

APPENDIX C

Hays Cleveland Controls and Instruments Drawings  
for Existing Boiler 1 and 2 dated 24 May 2011

***Hays Cleveland*** Division of UniControl Inc.

BOYNTON BEACH, FLORIDA 33426 - CLEVELAND, OHIO 44109

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## **CONTROLS & INSTRUMENTS**

**FOR**

**Existing Steam Boilers**

Boiler 1 - 350 BHP York Shipley 588-SPH-350-N2 Fire Tube with Power Flame AC8-GO-30 Burner

Boiler 2 - 350 BHP York Shipley 588-SPH-350-N2 Fire Tube with Power Flame AC8-GO-30 Burner

Natural Gas or No.2 Oil  
106 PSIG Steam Operating Pressure

**Upgrade Steam Boiler Control Systems  
at**

**Louis A. Johnson  
VA Medical Center  
1 Medical Center Drive  
Clarksburg, WV 26301**

Prime Contractor: Johnson Controls

2010 - Boiler 1 & 2 Firing Rate Controls  
Greenland Enterprises Order No 10-1104  
Hays Cleveland Job No 340-MS

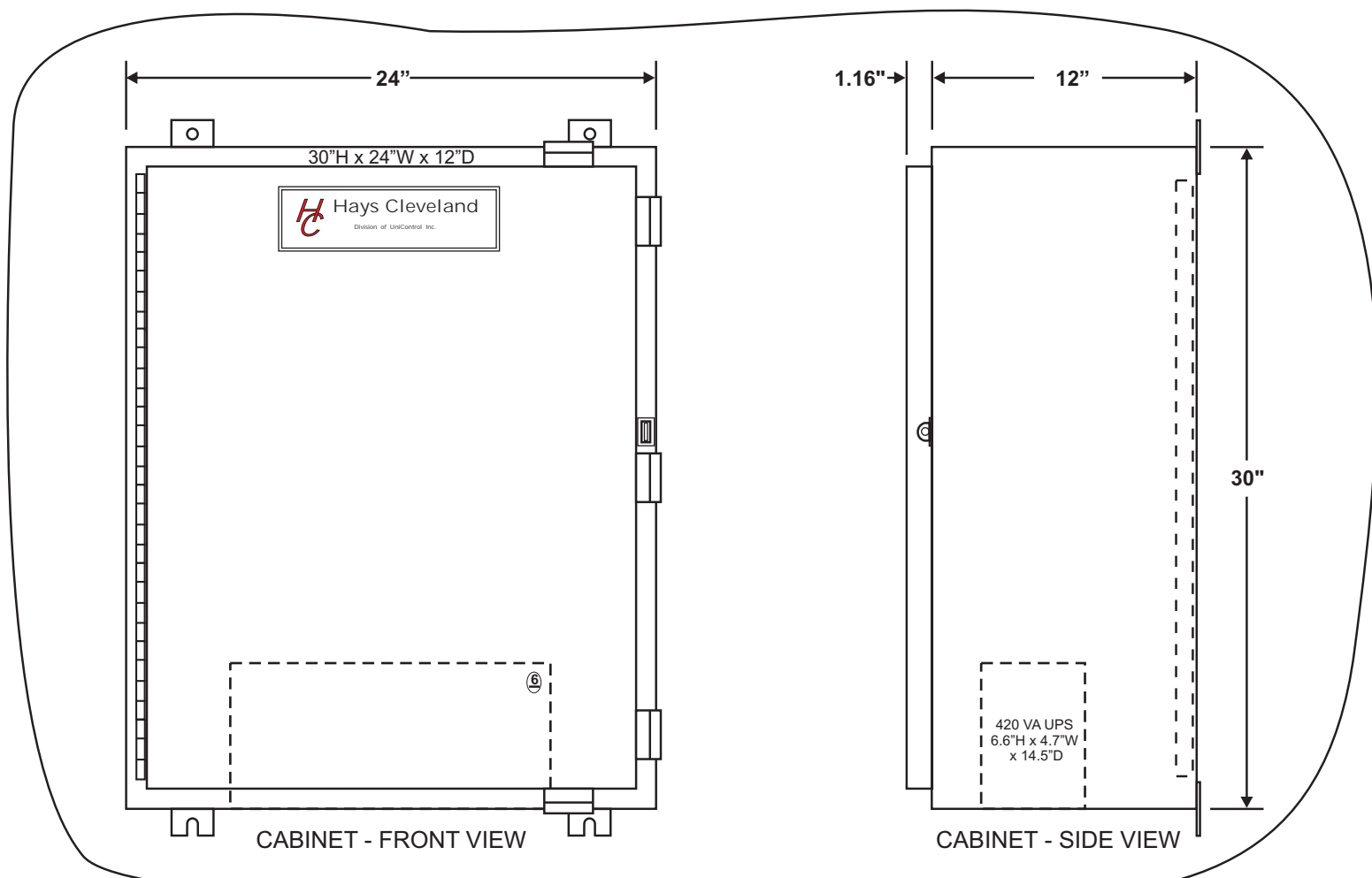
2011- Boiler 1 & 2 Monitoring & Water Level Controls  
Greenland Enterprises Order No 10-1187  
Hays Cleveland Job No 368-NS

