



A Sierra Monitor Company

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8700-84 Lutron eLumen

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after May 1, 2001

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1. Lutron eLumen Description

The Serial Lutron eLumen driver allows the FieldServer to transfer data to and from devices over RS-232 or RS-485 using eLumen protocol. The FieldServer can only be used operationally as a Lutron Client driver. Any existing Lutron Server drivers are for FieldServer testing purposes only and cannot be used to emulate a Lutron eLumen system.

The driver supports the following 3 panels: GRAFIK5000, GRAFIK6000 and GRAFIK7000. The hardware for all 3 panels is identical. The only differences are limits in the database. GRAFIK5000 has only 1 CSD link and can have a max of 128 zones. GRAFIK6000 has 3 CSD links with 512 zones. GRAFIK7000 has 6 links with 512 zones and can communicate with other processors.

The FieldServer eLumen driver implements the following functionality:

- Status monitoring of eLumen system data and parameters.
- System Control of eLumen.

Status monitoring is achieved by sending status requests to the eLumen system. Retrieved status data are collected and stored in FieldServer Data Arrays that allow access by other protocols.

System Control Commands can be configured in the FieldServer to address any groups of Areas, Zones or Scenes. A mechanism is provided by which the parameters are set before the command is triggered using the upstream protocol.

Commands are provided to read the names of Areas, Zones and Scenes from the eLumen to facilitate access by SCADA systems.

2. Driver Scope of Supply

1.01 Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
FS-8915-10	UTP cable (7 foot) for RS-232 use
FS-8917-02	RJ45 to DB9F connector adapter
FS-8700-84	Driver Manual.

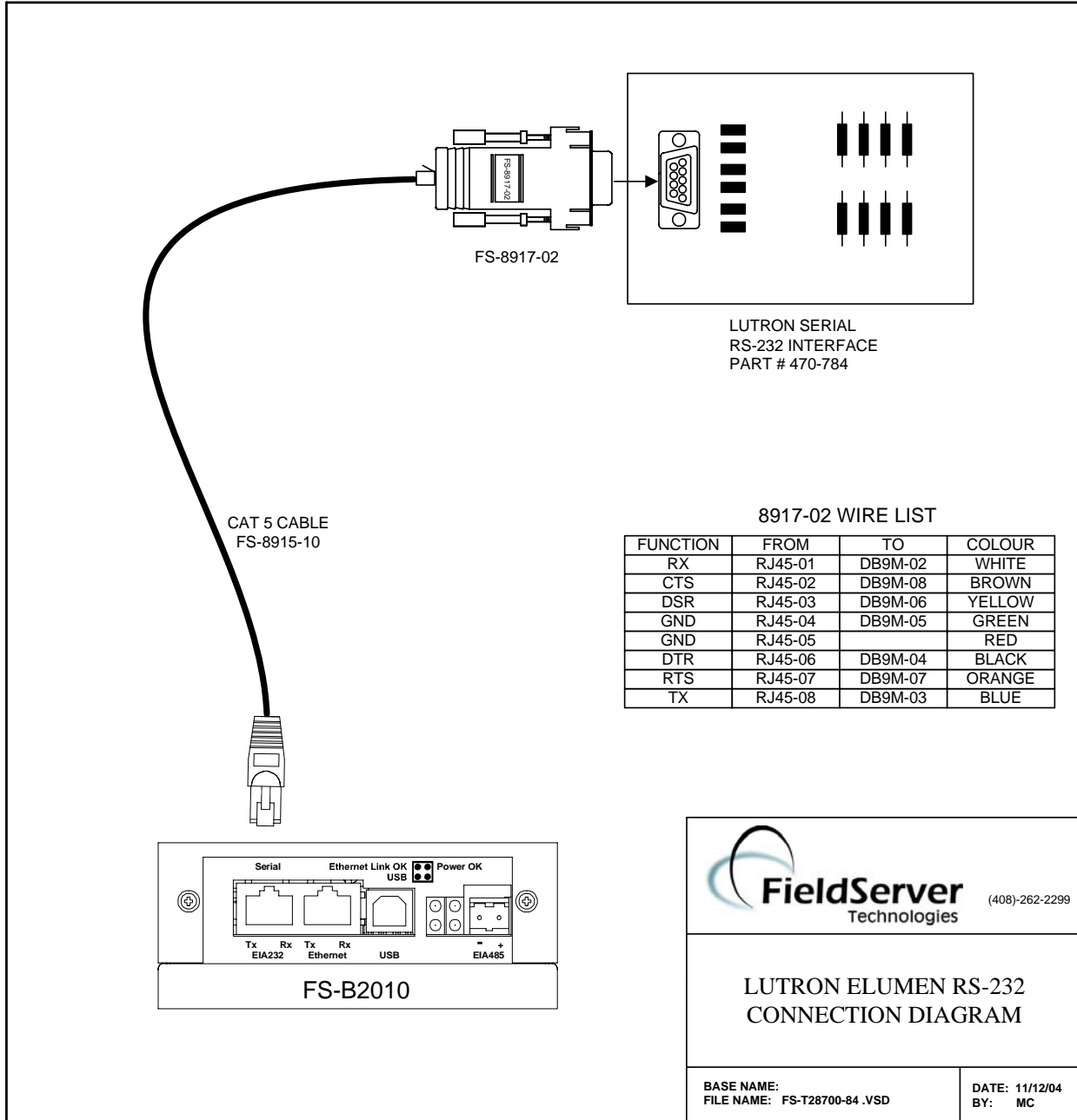
1.02 Provided by the Supplier of 3rd Party Equipment

