FieldServer Technologies

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8700-95 Notifier NFS3030

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after April 2009

Driver Version:	1.04
Document Revision:	2

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1 NOTIFIER NFS3030 DESCRIPTION

The NFS3030 Serial driver allows the FieldServer to record data from Notifier Onyx Series NFS3030 Fire Panels over RS-232.

The FieldServer acts as a Passive Client receiving messages and recording the status of a Notifier 3030 Fire Alarm Panel. There is no active polling by this driver; the communications are one-way through the panel's printer port.

This driver is not capable of emulating a Notifier NFS3030 panel and the very limited Server functionality has only been implemented to facilitate FieldServer's Quality Assurance program.

The purpose of this driver is to record the status of Fire Alarm System detectors and Modules in Data Arrays - one Data Array per loop. It is limited by the information that the Notifier NFS3030 unit sends in the form of text messages through its RS-232 printer port. The accuracy and timeliness of the data is therefore limited to the frequency of update messages that the Notifier Fire Panel issues.

Appendix A lists the Notifier message types supported by this driver and the effect on the status of points in the Data Array. The driver is capable of supporting the panel's port supervision message if configured to do so.

The panel must output messages in English.

Max Nodes Supported

FieldServer Mode	Nodes	Comments
Client	1	Each FieldServer port can connect to only 1 NFS3030 panel
Server	0	The NFS3030 driver cannot be used as a Server.

2 DRIVER SCOPE OF SUPPLY

2.1 Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
FS-8917-16	RS-485 Pigtail for RJ45 Port
FS-8700-95	Driver Manual.

3   HARDWARE CONNECTIONS

The FieldServer is connected to the Notifier NFS3030 Fire Panel as shown in the connection drawing.

Configure the Notifier NFS3030 Fire Panel according to manufacturer's instructions.
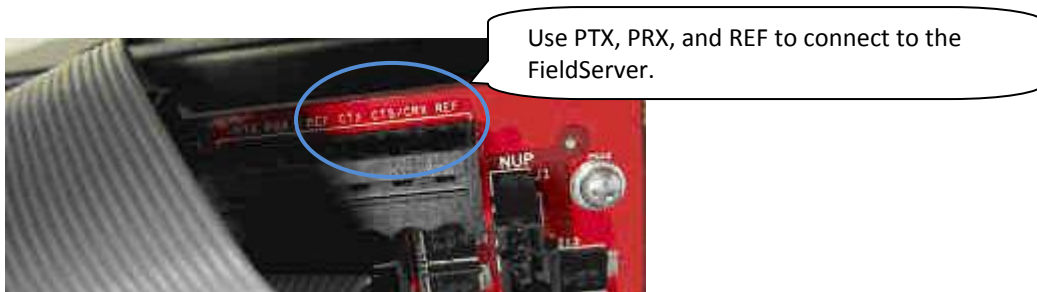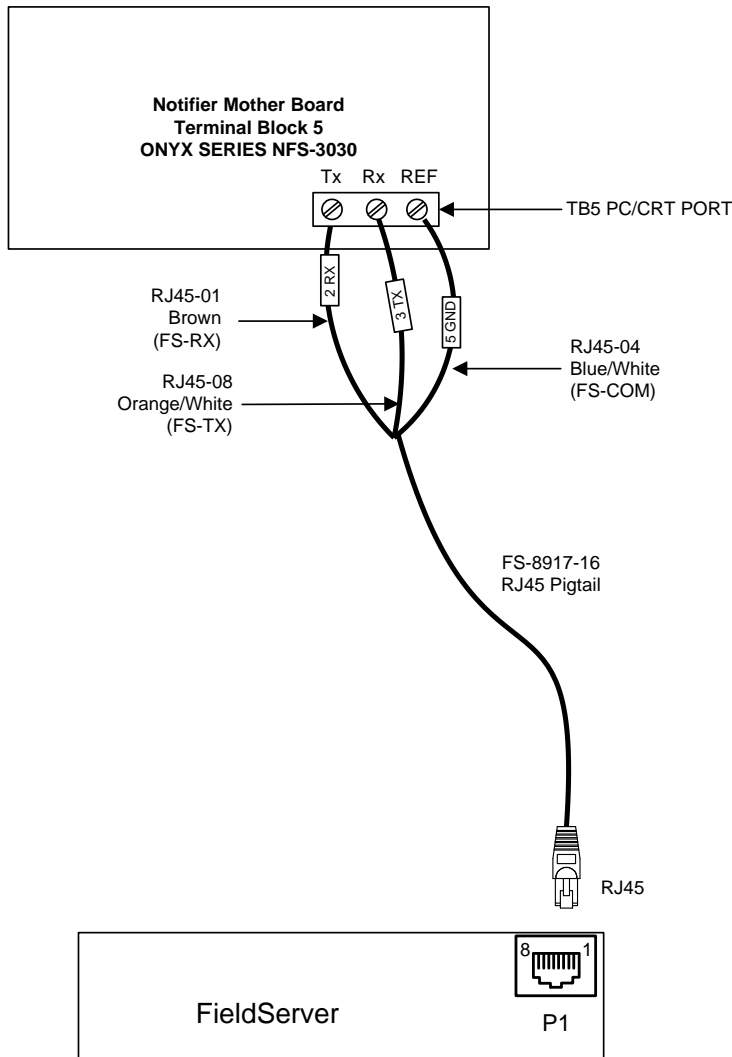
3.1   Hardware Connection Tips / Hints