### **CONTENTS**

**EQUIPMENT LAYOUT (1 SHEET): B68155**  
**SYSTEM CONFIGURATION (3 SHEETS): B68156**  
**WIRING SCHEMATICS (8 SHEETS): B68157**

NOTICE: Hays Republic and Cleveland Controls  
instrumentation & control product lines  
are Hays Cleveland Division of UniControl

**24 MAY 2011**



**LEGEND**

- Qty.1 Each, DIN-RAIL MOUNTED CONTROL MODULES, POWER SUPPLIES, RELAYS AND NETWORK SWITCH AS IDENTIFIED BY SYSTEM DRAWINGS B68155, SHEETS 1 THRU 3.
- Qty.1 Each, 420 VA UPS (INSIDE CABINET)
- Qty.1 Each, 12.1" COLOR TOUCHSCREEN DISPLAY, MAPLE SYSTEMS HMI612X-CE.
- Qty.1 Each, TOUCHSCREEN POWER SUPPLY, MEAN WELL DR-30-24
- Qty.1 Each, SUB-PANEL, HOFFMAN A30P24, 21"W x 27"H
- Qty.0 Each, n/a

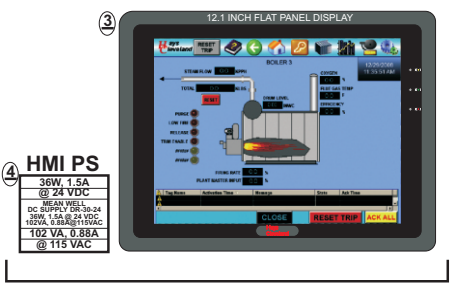
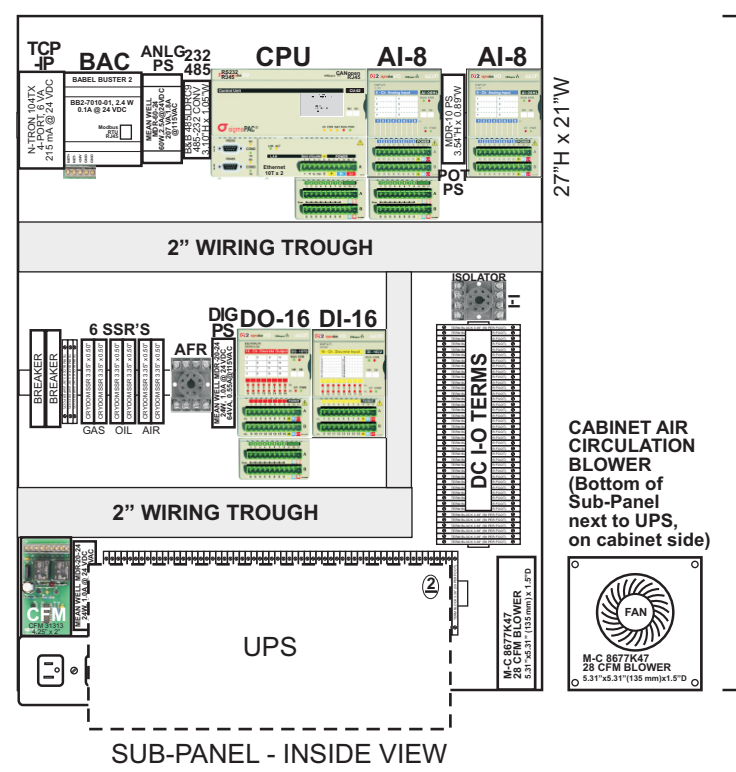
CABINETS PROVIDED BY COMBUSTION CONCEPTS

