ENGINEERING CHANGE ORDER

Number 03-	
Project Engineer: Stephen L. Robinson	Cross Ref. Doc. Type & Number: None
Change Requested By: Stephen L. Robinson	Page 1 of 1

Description of Change

Release of technical documentation for archive:

Johnson Controls, MetaSys, N2 System Protocol Specification, Jul. 26, 1994

Reason for Change None

Scope of Change

- ☐ Changes Form, Fit, or Function
- ☐ Other performance enhancement
- ☒ Internal

Type of Change

- ☐ New Product
- ☐ Error
- ☐ Design Improvement
- ☒ Additional Info
- ☐ Cost Reduction
- ☐ Conform to Present Practices

Material Disposition

- ☒ None
- ☐ Scrap
- ☐ Rework
  - ☐ Finished Goods
  - ☐ Work In Progress
  - ☐ Stock
- ☐ Running Change

Documentation Affected

Product Model Number: None

Drawing Number	Old Rev	New Rev
None		

Approvals	Engineering Signature		Date
	Materials Signature		Date
Cost Impact	0	New Comp. Cost	0
Obsol. Impact	0	New Comp. Lead Time	0

Manager's Initials in Appropriate Box

☐ EWS ☐ Hot ☒ Normal

Required Tasks (use attachments if necessary)	Initials	Date
Manufacturing None		
Production None		
Materials None		
Stock Room None		
Sales / Marketing None		
Repair None		
Quality Assurance None		
Other None		

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JOHNSON CONTROLS

Mr. David L.A. Toste
Engineering Staff
Pelco
300 W. Pontiac Way
Clovis, CA 93612

September 1, 1995

Dear Mr. Toste:

Enclosed is a copy of the *Metasys N2 System Protocol* that you requested. The *N2 System Protocol Specification* describes the internal protocols used in the Metasys N2 Bus. Accompanying the specification is the N2 testing software and test plan. The software and test plan can be used to verify operation of the N2 interface without Metasys software and hardware. The output of the N2 testing tool and the completed test plan can then be used to satisfy the requirements for licensing use of the Metasys compatible logo. The output and completed test plan should be sent to Paul Peot at the above address. A license agreement will be sent for your signature. Once the signed license agreement is received, a Metasys compatible logo kit containing usage instructions and artwork will be sent to you.

This document and software are provided to you free of charge. *They are, however, copyrighted and may not be duplicated.* All copies of this document and software must be ordered by using the *Metasys N2 System Protocol Specification Order Form*. Another copy of this form is included at the back of the document.

Sincerely,
JOHNSON CONTROLS, INC.

Darrell Standish

Darrell Standish
Advanced Applications
xc: Nick Popoutsis/TSM M14
encl. (2)

Phoned on 9-26-95
Paul Peot x4288
Louise Andra
San Pablo
11 521 8400

METASYS®

N2 System Protocol Specification

(For Vendors)

JOHNSON CONTROLS

Last Revised: 7/26/94

METASYS®

N2 System Protocol

Introduction

Purpose

This specification is intended to allow Johnson Controls, Inc. or other companies to design N2 devices that can be easily integrated into the Metasys® Network. The N2 protocol is intended to be general in nature, since the actual interface to each device type on the N2 may have some unique properties.

The N2 model hardware device is the virtual object (see Figure 1). The model allows for analog inputs/outputs, binary inputs/outputs, and internal floats/integers/bytes bit types. The model can have a maximum of 256 of each type.

Note: When the statement "JCI Use Only" appears in this document, it means that this byte or message structure cannot be used by vendor devices currently, only by Johnson Controls equipment.

Reference

- *Optomux® Operational Manual (Part #1927)*

Device Data Base Interface

Architecture

The N2 System protocol is a general interface for accessing data that resides in devices on the N2 network. Each device on the N2 can be thought of as a data base manager. The key to referencing a specific N2 device's data base is the device's *N2 address*. The data under the management of a particular N2 device can further be subdivided into groupings called *regions*. Each region is made up of one or more *records*, each record within a region having the same structure.

For the N2 System protocol, the N2 model hardware device is the "virtual object." The virtual object is shown below. It is made up of other objects: 1) analog inputs, 2) binary inputs, 3) analog outputs, 4) binary outputs, 5) float internal values, 6) integer internal values (16 bit), and 7) byte (8 bit) internal values. There may be a maximum of 256 of each type.

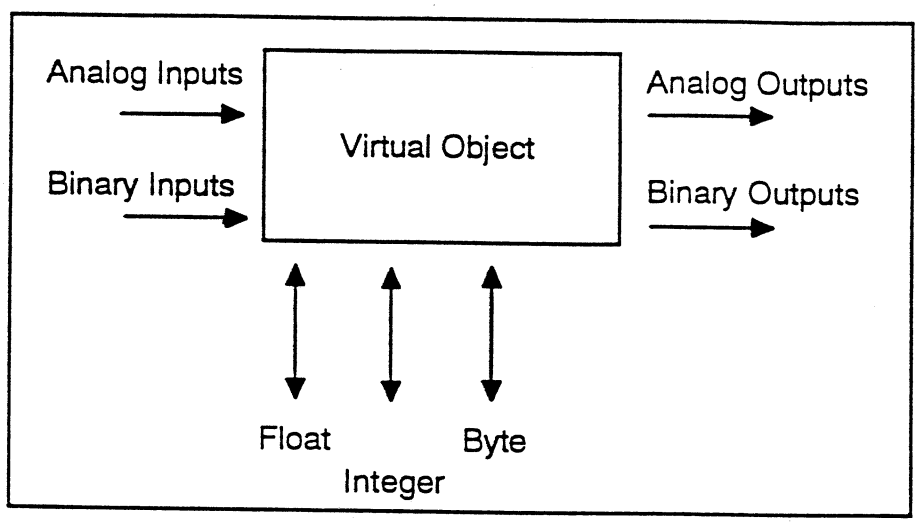


Figure 1: Virtual Object

Attribute	Type	Description
3	Float	Analog Input Value
4	Float	Linear Ranging Parameter 1 (JCI use only)
5	Float	Linear Ranging Parameter 2 (JCI use only)
6	Float	Linear Ranging Parameter 3 (JCI use only)
7	Float	Linear Ranging Parameter 4 (JCI use only)
8	Float	Low Alarm Limit
9	Float	Low Warning Limit
10	Float	High Warning Limit
11	Float	High Alarm Limit
12	Float	Differential
13	Integer	Filter Weight (JCI use only)
14	Float	AI_Offset (JCI use only)

Note: When limits are not defined, they will contain the value 0xFFFFFFFF or INVALID_FLOAT.