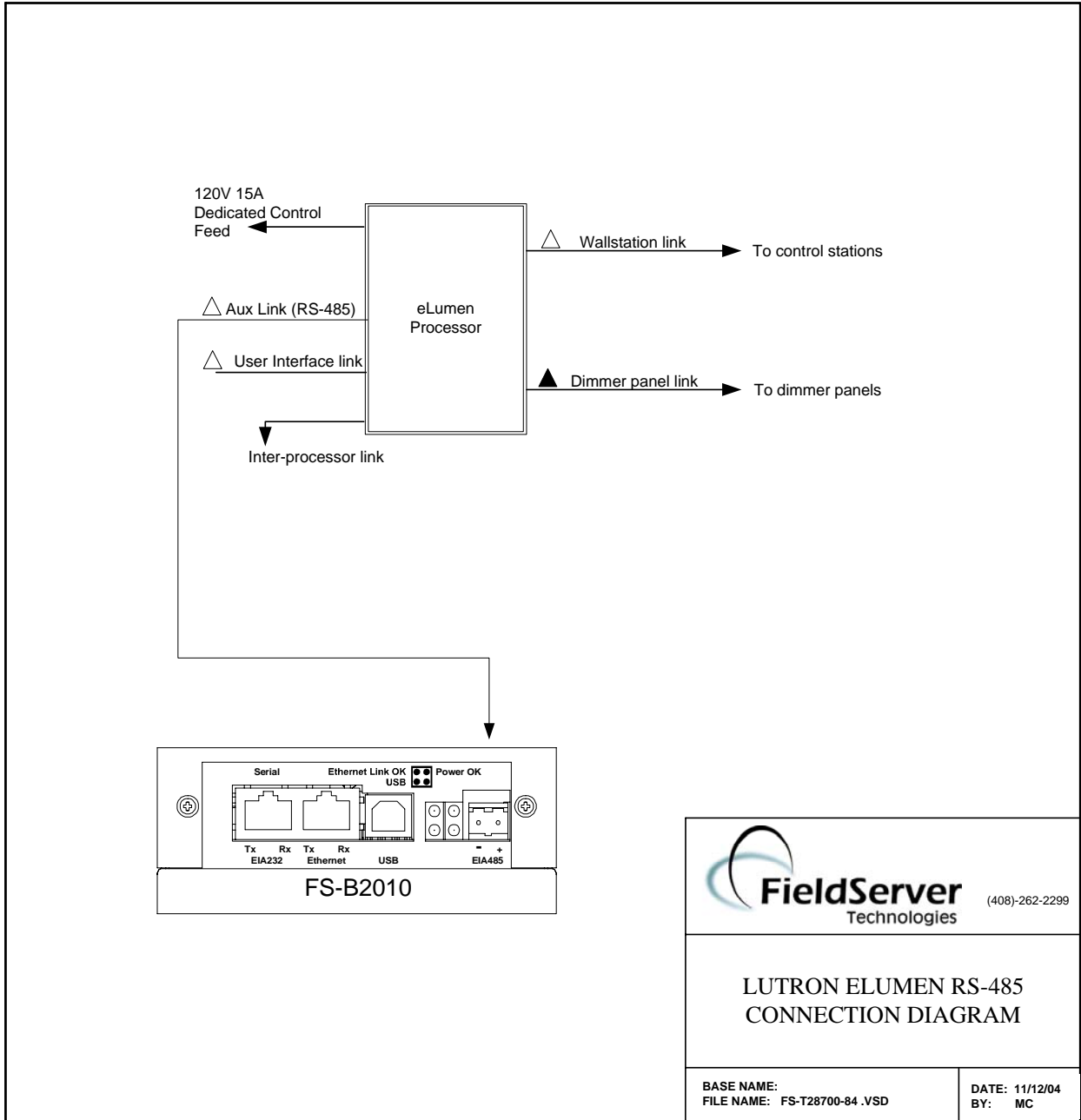
2.1.1. Required 3rd Party Hardware

Part #	Description
	Lutron Panel

3. Hardware Connections

The FieldServer is connected to the Lutron eLumen as shown in connection drawing. Configure the eLumen according to manufacturer's instructions





LUTRON ELUMEN RS-485 CONNECTION DIAGRAM

BASE NAME: FILE NAME: FS-T28700-84.VSD DATE: 11/12/04 BY: MC

4. Configuring the FieldServer as a Lutron eLumen Client

For a detailed discussion on FieldServer configuration, please refer to the FieldServer Configuration Manual. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See “.csv” sample files provided with the FieldServer).

This section documents and describes the parameters necessary for configuring the FieldServer to communicate with a Lutron eLumen Server

1.03 Data Arrays/Descriptors

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for Lutron eLumen communications, the driver independent FieldServer buffers need to be declared in the “Data Arrays” section, the destination device addresses need to be declared in the “Client Side Nodes” section, and the data required from the Servers needs to be mapped in the “Client Side Map Descriptors” section. Details on how to do this can be found below.

Note that in the tables, * indicates an optional parameter, with the bold legal value being the default.