**CABINET CONSTRUCTION**

Qty.0, 30"H x 24"W x 12"D. 14 GA CARBON STEEL CONSTRUCTION. SINGLE FRONT DOOR. HINGED, CLAMPED, NEMA 4 GASKETED. HOFFMAN CABINET A-30H24DLP & SUBPANEL A-30P24, W/ (Qty.5) AFC412SS FAST-OP CLAMPS. EXTERNAL PAINT: GREY POLYURETHANE, TEXTURED - SHERWIN WILLIAMS ASA61 F-63A31. CABINETS & HARDWARE FURNISHED BY COMBUSTION CONCEPTS. FINAL ASSEMBLY VIEWS ON THIS DRAWING ILLUSTRATE ONE POSSIBLE CABINET CHOICE.

**RECOMMENDED WIRING, PANEL & FIELD**

RS485/MODBUS - BELDEN 9501, INSIDE CABINET OR PANEL.  
 RS485/MODBUS - BELDEN 9841, FIELD. PANEL & BURNER SAFETY TO SCADA.  
 COMPUTER LAN CABLE - BELDEN 11872A, CATEGORY 6 DATA CABLE, OR AS REQUIRED  
 PANEL/FIELD INSTRUMENT CABLE - BELDEN 1030A, 2-COND SHIELDED, 16 AWG, 300 V  
 PANEL/FIELD INSTRUMENT CABLE - BELDEN 1031A, 3-COND SHIELDED, 16 AWG, 300 V  
 PANEL/FIELD INSTRUMENT CABLE - BELDEN 1033A, 2-COND SHIELDED, 20 AWG, 300 V



