever it becomes ready to receive data.

Data output.

Whenever the printer receives an <XOFF> character it will suspend its data output. Transmission from the printer will be enabled whenever it receives an character.

NOTES:

- When using software hand shake, CTS and RTS signals must not be connected.
- When the flow control state becomes <XOFF> from the printer, or NOT RTS, the printer will continue to buffer any characters received for subsequent processing up to a maximum of 32 characters. Any further characters received will be discarded. Even though the printer requires data entry to be suspended, the printer will accept and process flow control state change requests or change in CTS state, and the software reset command <SW_RESET>.

5. Printer Variants

5.1. A-Series *plus* Duo Support

A Duo printer is an A-Series plus which has two jets each of which can print an individual region of a message extending up to 8 lines subject to the message formats selected. The way that the Codenet protocol is to be used for describing such a Duo message, which must contain the message information for both jets, is to treat it as one large message. The message information is given in a left-to-right, top to bottom manner and line feeds are used to cause the message information that follows to be entered on the following line starting at the first unoccupied column position. For Duo messages we assume that a line feed given at the lowest line of the top jet allows the message information for the bottom jet to be described. This is illustrated in the example below.

The messages for each jet can use different message formats, and these shall be given by the printer configuration command (see 7.3).

The global information for a message given by Codenet will still apply to the whole Duo message, i.e. the global format Codenet commands act on both jets.

Any restrictions on the number of message elements, such as serial numbers or barcodes, which held for A-Series plus are valid for the whole of the Duo message across both jets.

Within this document any reference to A-Series **plus** also applies to the Duo variant, unless specified otherwise.

5.2. Example Duo Message

The following diagram shows an example Duo message created with a 4 line mixed upper region (Jet 1) and a 2 line mixed lower region (Jet 2).



Describing this message in the left to right, top to bottom manner you would give the following information:

1. text AB
2. change line height to 3
3. text C
4. line separator
5. line separator
6. change line height to 1
7. text DEF
8. line separator
9. text GH
10. line separator
11. change line height to 2
12. text IJ
13. line separator
14. change line height to 1
15. text KL

Note that the lower region is effectively treated as a continuation of the upper region in terms of describing the message.

A further example of message creation is also given in section 13.

6. Protocol

6.1. General

This section gives general information on the Codenet protocol described in this document.

- All references to hexadecimal values will be shown as the number followed by a lower case 'h'. All reference to digits or characters refer to characters as defined in the standard ASCII chart. For example, '1' will be represented by the character code value (31h) and 'Y' by character code value (59h).
- For clarity there is a 'slash' character (/) shown between the various parameters in the commands. It is not to be transmitted as part of the data.
- Unless otherwise stated individually below, all interface messages to and from the printer commence with "Escape" <ESC> (1Bh), may include one or more parameter fields, and end with "End of text" <EOT> (04h).
- With some exceptions, a positive or negative acknowledgement of requested information will usually be returned by the printer to indicate reception and interpretation of a command.
- A positive acknowledgement consists of a single character, ASCII <ACK> (06h).
- A negative acknowledgement consists of a 4 character sequence, ASCII <NACK> (015h) followed by a 3 ASCII digit error code.
- Most commands come in two forms: a 'setting' form that conveys parameter information to the printer to set up some feature or other, or a 'query' form that asks the printer for current settings of that parameter information.
- Most commands can be changed from the setting ("do this") form to the query ("tell me") form by replacing their relevant parameter fields with a single "query" character, ASCII '?' (03Fh).
- The SW_RESET command consists of a single ASCII <ETX> (03h) character.
- The printer ignores (discards) any <NULL> (00h), <LF> (0Ah), or <CR> (0Dh) characters that it may receive irrespective of when and where they occur.
- Commands to the printer break down into 7 groups. Each of the 7 groups is introduced below and formalised in detail later.
- Many commands have either a head selection field or jet selection field. A head assignment field refers to the printhead, and for a multi-jet machine such as the A-Series **plus** Duo the value of 1 refers to the whole printhead containing all jets. A jet assignment field, however, refers to individual jets whether they are on the same or separate printheads.
- On a single-headed printer, where reference is made to a print head number, this should always be '1'.
- If the head or jet number is invalid for the printer then the command shall always be responded to with a NAK.

For A-Series **plus**:

- The User shall be able to configure the Response Package Length to "VARIABLE" or "FIXED". "VARIABLE" Response of Package Length means ACK is one byte (06h), and NACK is four bytes (15h, A, B, C. Where A, B and C represent a three-character error code). "FIXED" Response of Package Length means both ACK and NACK are four bytes (06h, 00h, 00h, 00h and 15h, A, B, C. Where A, B and C represent a three-character error code).

For A-Series **plus** Duo:

- The value of a head assignment field should always be 1.
- The jet assignment field of a command shall be 1 for Jet 1 and 2 for the Jet 2 (Jet 1 is on the left with the wiring box at the top and the mounting plate at the back).

6.2. Initialisation Commands

These commands do such things as requesting the printer's identity and setting up the real time clock, etc.

6.3. Print Control Commands

These commands are, in the main, concerned with the control of operational features of the printer. For example, they identify which product detector to use for which head, assign message stores to print heads and direct the loading of a new print message.

6.4. Printer Status Commands

These commands allow the host system to control the unsolicited generation of status change reports and to obtain such reports on demand.

6.5. Global Format Commands

These commands exert control over the orientation of printed messages and affect all characters printed.

6.6. Embedded Format Commands

These commands are embedded within the text of stored print messages. Some of them affect the following characters until the end of the message, or until cancelled later in the message.

6.7. Application Specific Commands

These commands are included for use by special versions of the program. On the standard program version they will have no effect other than to solicit a negative acknowledgement from the printer.

6.8. Extended Commands

These commands access some of the additional features of the A-Series printers.

7. Initialisation Commands and Responses

7.1. Software Reset (SW_RESET) 'ETX' 03h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series

This command causes a restart of the printers operating program.

Format: <ETX> 03 Hex

Response: NONE, (start up sequence should follow)

Note: This command is only used under exceptional circumstances when it is required to force a software restart remotely. For example, it could be used when the printer's stroke pulse source is derived from a shaft encoder and the stroke pulses cease during an already active printing cycle (production line stopped).

This command is not a RAM reset. It is only equivalent to powering up the machine again.

7.2. Printer Identity (PRINT_ID) 'A' 41h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command instructs the ink jet printer to return its variant type. It should be the first to be sent to establish the communications link.

Query Format : Esc/**A**/?/Eot

Response to Query: Esc/**A**/ AA/BBBBB/CC/DD/Eot

AA = 2 digits specifying the printer type.
 BBBBB = 5 characters specifying the PSB firmware part identity.
 CC = 2 characters specifying the firmware issue.
 DD = 2 digit Codenet identity 00 to 99 (not used, default 00)

Field 'AA'

00 Codebox
 01 Solo
 02 Solo Twin Head
 03 A300
 04-19 *not allocated*
 20 Macrojet
 21 Casecoder
 22 A-Series *plus* A100
 23 A-Series *plus* A300
 24 A-Series *plus* Duo
 25-99 *not allocated*

Example of usage:

To printer:

Esc	Command ID	Payload	Eot
1B	41	3f	04
ESC	A	?	EOT

From Printer:

1B	41	30	33	35	36	30	30	36	30	31	30	30	04
ESC	A	0	3	5	6	0	0	6	0	1	0	0	EOT
ESC	Command ID	Printer Type		Build part Number					Firmware		Not Used		EOT

7.3. Printer Configuration (PRINT_CONFIG) 'B' 42h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command is normally used to request the ink jet printer to return its configuration data. It should be sent in order to determine the commands which are applicable to the particular installation. It may also be used to command the alteration of certain configuration values marked with *. Such changes will take effect on completion of the command acknowledgement.

Set Format: Esc/**B**/A/BBBBBBBBB/CCC/DDD/EE/FF*/G*/H/Eot

Query Format: Esc/**B**/?/Eot

A	= 1 digit, number of jets.
BBBBBBBBB	= 4 pairs of configuration data for heads/jets 1 to 4.
CCC	= 3 digits maximum number of messages
DDD	= 3 digits maximum message length (A-Series, A-Series plus and A-Series Duo = 255).
EE	= 2 digits specifying the barcode format.
FF*	= 2 digits, baud rate selector 00 to 12.
G*	= Flow control selector H = RTS/CTS or S = XON/XOFF
H	= 1 digit, number of user application commands, default = 0

Field 'BBBBBBBBB'

- head not present
- single line
- twin line (CIJ only)
- twin line + large
- triple line (CIJ only)
- triple line mixed (CIJ only)
- four line (CIJ only)
- 9 drop proportional (CIJ only)

Field 'EE'

0	None
1	Code 39
2	Interleaved 2-of-5
3	Not Used

4	EAN/UPC
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Field 'FF'	Baud Rate	Printer	DIL Switches 1, 2 MJ, CC, CB2, CB3 Only
00	75	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	
01	150	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	
02	300	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	Off Off
03	600	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	
04	1200	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	
05	2400	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	On Off
06	4800	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	
07	9600	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	Off On
08	19200	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	On On
09	110	MJ, CC, CB2, CB3, Solo, A-Series, A-Series <i>plus</i> ,	
10	38400	A-Series, A-Series <i>plus</i>	
11	57600	A-Series <i>plus</i>	

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement

Notes:

- ★ Only fields 'FF' and 'GG' can be changed.
- For A-Series *plus* if the transport layer is TCP/IP then the serial communication information returned by the command (fields 'FF' and 'G') will be ignored.

7.4. Set the Printer Real Time Clock (INIT_CLOCK) 'C' 43h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command sets the printer internal real time clock to the date and time given in the command parameters (default is the software creation date).

Set Format: Esc/C/AA/BB/CC/CC/xx/EE/FF/GG/Eot

Query Format: Esc/C/?/Eot

AA = 2 digit number for century (19 or 20)

BB	= 2 digit number for year-of-century (00 - 99)
CC	= 2 digit number for month-of-year (01 - 12)
DD	= 2 digit number for day-of-month (01 - 31, dependent on month)
xx	= 2 digit Not used (always set to 00)
EE	= 2 digit number for hour-of-day (00 - 23)
FF	= 2 digit number for minute-of-hour (00 - 59)
GG	= 2 digit number for second-of-minute (00 - 59)

Response to Query: as command string format, with current values.

Response to set : positive or negative acknowledgement

Note:

- A-Series **plus** only supports year (2001 to 2038)

7.5. Read/Load Month Name Table (INIT_DATE_MONTHS) 'D' 44h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command allows the text strings used for month name entries to be set up or returned to the terminal.

Set Format: Esc/**D**/AAA/BBB/CCC/DDD/EEE/FFF/GGG/HHH/III/JJJ/KKK/LLL/Eot

Query Format: Esc/**D**/?/Eot

AAA	= 3 characters for month 01 (AAA-zzz or space) (Default JAN)
BBB	= 3 characters for month 02 (AAA-zzz or space) (Default FEB)
CCC	= 3 characters for month 03 (AAA-zzz or space) (Default MAR)
DDD	= 3 characters for month 04 (AAA-zzz or space) (Default APR)
EEE	= 3 characters for month 05 (AAA-zzz or space) (Default MAY)
FFF	= 3 characters for month 06 (AAA-zzz or space) (Default JUN)
GGG	= 3 characters for month 07 (AAA-zzz or space) (Default JUL)
HHH	= 3 characters for month 08 (AAA-zzz or space) (Default AUG)
III	= 3 characters for month 09 (AAA-zzz or space) (Default SEP)
JJJ	= 3 characters for month 10 (AAA-zzz or space) (Default OCT)
KKK	= 3 characters for month 11 (AAA-zzz or space) (Default NOV)
LLL	= 3 characters for month 12 (AAA-zzz or space) (Default DEC)

Response to Query: as command string format, with current values.

Response to set : positive or negative acknowledgement.

7.6. Read/Load Day Name Table (INIT_DAYS) 'E' 45h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command allows the text strings used for day name entries to be set up or returned to the terminal.

Set Format: Esc/**E**/AAA/BBB/CCC/DDD/EEE/FFF/GGG/Eot

Query Format: Esc/**E**/?/Eot

AAA	= 3 characters for weekday 1 (AAA-zzz or space) (Default MON)
BBB	= 3 characters for weekday 2 (AAA-zzz or space) (Default TUE)
CCC	= 3 characters for weekday 3 (AAA-zzz or space) (Default WED)
DDD	= 3 characters for weekday 4 (AAA-zzz or space) (Default THU)
EEE	= 3 characters for weekday 5 (AAA-zzz or space) (Default FRI)
FFF	= 3 characters for weekday 6 (AAA-zzz or space) (Default SAT)
GGG	= 3 characters for weekday 7 (AAA-zzz or space) (Default SUN)

Response to Query: as command string format, with current values.

Response to set: positive or negative acknowledgement

7.7. Load/Read Character Set (CHAR_SET) 'X' 58h

Printers:- MJ, CC, CB2, Solo.

This command may be used to read a character set from the printer or load a character set to the printer. The checksum is the sum of all hexadecimal values in the 'char set data' portion of the command, calculated modulo 64K, (last significant two bytes) , derived by simply adding all the HEX data in the character set, then sent as four ASCII characters. When B=X, the checksum value returned by the printer is the same as that for B=A.

When downloading character fonts to RAM, the data will be lost during power down unless suitable battery backed RAM devices or sockets are used. Some, older, "Serial Interface" cards will need to be modified to allow RAM in the second character set.

Printers:- A-Series

This command may be used to read the logos from a Codebox character set and store them in the A-Series Label Store. The logos are extracted and stored with the names "1" to "8". The query command will return the logos in the same format if they are stored with the above names. ***The command will only work with 16 drop and 21 drop logos.*** The command was designed for use with the DOS version of Jetlink only.

Set Format: Esc/**X**/A/B/...char set data.../CCCC/Eot

Query Format: Esc/**X**/A/B/?/Eot

A = 1 digit, character set store selector 1 or 2 (Not used on A-Series)

B	= 1 character, portion selector		
X	= nothing	0	Characters for 0 bytes of data
A	= full character set	16384	Characters for 8192 bytes of data
B	= 7x5 character data	480	Characters for 96x5 strokes
C	= 7x7 character data	672	Characters for 96x7 strokes
L	= logo portion only	8192	Characters for 4096 bytes of data
/...char set data.../ = stroke data in		<u>ASCII</u>	characters 30 to 39, 41 to 46
CCCC = check sum as		<u>ASCII</u>	characters 30 to 39, 41 to 46

Response to Query: negative acknowledgement
Response to set: negative acknowledgement

7.8. Read/Load Alpha Hours Characters (INIT_ALPHA) 'Y' 59hPrinters:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command allows the 24 characters used with the Alpha Hour option to be set up or returned to the terminal.