The printer port must be enabled on the unit and set to 80 columns with NO supervision unless port supervision is enabled in the driver configuration.

4   CONFIGURING THE FIELDSERVER AS A (NOTIFIER NFS3030) 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 Notifier NFS3030 Server.

It is possible to connect the Notifier NFS3030 to any RS-232 port. These ports need to be configured for Protocol="nfs3030" in the configuration files.

4.1   Panel Status - Data Array Mapping

Note: all troubles will be recorded as a counter because there may be several troubles for a single device. This counter will be incremented or decremented as additional troubles are reported or cleared.

Parameter	Registers (float)	
{per loop}		
Fire Alarm	0-199 detectors 200-399 modules	
Trouble *each point will increment/decrement the number of troubles recorded, system normal will reset the counter to zero*	500-799 detectors 700-899 modules	
PreAlarm	1000-1199	detectors
	1200-1399	modules
Security Alarm	1500-1799	detectors
	1700-1899	modules
Supervisory	2000-2199	detectors
	2200-2399	modules
Disabled	2500-2799	detectors
	2700-2899	modules
On/Off	3000-3199	detectors
	3200-3399	modules
Active	3500-3799	detectors
	3700-3899	modules
{system points only}		
System Troubles	0-1000	
Disabled Zones	1000-1999	General Zones
	2000-2099	Releasing Zones
	2100-2199	Trouble Zones
Panel *note: some of these Data Arrays are not appropriate for panels but arranged in this fashion for symmetry in message parsing*	3000-3099	Fire Alarm
	3100-3199	Trouble
	3200-3299	*
	3300-3399	Security Alarm
	3400-3499	*
	3500-3599	Disabled
	3600-3699	On/Off
	3700-3799	*

4.2   Calculating array offset for a given Panel

Each Notifier 3030 Loop has a separate Data Array. There can be up to 10 loops per panel, and the status of the detectors and modules on any particular loop is recorded in the appropriate section of the Data Array according to the device address. e.g. For a detector L02D054 in PREALARM, the address would be 1054 in the Data Array for loop 2.

Data related to the fire panel but not associated with a loop (Panel Circuit, System Troubles, and Disabled Zones) are recorded in the system Data Array assigned to Loop 0. e.g. For a Panel Circuit P12.7 in FIRE ALARM the address = 3000 + 11*8 + 7 = 3095 would be set to 1.

