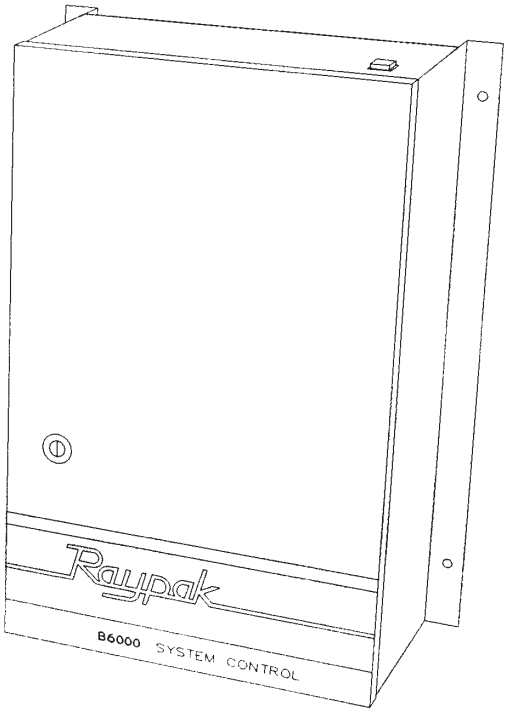
CATALOG NO.: 5000.60 B
Effective: 4-09-08
Replaces: 3-15-99



METASYS® COMPATIBLE PRODUCT

T-2
Raypak B6000 Metasys™ N2
System Protocol Interface

T-2 Communications Interface

Raypak B6000 Boiler Controller

to Johnson Controls Metasys N2 Interface Card

Installation and Operating Manual

Raypak® A Rheem® Company

P/N 240717 Rev. 3

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APPENDICES

NOTE: Minimum 18 AWG, 105°C, stranded wire must be used for all low voltage (less than 30 volts) external connections to the unit. Solid conductors should not be used because they can cause excessive tension on contact points. Install conduit as appropriate. All high voltage wires must be the same size (105°C, stranded wire) as the ones on the unit or larger.

1. Product Specifications

The Raypak Gateway card is a hardware product designed to be a communications front end for the Raypak B6000 Boiler Control and Johnson Controls N2 compatible masters.

The product includes the following functionality:

Metasys N2 Slave Interface

- Binary Input, Binary Output, Analog Input and Analog Output data type commands supported for primary control/monitoring of the B6000 operating parameters

- Supported Command/Subcommands:

0/4	:	Poll Message No Acknowledge
0/5	:	Poll Message with Acknowledge
0/9	:	Status Update
1/1	:	Read Analog Input Attributes
1/2	:	Read Binary Input Attributes
1/3	:	Read Analog Output Attributes
1/4	:	Read Binary Output Attributes
2/1	:	Write Analog Input Attributes
2/2	:	Write Binary Input Attributes
2/3	:	Write Analog Output Attributes
2/4	:	Write Binary Output Attributes
7/2/3	:	Override Analog Output
7/2/4	:	Override Binary Output
F	:	Identify Device Type

The following commands are recognized, and acknowledged, but do not have impact on the operation of the Gateway, and do not return any data:

0/0	:	Time Update
0/8	:	Warm Start

All other commands return a Bad Command Error Code

- Warning and Alarming functions preform on Analog Input and Binary Input data types

- Change of State Reponse buffering

Raypak B6000 Interface

- RS-485 electrical interface (as well as RS-232 and RS-422)

- Emulates Raypak Modem address and functionality

General Specifications

- Configuration via dip switches
  Slave Address, Baud and Parity

Hardware Specifications

- 4"x5" form factor

- Two male 9-pin D shell connectors

- Slave communications port configurable for RS-232C or RS-422/485

- Communication status - Active and Fault for each port

- 9 to 30 VDC external power

2.0 Metasys Slave Port Functionality

2.1 N2 Slave Communications

The Comminications Interface card supports the Johnson Controls Metasys™ N2 Protocol, as a slave, on port 1. This capability allows the module to communicate data from the Raypak B6000 Boiler Control to a Johnson Controls Metasys Master such as the Johnson Controls Companion™ or Metasys software.

The following discusses the functional capabilities of the card.

2.1.1 Command/Reply Cycle

Successful communications between a Slave and a Master will always consist of the following two transactions:

Command: Message from master giving instruction to slave.

Reply: Response to command.

A slave station will respond to a master issued command in several ways.

Data Message: If the command was executed by the Slave, the response message will include the data requested, or an acknowledgment that the command was executed.

Error Message: If the command could not be executed by the Slave, for whatever reason, an error response message is transmitted to the master. The error response message contains an error code indicating the cause of the error.

No Reply: If the master does not detect a reply within its time-out period, the master should retransmit the command, before a time out error is issued. If the Slave could not decode the message or an error occurred preventing the Slave from recognizing the message, no response will be issued.

2.1.2 N2 System Protocol Commands

The T-2 supports the commands and the data types necessary to enable control of the B6000 Controller from an N2 master. The data types and the commands, as well as the associated addressable points are overviewed below.

