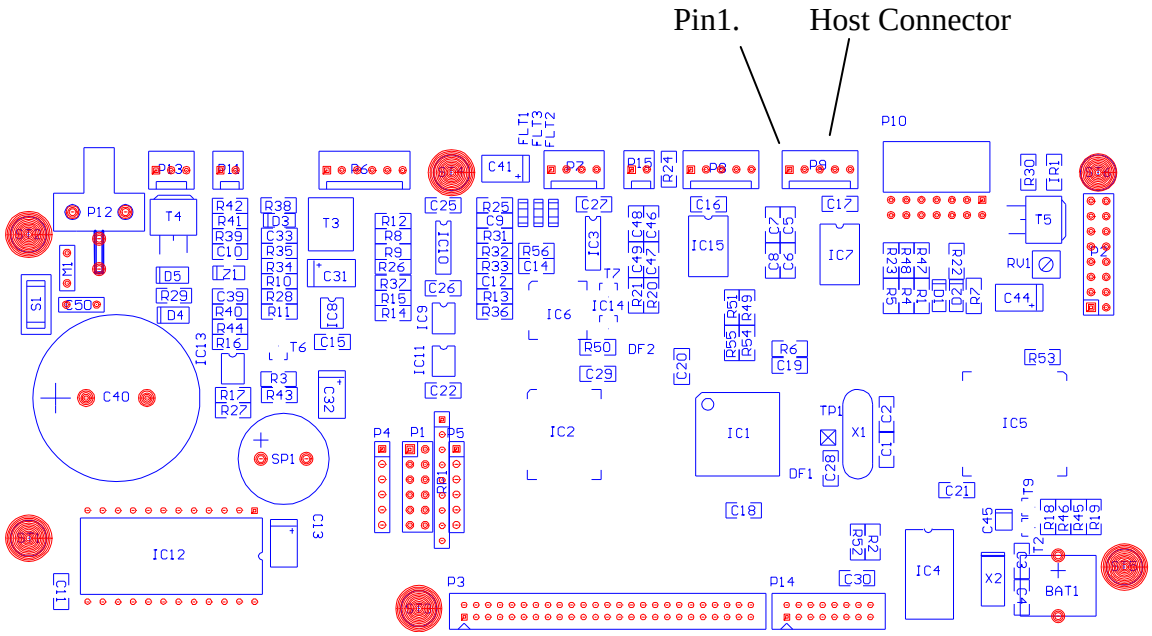
Hardware Description

Communication between all Pelican and CDS coin machines and a PC is done through an RS232 connection. The connection is a 5-pin Wafer connector located on the main circuit board marked P9 on the PCB Layout.



The connector has the following connections:

Name	Pin	Direction
RTS - Ready To Send	1	Out
RxD - Receive Data	2	In
TxD - Transmit Data	3	Out
CTS - Clear to Send	4	In
GND - Ground	5	Common

Standard RS232C voltage levels are used.
The RS232 parameters are:
9600 Baud
No handshake
8 data bits
1 stop bit

The PC may perform communication with the Pelican at all times, both when it is idle, and while it is counting coins.

Message Format

Messages can be sent from the PC to the PELICAN and from the PELICAN to the PC.
Both types of messages have the same format. They consist of a header byte (STX), a length byte, some data bytes, a 16-bit CRC calculation, and a trailer byte (ETX).

The protocol is handling errors is in the following way:

- If ACK/NACK is chosen in SETUP 5, the receiver will send ACK (06H) if the message is received succesfully, or NACK(15h) if there occurred an error.
- The coin machine has an activity time-out of 1,2 seconds while receiving a message. If the PC is sending a message to the coin machine, and stops in the middle of it, the coin machine will time out after 1,2 seconds and set the machine in the state of waiting for a new message.
- If the coin machine receives a new message while sending a message to the PC, the coin machine will finish the message, before it handles the new message.
- If the coin machine is waiting for acknowledge while receiving a new message from the PC, the coin machine stops waiting for acknowledge. It will immediately handle the new message from the PC.

“Extended protocol” is removed from alle versions.

It is possible to change the timeout of a message by changing the HOST-TIMEOUT value in SETUP 5. “1” is responding to a time of 0,025 seconds. If the time is to short, a message will be cleared before the transmission is finished. The timeout-counter is reset by everey received byte.