4.3   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 Notifier NFS3030 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
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
Loop_01            ,Float          ,4000
Loop_02            ,Float          ,4000
Loop_03            ,Float          ,4000
Loop_04            ,Float          ,4000
Loop_05            ,Float          ,4000
Loop_06            ,Float          ,4000
Loop_07            ,Float          ,4000
Loop_08            ,Float          ,4000
Loop_09            ,Float          ,4000
Loop_10            ,Float          ,4000
SYSTEM_INFO        ,Float          ,3800
```

4.4 Client Side Connection Descriptors

Section Title		
Connections		
Column Title	Function	Legal Values
Port	Specify which port the device is connected to the FieldServer	P1-P8[1]
Protocol	Specify protocol used	nfs3030, 3030
Baud*	Specify baud rate	**9600** (Vendor limitation)
Parity*	Specify parity	**None** (Vendor limitation)
Data_Bits*	Specify data bits	**8** (Vendor limitation)
Stop_Bits*	Specify stop bits	**1** (Vendor limitation)
Supervision_Mode*[2]	The driver is able to process port supervision queries sent by the panel. Refer to Appendix A.1 for more information.	**0**,1,2,3,4,5

Example

```
//      Client Side Connections


Connections
Port    ,Protocol    ,Baud
P1      ,nfs3030     ,9600
```

4.5 Client Side Node Descriptors

Note: This driver does not utilize the Node_ID or station address as there can only be one panel per RS-232 Port. However, the configuration files require that this be defined. See below or Client.csv as an example.

Section Title		
Nodes		
Column Title	Function	Legal Values
Node_Name	Provide name for node	Up to 32 alphanumeric characters
Node_ID	station address of physical Server node	1-255
Protocol	Specify protocol used	nfs3030, or 3030
Connection	Specify which port the device is connected to the FieldServer	P1-P8[1]

Example

```
//   Client Side Nodes


Nodes
Node_Name    ,Node_ID    ,Protocol    ,Connection
Panel_1      ,1          ,nfs3030     ,P1
```

---

[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.
[2] If the parameter is not specified or is Zero, then port supervision must be disabled at the panel.

4.6   Client Side Map Descriptors

4.6.1   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_Offset	Starting location in Data Array	0
Function	Function of Client Map Descriptor	Passive_Client

4.6.2   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
Length	Length of Map Descriptor	4000 (LOOP_X) 3800 (SYSTEM_INFO)
Address	Starting address of read block	1
Loop	Loop number	1 to 10

4.6.3   Map Descriptor Example 1: Standard Example

This shows the standard Map Descriptor setup for a panel with 10 loops plus a single "system_info" Map Descriptor assigned to loop 0.