Data Types The N2 System protocol treats data as objects, with each data type having a different structure and purpose. The data types recognized by the T-2 card are as follows:

- Binary Input (BI)
- Binary Output (BO)
- Analog Input (AI)
- Analog Output (AO)

Reading Attributes

The data objects contain attributes which describe several data points, and some of its functionality. The contents of these attributes, including object configuration, status, current value, and alarm/warning limits, can be accessed with the following commands:

1/1 Read Analog Input Attributes
1/2 Read Binary Input Attributes
1/3 Read Analog Output Attributes
1/4 Read Binary Output Attributes

Writing Attributes

The data object attributes can be configured by a master using the following commands:

2/1	Write Analog Input Attributes
2/2	Write Binary Input Attributes
2/3	Write Analog Output Attributes
2/4	Write Binary Output Attributes

Controlling the B6000 Controller

Access to the control functions is made available through the Override commands. The following commands allow the B6000 to be controlled:

7/2/3	Override Analog Output
7/2/4	Override Binary Output

Status Update

The host can issue a 'Status Update' command to the T-2. The response will contain device information ("1500-N2 Rev 1.0A") as well as current status information.

0/9	Status Update

Identify Device

When a master host first powers up, the 'Identify Device' command is issued to all of the Slaves. In the case of the T-2 card, the Device Code 10 Hex is returned to the host. When the Gateway first powers up, it will return and error code 0 in response to all commands from the host, indicating to the host that a power up condition has occurred. The host will respond with the "Identify Device' command, telling the Communications Interface that the host has detected the power condition. The command code is:

F	Identify Device

2.1.3 Command Error Checking

When the Slave cannot execute a command, an error code is generated and returned to the Master. Error codes generated at the Slave will usually be indicative of an illegal function, an illegal address, or bad data.

2.1.4 Data Integrity

As in all good protocols, there must exist a level of data integrity checking to verify, with some degree of assurance, the quality of the transmitted data. The N2 System protocol supports a summation/modulus type of error checking on the address and data content of the communication packet.

2.2 N2 Point Layout

A relationship between the N2 Point Address and the B6000 parameters has been set up to ease control and monitoring of the unit. The relationship, by data object type, is shown in detail in Appendix A.

3.0 Hardware Setup

3.1 1500 Interface Card Setup

3.1.1 Connecting Power to the T-2 Card

The T-2 Card requires an external source of DC voltage. The DC source voltage should be between 9V and 30V. The power is connected to TB1, located near the two 9 pin serial port connections.

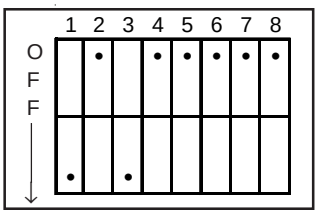
The connection to TB1 is as follows:

TB1-1	9-30 VDC (+)
TB1-2	Common (-)

3.1.2 Dip Switch Configuration

The T-2 card is configured primarily through two sets of dip switches. These switches are read initially on power up only.
The function of the dip switches is as follows (a value of one (1) is registered when the switch is in the ON position):

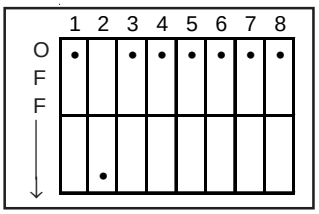
SW 1



OFF Position:

ON Position:

SW 2



OFF Position:

ON Position:

SW1 : Metasys Port Configuration

Switch Position	Function	Positions
1	Baud Rate	3 2 1
2	Selection	0 0 0 300
3		0 0 1 600
		0 1 0 1200
		0 1 1 2400
		1 0 0 4800
		1 0 1 **9600 - ***
		1 1 0 19200
		1 1 1 19200
4	Parity	5 4
5	Selection	0 0 **None - ***
		0 1 Odd
		1 0 Even
		1 1 Invalid
6	Not Used	
7		
8		

*** Factory Settings**
9600, No Parity, Address Bit 1

SW2 : Metasys N2 Slave Address Configuration

Switch Position	Function	Positions		
1	Baud Rate	1	Address Bit 0	Value = 1
2	Address	2	Address Bit 1	**Value = 2 - ***
3	Select	3	Address Bit 2	Value = 4
4		4	Address Bit 3	Value = 8
5		5	Address Bit 4	Value = 16
6		6	Address Bit 5	Value = 32
7		7	Address Bit 6	Value = 64
8		8	Address Bit 7	Value = 128

The parameters are defined as follows:

Baud Rate: The baud rate at which the module is to operate.
The baud rate is configured as follows:

Value	Baud Rate
0	300 Baud
1	600 Baud
2	1200 Baud
3	2400 Baud
4	4800 Baud
5	9600 Baud*
6	19200 Baud

If a value outside of this range is selected,upon firing the power up process the card's LEDs will flash on 1/2 second intervals until a correct address is selected. Powering down is not necessary.

Parity: The parity mode to be used by the module is defined by this word as follows:

0 No parity
1 Odd parity
2 Even parity

Metasys N2 Slave Address: Each of the separate drops off of a Johnson Controls Metasys Host must have a different Slave address. The Slave address is selected by encoding the Slave address in a binary form using the dip switches.

3.1.3 1500 Jumper Configurations

The 1500 Interface card has five sets of jumpers on the board. Generally, the default jumper positions will be adequate for most applications, with JP4 and JP5 being the only jumpers that should ever need to be reviewed. For completeness, we provide the following discussion on all of the jumper locations:

JP	Discussion
1	Hardware Reset (Not used)
2	Isolated Port 2 Power 1-2 Non-Isolated **(Default)** 2-3 Isolated (Should not be used)
3	Isolated Port 2 Ground 1-2 Non-Isolated **(Default)** 2-3 Isolated (Should not be used)
4	Metasys Port (P1) Termination Resistor 1-2 Connect 120 Ohms across Rec lines 2-3 Disconnect 120 Ohms (**Default)**
5	Metasys Port (P1) RS-232 or RS-422/485 Select 1-2 RS-232 Select (Should not be used) 2-3 RS-422/485 Select **(Default)**

3.2 B6000 Communications

The B6000 Communications Interface has been hard coded to operate at the following default conditions:

Baud	9600
Parity	Odd
Stop Bits	1

The 1500 Interface card emulates the modem card that is normally connected to the B6000.

