TRANBERG®

Gateway Protocol

Tranberg 2650 Commander Searchlight

Version 1.4

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Chapter I. Overview

The Gateway consists of two unidirectional serial interfaces, one for commands into the system, and one for outgoing status messages (to external system).
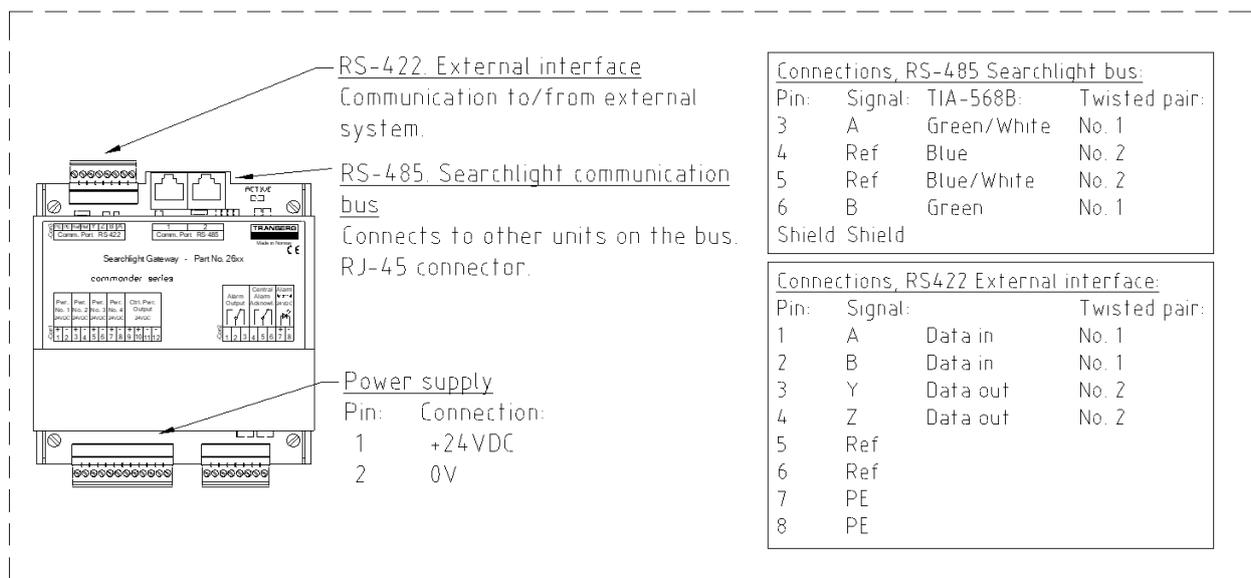
The Gateway acts as a panel in the searchlight system, receiving messages from all searchlights and panels, and retransmitting the information out to external equipment. Commands to the searchlights are received from external equipment and retransmitted on the system bus as a panel message.

Status output: Reads messages on the bus, converts and ouputs them on the gateway output.
NOTE: Status messages for all units connected to the bus are sent out continuously.

Command input: waits for commands from the external input, then waits for signal from bus master to send the command out over the bus.

Section 1.01   CONNECTIONS

RS-422. External interface
Communication to/from external system.

RS-485. Searchlight communication bus
Connects to other units on the bus.
RJ-45 connector.

Power supply
Pin:	Connection:
1	+24VDC
2	0V

Connections, RS-485 Searchlight bus:
Pin:	Signal:	TIA-568B:		Twisted pair:
3	A	Green/White		No. 1
4	Ref	Blue		No. 2
5	Ref	Blue/White		No. 2
6	B	Green		No. 1
Shield	Shield			

Connections, RS422 External interface:
Pin:	Signal:		Twisted pair:
1	A	Data in	No. 1
2	B	Data in	No. 1
3	Y	Data out	No. 2
4	Z	Data out	No. 2
5	Ref		
6	Ref		
7	PE		
8	PE		

Connect as shown in above diagram. Power supply: 24VDC to Con1. Internal control bus to RS-485 (port 1 or 2). External equipment to RS-422 port. (A+B = input to gateway, Y+Z = output from gateway).

Interface: Galvanically isolated RS-422, baud rate: 19200, 8 bit, No parity, 1 stop bit

Indicator: 'ACTIVE' LED lights when gateway is ready to receive commands. LED is off when waiting to send a command out on the bus, or to be registered on the bus by the master panel (see note).