Set Format: Esc/**Y**/AAA.....AAA/Eot

Query Format: Esc/**Y**/?/Eot

AAA.....AAA = 24 Characters (A-z 0-9 or space)

Default = ABCDEFGHJKLMNPQRSTUVWXYZ

Response to Query: as command string format, with current values.

Response to set: positive or negative acknowledgement

7.9. Read Checksums (READ_CHECKSUM) '!A' 21H 41hPrinters:- MJ, CC, CB2, CB3, Solo

Query format: Esc/**!A**/?/Eot

Response to Query: Esc/**!A**/AAAA/BBBB/CCCC/Eot

AAAA = 4 ASCII digit Programme (IC7) Checksum

BBBB = 4 ASCII digit Character Set 1 (IC9) Checksum

CCCC = 4 ASCII digit Character Set 2 (IC7) Checksum

8. Printer Control Commands and Responses

8.1. Print Go Delay (SET_DELAY) 'F' 46h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will set the delay between receiving a print go signal and starting printing. The delay is measured in stroke go pulses.

Set Format: Esc/**F**/A/BBBB/Eot

Query Format: Esc/**F**/A/?/Eot

A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

BBBB = 4 digits, delay value. 0000 to 9999 (default 0000)

Response to Query: as command string format, with current value.

Response to Set: positive or negative acknowledgement

Note:

- A300 and A-Series **plus** will interpret delay values of 0 and 1 as 2
- A-Series **plus** supports the delay value from 00000 to 65535 (Field BBBBB).

8.2. Auto-repeat Printing (SET_REPEAT) 'G' 47h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command specifies the number of additional times that a message is printed for each print-go command signal, provided that the signal remains in the active state. Entering 99 signifies continuous printing while the print-go signal is active.

Set Format: Esc/**G**/A/BB/CCCC/Eot

Query Format: Esc/**G**/A/?/Eot

A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

BB = 2 digits repeat number 00 to 99 (99 = continuous default 00)

CCCC = 4 digits repeat pitch, 0000 to 9999 strokes (default 0000)

Response to Query : as command string format, with current values.

Response to Set: positive or negative acknowledgement

Notes

- A-Series and A-Series **plus** will interpret repeat pitch values of 0 and 1 as 2
- For A-Series **plus**, the returned repeat value is 5 digits (Field CCCCC).

8.3. Auto-reverse Printing (SET_AUTOREV) 'H' 48h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series

This command causes the direction of the printed message to be reversed after a set number of prints, or (if set to 999) to be controlled by an external signal.

Set Format : Esc/**H**/A/BBB/Eot

Query Format: Esc/**H**/A/?/Eot

A = 1 digit head select 1 to 4

BBB = 3 digits 000 to 254 (999 = external default 000)

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement

Notes

- When set to 999, if the user port is not detected or not enabled, the printer will acknowledge the request but no action will be taken.

8.4. Printing Acknowledgement Flags (SET_ACK) 'I' 49h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command causes a character to be sent out of either the serial port or over the TCP/IP interface of the printer after each printed message.

Set Format : Esc/**I**/A/B/Eot

Query Format: Esc/**I**/A/?/Eot

A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

B = 1 char 1 to 4 or A to Z (default is 'OFF')

Response to Query: as command string format, with current value, or negative acknowledgement.

Response to set: positive or negative acknowledgement

Notes

- The print acknowledgement is transmitted as the single character specified, without a command header or terminator.

- If field B = a, b, c or d, then printing acknowledgement codes (1CH), (1DH), (1EH) or (1FH) will be generated, respectively. ASCII 'space' turns the function off.
- If field B = space the function is turned off

8.5. Flight Time Compensation (SET_FLIGHT_TIME) 'J' 4Ah

Printers:- CB2, CB3, Solo, A-Series, A-Series **plus**

This command sets the time of flight compensation, which is a means of keeping the printed text in the same place irrespective of changes in substrate speed.

The delays between detecting the print go signal and having the drops arrive at the substrate is a combination of three different delays:

- The time the photocell takes to 'see' the product.
- The time the programme takes to prepare the message.
- The time it takes for the drop, once charged, to arrive at the substrate.

There is an initial compulsory pre-print delay which is reduced more and more as the line speed increases so that at low line speeds there is a small delay before the first drops are charged, but at high line speeds the first drops are charged immediately.

Set Format: Esc/J/A/CCC/Eot

Query Format: Esc/J/A/?/Eot

A	=	1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series plus and A-Series plus Duo.
B	=	S - FLIGHT_PATH_TIME P - LABEL_PREPARATION_TIME D - PRODUCT_DETECTOR_RESPONSE
CCC	=	For MJ, CC, CB3, CB3, Solo 3 digit flight delay 000 to 255 For A-Series 3 digit flight delay 000 to 063 For A-Series plus and A-Series plus Duo 4 digits flight delay 0000 – 9999

Response to Query: as command string format but with B, fixed data (Esc/J/A/B/CCC/Eot), and current value.

Response to set: positive or negative acknowledgement

Notes

- The default values will vary from one program to another and unless advised to change it should be left at the default.
- If the code moves back down the product at high speeds increase the value BBB, if the code is advanced at high speeds decrease the value of BBB.
- When messages are printed very close together the print go signal may be ignored because the last print is not finished yet. In these cases the flight time delay can be reduced. However the code will move as the line speed varies, and there needs to be a minimum of 4 ms between the end of one print and the beginning of the next for the other parts of the system to function correctly.
- Support for D = PRODUCT_DETECTOR_RESPONSE will not be provided on A-Series **plus** printers.

Printers:- CB2, CB3, Solo,

This is an alternative to the command above, and is used when the time of flight, label preparation time, and product detector response, are to be set individually.

Set Format: Esc/**J**/A/C/ddd/Eot

Query Format: Esc/**J**/A/C/?/Eot

A = 1 digit head select 1 to 4

C = 1 character sub command character

S = drop flight time as in the above command.

P = label preparation time 000 499 @ 100µS (default 020 or 2mS).

D = product detector response time 000-999 @ 10µS (default 010 or 100µS)

ddd = 3 digit value as detailed below

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement

Note: The default values will vary from one program to another and unless advised to change it should be left at the default.

8.6. Product Detector Assignment (SEL_P_GO_IN) 'K' 4Bh

Printers:- MJ, CC, CB2, CB3, Solo

This command selects which print go input is used for a given print head.

Set Format: Esc/**K**/A/B/Eot

Query Format: Esc/**K**/A/?/Eot

A = 1 digit head select 1 to 4

B = 1 digit print go input select 0 to 2 (0 disables default is 1)

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Note: It is invalid to have two heads using two photocells if they are both using the same message number. Any such attempt will solicit a negative acknowledgement.

8.7. Active Product Detect Signal Level (SEL_P_GO_LEVEL) 'L' 4Ch

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command selects the logic high or low level as the trigger for the Print Go signal.

Set Format: Esc/**L**/A/B/Eot

Query Format: Esc/**L**/A/?/Eot

A = 1 digit product detector select (1 or 2). For A-Series and A-Series **plus** this will only be 1

B = 1 character (H or L) signal level

Response to Query : as command string format, with current value.

Response to set: positive or negative acknowledgement

Note: During first initialisation, or initialisation following the reset of the battery-backed memory, the printer monitors the product detector input and assumes that the values read correspond to their inactive states.

8.8. Product Detect Signal Persistence Time (SET_P_GO_TIME) 'M' 4Dh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command sets the minimum time (number of strokes) for which a change in state of a product detector signal has to persist before it takes effect.

Set Format : Esc/**M**/A/BB/Eot

Query Format: Esc/**M**/A/?/Eot

A = 1 digit product detector select 1 or 2.

BB = 2 digits minimum persistence, 00 to 99 strokes

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Note:

- As this is a number of strokes not real time care must be taken when the print signal is a fixed duration pulse and stroke pulses are from a shaft encoder, at low product speeds the print signal duration may not be long enough to initiate a print.
- A300 will interpret persistence values of 0 and 1 as 2
- For A-Series **plus** the Product Detect Signal Persistence Time value can be set up to 9999 (Field BBBB), but can be returned up to 65535.

8.9. Software Print Go (SOFT_P_GO) 'N' 4Eh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will initiate printing as though a print-go signal had been received at the nominated product detector.

Set Format : Esc/**N**/A/Eot

A = 1 digit print go input 1 or 2. (2 is only available on a Macrojet)

Response to Set: Positive or negative acknowledgement.

8.10. **Get message from store and put online. 'P' 50h**

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command is used to put a message on-line from the store.

Set Format : Esc/**P**/A/BBB/Eot

Query Format: Esc/**P**/A/?/Eot

A = 1 digit head select, 1 to 4. (Heads 2, 3 and 4 are only available on a Macrojet).

BBB = 3 digits message buffer select 001 to MAX_NUM_MSG

Response to Query: As command string format.

Response to set: Positive or negative acknowledgement.

Note:

- Due to the extensive message checking that MJ, CC, CB, CB3 and Solo printers software carries out the next message may not be available to be printed for 250-750ms
- For MJ and Solo printers it is invalid to have two heads using two photocells if they are both using the same message number. Any such attempt will result in a negative acknowledgement.
- For A-Series *plus* the message slot ID is the BBB (3 digits) field
- For A-Series *plus* Duo the message to head assignment shall still apply to both jets – i.e. there will be no functionality to access each jet individually.

8.11. **Head Enable (HEAD_ENABLE) 'Q' 51h**

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command enables or disables printing on the specified print head.

Set Format: Esc/**Q**/A/B/Eot

Query Format: Esc/**Q**/A/?/Eot

A = 1 digit head select, 1 to 4. (Heads 2, 3 and 4 are only available on a Macrojet).

B = 1 character head enable Y = enable or N = disable

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Note: For A-Series **plus** Duo the command shall apply to both jets – i.e. there will be no functionality to enable or disable one jet individually.

8.12. Clear All Messages (CLEAR_ALL_MESS) 'R' 52h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will take all messages off-line

Set Format: Esc/**R**/Eot

Response to Set: Positive or negative acknowledgement

8.13. Store Message with Name as 3 digits. 'S' 53h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will allow messages to be sent to the message store and stored using a 3 character/digit message name. The command also allows the message to be queried.

Set Format: Esc/**S**/AAA/.. message text ../Eot

Query Format: Esc/**S**/AAA/?/Eot

AAA = 3 digit message buffer number 001 to MAX_NUM_MSG, Although on some printer types this can be characters but it is always advised to use digits.

..message text.. = ASCII characters (20H-7FH) or embedded format commands.

Response to Query: as command string format. Esc/**S**/AAA/.. message text ../Eot.

Response to set: positive or negative acknowledgement

Notes

- For MJ when there is more than one head, the default message numbers will be 001 to head 1, 002 to head 2, etc.
- Care should be taken if a message containing a serial number is assigned to two heads. The serial number will be incremented as both heads print. The serial numbers printed by one head may not, therefore, be continuous.
- For A-Series products, MAX_NUM_MSG is 063
- For A-Series **plus** products, MAX_NUM_MSG is 127 for an A100 plus and 255 for other A-Series **plus** variants. The message buffer number will be used as the message name and its location. If the location (number) is already occupied on the printer, it shall be overwritten.
- For A-Series **plus** products, the message shall be stored / read from the current message store selected.

Worked examples:

1) Transfer a simple message to the printer store.

To printer

1B	53	39	39	39	48	65	6C	6C	6F	20	57	6F	72	6C	64	04
ESC	S	9	9	9	H	e	l	l	o		W	o	r	l	d	EOT
ESC	Command ID	Message Name		Message Data												EOT

From Printer

06
ACK

2) Transfer complex message to printer

We are going to create the following message and store it on the printer as message named 123.

¹⁻⁷3¹⁶₂₋₇⁷2¹⁶₃₋₇⁷1¹⁶₄₋₇⁷6²¹₇⁷2¹

1B	53	31	32	33	1B	75	31	31	2D	37	1B	75	34	33	32	1B
ESC	S	1	2	3	ESC	u	1	1	-	7	ESC	u	4	3	2	ESC
ESC	Command ID	Message Name			ESC	Font Height		Message data			ESC	Font Height		Message data		ESC

75	32	31	36	1B	75	31	37	1B	75	32	31	36	1B	75	31
u	2	1	6	ESC	r	1	7	ESC	u	2	1	6	ESC	u	1
Font Height				CR		Message data		Font Height			Message data		Font Height		

37	20	20	20	20	1B	75	33	32	31	1B	75	31	37	1B	72
7					ESC	u	3	2	1	ESC	u	1	7	ESC	r
Message data					Font Height			Message data		Font Height			Message data		CR

1B	75	31	32	2D	37	37	1B	75	32	31	36	1B	75	33
ESC	u	1	2	-	7	7	ESC	u	2	1	6	ESC	u	3
Font Height				Message data			Font Height			Message data		Font Height		

32	31	1B	72	33	2D	37	1B	75	32	31	36	31	36	1B	75	31	37
2	1	ESC	r	3	-	7	ESC	u	2	1	6	1	6	ESC	u	1	7
Message data		CR		Message data			Font Height			Message data				Font Height			Message data

1B	72	1B	75	31	34	2D	37	37	37	20	20	20	20	37	04
ESC	r	ESC	u	1	4	-	7	7	7					7	EOT
CR		Font Height			Message data										EOT

From Printer

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ACK

3) Transfer a message that embeds a Serial number in a Bar Code and also prints the serial number as a number next to it as illustrated below. The Bar Code type used is 2 of 5 interleaved with no check sum



To printer

1B	53	37	38	39	1B	71	32	1B	6A	31	4E
ESC	S	7	8	9	ESC	q	2	ESC	j	1	N
ESC	Command ID	Message Name			ESC	Insert Barcode	2of5 interleaved no checksum	ESC	Insert Serial Number	Serial num ID	Not Batch Linked

30	36	30
0	6	0
Numeric Field Width		First Numeric Limit

30	30	30	30	30	39	39	39	39	39	39	30	30	30	30	30	31	59
0	0	0	0	0	9	9	9	9	9	9	0	0	0	0	0	1	Y
1 st Numeric Limit					2 nd Numeric limit						Numeric Step Size					Has leading zeros	

4E	30	30	30	36	37	38	39	30	30	30	30	30	4E	1B	71	30	1B
N	0	0	0	6	7	8	9	0	0	0	0	0	N	ESC	q	0	ESC
No suffix or Prefix	Start Value							No of times each number will be repeat printed					Numeric steps	ESC	End of barcode	ESC	

6A	32	4E	30	36	30	30	30	30	30	30	30	39	39	39	39	39	39
j	2	N	0	6	0	0	0	0	0	0	0	9	9	9	9	9	9
Insert Serial Number	Serial Num ID	Not Batch Linked	Numeric Field Width	1 st Numeric Limit								2 nd Numeric limit					

30	30	30	30	30	31	59	4E	30	30	30	36	37	38	39
0	0	0	0	0	1	Y	N	0	0	0	6	7	8	9
Numeric Step Size						Has leading zeros	No suffix or Prefix	Start Value						

30	30	30	30	30	4E	04
0	0	0	0	0	N	EOT
No of times each number will be repeat printed					Numeric steps	End of file

From Printer

06
ACK

8.14. Product Counting (PROD_COUNT) 'T' 54h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command resets or reads the specified product counter within the printer.

