A Sierra Monitor Company

Driver Manual
(Supplement to the FieldServer Instruction Manual)

FS-8700-78 DataAire DART

APPLICABILITY & EFFECTIVITY

Effective for all systems manufactured after January 18, 1999

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1. Dart Driver Description

The Data Aire DART Driver is designed for connection to a DataAire Corporation DART. This driver has been modified for use on intelli-DART units which operate differently to previous DART units.

The Dart device is an active element on a network of DataAire devices such as DAP panels. It manages the devices and provides co-ordination and supervision. In performing these duties the Dart device polls all the devices on the network for all the data. The Dart is capable of 'echoing' the responses from these devices on one of its RS-232 ports. This driver is designed to listen passively to these echoes and store device data. In addition the driver can send messages (containing set point data, for example,) directly to individual devices on the network.

The intelli-DART driver is not passive, and is required to poll the intelli-DART units for DAP data after login. Logins are required on the initial poll, after 20 minutes, and if polls for data fail.

The FieldServer is connected to the RS-232 serial port of the Dart. The FieldServer can read and write but active polling must be minimized as it reduces the amount of time that the DART spends controlling the networked devices. The driver operates primarily as a passive client listening to echoes of the data being polled by the DART. The DART must be manually set to 'Echo' mode on the front panel of the Dart for the driver to operate correctly.

The driver may be configured very simply (See example 4.4.4). In addition a number of advanced configurations are possible. The manual is divided to separate the basic and advanced topics.

The driver supports the common message formats for common DataAire devices. A list of the supported messages is provided in the manual. The driver cannot be used to configure or read the status of a DART device itself.

The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer.

1.1. Performance Issues

Several factors outside FieldServer's control make for slow communications with DataAire devices. The DataAire communication is based on a very low baud rate. In addition inter-message timing constraints and overhead requirements for active messages in a Dart configuration add significant time to each transaction.

When a used with a DART device, writing to a set point (or other variable) may take up to 8 seconds to complete. The results of the write will not be seen until the DART has timed-out back into control mode and echoes the new data to the FieldServer. This will take at least 30 seconds and could take several minutes if there are many devices on the loop.

When applying the password in the IntelliDART to the Web interface, it prevents communications on the Serial port because the panel expects a password from the FieldServer.

2. Driver Scope of Supply

2.1. Supplied by FieldServer Technologies for this driver

FieldServer Technologies PART #	Description
FS-8917-03	FS-X40 RS-485 Connector
FS-8700-78	Driver Manual.

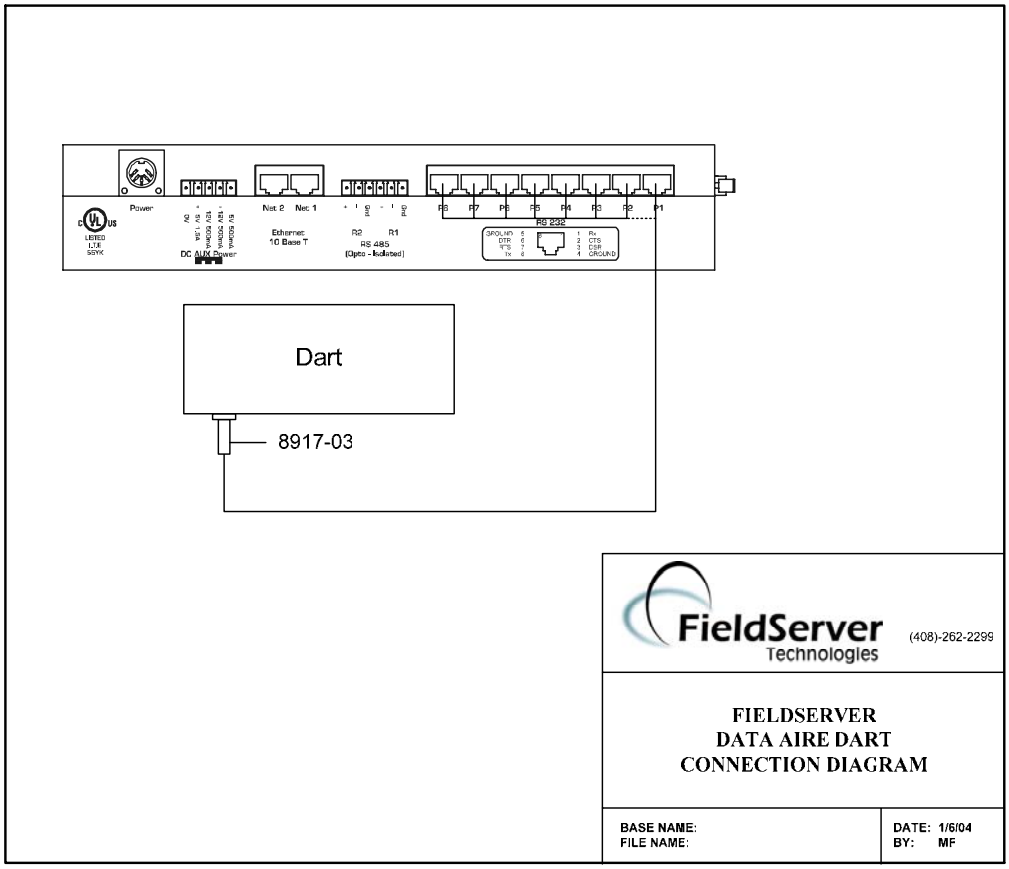
2.2. Provided by the Supplier of 3rd Party Equipment

2.2.1. Required 3rd Party Hardware

PART #	DESCRIPTION
	DataAire Dart and documentation
	RS-232 cable for the loop network

3. Hardware Connections

When a DART device is connected to the DataAire field devices then the FieldServer is connected to the serial port of the DART. The DART must be set to 'Echo' mode on the front panel of the DART.



4. Configuring the FieldServer as a DataAire Dart Client

For a detailed discussion on FieldServer configuration, please refer to the instruction manual for the FieldServer. The information that follows describes how to expand upon the factory defaults provided in the configuration files included with the FieldServer (See ".csv" files on the driver CD).

The configuration file tells the FieldServer about its interfaces, and the routing of data required. In order to enable the FieldServer for Dart Driver 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.

The DART Serial Driver cannot be configured as a data server.

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

4.1. Data Arrays

Section Title
Data_Arrays

Column Title	Function	Legal Values
Data_Array_Name	Provide name for Data Array	Up to 15 alphanumeric characters
Data_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 for the data being placed in this array.	1-10,000

Example

```
//Data_Arrays
Data_Array_Name,    Data_Format,    Data_Array_Length
DA_AI_01,           UInt16,         200
DA_AO_01,           UInt16,         200
DA_DI_01,           Bit,            200
DA_DO_01,           Bit,            200
```

4.2. Client Side Connection Descriptors

Section Title		
Connections		
Column Title	**Function**	**Legal Values**
Port	Specify which port the device is connected to the FieldServer (connected to the DART's RS-232 port.)	P1-P8[1]
Baud*	Specify baud rate	2400 (DartIII) 9600 (intelli-DART and DartIV)
Parity*	Specify parity	**None**
Data_Bits*	Specify data bits	**8**
Stop_Bits*	Specify stop bits	**1**
Protocol	Specify protocol used Either keyword may be used.	Dart
Handshaking*	Specify hardware handshaking	**None**
Poll Delay*	Time between internal polls	0-32000 s, **2.1 s**

Example

```
// Client Side Connections
Connections
Port,       Baud,    Parity,   Data_Bits,   Stop_Bits,   Protocol,   Poll_Delay
P1,         2400,    None,     8,           1,           Dart,       0.100s
```

4.3. 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	This is not the node address of the Dart device, but the node address of the DAP device whose data you wish to monitor.	1-259
Protocol	Specify protocol used	Dart
Port	Specify which port the Dart is connected to the FieldServer	P1-P8, R1-R2[1]
PLC_type	Specify the type of DART unit.	"intelliDart" or "DARTIII" or none specified

[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,      Port,      plc_type
Unit1,            1,            Dart,        P1,      intelliDART
```

4.4. Client Side Map Descriptors

4.4.1. FieldServer Specific 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 the Client Map Descriptor The use of the WRBX keyword is recommended for DART configurations as communications are minimized.	RDBC, WRBC, WRBX, Passive

4.4.2. Driver Specific 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	The length must always be set to one.
Address	Starting address of read block	Not required for client configuration - used in simulation configuration only.
The following parameters apply only to the Dart Driver.		
DA_Func*	Tells the driver to poll the device for all the data that is available. The data is device specific. Other uses of this parameter are permitted. These uses are discussed in the Advanced Topics section of this manual.	Everything See Section 4.4.6 for a map of how the data is stored in the FieldServer Data Arrays
DA_Field	Only required when the function is a write (wrbc) or when the Map Descriptor is associated with a write by means of the DA_Assoc parameter value. This is the name of the data field whose value you wish to set in the device. Other uses of this parameter are permitted. These uses are discussed in the Advanced Topics section of this manual.	See Table 5 for a list of permitted values.
DA_Assoc	Use to associate passive Map Descriptors with an active Map Descriptor. Multiple fields are associated with one WRBC Map Descriptor, resulting in multiple values being written to one device using a single message.	Any positive integer.
DA_Freq	This parameter is obsolete. It was required in versions of the driver prior to 1.07f. Read notes in Appendix 3.10	

4.4.3. Timing Parameters

Column Title	Function	Legal Values
Scan_Interval	Rate at which data is polled. A value that the FieldServer kernel uses to schedule Map Descriptors. Normally the driver listens passively for messages echoed by the Dart and the Scan_Interval is not important. However, with active Map Descriptors which read and write data, consider the effect of reading / writing too often. The DART device is typically configured to do work. Amongst its jobs are monitoring and scheduling various devices that are connected to it. Each time that one reads/ writes to a device, the control task of the DART is suspended for a period of 20-30 seconds. Thus if you read or write to often it will never get a chance to do its work.	>0.1s, **2000 msec** non-intelli-DART: minimum 2 minutes **2 minutes** 5 Minutes is recommended. intelli-DART: -no minimum -scan_interval over-rides **2 Seconds**

4.4.4. Map Descriptor: Example 1 – Read all possible data

```
Map_Descriptor_Name,  Data_Array_Name,  Data_Array_Offset,  Function,  Node_Name,  Address,  Length,  DA_Func
Read_Node_01,         DA_01          ,  0                 ,  passive ,  Unit1     ,  0       ,  1300,    Everything
```

The driver waits passively for the Dart to echo data from the devices.

No Scan Interval. The driver will process data as fast as the Dart can serve it.

4.4.5. Map Descriptor: Example 2 – intelli-DART Read all possible data