Section Title		
Data_Arrays		
Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_Array_Format	Provide data format. Each Data Array can only take on one format.	Float, Bit, UInt16, SInt16, Packed_Bit, Byte, Packed_Byte, Swapped_Byte
Data_Array_Length	Number of Data Objects. Must be larger than the data storage area required by the Map Descriptors for the data being placed in this array.	1-10,000

Example

```
// Data Arrays

Data_Arrays
Data_Array_Name,      Data_Format,      Data_Array_Length
Area_status,         UInt16,           64
Zone_list,           UInt16,           64
Zone_pars,           UInt16,           10
```


1.04 Client Side Connection Descriptions

Section Title		
Connections		
Column Title	Function	Legal Values
Port	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2 ¹
Protocol	Specify protocol used	eLumen
Baud*	Specify baud rate	9600 – Vendor limitation
Parity*	Specify parity	None
Data_Bits*	Specify data bits	8
Stop_Bits*	Specify stop bits	1
Handshaking*	Specify hardware handshaking	None
Poll _Delay*	Time between internal polls	0-32000 seconds, 1 second

Example

// Client Side Connections						
Connections						
Port,	Protocol,	Baud,	Parity,	Data Bits,	Stop Bits,	Poll_Delay
P1,	eLumen,	9600,	None,	None,	1,	0.100s

1.05 Client Side Node Descriptors

Section Title		
Nodes		
Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	The eLumen processor address - only decimal values allowed e.g. 11 hex has to be entered as 17.	0-255
Protocol	Specify protocol used	eLumen
Port	Specify which port the device is connected to the FieldServer	P1-P8, R1-R2 ¹
Node_type	Specifies the eLumen command and data format	Hex, decimal

¹ Not all ports shown are necessarily supported by the hardware. Consult the appropriate Instruction manual for details of the ports available on specific hardware.

Example

// Client Side Nodes				
Nodes				
Node_Name,	Node_ID,	Protocol,	Connection,	Node_type
LUT_GRF6_0,	17,	eLumen,	P1,	hex

1.06 Client Side Map Descriptors

The driver uses Map Descriptors with Lutron commands to build poll messages that will be sent to the eLumen system. Example Map Descriptors are shown in the next section. Note the following in the use of Map Descriptors for the Lutron driver:

Lutron command

Every Map Descriptor must have a Lutron command specified so the driver will know which command to send to the eLumen.

Function

Map Descriptor functions must be correctly specified to implement the functionality embodied by the specific Lutron command, e.g. a command to retrieve area status requires a read Map Descriptor whereas a command to toggle zones requires a write Map Descriptor.

DA Area Names, DA Scene Names, DA Zone Names, xxx Offset

These are user Map Descriptor fields needed to retrieve area, scene and zone names from the eLumen. Please refer to the Map Descriptor examples.

Link, Area, Link station, Switch, Zone, Sys var, Panel

These are user Map Descriptor fields that must be used as needed with a specific Lutron command. Please refer to the Map Descriptor examples.

DA Lut List, DA Lut List Offset

Lutron commands that allow multiple areas, zones, etc to be specified in one command e.g. Toggle zones use the areas or zones in the Data Array specified by DA_Lut_List at an offset specified by DA_Lut_List_Offset to build the poll message. The list must be filled in before the command is triggered by writing into the Data Array specified by Data_Array_Name.

DA Lut Params, DA Lut Params Offset

Lutron commands that use parameters such as delay and fade cycles use the parameters at the offset as specified by these Map Descriptor fields. Parameters must be filled in together with the list data if applicable before triggering the command by writing into the Data Array specified by Data_Array_Name. Please refer to the Map Descriptor examples.

4.1.1. FieldServer Related Map Descriptor Parameters

Column Title	Function	Legal Values
Map_Descriptor_Name	Name of this Map Descriptor	Up to 32 alphanumeric characters
Data_Array_Name	Name of Data Array where data is to be stored in the FieldServer	One of the Data Array names from "Data Array" section above
Data_Array_Location	Starting location in Data Array	0 to maximum specified in "Data Array" section above
Function	Function of Client Map Descriptor	ARS, RDBC, WRBC, WRBX, AWT

4.1.2. Driver Related Map Descriptor Parameters

Column Title	Function	Legal Values
Node_Name	Name of Node to fetch data from	One of the node names specified in "Client Node Descriptor" above
GRAFIK_command	Specifies the command to be sent to the eLumen.	A list of commands is provided in Appendix A.
Link	Wallstation link number	0-11 for GRAFIK_command: ena_wallstation, dis_wallstation, sim_ws_sw_press, sim_ws_sw_rls, 0-31 for GRAFIK_command: wallstation_status, switch_status,
Area	GRAFIK system area number	0-511
Link_station	Wallstation on link's number	0-31
Switch	Wallstation switch number	0-31
Zone	GRAFIK system zone number	0-511
Sys_var	GRAFIK system variable number	0-65535
Panel	GRAFIK panel number	0-511

Column Title	Function	Legal Values
DA_Lut_List	Name of Data Array that contains a list of zones or areas, etc, needed to build the poll message.	Any Data Array name. If not listed under Data Arrays the driver will auto-create the Data Array.
DA_Lut_List_Offset	The offset into the DA_Lut_List Data Array where the driver will retrieve the list data when building the poll message.	0 to the maximum offset into the DA_Lut_List Data Array.
DA_Lut_Parms	Name of Data Array containing parameters needed to build the poll message.	Any Data Array name. If not listed under Data Arrays the driver will auto-create the Data Array.
DA_Lut_Parms_Offset	The offset into the DA_Lut_Parms Data Array where the driver will retrieve the parameters when building the poll message.	0 to the maximum offset into the DA_Lut_Parms Data Array.
DA_Area_Names	Name of Data Array where retrieved area names will be stored.	Any Data Array name. If not listed under Data Arrays the driver will auto-create the Data Array.
DA_Area_Names_Offset	The offset into the DA_Area_Names Data Array where retrieved area names will be stored.	0 to the maximum offset into the DA_Area_Names Data Array.
DA_Scene_Names	Name of Data Array where retrieved scene names will be stored.	Any Data Array name. If not listed under Data Arrays the driver will auto-create the Data Array.
DA_Scene_Names_Offset	The offset into the DA_Scene_Names Data Array where retrieved scene names will be stored.	0 to the maximum offset into the DA_Scene_Names Data Array.

