



KONGSBERG

☐ CAMPUS 1
ABERDEEN SCIENCE &
TECHNOLOGY PARK
BALGOWNIE ROAD
BRIDGE OF DON
ABERDEEN
AB22 8GT

Tel: (01224) 226500
Fax: (01224) 226501

☒ AIRPORT INDUSTRIAL ESTATE
WICK
CAITHNESS
KW1 4QS

Tel: (01955) 603606
Fax: (01955) 707520

☐ UNIT 14
THE BRIARS
WATERBURY DRIVE
WATERLOOVILLE
HANTS
PO7 7YH

Tel: (02392) 247800
Fax: (02392) 247808

TITLE:

Software Protocol Document

For the OE10-102

Serial Pan and Tilt Unit

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KONGSBERG MARITIME	DATE	6	13975	06/14
DRAWN: S Wilson	04/10	5	13554	11/13
CHECKED:		4	13393	09/13
APPROVED:		3	12727	09/11
ORIGIN DOC No:		ISS	MOD	DATE
DRAWING No: 10-102-5035	SHEET 1 of 9			

RECORD OF ISSUE AND REVISION

DATE	REV NO.	MOD	DETAILS	AUTHORISED
04/10	1	-	First Issue	SW
05/10	2	-	CRN12606	SW
09/11	3	-	CRN12727	SW
09/13	4	-	CRN13393	SW
11/13	5	-	CRN13554	SW
06/14	6	13975	Fix PC Commands	WS

Authorized amendments will be notified by or under cover of this page of the Document and will be issued as complete pages, which replace the equivalent unamended pages.

The amended pages will carry the Document reference and Amendment Number.

Amendments are to be embodied by the authorised holders of the Document and superseded pages are to be withdrawn and destroyed. The Amendment Record above will be completed.

A Change Request Note (CRN) will be used to request and document any change.

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1. Summary

This document lists the commands that have been implemented in the OE10-102 Serial Pan and Tilt Unit. For a more complete list of the standard Kongsberg commands, port settings and timings please refer to document 0350-5020.

2. Related Documents

OE0350-5020 Kongsberg Maritimes Standard Network Command Protocol for Kongsberg Camera.
10-102-5020 Product Specification for the OE10-102 Serial Pan and Tilt Unit

3. Packet Data Structure

The packet data structure is a combination of bytes ranging from 00h to 7Fh except for the data section which may contain bytes outside of this range, and will adopt the following structure:

<to:from:length:command:data_1 data2 data_3 ... data_n:checksum:checksum ind>

Where:

To = 1 Byte in the range 0x01h to 0xFFh. (0x00h is a reserved address and cannot be used)

The id of the device the packet is intended for. This may be a peripheral device or a controller.

The controllers ID is reserved as 0x01.

From = 1 Byte in the range 0x01h to 0xFFh

The id of the device that has transmitted the packet. This may be a peripheral device or a controller. The controllers ID is reserved as 0x01.

Length = 1 Byte in the range 0x00h to 0xFFh.

The combined length of the command section, plus the data section, plus the colon joining them, e.g. **<to:from:06:TP:034:checksum:checksum ind >**. If the length of the command section is greater then 99 bytes then the Length will be set to 99 and the user must assume that the data is correct.

Command = Variable length with a maximum length of 2 Bytes in the range 0x00h to 0x7Fh.

The command that is to be sent to the peripheral or controller.

Data = Variable length

The data that is either sent with the command (e.g. the visca command 'VS' in the command field and the actual Sony VISCA© command in the data field) or data that is returned as part of a status check etc. Data elements are separated with space (0x20h) delimiters.

Checksum = 1 Byte

The packet checksum is an XOR of all the bytes (including delimiters such as ':' but excluding the < at the beginning and the :checksum:checksum ind > section at the end) in the packet.

If the checksum when calculated equals 0x3C then the Checksum byte will be set to 0xFF. If the checksum when calculated equals 0x3E then the Checksum byte will be set to 0xFF.

Checksum Ind = 1 Byte

If the checksum when calculated equals 0x3C then the Checksum Ind byte will be set to ASCII 0.

If the checksum when calculated equals 0x3E then the Checksum Ind byte will be set to ASCII 1.

For all other values of calculated checksum the Checksum Ind byte will be set to ASCII G.

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4. Feature Control Commands

Following is a list of standard command packets that have been implemented in the OE10-102 Serial Pan and Tilt Unit. All additions must be included into this document through the companies change control procedure.