NOTE: The gateway must be powered up before or simultaneously as power up of the master panel, in order for the master panel to query the gateway regularly. Otherwise the gateway will not be able to send commands to the units on the bus (The 'ACTIVE' LED will be off in that case).

Chapter II.   Messages

Section 2.01   MESSAGE FORMAT OVERVIEW

There are several message types defined in the system, they all have different format and length depending on message type. The messages are based on the ASCII table and so this manual refers to ASCII values and characters.

Messages types:
```
Bus Node identification at startup:
ONLINE_REPLY        '2'  Node present on bus

Searchlight status messages:
SEARCHLIGHT_REPLY   '6'  Status message from searchlight

Panel status messages and commands (to searchlights):
PANEL_REPLY         '4'  Speed move, light on/off etc.
PANEL_REPLY_POS     '8'  Position move, light on/off etc.
SET_ADDRESS         '7'  Not used

Alternative command messages from panel:
- Presets:
PRESET_SET          'A'  Write current position to preset
PRESET_GOTO         'B'  Move to preset position
```

Generic message format:
A message consists of a header ("$PTRA,", a from-address (sender), a message type identifier, the message body (data) with various delimiters (always comma ','), and an end-of-message delimiter:

```
"$PTRA,"    Header
'A'         From-address (which searchlight), range 'A' to 'H'
'6'         Message type (Here: SEARCHLIGHT_REPLY)
<data1>
','         field delimiter
<data2>
','         field delimiter
<...>
<dataN>
'*'         End-char. (end of message)
<LF><CR>    Msgs out from gateway: End-chars Line Feed and Carriage Return
```

A generic <data> field may consist of groups of parameters, i.e. horizontal and vertical position and speed, motor currents, etc.

Several parameters use the character '@' (ascii 64) for representing the value zero.

There are no checksums included in this message format.

Messages out from gateway (status msgs) ends with <LF><CR> (Line Feed and Carriage Return).

NOTE: The end character for received messages (commands) is the asterisk, '*' (ascii 42). It must be avoided in any values or parameters in the message. An asterisk inside the message will cause a premature end of message and message will be ignored.

Section 2.02   STATUS MESSAGE FORMAT

The status message format and length varies depending on message type.

Example: Type '6', `SEARCHLIGHT_REPLY`:
```
$PTRA,A6XC,@@@@10,H_M @@*
```

```
"$PTRA,"      Header
'A'           From-address (which searchlight), range 'A' to 'H'
'6'           Message type (Here: SEARCHLIGHT_REPLY). See 'COMMANDS' below.
'X'           Temperature: temp[degrees C] = msg_field - 64
'C'           Position. See 'POSITION BYTE' below.
','           field delimiter
'@'           Horizontal speed (32 steps in each direction, '@' = '0' / stop)
'@'           Vertical speed (see above)
'@'           Focus motor Z1 speed (see above)   : focus motors have only
'@'           Focus motor Z2 speed (not used)    : one speed (on/off).
'1'           Light1 status ('0' = off, '1' = on, '2' = ignition)
'0'           Light2 status ('0' = off, '1' = on, '2' = ignition)
','           field delimiter
'H'           H_Pos_angle_MSD
'_'           H_Pos_angle_LSD
'M'           V_Pos_angle_MSD
' '           V_Pos_angle_LSD
'@'           H motor current in 1/10ths Amps, '@' = 0.0A, 'A' = 0.1A, etc.
'@'           V motor current (same as above). I[A] = (msg_field – 64) / 10
'*'           End-char. (end of message)
<LF><CR>      End-chars Line Feed and Carriage Return
```

Position angles calculation:
From numeric angle to message format:
```
H_Pos_angle_MSD = (((m1_angle_h + 4005) / 89) + 32)
H_Pos_angle_LSD = (((m1_angle_h + 4005) % 89) + 32)
V_Pos_angle_MSD = (((m2_angle_v + 4005) / 89) + 32)
V_Pos_angle_LSD = (((m2_angle_v + 4005) % 89) + 32)
```

From message format to numeric angle:
```
m1_angle_h = ( (((H_Pos_angle_MSD - 32) * 89) + (H_Pos_angle_LSD -32)) – 4005 )
m2_angle_v = ( (((V_Pos_angle_MSD - 32) * 89) + (V_Pos_angle_LSD -32)) – 4005 )
```

Where `m1_angle_h` is horizontal position, `m2_angle_v` is vertical position. Both are integers in tenths of degrees (i.e. one rotation equals 3600). Position 0, 0 is by default when searchlight points away from (opposite of) connection box and straight ahead (horizontal level).