Column Title	Function	Legal Values
DA_Zone_Names	Name of Data Array where retrieved zone names will be stored.	Any Data Array name. If not listed under Data Arrays the driver will auto-create the Data Array.
DA_Zone_Names_Offset	The offset into the DA_Zone_Names Data Array where retrieved zone names will be stored.	0 to the maximum offset into the DA_Zone_Names Data Array.
Area_Names_Start	Start and end numbers of area name to be retrieved with get_names cmd	0-511
Area_Names_End		
Scene_Names_Start	Start and end numbers of scene name to be retrieved with get_names cmd	0-32,768
Scene_Names_End		
Zone_Names_Start	Start and end numbers of zone name to be retrieved with get_names cmd	0-511
Zone_Names_End		
Length	Length of Map Descriptor. The length is an indication of the number of data elements this Map Descriptor is responsible for updating. It is used in the overall points calculation of the FieldServer.	See example Map Descriptors for individual lengths per Map Descriptor.

4.1.3. Timing Parameters

Column Title	Function	Legal Values
Scan_Interval	Rate at which data is polled	0s to 32000s

4.1.4. System Monitor Command – Time Now

```
// Client side Map Descriptors
```

Map_Descriptors							
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	Length
Time_now,	5s,	Time_now,	0,	rdbc,	LUT_GRF6_0,	time_now,	1

Data storage in Data Array

Position from offset	Description:
0	Minutes from midnight

4.1.5. System Monitor Command – Astro Times

```
// Client side Map Descriptors
```

Map_Descriptors							
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	Length
Astro_times,	5s,	Astro_times,	0,	rdbc,	LUT_GRF6_0,	astro_times,	2

Data storage in Data Array

Position from offset	Description:
0	Sunrise minutes from midnight
1	Sunset minutes from midnight

4.1.6. System Monitor Command – Date

```
// Client side Map Descriptors

Map_Descriptors
Map_Descriptor_Name, Scan_Interval, Data_Array_Name, Data_Array_Offset, Function, Node_Name, GRAFIK_command, Length
Date, 5s, Date, 0, rdbc, LUT_GRF6_0, date, 4
```

Data storage in Data Array

Position from offset	Description:
0	Month (1-12)
1	Day of month (1-31)
2	Year (0-99)
3	Day of week (1-7, 1=Sunday)

4.1.7. System Monitor Command – Code Revision Level

```
// Client side Map Descriptors

Map_Descriptors
Map_Descriptor_Name, Scan_Interval, Data_Array_Name, Data_Array_Offset, Function, Node_Name, GRAFIK_command, Length
Code_rev, 5s, Code_rev, 0, rdbc, LUT_GRF6_0, code_rev_level, 1
```

Data storage in Data Array

Position from offset	Description
0	Code revision level

4.1.8. System Monitor Command – Bootcode Revision Level

```
// Client side Map Descriptors

Map_Descriptors
Map_Descriptor_Name, Scan_Interval, Data_Array_Name, Data_Array_Offset, Function, Node_Name, GRAFIK_command, Length
Bootcode_rev, 5s, Bootcode_rev, 0, rdbc, LUT_GRF6_0, bootcode_rev_level, 1
```

Data storage in Data Array

Position from offset	Description
0	Bootcode revision level

4.1.9. System Monitor Command – Serial Number

```
// Client side Map Descriptors
Map_Descriptors
Map_Descriptor_Name, Scan_Interval, Data_Array_Name, Data_Array_Offset, Function, Node_Name, GRAFIK_command, Length
Serial_num, 5s, Serial_num, 0, rdbc, LUT_GRF6_0, serial_no, 1
```

Data storage in Data Array

Position from offset	Description
0	Serial number

4.1.10. System Monitor Command – Area Status

```
// Client side Map Descriptors
Map_Descriptors
Map_Descriptor_Name, Scan_Interval, Data_Array_Name, Data_Array_Offset, Function, Node_Name, GRAFIK_command, Area, Length
Area_sts_00, 1s, Area_status, 0, rdbc, LUT_GRF6_0, Area_status, 0, 2
Area_sts_01, 1s, Area_status, 2, rdbc, LUT_GRF6_0, Area_status, 1, 2
```

Data storage in Data Array

Position from offset	Description
0	System scene on status
1	Sequence running status

Note: This command stores 2 data values. To prevent overlaps, remember to increment Data_Array_Offset by 2 when referencing the same Data Array with other Map Descriptors.

4.1.11. System Monitor Command – Timeclock Status

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	Area,	Length
Tclk_sts_00,	1s,	Tclk_status,	0,	rdbc,	LUT_GRF6_0,	timeclock_status,	0,	4
Tclk_sts_01,	1s,	Tclk_status,	4,	rdbc,	LUT_GRF6_0,	timeclock_status,	1,	4

Data storage in Data Array

Position from offset	Description
0	Schedule number
1	Next event type (1 = no more events, 2 = timeclock disabled, 3 = astronomic event, 4 = realtime event)
2	Next event time (minutes past midnight)
3	Next script

Note: This command stores 4 data values. To prevent overlaps, remember to increment Data_Array_Offset by 4 when referencing the same Data Array with other Map Descriptors.

4.1.12. System Monitor Command – Zone Intensity

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	Zone,	Length
Zn_int_00,	1s,	Zone_int,	0,	rdbc,	LUT_GRF6_0,	zone_intensity,	0,	1
Zn_int_01,	1s,	Zone_int,	1,	rdbc,	LUT_GRF6_0,	zone_intensity,	1,	1

Data storage in Data Array

Position from offset	Description
0	Zone intensity (0-127)

Note: This command stores 1 data value. To prevent overlaps, remember to increment Data_Array_Offset by 1 when referencing the same Data Array with other Map Descriptors.