The message format:

STX (02h) Start of Transmission
n = number of data frame bytes
Data frame byte 0
Data frame byte 1
:
Data frame byte n-1
CRC-hi (Checksum Hi- Byte)
CRC-lo (Checksum Low- Byte)
ETX (03h) End of Transmission

CRC Calculation

The CRC calculation is done on the data bytes only, i.e. not the length byte, STX, or ETX bytes. The following Turbo Pascal program demonstrates the algorithm used to calculate the CRC. It takes as parameter a string of data frame bytes.

```
FUNCTION calc_crc (frame: STRING): WORD;
VAR
Crc: WORD;
i, j: BYTE;
BEGIN
Crc: = 0;
FOR j: = 1 to Length (frame) DO
BEGIN
            crc := crc XOR (WORD (BYTE (frame[j])), SHL 8);
            FOR i := 1 TO 8 DO
              IF (crc AND $8000) <> 0
                THEN crc := (crc SHL 1) XOR $1021
                ELSE crc := (crc SHL 1)
          END;
          calc_crc := crc
        END;
```

Or an example in C++

```
int  __fastcall PelicanHostCom::CalcChecksum(char *frame)
{
int crc = 0;
int i,j,k;

k = strlen(frame);

for (j=0; j<k; j++)
{
  crc = crc ^ ((unsigned short)(frame[j]) << 8);

  for (i=1;i<9;i++)
  {
   if ( (crc & 0x8000)! = 0 ) crc = (crc << 1) ^ 0x1021;
   else crc = (crc << 1);
  }
}
 return crc; // Checksum
}
```

Main Control

Each message that can be sent to the PELICAN has a corresponding response message that contains status information and/or return values.
The data frame consists of a byte specifying a command number followed by parameter bytes.
These main commands can be used:
(Phrases: Wherever the word *Motor* is used, it means the coin-plate or hopper motor)

Command	Description	Direction
01h	Construct Link	PC > PELICAN
02h	Response on Construct Link	PC < PELICAN
03h	Destruct Link	PC > PELICAN
04h	Response on Destruct Link	PC < PELICAN
11h	Get Value	PC > PELICAN
12h	Value Returned	PC < PELICAN
21h	Set Value	PC > PELICAN
22h	Response on Set Value	PC < PELICAN
23h	Set Value with Motor Status	PC > PELICAN
24h	Response on Set Value with Motor Status	PC < PELICAN
31h	Get Display Contents	PC > PELICAN
32h	Response on Get Display Contents	PC < PELICAN
33h	Set Display Contents	PC > PELICAN
34h	Response on Set Display Contents	PC < PELICAN
35h	Set Keyboard to - String Input Mode	PC > PELICAN
36h	Response on Set - String Input Mode	PC < PELICAN
37h	Lock and Clear display	PC > PELICAN
38h	Response on Lock and Clear Display	PC < PELICAN
39h	Lock Keyboard	PC > PELICAN
3Ah	Response on Lock Keyboard	PC < PELICAN
3Dh	Lock and unlock Memory-function	PC > PELICAN
3Eh	Response on Lock/unlock Memory-function	PC < PELICAN
53h	Get last pressed key	PC > PELICAN
54h	Respons on get last pressed key	PC < PELICAN
71h	Setting external display-programming	PC > PELICAN
72h	Response on external display-programming	PC < PELICAN
73h	Header-programming	PC > PELICAN
74h	Response on header-programming	PC < PELICAN
75h	Footer-programming	PC > PELICAN
76h	Response on Footer-programming	PC < PELICAN
77h	Setting display/Header/Footer programming	PC > PELICAN
78h	Response on display/Header/Footer programming	PC < PELICAN

Some of the commands have sub functions, which will allow more detailed control of the machine. They will be explained in the corresponding chapters.

The following chapters will explain the different commands and requests in tables, which are showing the meaning of the different bytes in the Host-Protocol.

Construct Link

This command constructs the link between the PC and the PELICAN. It should be sent as the first command. No commands are accepted if this command isn't successfully executed. The password, "69390274", is fixed and cannot be changed.

If ACK/NACK is chosen in the setup, the complete sequence of a successfully “Construct Link” will look like this:

PC -> Pelican	”STX” – 09h - 01h – “69390274” – ”CRC-hi” – ”CRC-lo” – ”ETX”
Pelican -> PC	“ACK”
Pelican -> PC	“STX”- 02h – 02h – 00h – “CRC-hi” – “CRC-lo” – “ETX”
PC -> Pelican	“ACK”

Construct link transmission:

Byte #	Value	Description
0	02h	STX – (Start of transmission)
1	09h	Number of Data Bytes
2	01h	Construct Link – Command (First Data Byte)
3	36h '6'	1st password character
4	39h '9'	2nd password character
5	33h '3'	:
6	39h '9'	:
7	30h '0'	:
8	32h '2'	:
9	37h '7'	:
10	34h '4'	8th password character (Last Data Byte)
11	X	CRC Hi
12	X	CRC Lo
13	03h	ETX – (End of Transmission)

The machine will respond with:

Byte #	Value	Description
0	02h	STX – (Start of transmission)
1	02h	Number of Data Bytes
2	02h	Response on Construct Link (First Data Byte)
3	00h / 01h	*Status, see below (Last Data Byte)
4	X	CRC Hi
5	X	CRC Lo
6	03h	ETX – (End of Transmission)

***Status = 00h means successful construction. Status = 0lh means Link already constructed, or wrong password.**

Destruct Link

This command destructs the link. After this command, no further commands are accepted until a new Construct Link is sent and accepted.