NOTE: Unless otherwise specified, in the commands shown and examples given, the section Byte* represent one(1) eight bit byte. For example in the Pan Left Command the command sent to the peripheral is: **<to:from:03:PL::checksum:checksum ind >**

And the peripheral will reply with: **<to:from:08:ACK:PLByte1Byte2Byte3:checksum:checksum ind >**

Where ACK = The ASCII non-printable ACK character = 0x06h

Byte1 = The number of hundreds of degrees

Byte2 = The number of tens of degrees

Byte3 = The number of units of degrees

So to reply with an angle of 276 degrees, the reply would be:

<to:from:08:ACK:PL276:checksum:checksum ind >

Where a byte corresponds to a non-printable character in the ASCII codes it will be shown in the command and its reply as its Hexadecimal value except for the non-printable characters "ACK"(0x06h) and "NAK"(0x15h) which will be shown explicitly. If the byte is a printable character it will be shown in its printable form not as its hexadecimal value.

Check Status command:

Sent to peripheral device :**<to:from:03:ST::checksum:checksum ind >**

Returned from peripheral device:

<to:from:0D:ACK:STByte1Byte2Byte3...Byte9:checksum:checksum ind >

Byte1 = Status information of the camera.

Bit0 = 0 Video Module Off

Bit0 = 1 Video Module On

Bit1 = Focus supported

Bit2 = Zoom supported

Bit3 = Pan supported

Bit4 = Tilt supported

Bit5 = Auto focus supported

Bit6 = Manual Exposure supported

Bit7 = Stills camera

Byte2 = Status information of the camera.

Bit0 = Wiper supported

Bit1 = Washer supported

Bit2 = Lamp Control Supported (?)

Bit3 = Flash Supported

Bit4 = Flash Charged

Bit5 = Reserved

Bit6 = Reserved

Bit7 = Reserved

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Byte3 = Temperature and Humidity information if applicable.

Lower Nibble = Temp. Information in Range 0h - Fh and will be a linear representation of the temperature within the peripheral, ranging from -5°C to 75°C

i.e. -5°C = 0F to 75°C = Fh.

Upper nibble = Humidity information in range 0h - Fh and will be a linear representation of the humidity within the peripheral, ranging from 0% RH to 100% Rh

i.e. 0% RH = 0F to 100% Rh = Fh

Byte4 to Byte6 = Pan position if applicable.

Where Byte4 = Hundreds of Degrees,

Where Byte5 = Tens of Degrees,

Where Byte6 = Single Degrees,

transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Byte7 to Byte9 = Tilt position if applicable.

Where Byte7 = Hundreds of Degrees,

Where Byte8 = Tens of Degrees,

Where Byte9 = Single Degrees,

transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Change ID command:

Sent to peripheral device : **<to:from:04:SI*:checksum:checksum ind>**

where * = the new peripheral id. The id must be a 1 Byte. ASCII character in the range 0x02h to 0xFEh. (0x00h, 0x01h and 0xFFh are reserved addresses and cannot be used)

Returned from peripheral device: **<to:from:04:ACK:SI:checksum:checksum ind >**

When the peripheral receives the Change ID command it will CHANGE to the NEW id and transmit the return packet with the NEW id in the from section of the packet. This means that the controller will have to swap to the new id to receive the peripherals returned packet. The controller MUST then reply to the peripheral with a status command. This allows the peripheral to tell whether the controller is receiving on the peripherals new id. If no status command is received from the controller within 1 second the peripheral will swap back to the old id and wait for commands from the controller. The controller will revert back to the original address if no response to the status command is received.

Pan Left Command:

Sent to peripheral device : **<to:from:03:PL::checksum:checksum ind >**

Returned from peripheral device:

<to:from:07:ACK:PLByte1Byte2Byte3:checksum:checksum ind >

Byte1 to Byte3 = Current Pan position if applicable.

Where Byte1 = Hundreds of Degrees,

Where Byte2 = Tens of Degrees,

Where Byte3 = Single Degrees,

Transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Pan Right command:

Sent to peripheral device : **<to:from:03:PR::checksum:checksum ind >**

Returned from peripheral device:

<to:from:07:ACK:PRByte1Byte2Byte3:checksum:checksum ind >

Byte1 to Byte3 = Current Pan position if applicable.

Where Byte1 = Hundreds of Degrees,

Where Byte2 = Tens of Degrees,

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Where Byte3 = Single Degrees,
transmitted as ASCII characters in the range 0x30h to 0x39h
(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Pan Stop command:

Sent to peripheral device : <to:from:03:PS::checksum:checksum ind >

Returned from peripheral device:

<to:from:07:ACK:PSByte1Byte2Byte3:checksum:checksum ind >

Byte1 to Byte3 = Current Pan position if applicable.

Where Byte1 = Hundreds of Degrees,

Where Byte2 = Tens of Degrees,

Where Byte3 = Single Degrees,

transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Tilt Up command:

Sent to peripheral device : <to:from:03:TU::checksum:checksum ind >

Returned from peripheral device:

<to:from:07:ACK:TUByte1Byte2Byte3:checksum:checksum ind >

Byte1 to Byte3 = Current Tilt position if applicable.

