



ADVANCED WARNING

SYSTEMS

SmartGraphics^{HD}



Graphics Protocol

MAN 3025-1

WORLD LEADER OF INNOVATIVE SOLUTIONS
IN FIRE DETECTION AND ALARM SYSTEMS



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1 Introduction

The Ampac SmartGraphics^{HD} graphics package communicates with the Ampac FireFinder fire alarm control panel and the EV3000 emergency warning system by the Modbus RTU protocol.

The protocol can operate over RS232, RS485 and Ethernet (modnet protocol).

Information is transferred between the SmartGraphics^{HD} and the FireFinder / EV3000 by using the 4000 series of registers.

The EV3000 has a fixed database, please refer to section 6 for detail on the register and bit assignments.

The FireFinder has a dynamic database, which must be “regenerated” every time that the configuration is updated. To achieve this, a dbase IV file (DBF) is generated by ConfigManger when the configuration is compiled. The first 100 registers (from 40001 to 40101) are used for the command handling system and other system control and information. The device information begins at register 40101. Each 16 bit address is broken into 4 x 4 bit sub addresses with 4 bits allocated to each point in the system

2 Address Allocation (Variable DBF Record)

The register addresses are allocated by ConfigManager and are listed in a dbase IV file (DBF) that is generated (i.e. with SmartGraphics option selected) whenever the panel configuration is compiled. The name is in the format: Config **Name_variable.dbf** and contains the following fields:

FIELD	SIZE	USE
NAME	32	Tag name of the point in the system
TYPE	16	Data Type (Usually DIGITAL)
UNIT	16	I/O Device Name (Usually FireFinder)
ADDR	64	The address and offset of the Tag
RAW_ZERO	11	Not Used
RAW_FULL	11	Not Used
ENG_ZERO	11	Not Used
ENG_FULL	11	Not Used
ENG_UNITS	8	The Device Type Descriptor as entered in ConfigManager
FORMAT	11	Not Used
COMMENT	48	The Device Descriptor as entered in ConfigManager
EDITCODE	8	Not Used
LINKED	1	Not Used
OID	10	Not Used
REF1	11	Not Used
REF2	11	Not Used
DEADBAND	11	Not Used
CUSTOM	64	Not Used
TAGGENLINK	32	Not Used
CLUSTER	16	Always set to “SmartGraphics”

2.1 Field - NAME

This field is used by SmartGraphics to uniquely identify each point (Tag) in the system. The format of this name varies for each Tag type.

2.1.1 FireFinder Nodes (Panels)

This Tag name will be in the format Nx where x is the node address of the panel in the system.

2.1.2 FireFinder Modules

This Tag name will be in the format NxCyMz where x is the node address, y is the controller number within the node, and z is the module number on that controller.

2.1.3 Conventional Zones

This Tag name will be in the format Zx where x is the zone number.

2.1.4 Sensors

This Tag name will be in the format LxSy where x is the system loop number and y is the sensor number on that loop.

2.1.5 Loop Based Inputs/Outputs

This Tag name will be in the format LxSyOz for outputs and LxSylz for inputs where x is the system loop number and y is the sensor number on that loop and z is the output or input bit number on that sensor.

2.1.6 Panel Based Inputs/Outputs

This Tag name will be in the format IOMxOy for outputs and IOMxly for inputs where x is the system IO module number and y is the input or output offset on that module.

2.2 Field - TYPE

This field is used internally by SmartGraphics to configure the data type and is usually set to DIGITAL.

2.3 Field - UNIT

This field is used internally by SmartGraphics to configure the IO device name. Only the Tags with the UNIT field set to FireFinder are physical addresses within the FireFinder system.

2.4 Field - ADDR

This field sets the MODBus address and bit offset for the Tag within the Firefinder PLC database. It will be in the format xxxxx.y[z] where xxxxx is the MODBus address, y is the bit offset and z is the number of bits. The address (xxxxx) could be any legal one within the 40000 series of IO addresses, usually commencing at 40101. The offset (y) could be any value from 1-16, however as we allocate Tags in blocks of 4 bits it will usually be either 1, 5, 9 or 13. The number of bits (z) would usually be fixed at 4.