4.0 N2 System Protocol Support

The Raypak T-2 card supports several data read and write commands for the N2 System protocol. The decision on which command to use is made depending on the type of data being addressed, and the level of protocol support in the master equipment. The following sections detail the different commands supported by the module.

4.1 Attribute Commands

The T-2 Interface card supports the reading and writing to the data object attributes. Although read/write support is available for all attributes (i.e., the card will accept, store, and respond with values downloaded from a master), the T-2 does not use all aspects of the attribute functions. The following subsections discuss each data type, and in particular any functional aspects not supported by the T-2.

4.1.1 Analog Input

The Analog Input data object is by far the most complicated of the objects. All aspects of warning and alarm logic are supported by the T-2 (i.e., the T-2 uses the low and high alarm/warning limits to detect and trigger the object's alarm bits).

Not supported however are the linear ranging parameters, the filter weight, and the offset. The presumption is made that all analog input values gathered from the B6000 will come in scaled. No scaling parameters are required from the master to support any of the analog input values.

4.1.2 Binary Input

The Binary Input data object supports the normal state and alarm logic. The debounce and accumulator attributes are not supported.

4.1.3 Analog Output

The Analog Output data object is used by the T-2 as a simple conduit for set points in the B6000. No support is provided for scaling the output value, or for verifying the saturation level of the output value. The value written from the Master is communicated to the Controller.

4.1.4 Binary Output

The Binary Output data object is implemented to respond directly to the commands received from the master. When the master sends an output command, either a bit set or reset, the command is decoded and communicated to the Controller.

4.2 Control Commands

The 1500 card accepts control commands from a Master upon receipt of the following commands:

- Override Analog Output (Command 7/2/3)
- Override Binary Output (Command 7/2/4)

4.3 Device Identifier Code

When the T-2 receives an "Identify Yourself" command, the code 10 Hex is sent to the Master. The 10 Hex is the device ID used by Non-Johnson Controls hardware.

5.0 Diagnostics

Several hardware diagnostics capabilities have been implemented using the LED indicator lights on the front of the 1500 card. The possible conditions as indicated by the lights are:

5.1 LED Indicators

Several hardware diagnostics capabilities have been implemented using the LED indicator lights on the front of the module. The possible conditions as indicated by the lights are:

NAME	Color	Status	Indication
PORT ACTIVE	Green	Blinking	The 1500 is receiving a valid response from the Metasys Host
		OFF	The 1500 is not detecting a valid command. If the master is transmitting, be sure all dip switches are set correctly.
PORT 2 ACTIVE	Green	Blinking	The 1500 is processing a B6000 command.
		OFF	Check cable connections
PORT 1 COMM ERR	Red	ON	The Metasys port has detected a communications error condition
		OFF	No error conditions at this time.
PORT 2 FAULT	Red	ON	The 1500 card has detected a communications error condition.
		OFF	No error condition as at this time.

Should the configuration dip swicthes select an invalid address or an invalid baud rate, the LED indicators will alternate in an on/off fashion on 1/2 second intervals until correct values are selected.

APPENDIX A

Metasys Point Mapping

Raypak Metasys Register Assignments

Analog Output	Parm Offset	Description	
AO1	28	Setpoint	Day Setup (Desired water temp @ 70F)
AO2	29	Nitesetpoint	Night Setpoing (Desired water temp @ 70F)
AO3	30	Ratio Out	1-200 = 0.1 - 20.0 in 0.1 increments
AO4	31	Throttling	Delta T of all boilers in system
AO5	32	Modulating Step (%)	
AO6	33	Wait State Time (Sec)	
AO7	34	Outdoor Cut off temperature	
AO8	35	Control Band (degrees F tolerance from TAR)	
AO9	36	Lead Boiler Number (1 to Number of Boilers online)	
AO10	37	Number of Boilers on line	
AO11	38	TP - Boiler Pump Delay (Min) Boiler #1	
AO12	39	TP - Boiler Pump Delay (Min) Boiler #2	
AO13	40	TP - Boiler Pump Delay (Min) Boiler #3	
AO14	41	TP - Boiler Pump Delay (Min) Boiler #4	
AO15	42	TP - Boiler Pump Delay (Min) Boiler #5	
AO16	43	TP - Boiler Pump Delay (Min) Boiler #6	
AO17	44	TP - Boiler Pump Delay (Min) Boiler #7	
AO18	45	TP - Boiler Pump Delay (Min) Boiler #8	
AO19	46	TS - Boiler Start Times (Sec) Boiler #1	
AO20	47	TS - Ignition Time (Sec) Boiler #2	
AO21	48	TS - Ignition Time (Sec) Boiler #3	
AO22	49	TS - Ignition Time (Sec) Boiler #4	
AO23	50	TS - Ignition Time (Sec) Boiler #5	
AO24	51	TS - Ignition Time (Sec) Boiler #6	
AO25	52	TS - Ignition Time (Sec) Boiler #7	
AO26	53	TS - Ignition Time (Sec) Boiler #8	
AO27	53	Time - Hrs	
AO28	54	Time - Min	
AO29	55	Time - DWK	
AO30	57	Lead Change Hours	
AO31	160	OC Dead band: Off T>)C, ON T<=OC-OC&B	
AO32	161	Wait 1: Integral "I" Wait State Time	
AO33	162	KPN : Propportional "P" Constant Numerator (0-255)	
AO34	163	KPD : Propportional "P" Constant Denominator (0-255)	
AO35	164	KDN : Differential "D" Constant Numerator (0-255)	
AO36	165	KDD : Differential "D" Constant Denominator (0-255)	