```
//   Client Side Map Descriptors


Map Descriptors
Map_Descriptor_Name      ,Data_Array_Name      ,Data_Array_Offset      ,Function        ,Node_Name      ,Address      ,Length      ,Loop
Loop_01                  ,DA_Loop_01           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,1
Loop_02                  ,DA_Loop_02           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,2
Loop_03                  ,DA_Loop_03           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,3
Loop_04                  ,DA_Loop_04           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,4
Loop_05                  ,DA_Loop_05           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,5
Loop_06                  ,DA_Loop_06           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,6
Loop_07                  ,DA_Loop_07           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,7
Loop_08                  ,DA_Loop_08           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,8
Loop_09                  ,DA_Loop_09           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,9
Loop_10                  ,DA_Loop_10           ,0                      ,Passive_Client  ,Panel_01       ,0            ,4000        ,10
System_Info              ,DA_System_Info       ,0                      ,Passive_Client  ,Panel_01       ,0            ,3800        ,0
```

Select the Array for data storage according to the Loop ID. System data is stored under loop 0.

All Map Descriptors are passive waiting for a message from the NFS3030 panel.

Identify the loop id for which this Map Descriptor will store data

Appendix A. Useful Features

Appendix A.1. FieldServer Synchronization

To synchronize the FieldServer's Data Arrays with the Notifier NFS3030 fire panel, the fire panel must be in the SYSTEM NORMAL state, and then the FieldServer can be restarted. There is no method of auto-synchronizing the two devices because there is currently no method for polling data from the NFS3030 panel through the printer port.

When a system normal message is received by the driver it clears all the Data Arrays associated with the driver. It attempts to do this in one cycle of the FieldServer. Depending on the size of the Data Array's (each is typically 4k elements for this driver) and the number of loops this can take up so much cycle time that it can cause the system to crash especially in configurations where there are a large number of large moves. This can be avoided by eliminating unnecessary moves and by using bit arrays on the Map Descriptor rather than float arrays.

Appendix A.2. Port Supervision[3]

The driver is able to process port supervision queries sent by the panel. It has several modes for achieving this.

   Mode=1   Driver responds to port supervision queries.
   Mode=2   Driver responds to port supervision queries unless it fails to process a message correctly (parsing error). In this case the driver starts a 7 second timer during which time it will not respond to port supervision queries.
   Mode=3   Driver accepts the port supervision query but does not respond. This mode is useful for panels where supervision is enabled but no response should be sent.
   Mode=4   This is an internal mode. It means the mode is in transition.
   Mode=5   Similar to Mode 1 but can be made to transition between mode=3 and mode=5 based on the value in a Data Array. This mode is useful for Hot Standby.
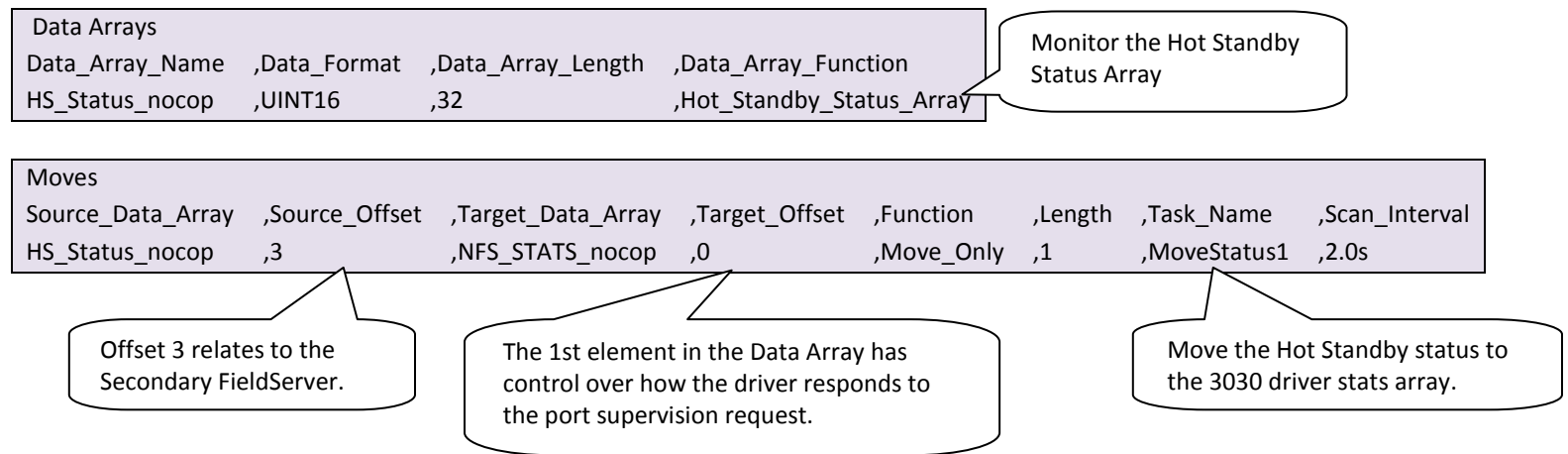
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[3] The driver did not support port supervision prior to version 1.02e.

Appendix A.2.1.   Port Supervision in Hot Standby:

A strategy that can be employed is the following.