The tables are shown without STX/ETX, Number of bytes and CRC Bytes!

Sending:

Byte #	Value	Description
0	03h	Destruct Link

The machine will respond with:

Byte #	Value	Description
0	04h	Response on Destruct Link
1	00h /01h	Status, see below

Status: 00h = successful destruction, 01h = link hasn't been constructed

Get Value – General description

This command requests the PELICAN to return a message containing the value of a specified variable.

Byte #	Value	Description
0	11h	Get Value
1	See below	Variable number

The following variable numbers can be specified:

Variable number	Description
10h	Containing of on specified bag.
16h	Current counting result. Get number of coins of each of the types 1-20 that so far have been counted in the current counting. These numbers correspond to the value that is displayed in the PELICAN display while counting. It is possible to choose between the flag of rejected coins and the number of rejected coins.
1Ch	Total counting result. Number of coins of each of the types 1-20 that have been counted since last Reset Total. These numbers correspond to the value that the PELICAN displays when you press MR.
1Dh	Number of filled bags
1Eh	Get the bag-number, currency and some possible other data of the coins.
1Fh	Get denomination value of coins 1 to 20. The values are returned as 32-bit integers without comma. (I.e. 0.20 is returned as 20 and 2.00 as 200).
21h	Get Keyboard buffer. Gets a password or an account number from the keyboard buffer. This buffer will only be accessible when the keyboard mode is set to STRING Input Mode. The buffer will clear automatically 20 sec's after the last key-press. Max 20 chars can be input, including [Enter Key].
22h	Get number of saved transactions. The number returned, is a byte value of the transactions that is saved in the flash memory. The machine will hold up to 500 of the last transactions made.
23h	Get transaction data. Returns the Data of the selected transaction number.
31h	Get the Software-version, Software-code and HOST-version
33h	Get the status of the machine. This values represents information on machine condition and keyboard/display status

In a new SW-version is it only possible to handle 16 different coin denominations. To get compatibility to existing HOST-SW, it is possible to send dummy-bytes containing zeros for the missing coins data. This is switched by the "data 20 coins"-flag in SETUP 5.
This is important for variable number 16h to 1Fh.

Other variable numbers shouldn't be used.
See the next chapter for a detailed description.

Response on Get Value

After receiving the *Get Value* Command, the PELICAN will respond with a message that contains the desired variable.

Byte #	Value	Description
0	12h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed
2	X	Get Value - Variable number
3	?	Data
4	?	Data
:	:	
X	?	Data

Important: If link not constructed only byte #0 and #1 is returned.

Get Value command - Variable 10h - Detailed

Get data of one bag:

Sending:
”STX” – 02h - 11h – 10h – BAG – ”CRC-hi” – ”CRC-lo” – ”ETX”

BAG is a number between 0 and 9. Depending on the machine type the number can change.
From the byte BAG only the 4 LSB-bytes are used.

Data-frame-format:

Byte #	Value	Description
0	02h	STX
1	20h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	10h	Returned – (Get bag contents) command
5	X	Bag number
6	X	Number of Coins - MSB / Pelican always 0
7	X	Number of Coins - 2nd Byte / Pelican always 0
8	X	Number of Coins - 3rd Byte
9	X	Number of Coins – LSB
10-13	X	Weight of sack
14-17	X	Value of coins in sack – currency 0
18-21	X	Value of coins in sack – currency 1
22-23	X	CRC
24	03h	ETX

If the chosen bag number is not possible there is added 0xF0 to the bag number.
If there is programmed no weightstop/bagstop to this bag, there is added 0xE0 to the bag number.
In both cases the transmission stops here.
The weight of the sack is in kg/100 000.

Get Value command - Variable 16h - Detailed

Get Current counting result:

Sending:

”STX” – 02h - 11h – 16h – ”CRC-hi” – ”CRC-lo” – ”ETX”

If S_OUT_CTR is chosen in SETUP 5 the following message is send:

Byte #	Value	Description
0	02h	STX
1	57h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	16h	Returned – (Get current counting result) command
5	X	Number of Coins - 1st Coin MSB
6	X	Number of Coins - 1st Coin 2nd Byte
7	X	Number of Coins - 1st Coin 3rd Byte
8	X	Number of Coins - 1st Coin LSB
9-12	X	Number of Coins – 2nd Coin
….	X	…
81-84	X	Number of Coins – 20th Coin
85-88	X	Number of Rejected coins
89-90	X	CRC
91	03h	ETX

Else if the S_out-flag is send instead of the number of rejected coins:

Byte #	Value	Description
0	02h	STX
1	55h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	16h	Returned – (Get current counting result) command
5	X	Number of Coins - 1st Coin MSB
6	X	Number of Coins - 1st Coin 2nd Byte
7	X	Number of Coins - 1st Coin 3rd Byte
8	X	Number of Coins - 1st Coin LSB
9-12	X	Number of Coins – 2nd Coin
….	X	…
81-84	X	Number of Coins – 20th Coin
85	X	S-out-flag
86-87	X	CRC
88	03h	ETX

If machine only handles 16-coins and “data 20 coins”-flag = 0, frame is shortened by the bytes 69 to 84.