Binary Output	Parm Offset	Description	
BO1	166	Initialize B6000 by writing STAR 80h odh to unit	STAR
BO2	167	Setback on/off control (0 = Off, 1 = On) - Write word value to B6000	4025h

Raypak Metasys Register Assignments

Analog Input	Parm Offset	Description
AI 1	60	Outdoor Temperature + 35
AI 2	61	Water Temperature + 35
AI 3	62	Controller Target Temp
AI 4	63	Valve Positions (0-100%) - Boiler #1
AI 5	64	Valve Positions (0-100%) - Boiler #2
AI 6	65	Valve Positions (0-100%) - Boiler #3
AI 7	66	Valve Positions (0-100%) - Boiler #4
AI 8	67	Valve Positions (0-100%) - Boiler #5
AI 9	68	Valve Positions (0-100%) - Boiler #6
AI 10	69	Valve Positions (0-100%) - Boiler #7
AI 11	70	Valve Positions (0-100%) - Boiler #8
AI 12	79	Setpoint Day Setup (Desired water temp @ 70F)
AI 13	80	Niteset Night Setpoing (Desired water temp @ 70F)
AI 14	81	Ratio Out 1-200 = 0.1 - 20.0 in 0.1 increments
AI 15	82	Throttling Delta T of all boilers in system
AI 16	83	Modulating Step (%)
AI 17	84	Wait State Time (Sec)
AI 18	85	Outdoor Cut off temperature
AI 19	86	Control Band (degrees F tolerance from TAR)
AI 20	87	Lead Boiler Number (1 to Number of Boilers online)
AI 21	88	Number of Boilers on line
AI 22	89	TP - Boiler Pump Delay (Min) Boiler #1 -Combine w/ seconds registers
AI 23	90	TP - Boiler Pump Delay (Min) Boiler #2
AI 24	91	TP - Boiler Pump Delay (Min) Boiler #3
AI 25	92	TP - Boiler Pump Delay (Min) Boiler #4
AI 26	93	TP - Boiler Pump Delay (Min) Boiler #5
AI 27	94	TP - Boiler Pump Delay (Min) Boiler #6
AI 28	95	TP - Boiler Pump Delay (Min) Boiler #7
AI 29	96	TP - Boiler Pump Delay (Min) Boiler #8
AI 30	97	TS - Ignition Time (Sec) Boiler #1
AI 31	98	TS - Ignition Time (Sec) Boiler #2
AI 32	99	TS - Ignition Time (Sec) Boiler #3
AI 33	100	TS - Ignition Time (Sec) Boiler #4
AI 34	101	TS - Ignition Time (Sec) Boiler #5
AI 35	102	TS - Ignition Time (Sec) Boiler #6
AI 36	103	TS - Ignition Time (Sec) Boiler #7
AI 37	104	TS - Ignition Time (Sec) Boiler #8
AI 38	105	Time - Hrs
AI 39	106	Time - Min
AI 40	107	Time - DWK
AI 41	108	LEAD CHANGE
AI 42	109	Hrs Remaining
AI 43	111/112	Boiler Valve Up Times (Sec) #1
AI 44	113/114	Boiler Valve Up Times (Sec) #2
AI 45	115/116	Boiler Valve Up Times (Sec) #3
AI 46	117/118	Boiler Valve Up Times (Sec) #4
AI 47	119/120	Boiler Valve Up Times (Sec) #5
AI 48	121/122	Boiler Valve Up Times (Sec) #6
AI 49	123/124	Boiler Valve Up Times (Sec) #7
AI 50	125/126	Boiler Valve Up Times (Sec) #8

AI 51	127/128	Boiler Valve Down Times (Sec) #1		
AI 52	129/130	Boiler Valve Down Times (Sec) #2		
AI 53	131/132	Boiler Valve Down Times (Sec) #3		
AI 54	133/134	Boiler Valve Down Times (Sec) #4		
AI 55	135/136	Boiler Valve Down Times (Sec) #5		
AI 56	137/138	Boiler Valve Down Times (Sec) #6		
AI 57	139/140	Boiler Valve Down Times (Sec) #7		
AI 58	141/142	Boiler Valve Down Times (Sec) #8		
AI 59	150	OC Dead band: Off T>)C, ON T<=OC-OC-	4621h	**extra read registers**
AI 60	151	Wait 1 : Integral “I” Wait State Time	4605h	
AI 61	152	KPN : Proportional “P” Constant Numerator (0-25	460bh	
AI 62	152	KPD: Proportional “P” Constant Denominator (0-2	460ch	
AI 63	153	KDN : Differential “D” Constant Numerator (0-255)	460fh	
AI 64	154	KDD: Differential “D” Constant Denominator (0-25	4610h	