4.1.13. System Monitor Command – Request Panel Emergency Status

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	Panel,	Length
Pnl_emerg_sts_00,	1s,	Pnl_emerg_sts,	0,	rdbc,	LUT_GRF6_0,	pnl_emerg_status,	0,	1
Pnl_emerg_sts_511,	1s,	Pnl_emerg_sts,	511,	rdbc,	LUT_GRF6_0,	pnl_emerg_status,	511,	1

Data storage in Data Array

Position from offset	Description
0	Panel emergency status 0 = normal; 1 = override

Note: This command stores 1 data value. To prevent overlaps, remember to increment Data_Array_Offset by 1 when referencing the same Data Array with other Map Descriptors.

4.1.14. System Monitor Command – System Variable Value

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	Sys_var,	Length
Sys_var_00,	1s,	Sys_vars,	0,	rdbc,	LUT_GRF6_0,	sys_var_val,	0,	1
Sys_var_01,	1s,	Sys_vars,	1,	rdbc,	LUT_GRF6_0,	sys_var_val,	1,	1

Data storage in Data Array

Position from offset	Description
0	System variable value

Note: This command stores 1 data value. To prevent overlaps, remember to increment Data_Array_Offset by 1 when referencing the same Data Array with other Map Descriptors.

4.1.15. System Monitor Command – Wallstation Status

```
// Client side Map Descriptors
```

Map_Descriptors									
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	link,	link_station,	Length
Wall_st_sts_0000,	1s,	Wall_st_sts_00,	0,	rdbc,	LUT_GRF6_0,	wallstation_status,	0,	0,	32
Wall_st_sts_0001,	1s,	Wall_st_sts_00,	32,	rdbc,	LUT_GRF6_0,	wallstation_status,	0,	1,	32

Data storage in Data Array

Position from offset	Description
0-31	All switches on station and their priority.

Note: This command stores 32 data values. To prevent overlaps, remember to increment Data_Array_Offset by 32 when referencing the same Data Array with other Map Descriptors.

Implementation note: The wallstation status command retrieves the status of all 32 switches defined on a wallstation. If you only want to retrieve the status of a few individual switches, rather only use the switch status Map Descriptor as described below.

4.1.16. System Monitor Command – Switch Status

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	link,	link_station,	switch,	Length
Sw_sts_000,	1s,	Sw_sts_00,	0,	rdbc,	LUT_GRF6_0,	switch_status,	0,	0,	0,	1
Sw_sts_001,	1s,	Sw_sts_00,	1,	rdbc,	LUT_GRF6_0,	switch_status,	0,	0,	1,	1

Data storage in Data Array

Position from offset	Description
0	Switch status and priority

Note: This command stores 1 data value. To prevent overlaps, remember to increment Data_Array_Offset by 1 when referencing the same Data Array with other Map Descriptors.

Implementation note: The switch status command only retrieves the status of one switch on a wallstation. To retrieve other switch statuses, use additional switch status Map Descriptors or else use the wallstation status Map Descriptor to retrieve the status of all 32 switches. When using both wallstation status and switch status Map Descriptors in the same configuration, it is not permissible to have the target Data Arrays overlap.

4.1.17. System Control Commands containing no Parameters: – Halt Zone

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Zone_halt,	Lut_triggers,	0,	awt,	LUT_GRF6_0,	halt_zone,	Zone_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-63	Zone(s) to halt

Note: After setting up the zone numbers to halt in the DA_Lut_List Data Array, trigger this command by writing the number of zones to halt into the Data Array specified by Data_Array_Name at an offset specified by Data_Array_Offset.

4.1.18. System Control Commands containing no Parameters: – Stop Scene Ramp Up

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Stop_scn_rmp_up,	Lut_triggers,	1,	awt,	LUT_GRF6_0,	stop_scene_ramp_up,	Area_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-31	Area(s) with scenes to stop ramp up

Note: After setting up the area numbers to stop scene ramps in the DA_Lut_List Data Array, trigger this command by writing the number of areas into the Data Array specified by Data_Array_Name at an offset specified by Data_Array_Offset.

4.1.19. System Control Commands containing no Parameters: – Select System Scene(s)

// Client side Map Descriptors

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Sel_scene,	Lut_triggers,	2,	awt,	LUT_GRF6_0,	sel_scene,	Scene_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset **Description**
 0-63 System scenes to select

4.1.20. System Control Commands containing no Parameters: – Disable Timeclock until Enabled

// Client side Map Descriptors

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Dis_tck_u_e,	Lut_triggers,	3,	awt,	LUT_GRF6_0,	dis_tclk_u_e,	Area_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset **Description**
 0-31 Area timeclocks to disable

4.1.21. System Control Commands containing no Parameters: – Disable timeclock until end of day or enable issued

// Client side Map Descriptors

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Dis_tck_u_eodoe,	Lut_triggers,	4,	awt,	LUT_GRF6_0,	dis_tclk_u_eodoe,	Area_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset **Description**
 0-31 Area timeclocks to disable

4.1.22. System Control Commands containing no Parameters: – Re-enable timeclock with complete catchup

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Rnbl_tck_cup,	Lut_triggers,	5,	awt,	LUT_GRF6_0,	rnbl_tclk_catchup,	Area_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-31	Area timeclocks to re-enable

4.1.23. System Control Commands containing no Parameters: – Re-enable timeclock and do previous event

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Rnbl_tck_doprev,	Lut_triggers,	6,	awt,	LUT_GRF6_0,	rnbl_tclk_do_prev_evt,	Area_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-31	Area timeclocks to re-enable

4.1.24. System Control Commands containing no Parameters: Standard re-enable timeclock

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Std_tck_rnbl,	Lut_triggers,	7,	awt,	LUT_GRF6_0,	std_tclk_rnbl,	Area_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-31	Area timeclocks to re-enable