Binary Input:

Attribute	Type	Description
1	Byte	Object Configuration Bit 0 = COS_enabled (1) Bit 1 = normal state Bit 2 = unused (0) Bit 3 = alarm_enabled (1) . Bit 7 = unused
2	Byte	Object Status Bit 0 = reliable (0) / unreliable (1) Bit 1 = override active (1) Bit 2 = unused Bit 3 = unused Bit 4 = normal (0) / alarm (1)

Binary Output:

Attribute	Type	Description
1	Byte	Object Configuration
		Bit 0 = COS_enabled (1)
		Bit 1 = normal state
		Bit 2 = unused
		.
		Bit 7 = unused
2	Byte	Object Status
		Bit 0 = reliable (0) / unreliable (1)
		Bit 1 = override active (1)
		Bit 2 = unused
		Bit 3 = unused
		Bit 4 = normal (0) / alarm (1) (JCI use only)
		Bit 5 = normal (0) / trouble (1) (JCI use only)
		Bit 6 = current state
		Bit 7 = unused
3	Integer	Minimum On-time (sec) (0-65535)
4	Integer	Minimum Off-time (sec) (0-65535)
5	Integer	Maximum Cycles/Hour
6	Integer	Interstage on delay(sec)(0-65535) (JCI use only)
7	Integer	Interstage off delay(sec)(0-65535) (JCI use only)

The Internal objects, float, integer, and byte can be anything that the specific N2 device wants them to be. The only restriction is that they are of the specified types.

The respective region numbers for the model virtual object are: (1) Region 1 - Analog Inputs, (2) Region 2 - Binary Inputs, (3) Region 3 - Analog Outputs, (4) Region 4 - Binary Outputs, (5) Region 5 - Internal Float values, (6) Region 6 - Internal Integer values, and (7) Region 7 - Internal Byte values.

Floats are represented in IEEE Floating Point format. They are transmitted as eight (8) ASCII characters (CHAR8), most significant byte to least significant byte.

Integers are signed (+/- 32767) 16 bits in length. They are transmitted as four (4) ASCII characters (CHAR4), most significant byte to least significant byte. Integers are represented in two's complement form.

Bytes are 8 bits in length. They are transmitted as two (2) ASCII characters (CHAR2), most significant character to least significant character. Bit 0 is the least significant bit (i.e., the right most bit).

Bits are 1 bit in length. They are transmitted as two (2) ASCII character (CHAR2) most significant character to least significant character. (Bits could be transmitted as 1 ASCII character (CHAR1); however, to facilitate the implementation of the Optomux protocol, they will be transmitted as two (2) ASCII characters. The bit is in the least significant position of the least significant character.

The order for bits is: bit 0 = 1, bit 7 =128

N2 Network Operation

Description

This section specifies the various aspects of the N2 protocol. Certain requirements, such as the physical characteristics and transmission format, must be followed closely for a device to operate properly on the network. Adherence to this specification will assure the N2 device will integrate into Metasys.

N2 Physical Characteristics

The communication interface is RS-485, 2-wire plus common, half-duplex operating at a fixed baud rate of 9600. The transmission format is 8 data bits with 1 start and 1 stop bit. No parity bit is used.

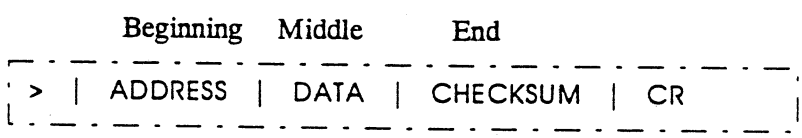
N2 Protocol

This protocol allows Optomux-type devices to co-exist on the network with all other devices. Providing a mechanism to communicate with a large number of different devices requires that the messages be kept general in nature. **This means that not all fields of a given message, or the entire message, may have meaning to every device on the network. If an N2 device does not handle one of these messages, then it should respond with the appropriate error message.**

Transmission Format

The basic transmission format described in this section allows Optomux-type devices to reside on the N2 network. The "data" portion of the transmission is specified in the *Defined Messages* section.

There are three (3) basic parts to a transmission from the master to a slave device on the N2.



Defined Messages

This section defines the middle portion of the transmission, a set of general messages for accessing data, performing commands, and polling devices for changes.

The first character of the middle portion of the message will always be the command character. Depending on the command character type, there may be a further subcommand character. The following table will show all of the commands defined in this document:

COMMAND#/SUBCOMMAND	DESCRIPTION
0 / 0	Time Update Message
0 / 1	Read Memory Diagnostics Message
0 / 4	Poll Message No Acknowledge
0 / 5	Poll Message With Acknowledge
0 / 8	Warm Start Message
0 / 9	Status Update Message
1 / Region (0-FH)	Read Field Message
2 / Region (0-FH)	Write Field Message
7 / (0-FH)	General Command Message, Subcommands (0-FH) defined separately for those devices that use this message
8 / (1-3H)	Upload Messages
9 / (1-3H)	Download Messages
F / -	Identify Self Message (no following character after command).

Read Memory Response

CHAR1	start of message	(A)
CHAR2	data @memory location 1	
CHAR2	data @memory location 2	
.		
.		
CHAR2	data @memory location n	
CHAR2	checksum	
CHAR1	end of message	(CR)

Poll With/Without Ack Message

This message is sent periodically to slave devices on the N2 by the N2 master to allow the slave devices to report any changes in condition. The poll message contains an acknowledge code which signals the device receiving the poll whether the master received any data sent in response to the previous poll message. If the master did not receive the data response, the slave device should transmit the previous response again.

CHAR1	command	(0)
CHAR1	subcommand	(4,5)

.

Analog Input/Output COS Response

The analog input/output COS message reports analog COS to the N2 polling device. Should an analog input/output (with COS report enabled) traverse low/high limits, low/high warning limits, saturation levels, or reliability, the N2 device responds with a COS message the next time it is polled. As long as the analog input/output has an unreported change and/or any previous COS report has not been acknowledged, its COS information continues to be reported.

CHAR1	start of message	(A)
.		
.		
CHAR2	region	(1,3)
CHAR2	object number	(0-255)
CHAR2	object status	
CHAR8	analog value	
.		
.		
CHAR2	checksum	
CHAR1	end of message	(CR)

No COS Poll Response

When no COS has occurred, the simple acknowledge message defined below is transmitted from the N2 device when the N2 device is polled.

CHAR1	start of message	(A)
CHAR1	end of message	(CR)

Read Analog Input Command

The read analog input command is used to retrieve any of the thirteen (13) attributes pertaining to specified analog input object.

CHAR1	command	(1)
CHAR1	region	(1)
CHAR2	object number	(0-255)
CHAR2	attribute number	(1-13)

Read Analog Input Response

CHAR1	start of message	(A)
CHAR8/CHAR2	attribute value	
CHAR2	checksum	
CHAR1	end of message	(CR)

Note: When either attribute 2 or 3 is requested, the N2 device responds with **both** attributes 2 and 3:

CHAR1	start of message	(A)
CHAR2	object status	
CHAR8	object value	
CHAR2	checksum	
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate response.