```
Map_Descriptor_Name,  Data_Array_Name,  Data_Array_Offset,  Function,  Node_Name,  Address,  Length,  DA_Func,     Scan_Interval
Read_Node_01,         DA_01          ,  0                 ,  rdbc    ,  Unit1,     0,        1300,    Everything,  400s
```

The driver polls the Dart for data from the devices.

Scan Interval. The driver will poll every 400 secs.

4.4.6. Map of How DataAire Device Data is stored in a Data Array

In example 4.4.4 the FieldServer listens passively for all possible data from the device called ‘unit1’ and stores the data in an array called ‘DA_01’.

The data that is obtained from ‘unit1’ is dependent on the type of device. Irrespective of the device type the arrangement of data, stored in DA_01, is fixed. If a data field cannot be obtained from ‘unit1’ then the array is left with a zero value for that data field.

In the following table the array location indicates the offset in the Data Array at which a data field can be found. (This offset is relative to the offset specified in the Map Descriptor.) The columns headed 2, 3 … indicate the unit types for which the data fields are available. For example: The field ‘d_temp’ can be read from unit types 2, 5,6,7,9 but not from any of the other unit types. It is beyond the scope of this manual to describe each field and to indicate valid ranges. Such information should be obtained from the DataAire Corporation.

‘x’ Indicates Read only
‘X’ Indicates a point that can be read & written.
‘w’ Indicates a write only point.

Table 1: Array Locations of “Everything”

Array Location	Method	Num Elements	Data Field (Table 0 provides descriptions)	2	3	4	5	6	7	8	9	14	15	Message Type
1	1	1	Zone		w	w	w	w	w	w	w	w	w	Dap-Config
2	1	1	Inhibit		w	w	w	w	w	w	w	w	w	Dap-Config
3	4	1	unitType	x	x	x	x	x	x	x	x	x	x	Dap-Unit
4	2	1	temp	x			x	x	x		x			Dap-Stat
5	2	1	hum	x			x	x	x		x			Dap-Stat
6	2	1	d_temp	x			x	x	x		x			Dap-Stat
7	3	8	Mode: Least Significant bit. Mode: Unit is in centigrade mode.	x			x	x	x		x			Dap-Stat
8			Mode: RFU, always 1	x			x	x	x		x			Dap-Stat
9			Mode: RFU, always 1	x			x	x	x		x			Dap-Stat
10			Mode: Unit is dehumidifying	x			x	x	x		x			Dap-Stat
11			Mode: Unit is humidifying	x			x	x	x		x			Dap-Stat
12			Mode: energy save is active	x			x	x	x		x			Dap-Stat
13			Mode: not used	x			x	x	x		x			Dap-Stat
14			Mode: not used	x			x	x	x		x			Dap-Stat
23	3	8	Hold: Least significant bit Hold: needed cooling is inhibited.	x			x	x	x		x			Dap-Stat
24			Hold: needed heating is inhibited	x			x	x	x		x			Dap-Stat
25			Hold: needed humidification is inhibited	x			x	x	x		x			Dap-Stat
26			Hold: needed dehumidification is inhibited	x			x	x	x		x			Dap-Stat
27			Hold: not used	x			x	x	x		x			Dap-Stat
28			Hold: not used	x			x	x	x		x			Dap-Stat
29			Hold: Network “standby” inhibit is active.	x			x	x	x		x			Dap-Stat
30			Hold: Network “off” inhibit is active	x			x	x	x		x			Dap-Stat
39	1	1	cs_on	x			x	x	x		x			Dap-Stat
40	1	1	hs_on	x			x	x	x		x			Dap-Stat

Array Location	Method	Num Elements	Data Field (Table 0 provides descriptions)	2	3	4	5	6	7	8	9	14	15	Message Type
41	1	1	valvePCT	x			x	x	x		x			Dap-Stat
42	1	1	hVlvPCT	x			x	x	x		x			Dap-Stat
43	4	14	errors See Appendix 3.8 for more information	x			x	x	x		x			Dap-Stat
57	2	1	hiTemp	x			x	x	x		x			Dap-Stat
58	2	1	loTemp	x			x	x	x		x			Dap-Stat
59	2	1	hiHum	x			x	x	x		x			Dap-Stat
60	2	1	loHum	x			x	x	x		x			Dap-Stat
61	1	1	chilled_water	x			x	x	x		x			Dap-Stat
62	1	1	compressor_config	x			x	x	x		x			Dap-Stat
63	1	1	heat_strip_config	x			x	x	x		x			Dap-Stat
64	1	1	hum_config	x			x	x	x		x			Dap-Stat
65	1	1	csUtilPct	x			x	x	x		x			Dap-Stat
66	1	1	hsUtilPct	x			x	x	x		x			Dap-Stat
67	1	1	valveUtilPct	x			x	x	x		x			Dap-Stat
68	1	1	humUtilPCT	x			x	x	x		x			Dap-Stat
69	1	1	alrm_select_1	x			x	x	x		x			Dap-Stat
70	1	1	alrm_select_2	x			x	x	x		x			Dap-Stat
71	1	1	alrm_select_3	x			x	x	x		x			Dap-Stat
72	1	1	alrm_select_4	x			x	x	x		x			Dap-Stat
73	3	56	bitErrors See Appendix 3.8 for more information	x			x	x	x		x			Dap-Stat
185	1	1	runtime_c1	x			x	x	x		x			Dap-Xtra
186	1	1	runtime_c2	x			x	x	x		x			Dap-Xtra
187	1	1	runtime_c3	x			x	x	x		x			Dap-Xtra
188	1	1	runtime_c4	x			x	x	x		x			Dap-Xtra
189	1	1	runtime_ht1	x			x	x	x		x			Dap-Xtra
190	1	1	runtime_ht2	x			x	x	x		x			Dap-Xtra
191	1	1	runtime_ht3	x			x	x	x		x			Dap-Xtra
192	1	1	runtime_hum	x			x	x	x		x			Dap-Xtra
193	1	1	runtime_evap	x			x	x	x		x			Dap-Xtra
194	1	1	runtime_cond	x			x	x	x		x			Dap-Xtra
195	1	1	runtime_dehum	x			x	x	x		x			Dap-Xtra
196	1	1	runtime_esc	x			x	x	x		x			Dap-Xtra
197	1	1	runtime_cwc	x			x	x	x		x			Dap-Xtra
198	4	20	errors	x			x	x	x		x			Dap-Xtra
218	6	10	errage	x			x	x	x		x			Dap-Xtra
258	1	1	version	x			x	x	x		x			Dap-Xtra
259	2	1	tmbmair	x			x	x	x		x			Dap-Xtra
260	2	1	tmbhum	x			x	x	x		x			Dap-Xtra
261	1	1	tmbairdb	x			x	x	x		x			Dap-Xtra
262	6	13	runtimes (as array)	x			x	x	x		x			Dap-Xtra
314	3	80	bitErrors	x			x	x	x		x			Dap-Xtra
474	4	1	adj_rate	X			X	X						Dap-Menu
478	1	1	alrm_delay_1	X			X	X						Dap-Menu
479	1	1	alrm_delay_2	X			X	X						Dap-Menu

Array Location	Method	Num Elements	Data Field (Table 0 provides descriptions)	2	3	4	5	6	7	8	9	14	15	Message Type
480	1	1	alrm_delay_3	X			X	X						Dap-Menu
481	4	1	alrm_enable_1	X			X	X						Dap-Menu
482	4	1	alrm_enable_2	X			X	X						Dap-Menu
483	4	1	alrm_enable_3	X			X	X						Dap-Menu
484	4	1	alrm_select_1	X			X	X						Dap-Menu
485	4	1	alrm_select_2	X			X	X						Dap-Menu
486	4	1	alrm_select_3	X			X	X						Dap-Menu
487	1	1	chilled_water	X			X	X						Dap-Menu
488	1	1	compressor_config	X			X	X						Dap-Menu
489	1	1	c_mode	X			X	X						Dap-Menu
490	2	1	fire_lim	X			X	X						Dap-Menu
491	1	1	heat_strip_config	X			X	X						Dap-Menu
492	1	1	hi_cal	X			X	X						Dap-Menu
493	1	1	hi_h_cal	X			X	X						Dap-Menu
494	2	1	hi_t_lim	X			X	X						Dap-Menu
495	1	1	humid_config	X			X	X						Dap-Menu
496	1	1	h_calib	X			X	X						Dap-Menu
497	1	1	lead_lag	X			X	X						Dap-Menu
498	1	1	loc_h_deadband	X			X	X						Dap-Menu
499	1	1	loc_h_setpt	X			X	X						Dap-Menu
500	2	1	loc_t_dband	X			X	X						Dap-Menu
501	2	1	loc_t_setpt	X			X	X						Dap-Menu
502	1	1	lo_cal	X			X	X						Dap-Menu
503	1	1	lo_h_lim	X			X	X						Dap-Menu
504	2	1	lo_t_lim	X			X	X						Dap-Menu
505	1	1	main_int	X			X	X						Dap-Menu
506	1	1	passwd_a	X			X	X						Dap-Menu
507	1	1	passwd_b	X			X	X						Dap-Menu
508	1	1	rst_mode	X			X	X						Dap-Menu
509	1	1	s_delay	X			X	X						Dap-Menu
510	2	1	t_calib	X			X	X						Dap-Menu
511	1	1	voice	X			X	X						Dap-Menu
512	1	1	vvrg	X			X	X						Dap-Menu
513	1	1	cat1	X			X	X						Dap-Menu
514	1	1	cat2	X			X	X						Dap-Menu
515	1	1	cat3	X			X	X						Dap-Menu
516	2	1	d_calib	X			X	X						Dap-Menu
517	2	1	lo_d_lim	X			X	X						Dap-Menu
518	1	1	ptc	X			X	X						Dap-Menu
519	2	1	supplyT		x	x				x				Chiller-Stat
520	2	1	returnT		x	x				x				Chiller-Stat
521	4	1	coolOn1		x	x				x				Chiller-Stat
522	4	2	coolOn2		x	x				x				Chiller-Stat
523	4	2	coolOn3		x	x				x				Chiller-Stat

Array Location	Method	Num Elements	Data Field (Table 0 provides descriptions)	2	3	4	5	6	7	8	9	14	15	Message Type
524	2	1	valvePct		x	x				x				Chiller-Stat
525	4	1	pumpsOn		x	x				x				Chiller-Stat
526	4	1	condOn		x	x				x				Chiller-Stat
527	4	1	modFail		x	x				x				Chiller-Stat
528	2	1	hiSupT		x	x				x				Chiller-Stat
529	2	1	loSupT		x	x				x				Chiller-Stat
530	2	1	hiRetT		x	x				x				Chiller-Stat
531	2	1	loRetT		x	x				x				Chiller-Stat
532	1	1	csUtilPct1		x	x				x				Chiller-Stat
533	1	1	csUtilPct2		x	x				x				Chiller-Stat
534	1	1	csUtilPct3		x	x				x				Chiller-Stat
535	1	1	valveUtilPct		x	x				x				Chiller-Stat
536	3	48	errors See Appendix 3.8 for more information		x	x				x				Chiller-Stat
584	1	1	mode		x	x				x				Chiller-Stat
585	6	11	runtimes		x	x				x				Chiller-Xtra
596	3	80	errold		x	x				x				Chiller-Xtra
676	6	10	errage		x	x				x				Chiller-Xtra
854	4	1	adjust_rate		x	x				x				Chiller-Menu
855	4	1	auto_ack		X	X				X				Chiller-Menu
856	2	1	aux_setpt		X	X				X				Chiller-Menu
857	4	1	backup_mods		X	X				X				Chiller-Menu
858	2	1	backup_setpt		X	X				X				Chiller-Menu
859	4	1	cmota		X	X				X				Chiller-Menu
860	4	1	comp_type		X	X				X				Chiller-Menu
861	4	1	ptc		X	X				X				Chiller-Menu
862	2	1	hi_r_lim		X	X				X				Chiller-Menu
863	2	1	hi_s_lim		X	X				X				Chiller-Menu
864	4	1	LL_policy		X	X				X				Chiller-Menu
865	2	1	lo_r_lim		X	X				X				Chiller-Menu
866	2	1	lo_s_lim		X	X				X				Chiller-Menu
867	1	1	main_int		X	X				X				Chiller-Menu
868	4	1	mods_configd		X	X				X				Chiller-Menu
869	1	1	network_ID		X	X				X				Chiller-Menu
870	1	1	op_1_delay		X	X				X				Chiller-Menu
871	1	1	op_2_delay		X	X				X				Chiller-Menu
872	4	1	op_1_message		X	X				X				Chiller-Menu
873	4	1	op_2_message		X	X				X				Chiller-Menu
874	1	1	password		X	X				X				Chiller-Menu
875	4	4	relay_mask_0		X	X				X				Chiller-Menu
879	4	4	relay_mask_1		X	X				X				Chiller-Menu
883	4	4	relay_mask_2		X	X				X				Chiller-Menu
887	4	1	restart_mode		X	X				X				Chiller-Menu
888	4	1	reverse_valve		X	X				X				Chiller-Menu
889	4	1	sc_alarm_on		X	X				X				Chiller-Menu

Array Location	Method	Num Elements	Data Field (Table 0 provides descriptions)	2	3	4	5	6	7	8	9	14	15	Message Type
890	1	1	start_delay		X	X				X				Chiller-Menu
891	1	1	supply_dband		X	X				X				Chiller-Menu
892	2	1	supply_setpt		X	X				X				Chiller-Menu
893	4	1	temp_scale		X	X				X				Chiller-Menu
894	4	1	valve_voltage		X	X				X				Chiller-Menu
895	4	1	voice		X	X				X				Chiller-Menu
896	4	1	water_valve		X	X				X				Chiller-Menu
897	1	1	return_cal		X	X				X				Chiller-Menu