Where Byte1 = Hundreds of Degrees,

Where Byte2 = Tens of Degrees,

Where Byte3 = Single Degrees,

transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Tilt Down command:

Sent to peripheral device : <to:from:03:TD::checksum:checksum ind >

Returned from peripheral device:

<to:from:07:ACK:TDByte1Byte2Byte3:checksum:checksum ind >

Byte1 to Byte3 = Current Tilt position if applicable.

Where Byte1 = Hundreds of Degrees,

Where Byte2 = Tens of Degrees,

Where Byte3 = Single Degrees,

transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Tilt Stop command:

Sent to peripheral device : <to:from:03:TS::checksum:checksum ind >

Returned from peripheral device:

<to:from:07:ACK:TSByte1Byte2Byte3:checksum:checksum ind >

Byte1 to Byte3 = Current Tilt position if applicable.

Where Byte1 = Hundreds of Degrees,

Where Byte2 = Tens of Degrees,

Where Byte3 = Single Degrees,

transmitted as ASCII characters in the range 0x30h to 0x39h

(e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Go to Tilt Position command:

Sent to peripheral device : <to:from:06:TP:*...*:checksum:checksum ind >

Returned from peripheral device: <to:from:07:ACK:TP*...*:checksum:checksum ind >

Where *...* = the position to go to in degrees ranging from 000 to peripherals

maximum tilt position transmitted as ASCII characters in the range 0x30h to 0x39h (e.g.

000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

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Go to Pan Position:

Sent to peripheral device : **<to:from:06:PP:*...*:checksum:checksum ind >**

Returned from peripheral device: **<to:from:07:ACK:PP*...*:checksum:checksum ind >**

Where *...* = the position to go to in degrees ranging from 000 to peripherals maximum pan position transmitted as ASCII characters in the range 0x30h to 0x39h (e.g. 000 = 0x30h 0x30h 0x30h , 270 = 0x32h 0x37h 0x30h)

Proportional control command:

Sent to peripheral device :

<to:from:07:PC:Byte1Byte2Byte3Byte4:checksum:checksum ind >

Where Byte1 = Commands to action:

Pan Bits 0 & 1: 002=Stop, 012=Pan Left, 102 = Pan Right

Tilt Bits 2 & 3: 002=Stop, 012=Tilt up, 102 = Tilt down

Focus Bits 4 & 5: 002=Stop, 012=Focus Near, 102 = Focus Far, 112 = Auto Focus

Zoom Bits 6 & 7: 002=Stop, 012=Zoom Wide, 102= Zoom Tele Byte2 = Pan speed in the range 0- 64h where 0x00h = stopped and 0x64h = maximum speed

Byte3 = Tilt Speed in the range 0- 64h where 0x00h = stopped and 0x64h = maximum speed

Byte4 = Zoom and focus speed, Upper byte is zoom speed and lower byte is focus speed: Both in the range 0x0h to 0xFh where 0x0h is the slowest speed and 0xFh = fastest speed

Returned from peripheral device: **<to:from:04:ACK:PC:checksum:checksum ind >**

Proportional Control with Feedback command:

Sent to peripheral device :

<to:from:07:PF:Byte1Byte2Byte3Byte4:checksum:checksum ind >

Where Byte1 = Commands to action:

Pan Bits 0 & 1: 002=Stop, 012=Pan Left, 102 = Pan Right

Tilt Bits 2 & 3: 002=Stop, 012=Tilt up, 102 = Tilt down

Focus Bits 4 & 5: 002=Stop, 012=Focus Near, 102 = Focus Far, 112 = Auto Focus

Zoom Bits 6 & 7: 002=Stop, 012=Zoom Wide, 102= Zoom Tele

Byte2 = Pan Speed in the range 0- 64h where 0x00h = stopped and 0x64h = maximum speed

Byte3 = Tilt Speed in the range 0- 64h where 0x00h = stopped and 0x64h = maximum speed

Byte4 = Zoom and focus speed, Upper byte is zoom speed and lower byte is focus speed: Both in the range 0x0h to 0xFh where 0x0h is the slowest speed and 0xFh = fastest speed

Returned from peripheral device:

<to:from:0E:ACK:PFByte1...Byte10:checksum:checksum ind >

Where Byte1 = Pan Speed

Byte1 = Tilt Speed

Byte3 = Tilt Position hundreds (Ascii char in range 0x30h to 0x39h)

Byte4 = Tilt Position tens (Ascii char in range 0x30h to 0x39h)

Byte5 = Tilt Position units (Ascii char in range 0x30h to 0x39h)

Byte6 = Pan Position hundreds (Ascii char in range 0x30h to 0x39h)

Byte7 = Pan Position tens (Ascii char in range 0x30h to 0x39h)

Byte8 = Pan Position units (Ascii char in range 0x30h to 0x39h)