4.1.25. System Control Commands containing no Parameters: Run script(s)

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Run_script,	Lut_triggers,	8,	awt,	LUT_GRF6_0,	run_script,	Script_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-63	Numbers of scripts to run

4.1.26. System Control Commands containing no Parameters: Toggle system variable value

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Toggle_sys_var,	Lut_triggers,	9,	awt,	LUT_GRF6_0,	toggle_sys_var_val,	Var_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-31	Numbers of system variables to toggle

4.1.27. System Control Commands containing no Parameters: Output temp scene

```
// Client side Map Descriptors
```

Map_Descriptors	Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Output_tmp_scn,	Lut_triggers,	10,	awt,	LUT_GRF6_0,	output_temp_scene,	Op_Tmp_Scene,	0,	1	

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Zone 0
1	Intensity 0
2	Fade 0
3	Delay 0
4	Zone number 1
5	Intensity 1
6	Fade 1
7	Delay 1
..	..
60	Zone 15
61	Intensity 15
62	Fade 15
63	Delay 15

Note: 1 to 16 temp scenes may be selected by this command. To trigger this command, write the number of temp scenes to output into the Data Array specified by Data_Array_Name at Data_Array_Offset.

4.1.28. System Control Commands containing no Parameters: Select scene in area

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Sel_scn_in_area,	Lut_triggers,	11,	awt,	LUT_GRF6_0,	sel_scene_in_area,	Sel_Scn_Area,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Area 0
1	Scene 0
2	Area 1
3	Scene 1
..	..
30	Area 15
31	Scene 15

Note: 1 to 16 area scenes may be selected by this command. To trigger this command, write the number of area scene pairs into the Data Array specified by Data_Array_Name at Data_Array_Offset.

4.1.29. System Control Commands containing no Parameters: Timeclock new schedule

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Tck_new_sched,	Lut_triggers,	12,	awt,	LUT_GRF6_0,	tclk_new_schedule,	Clk_sched,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Area tclk 0
1	Schedule 0
2	Area tclk 1
3	Schedule 1
..	..
60	Area tclk 30
61	Schedule 30
62	Area tclk 31
63	Schedule 31

Note: 1 to 32 new schedules may be started by this command. To trigger this command, write the number of area timeclocks into the Data Array specified by Data_Array_Name at Data_Array_Offset.

4.1.30. System Control Commands containing no Parameters: Set timeclock

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Set_tck,	Lut_triggers,	13,	awt,	LUT_GRF6_0,	set_tclk,	Set_tclk,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Hour (0-23)
1	Minutes (0-59)
2	Month (1-12)
3	Day of month (1-31)
4	Year (0 – 99)
5	Day of week (1-7, 1=Sunday)

4.1.31. System Control Commands containing no Parameters: Enable wallstation(s)

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Enable_ws,	Lut_triggers,	14,	awt,	LUT_GRF6_0,	ena_wallstation,	Ctrl_ws_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Link number (0-11) of Station ID 0
1	Station on link (0-31) of Station ID 0
..	..
62	Link number (0-11) of Station ID 31
63	Station on link (0-31) of Station ID 31

Note: 1 to 32 station ids may be used to enable wallstations. To trigger the command, write the number of station IDs into the Data Array specified by Data_Array_Name at Data_Array_Offset

4.1.32. System Control Commands containing no Parameters: Disable wallstation(s)

```
// Client side Map Descriptors
```

Map_Descriptors								
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Disable_ws,	Lut_triggers,	15,	awt,	LUT_GRF6_0,	dis_wallstation,	Ctrl_ws_list,	0,	1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Link number (0-11) of Station ID 0
1	Station on link (0-31) of Station ID 0
..	..
62	Link number (0-11) of Station ID 31
63	Station on link (0-31) of Station ID 31

Note: 1 to 32 station ids may be used to disable wallstations. To trigger the command, write the number of station IDs into the Data Array specified by Data_Array_Name at Data_Array_Offset.

4.1.33. System Control Commands containing no Parameters: Simulate wallstation(s) switch press

```
// Client side Map Descriptors
```

Map_Descriptors	Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Ws_sw_press,	Lut_triggers,	16,	awt,	LUT_GRF6_0,	sim_ws_sw_press,	Sim_sw_list,	0,	1	

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Link number (0-11)
1	Station of link (0-31) of Switch ID 0
2	Switch on station (0-31) of Switch ID 0
3	Station of link (0-31) of Switch ID 1
4	Switch on station (0-31) of Switch ID 1
..	..
63	Station of link (0-31) of Switch ID 31
64	Switch on station (0-31) of Switch ID 31

Note: 1 to 32 switch ids may be used in a single command. To trigger the command, write the number of switch IDs into the Data Array specified by Data_Array_Name at Data_Array_Offset.

4.1.34. System Control Commands containing no Parameters: Simulate wallstation(s) switch release

```
// Client side Map Descriptors
```

Map_Descriptors	Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Ws_sw_rls,	Lut_triggers,	17,	awt,	LUT_GRF6_0,	sim_ws_sw_rls,	Sim_sw_list,	0,		1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0	Link number (0-11)
1	Station of link (0-31) of Switch ID 0
2	Switch on station (0-31) of Switch ID 0
3	Station of link (0-31) of Switch ID 1
4	Switch on station (0-31) of Switch ID 1
..	..
63	Station of link (0-31) of Switch ID 31
64	Switch on station (0-31) of Switch ID 31

Note: 1 to 32 switch ids may be used in a single command. To trigger the command, write the number of switch IDs into the Data Array specified by Data_Array_Name at Data_Array_Offset.