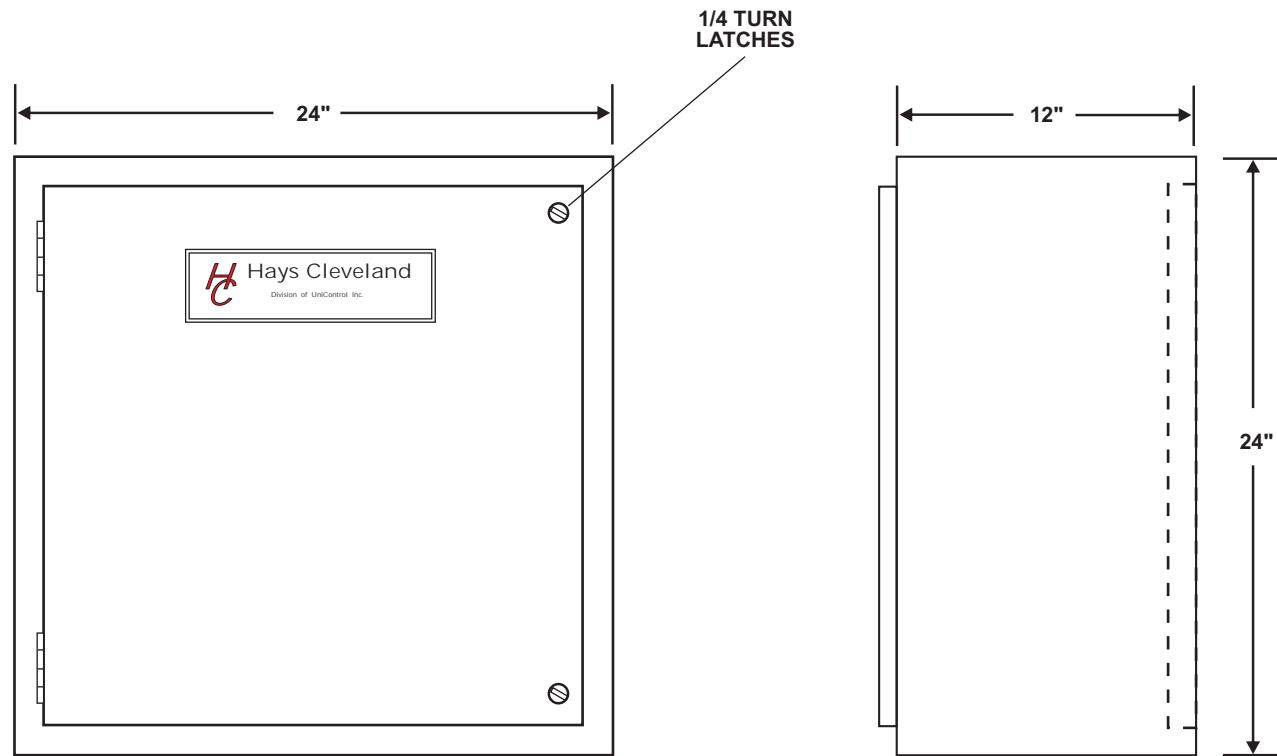
ITEMS FURNISHED LOOSE FOR BURNER CABINET MOUNTING

DIN-RAIL MOUNTED ALARM MODULES, POWER SUPPLIES AND RELAYS. AS-BUILT LAYOUT.

HAYS CLEVELAND JOB No 340-MS  
 Qty.2, ALL ITEMS THIS SHEET, UNLESS OTHERWISE NOTED

LTR	REVISIONS	BY	DATE
C	ADD EXTRA DC TERMINALS & 24 VDC GAS FLOW METER	FSS	11-19-10
B	AS BUILT	FSS	09-03-10
A	AS RELEASED	FSS	07-09-10

All revisions to hardware, wiring, and software must be approved in writing by Hays Cleveland Division of UniControl Inc.	DR.	<b>Hays Cleveland</b> Division of UniControl Inc.		
	DATE	Combustion Sales & Engineering - BOYNTON BEACH, FLORIDA 33426		
	CHK	BOILER 1 & 2 CONTROL SUB-PANEL LAYOUT BOILER FIRING RATE CONTROL VA MEDICAL CENTER - CLARKSBURG, WV 26301		
	R&D			
MFG	SCALE 0.130	DWG. NO.	B68155	REV C
	SHEET 1 OF 2			



CABINET - FRONT VIEW

CABINET - SIDE VIEW

**LEGEND**

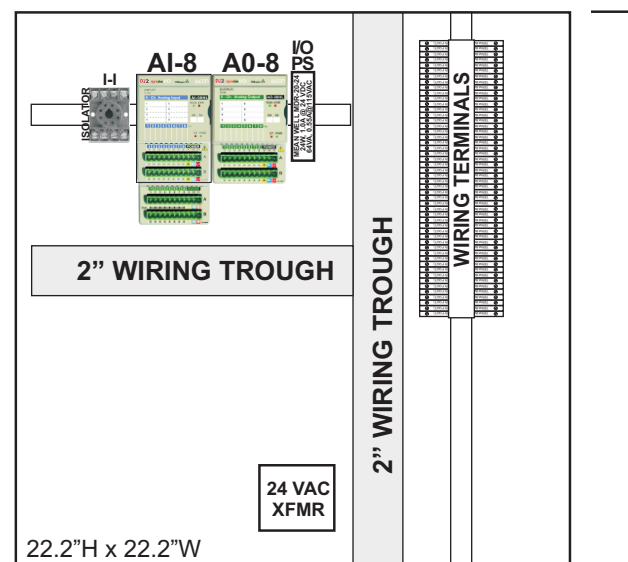
- 1. Qty.0, n/a
- 2. Qty.0, n/a
- 3. Qty.0, n/a
- 4. LOT, DIN-RAIL MOUNTED MODULES, POWER SUPPLY, RELAYS, CIRCUIT BREAKER, ETC AS IDENTIFIED BY SYSTEM DRAWINGS B68066, SHEET 10.

**CABINET CONSTRUCTION**

Qty.1 Each, 24"H x 24"W x 12"D. 16 GA STEEL CONSTRUCTION.  
 SINGLE FRONT DOOR. HINGED, NEMA 12 GASKETED, 1/4 TURN FASTENERS.  
 HOFFMAN "CONCEPT" CABINET CSD242412 & SUBPANEL CP2424.  
 EXTERNAL PAINT: GREY POLYURETHANE, TEXTURED - SHERWIN WILLIAMS ASA61 F-63A31.  
 INTERNAL PAINT: WHITE, SMOOTH.