The Primary FieldServer is set to Mode=1 and always responds to Port supervision Requests. The Secondary FieldServer is normally set to Mode=3 and will not respond to Port Supervision request, but is capable of transition. If the primary fails, the secondary becomes active but does not respond which causes a trouble at the panel. If the transition is tied to a Data Array value that changes from a value of 0 to a value of 1 when the secondary becomes active, then the secondary can be made to transition to mode=5 so that it starts responding. Thus, the trouble occurs for the duration of the transition timer (hard coded – 5 seconds). Thereafter the secondary responds so the trouble is suppressed. This means that the panel logs the event. When the Primary FieldServer becomes active again, the value at offset zero in the stats array will revert to 0 and the mode will transition to Mode=3.

Configuration Example

Data Arrays			
Data_Array_Name	,Data_Format	,Data_Array_Length	,Data_Array_Function
HS_Status_nocop	,UINT16	,32	,Hot_Standby_Status_Array

Monitor the Hot Standby Status Array

Moves							
Source_Data_Array	,Source_Offset	,Target_Data_Array	,Target_Offset	,Function	,Length	,Task_Name	,Scan_Interval
HS_Status_nocop	,3	,NFS_STATS_nocop	,0	,Move_Only	,1	,MoveStatus1	,2.0s

Offset 3 relates to the Secondary FieldServer.

The 1st element in the Data Array has control over how the driver responds to the port supervision request.

Move the Hot Standby status to the 3030 driver stats array.

Normally the Secondary FieldServer is not active and must not respond to the port supervision query. When it does become active it must start responding

- Define the Stats Array as described in Appendix B.5

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Appendix B. Troubleshooting tips

Appendix B.1. Connection Tips & Hints

- Trouble connecting to the Notifier printer port may occur if the port has not been enabled. By default this port is disabled. Please check the Notifier Manuals on how to enable this port and ensure that it is set to 80 columns no supervision unless port supervision is enabled in the driver configuration.

- If the FieldServer reboots when connected to the Panel Serial port, then it is most likely that an Optical Isolator is required to balance ground potential differences. Such differences have been known to damage the FieldServer serial port, and therefore it is recommended that this action is taken as soon as the symptom is observed.

Appendix B.2. Driver Limitations and Exclusions

- General zone disabling will be recorded, but zone information related to corresponding alarm, trouble, pre-alarm, security alarm, supervisory, and on/off will not be recorded

- Read point status data will not be recorded as this information is not available at the printer port.

- The Printer port must be enabled on the unit and set to 80 columns with NO supervision unless port supervision is enabled in the driver configuration. Refer to Appendix A.1 for more information.

- Data related to non-event driven printer reports will not be recorded by the FieldServer

- This driver was written specifically for the following Notifier 3030 firmware versions. Any changes or additions by Notifier will not be reflected in this driver unless specifically revised.

  - Boot: 001.001.001   Dec 03 2002
  - App: 001.005.001   Feb 28 2003

- Information about zone status that is incorporated with point status messages will not be recorded by this driver.

- This driver is not designed for multi-dropped panels **-** there can only be one panel connected to any given FieldServer port.

- This driver records data as presented to the printer port by the Notifier NFS3030, and can only be as accurate as this data.

- The driver cannot send any messages (including Ack, Reset and Silence) to the 3030 Panel.

- The driver does not support NFS2-3030, - a separate driver is needed.

Appendix B.3. Error Messages

Most error messages are associated with errors parsing an incoming message from the NFS3030. The most likely cause is a mismatch in expected message format. The driver will flag one of the following error messages and continue. In most cases the message currently being processed by the driver will also be printed so that problems can be easily diagnosed.