898	1	1	supply_cal		X	X				X				Chiller-Menu
899	4	1	adj_rate						X		X	X	X	Dap80-Menu
900	1	1	alrm_delay_1						X		X	X	X	Dap80-Menu
901	1	1	alrm_delay_2						X		X	X	X	Dap80-Menu
902	1	1	alrm_delay_3						X		X	X	X	Dap80-Menu
903	1	1	alrm_delay_4						X		X	X	X	Dap80-Menu
904	4	1	alrm_select_1						X		X	X	X	Dap80-Menu
905	4	1	alrm_select_2						X		X	X	X	Dap80-Menu
906	4	1	alrm_select_3						X		X	X	X	Dap80-Menu
907	4	1	alrm_select_4						X		X	X	X	Dap80-Menu
908	4	1	ant-enable						X		X	X	X	Dap80-Menu
909	4	1	autoflush_time						X		X	X	X	Dap80-Menu
910	4	1	auto_ack						X		X	X	X	Dap80-Menu
911	4	1	comp_config						X		X	X	X	Dap80-Menu
912	4	1	control_type						X		X	X	X	Dap80-Menu
913	4	1	c_mode						X		X	X	X	Dap80-Menu
914	4	1	da_volts						X		X	X	X	Dap80-Menu
915	4	1	dehum_on						X		X	X	X	Dap80-Menu
916	2	1	d_calib						X		X	X	X	Dap80-Menu
917	4	1	esaver_supp_comp						X		X	X	X	Dap80-Menu
918	2	1	fire_lim						X		X	X	X	Dap80-Menu
919	4	1	heater_config						X		X	X	X	Dap80-Menu
920	1	1	hi_h_lim						X		X	X	X	Dap80-Menu
921	2	1	hi_t_lim						X		X	X	X	Dap80-Menu
922	4	1	humid_config						X		X	X	X	Dap80-Menu
923	2	1	h_calib						X		X	X	X	Dap80-Menu
924	1	1	h_dband						X		X	X	X	Dap80-Menu
925	4	1	lead_lag						X		X	X	X	Dap80-Menu
926	2	1	lo_d_lim						X		X	X	X	Dap80-Menu
927	1	1	lo_h_lim						X		X	X	X	Dap80-Menu
928	2	1	lo_t_lim						X		X	X	X	Dap80-Menu
929	2	1	main_int						X		X	X	X	Dap80-Menu
930	1	1	network_id						X		X	X	X	Dap80-Menu
931	2	1	nom_h_setpt						X		X	X	X	Dap80-Menu
932	1	1	password						X		X	X	X	Dap80-Menu
933	4	1	ptc						X		X	X	X	Dap80-Menu

Array Location	Method	Num Elements	Data Field (Table 0 provides descriptions)	2	3	4	5	6	7	8	9	14	15	Message Type
934	3	16	relay_1_mask_0 Offset 934 contains the 1st bit Offset 935 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
950	3	16	relay_1_mask_1 Offset 950 contains the 1st bit Offset 951 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
966	3	16	relay_1_mask_2 Offset 966 contains the 1st bit Offset 967 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
982	3	16	relay_2_mask_0 Offset 982 contains the 1st bit Offset 983 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
998	3	16	relay_2_mask_1 Offset 998 contains the 1st bit Offset 999 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
1014	3	16	relay_2_mask_2 Offset 1014 contains the 1st bit Offset 1015 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
1030	3	16	relay_3_mask_0 Offset 1030 contains the 1st bit Offset 1031 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
1046	3	16	relay_3_mask_1 Offset 1046 contains the 1st bit Offset 1047 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
1062	3	16	relay_3_mask_2 Offset 1062 contains the 1st bit Offset 1063 contains the 2nd bit etc						X		X	X	X	Dap80-Menu
1078	4	1	reverse_valve						X		X	X	X	Dap80-Menu
1079	4	1	rst_mode						X		X	X	X	Dap80-Menu
1080	4	1	sc_alarms						X		X	X	X	Dap80-Menu
1081	1	1	s_delay						X		X	X	X	Dap80-Menu
1082	2	1	t_calib						X		X	X	X	Dap80-Menu
1083	1	1	t_dband						X		X	X	X	Dap80-Menu
1084	2	1	t_setpt						X		X	X	X	Dap80-Menu
1085	4	1	valve_config						X		X	X	X	Dap80-Menu
1086	4	1	voice						X		X	X	X	Dap80-Menu
1100	1	1	sensor_1_name									x	x	Dap80-Analog
1101	1	1	sensor_1_units									x	x	Dap80-Analog
1102	1	1	sensor_1_type									x	x	Dap80-Analog
1103	1	1	sensor_1_min_val									x	x	Dap80-Analog
1104	1	1	sensor_1_max_val									x	x	Dap80-Analog
1105	1	1	sensor_1_cal									x	x	Dap80-Analog
1106	1	1	sensor_2_name									x	x	Dap80-Analog
1107	1	1	sensor_2_units									x	x	Dap80-Analog
1108	1	1	sensor_2_type									x	x	Dap80-Analog
1109	1	1	sensor_2_min_val									x	x	Dap80-Analog
1110	1	1	sensor_2_max_val									x	x	Dap80-Analog
1111	1	1	sensor_2_cal									x	x	Dap80-Analog
1112	1	1	sensor_1_input									x	x	Dap80-Channels
1113	1	1	sensor_2_input									x	x	Dap80-Channels
1114	1	1	sensor_3_input									x	x	Dap80-Channels

Table 2: Point Descriptions

FieldServer Array Location	FieldServer Data Field	Point Description	Message Type	D/A Control Panel Type
1	Zone	Zone ID	DAP config	All
2	Inhibit	Unit On/ Standby/ Off Status	DAP config	All
3	Unit Type	Type Of DAP Panel	DAP Unit	All
4	temp	Current Temperature	DAP Stat	All
5	hum	Current Humidity	DAP Stat	All
6	d-temp	Current discharge temperature	DAP Stat	All
7	mode	Current Unit mode (note 1)	DAP Stat	All
23	hold	Current Functions are inhibited by Network (note2)	DAP Stat	All
39	cs_on	Cooling stages on	DAP Stat	All
40	hs_on	Heating stage on	DAP Stat	All
41	valvePCT	Openning Percentage of Chilled water valve	DAP Stat	All
42	hVlvPCT	Openning Percentage of hot water valve	DAP Stat	All
43	errors	Alarm (see note 3)	DAP Stat	All
57	hiTemp	Highest Temperature in the last 24 hrs	DAP Stat	All
58	loTemp	Lowest Temperature in the last 24 hrs	DAP Stat	All
59	hiHum	Highest Humidity in the last 24 hrs	DAP Stat	All
60	LoHum	Lowest Humidity in the last 24 hrs	DAP Stat	All
61	Chilled_water	Water Valve setting	DAP Stat	All
62	Compressor_config	Compressor configuration	DAP Stat	All
63	heat_strip_config	Heating configuration	DAP Stat	All
64	hum_config	Humidifier configuration	DAP Stat	All
65	csUtilPct	Utilization Percentage of cooling in the last 24 hrs	DAP Stat	All
66	hsUtilPct	Utilization Percentage of heating in the last 24 hrs	DAP Stat	All
67	ValveUtilPct	Utilization Percentage of CW valve in the last 24 hrs	DAP Stat	All
68	humUtilPct	Utilization Percentage of humidifier in the last 24 hrs	DAP Stat	All
69	alrm_select_1	Message for optional alarm Input #1 selection	DAP Stat	All

FieldServer Array Location	FieldServer Data Field	Point Description	Message Type	D/A Control Panel Type
70	alrm_select_2	Message for optional alarm Input #2 selection	DAP Stat	All
71	alrm_select_3	Message for optional alarm Input #3 selection	DAP Stat	All
72	alrm_select_4	Message for optional alarm Input #4 selection	DAP Stat	All
73	bitErrors	Alarm History	DAP Stat	All
185	runtime_c1	Compressor 1 runtime	DAP-Xtra	All
186	runtime_c2	Compressor 2 runtime	DAP-Xtra	All
187	runtime_c3	Compressor 3 runtime	DAP-Xtra	DAP046 only
188	runtime_c4	Compressor 4 runtime	DAP-Xtra	DAP046 only
189	runtime_ht1	Heating stage 1 runtime	DAP-Xtra	All
190	runtime_ht2	Heating stage 2 runtime	DAP-Xtra	All
191	runtime_ht3	Heating stage 3 runtime	DAP-Xtra	All
192	runtime_hum	Humidification runtime	DAP-Xtra	All
193	runtime_evap	Blower/ Fan runtime	DAP-Xtra	All
194	runtime_cond	Condenser runtime	DAP-Xtra	All
195	runtime_dehum	dehumidification runtime	DAP-Xtra	All
196	runtime_esc	Energy saver runtime	DAP-Xtra	All
197	runtime_cwc	Chilled water Valve runtime	DAP-Xtra	All
198	errors	Alarm History	DAP-Xtra	All
218	errage	Alarm History time (hrs)	DAP-Xtra	All
258	version	DAP II software revision number	DAP-Xtra	All
259	tmbmair	Temperature setpoint	DAP-Xtra	DAP049,048,046
260	tmbhum	Humidity setpoint	DAP-Xtra	DAP049,048,046
261	tmbairdb	Temperature deadband	DAP-Xtra	DAP049,048,046
262	runtimes	runtimes array (in hrs)	DAP-Xtra	DAP049,048,046
314	bitErrors		DAP-Xtra	DAP049,048,046
474	adj_rate	Adjustment rate	DAP Menu	DAP049,048,046
478	alrm_delay_1	optional alarm 1 delay setting	DAP Menu	DAP049,048,046
479	alrm_delay_2	optional alarm 2 delay setting	DAP Menu	DAP049,048,046
480	alrm_delay_3	optional alarm 3 delay setting	DAP Menu	DAP049,048,046
481	alrm_enable_1	Enable optional alarm 1 for alarm relay	DAP Menu	DAP049,048,046

FieldServer Array Location	FieldServer Data Field	Point Description	Message Type	D/A Control Panel Type
482	alrm_enable_2	Enable optional alarm 2 for alarm relay	DAP Menu	DAP049,048,046
483	alrm_enable_3	Enable optional alarm 3 for alarm relay	DAP Menu	DAP049,048,046
484	alrm_select_1	Select alarm message for Optional alarm input 1	DAP Menu	DAP049,048,046
485	alrm_select_2	Select alarm message for Optional alarm input 2	DAP Menu	DAP049,048,046
486	alrm_select_3	Select alarm message for Optional alarm input 3	DAP Menu	DAP049,048,046
487	Chilled_water	Chilled water Valve configuration	DAP Menu	DAP049,048,046
488	Compressor_config	Compressor configuration	DAP Menu	DAP049,048,046
489	c_mode	Unit in Centigrade temperature mode?	DAP Menu	DAP049,048,046
490	fire_lim	Firestat temperature setting	DAP Menu	DAP049,048,046
491	heat_strip_config	Heating configuration	DAP Menu	DAP049,048,046
492	hi_cal	A to D high limit setting	DAP Menu	DAP049,048,046
493	hi_h_limit	High humidity alarm limit setting	DAP Menu	DAP049,048,046
494	hi_t_lim	High temperature alarm limit setting	DAP Menu	DAP049,048,046
495	humid_config	Humidifer configuration	DAP Menu	DAP049,048,046
496	h_calib	Humidity calibration offset	DAP Menu	DAP049,048,046
497	lead_lag	Compressor lead/lag setting	DAP Menu	DAP049,048,046
498	loc_h_ddband	humidity deadband setting	DAP Menu	DAP049,048,046
499	loc_h_setpt	Humidity setpoint	DAP Menu	DAP049,048,046
500	loc_t_dband	Temperature deadband setting	DAP Menu	DAP049,048,046
501	loc_t_setpt	Temperature setpoint	DAP Menu	DAP049,048,046
502	lo_cal	A to D low limit setting	DAP Menu	DAP049,048,046
503	lo_h_lim	Low humidity alarm limit setting	DAP Menu	DAP049,048,046
504	lo_t_lim	Low temperature alarm limit setting	DAP Menu	DAP049,048,046
505	main_int	Maintenance schedule setting	DAP Menu	DAP049,048,046
506	passwd_a	Password A setting	DAP Menu	DAP049,048,046
507	passwd_b	Password B setting	DAP Menu	DAP049,048,046
508	rst_mode	Restart mode setting	DAP Menu	DAP049,048,046
509	s_delay	Start delay setting (in seconds)	DAP Menu	DAP049,048,046