Raypak Metasys Register Assignments

Binary Output	Parm Offset	Description		
Bl 1	58/0	Bit 0 = Night setback present	Night Setback	
Bl 2	59/0	Bit 0 = Fault Status (1=system fault)	Controller LED Status	
Bl 3	59/1	Bit 1 = call Out Request (1 = Yes)	Controller LED Status	
Bl 4	110/0	Bit 0 = Setbacl pm) 1_		
Bl 5	71/0	Boiler Not On Line		Boiler #1
Bl 6	/1	OK - Boiler Operation		
Bl 7	/2	Low Water outoff		
Bl 8	/3	Low Pressure Water		
Bl 9	/4	Low Pressure Gas		
Bl 10	/5	High Pressure Gas		
Bl 11	/6	High Limit		
Bl 12	/7	Thermostat - Operating aquastat (not fault)		
Bl 13	/8	Manual Override		
Bl 14	/9	Flow Switch		
Bl 15	/10	No Pilot		
Bl 16	72/0	Boiler Not On Line		Boiler #2
Bl 17	/1	OK - Boiler Operation		
Bl 18	/2	Low Water outoff		
Bl 19	/3	Low Pressure Water		
Bl 20	/4	Low Pressure Gas		
Bl 21	/5	High Pressure Gas		
Bl 22	/6	High Limit		
Bl 23	/7	Thermostat - Operating aquastat (not fault)		
Bl 24	/8	Manual Override		
Bl 25	/9	Flow Switch		
Bl 26	/10	No Pilot		
B127	73/0	Boiler Not On Line		Boiler #3
Bl 28	/1	OK - Boiler Operation		
Bl 29	/2	Low Water outoff		
Bl 30	/3	Low Pressure Water		
Bl 31	/4	Low Pressure Gas		
Bl 32	/5	High Pressure Gas		
Bl 33	/6	High Limit		
Bl 34	/7	Thermostat - Operating aquastat (not fault)		
Bl 35	/8	Manual Override		
Bl 36	/9	Flow Switch		
Bl 37	/10	No Pilot		
Bl 38	74/0	Boiler Not On Line		Boiler #4
Bl 39	/1	OK - Boiler Operation		
Bl 40	/2	Low Water outoff		
Bl 41	/3	Low Pressure Water		
Bl 42	/4	Low Pressure Gas		
Bl 43	/5	High Pressure Gas		
Bl 44	/6	High Limit		
Bl 45	/7	Thermostat - Operating aquastat (not fault)		
Bl 46	/8	Manual Override		
Bl 47	/9	Flow Switch		
Bl 48	/10	No Pilot		

BI 50	75/0	Boiler Not On Line	Boiler #5
BI 51	/1	OK - Boiler Operation	
BI 52	/2	Low Water outoff	
BI 53	/3	Low Pressure Water	
BI 54	/4	Low Pressure Gas	
BI 55	/5	High Pressure Gas	
BI 56	/6	High Limit	
BI 57	/7	Thermostat - Operating aquastat (not fault)	
BI 58	/8	Manual Override	
BI 59	/9	Flow Switch	
BI 60	/10	No Pilot	
BI 61	76/0	Boiler Not On Line	Boiler #6
BI 62	/1	OK - Boiler Operation	
BI 63	/2	Low Water outoff	
BI 64	/3	Low Pressure Water	
BI 65	/4	Low Pressure Gas	
BI 66	/5	High Pressure Gas	
BI 67	/6	High Limit	
BI 68	/7	Thermostat - Operating aquastat (not fault)	
BI 69	/8	Manual Override	
BI 70	/9	Flow Switch	
BI 71	/10	No Pilot	
BI 72	77/0	Boiler Not On Line	Boiler #7
BI 73	/1	OK - Boiler Operation	
BI 74	/2	Low Water outoff	
BI 75	/3	Low Pressure Water	
BI 76	/4	Low Pressure Gas	
BI 77	/5	High Pressure Gas	
BI 78	/6	High Limit	
BI 79	/7	Thermostat - Operating aquastat (not fault)	
BI 80	/8	Manual Override	
BI 81	/9	Flow Switch	
BI 82	/10	No Pilot	
BI 83	78/0	Boiler Not On Line	Boiler #8
BI 84	/1	OK - Boiler Operation	
BI 85	/2	Low Water outoff	
BI 86	/3	Low Pressure Water	
BI 87	/4	Low Pressure Gas	
BI 88	/5	High Pressure Gas	
BI 89	/6	High Limit	
BI 90	/7	Thermostat - Operating aquastat (not fault)	
BI 91	/8	Manual Override	
BI 92	/9	Flow Switch	
BI 93	/10	No Pilot	

T-2 (Raypak B6000 Metasys N2 System Protocol Interface)

Contents

	Quantity
T-2	1
EPROM (CPX.XNMn) in small black *ESD* box	1

Check packaging for damage or missing components

IMPORTANT NOTICE: These instructions are intended for the use by qualified personnel only, specifically trained and experienced in the installation of this type of equipment and related system components. Installation and service personnel may be required by some states to be licensed. If your state is such, be sure your contractor bears the appropriate license. Only qualified persons shall attempt to repair this equipment.

WARNING: Improper installation, adjustment, alteration, service or maintenance may damage the equipment, create a hazard resulting in asphyxiation, explosion, fire, electric shock, personal injury or property damage and will void the warranty.

CAUTION: *ONE SUPPLY SOURCE. TO REDUCE THE RISK OF ELECTRIC SHOCK, DISCONNECT ALL CONNECTIONS BEFORE SERVICING.*

CAUTION: *RISK OF ELECTRIC SHOCK. DISCONNECT SWITCH IS REQUIRED TO DE-ENERGIZE THE EQUIPMENT BEFORE SERVICING.*

Thank you for selecting the Raypak B6000 Boiler Management System and the Raypak B6000 Metasys N2 System Protocol Interface. It is our sincere hope that you will enjoy its power, ease of use and energy saving features.