**RECOMMENDED WIRING, PANEL & FIELD**

RS485/MODBUS - BELDEN 9501, INSIDE CABINET OR PANEL.  
 RS485/MODBUS - BELDEN 9841, FIELD. PANEL & BURNER SAFETY TO SCADA.  
 COMPUTER LAN CABLE - BELDEN 11872A, CATEGORY 6 DATA CABLE, OR AS REQUIRED  
 PANEL/FIELD INSTRUMENT CABLE - BELDEN 1030A, 2-COND SHIELDED, 16 AWG, 300 V  
 PANEL/FIELD INSTRUMENT CABLE - BELDEN 1031A, 3-COND SHIELDED, 16 AWG, 300 V  
 PANEL/FIELD INSTRUMENT CABLE - BELDEN 1033A, 2-COND SHIELDED, 20 AWG, 300 V



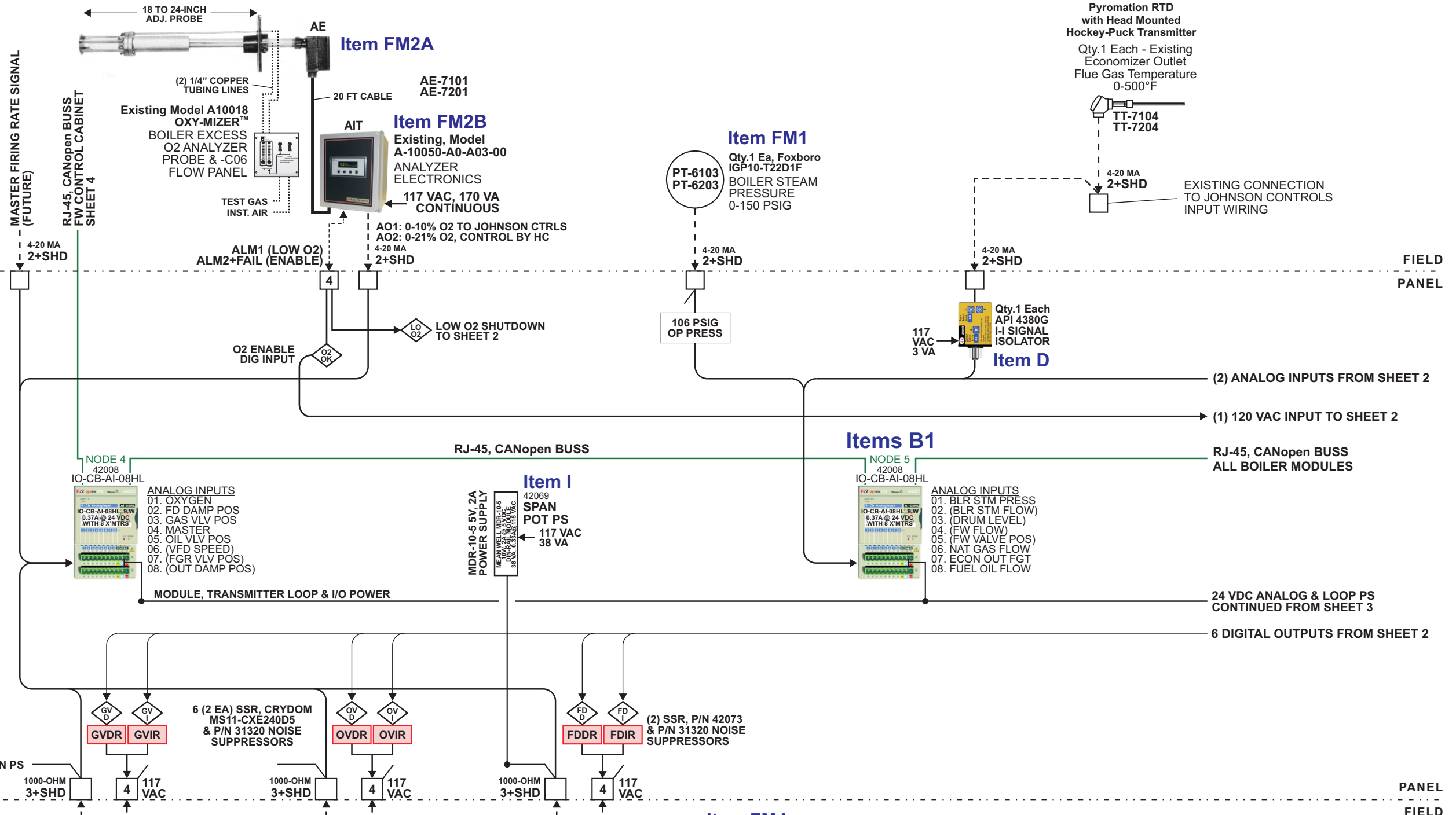
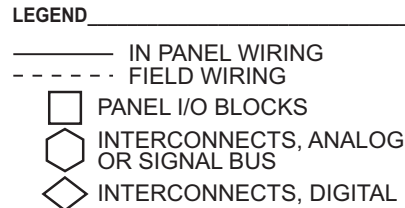
HOFFMAN SUBPANEL CP2424  
INSIDE CABINET