2.5 Field - RAW_ZERO

This field is not used by SmartGraphics and is usually null.

2.6 Field - RAW_FULL

This field is not used by SmartGraphics and is usually null.

2.7 Field - ENG_ZERO

This field is not used by SmartGraphics and is usually null.

2.8 Field - ENG_FULL

This field is not used by SmartGraphics and is usually null.

2.9 Field - ENG_UNITS

The Device Type Descriptor as entered in the 'Type Description' field in ConfigManager. eg. SMOKE, THERM, MCP etc.

2.10 Field - FORMAT

This field is not used by SmartGraphics and is usually null.

2.11 Field - COMMENT

The Device Descriptor as entered in the 'Description' field ConfigManager. eg. "FOOD COURT SOUTH ENTRANCE"

2.12 Field - EDITCODE

This field is not used by SmartGraphics and is usually null.

2.13 Field - LINKED

This field is not used by SmartGraphics and is usually null.

2.14 Field - OID

This field is not used by SmartGraphics and is usually null.

2.15 Field - REF1

This field is not used by SmartGraphics and is usually null.

2.16 Field - REF2

This field is not used by SmartGraphics and is usually null.

2.17 Field - DEADBAND

This field is not used by SmartGraphics and is usually null.

2.18 Field - CUSTOM

This field is not used by SmartGraphics and is usually null.

2.19 Field - TAGGENLINK

This field is not used by SmartGraphics and is usually null.

2.20 Field - CLUSTER

This field is always set to "SmartGraphics".

3 Address Sub-Allocation

As each 16bit Modbus address is broken down into 4 x 4bit nibbles some interpolation of the data will be required by the system reading the data from the FireFinder system.

Using the following extract from a variable.dbf file created by ConfigManager:

NAME	TYPE	UNIT	ADDR	ENG_UNITS	COMMENT
N1C1M1	DIGITAL	FireFinder	40103.1[4]		Apollo Loop No: 1
L1S1	DIGITAL	FireFinder	40103.5[4]	SMOKE	FOOD COURT SOUTH ENTRANCE
L1S2	DIGITAL	FireFinder	40103.9[4]	SMOKE	FOOD COURT SOUTH
L1S3	DIGITAL	FireFinder	40103.13[4]	SMOKE	FOOD COURT SOUTH
L1S4	DIGITAL	FireFinder	40104.1[4]	SMOKE	FOOD COURT SOUTH
L1S5	DIGITAL	FireFinder	40104.5[4]	SMOKE	FOOD COURT NORTH
L1S6	DIGITAL	FireFinder	40104.9[4]	SMOKE	FOOD COURT NORTH
L1S7	DIGITAL	FireFinder	40104.13[4]	SMOKE	FOOD COURT NORTH

The 16 bits of data returned from a poll of address 40103 would be broken down as follows:

Bits 1-4 would return the status of N1C1M1 (Node 1, Controller 1, Module 1)

Bits 5-8 would return the status of L1S1 (Loop 1 Sensor 1)

Bits 9-12 would return the status of L1S2 (Loop 1 Sensor 2)

Bits 13-16 would return the status of L1S3 (Loop 1 Sensor 3)

3.1 Zone/Sensor Status

The status of conventional zones (Zx) and Loop Sensors (LxSy) can be derived using the following table:

BIN	Zone/Sensor Status
-----	--------------------

0000	Normal
0001	Alarm
0010	Acknowledged alarm
0011	Investigate Alarm
0100	Pre-alarm
0101	Fault - device missing
0110	Fault - conventional
0111	Fault - type mismatch
1000	Fault - multiple devices
1001	Fault - not configured
1010	Fault - analog
1011	Fault - maintenance
1100	Fault - module fault
1101	Isolate - Alarm
1110	Isolate - Fault
1111	Isolate - Normal

3.2 Module Status

The status of a module (NxCyMz) can be derived from the following table:

BIN	Module Status
0000	Normal
0001	Fault - Missing
0010	Fault - Wrong type
0011	Fault - Extra module
0100	Fault - Fail
0101	Fault - Hardware error
0110	Fault - Controller not running
0111	Fault - Open circuit
1000	Fault - Short circuit on side A
1001	Fault - Short circuit on side B
1010	Fault - Loop inoperative
1011	Fault - Loop in over current
1100	
1101	
1110	
1111	

From the example above, if a poll of address 40103 returned a value of

<MSB>0001010111110000<LSB>

the status of the 4 Tags contained at that address would be:

Bits 1-4	N1C1M1 is Normal (0000)
Bits 5-8	L1S1 is Isolated and Normal (1111)
Bits 9-12	L1S2 is Fault – Device Missing (0101)
Bits 13-16	L1S3 Alarm (0001)

4 Advance Alarm DBF Records

Another dbase IV file is generated whenever the panel configuration (i.e. with SmartGraphics option selected) is compiled. The file name is in the format: Config Name_adv_alm.dbf and contains the following fields:

FIELD	SIZE	USE
TAG	79	Tag ID of the point in the system
NAME	79	Tag name of the point in the system
DESC	127	The Device Descriptor as entered in ConfigManager
EXPR	254	SmartGraphics Logic
CATEGORY	16	SmartGraphics Logic Categorisation
HELP	64	Not Used
PRIV	16	Not Used
AREA	16	Not Used
COMMENT	48	Not Used
SEQUENCE	16	Not Used
DELAY	16	Not Used
CUSTOM1	64	Not Used
CUSTOM2	64	Not Used
CUSTOM3	64	Not Used
CUSTOM4	64	Not Used
CUSTOM5	64	Not Used
CUSTOM6	64	Not Used
CUSTOM7	64	Not Used
CUSTOM8	64	Not Used
CLUSTER	16	Always set to "SmartGraphics"
PAGING	8	Not Used
PAGINGGRP	80	Not Used
EDITCODE	8	Not Used
LINKED	1	Not Used
TAGGENLINK	32	Not Used

Field - TAG

This field is used by SmartGraphics to uniquely identify each point (Tag) and its status (Alarm, Pre-alarm, Fault, Isolate) in the system.

Field - NAME

This field is the Device Descriptor as entered in the 'Description' field ConfigManager. eg. "FOOD COURT SOUTH ENTRANCE"

Field - DESC

This field contains the SmartGraphics logic for its processing.

Field - EXPR

This field contains the SmartGraphics logic for its processing for the alarm, pre-alarm, fault and isolate conditions.

Field - CATEGORY

This field is not used by SmartGraphics and is usually null.

Field - HELP

This field is not used by SmartGraphics and is usually null.

Field - PRIV

This field is not used by SmartGraphics and is usually null.

Field - AREA

This field is not used by SmartGraphics and is usually null.

Field - COMMENT

This field is not used by SmartGraphics and is usually null.

Field - SEQUENCE

This field is not used by SmartGraphics and is usually null.

Field - DELAY

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM1

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM2

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM3

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM4

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM5

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM6

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM7

This field is not used by SmartGraphics and is usually null.

Field – CUSTOM8

This field is not used by SmartGraphics and is usually null.

Field - CLUSTER

This field is always set to "SmartGraphics".

Field - PAGING

This field is not used by SmartGraphics and is usually null.

Field - PAGINGGRP

This field is not used by SmartGraphics and is usually null.

Field - EDITCODE

This field is not used by SmartGraphics and is usually null.

Field - LINKED

This field is not used by SmartGraphics and is usually null.

Field - TAGGENLINK

This field is not used by SmartGraphics and is usually null.

5 *FireFinder Command Processing*

The address 40001 is configured as a Read/Write ASCII address for the parsing of commands to and receiving command confirmations from the FireFinder system. All commands should be sent in upper case, space delimited as indicated and terminated with a CR + LF.

5.1 Valid Commands

Current commands supported are:

5.1.1 Master Reset – MRESET

This command is used to send a Master Reset to the system in the same way as pressing the Reset button on the panel keyboard.