Message	Explanation
NFS3030:#1 Err. Incoming data is being abandoned on port %d. MapDesc's are required to define storage.	A corresponding Map Descriptor with the correct loop number was not found for storing data.[4]
NFS3030:#2 FYI. Attempted to decrement < 0	A "cleared trouble" message appeared for an address when there were no more troubles to clear. This may occur if a history printer dump is made. The Notifier messages may not be printed in chronological order, so the clear will occur before the trouble.
NFS3030:#4 Err. Two line addressing parsing failure.	Please contact Tech Support.
NFS3030:#5 FYI. The MapDesc called <%s> is too short.	Increase the NFS3030-stats Data Array size[4]
NFS3030:#7 Err. Illegal Map Descriptor length - defaulting to 1.	Ensure that all Length field entries have been made correctly.[4]
NFS3030:#8 Err. Loop value error. Defaulting to 1	The Loop parameter has an invalid value. [4]
NFS3030:#9 Err. Undefined Loop.	Ensure all entries for the "Loop" field have been made. [4]
NFS3030:#10 Err. Illegal Node_ID [%d] - Set to 1	Nodes or stations are not part of this protocol - set the node value to the dummy value recommended in the driver manual. [4]
NFS3030:#11 Err. Parsing Invalid Single Line message: %s	Please contact Tech Support.
NFS3030:#12 Err. Parsing Invalid 2 Line message: %s	Please contact Tech Support.
NFS3030:#13 Err. Parse failure, sys trouble not found in lookup: |%s|	Please contact Tech Support.
NFS3030:#14 Err. Test file <%s> not found.	For development and testing only, please contact Tech Support.
NFS3030:#15 Err. Diagnostic line ignored.	For development and testing only, please contact Tech Support.
NFS3030:#16 Err. Attempt to store data outside of Data Array range.	Correct Data Array declarations. [4]
NFS3030:#17 Err. No polling allowed. Presumed write thru abandoned!	Polling is not supported by this driver. The write is not performed and the Map Descriptor is returned producing a Protocol Error. To avoid the problem, do not poke values into the Data Arrays using the RUINET utility and/or reconfigure the upstream driver so that it does not write data into the Data Arrays associated with this Driver's Map Descriptors.
NFS3030:#18 Err. Internal Diagnostic. Call Tech Support.	The driver performed a poll. This is not permitted except as part of the drivers self diagnosing QA tests.

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[4] Check configuration file settings. If necessary update the .csv file. Refer to the Configuration Manual for assistance.

Appendix B.4. FieldServer Statistics

The following table identifies statistics generated by the Notifier NFS3030 serial driver and their meanings.

Message	Meaning
Messages received	Total number messages of all types received and successfully interpreted from the Notifier NFS-3030 A message can be a single or double line reporting status.
Bytes received	Total number of bytes received by all message types from the Notifier NFS-3030. This number is independent of whether the message is to be ignored, is producing an error or will be successfully interpreted.
Protocol Errors	A message could not be parsed or stored correctly.
Msg Ignored (can be seen on error statistics screen for connection)	Total number of messages ignored by driver. Driver ignores the following messages Complete message but length is less than 50 leading CR (carriage return)character leading LF (line feed)character

Appendix B.5. Additional Statistics

Additional statistics are available if the NFS3030-Stats Map Descriptor is declared in the configuration file. The statistics are recorded in a Data Array, and addressed according to the formula. address = {statistic Id#}+ {port #}*{50 stats per port}. They may be viewed using the Ruinet application, or by reading the FieldServer's data with another device.To invoke this feature, add the following to the configuration file:

```
Nodes
Node_Name    ,Station    ,Port    ,Protocol
NFS_stats        ,1              ,P1        ,nfs3030
```

```
Data_Arrays
Data_Array_Name    ,Data_Format    ,Data_Array_Length
DA_NFS_STATS        ,UINT32            ,2000
```

```
Map_Descriptors
Map_Descriptor_Name    ,Data_Array_Name    ,Data_Array_Offset    ,Function    ,Node_Name    ,Address    ,Length
NFS3030-Stats                ,DA_NFS_STATS        ,0                            ,Server        ,NFS_stats        ,1            ,2000
```

Statistic	Description	Id #
NFS_STAT_SLAVE_BYTES_RCVD	Total number of bytes received on port	30
NFS_STAT_SLAVE_MSGS_RCVD	Total number of full length messages received, whether rejected or successfully interpreted	31
NFS_STAT_SLAVE_BYTES_REJECTED_BY_COMPLETE	Total bytes rejected if message is not of full length (i.e. <50)	32
NFS_STAT_SLAVE_OCCURRENCES_REJECTED_BY_COMPLETE	Total number of messages rejected if length is less than 50 or message is only CR or LF	33
NFS_STAT_SLAVE_BYTES_REJECTED_BY_PARSE_KEYWORD	Total number of bytes rejected if event keyword (see Appendix C.1.1) is unknown	34
NFS_STAT_SLAVE_OCCURRENCES_REJECTED_BY_PARSE_KEYWORD	Total number of messages rejected if event keyword (see Appendix C.1.1) is unknown.	35
NFS_STAT_SLAVE_ADDRESS_PARSE_FAILURE	Total number of messages producing error because of wrong address for loop, detector, panel, zone etc	40
NFS_STAT_SLAVE_PARSE_KEYWORD_FOUND_BUT_NOT_HANDLED.	Total number of messages received with known event keyword but not described in Appendix C.1.1	41
NFS_STAT_SLAVE_STORE_IGNORES_MESSAGE	Total number of messages for which Map Descriptor is not defined to store data.	42
NFS_STAT_SLAVE_STORED_MESSAGE	Total number of messages for which Driver stored data.	43
NFS_STAT_CLIENT_SENDS_POLL	Used during testing only - Increments by 1 each time the Client sends a poll.	44

Appendix C. Reference

Appendix C.1. Message to Data Array Mapping

This driver was designed to be connected to the Notifier Onyx NFS3030 printer port and listen for incoming messages. The panel's default setting for the printer port is off. To utilize this driver, the printer must be enabled on the unit and set to 80 columns with NO supervision unless port supervision is enabled in the driver configuration. Refer to Appendix A.1 for more information on port supervision.

The purpose of this driver is to record the status of devices connected to the NFS3030 system by interpreting the text messages sent to the printer port. Only messages that directly pertain to device status are currently supported. The following subset of event messages is recognized:

Appendix C.1.1. Notifier NFS3030 Message Types Recognized

Event Keyword	Data Arrays Affected	Clearing Event	Notes
Fire Alarm	Modules/Detectors	Cleared Fire Alarm System Normal	states: {0,1}
Trouble	Modules/Detectors System Panel Circuit	Cleared Trouble System Normal	This is for both point and system trouble - system troubles are only 1 line messages with no point address. states: {counter}
Pre Alarm	Detectors	Cleared Pre Alarm System Normal	states: {0,1}
Security Alarm	Modules Panel Circuit	Cleared Security Alarm System Normal	states: {0,1}
Supervisory	Modules	Cleared Supervisory System Normal	states: {0,1}
Disabled	Zones Modules/Detectors Panel Circuit	Cleared Disabled System Normal	states: {0,1}
On/Off	Modules Panel	Off/On	states: {0,1}
System Normal	All		Will reset all Data Arrays for all loops and the system to zero
Active	Modules	Cleared Active	

Appendix C.1.2.   System Trouble Messages

A detailed mapping of message interaction System Trouble messages provided by Notifier at the time this driver
was written is tabulated below. Any changes or additions by Notifier will not be reflected in this driver unless
specifically revised. Because of the patterns of the messages, the search string has been truncated to permit
message recognition with device address.

Case	NFS3030 message	Alternative search string
1.	LOOP x- x COMM FAILURE	COMM FAILURE
2.	STYLE 4 SHORT x LOOP x	STYLE 4 SHORT
3.	ANNUN x NO ANSWER	NO ANSWER
4.	ANNUN x TROUBLE	TROUBLE

System Trouble	ID #	System Trouble	ID #	System Trouble	ID #
AC FAIL	0	INTERNAL RAM ERROR	15	PROGRAM CORRUPTED	30
ADV WALK TEST	1	LOADING.NO SERVICE	16	PROG MODE ACTIVATED	31
UDACT NO ANSWER	2	COMM FAILURE	17	SELF TEST FAILED	32
UDACT TROUBLE	3	MAN EVAC INITIATED	18	SOFTWARE MISMATCH	33
AUXILIARY TROUBLE	4	MAN EVAC RECEIVED	19	STYLE 4 SHORT	34
BASIC WALK TEST	5	MANUAL MODE ENTERED	20	STYLE 6 POS. LOOP	35
BATTERY	6	NCM COMM LOSS	21	STYLE 6 NEG. LOOP	36
CHARGER FAIL	7	NETWORK FAIL PORT	22	STYLE 6 SHORT LOOP	37
CORRUPT LOGIC EQUAT	8	NFPA 24HR REMINDER	23	TEST PROGRAM UPDATE	38
DRILL INITIATED	9	NVRAM BATT TROUBLE	24	TM4 TROUBLE	39
DRILL RECEIVED	10	NO DEV. INST ON L1	25	TM4 NO ANSWER	40
EPROM ERROR	11	NO POWER SUPPLY INST	26	TM4 DISABLED	41
EXTERNAL RAM ERROR	12	PANEL DOOR OPEN	27	TROUBLE	42
GROUND FAULT LOOP	13	PRINTER OFF LINE	28	NO ANSWER	43
GROUND FAULT	14	PRINTER PAPER OUT	29	SYSTEM INITIALISATION	44