Read Binary Input Command

The read binary input command is used to retrieve any of the four (4) attributes of the specified binary input object.

CHAR1	command	(1)
CHAR1	region	(2)
CHAR2	object number	(0-255)
CHAR2	attribute number	(1-4)

Read Binary Output Response

CHAR1 start of message	(A)
CHAR4/CHAR2 attribute value	
CHAR2 checksum	
CHAR1 end of message	(CR)

If error occurs, see error messages for appropriate response.

Read Internal Parameter Command

The read internal parameter command retrieves the value attribute of the internal parameter objects.

CHAR1 command	(1)
CHAR1 region	(5-8)
CHAR2 object number	(0-255)
CHAR2 attribute number	(1-2)

Read Internal Parameter Response

CHAR1 start of message	(A)
CHAR2 object status	
CHAR8/CHAR4/CHAR2 value	
CHAR2 checksum	
CHAR1 end of message	(CR)

Note: When either attribute 1 or 2 is requested, the N2 device responds with **both** attributes 1 and 2.

If error occurs, see error messages for appropriate response.

Write Analog Output Command

The write analog output command is used to change an attribute of the specified analog output object (with the exception of attributes 2 and 3, object status, and current value).

CHAR1 command	(2)
CHAR1 region	(3)
CHAR2 object number	(0-255)
CHAR2 attribute number	(1,4-5)
CHAR8/CHAR2 attribute value	

Write Analog Output Response

CHAR1 start of message	(A)
CHAR1 end of message	(CR)

If error occurs, see error messages for appropriate response.

Write Binary Output Command

The write binary output command is used to change an attribute of the specified binary output object (with the exception of attribute 2, object status).

CHAR1 command	(2)
CHAR1 region	(4)
CHAR2 object number	(0-255)
CHAR2 attribute number	(1,3-7)
CHAR4/CHAR2 attribute value	

Write Binary Output Response

CHAR1 start of message	(A)
CHAR1 end of message	(CR)

If error occurs, see error messages for appropriate response.

Override Binary Input Command

The override binary input command is used to send an override value to the binary input object to be used in place of the current binary state. The override value becomes the object's current value. Generally, the override value remains active as long as the master continues polling the N2 device. In standalone operation, or should the polling stop, the object reverts to the object's input value after a specified period (normally 10 minutes).

CHAR1	command	(7)
CHAR1	subcommand	(2)
CHAR2	region	(2)
CHAR2	object number	(0-255)
CHAR2	override value	(0/1)

Override Binary Input Response

CHAR1	start of message	(A)
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate response.

Override Analog Output Command

The override output command is used to send an override value to the analog output object to be used in place of its current value attribute. The override value becomes the object's current value. Generally, the override value remains active as long as the master continues polling the N2 device. In standalone operation, or should the polling stop, the object reverts to the object's input value after a specified period (normally 10 minutes).

CHAR1	command	(7)
CHAR1	subcommand	(2)
CHAR2	region	(3)
CHAR2	output number	(0-255)
CHAR8	override value	

Override Parameter Value Response

CHAR1	start of message	(A)
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate error message.

Override Release Request

This message commands the N2 device to release a previously overridden data value. Once a value has been released the local value is be used.

CHAR1	command	(7)
CHAR1	subcommand	(3)
CHAR2	region	(1-8)
CHAR2	object no.	(0-255)

Override Release Response

CHAR1	start of message	(A)
CHAR1	end of message	(CR)

If error occurs see error messages for appropriate error message.

Write Analog Input Attributes Command

The write analog input attributes message is be used to download all attributes that characterize the specified analog input object.

CHAR1	command	(7)
CHAR1	subcommand	(7)
CHAR2	region	(1)
CHAR2	object no.	(0-255)
CHAR2	attribute 1	
CHAR8	attribute 4	
.		
.		
CHAR8	attribute 14	

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Write Analog Output Attributes Request

The write analog output attributes message is used to download all attributes that characterize the specified analog output object.

CHAR1	command	(7)
CHAR1	subcommand	(7)
CHAR2	region	(3)
CHAR2	object number	(0-255)
CHAR2	attribute 1	
CHAR8	attribute 4	
CHAR8	attribute 5	

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Write Analog Output Attributes Response

CHAR1	start of message	(A)
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate response.

Write Binary Output Attributes Request

This message is used to download all attributes that characterize the specified binary output object.

CHAR1	command	(7)
CHAR1	subcommand	(7)
CHAR2	region	(4)
CHAR2	object number	(0-255)
CHAR2	attribute 1	
CHAR4	attribute 3	
.		
.		
CHAR4	attribute 7	

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Read Binary Input Attributes Request

The read binary input attributes message is used to read all attributes of the specified binary input object.

CHAR1	command	(7)
CHAR1	subcommand	(8)
CHAR2	region	(2)
CHAR2	object number	(0-255)

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Read Binary Input Attributes Response

CHAR1	start of message	(A)
CHAR2	attribute 1	
CHAR2	attribute 2	
CHAR4	attribute 3	
CHAR8	attribute 4	
CHAR2	checksum	
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate response.

Read Analog Output Attributes Request

The read analog output attributes message is used to read all attributes of the specified analog output object.

CHAR1	command	(7)
CHAR1	subcommand	(8)
CHAR2	region	(3)
CHAR2	object number	(0-255)

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Read Binary Output Attributes Response

CHAR1	start of message	(A)
CHAR2	attribute 1	
CHAR2	attribute 2	
CHAR4	attribute 3	
.		
.		
CHAR4	attribute 7	
CHAR2	checksum	
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate response.

Identify Device Type Command

This message requests the N2 device to respond with a unique code identifying which kind of N2 device it is.

CHAR1	command	(F)

Identify Device Type Response

CHAR1	start of message	(A)
CHAR2	device code	(10H)
CHAR2	checksum	
CHAR1	end of message	(CR)

In order to integrate a vendor controller into the Metasys Network, the N2 device ID should be 10H. JCI controllers have unique IDs that are assigned by Johnson Controls.

Upload Record (JCI use only)

This command requests the N2 device to send the next record of the specific item being uploaded. This can be: 1) the first record, 2) the next record, or 3) the last record.

CHAR1	command	(8)
CHAR1	subcommand	(3)
CHAR4	record number	(0-65535)

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Upload Record Response

CHAR1	start of message	(A)
CHAR2	last record	(1/0)
	(1 = true)	
	(0 = false)	
CHAR4	record number	(0-65535)
CHAR4	number of information characters	(1-502)
CHAR8/CHAR4/CHAR2	information	
.		
.		
.		
CHAR8/CHAR4/CHAR2	information	
CHAR2	checksum	
CHAR1	end of message	(CR)

If error occurs, see error messages for appropriate response.