4.1.35. System Control Commands containing no Parameters: Stop scene ramp down

```
// Client side Map Descriptors
```

Map_Descriptors	Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	Length
Stop_scn_rmp_dn,	Lut_triggers,	18,	awt,	LUT_GRF6_0,	stop_scene_ramp_dn,	Area_list,	0,		1

DA Lut List data setup

Position from DA_Lut_List_Offset	Description
0-31	Area(s) with scenes to stop ramp down

Note: After setting up the area numbers to stop scene ramps in the DA_Lut_List Data Array, trigger this command by writing the number of areas into the Data Array specified by Data_Array_Name at an offset specified by Data_Array_Offset.

4.1.36. System Control Commands Containing Parameters: Toggle zone

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Toggle_zone,	Lut_triggers,	19,	awt,	LUT_GRF6_0,	toggle_zone,	Zone_list,	0,	Zone_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset **Description**
 0-63 Zone(s) to toggle

DA Lut Parms setup

Position from DA_Lut_Parms_Offset **Description**
 0 Fade cycles

4.1.37. System Control Commands Containing Parameters: Fade zone(s) to level

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Fade_to_level,	Lut_triggers,	20,	awt,	LUT_GRF6_0,	fade_zone,	Zone_list,	0,	Zone_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset **Description**
 0-63 Zone(s) to fade to level

DA Lut Parms setup

Position from DA_Lut_Parms_Offset **Description**
 0 Level to fade to (0-127)
 1 Fade cycles
 2 Delay cycles

4.1.38. System Control Commands Containing Parameters: Ramp zone(s) up

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Rmp_zones_up,	Lut_triggers,	21,	awt,	LUT_GRF6_0,	ramp_zones_up,	Zone_list,	0,	Zone_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-63	Zone(s) to ramp up

DA Lut Params setup

Position from DA_Lut_Params_Offset	Description
0	Initial rate step size
1	Repeat rate step size

4.1.39. System Control Commands Containing Parameters: Ramp zone(s) down

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Rmp_zones_down,	Lut_triggers,	22,	awt,	LUT_GRF6_0,	ramp_zones_down,	Zone_list,	0,	Zone_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-63	Zone(s) to ramp down

DA Lut Params setup

Position from DA_Lut_Params_Offset	Description
0	Initial rate step size
1	Repeat rate step size

4.1.40. System Control Commands Containing Parameters: Pommel or pulse zone(s Toggle zone)

```
// Client side Map Descriptors

Map_Descriptors
Map_Descriptor_Name, Data_Array_Name, Data_Array_Offset, Function, Node_Name, GRAFIK_command, DA_Lut_List, DA_Lut_List_Offset, DA_Lut_Parms, DA_Lut_Parms_Offset, Length
Pulse_zone, Lut_triggers, 23, awt, LUT_GRF6_0, pulse_zone, Zone_list, 0, Zone_pars, 0, 1
```

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-63	Zone(s) to pommel or pulse

DA Lut Parms setup

Position from DA_Lut_Parms_Offset	Description
0	Delay1 cycles
1	Intensity1 (0-127)
2	Fade1 cycles
3	Delay2 cycles
4	Intensity2 (0-127 or 255)
5	Fade2 cycles

4.1.41. System Control Commands Containing Parameters: Flash zones aka “Multi level (Flash or Warn or Chase)“

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Flash_zone,	Lut_triggers,	24,	awt,	LUT_GRF6_0,	flash_zone,	Zone_list,	0,	Zone_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-63	Zone(s) to flash

DA Lut Parms setup

Position from DA_Lut_Parms_Offset	Description
0	Delay1 cycles
1	Intensity1 (0-127)
2	Fade1 cycles
3	Delay2 cycles
4	Intensity2 (0-127)
5	Fade2 cycles
6	Delay2 cycles
7	Repeat (0-255)

4.1.42. System Control Commands Containing Parameters: Ramp scene zones up

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Rmp_scn_zns_up,	Lut_triggers,	25,	awt,	LUT_GRF6_0,	ramp_scene_zones_up,	Area_list,	0,	Area_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-31	System area numbers

DA Lut Parms setup

Position from DA_Lut_Parms_Offset	Description
0	Unaffected intensity (0-128)
1	Initial rate step size
2	Repeat rate step size

4.1.43. System Control Commands Containing Parameters: Ramp scene zones down

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Rmp_scn_zns_dn,	Lut_triggers,	26,	awt,	LUT_GRF6_0,	ramp_scene_zones_dn,	Area_list,	0,	Area_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-31	System area numbers

DA Lut Params setup

Position from DA_Lut_Params_Offset	Description
0	Unaffected intensity (0-128)
1	Initial rate step size
2	Repeat rate step size

4.1.44. System Control Commands Containing Parameters: Select system scene(s) using override times

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Sel_scene_oride,	Lut_triggers,	27,	awt,	LUT_GRF6_0,	sel_scene_override,	Scene_list,	0,	Scene_pars,	0,	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-63	System scene numbers

DA Lut Params setup

Position from DA_Lut_Params_Offset	Description
0	Fade cycles
1	Delay cycles

4.1.45. System Control Commands Containing Parameters: Set system variable value

```
// Client side Map Descriptors
```

Map_Descriptors										
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	DA_Lut_List,	DA_Lut_List_Offset,	DA_Lut_Parms,	DA_Lut_Parms_Offset,	Length
Set_sys_var,	Lut_triggers,	28,	awt,	LUT_GRF6_0,	set_sys_var_val,	Var_list,	0,	Var_pars,	0	1

DA Lut List setup

Position from DA_Lut_List_Offset	Description
0-31	System variable numbers

DA Lut Parms setup

Position from DA_Lut_Parms_Offset	Description
0	New value

4.1.46. Listening to switch presses and releases: Enabling switch presses and releases reporting

```
// Client side Map Descriptors
```

Map_Descriptors						
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	length
Ena_sw_Isn,	Sw_Isn_trigger,	0,	awt,	LUT_GRF6_0,	enable_sw_listen,	1

Note: To enable the reporting of switch presses and releases, write any value into the Sw_Isn_trigger Data Array at offset specified by Data_Array_Offset.