Max/min values for position:
```
m1_angle_h: -185 degrees to 185 deg. Negative values = left for center.
m2_angle_v: -35 deg. to 15 deg. Negative values are down / below horiz. level.
```

Position byte:
Each axis has one of 8 position states, which are combined into one byte in message. These states are used for the position indicators on panel.

0	park position	4	home position
1	extreme left	5	to the right of home
2	soft stop left	6	extreme right
3	to the left of home	7	extreme right

```
Position byte = (Vert_motor_pos * 8) + Hor_motor_pos + 32
```

Section 2.03   OUTPUT MESSAGE EXAMPLE

Message from searchlight:
```
$PTRA,A6XC,@@@@10,H_M @@*
```

```
Header              '$PTRA,'
Searchlight no:     'A'
Command             '6': SEARCHLIGHT_REPLY
Temperature         'X': ascii('X') - 64 = 88 - 64 = 24 degrees C
Position            'C' (see Position byte)
H speed (M1)        '@'
V speed (M2)        '@'
Z1 speed (focus)    '@'
Z2 speed (n/a)      '@'
light source 1      '1'
light source 2      '0'
H_pos_angle_MSD     'H'
H_pos_angle_LSD     '_'
V_pos_angle_MSD     'M'
V_pos_angle_LSD     ' '
H motor M1 curr     '@'
V motor M2 curr     '@'
```

Position calculation:
```
m1_angle_h = ((H_Pos_angle_MSD - 32) * 89) + (H_Pos_angle_LSD - 32) - 4005
m1_angle_h = ((ascii('H') - 32) * 89) + (ascii('_') - 32) - 4005
m1_angle_h = ((72 - 32) * 89) + (137 - 32) - 4005 = 3560 + 105 - 4005 = -340.
The horizontal angle is -34 degrees, i.e. 34 degrees to the left of center

m2_angle_v = ((V_Pos_angle_MSD - 32) * 89) + (V_Pos_angle_LSD - 32) - 4005
m2_angle_v = ((77 - 32) * 89) + (32 - 32) - 4005 = 4005 + 0 - 4005 = 0
The vertical angle is 0, i.e. in horizontal level.
```

From panel:
```
$PTRA,04A*
```

```
Header              '$PTRA,'
Panel no.           '0' (zero is always bus master). Panel no. range is '0' to '?'.
Command             '4'
Searchlight no.     'A'
```

Meaning: Panel no. 0 (= master) currently controls searchlight no. A (i.e. searchlight operated by button '1' on panel).

Short sequence dump from a system with one panel and one searchlight:

```
$PTRA,A6XC,@@@10,H_M @@*
$PTRA,04A*
$PTRA,A6XC,@@@10,H_M @@*
$PTRA,04A*
$PTRA,A6XC,@@@10,H_M @@*
$PTRA,04A*
$PTRA,A6XC,P@@10,H_M A@*
$PTRA,04A*
$PTRA,A6XC,P@@10,HaM C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,HjM C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,I M C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,I2M C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,IGM D@*
$PTRA,04A*
$PTRA,A6XC,P@@10,I\M C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,IqM B@*
$PTRA,04A*
$PTRA,A6XC,P@@10,J-M C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,JBM D@*
$PTRA,04A*
$PTRA,A6XC,P@@10,JWM C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,JlM D@*
$PTRA,04A*
$PTRA,A6XC,P@@10,K(M D@*
$PTRA,04A*
$PTRA,A6XC,P@@10,K=M C@*
$PTRA,04A*
$PTRA,A6XC,P@@10,KRM D@*
$PTRA,04A*
$PTRA,A6XC,P@@10,KgM D@*
```

Horizontal position

Horizontal motor current

As the horizontal motor moves at speed 'P', the horizontal position (angle) of the searchlight changes, and the current in the horizontal motor increases.

Section 2.04   COMMAND INPUT

The messages in to the system/gateway are similar in format as the output messages. The fields not used are filled with '@' (ascii 64) or '-' (hyphen, ascii 45). For example, the position value are not used in the move command ('PANEL_REPLY'), since the searchlight moves continuously until the next command or to end stop.