Download Record (JCI use only)

This command sends the N2 device the next record of the specific item being downloaded. This can be: 1) the first record, 2) the next record, or 3) the last record.

CHAR1 command	(9)
CHAR1 subcommand	(3)
CHAR2 last record	(1/0)
(1 = true)	
(0 = false)	
CHAR4 record number	(0-65535)
CHAR4 number of information characters	(1-502)
CHAR8/CHAR4/CHAR2 information	
.	
.	
.	
CHAR8/CHAR4/CHAR2 information	

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

Download Record Response

CHAR1 start of message	(A)
CHAR1 end of message	(CR)

If error occurs, see error messages for appropriate response.

Download Complete (JCI use only)

This message informs the N2 device that the N2 master has completed the specific download.

CHAR1 command	(9)
CHAR1 subcommand	(4)

Implementation of this command at the slave device is optional; it would be used for N2 commissioning purposes only.

DEFINED CODES	DESCRIPTION OF ERROR
00	Device has reset and is waiting for the "Identify Yourself" command.
01	Undefined Command: command not understood by addressed device.
02	Checksum error.
03	Input buffer overrun: message longer than maximum device expects to receive.
05	Data field error: size of message not correct for command type.
10	Invalid Data: one of the fields contains a value that is out of the expected range. A vendor device should return this code if a requested point does not exist or a commanded value is out of range.
11	Invalid command for data type: command not appropriate for this field or record.
12	Command not accepted: due to problems with the device, the command is ignored. The master should then use the Status Update Request command (described in section *Status Update Request*) to determine the problem.

Timing

This section discusses timing guidelines. If a device deviates from these guidelines, it will have an impact on the N2 network performance.

- The maximum time (if possible) from receipt of the last character of a message to the transmission of the first character of the response should not exceed 10 msec. Most devices will turn the message around even faster than 10 msec.

Slave

A slave device only responds when it receives a valid message directed to its address.

Identify Device Type Message

When the slave receives this message, it is expected to respond with its unique device code as described in the section on the "Identify Device Type" message. Receiving this message from the master signals to the slave device that the master has for some reason lost the current state of all events it reports on. The slave should then flag all events that it reports on to report on the next "Poll Message". This causes the master to be updated every time it sends the "Identify Device Type" message.

Power Reset

Following a power reset, the slave will return an error code of "00" to any message until it receives the type "F" message. This will force the master to recognize the slave has reset.

Poll Message Response

When the slave receives a poll message (0 / 4, 0 / 5), it first checks to see if the master is acknowledging the response from the previous "Poll Message". If so, the slave can then report any event that have occurred since the last report. If not, it retransmits the previous message.

Command Mechanism

The second type of communication between the master and devices on the N2 network is the command mechanism. Commands can be issued by any task in the system that requires access to some data that resides in a device on the N2.

A command will be allowed to preempt the polling sequence and be issued immediately by the communication task upon completion of the present message transaction. A limit is placed on the number of command transactions allowed per poll sequence. The limit is based on the priority poll table the device is in.

Buffer Sizing

The N2 master's transmit/receive buffers are 256 ASCII characters. The N2 hardware virtual device's transmit and receive buffers are also 256 ASCII characters.

The N2 master only sends one message (in the data portion of the message) at a time. The N2 virtual object responds to a N2 master message with the appropriate reply. Analog input and binary input COS' can only be sent by the virtual object as a response to a poll message. When replying to the poll message, the N2 virtual object may respond with as many analog and binary input COS' that can be packed into the return poll message within the limitations of the transmit buffer size (maximum of 256 ASCII characters).

METASYS®
SPD Advanced Applications

Metasys N2 System Protocol Specification for Vendors Order Form

The Metasys N2 System Protocol Specification for Vendors describes the internal protocols used in the Metasys N2 Bus connection to an NCU. It details the methods and data structures required to read and write the *value* attribute of most objects.

The Metasys N2 System Protocol Specification for Vendors contains information necessary to connect a third-party system to the Metasys N2 Bus. In many cases, however, it will not be the most functional or cost-effective means to achieve interoperability or data sharing between the Metasys Network and another system. Contact your local Johnson Controls Sales Engineer to learn about other connectivity options.

While the Metasys N2 System Protocol Specification for Vendors is believed to be accurate at the time of printing, Johnson Controls, Inc. does not guarantee the accuracy of the document, nor will it be held responsible for damages of any kind, direct or indirect, which may result from the use of the Metasys N2 System Protocol Specification, even in situations in which a Johnson Controls employee has examined your system. Further, you understand that the protocols described in the Metasys N2 System Protocol Specification are subject to change without notice.

The Metasys N2 System Protocol Specification for Vendors is provided free of charge. *It is, however, copyrighted and may not be duplicated.* All copies must be ordered using this form.

Please send my copy of the Metasys N2 System Protocol Specification for Vendors to:

Name _____

Company _____

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City _____ State _____ Zip Code _____

Telephone Number _____ Branch Code (if any)_____

Are you requesting an update to older version? _____ Date on front cover _____

Mail or FAX this request to:

Johnson Controls, Inc.
507 E. Michigan St.
Milwaukee, WI 53202
FAX: (414) 274-4400
ATTN: Advanced Applications, M67

VPT-41/42 -N Specification

Controller : SAB 80C535-N-T40/85 12MHz

Program Memory : 29F010 or 27C256

Data Memory : 6264 (8k) or 62256 (32k)