5.1.2 Buzzer Mute – BMUTE

Used to mute the system Alarm and Fault buzzer.

5.1.3 Acknowledge – ACK [Zone/Sensor] [TO] [Zone/Sensor]

Used to Acknowledge an unacknowledged alarm condition. (Only if required by the region/Country code that system is configured to run in)

5.1.4 Isolate – ISOL [Zone/Sensor] [TO] [Zone/Sensor]

Used to Isolate (Disable) individual, or a range of Zones or Sensors. Note that in FireFinder >= V6.0.65.46, the zone isolate command references the setting stored in the EEPROM B4 of the FACP. That is, if this value is 0xFFFF, the zone isolate command will function normally; otherwise, all the MCPs of the zone in question will be excluded from this disablement request.

5.1.5 De-isolate - DEISOL [Zone/Sensor] [TO] [Zone/Sensor]

Used to De-isolate (Enable) individual, or a range of Zones or Sensors.

5.1.6 Alarm Test – ALARMT [Zone/Sensor] [TO] [Zone/Sensor]

Used to Alarm Test individual, or a range of Zones or Sensors.

5.1.7 Fault Test – FAULTT [Zone/Sensor] [TO] [Zone/Sensor]

Used to Fault Test individual, or a range of Zones or Sensors.

5.1.8 Sounder Silence / Sounder Resound

Used to silence or resound the sounders.

5.1.9 Evacuation On

Used to set the FACP into evacuation mode.

5.1.10 Get Detector Analogue Value

Used to obtain the analogue value of a detector.

5.1.11 External Bell Isolate / De-isolate

Used to isolate or de-isolate the external bells outputs.

5.1.12 Auxiliary Isolate / De-isolate

Used to isolate or de-isolate the auxiliary outputs.

5.1.13 Warning System Isolate / De-isolate

Used to isolate or de-isolate the warning system outputs.

5.1.14 FWRE Isolate / De-isolate

Used to isolate or de-isolate the FWRE outputs.

All commands are preceded by !CMD

5.2 Controller Response Codes

There are 3 possible response codes that will be sent by the panel.

5.2.1 Response !OK

This confirms that the command was received and processed successfully.

5.2.2 Response !ERROR

This indicates that the Controller was unable to process the command, or it was not formatted correctly.

5.2.3 Response !FAIL

This response returned after an ALARMT or FAULTT command has been sent indicated that one or more of the devices tested failed the test performed.

5.3 Command Syntax

Before sending any command to the panel it is good practice to check that the panel is ready to receive a command and the command interpreter is not being used by the front panel keyboard. This is achieved by writing '!CMD' in ASCII format to the command handler address (40001) and waiting for the '!OK' response at the same address.

5.3.1 System Command Syntax

To send a Master Reset command to the system the following command procedure would be required:

Send: !CMD
Wait for: !OK
Send: !CMDMRESET
Wait for: !OK

5.3.2 Single Tag Command Syntax

Certain commands require a Tag name to perform the operation on. To Isolate a single [Z]one the following procedure should be followed:

Send: !CMD
Wait for: !OK
Send: !CMDISOL Z1
Wait for: !OK

To Isolate a single [L]oop [S]ensor the follow this procedure:

Send: !CMD
Wait for: !OK
Send: !CMDISOL L1S1
Wait for: !OK

5.3.3 Multiple Tag Command Syntax

To De-Isolate a range of [Z]ones the follow this procedure:

Send: !CMD
Wait for: !OK
Send: !CMDDEISOL Z1 TO Z10
Wait for: !OK

To De-Isolate a range [L]oop [S]ensors follow this procedure:

Send: !CMD
Wait for: !OK
Send: !CMDDEISOL L1S1 TO S126
Wait for: !OK

6 EV3000 Interface

6.1 EV3000 EWS Status Register – READ ONLY

(Register assignment 40001)

Bit	Assignment
0	Auto
1	Manual
2	Isolate
3	This ECP is in Control
4	Remote ECP in Control
5	Alarm System Isolated
6..7	Not Used
8..15	Address of the ECP in control (Hexadecimal)