Get Value command - Variable 1Ch – Detailed

Get Total counting result:

Sending:

”STX” – 02h - 11h – 1Ch – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	53h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	1Ch	Returned – (Get Total counting result) command
5	X	Total Coins - 1st Coin MSB
6	X	Total Coins - 1st Coin 2nd Byte
7	X	Total Coins - 1st Coin 3rd Byte
8	X	Total Coins - 1st Coin LSB
9-12	X	Total Coins – 2nd Coin
….	X	…
81-84	X	Total Coins – 20th Coin
85-86	X	CRC
87	03h	ETX

If machine only handles 16-coins and “data 20 coins”-flag = 0, frame is shortened by the bytes 69 to 84.

Get Value command - Variable 1Dh – Detailed

Get Number of filled bags:

Sending:

”STX” – 02h - 11h – 1Dh – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	17h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	1Dh	Returned – (Get Total counting result) command
5	X	Filled bag 0 - MSB
6	X	Filled bag 0 - LSB
7-8	X	Filled bag 1
….	X	…
23-24	X	Filled bag 9
25-26	X	CRC
27	03h	ETX

Get Value command - Variable 1Eh – Detailed

Get Coin currency:

Sending:
”STX” – 02h - 11h – 1Eh – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	17h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	1Eh	Returned – (Get Denominations) command
5	X	Coin data – coin 0
6	X	Coin data – coin 1
...		
24	X	Coin data – coin 10
25-26	X	CRC
27	03h	ETX

If machine only handles 16-coins and “data 20 coins”-flag = 0, frame is shortened by the bytes 21 to 24.

Coin data:
Bit 0-3: Bag number of coin 0-9
Bit 4: currency 0-1
Bit 5: coin on = 1, off = 1

Get Value command - Variable 1Fh – Detailed

Get Coin Denominations:

Sending:
”STX” – 02h - 11h – 1Fh – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	53h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	1Fh	Returned – (Get Denominations) command
5	X	Denomination - 1st Coin MSB
6	X	Denomination - 1st Coin 2nd Byte
7	X	Denomination - 1st Coin 3rd Byte
8	X	Denomination - 1st Coin LSB
9-12	X	Denomination – 2nd Coin
….	X	…
81-84	X	Denomination – 20th Coin
85-86	X	CRC
87	03h	ETX

If machine only handles 16-coins and “data 20 coins”-flag = 0, frame is shortened by the bytes 69 to 85.

Get Value command - Variable 21h – Detailed

Get Keyboard Buffer:

Asking for this value should only be done after the " Set Keyboard to String Input Mode" command is executed. This will stop the Machine and disable it, until it is released with the same command. Please refer to the " Set Keyboard to String Input Mode" description for further details.

Sending:

"STX" – 02h - 11h – 21h – "CRC-hi" – "CRC-lo" – "ETX"

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	18h	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	21h	Returned – (Get Keyboard) Value
5	00h/01h	0=Not in Input mode. 1=String Input mode
6	X	1st Byte in buffer
….	X	…
25	X	20th Byte in buffer
26-27	X	CRC
28	03h	ETX

Get Value command - Variable 22h – Detailed

Getting Number of saved transactions and the last transaction-number:

Sending:

”STX” – 02h - 11h – 22h – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	0Bh	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	22h	Response on – (Number of saved transactions) Value
5-6	0-500	Transactions saved.
7-8	X	Transaction-SN – first possible serial number
9-10	X	First stored transaction number
11-12	X	Last stored transaction number
13-14	X	CRC
15	03h	ETX

Get Value command - Variable 23h – Detailed

Get Transaction Data:

Set's a pointer to the selected location in the flash memory, and returns the transaction data in it.