ADC : National ADC12138

Lensdriver : 3 x 100mA / 12V

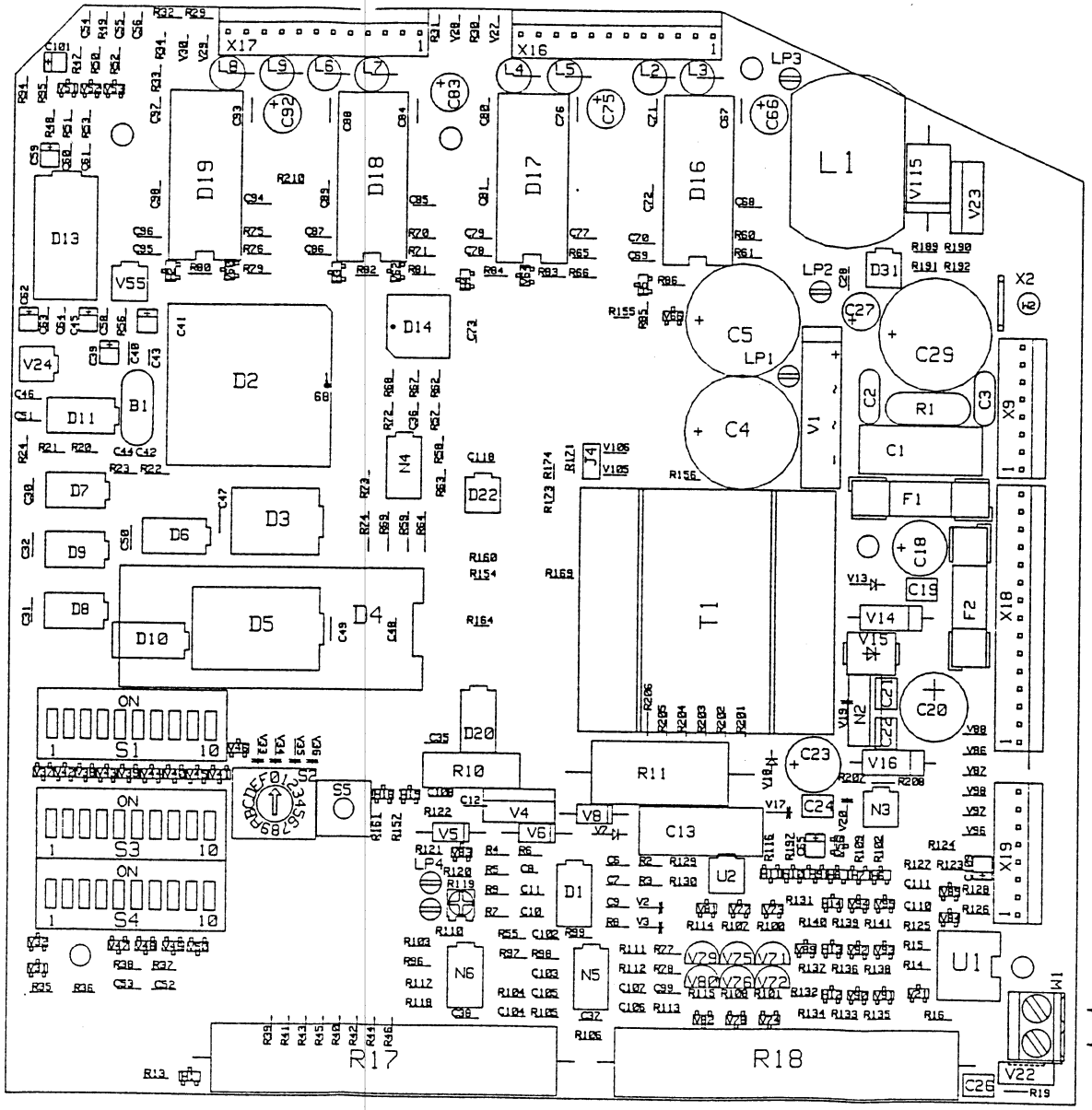
Auxilary Outputs : 3 x OpenCollector-Output (100mA / 12V)

Addressrange : 0 ... 2046

Interfaceports : RS-232, RS-485 (2 and/or 4-Lines), TTY (20mA, in and out)

Baudrate : 300, 600, 1200, 2400, 4800, 9600, 19200

Dataformat : 1 Startbit, 8 Databits, no parity, 1 Stopbit



ACHTUNG
ELEKTROSTATISCH GEFÄHRDETE BAUELEMENTE(EGB)
ATTENTION
ELECTROSTATIC SENSITIVE DEVICES

CHANGE	DATE	CHECK	DATE	DATE	26.09.97
				NAME	J.HEILAND
				CHECK	
				SCALE	1,4:1
ASSEMBLY DRAWING				VPT 42 RS485 Half Duplex	

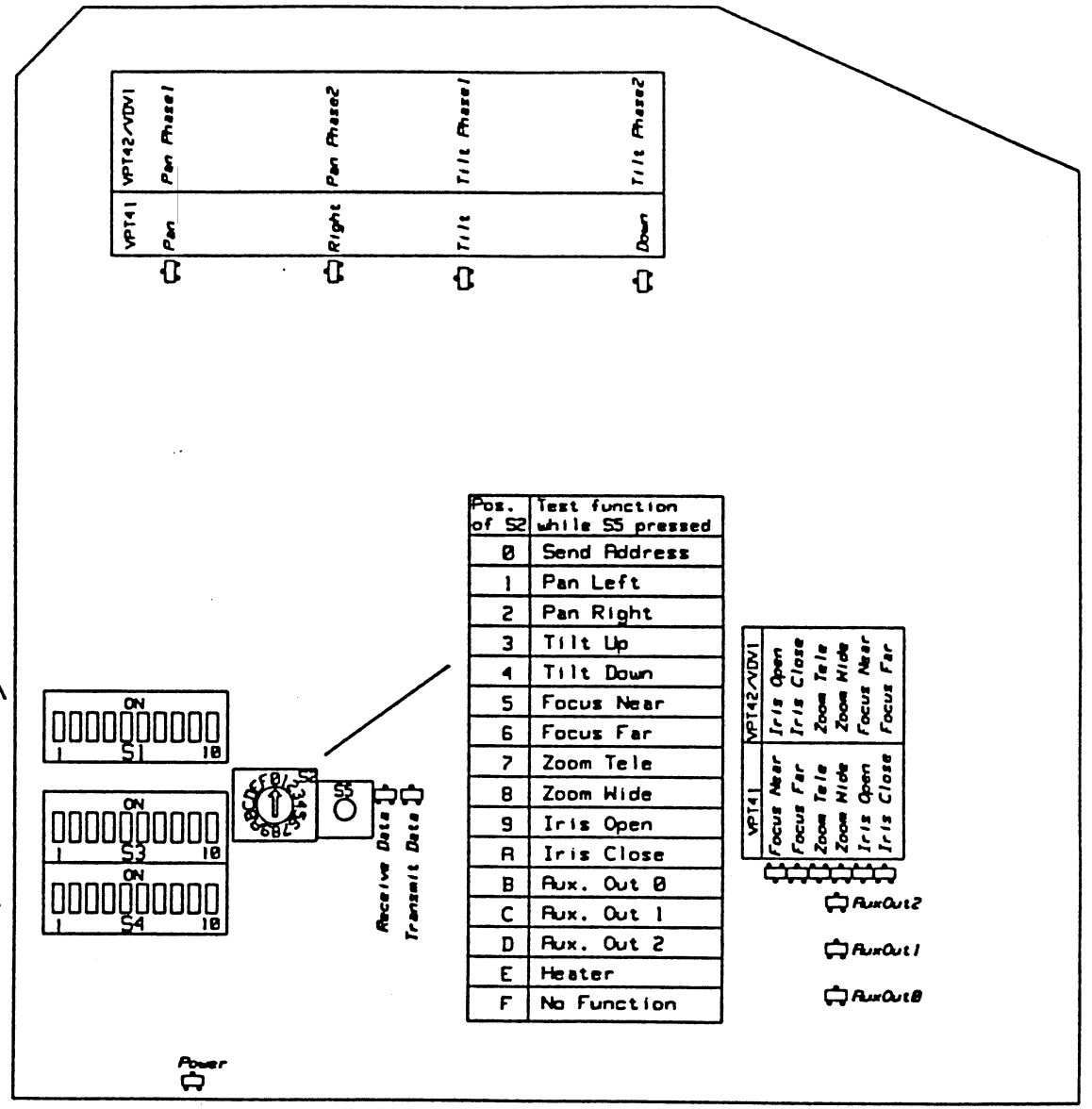
Heiland electronic
Automatisierungs- und Messtechnik