DIN-RAIL MOUNTED  
MODULES,  
POWER SUPPLY AND  
RELAYS

HAYS CLEVELAND JOB No 368-NS  
 Qty.2, ALL ITEMS THIS SHEET, UNLESS OTHERWISE NOTED

C	-	
B	-	
A	-	
LTR	REVISIONS	BY DATE

All revisions to hardware, wiring, and software must be approved in writing by Hays Cleveland Division of UniControl Inc.	DR. FSS	<b>Hays Cleveland</b> Division of UniControl Inc. Combustion Sales & Engineering - BOYNTON BEACH, FLORIDA 33426	
	DATE 04-15-11		
	CHK	BOILER 1 & 2 FW CONTROL CABINET LAYOUT BOILER WATER LEVEL CONTROL I/O VA MEDICAL CENTER - CLARKSBURG, WV 26301	
	R&D		
MFG	SCALE 0.130	DWG. NO. B68155	REV -
	SHEET 2 OF 2		



**FIELD PANEL**

**CPU CONTROLLER FUNCTIONS & NOTES**

1. BOILER SUB-MASTER FUNCTIONS TO EITHER MASTER SIGNAL OR TO LOCAL BOILER STEAM PRESSURE.
2. PARALLEL POSITIONING FUEL-AIR CONTROL FOR NAT GAS OR NO.2 FUEL OIL.
3. COMBUSTION AIR CONTROL WITH FD AIR DAMPER LOUVER POSITIONING.
4. PURGE & LOW FIRING POSITIONING USING SWITCHED ACTUATOR CONTROL SIGNALS, INTERLOCKED INTO THE BURNER SAFETY SYSTEM.
5. DEVIATION LIMITING WITH CHANGES IN FUEL & AIR SIGNALS TO THEIR POSITION SIGNALS.
6. BOILER SHUT DOWN WITH CONTROL FAULT OR WITH FUEL OR AIR ACTUATOR FAILURES.
7. LOW FIRE HOLD TO MEASURED STEAM PRESSURE INPUT SIGNAL.
8. COMBUSTION EFFICIENCY TO EXCESS O2 AND FLUE GAS TEMP SIGNALS.

**FD AIR DAMPER STARTUP**

FD AIR DAMPER ACTUATOR LOUVERS POSITIONED TO 100% (MAX) DURING PURGE CYCLE. BEFORE LIGHT-OFF, THE DAMPER ACTUATOR IS DRIVEN TO 0% FIRING RATE POSITION (ADJ). END SWITCHES IN THE DAMPER & VALVE LINKAGE INTERFACED TO THE BURNER SAFETY SYSTEM BY INSTALLING BURNER TECHNICIAN.

**PANEL FIELD**

Qty.1 Each  
SQM53-461R1A3R  
200 In-Lb Actuator  
with keyed shaft for  
coupling to valve.

**Item FM5**  
POSITIONING ACTUATOR, with

Qty.1 Each  
Hauck PVS Adjustable Port  
Butterfly Control Valve

**Item FM5A**  
FCV-4111  
FCV-4211

Qty.1 Each  
SQM53-461R1A3R  
200 In-Lb Actuator  
with keyed shaft for  
coupling to valve.