Sending:

"STX" – 02h - 11h – 23h – (2 Byte - Transaction number) - "CRC-hi" – "CRC-lo" – "ETX"

Returns this data-frame-format:

Byte #	Value	Description
0	02h	STX
1	37	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	23h	Response – (Get Transaction Data) Command
5-6	X	Transaction number
7-8	X	Cashier number
9	X	Not used yet
10	X	Hour
11	X	Minute
12	X	Year
13	X	Month
14	X	Day
15-18	X	Fee amount – currency 0
19-22	X	Fee amount – currency 1
23-26	X	Coin-amount – currency 0
27-30	X	Coin-amount – currency 1
31-34	X	Note-amount – currency 0 – Pelican Accountnumber –high 4 bytes if accountnumber is chosen in CDS-versions
35-38	X	Note-amount – currency 0 – Pelican Accountnumber –low 4 bytes if accountnumber is chosen in CDS-versions
39-40	X	CRC
41	03h	ETX

Only some special SW-versions have the possibility to choose account-numbers.
Important: account-number is send in two longs:
Example:
Account-number: 045689023568898007 is split in two parts
045689023 – Account-number - high
568898007 – Account-number - low

The low and high account-numbers each take 9 digits.

If the chosen transaction-number is not one of the stored numbers, the returned answer is:

Byte #	Value	Description
0	02h	STX
1	5	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	23h	Response – (Get Transaction Data) Command
5-6	0h	Transaction number – no transactions stored
7-8	X	CRC
9	03h	ETX

If the machine is out of counting-mode the answer is:

Byte #	Value	Description
0	02h	STX
1	4	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command. (First Data Byte!)
3	X	Link-status
4	23h	Response – (Get Transaction Data) Command
5-6	FFFFh	Transaction number – machine not in counting-mode
7	X	CRC
8	03h	ETX

Get Value command - Variable 31h – Detailed

Get Software-version, Software-Code and HOST-version:

Sending:

”STX” – 02h - 11h – 31h – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns the following data-frame-format:

Byte #	Value	Description
0	02h	STX
1	0Ch	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command.
3	X	Link-status
4	31h	Returned – (Get Status) command
5	X	SW-version - MSB
6	X	SW-version - 2nd Byte
7	X	SW-version - 3rd Byte
8	X	SW-version - LSB
9-12	X	SW-code – see below
13-16	X	HOST-version
17-18	X	CRC
19	03h	ETX

Version and Code are stored in a long variable. The right version/code is shown in decimal-mode.

Software code:

XXYYPPPP

XX – machine-type
1X – Pelican
4X – CDS-machine 501, 524
86 – Pinguin 726
89 – Penguin 709

YY – is showing the typical used type of sensor to this Software using the last two digits of the part number.

PPPP – is showing the used boardtype

Get Value command - Variable 33h – Detailed

Get Machine Status:

Sending:
”STX” – 02h - 11h – 33h – ”CRC-hi” – ”CRC-lo” – ”ETX”

Returns the following data-frame-format:

Byte #	Value	Description
0	02h	STX
1	0Fh	Number of bytes (only data bytes)
2	12h	Returned – (Get Value) command.
3	X	Link-status
4	33h	Returned – (Get Status) command
5	X	Program State (see table below)
6	X	Status Flags 1 (see table below)
7	X	Status Flags 2 (see table below)
8	X	Status Flags 3 (see table below)
9	X	Status Flags 4 (see table below)
10	X	Status Flags 5 (see table below)
11	X	Status Flags 6 (see table below)
12	X	Status Flags 7 (see table below)
13	X	Status Flags 8 (see table below)
14-15	X	CRC
16	03h	ETX

The next pages will show tables with detailed Program states and flags.
There are som not used bits in this frame. Those bits are reserved for possible later use.

Program Status & Flags – Detailed

Machine: P = Pelican / C = CDS

Program state:

Value	Description	Machine
00h	No coins expected	P + C
01h	Counting-mode	P + C
02h	Tubing-mode *	P
20h	Memory	P + C
40h	Programming	P + C
4Ah	Bagstop-programming	P + C
43h	Separate-coins-mode	P
44h	Stop-on-amount-mode **	P
45h	Service-mode	C
80h	Setup	P + C
8Ah	Calibration-mode ***	P + C
8Bh	Auto-Calibration-mode ***	P + C
8Ch	View coin data	P + C
8Dh	View sensor data	P + C

* While wheel is running, else 00h
** While wheel is running, else 40h
*** While wheel is running, else 80h

Status Flags 1: 1=true , 0=false.

Bit	State	Machine
0	Plate Motor Running	P + C
1	At least one bag full	P + C
2	At least one middle-drawer full	P
3	Rail-stop error	P + C
4	Sensorhead Changed Position	P + C
5	Sensor out of calibration	P + C
6	Pending transaction if ‘1’	P + C
7	0	

Status Flags 2: 1=true , 0=false.

Bit	State	Machine
0	Display locked by HOST (Only Host can Write to display in Counting-Mode)	P + C
1	1 = Display locked – Counting mode 0 = display unlocked while machine not in Counting mode	P + C
2	Keyboard locked by HOST (Machine will not respond on keyboard input)	P + C
3	String Input Mode Activated (Machine is Disabled) Program state will be 00h	P + C
4	Auto-transmission is removed. Bit shows always "0".	P + C
5	Auto-transmission is removed. Bit shows always "0".	P + C
6	RJCT-Mode (Plate Motor runs, all coins are rejected)	P + C
7	STOP-mode	C

Status Flags 3 : 1=true , 0=false.