REV. 2
FILE: vptb42_1

Address selected by S1										
Switch No.	1	2	3	4	5	6	7	8	9	10
Address if switch ON	1	2	4	8	16	32	64	128	256	512

Functions selected by S3										
1	2	3	X	4	5	6	7	8	9	10
Relais-Mux				No Function	No Function	No Function	No Function	No Function	No Function	No Function

Functions selected by S4										
1	2	3	4	5	X	6	7	8	9	10
OFF: State-LED's enabled ON: State-LED's disabled	No Function	OFF	OFF	OFF	300	OFF: Heater off during Pan/Tilt OFF: Heater on during Pan/Tilt	OFF: Heat only by resistors ON: Additional heat by motors	OFF: Mounting Direction normal ON: Mounting Direction Upside down	No Function	No Function
		ON	OFF	OFF	600					
		OFF	ON	OFF	1200					
		ON	ON	OFF	2400					
		OFF	OFF	ON	4800					
		ON	OFF	ON	9600					
		OFF	ON	ON	19200					
		ON	ON	ON	-----					
		Baud Rate								



Pos. of S2	Test function while S5 pressed
0	Send Address
1	Pan Left
2	Pan Right
3	Tilt Up
4	Tilt Down
5	Focus Near
6	Focus Far
7	Zoom Tele
8	Zoom Wide
9	Iris Open
A	Iris Close
B	Aux. Out 0
C	Aux. Out 1
D	Aux. Out 2
E	Heater
F	No Function

CHANGE	DATE	CHECK	DATE	DATE	26.09.97
				NAME	J.HEILAND
				CHECK	
				SCALE	1 : 1

Heiland electronic

ASSEMBLY DRAWING

VPT41/VPT42/VDV1
Modeswitches and Identifiers

REV. 2

FILE: vptb s

VT Kommando Übersicht			A...Z, a...z, 0, 1, 2 = ASCII, nnn = Adresse in ASCII (000 bis 999); mmh nnh= Adresse in hex; ssh = Speed in hex	
Steuerfunktion	**Speed**		**VT**	**Bemerkung**
Datenformat			9600,8,n,1	
S/N-Kopf-Steuerung, fixed speed				
Schwenken rechts	max	5	P mmh nnh R 00h	bei var.Speed Version mit kleiner Geschw. fahren
Schwenken links	max	5	P mmh nnh L 00h	"
Neigen hoch	max	5	P mmh nnh U 00h	"
Neigen tief	max	5	P mmh nnh D 00h	"
Schwenken+Neigen rechts+hoch	max	5	P mmh nnh S 00h	"
Schwenken+Neigen rechts+tief	max	5	P mmh nnh M 00h	"
Schwenken+Neigen links+hoch	max	5	P mmh nnh V 00h	"
Schwenken+Neigen links+tief	max	5	P mmh nnh E 00h	"
S/N-Kopf-Steuerung, variable speed				
Schwenken rechts, +speed	var	6	P mmh nnh R ssh 00h	01h < ssh > FFh, 1d...255d
Schwenken links, +speed	var	6	P mmh nnh L ssh 00h	"
Neigen hoch, +speed	var	6	P mmh nnh U ssh 00h	"
Neigen tief, +speed	var	6	P mmh nnh D ssh 00h	"
Schwenken+Neigen rechts+hoch, +speed	var	7	P mmh nnh S pph tth 00h	01h < pph,tth > FFh, 1d...255d
Schwenken+Neigen rechts+tief, +speed	var	7	P mmh nnh M pph tth 00h	"
Schwenken+Neigen links+hoch, +speed	var	7	P mmh nnh V pph tth 00h	"
Schwenken+Neigen links+tief, +speed	var	7	P mmh nnh E pph tth 00h	"
Stop Schwenken		5	P mmh nnh I 00h	
Stop Neigen		5	P mmh nnh J 00h	
Stop Schwenken+Neigen		5	P mmh nnh X 00h	
S/N-Geschwindigkeit normal			./.	
S/N-Geschwindigkeit hoch			./.	

Objektiv-Steuerung				
Zoom tele	max	5	P mmh nnh T 00h	
Zoom wide	max	5	P mmh nnh W 00h	
Focus far	max	5	P mmh nnh F 00h	
Focus near	max	5	P mmh nnh N 00h	
Iris open	max	5	P mmh nnh O 00h	
Iris close	max	5	P mmh nnh C 00h	
Zoom tele + speed	var	6	P mmh nnh T ssh 00h	01h < ssh > FFh, 1d...255d
Zoom wide + speed	var	6	P mmh nnh W ssh 00h	"
Focus far + speed	var	6	P mmh nnh F ssh 00h	"
Focus near + speed	var	6	P mmh nnh N ssh 00h	"
Iris open + speed	var	6	P mmh nnh O ssh 00h	"
Iris close + speed	var	6	P mmh nnh C ssh 00h	"
Stop Zoom		5	P mmh nnh K 00h	
Stop Focus		5	P mmh nnh G 00h	
Stop Iris		5	P mmh nnh B 00h	
Stop Objektiv-Steuerung		5	P mmh nnh Y 00h	