Please follow the instructions carefully to insure proper installation.

FORWARD

The Raypak Communications Interface is designed to allow the Johnson Controls Metasys System to monitor and control the Raypak B6000 Boiler Management System.

T-2 INSTALLATION AND MOUNTING

T-2 Module should be mounted on a permanent base not subject to vibrations, moisture or dust. It should be readily accessible, for serviceability.

MECHANICAL INSTALLATION

Mount the System Protocol Interface within five (5) feet of B6000 System Control Box.

The Gateway Interface must be mounted vertically with conduit holes facing downward. Conduit holes are provided to accommodate standard conduit fittings. Additional or larger conduit fitting that may be required should be located on the bottom of the module. Mount the Interface with 3/8" or 1/4" hardware in four (4) places.

A Minimum of six (6) inches clearance on all sides is required and a minimum of eighteen (18) inches clearance from the front is required for service access. The hinged side of the box is to the right and the clearance (minimum 3" from bolt hole on the right side) should be sufficient to open the cover.

A sub-panel containing the disconnect switches and surge suppressors is required at or near the equipment locations(s).
for accessibility remove the lower interior panel, by removing the four (4) access screws.

INSTALL CONDUIT AS APPROPRIATE.

ELECTRICAL CHARACTERISTICS 120 VAC, 0.25A 60 Hz

ELECTRICAL INSTALLATION

120 VAC FEEDER CIRCUITS
Install a surge protection device sized appropriately for your installation.

Install separate disconnect means for each load. Pull in appropriately sized wire for equipment as defined by NEC and/or local code.

It is strongly recommended that the Communications Interface B6000 System Control Module and the B6000 Boiler Control Module be supplied from the same source power.

WIRING 1500 - RPK

1. Open front door of System Protocol Interface Gateway Enclosure.

2. Remove Four Screws and the lower cover, revealing the field wiring blocks.

3. Attach wires from Johnson Controls Metasys N2 Interface Card (N2 BUSS) to the field wiring side of left terminal block (N+, GND, N=, N- GND). Refer to diagram in this user manual.

4. Turn off power to the B6000 System Control Box.

5. Open front door of the B6000 System Control Box.

6. Remove four screws and the lower cover, revealing the field wiring blocks in lower left.

7. Run RS-485 cable (provided) to the lower left field wiring terminal in the B6000 System Control Box. Attach wires to the upper four terminals as follows.

BLU/WHT	to	+	(1)
WHT/BLU	to	-	(2)
ORG/WHT	to	COM	(3)
SHIELD	to	GND	(4)

8. The EPROM (CPX.XNMn) in small black ESD box, must be installed in place of the current EPROM.

9. View the B6000 System Control Board picture on the next page. Note Location of the EPROM, U4.

10. Remove four screws holding upper panel with display screen and keypad. Carefully remove upper panel and turn over exposing B6000 System Control board.

11. Using ESD procedures carefully remove EPROM labeled CP80NM to location U4.

12. Again using ESD procedures carefully replace with EPROM labeled CP80NM to location U4.

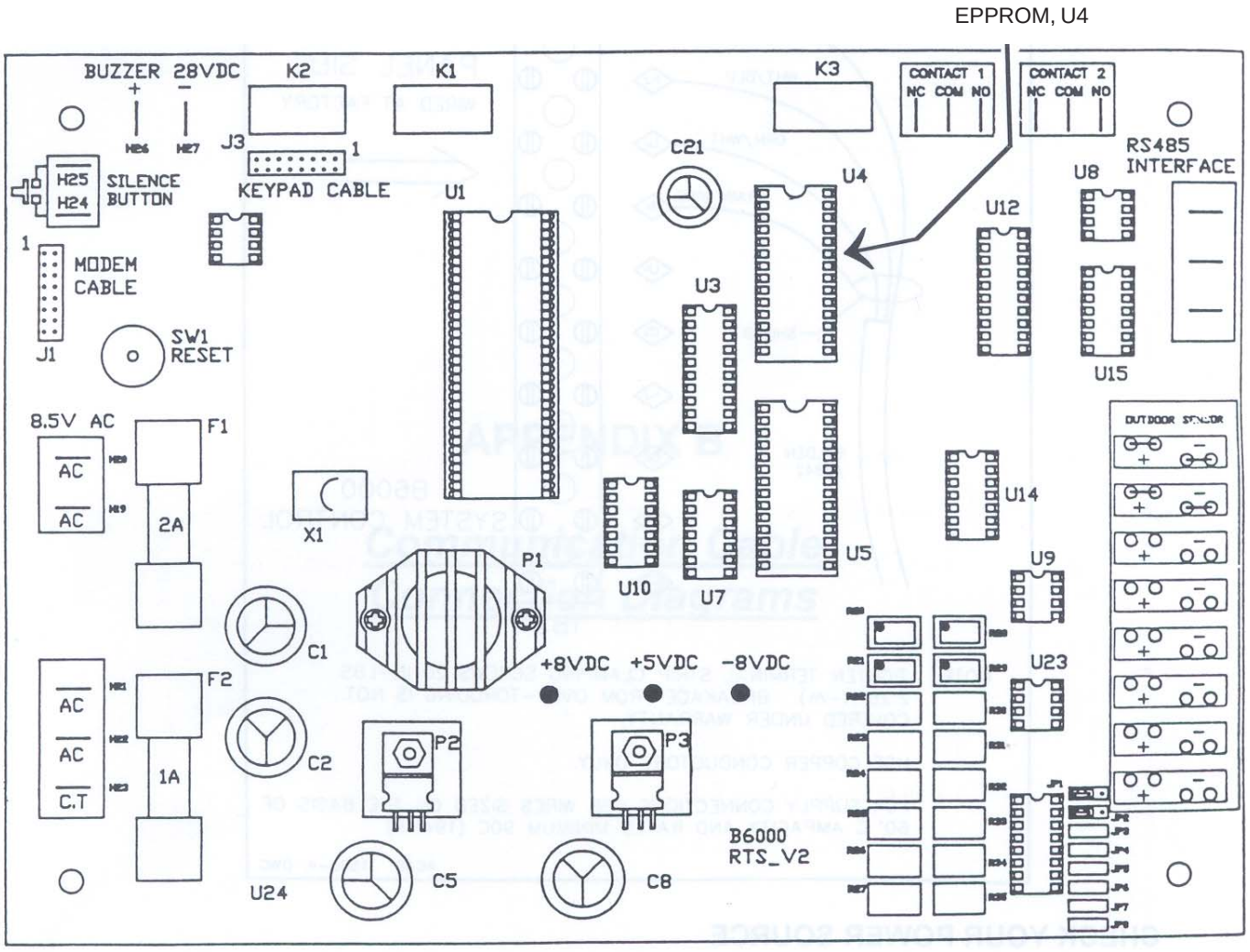
13. Reassemble B6000 System Control Box.