Set Format: Esc/**T**/A/0/Eot (Reset counter)

Query Format: Esc/**T**/A/?/Eot (Interrogate counter)

A = 1 digit, counter identity 1 or 2.

Response to Query: Esc/**T**/A/NNNNNN/Eot – where NNNNNN = 6 digits product count.

Response to Reset: positive or negative acknowledgement

Note:

- The count is of photocell transitions and not necessarily codes printed. For example, on a CIJ machine the HV may be 'OFF'.
- For A-Series *plus* response to query will be NNNNNNNNNN a 10 digit number padded with leading zeros.
- For A-Series *plus* counter 2 (“Prints since power on”) can only be reset if it is configured to be persistent (“Resettable counter 2”). A NAK will be returned on attempting to reset or query counter 2 if it is non-persistent (“Prints since power on”).

8.15. Read/Update Serial Number (SERIAL) 'U' 55h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command is used to read back or update the next value of the specified serial number to be used for printing in the specified message.

Set Format: Esc/**U**/AAA/B/C..C/Eot

Query Format: Esc/**U**/AAA/B/?/Eot

AAA = 3 digit message buffer number 001 to MAX_NUM_MSG

B = 1 digit serial number identity 1 or 2

C..C = current or new serial number value.

Response to Query: as command string format.

Response to set: positive or negative acknowledgement

Note:

- Any serial number update value must comply with the width and range limits used to create the number in the first place.
- For A-Series products, MAX_NUM_MSG is 063
- For A-Series **plus** products, MAX_NUM_MSG is 127 for an A100 plus and 255 for other A-Series **plus** variants. The message buffer number will be used as the message name and its location. If the location (number) is already occupied on the printer, it shall be overwritten.

8.16. Read Stroke Output Period (STROKE_PERIOD) 'V' 56h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will return the current stroke output period.

Query Format: Esc/**V**/??/Eot

Query Response: Esc/**V**/NNNNN/Eot – NNNNN = 5 digits stroke output period in uS.

Note: A response of ????? will mean that the stroke period exceeds the measurement capability of the printer, i.e. very slow stroke rate.

8.17. Read Modification Level (MOD_STATE) 'W' 57h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

On MJ, CC, CB this command is used by the Pocket Terminal to identify the functions allowed on a particular machine's software. If the software is release _20 or earlier the response will be NAK 003. The command is Query only and returns the Release Number or Modification Status of the Software.

On A-Series, A-Series *plus* this command is only implemented in order to maintain compatibility.

Query Format: Esc/**W**/~/Eot

A = the Modification Status

Query Response: Esc/**W**/A/Eot

Note: A = Always returns 2 for A-Series and A-Series *plus*.

8.18. Get Software Real-time clock (GET_SW_RTC) 'Z' 5Ah

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command is used as 'what if' enquiry to read back the various ways the clock would be printed if offset by the enquiry parameters.

Set Format : Esc/**Z**/YYY/DDD/HHH/MMM/Eot

Query Format: Esc/**Z**/~/Eot

YYY	= 3 digits years offset	(000-099)
DDD	= 3 digits days offset	(000-366)
HHH	= 3 digits hours offset	(000-023)
MMM	= 3 digits minutes offset	(000-059)

Response to set: positive or negative acknowledgement

Response to Query: Esc/**Z**/AA/BBB/CCCC/DD/EEE/FF/GG/HHH/II/J/KK/LL/M/Eot

AA	= 2 digits day of the month	(00-31)
BBB	= 3 digits Julian day of the year	(000-366)
CCCC	= 4 digits year number	(1900-2199)
DD	= 2 digits month number	(00-12)
EEE	= 3 digits month name	(Jan-Dec)
FF	= 2 digits hour-of-day	(00 to 23)

GG	= 2 digits quarter hour count	(00 to 96)
HHH	= 3 digits day of the week	(Mon-Sun)
II	= 2 digits week of the year	(01-53)
J	= 1 digit day of the week	(1-7)
KK	= 2 digits minutes of the hour	(00-59)
LL	= 2 digits seconds of the minute	(00-59)
M	= 1 character Alpha hour	(A-z 0-9)

Notes:

- The M field is only returned if MOD_STATE >0
- This is used to **read** the clock (with offset) not to set it, if you want to "set" the printer's real-time clock the INIT_CLOCK command "C" should be used.
- On A-Series and A-Series **plus** this command is only implemented in order to maintain compatibility it will not Set or Get any data.

8.19. Continuous Printing (SET_CONTINUE) '[' 5Bh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command is similar to Auto Repeat, but the printing will continue without having to set a "Number to Print" field. More importantly, any clock or numbering data will be updated before each print.

Set Format: Esc/[A/B/CCCC/Eot

Query Format: Esc/[?/Eot

A	= 1 digit head select, 1 to 4. (Heads 2, 3 and 4 are only available on a Macrojet).
B	= 1 character on/off, "Y" = On, "N" = Off
CCCC	= 4 digits inter message pitch - 0000 to 9999

Response to Query: as command string format.

Response to set: positive or negative acknowledgement

Notes

- The pitch is from the front of one message to the front of the next message.
- The accuracy of the repeat pitch will be subject to many variables, especially the inclusion of clock and numbering, so accuracy cannot be guaranteed.
- A-Series and A-Series **plus** will interpret pitch values of 0 and 1 as 2
- A-Series **plus**, the returned repeat value is 5 digits (Field CCCCC).

8.20. Auto-inverted Printing (AUTO_INV) '\' 5Ch

Printers:- MJ, CC, CB2, CB3, Solo, A-Series

This command will cause every other print to be printed upside down. This is used, for example, to print onto cables where the codes need to be read from either direction.

Set Format : Esc/\A/B/Eot

Query Format: Esc/\?/Eot

A = 1 digit head select 1 to 4. (Heads 2, 3 and 4 are only available on a Macrojet).

B = 1 character on/off "Y" = On "N" = Off

Response to Query: as command string, with current value

Response to set: positive or negative acknowledgement

8.21. Handle Text (INSERT_TEXT) '<' 3Ch

Printers:- A-Series **plus**

This command reserves a number of spaces within a message.

Set Format: Esc/</A/Eot

Query Format: Esc/</?/Eot

A = Number of spaces

Response to set : positive or negative acknowledgement

Response to Query : as command string, with current value

8.22. External Message Select (EXTERNAL_SELECT) '@' 40h

Printers:- CB2, CB3, Solo, A-Series, A-Series **plus**

This command is used to enable or disable external message selection. Once enabled this facility will allow the selection of one of a number of pre-defined messages.

Set Format: Esc/@/A/Eot

Query Format: Esc/@/?/Eot

A = 1 character Y or N

Response to Query: as command string format.

Response to set: positive or negative acknowledgement

Note:

- For A-Series printers the only valid messages names which may be used are 001-063.
- For A-Series **plus** A100 the only valid messages names which may be used are 001-127.

- For A-Series **plus** A300 and A-Series **plus** Duo the only valid messages names which may be used are 001-255.
- For CB2, CB3, Solo

User ports are connected as follows:

- J = Bit0
- K = Bit1
- N = Bit2
- P = Bit3

All inputs are active low.

1. A selection of message number 0 (all inputs high) will assign message 16
2. Changing a message can take 250-750mS depending on the type of data in the message.
3. This facility is not available on Macrojet and Casecoder due to the limited number of user ports, and the use of user ports for print go.
4. This facility is only available if MOD_STATE > 0.

8.23. External Serial Number Reset, Rollover and Update 'J' 5Dh

Printers:- A-Series, A-Series **plus**

Set Format: ESC/J/A/B/C/D/E/F/GG/HH/Eot

- A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.
- B = 1 digit serial number select 1 or 2
- C = enable or disable internal updates (each character either E or D)
- D = Disable or active high or low for rollover (each character either H, L, or D)
- E = Disable or active high or low for update (each character either H, L, or D)
- F = Disable or active high or low for reset (each character either H, L, or D)
- GG = Rollover pulse width (01-99 – 00 ignore)
- HH = Input pulse width (01-99 – 00 ignore)

Response to set: positive or negative acknowledgement

8.24. Read Liquid Levels (LIQUID_LEVELS) 'y' 79h

Printers:- A-Series

This command will return the current Ink and Makeup levels

Query Format: Esc/y/?/Eot

Query Response: Esc/y/AAABBB/Eot

AAA = 3 digits that represent the Ink Level

BBB = 3 digits that represent the Makeup Level

Note: This command is ONLY available for the A-Series PI-OEM machine variant.

9. Printer Status Commands and Responses

9.1. Status Reporting Mode (STATUS_REPORT_MODE) '0' 30h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command sets the mode for the reporting of status changes.

Set Format: Esc/**0**/A/B/Eot

Query Format: Esc/**0**/?/Eot

- A = Unsolicited reporting Y = enable, N = disable (Default N)
- B = Mode control 0 to 7 (On CB, CB3 and Solo default from DIL switch 4, ON=1 OFF=7)
- 0 = No Error Reporting
 - 1 = Serial Interface Status
 - 2 = Fault Monitor Status
 - 3 = Serial Int. and Fault Monitor Status
 - 4 = Ink Monitor Faults
 - 5 = Serial Int. and Ink Monitor Status
 - 6 = Fault Monitor and Ink Monitor Status
 - 7 = Serial Int. Fault Monitor and Ink Monitor Status

Response to Query: as command string format, with current values.

Response to set: positive or negative acknowledgement.

Note: Whatever the setting of field A the errors selected in field B are logged for inspection with the STATUS command 31h.

9.2. Status Request (STATUS) '1' 31h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command will cause the printer to send its current or historical status, whether unsolicited reporting is enabled or not. Unsolicited status reports will be generated (without asking) if reporting is enabled and a change of status occurs. The printer buffers the last 16 status change reports in a FIFO queue until this command is received requesting "historical" status. It then transmits the oldest report that it has buffered and deletes it. If no reports have been buffered by the printer since the last status request was serviced, then a single current status message will be returned to the host system. This is also the case when "current" status is requested.

Query Format: Esc/**1**/A/?/Eot

Query Response: Esc/**1**/A/SSS/B/HHMM/Eot

A = 1 character, H = historical, C = current.

B = 1 digit jet number (0 if not applicable)
 HHMM = 4 digits, status change time (24 hour clock)
 SSS = 3 digits, giving the current status 000 to 999

Field 'SSS'

0xx = Status changed from abnormal to normal.
 1xx = Status changed to abnormal (Warning).
 2xx = Status changed to abnormal (Printing inhibited).
 9xx = Undefined status codes.

Where xx =

00 Printer Ready - Normal = 000; Fault condition = 100
 01 Printer SW (re)start - memory retained OK
 02 Printer SW (re)start - memory cleared to defaults
 03 Lid detected open
 04 Charge circuit (failed = 104; recovered = 004)
 05 Solvent level - low = 205; OK = 005
 06 Solvent empty - displays as 206
 07 Ink Level - OK = 007; Low = 107
 08 24 Hours to sump expires (Only displays as 108)
 09 2 Hours to sump expires (Only displays as 109)
 10 Head purge (activated = 110; deactivated = 010)
 11 Stroke Rate (OK = 011; Too Fast = 111)
 12 Printer SW (re)start - head configuration changed (Only displays as 112)
 13 Printer SW (re)start - first character set absent (Only displays as 213)
 14 Printer SW (re)start - incompatible first character set (Only Displays as 214)
 15 Second character set absent (Only displays as 115)
 16 Incompatible second character set (Only Displays as 116)
 17 Missed output stroke(s) due to high stroke rate (Only displayed as 117)
 18 Ink bag (empty = 118; OK = 018)
 19 Not Used See Other below
 20 Ink monitor (normal = 020)
 21 Viscosity out of normal working range (Only displays as 221)
 22 Viscometer timed out (Only displays as 222)
 23 Wrong sump installed (Only displays as 223)
 24 Sump empty - supersedes ink low 107, (Only displayed as 224)
 25 Sump expired -supersedes sump 2 hours warning 109, (Only displayed as 225)
 26 EHT supply (failed = 226; recovered = 026)
 27 Ink on charge electrode (detected = 227; OK = 027)
 28 Phase lock (lost = 228; recovered = 028)
 29 Charge circuit (tripped off = 229; recovered = 029)
 30 Modulation (failed = 230; recovered = 030)
 31 Jet alignment (miss-aligned = 231; OK = 031)
 32 Temperature out of normal working range (Only displayed as 232)
 33 Pressure out of normal working range Only displayed as 233)
 99 Undefined Alert (Only displayed as 999)
 Other Undefined Condition (software error).

Notes:

- For A-Series **plus** printers, the following values (in field 'SSS') are unsupported: 01, 02, 03,12,13,14. (A negative Ack will be returned to any request)
- For A-Series **plus** Duo printers, field 'B' shall indicate the affected jet – a value of 1 shall indicate jet 1, a value of 2 shall indicate jet 2 and a value of 3 shall indicate both jets.

10. Global Format Commands and Responses

Global commands act on every message that is to be printed once they are switched on. Global commands are in addition to embedded ones so if you have set via embedded command to print bold using the global bold as well will create a bold, bold message.

10.1. Reverse Message Print Sequence (MESS_REV) 'a' 61h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will cause all messages to be printed starting from the last field back to the first with each message field reversed until it is switched off.

Set Format: Esc/**a**/A/B/Eot

Query Format: Esc/**a**/A/?/Eot

A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

B = 1 character Y = reverse or N = forward

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Note: For A-Series **plus** Duo printers this setting shall be common for both jets.

10.2. Print Message Bold (MESS_BOLD) 'b' 62h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will cause all message to be printed out in bold characters (each vertical stroke to be printed twice) until it is switched off.

Set Format: Esc/**b**/A/B/Eot

Query Format: Esc/**b**/A/?/Eot

A = 1 digit head select 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

B = 1 character Y = bold or N = normal

Response to query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Note: To achieve printing of individual message elements in bold use command k.

10.3. Print Message Double Space (DOUBLE_SPACE) 'c' 63h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series **plus**

This command will cause the message to be printed out with double spacing.

Set Format: Esc/**c**/A/B/Eot

Set Query: Esc/**c**/A/?/Eot

A = 1 digit head select 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

B = 1 character Y = double or N = normal

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Notes: See embedded commands for the A-Series version of this command which not Global.

10.4. Reverse Individual Characters (CHAR_REV) 'd' 64h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command causes each individual field in the message to be printed in reverse, or forward if "message reverse" is in force.

Set Format: Esc/**d**/A/B/Eot

Query Format: Esc/**d**/A/?/Eot

A = 1 digit head select 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

B = 1 character Y = reverse or N = forward

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

10.5. Inverted Printing (CHAR_INV) 'e' 65h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command causes the characters to be printed upside down.