Example of message to send to gateway:
```
$PTRA,0?4A--CC@@10----@@*
```

```
"$PTRA,"    Header
'0'         To-address, always '0' (Bus master address, panel 0)
'?'         From-address, always '?' (gateway address)
'4'         Message type (Here: PANEL_REPLY). See 'COMMANDS' above.
'A'         number / address of searchlight to control
'-'         Not used
'-'         Not used
'C'         Horizontal speed (32 steps in each direction, '@' = 0 / stop)
'C'         Vertical speed (see above)
'@'         Focus motor Z1 speed (see above)   : current focus motors have
'@'         Focus motor Z2 speed (not used)    : only one speed fw/off/bw.
'1'         Light1 status ('0' = off, '1' = on, '2' = ignition)
'0'         Light2 status (see above)
'-'         H Pos angle MSD.   : Angles not used in move (PANEL_REPLY)
'-'         H pos angle LSD.   : command, but used in move to position
'-'         V Pos angle MSD.   : (PANEL_REPLY_POS) command. Same format
'-'         V pos angle LSD.   : as status message.
'@'         Not used
'@'         Not used
'*'         End-char. (end of message)
```

This message means:
- message to master '0', from gateway / panel no. 15 ('?'), both are mandatory fields,
- use speed move command (PANEL_REPLY, '4'),
- control searchlight 'A',
- drive both motors with speed 'C',
- focus motors off '@@',
- turn on (or keep on) light source 1.
- position info is not used in speed moves, set to '-'

Examples of changes to the above message:
```
$PTRA,0?4A--@@@@10----@@*
```
- turn off / stop both motors

```
$PTRA,0?4A--@0@@10----@@*
```
- drive vertical motor at speed '0', i.e. 48 ('0') – 64 ('@') = –16, i.e. half speed.

```
$PTRA,0?4A--@@@@00----@@*
```
- turn off motors, turn off lights

NOTE: The asterisk character, '*', may appear in the calculated value for the horizontal and vertical position. These positions must be avoided, as an asterisk will be interpreted as end of message. Instead, use a position + 1 or – 1 unit (equals 0.1 degree change). See also Section 2.01 MESSAGE FORMAT OVERVIEW.

Section 2.05 POSITION PRESETS

Each searchlight can store 10 position presets, numbered 0 to 9.

Preset no. 0 is called PARK and is usually reserved for parking position, but may be freely used. Preset 1 is called HOME and is used by the HOME-button on the control panel. The rest of the presets are available to the user. It is possible to both set and go to these preset positions through the gateway.

The various message command values for using the presets are listed in Section 2.01 MESSAGE FORMAT OVERVIEW.

Store preset: 'A' (`PRESET_SET`)

Example of message to send to gateway:

```
$PTRA,0?AA2*
```

```
"$PTRA,"    Header
'0'         To-address, always '0' (Bus master address, panel 0)
'?'         From-address, always '?' (gateway address)
'A'         Message type (PRESET_SET). See 'COMMANDS' above.
'A'         Searchlight to control
'2'         Preset number, '0' to '9' (ASCII 48 to ASCII 57)
'*'         End-char. (end of message)
```

To store a preset, first move the searchlight to the desired position you want to store, and then send a PRESET_SET-command as described above.

It's also possible to store a preset with a desired speed you want the searchlight to move to this preset. If no speed is stored (as in the example above), the searchlight will move as quickly as possible.

Example of message to send to gateway:

```
$PTRA,0?AA2-AA*
```

```
"$PTRA,"    Header
'0'         To-address, always '0' (Bus master address, panel 0)
'?'         From-address, always '?' (gateway address)
'A'         Message type (PRESET_SET). See 'COMMANDS' above.
'A'         Searchlight to control
'2'         Preset position
'-'         Not used
'A'         Horizontal speed (32 steps in each direction, '@' = 0 / stop)
'A'         Vertical speed (see above)
'*'         End-char. (end of message)
```

Go to preset: 'B' (`PRESET_GOTO`).

Example of message to send to gateway:

```
$PTRA,0?BA2*

"$PTRA,"     Header
'0'          To-address, always '0' (Bus master address, panel 0)
'?'          From-address, always '?' (gateway address)
'B'          Message type (PRESET_GOTO). See 'COMMANDS' above.
'A'          Searchlight to control
'2'          Preset position
'*'          End-char. (end of message)
```

The searchlight will move to the position stored in preset 2. If a speed setting was stored, the searchlight will move with that speed. If no speed was stored, the searchlight will move with full speed to that position.

NOTE: If a speed is stored to preset 1, this will also affect the movement when pressing the "HOME"-button on the control panel.