FieldServer Array Location	FieldServer Data Field	Point Description	Message Type	D/A Control Panel Type
510	t_calib	Temperature calibration offset	DAP Menu	DAP049,048,046
511	voice	Audible alarm tone setting	DAP Menu	DAP049,048,046
512	vvrg	Chilled water output voltage setting	DAP Menu	DAP049,048,046
513	cat1	Alarm relay #1 category selection	DAP Menu	DAP 046
514	cat2	Alarm relay #2 category selection	DAP Menu	DAP 046
515	cat3	Alarm relay #3 category selection	DAP Menu	DAP 046
516	d_calib	Discharge Air sensor calibration offset	DAP Menu	DAP 046
517	lo_d_lim	Low Discharge temperature limit setting	DAP Menu	DAP 046
518	ptc	Person to contact on alarm message	DAP Menu	DAP 046
All the points of Chiller Panel are omitted from this list as they have not been made available to FieldServer.				
899	adj_rate	Adjustment rate setting	DAP80 Menu	DAP80
900	alrm_delay_1	optional alarm 1 delay setting	DAP80 Menu	DAP80
901	alrm_delay_2	optional alarm 2 delay setting	DAP80 Menu	DAP80
902	alrm_delay_3	optional alarm 3 delay setting	DAP80 Menu	DAP80
903	alrm_delay_4	optional alarm 4 delay setting	DAP80 Menu	DAP80
904	alrm_select_1	Select alarm message for Optional alarm input 1	DAP80 Menu	DAP80
905	alrm_select_2	Select alarm message for Optional alarm input 2	DAP80 Menu	DAP80
906	alrm_select_3	Select alarm message for Optional alarm input 3	DAP80 Menu	DAP80
907	alrm_select_4	Select alarm message for Optional alarm input 4	DAP80 Menu	DAP80
908	ant_enable	Humidity anticipation setting (on/off)	DAP80 Menu	DAP80
909	autoflush_time	Autoflush timer setting	DAP80 Menu	DAP80
910	auto_ack	Automatic self-test acknowledge	DAP80 Menu	DAP80
911	Comp_config	Compressor configuration	DAP80 Menu	DAP80

FieldServer Array Location	FieldServer Data Field	Point Description	Message Type	D/A Control Panel Type
912	control_type	Control type setting	DAP80 Menu	DAP80
913	c_mode	display temperature mode (F or C degree)	DAP80 Menu	DAP80
914	DA_volts	Water Valve voltage range setting	DAP80 Menu	DAP80
915	dehum_on	Dehumidification mode selection	DAP80 Menu	DAP80
916	d_calib	Discharge Air sensor calibration offset	DAP80 Menu	DAP80
917	esaver_supp_comp	Energy saver supplement mode setting	DAP80 Menu	DAP80
918	fire_lim	Firestat temperature limit setting	DAP80 Menu	DAP80
919	heater_config	Heating configuration	DAP80 Menu	DAP80
920	hi_h_lim	High humidity alarm limit setting	DAP80 Menu	DAP80
921	hi_t_lim	High temperature alarm limit setting	DAP80 Menu	DAP80
922	humid_config	Humidifier configuration	DAP80 Menu	DAP80
923	h_calib	Humidity calibration offset	DAP80 Menu	DAP80
924	h_dband	humidity deadband setting	DAP80 Menu	DAP80
925	lead_lag	Compressor lead/lag setting	DAP80 Menu	DAP80
926	lo_d_lim	Low Discharge temperature limit setting	DAP80 Menu	DAP80
927	lo_h_lim	Low humidity alarm limit setting	DAP80 Menu	DAP80
928	lo_t_lim	Low temperature alarm limit setting	DAP80 Menu	DAP80
929	main_int	Maintenance schedule setting	DAP80 Menu	DAP80
930	network_id	set unit Network ID	DAP80 Menu	DAP80
931	nom_h_setpt	Humidity setpoint	DAP80 Menu	DAP80
932	password	password	DAP80 Menu	DAP80
933	ptc	Person to contact on alarm message	DAP80 Menu	DAP80
934	relay_1_mask_0	selection for alarm contact	DAP80 Menu	DAP80
950	relay_1_mask_1	selection for alarm contact	DAP80 Menu	DAP80
966	relay_1_mask_2	selection for alarm contact	DAP80 Menu	DAP80
982	relay_2_mask_0	selection for alarm contact	DAP80 Menu	DAP80
998	relay_2_mask_1	selection for alarm contact	DAP80 Menu	DAP80
1014	relay_2_mask_2	selection for alarm contact	DAP80 Menu	DAP80

FieldServer Array Location	FieldServer Data Field	Point Description	Message Type	D/A Control Panel Type
1030	relay_3_mask_0	selection for alarm contact	DAP80 Menu	DAP80
1046	relay_3_mask_1	selection for alarm contact	DAP80 Menu	DAP80
1062	relay_3_mask_2	selection for alarm contact	DAP80 Menu	DAP80
1078	reverse_valve	Chilled water direction setting	DAP80 Menu	DAP80
1079	rst_mode	Restart mode setting	DAP80 Menu	DAP80
1080	sc_alarms	Compressor short cycle setting	DAP80 Menu	DAP80
1081	s_delay	Start delay setting (in seconds)	DAP80 Menu	DAP80
1082	t_calib	Temperature calibration offset	DAP80 Menu	DAP80
1083	t_dband	Temperature deadband setting	DAP80 Menu	DAP80
1084	t_setpt	Temperature setpoint	DAP80 Menu	DAP80
1085	Valve_config	Chilled water Valve configuration	DAP80 Menu	DAP80
1086	voice	Audible alarm tone setting	DAP80 Menu	DAP80
1100	sensor_1_name	Optional Analog sensor 1 name	DAP80 Menu	DAP80 W/analog
1101	sensor_1_units	Optional Analog sensor 1 units	DAP80 Menu	DAP80 W/analog
1102	sensor_1_type	Optional Analog sensor 1 Type	DAP80 Menu	DAP80 W/analog
1103	sensor_1_min_val	Optional Analog sensor 1 minimum value	DAP80 Menu	DAP80 W/analog
1104	sensor_1_max_val	Optional Analog sensor 1 maximum value	DAP80 Menu	DAP80 W/analog
1105	sensor_1_cal	Optional Analog sensor 1 calibration offset	DAP80 Menu	DAP80 W/analog
1106	sensor_2_name	Optional Analog sensor 2 name	DAP80 Menu	DAP80 W/analog
1107	sensor_2_units	Optional Analog sensor 2 units	DAP80 Menu	DAP80 W/analog
1108	sensor_2_type	Optional Analog sensor 2 Type	DAP80 Menu	DAP80 W/analog
1109	sensor_2_min_val	Optional Analog sensor 2 minimum value	DAP80 Menu	DAP80 W/analog
1110	sensor_2_max_val	Optional Analog sensor 2 maximum value	DAP80 Menu	DAP80 W/analog
1111	sensor_2_cal	Optional Analog sensor 2 calibration offset	DAP80 Menu	DAP80 W/analog
1112	sensor_1_input	sensor 1 input	DAP80 Menu	DAP80 W/analog
1113	sensor_2_input	sensor 2 input	DAP80 Menu	DAP80 W/analog
1114	sensor_3_input	sensor 3 input	DAP80 Menu	DAP80 W/analog

Note 1:mode:2' bit definitions:	
0X01	Unit is in centigrade mode
0X02	RFU , always 1
0X04	RFU , always 1
0X08	Unit is dehumidifying
0X10	Unit is humidifying
0X20	Energy save is active
0X40	not used
0X80	not used
Note 2:hold:2' bit definitions:	
0X01	needed cooling is inhibited
0X02	needed heatingg is inhibited
0X04	needed humidification is inhibited
0X08	needed dehumidification is inhibited
0X10	not used
0X20	not used
0X40	Network"standby" inhibit is active
0X80	Network"off" inhibit is active

Note 3:errors:7*2' bit definitions		
00	Manual override:check bypass switches	errors[0], bit 0x01
01	water detected under floor	errors[0], bit 0x02
02	No air flow, check belt and motor	errors[0], bit 0x04
03	dirty filter: check filter	errors[0], bit 0x08
04	Humidifier problem: check water pressure	errors[0], bit 0x10
05	Low voltage warning	errors[0], bit 0x20
06	Firestat alarm, unit shutdown	errors[0], bit 0x40
07	compressor short cycle	errors[0], bit 0x80
08	power problem or unit restart	errors[1], bit 0x01
09	humidity sensor problem	errors[1], bit 0x02
10	temperature sensor problem	errors[1], bit 0x04
11	schedule maintenance due	errors[1], bit 0x08
12	high presure C1: manual reset	errors[1], bit 0x10
13	low presure C1: auto reset	errors[1], bit 0x20
14	high presure C2: manual reset	errors[1], bit 0x40
15	low presure C2: auto reset	errors[1], bit 0x80
16	smoke detector: unit shutdown	errors[2], bit 0x01
17	No water flow :check pump	errors[2], bit 0x02
18	Discharge temperature sensor problem	errors[2], bit 0x04
19	High Temperature warning	errors[2], bit 0x08
20	Low temperature warning	errors[2], bit 0x10
21	High humidity warning	errors[2], bit 0x20
22	low humidity warning	errors[2], bit 0x40
23	Fan motor overload: check motor amperage	errors[2], bit 0x80
24	Local alarm 1: see tag inside door	errors[3], bit 0x01
25	Local alarm 2: see tag inside door	errors[3], bit 0x02
26	Local alarm 3: see tag inside door	errors[3], bit 0x04
27	Local alarm 4: see tag inside door	errors[3], bit 0x08
28	Standby Pump on: check primary pump	errors[3], bit 0x10
29	UPS power on: check primary power	errors[3], bit 0x20
30	Custom message on optional input 1	errors[3], bit 0x40
31	Custom message on optional input 2	errors[3], bit 0x80
32	Custom message on optional input 3	errors[4], bit 0x01
33	Custom message on optional input 4	errors[4], bit 0x02
34	Humidification inhibited	errors[4], bit 0x04
35	Reheat inhibited	errors[4], bit 0x08
36	Reheat and humidification inhibited	errors[4], bit 0x10
37	Discharge air temperature limit	errors[4], bit 0x20
38	Reheat mode during dehumidication	errors[4], bit 0x40
39	Manual override:check bypass switches	errors[4], bit 0x80
40	High condensate water level	errors[5], bit 0x01

4.4.7. Unit Types

When the driver reads everything from a device it must first obtain the device's unit type so that it can determine what other data is available. Once the unit type is obtained then the driver updates the 'Unit-Type' field visible on the node screen of the RUIDebug program. The unit type is also available in the Data Array defined in Table 1.

Table 3: Unit Types Defined by the Driver

Unit Type	Numeric Unit Type	Description
"-"	0	Unknown/unavailable/un-initialized
"1"	1	044 data logger
"2"	2	046 expanded DAP
"3"	3	046 2 mod chiller
"4'	4	046 3 mod chiller
"5"	5	048 DAP, 80-character display
"6"	6	049 DAP, 16-character display
"7"	7	080 DAP II, no relay expansion
"8"	8	080 Chiller II
"9"	9	080 DAP II, with relay expansion
"10"	10	Not Defined
"11"	11	Not Defined
"12"	12	Not Defined
"13"	13	Not Defined
"E"	14	080 DAP II, with analog module
"F"	15	080 DAP II, with relay and analog

4.4.8. Map Descriptor: Example 3 – Writing a Set-Point.

A DataAire device cannot be written to until it has been read. This is a limitation of the DataAire protocol. This means that you configuration cannot consist only of wrbc Map Descriptors. It should consist of a at least a Map Descriptor like example 1for every unit that you wish to write to.