4.1.47. Listening to switch presses and releases: Disabling switch presses and releases reporting

```
// Client side Map Descriptors
```

Map_Descriptors						
Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name,	GRAFIK_command,	length
Dis_sw_Isn,	Sw_Isn_trigger,	1,	awt,	LUT_GRF6_0,	disable_sw_listen,	1

Note: To disable the reporting of switch presses and releases, write any value into the Sw_Isn_trigger Data Array at offset specified by Data_Array_Offset.

4.1.48. Listening to switch presses and releases: Listening to switch presses and releases

```
// Client side Map Descriptors
Map_Descriptors
Map_Descriptor_Name,   Data_Array_Name,   Data_Array_Offset,   Function,   Node_Name,   GRAFIK_command,   link
Raw_sw_sts_00,        Raw_sw_sts_00,     0,                   passive,    LUT_GRF6_0,    raw_sw_status,    0
```

Switch press and release status storage Data Array format

Position from Data_Array_Offset	Description
0	Station0, Switch0, status
1	Station0, Switch1, status
..	..
31	Station0, Switch31, status
32	Station1, Switch0, status
63	Station1, Switch31, status
..	..
1022	Station31, Switch30, status
1023	Station31, Switch31, status

Note: You have to set up a separate Map Descriptor for every link to be monitored for switch presses and releases.

4.1.49. Active read on startup: Retrieving names

Warning: Only one (1) active read on startup Map Descriptor may be used.

The retrieval of area, scene and zone names is done with a single active read on startup (ars) Map Descriptor. Enter the start and end numbers for the names you want to retrieve from the eLumen. The names will be stored sequentially in the indicated Data Arrays

```
// Client side Map Descriptors

Map_Descriptors
Map_Descriptor_Name, Function, Node_Name, GRAFIK_command, DA_Area_Names, DA_Area_Names_Offset, Area_Names_Start, Area_Names_End,
Get_Names, ars, LUT_GRF6_0, get_names, Area_Names, 0, 0, 511,
```

```
DA_Scene_Names_Offset, Scene_Names_Start, Scene_Names_End, DA_Zone_Names, DA_Zone_Names_Offset, Zone_Names_Start, Zone_Names_End, Length
0, 0, 50, Zone_Names, 0, 0, 511, 1
```

Area names storage format

Position from DA_Area_Names_Offset	Description
0	Area (name_start) name
40	Area (name_start+1) name
80	Area (name_start+2) name
..	
40 * name_end	Area (name_end) name

Scene names storage format

Position from DA_Scene_Names_Offset	Description
0	Scene (name_start) name
40	Scene (name_start+1) name
80	Scene (name_start+2) name
..	
40 * name_end	Scene (name_end) name

Zone names storage format

Position from DA_Zone_Names_Offset	Description
0	Zone (name_start) name
40	Zone (name_start+1) name
80	Zone (name_start+2) name
..	
40 * name_end	Zone (name_end) name

Appendix A. Data Tables

Table of Legal Values for Commands to be sent to the eLumen

pnl_emerg_status	run_script
wallstation_status	toggle_sys_var_val
switch_status	output_temp_scene
Area_status	sel_scene_in_area
timeclock_status	tclk_new_schedule
zone_intensity	set_tclk
sys_var_val	ena_wallstation
time_now	dis_wallstation
astro_times	sim_ws_sw_press
date	sim_ws_sw_rls
code_rev_level	toggle_zone
bootcode_rev_level	fade_zone
serial_no	ramp_zones_up
halt_zone	ramp_zones_down
stop_scene_ramp_up	pulse_zone
stop_scene_ramp_dn	flash_zone
sel_scene	ramp_scene_zones_up
dis_tclk_u_e	ramp_scene_zones_dn
dis_tclk_u_eodoe	sel_scene_override
rnbl_tclk_catchup	set_sys_var_val
rnbl_tclk_do_prev_evt	get_names
std_tclk_rnbl	

Appendix B. Revision History

Date	Resp	Format	Driver Ver.	Doc. Rev.	Comment
05/10/02			1.00	0	Initial version
06/27/02			1.00	1	Updated with awt Map Descriptor function
06/28/02			1.00	2	Updated get_names function using one ars Map Descriptor
08/14/02			1.00	3	Updated switch status and wallstation status mapdesc descriptions. Added length column to all mapdesc examples.
09/23/02			1.01	0	Added stop scene ramp down command.
12/31/02			1.02	0	Added request panel emergency status command.
03/18/02			1.03	0	Updated max area number to 511
08/20/03			1.03	1	Releasing
11/07/03			1.03	2	DUR0262, removed extra rows in Select Scene in Area data setup table.
10/20/04	Meg	Meg	1.03	3	Major manual reformat – DUR0479 Changed document name – DUR0468. Updated Description – 0469 Added RS-485 functionality – DUR0481
11/11/04	Meg	Meg	1.04	0	Changed protocol and description name to ELUMEN. Some formatting updates. DUR0468
11/12/04	Meg	Meg	1.04	1	Further changes as sanctioned by DR. Connection diagram updated to show correct adapter, wire list tidied up. Info on RS-485 connection requested from DR.
12/17/04	Meg	Meg	1.04	2	Connection drawings updated according to data from customer and comments from Mac. Formatting and common documentation errors eliminated.
1/6/05	JD		1.04	3	Releasing