Positions-Steuerung	mem			
Pos.Steuerung Start Kommando			./.	
Position speichern		6	P mmh nnh s pph 00h	01h < pph > 40h, 1d...64d
Position anfahren		6	P mmh nnh c pph 00h	01h < pph > 40h, 1d...64d
Geschw. wärend des Positionierens	sto	6	P mmh nnh v ssh 00h	01h < ssh > FFh, 1d...255d, für PAN und TILT
Positionsumlauf Start (Simatrix)		5	P mmh nnh u 00h	Pos.Umlauf von Umlaufanfang bis Umlaufende, max. 64
Positionsumlauf Start (AW Steuerung)		5	P mmh nnh t 00h	Pos.Umlauf von Pos.1 bis Pos.8 ! ! !
Positionsumlauf abbrechen	res	5	P mmh nnh x 00h	wird auch durch Rechts oder Links unterbrochen
Position für den Umlaufanfang (Simatrix)	sto	6	P mmh nnh d pph 00h	01h < pph > 40h, 1d...64d
Position für das Umlaufende (Simatrix)	sto	6	P mmh nnh e pph 00h	01h < pph > 40h, 1d...64d
Ruhezeit pro Position bei Umlauf	sto	6	P mmh nnh t ddh 00h	01h < ddh > FFh, 1d... 255d sec, Zeit läuft ab dem Erreichen der Position
Position in den Umlauf aufnehmen (AW Steuerung)	sto	6	P mmh nnh I pph 00h	01h < pph > 08h, 1d...8d
Position aus Umlauf herausnehmen (AW Steuerung)	sto	6	P mmh nnh B pph 00h	01h < pph > 08h, 1d...8d
Pan Speed, während des Umlaufs	sto	6	P mmh nnh H ssh 00h	01h < ssh > FFh, 1d...255d
Tilt Speed, während des Umlaufs	sto	6	P mmh nnh V ssh 00h	01h < ssh > FFh, 1d...255d
Endposition rechts speichern	sto	5	P mmh nnh l 00h	
Endposition links speichern	sto	5	P mmh nnh w 00h	
Endposition hoch speichern	sto	5	P mmh nnh k 00h	
Endposition tief speichern	sto	5	P mmh nnh p 00h	
Endpositionen begrenzen	sto	5	P mmh nnh j 00h	
Endpositionen abschalten	init	5	P mmh nnh o 00h	
Initialisierung		5	P mmh nnh i 00h	
Zufallsbetrieb (Umlauf) aktiv		5	P mmh nnh r 00h	
Zufallsbetrieb (Umlauf) inaktiv	res	5	P mmh nnh q 00h	
max. Positioniergeschw. im Zufallsbetr.	sto	6	P mmh nnh f ssh 00h	01h < ssh > FFh, 1d...255d
min. Positioniergeschw. im Zufallsbetr.	sto	6	P mmh nnh g ssh 00h	01h < ssh > FFh, 1d...255d
max. Ruhezeit im Zufallsbetrieb	sto	6	P mmh nnh m ddh 00h	01h < ddh > FFh, 1d... 255d sec
min. Ruhezeit im Zufallsbetrieb	sto	6	P mmh nnh n ddh 00h	01h < ddh > FFh, 1d... 255d sec
Einleitung für mehrere Kommandos			./.	
Auto Homeposition aktiv		5	P mmh nnh h 00h	Autopan Positionen #63 und #64, (Siemens hat kein Autopan)
Auto Homeposition inaktiv	res	5	P mmh nnh y 00h	
Auto Homeposition Wartezeit	sto	6	P mmh nnh h ddh 00h	01h < ddh > FFh, 1d... 255d sec
Grundposition anfahren (Homeposition)		5	P mmh nnh H 00h	Position #1 (VT), #1 (Geutebrück), #64 (Siemens)
Autopan Ein		5	P mmh nnh a 00h	
Autopan Aus	res	5	P mmh nnh b 00h	
Autopan Geschwindigkeit	sto	6	P mmh nnh a ssh 00h	01h < ssh > FFh, 1d...255d
Autopan Dauer einstellen	sto	6	P mmh nnh P ddh 00h	01h < ddh > FFh, 1d... 254d min, 255d = unendlich

Relais-Steuerung				
Relais 1 aktiv		6	P mmh nnh A 11h 00h	
Relais 2 aktiv		6	P mmh nnh A 21h 00h	
Relais 3 aktiv		6	P mmh nnh A 31h 00h	
Relais 4 aktiv		6	P mmh nnh A 41h 00h	
Relais 5 aktiv		6	P mmh nnh A 51h 00h	
Relais 6 aktiv		6	P mmh nnh A 61h 00h	
Relais 7 aktiv		6	P mmh nnh A 71h 00h	
Relais 8 aktiv		6	P mmh nnh A 81h 00h	
Relais 1 inaktiv	res	6	P mmh nnh A 10h 00h	
Relais 2 inaktiv	res	6	P mmh nnh A 20h 00h	
Relais 3 inaktiv	res	6	P mmh nnh A 30h 00h	
Relais 4 inaktiv	res	6	P mmh nnh A 40h 00h	
Relais 5 inaktiv	res	6	P mmh nnh A 50h 00h	
Relais 6 inaktiv	res	6	P mmh nnh A 60h 00h	
Relais 7 inaktiv	res	6	P mmh nnh A 70h 00h	
Relais 8 inaktiv	res	6	P mmh nnh A 80h 00h	
Relais 1 aktiv, Relais 2 inaktiv		6	P mmh nnh A A2h 00h	
Relais 2 aktiv, Relais 1 inaktiv		6	P mmh nnh A A3h 00h	
Relais 1 + 2 aktiv		6	P mmh nnh A A1h 00h	
Relais 1 + 2 inaktiv	res	6	P mmh nnh A A0h 00h	
alle Relais einschalten		6	P mmh nnh A F1h 00h	
alle Relais ausschalten	res	6	P mmh nnh A F0h 00h	
Sonderfunktionen				
Beleuchtung einschalten		6	X mmh nnh L 1 00h	
Beleuchtung ausschalten		6	X mmh nnh L 0 00h	
Kamera einschalten		6	X mmh nnh C 1 00h	
Kamera ausschalten		6	X mmh nnh C 0 00h	
Wisch/Wasch einschalten		6	X mmh nnh W 1 00h	
Wisch/Wasch ausschalten		6	X mmh nnh W 0 00h	
Pumpe einschalten		6	X mmh nnh P 1 00h	
Pumpe ausschalten		6	X mmh nnh P 0 00h	
Extrafunktion F0 einschalten		6	X mmh nnh X 1 00h	
Extrafunktion F0 ausschalten		6	X mmh nnh X 0 00h	
Extrafunktion F1 einschalten		6	X mmh nnh Y 1 00h	
Extrafunktion F1 ausschalten		6	X mmh nnh Y 0 00h	
Wisch-/Wasch-Zyklus starten		5	X mmh nnh S 00h	
Wisch-/Wasch-Dauer	sto	6	X mmh nnh S ddh 00h	01h < ddh > FFh, 1d... 255d sec
Reset			./.	

K500 Kamera parametrieren				
K500, open port		5	C mmh nnh 04h 00h	
K500, close port		5	C mmh nnh 80h 00h	
Bildausschnitt Zoom +		5	C mmh nnh 57h 00h	
Bildausschnitt Zoom -		5	C mmh nnh 53h 00h	
Bildausschnitt rechts		5	C mmh nnh 51h 00h	
Bildausschnitt links		5	C mmh nnh 52h 00h	
Bildausschnitt tief		5	C mmh nnh 54h 00h	
Bildausschnitt hoch		5	C mmh nnh 58h 00h	
Bildausschnitt rechts / hoch		5	C mmh nnh 59h 00h	
Bildausschnitt links / hoch		5	C mmh nnh 5Ah 00h	
Bildausschnitt rechts / tief		5	C mmh nnh 55h 00h	
Bildausschnitt links / tief		5	C mmh nnh 56h 00h	
Bildausschnitt-Steuerung Stop		5	C mmh nnh 50h 00h	
K500 OSD On und 2xSET-Taste		5	C mmh nnh 5Bh 00h	
K500 SET-Taste		5	C mmh nnh 5Ch 00h	
K500 UP-Taste		5	C mmh nnh 5Dh 00h	
K500 DOWN-Taste		5	C mmh nnh 5Eh 00h	
K500 Gain +4dB (standard)		5	C mmh nnh 5Fh 00h	
K500 Gain +10dB		5	C mmh nnh 60h 00h	