Set Format: Esc/**e**/A/B/Eot

Query Format: Esc/**e**/A/?/Eot

A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.

B = 1 character Y = invert or N = normal

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement

Note: For A-Series **plus** Duo printers this setting shall be common for both jets.

10.6. Barcode Thickness Ratio (BAR_RATIO) 'f' 66h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command is used to adjust the ratio of bar and space element thickness employed in barcode printing. It allows the user to optimise the readability of the resulting barcode.

Set Format: Esc/f/A/B/C/D/E/F/Eot

Query Format: Esc/f/A/B/?/Eot

- A = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series **plus** and A-Series **plus** Duo.
- B = 1 digit barcode type 1 to 9
- C = 1 digit strokes for thin bar / space 1 or 2 (A-Series **plus** : The module width 1 to 10)
- D = 1 digit strokes for thin-medium bar / space 0 to 7 (A-Series **plus** : Space to module width ratio 1 or 2 which maps to 1:1 or 2:1)
- E = 1 digit strokes for thick-medium bar / space 0 to 8 (A-Series **plus** : Wide to module width ratio 0 to 8 which maps to 2.0:1 to 2.8:1. The resulting ratio will be the wide ratio multiplied by the module width and rounded up to the nearest integer)
- F = 1 digit strokes for thick bar / space 2 to 9 (A-Series **plus** : This is not used)

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

Field 'B'

- 1 = Code 39
- 2 = 2 of 5 Interleaved
- 3 = USPS
- 4 = EAN / UPC

Fields C,D,E,F

Code 39 - Element widths : narrow 1, wide 3 (A-Series **plus** : Default module width is 1 space to module width ratio is 1:1 and wide to module width ratio is 2:1)

Interleaved 2 of 5 - Element widths : narrow 1, wide 3 (A-Series **plus** : Default module width is 1, space to module width ratio is 1:1 and wide to module width ratio is 2:1)

EAN/UPC - Element widths : narrow 1, medium_1 2, medium_2 3, wide 4 (A-Series **plus** : The widths can be increased or reduced only by changing the module width).

Note: For A-Series **plus** Duo printers this setting shall be common for both jets.

10.7. Global Print Format (SET_FORMAT) 'g' 67h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command sets the global attributes for the printed message orientation, collectively.

Set Format: Esc/**g**/A/B/C/D/E/F/Eot

Query Format: Esc/**g**/A/?/Eot

- | | |
|---|--|
| A | = 1 digit head select, 1 to 4. This shall be always 1 for A-Series, A-Series plus and A-Series plus Duo. |
| B | = 1 char, reverse message Y or N |
| C | = 1 char, print all bold Y or N |
| D | = 1 char, double space Y or N |
| E | = 1 char, invert Y or N |
| F | = 1 char, reverse characters Y or N |

Response to Query: as command string format, with current values.

Response to set: positive or negative acknowledgement.

Note:

- No support for option F in A-Series **plus**. The request will always return N for that option.
- For A-Series **plus** Duo printers all settings are common to both jets.

11.Embedded Commands and Responses

These commands are embedded within the entered text of individual print messages. They have effect over parts of the printed message and are additional to any global format commands that may be in force at the time of printing. They affect the specified message only.

Note that all of the commands in this group have no "End Of Text" character and normally solicit no response from the printer. However, any unrecognised, out of range or invalid value entered, or an excessive print message length, will cause a negative acknowledgement to be generated when the next "End Of Text" character is encountered.

11.1. Handle Text (INSERT_TEXT) '<' 3Ch

Printers:- A-Series *plus*

This command adds a number of spaces within a message.

Set Format: Esc/</A/Eot

Query Format: Esc/</?/Eot

A = Number of spaces

Response to set: positive or negative acknowledgement

Response to Query: as command string format, with current values.

11.2. Start Double Space printing of messages (START_DOUBLE_SPACE) 'c' 63h

Printers:- A-Series

This command will cause all the message from that point forward to be printed out with double spacing until the command is switched off or the EOT is encountered.

Format: Esc/c/

Note: For all other printers see command c in the global section.

11.3. Change Unicode Page (SET_UNICODE_PAGE) 'h' 68h

Printers:- A-Series, A-Series *plus*

Characters are by default from Unicode page number 00. This page number can be altered with the following command;

Format Esc/h/XX/

XX = A two digit hex page number in upper case.

E.g. ESC\h\10 would change the Unicode page to 0x10 (Dec 16).

11.4. Select Character (SEND_CONTROL_CHAR) 'i' 69h

Printers:- A-Series, A-Series *plus*

Selects a specific character from the current Unicode page.

Format Esc/**i**/XX/

XX = A two digit character number in upper case.

E.g. ESC\i\32 would select Unicode character 0x32 from the currently selected page.

11.5. Insert Serial Number (INSERT_NUM) 'j' 6Ah

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command causes a serial number to be included in the message starting at the current line and column position, and with the current character attributes. Up to 2 independent or batch linked serial numbers per print message may be entered and may be positioned anywhere in the associated print message, see notes for variations of this. Each of these serial numbers and their characteristics are initialised using the following control string.

Format Esc/**j**/A/B/CC/D..D/E..E/F..F/G/H/I/JJ/KK/L..L/MMMMM/N/

A = 1 digit serial number identity 1 or 2

B = 1 character batch link flag Y or N (Y is valid only when A=2)

CC = 2 digits numeric field width 00 to 16

D..D = first numeric limit 0..0 to 9..9, width as "CC"

E..E = second numeric limit 0..0 to 9..9, width as "CC"

F..F = numeric step size 0..1 to 9..9, width as "CC"

G = 1 character leading zeros print flag Y or N

H = 1 character prefix/suffix select P, S or N

I = 1 digit number of alpha prefix/suffix chars 0, 1 or 2

JJ = prefix/suffix characters 1st limit AA to ZZ, width as "I"

KK = prefix/suffix characters 2nd limit AA to ZZ, width as "I"

L..L = start value AA0..0AA to ZZ9..9ZZ, width as "CC" plus "I"

MMMMM = 5 digit repeat printing count for each value 00000 to 50000

N = 1 character, step order select A = Alpha N = Numeric.

Note:

- For two batch linked serial numbers, number 2 will be stepped on by the rolling over of number 1. Field "B" is always ignored for serial number 1. It is also ignored if serial number 2 is the only one entered.
- A value of "00" in field "CC" specifies an alpha only serial number. A value of "0" in field "I" specifies a numeric only serial number. If both are zero, the embedded command will be rejected.

- If leading zeros are suppressed, i.e. field "G" is "N", then spaces will be printed in place of any leading zeros. However, for a serial number embedded in a barcode, leading zeros will always be printed and suppression will be ignored.
- If the first limit value is less than the second limit value, then an incrementing number will be generated: if it is greater, a decrementing number will be generated. When both limits are equal, a fixed number will be generated.
- The start value, field "L..L", must lie within the range bounded by the specified limits.
- When using an Alpha increment, the Alpha prefix/suffix is incremented first whereas when using Numeric, the numeric part will increment first. Every message can have its own serial number associated with it. This serial numbering information is remembered for message 'n' when the printer switches from printing message 'n' to printing any of the other defined messages. In this way, serial numbering of a product by message 'n' can be resumed at a later stage from where it left off. The contents of the serial numbering definition together with the next serial number value to be printed for the message (in the start number field) will be read back whenever the stored message is used again.
- For A-Series and A-Series *plus* A100+ printer there is a limit of 1 serial number per message.
- For an A-Series and A-Series *plus* A200+/A300+ or A-Series *plus* Duo printer there is a limit of 2 serial numbers per message. For a Duo printer this limit applies across both regions.

11.6. Start Bold Characters (START_BOLD) 'k' 6Bh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

After this command is entered all characters entered will be printed double width (each vertical stroke is printed twice). This is additional to any global commands set at the time of printing. It remains in force until the stop bold characters command is found.

Format Esc/**k**/

11.7. Select 2nd Character Font (FONT_2) 'l' 6Ch

Printers:- MJ, CC, CB2, CB3, Solo, A-Series

Characters entered following this command will be printed using the 2nd character font until a select 1st character font command is encountered.

Format Esc/**l**/

Note: For A-Series this command will be acknowledged but no action will be taken.

11.8. Insert Logo (INSERT_LOGO) 'm' 6Dh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command causes the specified pre-defined Domino style logo (.lgo) to be inserted into the print message starting at the current line and column position.

Format: Esc/**m**/A/

A = 1 character logo selector.

Notes:

- Prior to implementing a logo, character height must be set to the appropriate character height applicable to the type of printer. Character height should be restored to the required value following logo entry. In the HEADER information for the logo there is a description field. The description field must contain a single character. This character is used in the protocol to insert the required logo.
- A-Series **plus** supports any character for the character logo selector (Field A), but is not case-sensitive. Therefore, any lower case value will select the same logo as it's upper case equivalent.
- For A-Series, A-Series **plus** and A-Series **plus** Duo there is a limit of 16 logos per message. For a Duo printer this limit applies across both regions.

11.9. Insert Date/Time (INSERT_CLOCK) 'n' 6Eh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command causes a specified date or time field to be inserted into the message starting at the current line and column position and with the current character attributes. The printed value will be derived from the printer's real time clock data taking into account any applicable offsets. A maximum of 4 entries of each field type is permitted in each print message, i.e. 1 per offset.

Format Esc/**n**/C/X/

C = 1 digit clock selector 1 to 4

X = 1 character as below

Char	Field	Print range
A	Date (day of month)	01 to 31
B	Day of year	001 to 366
C	Julian year (year of decade)	0 to 9
D	Year (year of century)	00 to 99
E	Year	1979 to 2199
F	Month #	01 to 12
G	Month (from INIT_DATE_MONTHS)	Jan to Dec
H	Hours (hour of the day)	00 to 23
I	Quarter hours (from 00:00:00)	01 to 96
J	Day (from INIT_DAY)	Mon to Sun
K	Week no (to BS47450)	01 to 53
L	Day # (from Mon to Sun)	1 to 7
M	Minutes	00 to 59
N	Seconds	00 to 59
O	Alpha Hour (from INIT_ALPHA)	A to Z or User Defined
P	Julian Day (Feb 29 = Day 366)	001 to 366

Notes:

- Week numbering conforms to BS 4760 : 1971. (ISO/R 2015 "Numbering of Weeks")
- Options G, J, and O may be set by means of the commands INIT_DATE_MONTHS, INIT_DAYS, and INIT_ALPHA.

- Options G, J, and O are not allowed embedded within a barcode.
- For MJ, CC, CB2, CB3, Solo, Option O only available if MOD_STATE > 0
- For an A-Series **plus** or A-Series **plus** Duo printer there is a limit of 16 clock fields (date or time) per message. For a Duo printer this limit applies across both regions.

11.10. Offset Date/Time (OFFSET_CLOCK) 'o' 6Fh

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command applies a user-supplied positive offset to inserted date or time fields in the print message.

Format Esc/o/A/B/CCC/

A = 1 digit clock selector 1 to 4

B = 1 character offset type selector

CCC = 3 digits offset value.

Field 'B'	Field 'CCC'	Offset Type
A	000 - 099	Years (carry from days modulo 100 carry to Century)
C	000 - 366	Days (carry from hours modulo 365 or 366 leap years)
E	000 - 023	Hours (carry from minutes, modulo 24 carry to days)
F	000 - 059	Minutes (modulo 60 carry to Hours)

Notes:

- Prior to printing a given message that incorporates embedded clock fields, the printer operating program generates up to four message specific clocks by applying any defined positive clock offsets, encountered in the message, to the printer's system real-time clock. These message specific clocks are then used in the updating of any relevant clock strings in the print buffer.
- Current year and any year offset must be taken into consideration in order to allow for offset periods which straddle one or more leap days
- Offset date/time command fields may occur at any point within the stored print message.
- Offsets reset to zero when another message is sent unless a new offset is requested in that message.
- If using Codenet part number 51064 then Field A is used for months offset

11.11. Insert Time Conditional Print String (TIME_COND) 'p' 70h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This embedded format command allows the user to define a sequence of characters to be substituted in the entered print message if the time of printing falls within a pre-defined pair of limits. This is useful for marking products on a work shift basis. A maximum of 5 characters is allowed in a time conditional string and up to 4 such strings can be specified for each print message. Time conditional strings may be grouped together for use as alternatives which are substituted at the time of printing.

Format Esc/p/A/B/CCCC/DDDD/E/F...F/B/CCCC/DDDD/E/F...F/

A = 1 digit, number of alternative strings 1 to 4

B = 1 digit, time conditional string identity 1 to 4

CCCC = 4 digits, start time 0000 to 2359

DDDD = 4 digits, end time 0000 to 2359
 E = 1 digit, string length 1 to 5
 F...F = plain characters to be printed (as length field 'E')

Notes

- Where time conditional fields occur in the same place in the entered print message they will be interpreted as time conditional alternative print strings and the length of the longest one will be that used to reserve print buffer space. In this case, if the time limits associated with the time conditional strings overlap each other then the string with the lower identity number will be the one printed.
- Start and end times will be compared at the time of printing with the printer's real time clock hours and minutes to determine whether a time conditional string is to be substituted into the printed message.
- Outside of the active time limits for any of the entered time conditional strings their positions in the printed message will be printed as spaces to the same string length.
- Time conditional strings are not allowed embedded within a barcode.
- For an A-Series **plus** or A-Series **plus** Duo printer there is a limit of 4 time conditional fields (also known as shift codes) per message. For a Duo printer this limit applies across both regions.

11.12. Insert Barcode (INSERT_B_CODE) 'q' 71h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series **plus**

This command will cause the following text to be printed in bar encoded format until a matching terminating command is encountered. The bar code must be terminated with the relevant terminator.

Format: Esc/**q**/A/.....Esc/**q**/0/

A = 1 digit, barcode type 1 to 9, 0 to end the bar code

Field 'A'

0 = Bar Code Terminator

1 = Code 39

2 = 2 of 5 Interleaved, No checksum

3 = USPS (Not implemented)

4 = EAN / UPC

5 = Codabar (Not implemented)

6 = Code 128 code set B

7 = 2 of 5 Interleaved, Modulus 10 factor 3 checksum

8 = Code 128 Auto codeset ABC

9 = Code 93 (Automatic calculation of check digits) - A-Series **plus** only.

Format for EAN/UPC : Esc/**q**/A/B/C....C/B/Esc/**q**/0

A = Bar code type EAN/UPC = 4

B = Number of digits \$ = 8, & = 12, @ = 13

C....C = Digits to be encoded, (including check digit)

Note: Prior to entering a barcode start command, character height must be set to the maximum character height applicable to the type of printer. Character height should be restored to the required value following entry of the corresponding barcode end command.