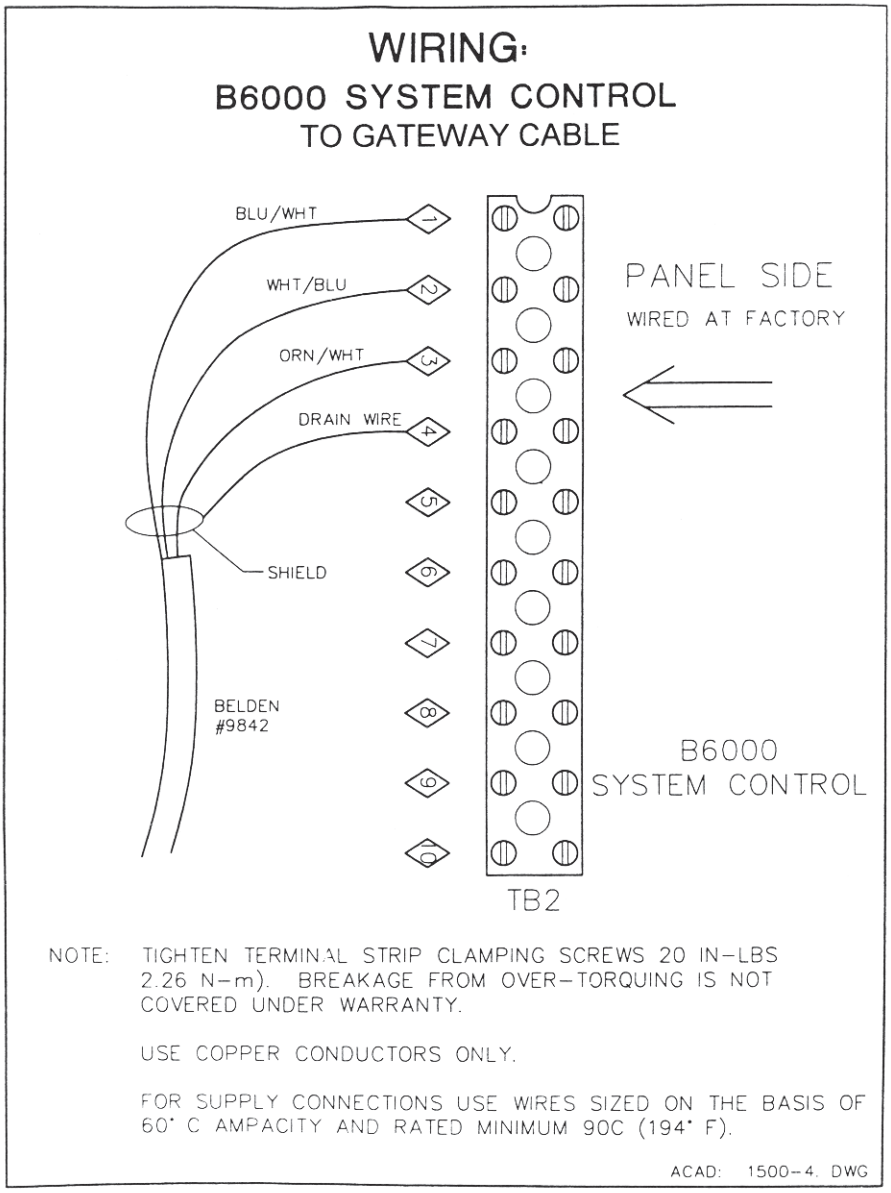
14. Turn power back on to B6000 System Control Box.