VDV-20C Dome Sonderbefehle				
Adresse einstellen	sto	8	P mmh nnh A S xxh yyh 00h	Adreßkodierung für xxh und yyh siehe Hinweise (letztes Blatt).
Position anfahren, mit X/Y-Koordinaten		8	P mmh nnh G pp2 pph1 pph0 00h	Position evtl. codiert übertragen, Hinweis 1) (letztes Blatt) beachten
Pan 180° drehen		5	P mmh nnh f 00h	
Clear				siehe Kommando "Initialisierung", Blatt 3
Alarm reading			?	
Zoom Speed	sto	7	P mmh nnh Z S X1 00h	X1 = ASC-Zeichen, 1 < > 3
Focus manuell		7	P mmh nnh F O M 00h	
Focus Auto	res	7	P mmh nnh F O A 00h	
Autotracking		6	P mmh nnh A T 00h	
Tour 1 laden	sto	6+n	P mmh nnh L 1 (B1) ..... (Bn) 00h	B1... Bn sind Datenblöcke á 6 Byte, Hinweis 1) beachten
Tour 2 laden	sto	6+n	P mmh nnh L 2 (B1) ..... (Bn) 00h	B1... Bn sind Datenblöcke á 6 Byte, Hinweis 1) beachten
Tour 1 starten	res	7	P mmh nnh T R 1 00h	
Tour 2 starten	res	7	P mmh nnh T R 2 00h	
Tour abbrechen		7	P mmh nnh T S T 00h	Tour kann auch mit Befehl Rechts o. ä. beendet werden
VDV-20C Dome Kamera parametrieren (sind im Protocol (78) /II vom 21.08.97 nicht mehr vorhanden), können gestrichen werden ???				
AGC Auto		6	C mmh nnh A A 00h	
AGC manuell		6	C mmh nnh A M 00h	
AGC set	sto	8	C mmh nnh A X1 X2 X3 00h	X1, X2, X3 = ASC-Zeichen, 000 < > 1C0
Digital Zoom on		6	C mmh nnh D 1 00h	
Digital Zoom off		6	C mmh nnh D 0 00h	
Magnification	sto	7	C mmh nnh M X1 X2 00h	X1, X2 = ASC-Zeichen
Auto Shutter on		6	C mmh nnh S A 00h	
Shutter manuell		6	C mmh nnh S M 00h	
Shutter set	sto	7	C mmh nnh S X1 X2 00h	X1, X2 = ASC-Zeichen
Brightness Auto		6	C mmh nnh B A 00h	
Brightness manuell		6	C mmh nnh B M 00h	
Brightness set	sto	7	C mmh nnh B X1 X2 00h	X1, X2 = ASC-Zeichen
White Balance Auto		6	C mmh nnh W A 00h	
White Balance Manuell		6	C mmh nnh W M 00h	
White level set	sto	7	C mmh nnh W X1 X2 00h	X1, X2 = ASC-Zeichen
VDV-20C Dome Kamera Onscreen Menu Controls (Protocol (78) / II vom 21.08.97)				
Camera On-Screen Menu		6	C mmh nnh O S 00h	
Cursor up		6	C mmh nnh C U 00h	
Cursor down		6	C mmh nnh C D 00h	
SET Button		6	C mmh nnh B S 00h	
Button Release		6	C mmh nnh B R 00h	
Camera Set-up ready		6	C mmh nnh S R 00h	
Start ID Menu		6	C mmh nnh I D 00h	

Hinweise zum VT Protokoll

1) Das Hexzeichen <00h> dient zur Kennzeichnung des Kommando-Endes und darf in der Zeichenfolge eines Kommandos nur einmal vorkommen und zwar als Abschlußzeichen.
Außerhalb eines Kommandostrings kann das Zeichen <00h> beliebig oft vorkommen.

2) Die Parameter für Geschwindigkeit- oder Zeit-Einstellungen haben als niedrigsten Wert immer 1 und nicht 0.

3) Wenn bei den kombinierten Kommandos (z.B. Schwenken und Neigen für VS-Köpfe) die Geschwindigkeit für eine Richtung 0 ist, dann muß das einfache Kommando für nur eine Richtung verwendet werden.

4) Die niedrigste Geräteadresse ist "0", entspicht der Kommandoadresse <80h> <80h>.

5) Die Generaladresse ist "2047", entsprechend <8Fh> <FF>. Die höchste Geräteadresse ist "2046"; enspricht der Kommandoadresse <8Fh> <FEh>.

6) Der Aufbau des niederwertigen Adreßbytes (nnh) :
Bit0 ... Bit6 enthalten die niederwertigen Bits der Adresse
Bit7 ist immer "1"

7) Der Aufbau des höherwertigen Adreßbytes (mmh) :
Bit0 ... Bit3 enthalten die höherwertigen Bits der Adresse
Bit4 ... Bit 6 sind reserviert und vorläufig auf "0"
Bit7 ist immer "1"

8) Gerätekennbuchstaben
P - Pan/Tilt Head
C - Camera, Camera- und P/T-Adresse sind identisch
M - Matrix
K - Keybord
A - Alarm Unit
R - Relay Unit
X - Sonderfunktionen
usw.

9) die Datenblöcke der Befehle "Tour 1/2 laden" beinhalten die Parameter H Speed / V Speed / Zoom Speed / Position / Standzeit.

10) X X X die Befehle die den VDV-20C Dome betreffen sind von VT vorgegeben, aber vom Hersteller noch nicht bestätigt, 14.08.97. X X X

Beispiele :

Kamera #1, rechts Schwenken	<50k> <80h> <81h> <52h> <00h>
Kamera #520, Zoom tele	<50h> <84h> <88h> <54h> <00h>
Kamera #128, Position #12 anfahren	<50h> <81h> <80h> <63h> <0Ch> <00h>
Kamera #2000, Autopandauer 120min	<50h> <8Fh> <D0h> <50h> <F8h> <00h>
Kamera #1000, Schwenken links, Speed #55	<50h> <87h> <E8h> <4Ch> <B7h> <00h>
Kamera #2, Auto Homeposition, Wartezeit 60 sec	<50h> <80h> <82h> <68h> <BCh> <00h>
alle S/N-Köpfe, auf Homeposition fahren	<50h> <8Fh> <FFh> <48h> <00h>

Befehlsdauer bei Datenformat 8,n,2

	2400Bd	9600Bd
5 Byte	22,9ms	5,7ms
6 Byte	27,5ms	6,9ms
7 Byte	32,1ms	8,0ms