```
Map_Descriptor_Name,  Data_Array_Name,  Data_Array_Offset,  Function,  node_name,  Address,  Length,  DA_Field,      Scan_Interval
Write_SP_01        ,  DA_SETPOINTS   ,  0                  ,  wrbc    ,  unit1    ,  0       ,  1       ,  nom_h_setpt,  120.0s
```

The setpoint is obtained from this Data Array.

Always leave the address set to zero and the length as one.

Specify the data field you wish to write.

Pick from table 4.5.1. Ensure that the keyword can be written to the unit type identified as unit1.

Example. If unit1 is a Chiller then the above Map Descriptor will not function correctly as it can only be used to write to unit types 7,9,14,15.

This is how often the data will be written to the device.

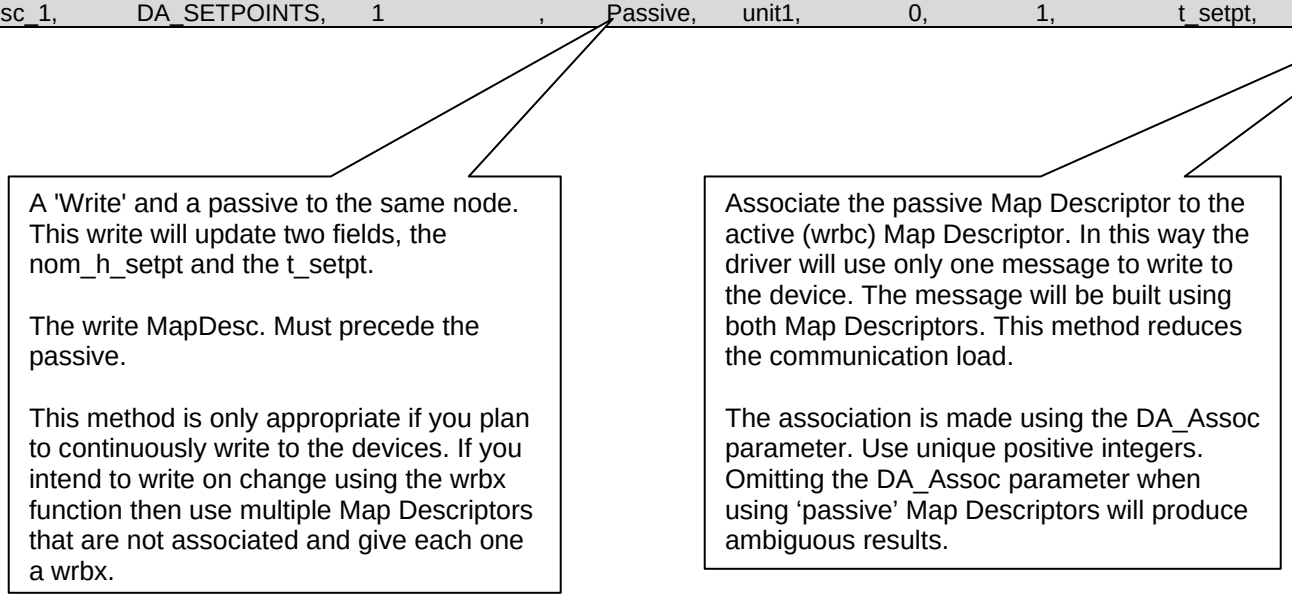
Slow the scan interval down. The dart will only take control of the devices when the network has been idle for at least 50 seconds. If you generate polls too often then the dart will never exercise control.

Recommendation

Use wrbx instead of wrbc. This causes the driver to generate the command message only when the setpoint changes which in turn minimizes communications. Using this method the DART's control mode is interrupted the least.

4.4.9. Map Descriptor: Example 4 – Writing multiple points using one message.

Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	node_name,	Address	Length	DA_Field	DA_Assoc	Scan_Interval
Write_MapDesc_1,	DA_ SETPOINTS,	0 ,	Wrbc,	Unit1,	0,	1,	nom_h_setpt,	2,	120.0s
Write_MapDesc_1,	DA_SETPOINTS,	1 ,	Passive,	unit1,	0,	1,	t_setpt,	2,	120.0s



Appendix 1. Advanced Topics

Appendix 1.1. Additional Driver Specific Map Descriptor Parameters

The driver offers advanced configuration by adding to and extending the Map Descriptors specific to the DART Serial Driver.

Column Title	Function	Legal Values
DA_Func*	Specifies the DataAire Command/Query function to be used. Use a function appropriate to the type of slave (DAP/Chiller/DAP80) and the type of data required.	Numeric/Text. – see Table 1
DA_Field*	Specifies the data field to be retrieved from the slave device. Slaves are only capable of responding with a data composite consisting of many data fields. This parameter specifies the parameters to extract from the data composite. Note[1].	Text –See Table 1 and Table 5
DA_Assoc*	Use to associate passive Map Descriptors with an active Map Descriptor. In some cases you may have a read (rdbc) addressing the same node as a write (wrbc). Both the read and write may have associated Map Descriptors. This field is used to make the association. Give the rdbc & passive Map Descriptors associated with the rdbc the same value (any number) and give the wrbc and its passive Map Descriptors another value for DA_Assoc.	Any positive integer.
Da_Freq	This parameter is obsolete. It was required in versions of the driver prior to 1.07f.	Read notes in Appendix 3.10
DA_Method$^{\Psi}$	Specifies the extraction method. Such as Hex-ASCII to decimal number in 10's of a degree,	
DA_Bytcnt$^{\Psi}$	Specifies the number of bytes that are to be processed by the method specified above. For method #6 which processes an array of elements the DA_Bytcnt specifies the number of bytes that constitute each element of the array.	>= 1
DA_Offset$^{\Psi}$	An offset into the data composite that is returned when the slave is polled. The offset is the number of bytes from the first data byte.	0 to the length of the data composite. No validation is performed.
DA_Elecnt$^{\Psi}$	Number of elements that are produced by the extraction method.	>= 1

$^{\Psi}$ These parameters are only required for custom data extractions not provided for with DA_Field parameter.

The driver supports a limited subset of the DART Poll & Response Functions. The selection of the sub-set is based on the identification of useful & practical functions.

In addition to the 'Everything' keyword indicated in Chapter 4, the following specific query functions are implemented.

Table 4: DA_Func Parameter – Permitted values

Func.	Description	Driver Parameter	Protocol Id.
'1'	DART Config Query	DA_Func = dart-config	49
'2'	Dart Psswd Query	DA_Func = dart-password	50
'3'	DAP Config Command	DA_Func = dap-config	51
'4'	DAP Log Query	DA_Func = dap-log	52
'5'	DAP Unit-Type Query	DA_Func = dap-unit	53
'6'	DAP Stat Query	DA_Func = dap-stat	54
'7'	DAP Xtra Query	DA_Func = dap-xtra	55
'8'	DAP Menu Query	DA_Func = dap-menu	56
'A'	Chiller Stat Query	DA_Func = chiller-stat	65
'B'	Chiller Xtra Query	DA_Func = chiller-xtra	66
'C'	Chiller Menu Query	DA_Func = chiller-menu	67
'D'	Dart Status	DA_Func = dart-status	68
'E'	DAP80 Menu Query	DA_Func = dap80-menu	69
'G'	DAP Analog Query	DA_Func = dap80-analog	71
'H'	DAP Channels Query	DA_Func = dap80_channles	72

Each of the above queries returns a complex set of data consisting of many sub-fields. Contact Data-Aire for a complete listing of the data composite returned.

The following special / diagnostic functions are also implemented.

Driver Parameter	Protocol Id.
DA_Func = All-Listen	11
DA_Func = Ack	6
DA_Func = Dart-Transparant	2
DA_Func = Dart-Opaque	3
DA_Func = Test-Echo	16
DA_Func = Test-No-Echo	15
DA_Func = Unit-Talk	13

With the exception of the Unit-Talk command, these are nodeless commands.

When using any of these special commands no other DA_* fields need be specified.

The operation of these functions is as follows:

- All-Listen instructs all units in the network to switch their relays to the listen position. Those units already in the listen position will do nothing. Those in the talk position will first echo the all-listen command and then switch their relays to the listen position. A pause of 0.15 seconds is required after the transmission of this command to allow time for the units to switch their mechanical relays.

Table 5: DA_Field_Parameter - Permitted values.

Legal values depend on the value of DA_Func.
The whole data record returned by the slave is stored in the Data Array byte for byte.
The number of bytes written is dependent on the DA_Func.

DA_Func	Bytes
DA_Func=dart-password	231
DA_Func=dart-config	41
DA_Func=dap-config	4
DA_Func=dap-log	240
DA_Func=dap-unit	1
DA_Func=dap-stat	68
DA_Func=dap-xtra	124
DA_Func=dap-menu	103
DA_Func=chiller-stat	54
DA_Func=chiller-xtra	104
DA_Func=chiller-menu	89
DA_Func=dap80-menu	138
DA_Func=dart-status	9
DA_Func=dap80-analog	36
DA_Func=dap80-channels	12
Special	Indicates that a user defined extraction is specified in the Map Descriptor. When this value is specified as the DA_Field value then DA_Method,DA_Bytcnt,DA_Offset,DA_Elecnt must also be specfied.

See Table 1 for all other keywords.

DA_Method Parameter Values and Notes

The DA_Method specifies a method for interpreting a range of bytes when the DA_Field=special.

Method 1:
Each byte is valid when it contains only one of the following ASCII characters.

{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F}

Each byte being parsed is considered to be a hexadecimal digit. The most significant digit is the left most byte.

Thus the four bytes
30 31 32 33 (hex) are interpreted by regarding the ASCII value of each byte as a hexadecimal digit. Thus we interpret the 4 bytes as the hexadecimal number 0123 and the decimal value is equal to 291.

Method 2
This method is the same as method one but is used for humidity's and temperatures which are transmitted as the number of tenths of a unit.

Therefore, using the example from method 1. The 4 bytes yield the decimal number 29.1 °F/%.

Method 3
Each byte is regarded as containing a hexadecimal digit in ASCII format.

Example: incoming byte contains 41(hex). -> regard as the hexadecimal digit 'A' in ASCII format.

The method then converts the hex digit to a series of 8 bits. In this example the bits are 00001010 with the msb being the left most.

Method 4
Each byte is regarded as containing a hexadecimal digit in ASCII format.

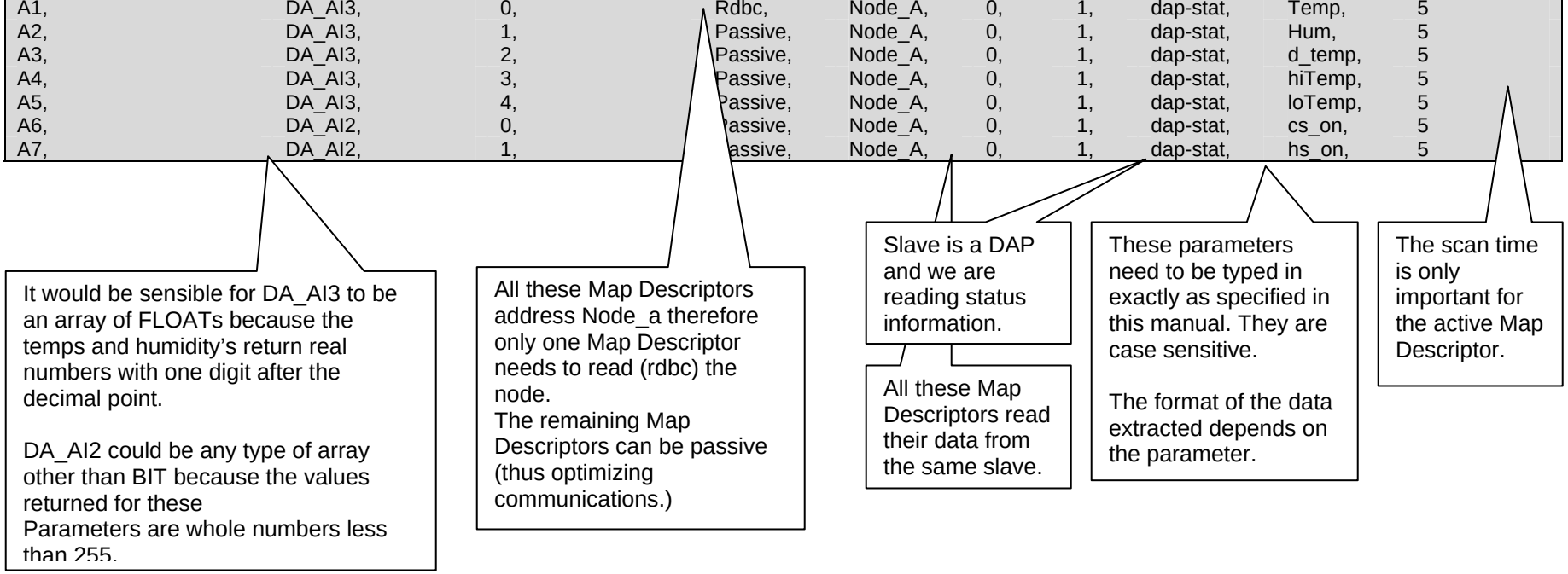
Example: incoming byte contains 41(hex). -> regard as the hexadecimal digit 'A' in ASCII format. The decimal value of this digit is written to the Data Array. In this example the number 10 would be written to the Data Array.

Method 5
There is no translation. The raw bytes are written to the Data Array.

Method 6
Processes an array of elements using method 1 translation. The raw data being parsed is considered to consist of DA_elecnt elements each consisting of DA_bytecnt bytes. Method 1 is applied to each cluster of bytes.

Advanced Map Descriptor Example 1:

Map_Descriptor_Name	Data_Array_Name	Data_Array_Offset	Function	node_name	Address	Length	DA_Func	DA_Field	Scan_Interval
A1,	DA_AI3,	0,	Rdbc,	Node_A,	0,	1,	dap-stat,	Temp,	5
A2,	DA_AI3,	1,	Passive,	Node_A,	0,	1,	dap-stat,	Hum,	5
A3,	DA_AI3,	2,	Passive,	Node_A,	0,	1,	dap-stat,	d_temp,	5
A4,	DA_AI3,	3,	Passive,	Node_A,	0,	1,	dap-stat,	hiTemp,	5
A5,	DA_AI3,	4,	Passive,	Node_A,	0,	1,	dap-stat,	loTemp,	5
A6,	DA_AI2,	0,	Passive,	Node_A,	0,	1,	dap-stat,	cs_on,	5
A7,	DA_AI2,	1,	Passive,	Node_A,	0,	1,	dap-stat,	hs_on,	5



Advanced Map Descriptor Example 2

The DAP-II Status query returns 14 bytes of errors & status information. The arrangement and meaning of these bytes is defined by the DataAire Corporation and is also dependent on the type of DAPII module being polled.

Map_Descriptor_Name	Data_Array_Name	Data_Array_Offset	Function	node_name	Address	Length	DA_Func	DA_Field	Scan_Interval
A1	DA_AI1	0,	Rdbc,	Node_A,	0,	1,	dap-stat,	Errors,	5
A2	DA_DI1	1,	Passive,	Node_A,	0,	1,	dap-stat,	bitErrors,	5

The 'errors' key word returns 14 bytes, thus we DA_AI1 should be a BYTE array. Each byte will have values 0-15 to represent the value of the bits in each byte.

The bitErrors extracts the same data from the DAP but presents it as a series of 14x8 bits. Thus make DA_DI1 a BIT array

Slave is a DAP and we are reading status information.

Data arrangement and meaning of each error is defined by Data Aire Corp.

Example: Bit 24 is a LOW TEMP WARNING for DAPII-044/8/9 units; Bit 09 is a HUMIDITY SENSOR PROBLEM for a DAPII-080 unit.

BitErrors is a synonym for errors. The data is extracted using a different data format.

Advanced Map Descriptor: Example 3 - Using the 'special' parameter.

Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	Node_Name	Addres,,s	Length,	DA_Func,	DA_Field,	DA_Method,	DA_Bytcnt,	DA_Offset,	DA_Elecnt,	Scan_Interval
A1,	DA_AI3,	0,	Rdbc,	Node_A,	0,	1,	dap-stat,	Special,	1,	4,	10,	1,	5

It would be sensible for DA_AI3 to be an array of FLOATs because extraction method(=1) returns a floating point number.

You can use specials as rdbc and passive Map Descriptors.

Performs a DAP status query

Once you use the parameter 'special' you must specify the additional parameters.

See Table 1 for descriptions on how these extraction methods work.

From the data bytes returned by the slave, extract 4 bytes starting at byte 10 and apply method 1 to convert the bytes before writing them to the FieldServer Data Array.

Advanced Map Descriptor Example 4: - Using the 'DA_Assoc' parameter.

Map_Descriptor_Name,	Data_Array_Name,	Data_Array_Offset,	Function,	node_name,	Address,	Length,	DA_Func,	DA_Field,	DA_Assoc,	Scan_Interval
A1,	DA_AI3,	0,	Rdbc,	Node_A,	0,	1,	dap80-menu,	All,	1,	5
A2,	DA_AI3,	1,	Passive,	Node_A,	0,	1,	dap80-menu,	alrm_delay_1,	1,	5
A3,	DA_AI3,	2,	Passive,	Node_A,	0,	1,	dap80-menu,	alrm_delay_2,	1,	5
A4,	DA_AI3,	3,	Passive,	Node_A,	0,	1,	dap80-menu,	airm_delay_3,	1,	5
A8,	DA_AI4,	0,	Wrbc,	Node_A,	0,	1,	dap80-menu,	nom_h_setpt,	2,	5
A9,	DA_AI4,	1,	Passive,	Node_A,	0,	1,	dap80-menu,	t_setpt,	2,	5

A 'Read' and some passive Map Descriptors to extract other data fields from the same read. (optimizes communications)

Read must precede the passive's.

A 'Write' and a passive to the same node. This write will update two fields, the nom_h_setpt and the t_setpt.

The write map desc. Must precede the passive.

Potential confusion for the FieldServer because the node and the DA_Func's are the same for all the Map Descriptors.

Solve this problem using DA_Assoc.

DA_Assoc associates the passives with the correct active Map Descriptor.

Thus Map Descriptors A2,3,4 are associated with A1 because the value of DA_Assoc is 1 for all these Map Descriptors; Map Descriptor A9 is associated with A8 because the value of DA_Assoc is 2 for both these Map Descriptors.

Map Descriptor: Example 5 - Using a special / diagnostic command.

Map_Descriptor_Name,	Scan_Interval,	Data_Array_Name,	Data_Array_Offset,	Function,	node_name,	Address,	Length,	DA_Func
A1,	1.0s,	UNUSED_ARRAY,	0,	Wrb,	No_node,	0,	1,	All-Listen

A Data Array must be associated with the Map Descriptor even though it will not be used. It may be any data type.

This command is sent only once. If you need to do this periodically then change to a wrbc.

Must connect this Map Descriptor to a node whose node_id is zero. For example.

Nodes
Node_Name, Node_ID, Protocol, Port
Unit1, 0, Daire, R1

This is a special / dianostic command. It causes a one byte message to be sent.

Appendix 2. Related Documents

The driver as specified in this manual is based on DataAire Poll and Response Protocol Revision 3.2 dated 4 Nov 1997.

The driver is compliant with a later release of the specification Revision 3.7 - 21 JUN 00.

Appendix 3. Troubleshooting Tips

Appendix 3.1. Bad Values

In the event that the driver cannot correctly decode the raw bytes it will generally write a value which indicates bad data. In most cases the indicating value is -1 or 65535 (depending on data type). When setting bits for status fields the driver will not write new data to the array if the incoming byte is invalid. Look in the error log for indication of this type of problem.

Example: Valid ASCII digits are 0...9, A...F. If a byte is being parsed and a hex digit is expected but not found, then the driver considers this an error and writes the bad value indication OR produces an error message when the bad value indication cannot be used.

Appendix 3.2. Dead Nodes

When a node is absent or dies it is possible that the Dart may go idle and stop communicating with all other nodes. This problem is not related to the driver but to the DataAire devices.

Appendix 3.3. Ignored Messages

The driver reports ignored messages. These are messages sent by a DAP/DART for which the driver cannot find a Map Descriptor to store the message. This does not mean the driver is not working. It means that a message which contains data that the driver/you are not interested in is being discarded.

The current version of the driver ignores a few messages relating to the status of the DART device. Later versions of the driver will be capable of storing these messages and the number of ignored messages will decrease.

Appendix 3.4. Driver Error Messages

Message marked with a * are printed once and then suppressed. The reason for this is to ensure that they do not fill the error log and thus obscure other important messages.

Message	Description