Bit	State	Machine
0	CDS – Bowl: 1-closed / 0 = open	C
1	CDS – Bowl: 1 = full / 0 = empty	C
2	Door lock	*C
3	Drawer: 1 = open / 0 = closed	P
4	Rejectplate: 1 = open / 0 = closed	P
5-7	Number of used bag in CDS 524 and Penguin 726 else 0 0 = Bag 1, 1 = Bag 2… and 6 = Bag 6	524: 4 bags 726: 6 bags

*Some CDS/Penguin-machines have a special switch added to tell if the door is locked or not. On all other machines this bit has no usable value.

Status Flags 4: 1=true , 0=false.

Bit	State	Machine
0	Out of paper printer 1	P
1	Out of paper printer 2	P
2	Error printer 1	P
3	Error printer 2	P
4	0	
5	0	
6	0	
7	0	

Status Flags 5 : 1=true , 0=false.

Bit	State	Machine
0-5	Out of order code	C
6	0	
7	0	

Out of order code:

Code	Error
1	Billprinter out of paper
3	Error on billprinter
5	Maximum of 500 transactions reached
6	Overflow – maximum of amount reached
7	At least one full bag
8	Coins left in bowl
9	Railstop
10	Machine is turned on with an unfinished transaction
11	Bowl not closed
12	All bags are filled up

Status Flags 6

Bit	State	Machine
0	0	
1	0	
2	Memory locked if ‘1’	
3	0	
4	0	
5	0	
6	0	
7	0	

Status Flags 7 and 8 not used yet.

Bit	State	Machine
0	0	
1	0	
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	

Set Value command - Variable 5Eh – Detailed

Simulate Keyboard:

The following is a table of key-codes associated to different keys on the keyboard. Use the key codes as input-data in the keyboard buffer. Use only one code for each Set Value command.

Key code	Key Description
20h	"RJCT" same as "Set Value 60h" – Due to backwards compatibility.
30h	"0"
31h	"1"
32h	"2"
33h	"3"
34h	"4"
35h	"5"
36h	"6"
37h	"7"
38h	"8"
39h	"9"
3ch	"<"
3eh	">"
4ch	"Lock"
4dh	"MR"
2eh	"."
0ah	"Paper Feed"
0dh	"Enter"
18h	"CLR."
2bh	"M+"
50h	"Print"
53h	"Start/Stop"
54h	"Tubing"
70h	"Prog."
71h	Setup Function, same as "5"+"Enter"+"Prog."

Set Value command - Variable 5Eh – Detailed

Example of data frame to simulate pressing the *Start/Stop* key:

Byte #	Value	Description
0	21h	Set Value
1	5eh	Keyboard buffer
2	53h	Start/Stop Key

Sending:

”STX” – 03h - 21h – 5Eh – 53h - ”CRC-hi” – ”CRC-lo” – ”ETX”

After receiving this command, the machine will respond with the following data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	5Eh	Returned – (Simulate Keyboard) command
5-6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

Same example of data frame with motor status:

Byte #	Value	Description
0	21h	Set Value
1	5eh	Keyboard buffer
2	53h	Start/Stop Key

Sending:

”STX” – 03h - 23h – 5Eh – 53h - ”CRC-hi” – ”CRC-lo” – ”ETX”

After receiving this command, the machine will respond with the following data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	24h	Returned – (Set Value) command.
3	X	Link-status
4	5Eh	Returned – (Simulate Keyboard) command
5	1	Wheel is running
6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

Set Value command - Variable 60h – Detailed

Start REJECT: (Reject and ignore all coins)

This command starts the coin plate rejects all coins. If the plate motor was running previous to the REJECT command, in any of the counting modes, it will start to reject the next incoming coin. The machine returns to normal counting mode by pressing on one of the START-buttons, receiving the key START or receiving the instruction "Set Machine in normal counting mode".

This command is often used in OEM systems, like bridge toll payment, where the machine is running in a "Stop amount mode". (See more in the following chapters)

Sending:

"STX" – 02h - 21h – 60h - "CRC-hi" – "CRC-lo" – "ETX"

After receiving this command, the machine will respond with the following data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	60h	Returned – (Set RJCT MODE) command
5-6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

Set Value command - Variable 63h – Detailed

Set Machine in normal mode

This command stops the coin plate, if the plate motor was running, and disables all other counting Modes. It is the same mode as if the machine just was turned on.

It is not affecting any counting result or s-out registers.