Bar Code Characteristics

Code 39

Character set : 0 to 9 A to Z space - . \$ / + % start / stop characters (See Note).

Element widths : narrow 1, wide 3 (See Note).

Nominal widths : Each character consists of 3 wide + 5 narrow

Notes

- For display purposes the start/stop character is usually shown as an asterisk '*'.
- The inter character gap is set to 1 narrow space.
- In A-Series **plus** the asterisks are not valid within the Barcode text. They are added automatically as the start and stop characters.
- The default Barcode ratio and inter character gap are set to 2:1 and 1:1 the module width respectively and can be changed using the Barcode Thickness command.

Interleaved 2 of 5

Character set : 0 to 9, start, stop (generated by the Ink Jet)

Element widths : narrow 1, wide 3 (See Note)

Nominal widths : start pair 8, digit pair 18, stop pair 10

Notes

- Message starts with a pair of start characters, 8 elements. All digits are printed as pairs, therefore there needs to be an even number of digits. If an uneven number is specified then add a leading zero. Message ends with a pair of stop characters, 10 elements.
- In A-Series **plus** the default Barcode ratio and inter character gap are set to 2:1 and 1:1 the module width respectively and can be changed using the Barcode Thickness command.

Codabar

Character set : 0 to 9 - \$: / . + and 4 start / stop characters

Element widths : narrow = 1, wide = 3

Nominal widths : 0-9 - \$ 11 elements all others 13 elements

Code 128 (MJ, CC, CB2, CB3, Solo)

Character set : ASCII character set 20H to 7EH

Element widths : narrow = 1, med.1 = 2, med. 2 = 3, wide = 4

Nominal widths : 11 elements

Code 128 (A-Series, A-Series **plus**)

Character set is codeset B, alphanumeric and punctuation.

A modulo-103 check digit is added by default.

Code 128 Auto (A-Series, A-Series *plus*)

Character set is codeset A, B, C, alphanumeric and punctuation. The codeset selection is handled automatically by the printer.

A modulo-103 check digit is added by default.

EAN/UPC

Character set : 0 to 9

Element widths : narrow = 1, med.1 = 2, med. 2 = 3, wide = 4

Nominal widths : 7 elements

EAN 8 \$ [5 dig. manf. code] [2 dig. art. code] [chk dig.] \$

EAN13 @ [nat.dig.] [6 dig.manf. code] [5 dig.art. code] [chk.dig.][nat.dig.] @

UPC12 & [6 dig. manf. code] [5 dig. art. code] [chk.dig.] &

Notes

- Within a bar code Logo's, Time Conditional Clock and Clock fields 'GG' 'JJ' and 'O' are not allowed.
- With EAN and UPC bar codes the check digit must be included as the software does not calculate it.
- With EAN and UPC bar codes only simple numbers are allowed, (no clock or serial numbers)
- With EAN 13 the first digit must be inserted again at the end as digit number 14. This allows the "country code" to be read correctly irrespective of scanner direction. In A-Series **plus** this is not supported i.e. 13 digits are expected.
- For A-Series and A-Series **plus** A100+ printer there can be no barcodes in a message.
- For A-Series, A-Series **plus** A200+/A300+ and A-Series **plus** Duo printer there is a limit of 4 barcodes or 2D codes per message. For a Duo printer this limit applies across both regions.

11.13. Line Separator (NEW_LINE) 'r' 72h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

This command will cause the text that follows to be entered on the following line starting at the first unoccupied column position.

Format Esc/**r**/

Note

- After receiving a "Line Separator" character the software will revert to the default of non-bold first character set. Therefore, an attribute set in one line must be set again if required in the next line.
- For an A-Series *plus* Duo printer the line separator shall be used to give the message information for both jets in the same Codenet command.

11.14. Stop Double Space printing of messages (STOP_DOUBLE_SPACE) 's' 73h

Printers:- A-Series

This command will stop the message from being printed out with double spacing.

Format: Esc/**s**/

11.15. Select 1st Character font (FONT_1) 't' 74h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series

Characters entered following this command will be printed using the first character font until a select second character font command is encountered.

Format Esc/**t**/

Note: For A-Series this command will be acknowledged but no action will be taken.

11.16. Set Character Height (SET_HEIGHT) 'u' 75h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

Characters entered following this command will be printed with the specified height, if valid and available. Not all print formats have all character sets present.

Format Esc/**u**/A/

A = 1 to maximum height for printer type 1, 2, or 3

11.17. Stop Bold (STOP_BOLD) 'v' 76h

Printers:- MJ, CC, CB2, CB3, Solo, A-Series, A-Series *plus*

Characters entered following this command will be printed single width (each vertical stroke is printed once). This has no effect on any additional global commands in force at the time of printing.

Format Esc/**v**/

11.18. Insert Language Date/Time (INSERT_LANGUAGE_CLOCK) 'w' 77h

Printers:- A-Series, A-Series *plus*

This command is very similar to (INSERT_CLOCK) but has an additional field which determines which counting format is to be used.

Format Esc/**w**/C/X/A/

C = 1 digit clock selector 1 to 4

X = 1 character clock type

A = 1 character language type

Clock Type X

Char	Field	Print range
A	Date (day of month)	01 to 31
B	Day of year	001 to 366
C	Julian year (year of decade)	0 to 9
D	Year (year of century)	00 to 99
E	Year	1979 to 2199
F	Month #	01 to 12
G	Month (from INIT_DATE_MONTHS)	Jan to Dec
H	Hours (hour of the day)	00 to 23
I	Quarter hours (from 00:00:00)	01 to 96
J	Day (from INIT_DAY)	Mon to Sun
K	Week no (to BS47450)	01 to 53
L	Day # (from Mon to Sun)	1 to 7
M	Minutes	00 to 59
N	Seconds	00 to 59
O	Alpha Hour (from INIT_ALPHA)	A to Z or User Defined
P	Julian Day (Feb 29 = Day 366)	001 to 366

Language type A

Char	Language
1	Arabic
2	Farsi

Notes

- Week numbering conforms to BS 4760: 1971. (ISO/R 2015 "Numbering of Weeks")
- Options G, J, and O may be set by means of the commands INIT_DATE_MONTHS, INIT_DAYS, and INIT_ALPHA.
- Options G, J, and O are not allowed embedded within a barcode.

- For an A-Series **plus** or A-Series **plus** Duo printer there is a limit of 16 clock fields (date or time) per message. For a Duo printer this limit applies across both regions.

11.19. Insert Bitmap (INSERT_BITMAP) 'x' 78h

Printers:- A-Series **plus**

This command causes the specified pre-stored bitmap to be inserted into the print message starting at the current line and column position. This is similar to the 'm' command with the difference that any bitmap with a name up to five characters can be inserted into the print message.

Format: Esc/**x**/A/B...B

A = 1 digit, bitmap name length 1 to 5.

B...B = 1 to 5 characters bitmap name.

Notes

- Prior to implementing a bitmap, character height must be set to the appropriate character height applicable to the type of printer. Character height should be restored to the required value following bitmap entry.
- For an A-Series **plus** or A-Series **plus** Duo printer there is a limit of 16 bitmaps per message. For a Duo printer this limit applies across both regions.

11.20. 2D Codes (INSERT_D_CODE) 'z' 7Ah

Printers:- A-Series, A-Series **plus**

This command will cause the following text to be printed in 2-D code format until a matching terminating command is encountered. The 2-D code must be terminated with the relevant terminator. Unlike the barcode command each 2-D code has its own independent attribute block. Upto 4 different 2-D codes may be inserted into a message

Format: Esc/z/A/B/CC/DD/EE/F/G/H/I/.....Esc/z/0/

A = 1 digit, 2-D code type 1 or 2, 0 to end the dot code

Field 'A'	Description
0	Bar Code Terminator
1	DataMatrix
2	QRCode (A-Series plus specific)

B = 1 digit, 0 to 6 for DataMatrix or 1 to 2 for QRCode

Field 'B' (DataMatrix)	Description
0	Numeric only (DataMarix)
1	Alpha only (DataMatrix)

2	Alpha numeric (DataMatrix)
3	Upper case only
4	Lower case only
5	Punctuation
6	8 bit ASCII

Field 'B' (QRCode)	Description
1	QRCode model 1
2	QRCode model 2

CC = 2 digits, 00 to 99 (DataMatrix error code correction) or 00 to 03 (QRCode error correction level)

Field 'C'	DataMatrix
00	000
01	010
02	040
03	050
04	060
05	
06	080
07	
08	100
10	120
26	200

Field 'C'	QRCode
00	L
01	M

02	Q
03	H

DD = 2 digit, Rows 00...99 the number of rows for DataMatrix, 21, 25 or 29 for QRCode.

EE = 2 digit, Column 00...99 the number of columns for DataMatrix, 21, 25 or 29 for QRCode.

Note: QR Codes must be square i.e. the values for DD and EE must be the same.

When DD = 00 and EE = 00 then the printer will automatically choose the largest possible size for the 2D code that fits in the currently selected print format.

F = 1 digit magnification 0 to 4 for DataMatrix (Available only in A-Series releases 1.15 and later),
0 or 1 for QRCode.

Note: Certain combinations of dotcode sizes and magnifications (Eg 16x48 and x4) are unavailable. Both 0 and 1 denote a x1 magnification (default) to the 2D code.

G = 1 digit field alignment option, this option will align the 2D code bitmap to the top or the bottom. The following example shows a 2D code of 10 rows aligned at the top and bottom respectively.



Field 'G'	Alignment
0	Align to the top (default)
1	Align to the bottom

H = 1 digit field supplementary 3 (currently unused)

I = 1 digit field supplementary 4 (currently unused)

Example – DataMatrix

- Store to message 001
- Size 2 character (16 drop)
- Code type ID Matrix
- Format 0 (numeric)
- ECC 26 (ECC 200)
- Rows 10
- Columns 10
- Supplementary data (0, 0, 0, 0)
- Data to be encoded 1234

ESC\S0011234ESC\u2 ESC\z1026101000001234ESC\z0\EOT

Example - QRCode

- Store to message 001
- Size (32 drop)
- Code type QRCode
- Model 2
 - (L error correction level)
- Rows 29
- Columns 29
- Supplementary data (0,0,0,0)
- Data to be encoded in hex 0x8140 0x0030 0x0031

ESC\S0011234ESC\u2ESC\z220029290000**814000300031**\ESCz0\EOT

Notes

- QRCodes can support Unicode characters so each static character i.e. a character not part of a dynamic field must be sent as a combination of 4 ASCII characters 0x30 – 0x39 and 0x41 – 0x46. For example, the ASCII 0x31 (1) must be sent as 0x30, 0x30, 0x33, 0x31 and the Unicode character 0x8140 must be sent as 0x38, 0x31, 0x34, 0x30. The valid Unicode character range is 0x0000 – 0xFDFE.
- A-Series **plus** only supports DataMatrix ID of 200.
- For A-Series and A-Series **plus** A100+ printer there can be no 2D codes in a message.
- For A-Series, A-Series **plus** A200+/A300+ and A-Series **plus** Duo printer there is a limit of 4 barcodes or 2D codes per message. For a Duo printer this limit applies across both regions.

11.21. User Function Enable (USER_ENABLE) '+' 2Bh

Printers:- A-Series **plus**

This command is used to embed a custom script within a message. If the script doesn't exist or the maximum number of scripts per message has been reached then a NAK will be returned at the next Eot.

Format: Esc/+/...Script Name...

Script Name: Is the filename of the script including the file extension (.csf). The extension is used to show where the name ends, so if this is omitted a NAK will be returned at the next Eot.

Note: This command is only supported in A-Series **plus** from build version 02.01.0014.

11.22. Insert Updateable Text field (INSERT_UPDATEABLE_TEXT) '|' 7Ch

Printers:- A-Series *plus*

This command inserts an updateable text field into the A-Series *plus* message. The field can be populated with data sent via Ethernet or RS232 using the External Protocol.

Format:	Esc/ /AAAA/BB/CCCC/DD/E
AAAA	= 4 digits, length range from 0001 to 1024.
BB	= 2 characters in hex (e.g. comma = 2C) in the range from 00 to 7D. 00 implies that the external data is not delimited. If set to 00 then the offset will be used to extract the set of data from the external data buffer. E.g. 00 is sent to the printer as 30 30.
CCCC	= 4 digits, offset within the external data buffer, range from 0000 to 1023.
DD	= 2 digits, index (used for delimited data only) range from 01 to 16.
E	= 1 digit, method that will be used to fill the external data buffer with data - 0 (RS232) or 1 (Ethernet).

Notes

- Example 1:
 - The external data sent to the buffer is **0123456**
 - Esc/|/0003/00/0001/DD/1
 - AAAA – updatable text field length – is set to 0003
 - BB – Delimiter – is set to 00 no delimiter.
 - CCCC – offset within external data buffer – is set to 0001
 - DD – Index – is set to default 01 as it is not used in this example.
 - E – Comms method – is set to 1 for Ethernet
 - The data inserted into the message is **123**
- Example 2:
 - The external data sent to the buffer is **0123,456,ABCD**
 - Esc/|/0003/00/0001/DD/1
 - AAAA – updatable text field length – is set to 0004
 - BB – Delimiter – is set to 2C (,)
 - CCCC – offset within external data buffer – is set to 0000 as it is not used in this example.
 - DD – Index – is set to 03
 - E – Comms method – is set to 1 for Ethernet
 - The data inserted into the message is **ABCD**
- For an A-Series *plus* or A-Series *plus* Duo printer there is a limit of 16 Updateable Text Fields per message. For a Duo printer this limit applies across both regions.

12. Application Specific Commands & Responses

The following commands have no action on the standard printer and will solicit a negative acknowledgement if entered. This command set is used when the Applications Department create “special” features for specific applications. These commands are not used in A-Series or A-Series *plus* printers

12.1. User Function Execute (USER-EXEC) '*' 2Ah

Printers:- MJ, CC, CB2, CB3, Solo

Sending this command to the printer in its command form, if applicable, will cause the specified user function to be executed or set up in some way, but only if it is enabled and implemented. Use of the command in its enquiry form, if applicable, will solicit information from the specified user function.

Set Format: Esc/*A/P...P/Eot

Query Format: Esc/*A/?/Eot

A = 1 digit, user function selector 1 - 9

P...P = any applicable parameter fields required

Response : If function disabled or invalid parameters received or command not implemented, then negative acknowledgement, otherwise positive acknowledgement or information response (as defined for specific user function).

12.2. User Function Enable (USER_ENABLE) '+' 2Bh

Printers:- MJ, CC, CB2, CB3, Solo

This command is used to enable or disable the specified user function, if the function has been implemented.

Set Format: Esc/+A/B/Eot

Query Format: Esc/+A/?/Eot

A = 1 digit, user function selector 1 - 9

B = 1 character Y = enable or N = disable

Response to Query: as command string format, with current value.

Response to set: positive or negative acknowledgement.