Dart:#1 FYI. The MapDesc called <%s> is too short.	The Map Descriptor used to expose driver stats must be 500 elements long. Change the length parameter and ensure that the Data Array is long enough too. Edit the CSV file and reset the FieldServer for the changes to take effect.
Dart:#2 FYI. You could have used a MapDesc called <%s> to expose diagnostic info.	You may safely ignore this message. If is for your information only. The driver is capable of exposing performance and communication statistics. See Appendix 3.7 for more information.
Dart:#3 Err. Method3 requires even number of bytes. nb= %d Md= <%s>	There is no corrective action you can take. If the message only gets printed once then ignore it. The contents of a message may have been corrupted. If the error is printed more than once
Dart:#4 Err. Method1 is translating invalid bytes. ch= %d(dec) %d(dec)	

Message	Description
Dart:#4 Err. Method2 is translating invalid bytes. ch= %d(dec) %d(dec)	then take a log, ensuring that one of these messages gets printed during the period that the log is running. Then request Technical Support. Read the notes above.
Dart:#4 Err. Method3 is translating invalid bytes. ch1= %d(dec) %d(dec)	
Dart:#5 Err. Method3 is translating invalid bytes. ch2= %d(dec) %d(dec)	
Dart:#6 Err. Invalid Station (Dec) %d-%d-%d	
Dart:#7 Err. Station= %d illegal - forcing to 1	This station number refers to the address of the DAP devices connected to the DART. Valid addresses are 1-260[∞].
Dart:#8 FYI. Config suitable for Dart Serial Port. Minimize polling or risk reducing Dart effectiveness	This message is printed for confirmation only. It confirms that the driver has been configured for use for connection to a DART and not for connection directly to a DAP device. No corrective action is required.
Dart:#10 Err. Invalid Station#(%d) . (1-260) MapDesc= <%s>	Valid node numbers are 1-260. The node numbers correspond to the addresses of the various DAP devices you have connected to the DART.[∞]
Dart:#11 Err. Invalid Daire function (%d) .MapDesc= <%s>	The value of the DA_Function parameter specified in the CSV file cannot be recognized by the driver. Read Appendix 1for more information.[∞]
Dart:#12 Err. Invalid Daire field (%d) .MapDesc= <%s>	The value of the DA_Field parameter specified in the CSV file cannot be recognized by the driver. Read Appendix 1for more information.[∞]
Dart:#13 Err. Invalid Daire method (%d) .MapDesc= <%s>	The value of the DA_Method parameter specified in the CSV file cannot be recognized by the driver. Read Appendix 1 for more information.[∞]
Dart:#14 Err. Map Desc. Cant understand function= %d <%s>	The value of the DA_Function parameter specified in the CSV file cannot be recognized by the driver. Read Appendix 1 for more information.[∞]
Dart:#15 Err. Map Desc. Cant understand id= %d <%s>	The value of the DA_Field parameter specified in the CSV file cannot be recognized by the driver. Read Appendix 1 for more information.[∞]
Dart:#16 Err. Unknown Response= %X(h)	These are variations of the same problem. A message has been received that cannot be recognized. If this error occurs repeatedly the make a log file and report the error to FST. You cannot take any corrective action. If the error occurs occasionally it may be indicating an
Dart:#17 Err. Unknown Query= %X(h)	
Dart:#18 Err. Unknown Command= %X(h)	

[∞] . Edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes

Message	Description
Dart:#19 Err. Unknown Msg Type= <%c>	occasional corrupt message and may be ignored.
Dart:#20 FYI. Writing before Unit Type is known.	If you see this message, report to FST immediately.
Dart:#21 Err. Cant write this function= %c. Md= <%s>	Only certain data is writable. See example 4.4.4for more information.[∞]
Dart:#22 FYI. Write abandoned. Md= <%s>. ch= %d j= %d off= %d dev= <%s>	It isn't possible to write to a DAP device before it has been read successfully. This message arises if the device has been read but some of the data contained in the read is invalid. The driver is preventing the invalid data being written back to the device. If this message only occurs once or twice after the FieldServer is restarted then you may safely ignore this message. If the message occurs repeatedly then make a log file and report the error to FST.
Dart:#23 FYI. Write abandoned. Read incomplete. Will retry. Md= <%s>	It isn't possible to write to a DAP device before it has been read successfully. If this message only occurs once or twice after the FieldServer is restarted then you may safely ignore this message. If the message occurs repeatedly then your configuration may need changing. Read this manual from section Appendix 3.6.
Dart:#23a FYI. Write abandoned. Read incomplete. Will retry. Md= <%s>	
Dart:#24 Err. Rev-Translate: Unknown Method.	Report this error to FST providing a copy of your CSV file.
Dart:#25 Err. Field= <%s> cannot be used for write. Mapdesc= <%s>	This error arises when (1) a Map Descriptor refers to a field that is not unique but the function has not been specified or (2) when you have specified a field that is not writable. See Appendix 1.1 for additional information. [∞] This error could also be produced if there are two (or more) write MapDesc's each having a different DA_Func but with the DA_Assoc values of each MapDesc set equal (or implied equal when not set in the csv file.) Edit the CSV file, Specify the DA_Assoc parameter for the write MapDesc's, ensuring that non-associated MapDesc's have different values for this parameter.
Dart:#26 Err. MapDesc= <%s> Read: param->daire_function= %c	You are trying to a read/write data from a DAP device and the driver cannot process the specified DA_Function for reading. Check your CSV file. The problem is resolved by correcting the configuration and resetting the FieldServer.

[∞] . Edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes

Message	Description
Dart:#27 Err. Cant write. function= %d Md= <%s>	You are trying to a read/write data from a DAP device and the driver cannot process the specified DA_Function for writing. Check your CSV file. The problem is resolved by correcting the configuration and resetting the FieldServer.
Dart:#28 Err. No MapDesc's !	Report this error to FST providing a copy of your CSV file.
Dart:#29 Err. Mapdesc= <%s> Special specified with invalid method.	Read Appendix 1 and review the CSV file. When you have corrected the CSV file reset the FieldServer for the changes to take effect.
Dart:#30 Err. mapdesc= <%s> Unknown translation Method= %d	
Dart:#31 Err. Can't translate map desc. Data not stored.	Make a log file and report the problem to FST providing a copy of your CSV file.
Dart:#32 Err. Driver does not support unit type='%c' (node= %d)	The driver found a device whose type is not supported. Remove this node from you CSV file and reset the FieldServer.
Dart:#33 Err. Conflicting unit types='%c' vs '%c' (node= %d)	The expected and discovered unit types are different. The driver will always work with the discovered unit type.
Dart:#35 Err. Cant write to a data logger MapDesc= <%s>	Correct the problem by removing the offending MD and reset the FieldServer for the change to take effect.
Dart:#36 FYI. Cant write until unit type is known. Will retry. Md= <%s>	This message is printed when you have specified a write with a DA_Field but no DA_Function. Under these circumstances the driver cannot write until it knows the Unit Type of the device. If you are polling using the 'Everything' function then the driver will obtain the unit type in time and the error will not be reproduced.
Dart:#37 Err. MapDesc= <%s> Cant write '%s' (%d:%d) to a unit= %d	The DA_Field and DA_Function type specified are not suitable for the Unit_Type found.
Dart:#38 FYI. Configured/Reported Unit Types dont match. Node= <%s>	This message may be safely ignored. If the discovered type is what you expect then edit the CSV file and reset the FieldServer.
Dart:#39 FYI. Poll Delay set to min of %.1f secs	There is a minimum amount of time that must pass between one active message and the next poll. This should be set on the connection. To avoid having this message printed again, edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.

Message	Description
*Dart:#40 FYI. Cant store Data(node= %d)	This message is printed when the driver attempts to store the contents of a message in its internal memory. The store failed because the node identified in the message cannot be found on the FieldServer. If the message only gets printed once then ignore it. The contents of a message may have been corrupted. If the error is printed more than once then take a log, ensuring that one of these messages gets printed during the period that the log is running. Then request Technical Support.
*Dart:#41 FYI. Ignored	A message was received but the driver could not find an appropriate place to store the data. This could occur if no Map Descriptor exists to store the relevant data. This could happen if the Dart, for example, echoed a message from a DAP unit #17 and no node #17 had been defined in the CSV file. You should check the configuration file to ensure that one node has been defined for each device connected to the DART. If necessary add new nodes and Map Descriptors to the CSV file, download the modified file and reset the FieldServer for the changes to have effect.
Dart:#41 FYI. Dart Version	This message is for your information only. If it corresponds with what you expect then ignore it. This driver is for use with a DART device is not suitable for direct connection to a DAP unit.
Dart:#42 FYI. Connection Timeout set to min of %.1f secs.	The timeout on the connection should be set in the configuration file. We recommend a minimum of 10 seconds and have adjusted the connection timeout accordingly. To avoid this message in future, edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.
Dart:#43 FYI. Node Timeout set to min of %.1f secs.	The timeout on the node should be set in the configuration file. We recommend a minimum of 10 seconds and have adjusted the node timeout accordingly. To avoid this message in future, edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.

Message	Description
Dart:#44 FYI. Mapdesc Timeout set to min of %.1f secs. MapDesc= <%s>	The timeout on the Map Descriptor should be set in the configuration file. We recommend a minimum of 10 seconds and have adjusted the Map Descriptor timeout accordingly. This message can also be avoided by setting the connection / node timeout – perhaps they have been configured with default values. To avoid this message in future, edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.
*Dart:#45 Warning. !!! Special Script time delays in effect. !!!	The driver is operating in simulation mode. If you see this message, call for Technical Support.
Dart:#46 Err. Chan idle detects invalid message	Before writing to a device the driver applies a sanity test to a couple of variables. Remember that the driver cannot write to a single variable but has to write to a whole block at a time. This is why the sanity test is applied. It is applied to the Temp Set point and Humidity Set point. The temperature is expected to be between 50 and 90 and the humidity should be between 20 and 90 %. If the message is only printed once then it may be safe to ignore it (based on the assumption that some invalid values were obtained from a corrupt message). However if it is printed more than once, taka log, ensuring the log is running while one of these messages is printed. You cannot correct this problem yourself and you must report it to Tech support.
*Dart:#47 FYI. Dart being set to %s.	This message is for your information only. If the time makes sense then ignore this message. If the time is invalid then you may need to set the time on the FieldServer, this can be done by using the RUINET utility application supplied with your FieldServer.
Dart:#47 Err. MapDesc=%s. No Node.	If this message is printed then contact tech Support and provide a copy of the configuration CSV file which produced the error.

Message	Description
Dart:#51 FYI. No Scan_Interval defined. Using default.	This message is printed when a Map Descriptor for a node which has not been configured as an intelli-dart does not have its Scan_Interval parameter set. This is unusual but may be the case with older configuration supplied before version 1.07f of this driver was released. You can ignore this message, a default scan intervals has been allocated but we recommend that you modify the CSV file to correct the issue permanently. To avoid this message in future, edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.
Dart:#48 FYI. Scan_Interval too short. Attempted to use DA_Freq	If the scan interval is too small, then the driver guessed that this was a configuration built before 1.07f of the driver when DA_Freq was still used as a parameter. It has attempted use the DA_Freq value as the scan interval but it could not find the value. You can ignore this message as the scan interval has been set to a minimum but to provide a permanent solution edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.
Dart:#49 Err. MapDesc=%s. DA_Freq too short. Read Manual	If the scan interval is too small, then the driver guessed that this was a configuration built before 1.07f of the driver when DA_Freq was still used as a parameter. It has attempted use the DA_Freq but found it was too small. To solve the problem, edit the configuration CSV file, remove references to DA_Freq and specify a Scan_Interval. Download the changed file and reset the FieldServer to give effect to the changes.
Dart:#50 FYI. MapDesc=%s. DA_Freq assigned to Scan_Interval. Read Manual.	If the scan interval is too small, then the driver guessed that this was a configuration built before 1.07f of the driver when DA_Freq was still used as a parameter. It has used the DA_Freq parameter to assign a Scan_Interval. You can ignore this message but to prevent it getting printed, edit the configuration CSV file, remove references to DA_Freq and specify a Scan_Interval. Download the changed file and reset the FieldServer to give effect to the changes.

Message	Description
Dart:#52 FYI. secondary_port has no meaning for this driver.	The secondary port has been configured. This is only necessary for the DAP driver which is used to connect a FieldServer to DAP device directly. No corrective action is required but to avoid having this message printed again, edit the configuration CSV file, download the changed file and reset the FieldServer to give effect to the changes.
Dart:#53 FYI. Diagnostic Poll Sent. Md= <%s>	This message can be safely ignored. It is printed when a special diagnostic poll is sent. These polls are configured in the CSV file and are normally only used during the resolution of a Support Incident.

Appendix 3.5. Driver Exposed Stats

The driver can expose its operating / error stats if you add the following section to your configuration CSV file.