Sending:

”STX” – 02h - 21h – 63h - ”CRC-hi” – ”CRC-lo” – ”ETX”

After receiving this command, the machine will respond with the following data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	63h	Returned – (Set Normal MODE) command
5-6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

Set Value command - Variable 64h – Detailed

Clear transactions

This command clears the transactions in the memory of the Pelican.
The Pelican saves up to 500 transactions. If those number is reached, the machines are waiting for a clear-instruction. This could be a “RESET FULL BAGS” or “RESET TOTAL” on the machine, or this command send from the HOST.
This function only works if the machine is in counting mode, and there is no counting in progress.

Sending:

”STX” – 02h - 21h – 64h - ”CRC-hi” – ”CRC-lo” – ”ETX”

After receiving this command, the machine will respond with the following data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	64h	Returned – Clear Transactions command
5-6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

Set Value command - Variable 65h – Detailed

Clean hopper – only CDS-versions

This command starts the cleaning-procedure of the hopper – only on machines with a movable hopper.

Sending:

”STX” – 02h - 21h – 65h - ”CRC-hi” – ”CRC-lo” – ”ETX”

After receiving this command, the machine will respond with the following data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	65h	Returned
5-6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

This function only works if the machine is in counting mode, and there is no counting in progress.

Set Value command - Variable 66h – Detailed

Stop machine – only CDS-versions

This command stops the coin wheel and the band motor. The machine is going into reject mode. The STOP-mode is cancelled by any function-call that leaves the Counting-mode or restarts the wheel.
The REJECT-mode is cancelled by starting the wheel in COUNTING-mode.

Sending:

”STX” – 02h - 21h – 66h - ”CRC-hi” – ”CRC-lo” – ”ETX”

The machine will respond with this data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	66h	Returned
5-6	X	CRC
7	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.

This function only works if the machine is in counting mode.

Set Value command - Variable 67h – Detailed

Change used bag – only in CDS524-mode

This command changes the used bag number.

Sending:

”STX” – 03h - 21h – 67h – bag number- ”CRC-hi” – ”CRC-lo” – ”ETX”

The machine will respond with this data-frame:

Byte #	Value	Description
0	02h	STX
1	03h	Number of bytes (only data bytes)
2	22h	Returned – (Set Value) command.
3	X	Link-status
4	67h	Returned
5	X	Bag number 1-4 – OK (CDS 524-mode) Bag number 1-6 – OK (726-Software) Bag number = 0xFF – failed to change
6-7	X	CRC
8	03h	ETX

Important: If link not constructed only byte #0 and #1 is returned.
IF motor status is sending, byte 6 is motor-state and CRC and ETX are moved one byte.

This function only works if the machine is in counting mode, and there is no counting in progress.

Other direct Commands

It could look a bit confusing, that some of the commands and values has to be read or set using the "Set" or "Get" commands, and others could be affected directly with a Main Control Command. This is done to achieve backwards compatibility to older machine types, and to give older OEM customers the possibility to use the new host commands, without rewriting their complete existing control software.

Direct command - 31h – Detailed

Get Display Contents

This command requests the PELICAN and CDS to return the 40 characters in the 2 display lines.

Penguin:
It will return the 80 characters of the display. There is another type of display-control in the penguin, so it has two display-buffers.

- Buffer ONE is controlled by the machine, and is always updated by the machine, even if the display is locked. This command always returns the data of this buffer, even if the display is locked.
- Buffer TWO is completely controlled by the HOST. Those data are shown if the display is locked and the machine is in counting mode. If the machine is entering MEMORY-mode, PROGRAMMIND-mode or some other modes the machine will show the data of buffer ONE.

Please Note:
The maximum polling speed of this command is 1 time every second, to avoid conflicts between counting procedure and communication.

From this point on, only the DATA Bytes is shown in all tables. The reader should at this point be familiar with the placement of the STX, ETX, CRC and Number of bytes.

Byte #	Value	Description
0	31h	Get Display Contents

The machine will respond with a message that contains the 40 bytes of display contents.

Byte #	Value	Description
0	32h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed
2	1st Line 1st Char	ASCII Value
3	1st Line 2nd Char	
:	:	
22	2nd Line 1st Char	
:	:	
41	2nd Line last Char	

If link not constructed, only byte #0 and #1 are returned.

Direct command - 33h – Detailed

Set Display Contents

This command sets up to 40 characters in two display lines.

Previous to this command, the user should send the " Lock and Clear Display " to avoid the machine overwriting the users display text.

Byte #	Value	Description
0	33h	Set Display Contents
1	X	Control byte: Bit 0-4: position of signs in row Bit 5–6: line in display Bit 7: Clear display first
2	X	ASCII code of first sign
3	X	ASCII code of second sign
4	X	ASCII code of third sign
	…	

The machine will respond with:

Byte #	Value	Description
0	34h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed or command not possible
2	X	Control byte: Bit 0: 1 = host has locked display / 0 = display unlocked Bit 1: 1 = machine is working with locked display 0 = machine is working with unlocked display → not able to handle display data. Bit 2: 1 = last display message not handled → not able to handle new display data

Direct command - 35h – Detailed

Set Keyboard to string Input Mode

This command clears line 2 of the display and puts an input cursor at the leftmost position. It waits for keyboard input terminated by the "enter" key
Up to 20 chars, including the terminating "CR" sign can be placed in the input buffer.
It is only possible to use the signs 1 to 9 and '.' for input.
The string input mode is left when ENTER is pressed or if the maximum of twenty characters is reached.