6.2 EV3000 Fault Status Register – READ ONLY

(Register assignment 40002)

Bit	Assignment
0	Tone Fault
1	Module Fault
2	Charger Fault
3	System on Batteries
4	ECP Fault
5	Communications Fault
6	System Fault
7	Battery Fault
8	Microphone Fault
9	Amplifier/Speaker Fault
10	EAID Fault
11	FIB Fault
12	Visual Fault
13..15	Not Used

6.3 EV3000 All Call Status Register – READ ONLY

(Register assignment 40003)

Bit	Assignment
0	PA
1	Alert
2	Evacuate
3	WIP
4..15	Not Used

6.4 EV3000 EIS Status Register – READ ONLY

(Register assignment 40004)

Bit	Assignment
0	EIS is in manual – at least one master handset is off hook
1	This ECP is in control of the EIS
2	Master Handset at this ECP is off hook
3..7	Not Used
8..15	Address of the EIS in control (Hexadecimal)

6.5 EWS Zone Status Registers – READ ONLY

(Register assignment 40021...40188)

Bit	Assignment
0	Visual Fault
1	EAID Fault
2	FIB Fault
3	Amplifier/Speaker Fault
4	Standby Amplifier Fault
5	EAID Alarm
6	FIB Alarm
7	Zone in PA
8	Zone in Alert
9	Zone in Evacuate
10..15	Not Used

6.6 Emergency Intercom Status Registers READ ONLY

2 x WIPs per Register (Register assignment 40189...40356)

Bit	Assignment
0	WIP 1 Off Hook (Calling In to ECP)
1	WIP 1 Call (Call to the WIP from the ECP)
2	WIP 1 All Call
3	WIP 1 In Use (WIP communication underway)
4	WIP 1 Zone Clear
5	WIP 1 Fault
6	Not Used
7	Not Used
8	WIP 2 Off Hook (Calling In)
9	WIP 2 Call (Call to the WIP)
10	WIP 2 All Call
11	WIP 2 In Use (WIP communication underway)
12	WIP 2 Zone Clear State
13	WIP 2 Fault
14..15	Not Used

6.7 Key – Switch Control Register WRITE ONLY

(Register assignment 40357)

• Bit	• Assignment
• 0	• Auto
• 1	• Manual

6.8 All Call Control Register WRITE ONLY

(Register assignment 40358)

• Bit	• Assignment
• 0	• All Call PA
• 1	• All Call Alert
• 2	• All Call Evacuation
• 3	• All Call WIP
• 4	• All Call Off
• 5..15	• Unused

6.9 EWS Zone Control Registers WRITE ONLY

4 EWS zones per register – (Register assignment 40359...40400)

Bit	Assignment
0	Zone 1 PA
1	Zone 1 Alert
2	Zone 1 Evacuate
3	Zone 1 Off
4	Zone 2 PA
5	Zone 2 Alert
6	Zone 2 Evacuate
7	Zone 2 Off
8	Zone 3 PA
9	Zone 3 Alert
10	Zone 3 Evacuate
11	Zone 3 Off
12	Zone 4 PA
13	Zone 4 Alert
14	Zone 4 Evacuate
15	Zone 4 Off

6.10 Emergency Intercom Control Registers WRITE ONLY

8 WIPs per register – (Register assignment 40401...40442)

Bit	Assignment
0	WIP 1 Call/Answer
1	WIP 1 Clear
2	WIP 2 Call/Answer
3	WIP 2 Clear
4	WIP 3 Call/Answer
5	WIP 3 Clear
6	WIP 4 Call/Answer
7	WIP 4 Clear
8	WIP 5 Call/Answer
9	WIP 5 Clear
10	WIP 6 Call/Answer
11	WIP 6 Clear
12	WIP 7 Call/Answer
13	WIP 7 Clear
14	WIP 8 Call/Answer
15	WIP 8 Clear

UNCONTROLLED DOCUMENT

NOTE: Due to AMPAC's commitment to continuous improvement specifications may change without notice.