Byte9 = Pan endstops enable (0x30h = enabled, 0x31h = disabled)

Byte10 = Tilt endstops enable (0x30h = enabled, 0x31h = disabled)

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Set pan anti-clockwise soft end stop:

Send to peripheral device: **<to:from:03:AW::checksum:checksum ind >**

Returned from peripheral device: **<to:from:04:ACK:AW:checksum:checksum ind >**

Set pan clockwise soft end stop:

Send to peripheral device: **<to:from:03:CW::checksum:checksum ind >**

Returned from peripheral device: **<to:from:04:ACK:CW:checksum:checksum ind >**

Set tilt up soft end stop:

Send to peripheral device: **<to:from:03:UT::checksum:checksum ind >**

Returned from peripheral device: **<to:from:04:ACK:UT:checksum:checksum ind >**

Set tilt down soft end stop:

Send to peripheral device: **<to:from:03:DT::checksum:checksum ind >**

Returned from peripheral device: **<to:from:04:ACK:DT:checksum:checksum ind >**

Set Pan Speed command:

Send to peripheral device: **<to:from:04:DS:*.checksum:checksum ind >**

Where * = data representing the new pan speed and will be in the range 0x00h to 0x64h
where 0x00h = stopped and 0x64h = maximum speed

Returned from peripheral device: **<to:from:04:ACK:DS:checksum:checksum ind >**

Set Tilt Speed command:

Send to peripheral device: **<to:from:04:TA:*.checksum:checksum ind >**

Where * = data representing the new pan speed and will be in the range 0x00h to 0x64h
where 0x00h = stopped and 0x64h = maximum speed

Returned from peripheral device: **<to:from:04:ACK:TA:checksum:checksum ind >**

Use Endstops command:

Send to peripheral device: **< to:from :04:ES:*.checksum:checksum ind>**

where * = **0x30h** for don't use end stops and * = **0x31h** for use end stops.

Returned from peripheral device: **< to:from :05:ACK:ES*:checksum:checksum ind>**

where * = **0x30h** for not using end stops and * = **0x31h** for using end stops.

Pan and Tilt Status command:

Send to peripheral device: **< to:from :03:AS::checksum:checksum ind>**

Returned from peripheral device:

< to:from :0E:ACK:ASbyte1 ... byte10:checksum:checksum ind>

Where byte1 = pan speed byte value containing the P and T pan speed

byte2 = tilt speed byte value containing the P and T tilt speed

byte3 = tilt position hundreds ASCII character in the range 0x30h to 0x39h

byte4 = tilt position tens ASCII character in the range 0x30h to 0x39h

byte5 = tilt position units ASCII character in the range 0x30h to 0x39h

byte6 = pan position hundreds ASCII character in the range 0x30h to 0x39h

byte7 = pan position tens ASCII character in the range 0x30h to 0x39h

byte8 = pan position units ASCII character in the range 0x30h to 0x39h

byte9 = using pan end stops ASCII character 0x30h to say not using end stops. ASCII character 0x31h to say using end stops.

byte10 = using tilt end stops ASCII character 0x30h to say not using end stops. ASCII character 0x31h to say using end stops.

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ACK command:

Sent/Received by peripheral device : **<to:from:*.ACK:*.:.checksum:checksum ind >**

The actual data in the field is dependant on the initial command that was sent to the peripheral as specified above.

NAK command:

Sent by peripheral device : **<to:from:03:NAK:CommandByte1:checksum:checksum ind >**

Where Command = Command that was initially sent to the device and caused the NAK reply.

Byte1 = Error code returned by the peripheral. The error code will consist of one(1) byte of data where each bit represents a specific error.

Byte1 = Error Byte.

Bit0 = 1 Error: Device under control of another controller

Bit1 = 1 Error: At focus end stop

Bit2 = 1 Error: At zoom end stop

Bit3 = 1 Error: Command not available for device

Bit4 = 1 Error: Command not recognized

Bit5 = 1 Error: Device timed out

Bit6 = 1 Error: User undefined

Bit7 = 1 Error: User undefined

Example:

Command sent to the Device **<to:from:03:FN::checksum:checksum ind >**

NAK reply: **<to:from:05:NAK:FN2:checksum:checksum ind >**

5. Default/Broadcast Address:

There is also a default/broadcast address. All peripherals connected to the network will enact the specified command. The broadcast address is fixed and must not be changed. This is characterized by the TO section being set to 0xFFh with all other sections being as standard for the required command e.g. **<FF:from:length:command:data_1 data_2 data_3.....data_n:checksum:checksum ind >**

Care MUST be taken when using the broadcast format when operating on a multi-peripheral network to avoid corrupting id settings etc in the peripherals. It is up to the programmer to ensure that care is taken, with relevant warnings, when using the broadcast packet on a network as the peripheral will not conduct any checks out with its usual checks.

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