**Item FM6**  
POSITIONING ACTUATOR, with

Qty.1 Each  
Hauck MCOV Micro-Cam  
Fuel Oil Control Valve

**Item FM6A**  
FCV-5106  
FCV-5206

Qty.1  
SQM56-564R1A3R  
310 In-Lb Actuator  
with Output Lever  
POSITIONING ACTUATOR

**Item FM3**

Existing  
FD Air Damper  
and Louvers

C	INPUT CHANNEL ASSIGNMENTS FOR BURNER FUEL OIL AND NAT GAS FLOW METERS	FSS 11-19-10
B	AS BUILT	FSS 08-31-10
A	AS RELEASED	FSS 07-09-10
LTR	REVISIONS	BY DATE

HAYS CLEVELAND JOB No 340-MS  
Qty.2, ALL ITEMS THIS SHEET, UNLESS OTHERWISE NOTED

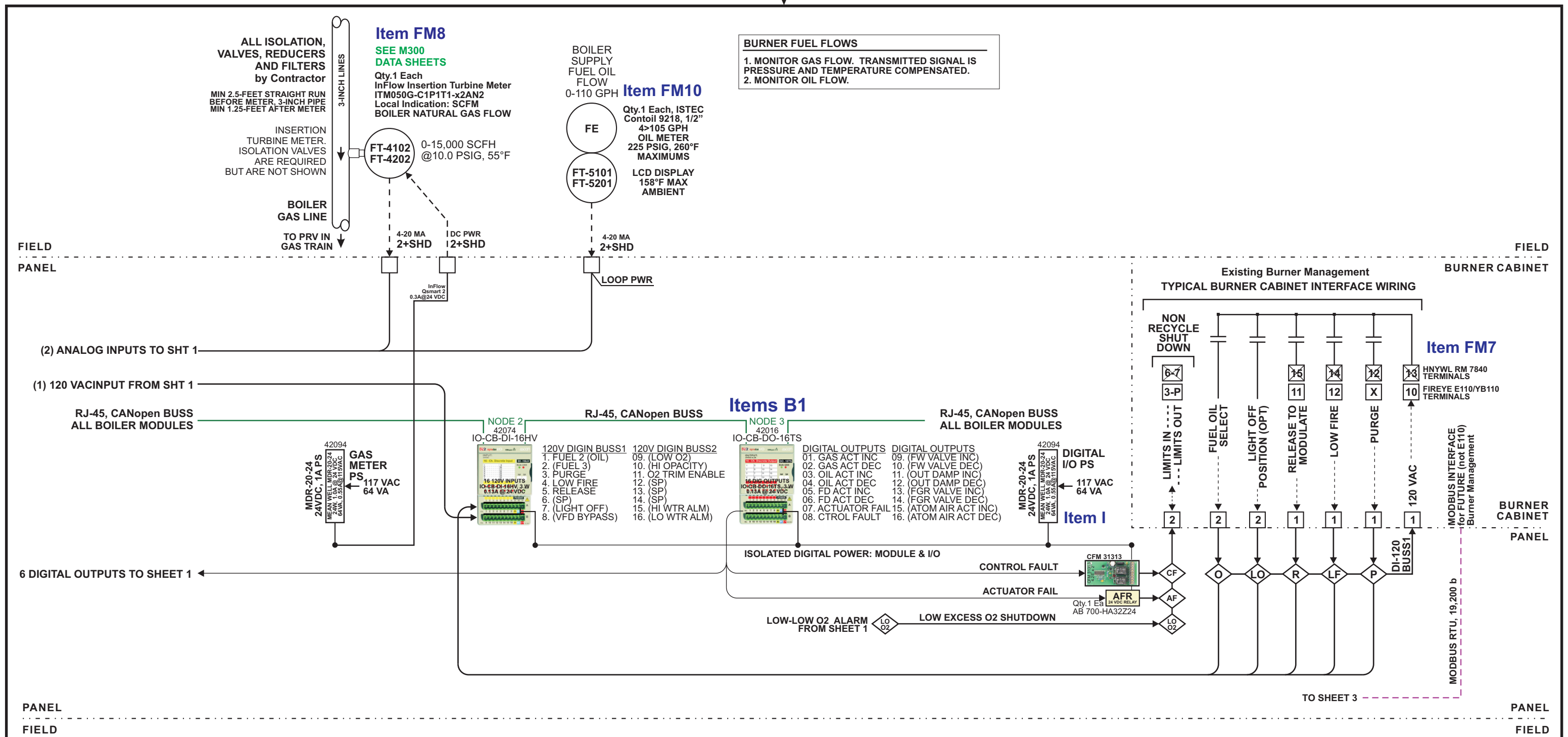
All revisions to hardware, wiring, and software must be approved in writing by Hays Cleveland Division of UniControl Inc.