```
//================================================================
////  Exposing Dart Driver Stats
////================================================================
//Nodes
Node_name,          Node_ID,        Protocol
Dart_Dummy,         1    ,          dart

Data_Arrays
Data_Array_Name,    Data_Format,    Data_Array_Length
DA_DART_STATS,      FLOAT,          1000

Map_Descriptors
Map_Descriptor_Name,  Data_Array_Name,  Function,  node_name,  Address,  Length
Dart-Stats,           DA_DART_STATS,    Passive,   Dart_Dummy,  1,        1000
```

A different set of stats are maintained for each port the driver is using. The table below describes the stats and provides the offset into the Data Array dependent on the port number.

Stat	Array Offset									Symbol	Description
	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8		
1	1	51	101	151	201	251	301	351	401	DRV_DLL_CLIENT_SENDS_MSG	Increments by 1 each time the DLL Layer sends a poll on behalf of the client side
2	2	52	102	152	202	252	302	352	402	DRV_DLL_CLIENT_SENDS_ACKNAK	Not Used
3	3	53	103	153	203	253	303	353	403	DRV_DLL_CLIENT_SENDS_BYTES	When the DLL Layer sends a message on behalf of a client, the stat increases by the number of bytes in that message
4	4	54	104	154	204	254	304	354	404	DRV_DLL_SERVER_SENDS_MSG	Increments by 1 each time the DLL Layer sends a poll on behalf of the server side
5	5	55	105	155	205	255	305	355	405	DRV_DLL_SERVER_SENDS_ACKNAK	Not Used
6	6	56	106	156	206	256	306	356	406	DRV_DLL_SERVER_SENDS_BYTES	When the DLL Layer sends a message on behalf of the sever, the stat increases by the number of bytes in that message
7	7	57	107	157	207	257	307	357	407	DRV_DLL_CLIENT_RCVS_MSG	When the DLL layer receives a message whose origin was a client the stat increases by 1
8	8	58	108	158	208	258	308	358	408	DRV_DLL_CLIENT_RCVS_BYTES	When the DLL layer receives a message whose origin was a client the stat increases by the number of bytes in the message
9	9	59	109	159	209	259	309	359	409	DRV_DLL_SERVER_RCVS_MSG	When the DLL layer receives a message whose origin was a server/panel the stat increases by 1
10	10	60	110	160	210	260	310	360	410	DRV_DLL_SERVER_RCVS_BYTES	When the DLL layer receives a message whose origin was a server/panel the stat increases by 1

Stat	Array Offset									Symbol	Description
	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8		
11	11	61	111	161	211	261	311	361	411	DRV_DLL_TIMEOUT	When the DLL Layer times out waiting for a response the stat increases by 1, Look at stat 13 for info
12	12	62	112	162	212	262	312	362	412	DRV_DLL_ERROR	When the DLL Layer encounters an error (including a timeout) the stat increases by 1, the error source is found in stat 13
13	13	63	113	163	213	263	313	363	413	DRV_DLL_ERROR_CODE	When the DLL Layer encounters an error (including a timeout) it stores a code here to indicate the error cause,. Gets overwritten.
14	14	64	114	164	214	264	314	364	414	DART_STAT_FAILED_CHECKSUM	When the DLL Layer rejects a message because the checksum failed this stat increases by 1
15	15	65	115	165	215	265	315	365	415	DART_STAT_FAILED_FUNCTION	When the DLL Layer rejects a message because the checksum failed this stat increases by 1
16	16	66	116	166	216	266	316	366	416	DART_STAT_FAILED_NOSTART	Not used. Previously, when a message was rejected because it did not begin 0x01 this stat was increased by 1
17	17	67	117	167	217	267	317	367	417	DART_STAT_FAILED_PROTOCOL	When the DLL Layer rejects a message other than for one of the above reasons, this stat increases by 1
18	18	68	118	168	218	268	318	368	418	DART_STAT_FAILED_IC_TIMEOUT	When the DLL detects an Inter Character Timeout this stat increases by 1
19	19	69	119	169	219	269	319	369	419	DART_STAT_NOISE_BYTE_COUNT	The DLL Layer removes invalid bytes from the middle of messages assuming they are noise. This stat increases by 1 for each byte removed.
20	20	70	120	170	220	270	320	370	420	DART_STAT_NOISE_BYTE_VALUE	The most recent invalid byte to be removed from the middle of a message has its ASCII value stored here.

Stat	Array Offset									Symbol	Description
	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8		
21	21	71	121	171	221	271	321	371	421	DART_STAT_BUFFER_OVERFLOW	When the DLL Layer receive buffer overflows, this stat increases by 1. Usually the whole buffer is discarded when this happens
22	22	72	122	172	222	272	322	372	422	DART_SPECIAL_COMMAND_COUNT	If the DLL layer receives a special control message this stat increases by 1. These messages included the all-listen, echo ...
23	23	73	123	173	223	273	323	373	423	DART_SPECIAL_COMMAND_CODE	When the DLL layer receives one of the special control messages (above) the message type is stored at this stat location. Gets overwritten
24	24	74	124	174	224	274	324	374	424	DART_MSG_IGNORED_NO_SUITABLE_MAPDESCS	When a message is received but the driver cannot find a suitable MD to use to store the information this stat increases by 1. The message type is stored in stat 31 which gets overwritten.
25	25	75	125	175	225	275	325	375	425	DART_FAILED_PARSE	Each time the DLL message parser cannot parse a message successfully this stat increase by 1. Reasons might be stat 14,15,16,17
26	26	76	126	176	226	276	326	376	426	DART_CANT_WRITE1	A write has been abandoned because part of the write block buffer has been found to have non-alpha/digit bytes.
27	27	77	127	177	227	277	327	377	427	DART_CANT_WRITE2	Similar to 26 but entire buffer is empty. Perhaps a read has not been done yet.
28	28	78	128	178	228	278	328	378	428	DART_MSG_IGNORED_NOT_USEFUL	Increases by 1 each time a message is processed which the driver does not find useful such as the dart config command/query

Stat	Array Offset									Symbol	Description
	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8		
29	29	79	129	179	229	279	329	379	429	DART_STAT_FAILED_TIMEOUT1	When the DLL layer is consuming responses from the login sequence and there is a timeout this stat increases by 1
30	30	80	130	180	230	280	330	380	430	DART_STAT_FAILED_TIMEOUT2	When the DLL layer is consuming responses from the login sequence and there is a timeout and the number of retires has not been exceeded this stat increases by 1
31	31	81	131	181	231	281	331	381	431	DART_IGNORE_MSG_TYPE	See stat 24
32	32	82	132	182	232	282	332	382	432	DART_WRITE_TRANSACTION_CMPLT	Incremented by 1 each time the transparent message is sent just prior to to sending the write to the DAP unit
33	33	83	133	183	233	283	333	383	433	DART_FORM_POLL	Each time the client side application layer sends a message, this stat increases by 1
34	34	84	134	184	234	284	334	384	434	DART_WRITE_OPAQUE	Incremented by 1 each time the Opaque Message is sent (msg#1 as part of the sequence of message used to go to opaque mode)
35	35	85	135	185	235	285	335	385	435	DART_WRITE_PASSWD	Incremented by 1 each time the password Message is sent (msg#2 as part of the sequence of message used to go to opaque mode)
36	36	86	136	186	236	286	336	386	436	DART_WRITE_STAT	Incremented by 1 each time the password Message is sent (msg#3 as part of the sequence of message used to go to opaque mode)
37	37	87	137	187	237	287	337	387	437	DART_WRITE_TIME	Incremented by 1 each time the Dart Status Query is sent (msg#3 as part of the sequence of message used to go to opaque mode)

Stat	Array Offset									Symbol	Description
	Port 0	Port 1	Port 2	Port 3	Port 4	Port 5	Port 6	Port 7	Port 8		
38	38	88	138	188	238	288	338	388	438	DART_WRITE_DART_CFG	Incremented by 1 each time the Dart Config Query is sent (msg#3 as part of the sequence of message used to go to opaque mode)
39	39	89	139	189	239	289	339	389	439	DART_NON_CONTINUOS	Relates to the now obsolete use of DA-freq. Has no meaning.
40	40	90	140	190	240	290	340	390	440	DART_WRITE_BEFORE_READ	Increases by 1 each time a write has been abandoned because still waiting for a read, there is some error in the message, the variable to be written cannot be written to, the variable is not recognized ...
41	41	91	141	191	241	291	341	391	441	DART_STAT_DA_FREQ	Relates to the now obsolete use of DA-freq. Has no meaning.
42	42	92	142	192	242	292	342	392	442	DART_STAT_SCAN_INTERVAL	Relates to the now obsolete use of DA-freq. Has no meaning.
43	43	93	143	193	243	293	343	393	443	DART_STAT_LOGIN_TIMER	The value of the intellidart login timer is stored at this stat location. Intelli dart do not require a login before every write, only after a time
44	44	94	144	194	244	294	344	394	444	DART_STAT_LOGIN_COUNT	Each time a login before a poll is done, this stat is increased by 1 and with an intellidart it increases by 2

Appendix 3.6. Writing data to Dap Devices

The variables in a DAP device are not individually addressable. When a DAP device is read a data composite is returned. The driver extracts the data you require. When data is written to a DAP device it is not possible to write a value to one individual data element such as a temperature setpoint. Rather, the DAP devices requires the complete data composite (all its variables, states, settings) be written at once. This makes the setting of a setpoint a complex operation for the driver.

It involves the following steps
1. Read the device, obtain a complete set of data and store (internally in the driver.).
2. Use this stored data to form the basis for a write. Modify the data with the data the user wishes to set.
3. Write the modified data composite back to the DAP device.

You can see that to complete a 'write' operation successfully, we must first read the device successfully. If the read has not been completed then the write operation will be abandoned. The driver prints messages to the error logs and records a NODE_OFFLINE stat each time that it attempts to write but is unable to.

The DAP-Config command is an exception to the above notes. A read is not required. The Dap Config command is used to turn off/on DAP units. The Command uses two consecutive array elements. The first is the zone, the second is the inhibit command. Valid zones are 0-63.

If any inhibit bit (bits 0-5) is set then the unit will not run. If bits 0 to 5 are off then the unit will run. Bits 6& 7 are used for display only on the DAP panel.

0x01 - Inhibit Cooling
0x02 - Inhibit Heating
0x04 - Inhibit Humid
0x08 - Inhibit Dehumidification
0x10 - Inhibit fan
0x20 - Reserved
0x40 - Network Standby - Display on panel (only has no effect on unit)
0x80 - Network off inhibit is active - display only - no effect on operation

This function should be used as a wrbc/x. When the driver encounters this command it reads the associated Data Array, loads the two elements found at the array offset into the message and transmits the message. The driver does not set any Data Array elements to confirm that the command concluded successfully.

Appendix 3.7. Driver Limitations and Exclusions

There can only be one type of DART driver per port. Example: DARTIII and intelli_DART nodes cannot exist on the same connection.

When applying the password in the IntelliDART to the Web interface, it prevents communications on the Serial port because the panel expects a password from the FieldServer.

Appendix 3.8. Dap Unit Errors

The following tables provide information on the storage of errors. Note that the errors are stored in one of two ways – One storage method stores 8 alarm bits at a time in a single array element (stored as byte values) – The other method stores each alarm at a different location in the Data Array

Table 6 Errors stored in response to a Dap-Stat Query

Byte	Bit	Relative Offset	Location in Data Array (Absolute Offset)		046, 048 and 049 Units	DAP 80 Units
			Each alarm stored as a separate bit	Each set of 8 alarms stored as a byte*		