13. Extended Codenet Commands 'O' 4Fh

A previously unused command character 'O' (4FH) has been used to access the extended commands. This set of the extended commands is only available on the A-Series or A-Series *plus* printers.

13.1. External Data Queues 'OE' 4Fh 45h

Printers:- A-Series *plus*

Use in conjunction with Command OP. The following extended command OE allows external data to be sent to the printer storing the external data block in the corresponding queue of the connection i.e. RS232 or TCP. The command also allows for the external data queues and historic log to be cleared:

Set Format: Esc/**O**/**E**/AAAA/B...B/Eot

AAAA External data block length 0001 to 1024, use 0000 to clear the queues.

B...B The data only without start and end characters.
If AAAA = 0000 you now need to choose the queue to clear

- 0 = TCP
- 1 = RS232
- 2 = Historic Log

Response to set: positive or negative acknowledgement

13.2. Print Height (PRINT_HEIGHT) 'OH' 4Fh 48h

Printers:- A-Series, A-Series *plus*

This command allows control of the print height

Set Format: Esc/**O**/**H**/AAA/Eot

Query Format: Esc/**O**/**H**/?.Eot

AAA = 50-100 representing a percentage of the print height (See table below)

Response to Query: Returns the current value for the print height

Response to set: positive or negative acknowledgement.

Approximate table for values sent using the Print Height command

Value Sent	Command	Value On A-Series Printer	Value On A-Series <i>plus</i> Printer
0 to 30	Esc/O/H/020/Eot	0 or NAK	NAK

30 - 50	Esc/O/H/050/Eot	0 %	NAK
55	Esc/O/H/055/Eot	10 %	55%
60	Esc/O/H/060/Eot	21 %	60%
65	Esc/O/H/065/Eot	30 %	65%
70	Esc/O/H/070/Eot	40 %	70%
75	Esc/O/H/075/Eot	50 %	75%
80	Esc/O/H/080/Eot	60 %	80%
85	Esc/O/H/085/Eot	70 %	85%
90	Esc/O/H/090/Eot	80 %	90%
95	Esc/O/H/095/Eot	90 %	95%
100	Esc/O/H/100/Eot	100 %	100%

Note: The actual percentage supplied (AAA field) is used as value for A-Series **plus**

13.3. Store Message with variable length name 'OM' 4Fh 4Dh

Printers:- A-Series **plus**

This command will allow messages with a variable length message name to be sent to the message store and stored with that name. The command also allows the message to be queried.

Set Format: Esc/OM/AA/... message name .../... message text .../Eot

Query Format: Esc/**OM**/AA/... message name .../?/Eot

AA = 2 digit number of characters in message name from 01 to 50,

... message name ... = message name in ASCII characters (20H-7FH).

... message text ... = ASCII characters (20H-7FH) or embedded format commands.

Response to Query: as command string format.

Esc/OM/AA/... message name .../... message text .../Eot.

Response to set: positive or negative acknowledgement.

Example:

1B	4F4D	0	5	42	45	41	4E	53	41	42	43	44	04
ESC	OM	30	35	B	E	A	N	S	A	B	C	D	EOT
ESC	Command ID	Length of Message Name		Message Name				Message data				EOT	

13.4. Get message with variable length name from store and put online.

'ON' 4Fh 4Eh

Printers:- A-Series **plus**

This command is used to get a message with a variable length name and put it on-line for printing.

Set Format : Esc/ON/A/BB/... message name .../Eot

Query Format: Esc/ON/A/?/Eot

A = 1 digit head select. Set to 1.

BB = 2 digit number of characters in message name from 01 to 50,

... message name ... = message name in ASCII characters (20H-7FH).

Response to Query: As command string format.

Response to set: Positive or negative acknowledgement.

Example:

1B	4F4E	1	0	5	42	45	41	4E	53	04
ESC	ON	31	30	35	B	E	A	N	S	EOT
ESC	Command ID	Print Head Select	Length of Message Name		Message Name				EOT	

13.5. Configure External Data Queue 'OP' 4Fh 50h

Printers:- A-Series **plus**

The following extended command can be used to configure the external data protocol on the printer:

Format: Esc/**O/P**/AA/B/CC/DDDD/E/F/GG/H/I/J/Eot

AA Start character in hex e.g. 02h (STX). FFh implies no start character.

B Type of external data: ASCII = 0 or Unicode = 1.

CC End character in hex e.g. 03h (ETX). FFh implies no end character.

DDDD	The length of the external data block if no start and end characters are defined. The maximum length shall be 1024. If you have a start and end character defined then set this to the default max size of 1024 and it will be ignored.
E	0 = disable ACK/NAK. 1 = enable ACK/NAK. This is the ACK/NAK given when a packet of data is received. Some external devices like checkweighers do like anything returned from the printer.
F	0 = Do not write each packet of data to historic log. 1 = Write each packet of data to historic log. The historic log holds 1000 entries.
GG	00 to 10 (ASCII) The number of duplicate packets allowed before an alert is set. Each packet is checked against the entries in the historic log. 00 means that any duplicates in the last 1000 packets will be flagged as errors. 10 allows for 10 duplicates to occur before an alert is raised.
H	0 = Overwrite entries in historic log after 1000 entries. 1 = Clear historic log when it is gets to 1000 entries and start again.
I	0 = Delete historic log on printer shut-down, 1 = Keep historic log on printer shut-down.
J	0 = Keep data in the external data queue when you change the printed message. 1 = Clear external data queues when you change the printed message.

Response to set: positive or negative acknowledgement

13.6. Download message without save 'OQ' 4Fh 51h

Printers:- A-Series, A-Series **plus**

This command will allow messages to be downloaded directly to the SGB. A Three digit number is required for the SGB to reference this message however it is *not* stored in the message store. This command is available in A-Series releases of 1.14 and later.

Format : Esc/**O**/**Q**/AAA/.. message text ../Eot

Or Esc/**O**/**Q**/AAA/?/Eot

AAA = 3 digit message buffer number 001 to MAX_NUM_MSG

..message text.. = ASCII characters (20H-7FH) or embedded format commands.

Response to Query: NAK

Response to set: positive or negative acknowledgement

Note:

- For A-Series products, MAX_NUM_MSG is 063
- For A-Series **plus** products, MAX_NUM_MSG is 127 for an A100 plus and 255 for other A-Series **plus** variants. The message buffer number will be used as the message name and its location. If the location (number) is already occupied on the printer, it shall be overwritten.

13.7. Sequence Control (SEQUENCE_CONTROL) 'OS' 4Fh 53h

Printers:- A-Series, A-Series *plus*

This command allows control of the Printer Sequencing (Sequence On/OFF)

Set Format: Esc/**O/S**/A/Eot

Query Format: Esc/**O/S/?**/Eot

A = 0 for Sequence Off, 1 for Sequence On

Response to Query: As command string

Response to set: positive or negative acknowledgement.

13.8. Get Current Status (STATUS_POLL) 'O1' 4Fh 31h

Printers:- A-Series, A-Series *plus*

This command is used to query the status of the printer and the condition of the front panel LEDs.

Query Format: Esc/**O/1/?**/Eot

Response to Query: Esc/**O/1/AAA/BB**/Eot

Where:

AAA = Status value 3 digits 0-255

BB = State of the front panel indicator LEDs - this is a 2 digit HEX-ASCII value, representing the bit-field of the indicator state.

Bit 0	Green On
Bit 1	Amber On
Bit 2	Red On
Bit 3	0
Bit 4	Green Flashing
Bit 5	Amber Flashing
Bit 6	Red Flashing
Bit 7	0

Note: A-Series *plus* supports the following states of the front indicator LEDs: -

Printer's States:

Assigned Bits:		Ready To Print	Warning Alert	Fault Alert	Transitional
Green ON	Bit 0	1	0	0	0
Amber ON	Bit 1	0	1	0	0
Red ON	Bit 2	0	0	1	0
Not Used	Bit 3	0	0	0	0
Green Flashing	Bit 4	0	0	0	1
Amber Flashing	Bit 5	0	0	0	0
Red Flashing	Bit 6	0	0	0	0
Not Used	Bit 7	0	0	0	0

Note: A-Series *plus* does not support the Amber and Red Flashing bits, so the returned values for these Bits will always be 0.

13.9. Get Current Alert (ALERT_POLL) 'O2' 4Fh 32h

Printers:- A-Series

This is used to obtain a list of the current active alerts on the machine.

Query Format: Esc/O/2/?/Eot

Response to Query: Esc/O/2/AA/BBB/C..../Eot

Where:

AA = the number of alerts following in this message 2 decimal digits, minimum 00, maximum 16

BBB = the ID of the first alert following, the value is enumerated in the table in section9.2)

C = the state of the alert: 0 = not accepted, 1 = accepted

BBB and C are repeated AA times to give details of all the currently active alerts.

13.10. Store Bitmap (STORE_BITMAP) 'OL' 4Fh 4Ch

Printers:- A-Series *plus*

This command stores a Windows compatible monochrome bitmap in the logo store on the compact flash. Subsequently, the bitmap can be inserted into a message via the 'm' or 'x' commands.

Set Format: Esc/O/L/A/B...B/C...C/Eot

A = 1 digit, telling us the number of characters in the bitmap name. Excepted values are from and including 1 to and including 5. Note this must not include the extension so IMG.bmp is only 3 characters.

B...B = the name of the bitmap excluding the extension. Min 1 character and Max 5 characters in the example shown in A above this would be IMG.

C...C = The hex values of the bitmap eg 0F is sent as 3046. Excepted values are from the range= 0x30 to 0x39 or 0x41 to 0x46 bitmap data. Maximum number of characters you can encode is 2048. A 219x32 bitmap is 2016 bytes.

Response to set: positive or negative acknowledgement

Note: The Bitmap MUST be 2 colour black and white and conform to the bitmap (.bmp) standard.



Img.bmp

To work out the values of C....C look at the following. We have a 16x16 logo called img.bmp. Open the logo in hex editor and you will see the hex values for each byte of it. Each byte is represented by a Hex value as circled. The value circled is 42 but we need to break this down to two digits 4 and 2 and send each of these digits down as a hex values so 42 becomes 3432. When 3432 enters the printer it is stored back as 42.

3432

42	4D	7E00	0000	0000	0000	3E00	0000	2800	0000	1000
0000	1000	0000	0100	0100	0000	0000	4000	0000	130B	
0000	130B	0000	0200	0000	0200	0000	0000	0000	FFFF	
FFFF	18FF	0000	3CFF	0000	BDF7	0000	BDF7	0000	BDF7	
0000	BBF7	0000	C3F7	0000	DBF7	0000	DB80	0000	D3F7	
0000	D7F7	0000	D7F7	0000	D7F7	0000	D7F7	0000	EFF7	
0000	EFF7	0000								

The name of the logo (B...B) is img which means it is 3 characters long (A) we end up with the following protocol string (you will need to fill in the rest of the values illustrated by)

Esc/**O**/**L**/3/img/34323444374530303030303030 30304546464630303030/Eot

14. Print Message Entry

The following are rules for converting the source of a required print message into a "message storage" interface command string.

- The print message comprises of a number of non-overlapping parts, i.e. the entire message print area is defined.
- The required print message is defined in terms of a sequence of field descriptions from left to right for each line in turn, top to bottom, as each new field is encountered.
- For A-Series plus Duo printers the whole Duo message is described as if the message for the bottom jet follows immediately from the message in the top jet, i.e. the line immediately below the bottom line of the message for the top jet shall be the top line of the message for the bottom jet.
- Each field in the print message may be one of the following types:
 - Plain printing character
 - Selector for a logo
 - Selector for a clock string, with or without an offset value
 - Time conditional string of plain printing characters
- Set-up information for a printer generated alphanumeric serial number string
- Selector and string for printer generated bar-coding, the string portion of which may contain any combination of the above field types (subject to limitations of the Bar Code type) as sub-fields.
- Field types are selected by means of embedded commands in the interface command string, with the exception of plain printing characters, which are the default.
- Print message fields can have a number of attributes. These are:
 - Field size
 - Bold or non-bold printed
 - Selected from one of two printer character sets
- Attributes are selected by means of including embedded commands in the interface command string. Once selected, an attribute applies to all subsequent field descriptions on the same source line until superseded.
- Initial selections assumed at the start of each source print line:
 - Character / field size 1
 - Non-bold
 - Character set 1
 - Plain printing character field expected
 - Left-most print field on the line

14.1. Codebox 3 Example

Column									
1	2	3	4	5	6	7	8	9	
*	****	*****		*****			*****		Line 1
* *	* *	*****		*****			*****		
* *	* *	**	**	*****			**		
* *	****	**	**	***		****	**		
*****	*	*	**	***		***	**		
* *	* *	**		***		***	**		Line 2
*	****	**		***		***	**		
*	****	**		***		***	**		
*****	*****	**		***		***	**		
*	*	**		***		***	**		
*	*	**		***		***	**		Line 3
*****	*****	**	**	***		***	**		
*	*	*****		***		***	*****		
*****	*	*****		***		***	*****		
	*****	**	**	***		***	*	*	
**		**	**	***		***	*	*	Line 3
**		**	**	***		***	*	*	
**		*****	*****	***		***	*	*	
**	*****	**	**	*****		*****	*	*	
**	**	**	**	*****		*****	*	*	
*****	**	**	**	*****		*****	***	*	

An example of a triple line print message printed from store 5, this would have been entered by means of the command string:

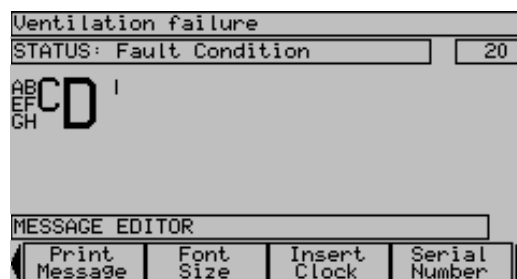
```
Esc/S/005/AB/Esc/u/2/C/Esc/u/3/D/Esc/u/1/Esc/r/EF/Esc/r/Esc/k/GH/Esc/v/JK/Eot
```

And as a Hex string this would be sent as:

```
1B 53 30 30 35 41 42 1B 75 32 43 1B 75 33 44 1B 75 31 1B 72 1B 6B 47 48 1B 76 4A 4B 04
```

14.2. A-Series Example

An example of a triple line print message printed from store 025:



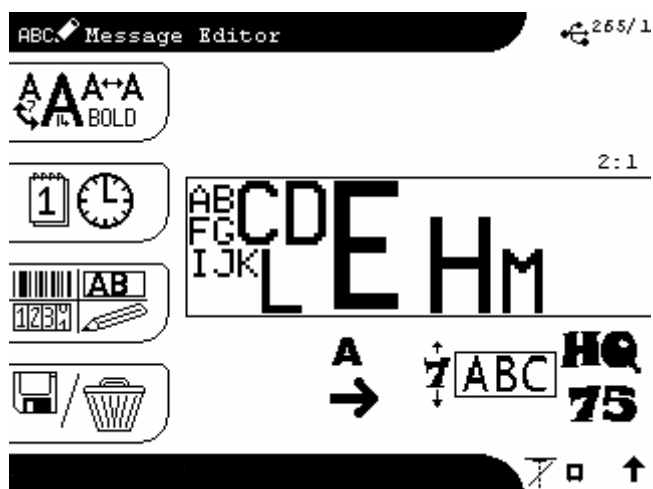
This would have been entered by means of the command string:

Esc/S/025/AB/Esc/u/2/C/Esc/u/3/D/Esc/u/1/Esc/r/EF/Esc/r/GH/Eot

^[S025	AB	^[u2	C	^[u3	D	^[u1	^[r	EF	^[r	GH	^D
Store	AB	Size	C	Size	D	Size	Line	EF	Line	GH	End

14.3. A-Series *plus* Example

To create the following message shown in the A-Series *plus* editor



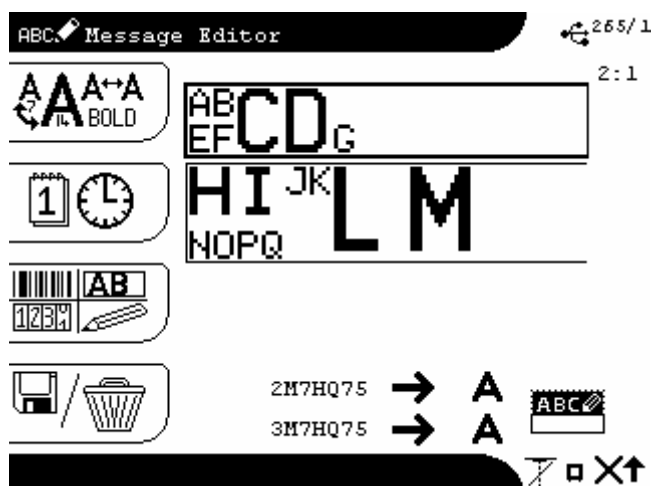
and store it in message location 006, with the name '006' then the following Codenet command would be used:

Esc/S/006/AB/Esc/u/2/CD/Esc/u/4/E/Esc/r/Esc/u/1/FG/Esc/u/3/H/Esc/r/Esc/u/1/IJK/Esc/u/2/L
M/Eot

^[S006	AB	^[u2	CD	^[u4	E	^[r	^[u1	FG	^[u3	H	^[r	^[u1	IJK	^[u2	LM	^D
Store	AB	Size	CD	Size	E	Line	Size	FG	Size	H	Line	Size	IJK	Size	LM	End

14.4. A-Series *plus* Duo Example

To create the following message shown in the A-Series *plus* Duo editor



and store it in message location 018, with the name '018' then the following Codenet command would be used:

```
Esc/S/018/AB/Esc/u/2/CD/Esc/r/u/1/EFG/Esc/r/Esc/u/2/HI/Esc/u/1/JK/Esc/r/
Esc/r/Esc/u/1/NOPQ/Eot
```

^[S018	AB	^[u2	CD	^[r	^[u1	EFG	^[r	^[u2	HI	^[u1	JK	^[r	^[r	^[u1	NOPQ	^D
Store	AB	Size	CD	Line	Size	EFG	Line	Size	HI	Size	JK	Line	Line	Size	NOPQ	End

15. Negative Acknowledgement Error Codes

Negative acknowledgement error codes consist of 3 ASCII digits which are transmitted to the controller following the negative acknowledgement control character.

000	Software error (this error code should never occur)
001	Specified character set not present
002	Invalid command header, <ESC> expected
003	Unrecognised command code following <ESC>
004	Unexpected characters occurred before <EOT>
005	Invalid head selector
006	Out of range print acknowledgement character
007	Command parameter out of permitted range
008	Print message number out of range
009	Syntax error
010	Print message too long for message store
011	Print message too long for print buffer
012	Invalid embedded format command
013	Invalid character in print message
014	Invalid number of lines in print message
015	Invalid character size specified in print message
016	Cannot load message
017	Specified print message number is invalid
018	Message assigned to another product detector
019	Cannot assign logo to single line head
020	Command not implemented
021	Logo ID invalid for specified character set
022	Invalid character set specified
023	Invalid checksum field
024	Checksum error
025	No character set RAM available

026	Character set download error
027	Command rejected printing disabled
028	Clock ID out of range
029	Invalid clock field selector
030	Duplicate clock field specified
031	Time-conditional string has duplicate time field
032	Serial number out of range
033	Serial number increment value too big
034	Identifier out of range
035	Numeric field too long
036	Non-numeric character encountered
037	Both numeric and pre/suffix lengths are zero
038	Non-alpha character encountered
039	Invalid step order selected
040	Invalid product detector identity specified
041	Too many time-conditional strings specified
042	Time-conditional string identifier out of range
043	Time-conditional string time limit out of range
044	Time-conditional string too long
045	Invalid barcode type specified.
046	Command invalid in barcode string.
047	Maximum character size must be selected first.
048	Invalid character for barcode type
049	Invalid character count for barcode
050	The printer is busy with Auto Repeat de-assert photocell
051	An internal printer error caused the command not to be processed
052	The requested file could not be found
301	There are too many MRC
401	Wrong language ID out of range
402	Ignore send acknowledge

403	MRC exceed maximal width
404	Invalid 2D Code type
405	Invalid 2D code format
406	Invalid 2D code ECC
407	Invalid 2D Code rows number
408	Invalid 2D Code columns number
409	Invalid 2D Code magnification factor
410	Invalid 2D Code alignment

16. A-Series *plus* Status Reporting

Refer to the tables below for the A-Series *plus* status reporting mode.

Note: On an A-Series *plus* Duo printer all alerts relating to the printhead shall apply to either jet.

16.1. Ink Monitor Status Grouping Table

The ink monitor status reporting messages are single bytes, sent to host controller via RS232 or Ethernet when an internal ink system related event occurs.

Description	Internal printer event
No faults on ink bus	
Viscosity out of range	Viscosity out of range
Ink system fault	Ventilation failure Fluid sensor fault Gunbody temperature high Gunbody temperature low Too much ink Ink heating failed Too much make-up Excessive ink pressure Ink pressure loss Abnormal ink pressure Ink temperature high Pressure sensor input error Solvent Level sensor input error Ink Level sensor input error Ink Temperature sensor input error Head Temperature sensor input error
Ink reservoir timed out	Ink change due – Replace Ink Reservoir Beware! Ink Reservoir change overdue
Viscometer error	Viscometer fault
Ink reservoir has less than 24 hours to go	Ink change needed in less than 24 hrs
Make-up empty	No make-up Add make-up cartridge
Ink reservoir has less than 2 hours to go	Ink change needed in less than 2hrs

16.2. Fault Monitor Status Grouping Table

The fault monitor status is created by switching bits on and off. The byte that is sent to the host controller via RS232 or Ethernet is a combination of the following bits:

Description	Internal printer event
High voltage fault	Deflection EHT has tripped off
Charge fault	Drop break-off position is low Drop break-off position is high Drop charging has failed Charge detection has failed Ink detected on charge electrode Jet modulation has failed
Gutter fault	Gutter dry
This bit is always cleared	
Printer ready	Set when: <ul style="list-style-type: none"> • Status = Ready To Print Cleared when: <ul style="list-style-type: none"> • Deflection EHT has tripped off • Gutter dry • Status = Sequencing On • Status = Sequencing Off • Status = Ink System On – Jet Off • Status = Jet On – Modulation Off • Status = Jet On - HV Off • Status = Head Bleed In Progress • Status = Modulation Reset • Status = Printer Standby • Status = Manual Operation • Status = Fault Condition • Status = Printer Initialising • Status = Head Flushed • Status = Jet Running • Status = Phase Locked • Status = Modulating • Status = Fault Recovery Attempt • Status = Printer Off • Status = Printing Disabled
Make Up Cartridge Low	Make Up Cartridge Low
Ink Cartridge Empty	Ink Cartridge Empty
Reservoir Level Too Low	Reservoir Level Too Low

16.3. Interface Status Grouping Table

These bytes are sent to host controller via RS232 or Ethernet when an event occurs. Bit 3 is always set.

Description

A print trigger has been received and the delay count is finished but there is no message ready to print.
Stroke rate too fast for the program, or when matrix speed check is enabled, stroke rate is too fast for matrix.
An invalid control character has been received, or a parameter for a control character is invalid.
The message (in strokes) is longer than the aperture.
Print trigger received while delay is being counted, or after delay count is ready, the printer is still printing.
An invalid logo has been selected in the message.
Message numbers not in sequence, or message number and semaphore input mismatch.
Message checksum correct.
Message checksum incorrect.
Status unknown (this should only occur when the SGB board is waiting for a status message from the PSB board after power up).
Printer off.
Sequencing off.
Sequencing on.
Printer running with jet and HV on
Print acknowledge 1.
Acknowledge clear messages.

17. Appendix I – Compatibility guide

		A-Series compared to 51000		A-Series plus compared to A-Series	
Software reset	<ETX>	SAME as 51000		SAME as A-Series	
User function execute	'★'	UNSUPPORTED		UNSUPPORTED	
User function enable	'+'	UNSUPPORTED		UNSUPPORTED	
Status reporting mode	'0'	SAME as 51000		SAME as A-Series	
Status request	'1'	SAME as 51000		SAME as A-Series	
External Message Select	'@'	DIFFERENT	Ext. Message Select Enable	SAME as A-Series	
Printer identity	'A'	DIFFERENT	Printer Type '03'	DIFFERENT	Printer Type '22' for A100 plus and '23' for A300 plus.
Printer configuration	'B'	DIFFERENT	Max Msgs '999' & others	DIFFERENT	Max Msgs '255' for A300 plus and '127' for A100 plus. Baud rates 38400 (10), 57600 (11) and 115200 (12) are supported.
Printer real time clock	'C'	SAME as 51000		DIFFERENT	Years less than 2001 are not supported
Calendar date months	'D'	SAME as 51000		SAME as A-Series	
Calendar days	'E'	SAME as 51000		SAME as A-Series	
Print go delay	'F'	DIFFERENT	'0000' & '0001' read as '0002'	DIFFERENT	'0000' & '0001' read as '0002'. Four or five digit delay is supported. Five digit delay is returned.

Auto-repeat printing	'G'	DIFFERENT	'0000' & '0001' read as '0002'	DIFFERENT	This does not apply to the printed message. Instead, any messages created thereafter will include this setting.
Auto-reverse printing	'H'	DIFFERENT	Values upto '254'. No EXTERNAL control	UNSUPPORTED	
Setting print ack. flags	'I'	SAME as 51000		SAME	
Flight time compensation	'J'	DIFFERENT	Label Prep Time Fixed	DIFFERENT	Label Prep Time Fixed. If flight of time is greater than 63, 63 is returned.
Product detector assignment	'K'	DIFFERENT		DIFFERENT	
Product detect signal level	'L'	SAME as 51000		SAME as A-Series	
Product detect persistence time	'M'	DIFFERENT	Strokes read as μ s	DIFFERENT	Persistence can be 2 or 5 digits. A five digit persistence is returned.
Software print go	'N'	SAME as 51000		SAME as A-Series	
Message to head assignment	'P'	SAME as 51000		SAME as A-Series	
Head enable	'Q'	SAME as 51000		SAME as A-Series	
Clear all messages	'R'	DIFFERENT	All Messages taken off-line	SAME as A-Series	All Messages taken off-line
Message storage	'S'	SAME as 51000		SAME as A-Series	
Product counting	'T'	SAME as 51000		DIFFERENT	The 'prints since power up' counter can be reset and queried provided it is configured as 'resettable counter 2'

Current serial number	'U'	SAME as 51000		SAME as A-Series	
Read stroke period	'V'	SAME as 51000		SAME as A-Series	
Read Mod or Release	'W'	DIFFERENT	'2' returned as modification state	SAME as A-Series	'2' returned as modification state
Read / load character set	'X'	SAME as 51000	Partial support see comms doc for details	UNSUPPORTED	
Alpha hour characters	'Y'	SAME as 51000		SAME as A-Series	
Get software real-time clock	'Z'				
Continuous printing	'['	SAME as 51000		SAME as A-Series	This does not apply to the printed message. Instead, any messages created thereafter will include this setting.
Auto Invert	'\ '	SAME as 51000		UNSUPPORTED	
Read Checksums	!A	UNSUPPORTE D		UNSUPPORTED	
Handle Text	<	UNSUPPORTE D		NEW	
External Serial Number Reset, Rollover and Update]	NEW		SAME as A-Series	
Read Liquid Levels	y	NEW	Partial support see comms doc for details	UNSUPPORTED	
Handle Text	<	UNSUPPORTED		NEW	
Print Height	OH			DIFFERENT	Applies to all printed messages
Store message with variable length message name	OM			New	
Put message with variable length message name on line	ON			New	
Sequence Control	OS				

Download message without save	'OQ'				
Get Current Status	'O1'				
Get Current Alert	O2			UNSUPPORTED	
Store Bitmap	'OL'	UNSUPPORTED		NEW	
Embedded message commands					
Reverse message print sequence	'a'	SAME as 51000		SAME as A-Series	
Print message bold	'b'	SAME as 51000		SAME as A-Series	
Double spaced printing	'c'	DIFFERENT	embedded command	DIFFERENT	Global command
Reverse individual characters	'd'	DIFFERENT	ACKed but NO ACTION	SAME as A-Series	
Inverted printing	'e'	SAME as 51000		SAME as A-Series	
Barcode thickness ratio	'f'	DIFFERENT	ACKed but NO ACTION	DIFFERENT	Supports module width, space to module width and wide to module width ratios.
Global print format	'g'	SAME as 51000		DIFFERENT	For message bold, double space and reverse individual characters 'NNN' is returned. Setting message bold, double space and reverse individual characters is ignored.
Change Unicode Page	'h'	NEW		SAME as A-Series	
Select Character	'I'	NEW		SAME as A-Series	
Insert serial	'j'	SAME as		SAME as A-Series	

number		51000			
Start bold characters	'k'	SAME as 51000		SAME as A-Series	
Select 2nd character font	'l'	DIFFERENT	ACKed but NO ACTION	UNSUPPORTED	
Insert logo	'm'	SAME as 51000	Logo name restrictions	SAME as A-Series	
Insert date / time	'n'	SAME as 51000		SAME as A-Series	
Offset date / time	'o'	SAME as 51000		SAME as A-Series	
Time conditional print string	'p'	SAME as 51000		SAME as A-Series	
Insert barcode	'q'	SAME as 51000	see comms doc for spec	SAME as A-Series	see comms doc for spec
Line separator	' r '	SAME as 51000		SAME as A-Series	
Stop Double Space printing of messages	s	NEW		UNSUPPORTED	
Select 1st character font	't'	DIFFERENT	ACKed but NO ACTION	UNSUPPORTED	
Set character height	'u'	SAME as 51000		SAME as A-Series	
Stop bold	'v'	SAME as 51000		SAME as A-Series	
Insert Language Date/Time	'w'	NEW		SAME as A-Series	
Insert bitmap	'x'	UNSUPPORTED		NEW	
2D Codes	'z'	NEW		Different	Has extra QR codes
User Function Enable	'+'	UNSUPPORTED		NEW	

18. Appendix 2 – Codebox 3 items

18.1. Codebox 3 Front Panel Protocol

Description

The format of the messages does not follow the convention of the 51000 Protocol to allow the CB3 front panel to be able to easily recognise a message destined to be serviced by it, instead of being passed on the Serial Interface Card. In addition some messages are covered by a CRC16 checksum to ensure any transmission errors are discovered.