15. Connect 120 VAC (hot, Neutral, ground) to T-2 at right terminal block.

16. Reassemble.

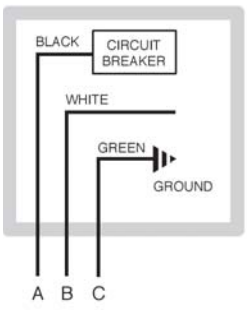
B6000 SYSTEM CONTROL BOARD

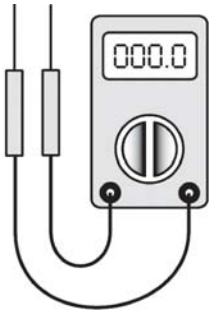




CHECK YOUR POWER SOURCE

CIRCUIT BREAKER PANEL





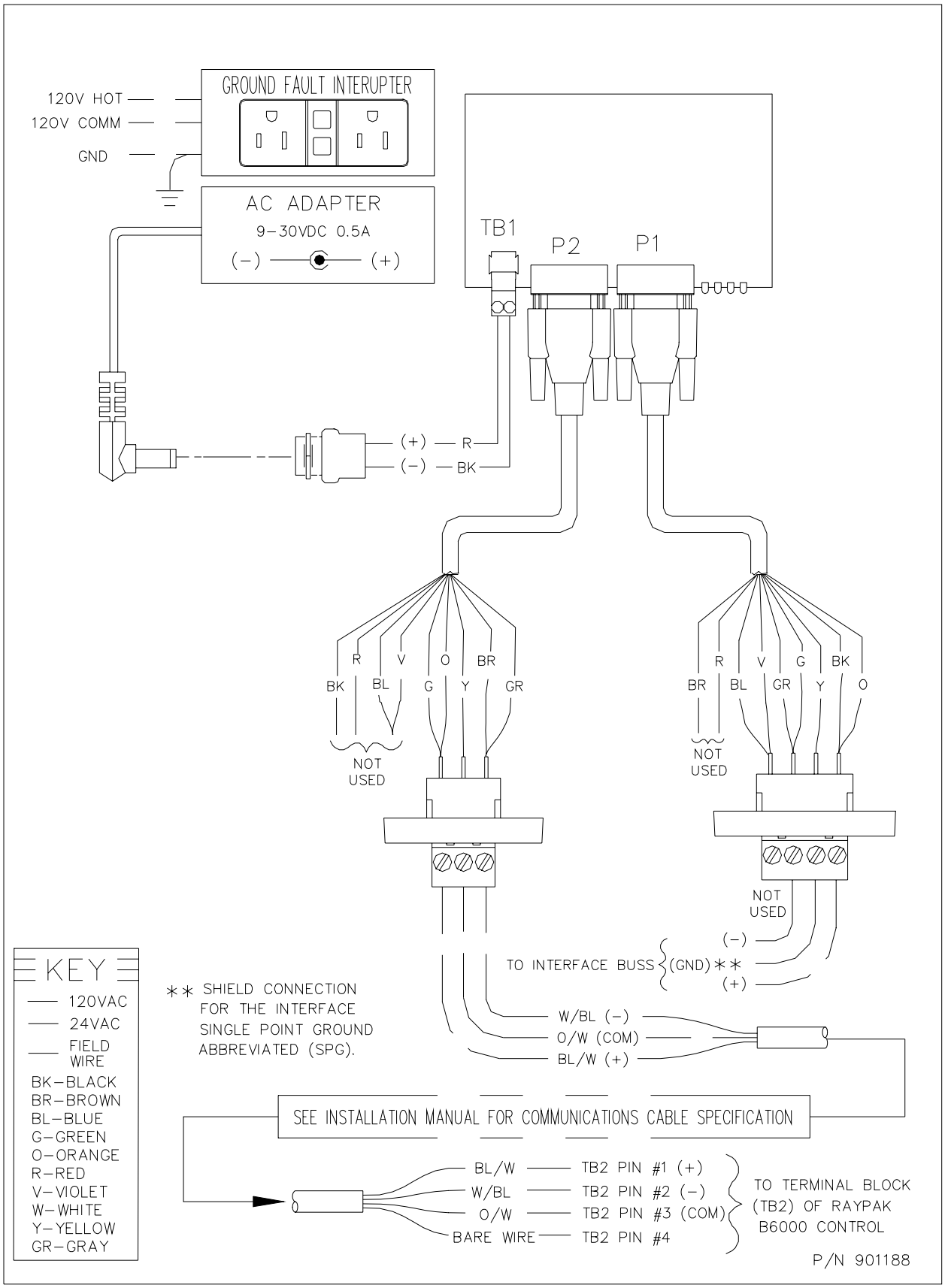
AC 108 Volts AC Minimum, 132 Volts MAX

AB = 108 Volts AC Minimum, 132 Volts MAX

BC = Must be less than 1.0 Volts AC

APPENDIX B

Communication Cable Connection Diagrams


GROUND FAULT INTERUPTER
120V HOT
120V COMM
GND
AC ADAPTER
9-30VDC 0.5A
(-)
(+)
TB1
P2
P1
(+) R
(-) BK
BK R V O BR
BL G Y GR
NOT USED
BR R V G BK
BL GR Y O
NOT USED
NOT USED
(-)
TO INTERFACE BUSS (GND)**
(+)
W/BL (-)
O/W (COM)
BL/W (+)
KEY
120VAC
24VAC
FIELD WIRE
BK-BLACK
BR-BROWN
BL-BLUE
G-GREEN
O-ORANGE
R-RED
V-VIOLET
W-WHITE
Y-YELLOW
GR-GRAY
** SHIELD CONNECTION FOR THE INTERFACE SINGLE POINT GROUND ABBREVIATED (SPG).
SEE INSTALLATION MANUAL FOR COMMUNICATIONS CABLE SPECIFICATION
BL/W TB2 PIN #1 (+)
W/BL TB2 PIN #2 (-)
O/W TB2 PIN #3 (COM)
BARE WIRE TB2 PIN #4
TO TERMINAL BLOCK (TB2) OF RAYPAK B6000 CONTROL
P/N 901188

www.raypak.com

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Litho in U.S. A.