0	0	0	73	43:00	N/A	Manual Override: check bypass switch (DapII ver 5.0 or later)
0	1	1	74	43:01	High Pressure Failure Compressor No. 1	Water detected under floor: check probe
0	2	2	75	43:02	High Pressure Failure Compressor No. 2	No air flow: check belt and motor
0	3	3	76	43:03	High Pressure Failure Compressor No. 3	Dirty filter: check filters
0	4	4	77	43:04	High Pressure Failure Compressor No. 4	Humidifier problem: check water pressure
0	5	5	78	43:05	High Pressure Warning Compressor No. 1	Low voltage warning: check unit
0	6	6	79	43:06	High Pressure Warning Compressor No. 2	Firestat alarm: unit shutdown
0	7	7	80	43:07	High Pressure Warning Compressor No. 3	Compressor short cycle warning
1	0	8	81	44:00	High Pressure Warning Compressor No. 4	Power problem or unit restart
1	1	9	82	44:01	Low Pressure Failure Compressor No. 1	Humidity sensor problem
1	2	10	83	44:02	Low Pressure Failure Compressor No. 2	Temperature sensor problem
1	3	11	84	44:03	Low Pressure Failure Compressor No. 3	Scheduled maintenance due
1	4	12	85	44:04	Low Pressure Failure Compressor No. 4	High pressure C1: Manual reset required
1	5	13	86	44:05	No Air Flow, Check Belt and motor	Low pressure C1: Manual reset required
1	6	14	87	44:06	Change Filters, High Pressure Drop	High pressure C2: Manual reset required
1	7	15	88	44:07	Local Alarm. See Tag inside Door	Low pressure C2: Manual reset required

* 43:00 Indicates array element zero. Individual alarm can be found by masking and looking at the zero'th bit of this element.

Byte	Bit	Relative Offset	Location in Data Array (Absolute Offset)		046, 048 and 049 Units	DAP 80 Units
			Each alarm stored as a separate bit	Each set of 8 alarms stored as a byte*		
2	0	16	89	45:00	Manual Override, service or emergency	Smoke detector: unit shutdown
2	1	17	90	45:01	Humidifier Failure, Check water pressure	No water flow: check pump
2	2	18	91	45:02	No water flow. Check glycol pump.	Discharge temperature sensor problem
2	3	19	92	45:03	Smoke detected, located inside unit	High temperature warning
2	4	20	93	45:04	Fire Stat Tripped, Location inside unit	Low temperature warning
2	5	21	94	45:05	Standby pump on, check glycol pump	High humidity warning
2	6	22	95	45:06	Low voltage warning, check unit	Low humidity warning
2	7	23	96	45:07	Water detected in under floor area	Fan motor overload: check motor amperage
3	0	24	97	46:00	Low air temperature warning	Local alarm #1: See tag inside door
3	1	25	98	46:01	High air temperature warning	Local alarm #2: See tag inside door
3	2	26	99	46:02	Low Humidity warning	Local alarm #3: See tag inside door
3	3	27	100	46:03	High Humidity warning	Local alarm #4: See tag inside door
3	4	28	101	46:04	Low chilled-water-in alarm	Standby pump on: check primary pump
3	5	29	102	46:05	High chilled-water-in alarm	UPS power on: check main power supply
3	6	30	103	46:06	Low chilled-water-out alarm	Custom message on optional input #1
3	7	31	104	46:07	High chilled-water-out alarm	Custom message on optional input #2
4	0	32	105	47:00	High or Low limits misadjusted	Custom message on optional input #3
4	1	33	106	47:01	Air temperature sensor error	Custom message on optional input #4
4	2	34	107	47:02	Humidity sensor error	Humidification Inhibited
4	3	35	108	47:03	Discharge air sensor error	Reheat inhibited
4	4	36	109	47:04	No communications with temp/humid module	Reheat and humidification inhibited
4	5	37	110	47:05	No communications with LCD module	Discharge air temperature limit (just a condition)

Byte	Bit	Relative Offset	Location in Data Array (Absolute Offset)		046, 048 and 049 Units	DAP 80 Units
			Each alarm stored as a separate bit	Each set of 8 alarms stored as a byte*		
4	6	38	111	47:06	Alarm network communications failure	Reheat mode during dehumidification (just a condition)
4	7	39	112	47:07	AC Power or controller restart	Manual Override: Check bypass switches (DAPII ver 5.1 and later)
5	0	40	113	48:00	Network doppelganger error	N/A
5	1	41	114	48:01	Incompatible Fahrenheit / centigrade mode	N/A
5	2	42	115	48:02	Schedule normal maintenance due	N/A
5	3	43	116	48:03	compressor short cycle warning	N/A
5	4	44	117	48:04	Fan motor overload, check motor amperage	N/A
5	5	45	118	48:05	Custom message on optional alarm input #1	N/A
5	6	46	119	48:06	Custom message on optional alarm input #2	N/A
5	7	47	120	48:07	Custom message on optional alarm input #3	N/A
6	0	48	121	49:00	Discharge air temperature limit (just a condition)	N/A
6	1	49	122	49:01	Reheat mode during dehumidification (just a condition)	N/A
6	2	50	123	49:02	N/A	N/A
6	3	51	124	49:03	N/A	N/A
6	4	52	125	49:04	N/A	N/A
6	5	53	126	49:05	N/A	N/A
6	6	54	127	49:06	N/A	N/A
6	7	55	128	49:07	N/A	N/A

Table 7 Errors stored in response to a Chiller Stat Query

Location in Data Array	Alarm / Bit Descriptions	Byte	Bit	Relative Offset
536	Auxiliary cooling available	0	0	0
537	Auxiliary cooling locked out	0	1	1
538	Unit on backup module standby	0	2	2
539	Custom message on optional input #1	0	3	3
540	Custom message on optional input #2	0	4	4
541	Evaporator freeze stat module #1	0	5	5
542	Evaporator freeze stat module #2	0	6	6
543	Evaporator freeze stat module #3	0	7	7
544	High pressure problem module #1	1	0	8
545	High pressure problem module #2	1	1	9
546	High pressure problem module #3	1	2	10
547	High return temperature warning	1	3	11
548	High supply temperature warning	1	4	12
549	Local alarm #1: See tag inside door	1	5	13
550	Local alarm #2: See tag inside door	1	6	14
551	Low pressure problem module #1	1	7	15
552	Low pressure problem module #2	2	0	16
553	Low pressure problem module #3	2	1	17
554	Low return temperature warning	2	2	18
555	Low supply temperature warning	2	3	19
556	Low voltage warning: check unit	2	4	20
557	Scheduled normal maintenance due	2	5	21
558	Manual override: compressor	2	6	22
559	Manual override: check bypass switches	2	7	23
560	No chilled water flow module #1	3	0	24
561	No chilled water flow module #2	3	1	25
562	No chilled water flow module #3	3	2	26
563	No condenser water flow	3	3	27
564	Power problem or restart	3	4	28
565	Return temperature sensor problem	3	5	29
566	compressor short cycle warning	3	6	30
567	Standby pump on: Check primary pump	3	7	31
568	Supply temperature sensor problem	4	0	32
569	Unit on total standby	4	1	33
570	Under floor water detected	4	2	34
571	N/A	4	3	35
572	N/A	4	4	36
573	N/A	4	5	37
574	N/A	4	6	38
575	N/A	4	7	39
576	N/A	5	0	40
577	N/A	5	1	41
578	N/A	5	2	42
579	N/A	5	3	43
580	N/A	5	4	44
581	N/A	5	5	45
582	N/A	5	6	46
583	N/A	5	7	47

Appendix 3.9. Dart/intelli-DART login differences and Login Notes

The original DART driver logs into the DART unit every time a DAP unit poll is made. For intelli-DART drivers, this has been slightly modified. The driver will login to the intelli-DART unit once only. Further DAP polls will not initiate a login sequence until 20 minutes have elapsed, or a DAP poll timeout has occurred. In these two cases, the driver will attempt to re-login to the intelli-DART unit and reset the 20 minute timer. When applying the password in the Intellidart to the Web interface, it prevents communications on the Serial port because the panel expects a password from the FieldServer.

In versions of the driver prior to 1.07f the login sequence consisted of a long sequence of messages to / from the DART. During testing in Aug-Oct 2003 a bug was discovered in the Dart controllers which made the login erratic and thus made it almost impossible for the driver to poll (write) to a DAP device. This bug has been fixed by DataAiree and presumably newer firmware eliminates the problem. While testing with the improved firmware a bug in the driver was discovered. This bug caused the login to fail if the 1st message received after step 1 of the login was in fact the final echoed message. This bug has been corrected and a highly satisfactory performance for writing set points has been achieved and tested.

The newer firmware from DARTIV onwards requires a shorter login sequence consisting of only two messages (previously 5) and hence the time cost of the login has been reduced.

Appendix 3.10. Scan_Interval and DA_Freq

In versions of the driver prior to 1.07f a parameter called “DA_FREQ” was required. Read the notes below if you have been provided with an updated driver nut - your configuration was built before October 2003.In newer versions of the driver, the driver will automatically attempt to adjust the configuration using the old DA_FREQ values. It is possible that it could not make the adjustment. In this case error messages #48, #49, #50 or #51 may be printed.

It is best to modify configuration files which use the DA_Freq parameter by either
1) Replacing it with Scan_Interval or
2) Adjusting the Scan_Interval to an appropriate value and removing the DA_Freq parameter.

DA_Freq: The following notes were provided to explain the DA_Freq parameter. They are now obsolete and are provided for reference only.

A driver specific value that defines a delay period after the kernel has scheduled a Map Descriptor to the active queue.

For non-intelli-DART drivers, this is the period between DAP polls. There is a minimum period of 2 minutes, and a default of 5 minutes. Scan_Interval default values are 2.0 secs. Scan_Interval and DA_Freq are independent values.

For intelli-DART drivers, there are no limitations on the value. If the Scan_Interval field is specified then this value will over-ride the DA_Freq value. DA_Freq will then be set to a low value. (2.0s) If only a DA_Freq value is specified, then the Scan_Interval will take kernel defaults (2.0s). If neither DA_Freq nor Scan_Interval are specified then the DA_Freq will default to 5 minutes and Scan_Interval will take the kernel default of 2.0s.

Appendix 4. Revision History

Date	Resp	Format	Driver Ver.	Doc. Rev.	Comment
2/2/03	PMC		1.06	1	New Section 6.5 Blank. New section. 6.6 Added notes on how error bits are arranged. Updated table 4.4.5.1 to point to section 6.6
4/24/03	DNC		1.07	0	Adde Table 4.4.5.2: Point Descriptions Modified default poll delay to 2.1 secs For intelli-DART only, the driver will only login once, and then re-login after every 20 mins, or after a poll timeout occurs. For intelli-DART units, scan_interval now over-rides DA_Freq values. There is no minimum limit for DA_Freq. If scan_interval is not specified then it will take the same value as kernel defaults. If neither is specified then different defaults apply to both. Diagnostics stats added for offsets 41, 42, and 43 for the DA_Freq, scan_interval, and login countdown timer respectively. Increase MX_DART_STATS_PER_PORT from 40 to 50 which affected some test scripts. Driver Limitations and Exclusions added as section 6.5 Added example of a read status Map Descriptor as section 4.4.5 for intelli-DART units.
12/19/03	PMC		1.07	1	Various Minor Corrections – Most Headers have 1st character missing … Changed hard coded cross references to Word Cross-Reference Entries. Obsolete the parameter DA_FREQ and added Appendix 3.10 to explain this. Added notes to the Scan_Interval parameter. Added connection diagram. Performance Issues: Removed some notes in this section. They related to non-dart connections. Added section with driver error messages Added section with driver exposed stats Added notes on the login and write bugs
1/6/04	MF		1.07	2	Reformatted Document. Major cosmetic changes to tables etc. Updated Cross referencing.
2/19/04	JD		1.07	3	Releasing
2/24/04	MF	MF	1.07	4	Updated according to DUR0312. Added new revision table.

Date	Resp	Format	Driver Ver.	Doc. Rev.	Comment
7/7/04	meg	meg	1.07	5	Updated according to DUR0377. A few more format changes. Changed final chapters to appendices. Added notes from DUR0376
12/29/04	Jd		1.07	6	Releasing