Basic Request Format

< STX >< Command >< Qualifier >< ETX >
< STX > The message start character
< Command > A single ascii character
< ETX > The message end character
< Qualifier > Specific to a command and typically will consist of a filename or directory name

Basic Data Format

< STX >< Command >< Qualifier >< ; >< DATA >< CRC16 >< ETX >
< STX > The message start character
< Command > A single ascii character
< ETX > The message end character
< Qualifier > Specific to a command and typically will consist of a filename or directory name

< ; > The header is completed with a ';' (semicolon)
< DATA > The data must all be ascii characters
< CRC16 > A two byte CRC16 check value sent as 4 ascii characters.

Get File from CB3

Requests a file be sent from one of the drives in the CB3, 'A' being the ROM drive containing the code and the fixed files and 'B' being the RAM drive with the variable data. Wildcards are not allowed and the maximum file size is 32K bytes. The drive must be specified

Format: < STX > A < Filename >< ETX >
Response: < STX > A < Filename > ; < Length >< Data >< CRC >< ETX >
Filename Must be in quotes and must include the drive letter of the CB3 but no directory separator (e.g. "b:afile.txt")
Length 4 hex-ascii characters which give the length of the following data block up to the check value.
Data Up to 32K bytes (transmitted as 64K hex-ascii characters)
CRC Two byte check value using the CRC16 algorithm and sent as 4 hex-ascii characters. The CRC covers the data block only.

Send File to CB3

Sends a file to the CB3 'B' drive, wildcards are not allowed in the filename and the maximum file size is 32K bytes. The drive must be specified

Format: < STX > B < Filename >< Length > ; < Data >< CRC >< ETX >
Response: <ACK> or <NAK>
Filename Must be in quotes and must include the drive letter of the CB3 but no directory separator(e.g. "b:afile.txt")
Length 4 hex-ascii characters which give the length of the following data block up to the check value.
Data Up to 32K bytes (transmitted as 64K hex-ascii characters)
CRC Two byte check value using the CRC16 algorithm and sent as 4 hex-ascii characters. The CRC covers the data block only.
NAK 3digit error code

Get CB3 Directory List

Enables a remote system to interrogate the CB3 and receive a list of the files on a drive. Wildcards are allowed. The data is returned formatted as a continuous string with < CR >< LF > following each directory entry.

Format: < STX > C < Dir Specifier >< ETX >

Dir Specifier Must be in quotes and must include the drive letter of the CB3 but no directory separator(e.g. "b:*. *"). Must have a full path (e.g. "b:" is invalid).

Response: < STX > C < Dir Specifier >< Length > ; < Dir Data >< CRC >< ETX >

Dir Specifier Must be in quotes and must include the drive letter of the CB3 but no directory separator(e.g. "b:*. *"). Must have a full path (e.g. "b:" is invalid).

Length 4 hex-ascii characters which give the length of the following data block up to the check value.

Dir Data The directory listing is transmitted as a sequence of ascii characters in fixed fields, an eight character field, a three character extension field and a length field with a <CRLF> as a line separator.

CRC Two byte check value using the CRC 16 algorithm and sent as 4 hex-ascii characters. The CRC covers the DirData block only.

Delete a File from CB3 RAM Disk

Allows a file to be deleted from the CB3 'B ' drive.

Wildcards are not allowed in the filename.

Format: < STX > D < Filename >< ETX >

Filename Must be in quotes and must include the drive letter of the CB3 but no directory separator(e.g. "b: afile.txt")

Response <ACK> File has been deleted as requested

<NAK> + < NAK CODE > Incorrect reception

NakCode 3digit error code

Get Inkmonitor Data from CB3

The dynamic data sent by the inkmonitor card and displayed on the CB3 front panel is sent to the PC. The data includes the temperature, the ball fall-time and the expected ball fall-time.

Format:	< STX > E < ETX >
Response	<STX> E <Length > ; < InkData >< CRC ><ETX>
Length	4 hex-ascii characters which give the length of the following data block up to the check value.
InkData	The data is transmitted as 6 hex-ascii characters representing 3 bytes.
Byte 0	Ink temperature
Byte 1	Actual ball fall-time / 2
Byte 3	Expected ball fall-time / 2
CRC	A two byte check value using the CRC 16 algorithm and sent as 4 hex-ascii characters. The CRC covers the inkdata block only.

Get Ink and Faultmonitor Status from CB3

The status bits sent from the ink and fault monitor cards to the CB3 front panel may be obtained for inspection.

Format	< STX > S < ETX >
Response	< STX > S < Length > ; < FaultData >< CRC >< ETX >
Length	4 hex-ascii characters which give the length of the following data block up to the check value.
FaultData	The data is transmitted as 8 hex-ascii characters representing 4 bytes.
Byte 0	Fault monitor status bits
Byte 1	Fault monitor status bits
Byte 2	Ink monitor status bits
Byte 3	Ink monitor status bits
CRC	A two byte check value using the CRC 16 algorithm and sent as 4 hex-ascii characters. The CRC covers the inkdata block only.

Remote Jet-On Command

The command will toggle the 'Jet On' port bit. The action of toggle off will also turn off the EHT if it is on. The response only indicates the fact that the command has been successfully received. To observe the machine response use the Status Command.

Format	< STX > J < ETX >
Response	<ACK> The command has been received and actioned <NAK> Incorrect reception
NakCode	3digit error code

Remote EHT-On Command

The command will toggle the 'EHT On' port bit. The action will only occur if the Jet is on, otherwise the action will be ignored. The status can be monitored to observe the results of the action as the action of the machine to the command is too slow to allow the condition to be returned as a response to the command.

Format	< STX > H < ETX >
Response	<ACK> The command has been received and actioned <NAK> Incorrect reception
NakCode	3digit error code

18.2. Ink and Fault monitor Status Bit Allocation

The descriptions below refer to true logic, in that a '1' will indicate the state described.

Byte 0 Bit0	"EHT fault "
Byte 0 Bit1	"Charge fault "
Byte 0 Bit2	"Gutter fault "
Byte 0 Bit3	"Modulation Fault "
Byte 0 Bit4	"Reservoir low "
Byte 0 Bit5	"Make-up low "
Byte 0 Bit6	"Ink low "
Byte 1 Bit0	"Shutting down "
Byte 1 Bit1	"Printer Ready "
Byte 1 Bit2	"EHT active "
Byte 1 Bit3	"Jet active "
Byte 1 Bit4	"Flush low "
Byte 2 Bit0	"Fan fail "
Byte 2 Bit1	"Electronics is overtemp"
Byte 2 Bit2	"1st Warning"
Byte 2 Bit3	"2nd Warning"
Byte 2 Bit4	"Reservoir timeout "
Byte 2 Bit5	"No ball detected "
Byte 2 Bit6	"Viscosity overrange"
Byte 3 Bit0	"Pump off "
Byte 3 Bit1	"Heater not ready."
Byte 3 Bit2	"Heater fault "

NOTE: Other bits are undefined and may be in any state.

18.3. Error return codes

Listed are the error return codes received from the Codebox 3 when communicating using the described protocol. Note that these should not be confused with those used by the Codenet protocol, which may have similar numbers.

Error Code	Description
100	Data Count Error - The count of the data received did not match the number of bytes expected from the header data.
101	Error in data received - Part of the data in the message did not match what was expected by the command
102	File Open Failed - The CB3 front panel failed to open the file requested, either the file does not exist, it cannot be written to, or there is insufficient space.
103	Error in header - One or more parameters in the header are incorrect
104	Command Error - The command sent was not recognised
105	No Header - No header was located in the data sent.
106	Data Timeout - Data was expected but none arrived within the timeout period
107	CRC Error - The calculated CRC and that sent with the data did not math
108	Memory Allocation Error - The CB3 was unable to obtain sufficient memory to service the request.

18.4. CRC16 Generation

The CRC16 used by the transfer routine is calculated from a table driven system to achieve fast operation and simple code. The table and the macro used to do this is printed below. The whole of the data below can be maintained in a header file.

// CRC table

```
unsigned short crctab[256] = {
0x0000, 0x1021, 0x2042, 0x3063, 0x4084, 0x50a5, 0x60c6, 0x70e7,
0x8108, 0x9129, 0xa14a, 0xb16b, 0xc18c, 0xd1ad, 0xe1ce, 0xf1ef,
0x1231, 0x0210, 0x3273, 0x2252, 0x52b5, 0x4294, 0x72f7, 0x62d6,
0x9339, 0x8318, 0xb37b, 0xa35a, 0xd3bd, 0xc39c, 0xf3ff, 0xe3de,
0x2462, 0x3443, 0x0420, 0x1401, 0x64e6, 0x74c7, 0x44a4, 0x5485,
0xa56a, 0xb54b, 0x8528, 0x9509, 0xe5ee, 0xf5cf, 0xc5ac, 0xd58d,
0x3653, 0x2672, 0x1611, 0x0630, 0x76d7, 0x66f6, 0x5695, 0x46b4,
0xb75b, 0xa77a, 0x9719, 0x8738, 0xf7df, 0xe7fe, 0xd79d, 0xc7bc,
0x48c4, 0x58e5, 0x6886, 0x78a7, 0x0840, 0x1861, 0x2802, 0x3823,
0xc9cc, 0xd9ed, 0xe98e, 0xf9af, 0x8948, 0x9969, 0xa90a, 0xb92b,
0x5af5, 0x4ad4, 0x7ab7, 0x6a96, 0x1a71, 0x0a50, 0x3a33, 0x2a12,
0xdbfd, 0xcdbdc, 0xfbbf, 0xeb9e, 0x9b79, 0x8b58, 0xbb3b, 0xab1a,
0x6ca6, 0x7c87, 0x4ce4, 0x5cc5, 0x2c22, 0x3c03, 0x0c60, 0x1c41,
0xedae, 0xfdd8f, 0xcdec, 0xddcd, 0xad2a, 0xbd0b, 0x8d68, 0x9d49,
0x7e97, 0x6eb6, 0x5ed5, 0x4ef4, 0x3e13, 0x2e32, 0x1e51, 0x0e70,
0xff9f, 0xefbe, 0xdfdd, 0xcffc, 0xbflb, 0xaf3a, 0x9f59, 0x8f78,
0x9188, 0x81a9, 0xb1ca, 0xa1eb, 0xd10c, 0xc12d, 0xf14e, 0xe16f,
0x1080, 0x00a1, 0x30c2, 0x20e3, 0x5004, 0x4025, 0x7046, 0x6067,
0x83b9, 0x9398, 0xa3fb, 0xb3da, 0xc33d, 0xd31c, 0xe37f, 0xf35e,
0x02b1, 0x1290, 0x22f3, 0x32d2, 0x4235, 0x5214, 0x6277, 0x7256,
0xb5ea, 0xa5cb, 0x95a8, 0x8589, 0xf56e, 0xe54f, 0xd52c, 0xc50d,
0x34e2, 0x24c3, 0x14a0, 0x0481, 0x7466, 0x6447, 0x5424, 0x4405,
0xa7db, 0xb7fa, 0x8799, 0x97b8, 0xe75f, 0xf77e, 0xc71d, 0xd73c,
0x26d3, 0x36f2, 0x0691, 0x16b0, 0x6657, 0x7676, 0x4615, 0x5634,
0xd94c, 0xc96d, 0xf90e, 0xe92f, 0x99c8, 0x89e9, 0xb98a, 0xa9ab,
0x5844, 0x4865, 0x7806, 0x6827, 0x18c0, 0x08e1, 0x3882, 0x28a3,
0xcb7d, 0xdb5c, 0xeb3f, 0xfb1e, 0x8bf9, 0x9bd8, 0xabbb, 0xbb9a,
0x4a75, 0x5a54, 0x6a37, 0x7a16, 0x0af1, 0x1ad0, 0x2ab3, 0x3a92,
0xfd2e, 0xed0f, 0xdd6c, 0xcd4d, 0xbdaa, 0xad8b, 0x9de8, 0x8dc9,
0x7c26, 0x6c07, 0x5c64, 0x4c45, 0x3ca2, 0x2c83, 0x1ce0, 0x0cc1,
0xef1f, 0xff3e, 0xcf5d, 0xdf7c, 0xaf9b, 0xbfba, 0x8fd9, 0x9ff8,
0x6e17, 0x7e36, 0x4e55, 0x5e74, 0x2e93, 0x3eb2, 0x0ed1, 0x1ef0
}
```

Software Function: "updcrc(data, sum)"

Description: computes CRCs' based on the initial value (sum)and the data
(data)

Input(s): data - unsigned byte - data to be added to CRC value
sum - unsigned int - starting value for CRC

Return(s): sum - new value of CRC

Notes: #define updcrc(d, s) (crctab[((s >> 8) & 0xff)] ^ (s << 8) ^ d)
#endif //CRC16_H

18.5. Codebox 3 Front Panel Dot Code Protocol

Two Dot Code symbologies have been provided as an option. SNOWFLAKE and ID MATRIX.

To access the Dot Code functions the Bar-Code embedded command has been extended to add CODE TYPE 9.


Printing Dot Codes

To print Dot Codes the Front Panel has to intercept the Message Command and process the Dot Code part. The STX F part tells the Front Panel that this message needs to be processed to print Dot Codes.

Before Dot Codes can be printed, the feature must be enabled and the relevant Dot Code parameters selected from the Service Menu.

Format < STX > F ; <ESC> S 001<Message Data> <EOT> < ETX >

Example Message

12		34
56		78

<STX> F ; <ESC> S001 12 <ESC> u2 <ESC> q9 1234 <ESC> q0
<ESC> u1 34 <ESC> r 5678 <EOT> <ETX>

18.6. Error return codes specific to Dot Coding

These errors will only be displayed when Dot Codes are transmitted.

Error Code	Description
110	Call to third party libraries returned an error code. Perhaps the wrong type of data is being encoded or the data capacity has been exceeded.
111	Conversion failed, this is an internal error and indicates that an Issue 7 protocol command has failed a syntax check. Try sending the command without the ESC q's, to determine the syntax error.
112	The RS-232 transmission between the Front Panel and the Serial Interface has failed.
113	Not Applicable.
114	Dot Code feature disabled. Use the command to enable the Dot Codes.