Note: Use the command Set Display Contents to set the input text in the first display line!

Byte #	Value	Description
0	35h	Set Keyboard to string Input

The machine will respond with:

Byte #	Value	Description
0	36h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed or command not possible
2	00h / 01h	0 = not possible to go into string-input mode 1 = machine will change to string-input-mode

Direct command - 37h – Detailed

Lock Display

Activating this command disables the machine to update the display by its own in Counting mode. If the machine is entering another mode, for example an error handling, memory, setup of the machine, will update the display again. If the machine is returning to normal counting mode, the machine will automatically return to the locked display, until the lock flag is reset.
Deactivating this function will activate the normal display functions.

Note: Use the command Set Display Contents to display user text!

Byte #	Value	Description
0	37h	Lock and clear Display
1	01h/00h	01h = Activate function / 00h = Deactivate function

After receiving this command, the PELICAN will respond with:

Byte #	Value	Description
0	38h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed

Direct command - 39h – Detailed

Lock Keyboard

This command locks the keyboard and disables all keyboard functions; also software controlled key entry.
Deactivating this function will activate the normal keyboard functions.

In CDS 5xx and 7xx-Software:
If "LOCK GRN/RED KEY:" is set in SETUP 5, also the RED and GREEN Buttons are ignored.

Byte #	Value	Description
0	39h	Lock Keyboard
1	01h/00h	01h = Activate function / 00h = Deactivate function

The machine will respond with:

Byte #	Value	Description
0	3Ah	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed or command not possible

Direct command – 3Dh – Detailed

Disable Memory function

This command is locking the MEMORY-function.

Byte #	Value	Description
0	3Dh	Lock/Unlock Memory-function
1	01h/00h	01h = Memory locked/ 00h = Memory unlocked

The machine will respond with:

Byte #	Value	Description
0	3Eh	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed or command not possible

Direct command - 53h – Detailed

Get last pressed key

This command sends the key-code of the last pressed key, even if the keyboard should be locked. If the command is executed, this key will be cleared.

Byte #	Value	Description
0	53h	Get last pressed key

The machine will respond with:

Byte #	Value	Description
0	54h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed or command not possible
2	XX	Key-code of the last pressed key

If the key-code is zero, there has not been pressed any key.

Direct command - 71h – Detailed

Set machine in programming mode for external display text

This command only works on a pelican machine
This command is only working if the machine is in counting mode, and the machine is not running!!!

Byte #	Value	Description
0	71h	Set machine in programming external display text

After receiving this command, the PELICAN will respond with:

Byte #	Value	Description
0	72h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed

Direct command - 73h and 75h – Detailed

Set machine in programming mode for header/footer text

This command is only working if the machine is in counting mode, and the machine is not running!!!

Byte #	Value	Description
0	73h/75h	Set machine in programming mode for header/footer text

After receiving this command, the PELICAN will respond with:

Byte #	Value	Description
0	74h/76h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed

Direct command - 77h – Detailed

Sending a code to the machine in programming-mode for external display/header/footer text

Code is representing the ASCII-code of a sign. If the machine has received 248 signs, the machine will automatically leave the programming-mode. The Machine will also leave if the machine has received the termination-codes. This means if the machine has received a 0h followed FFh.

Byte #	Value	Description
0	77h	Set machine in programming external display text
1	Code	Code represents the ASCII-code of a sign.

After receiving this command, the PELICAN will respond with:

Byte #	Value	Description
0	78h	Value Returned
1	00h / 01h	Status: 0 = OK, 1 = link not constructed
2	Code	Received code of the command
3	No	No is representing the number of codes received.

Watchdog-timer in HOST-communication

The watchdog-timer is activated in SETUP 5 and is called HOST-WDT.
If this function is chosen, and the link between HOST and machine is established, a counter is set to 30 seconds every time the machine receives a HOST-command.
If the machine is in counting-mode, and the counter is on 0seconds, the machine will show “Out of order - Call Cashier”. If ENTER is pressed the machine will show “Error number: 15”.
On any new pressed key the machine will leave the error-mode and return to counting mode.
If the machine receives a new command form the HOST during the watchdog-error, the machine will automatically return to counting-mode.

Slave-function in HOST-communication

If the SLAVE-function is selected in SETUP 5, the machine will return to error-message as long as there is not established a link between HOST and machine.

Additional commands may be added.

Subject to change without notice.

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