DR.	FSS
DATE	05-20-10
CHK	
R&D	
MFG	

**Hays Cleveland** Division of UniControl Inc.  
Combustion Sales & Engineering - BOYNTON BEACH, FLORIDA 33426

BOILER MASTER  
BOILER 1 & 2 FIRING RATE CONTROLS  
VA MEDICAL CENTER - CLARKSBURG, WV 26301

SCALE	none	DWG. NO.	B68156	REV	C
SHEET	1 OF 4				



HAYS CLEVELAND JOB No 340-MS  
 Qty.2, ALL ITEMS THIS SHEET, UNLESS OTHERWISE NOTED

**LEGEND**  
 — IN PANEL WIRING  
 - - - FIELD WIRING  
 □ PANEL I/O BLOCKS  
 ○ INTERCONNECTS, ANALOG OR SIGNAL BUS  
 ◇ INTERCONNECTS, DIGITAL

C	ADD BURNER OIL FLOW METER, AND GAS FLOW METER AND POWER SUPPLY.	FSS 11-19-10
B	AS BUILT	FSS 08-31-10
A	AS RELEASED	FSS 07-09-10
LTR	REVISIONS	BY DATE

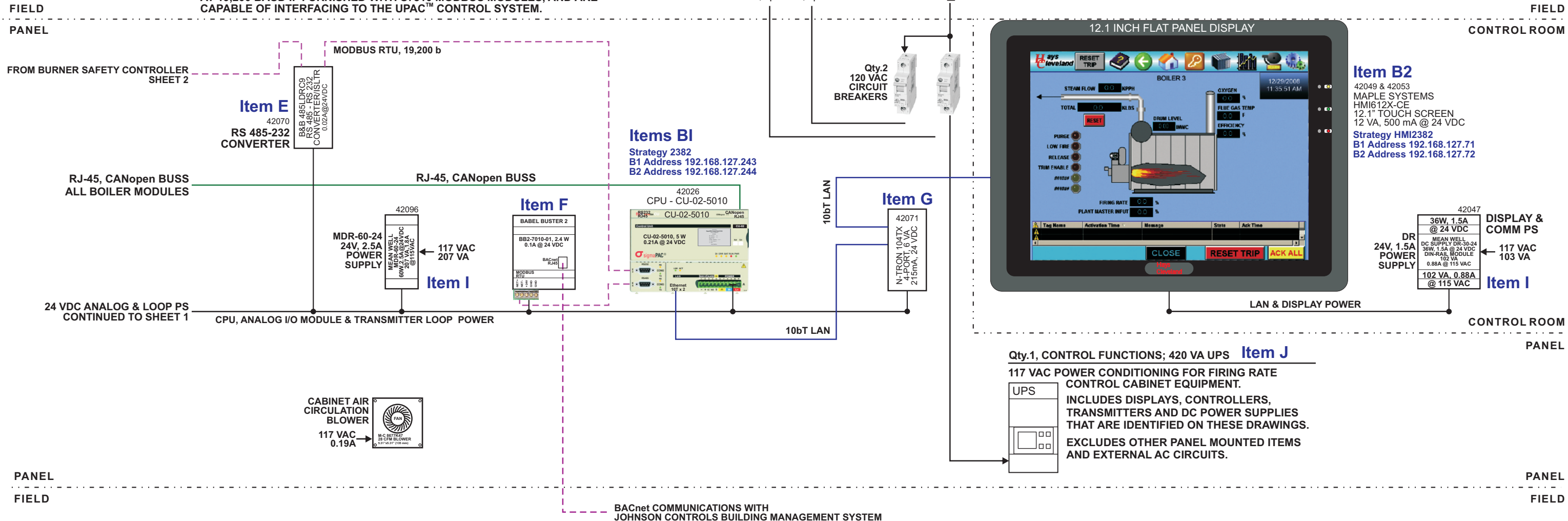
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DR.	FSS	<b>Hays Cleveland</b> Division of UniControl Inc. Combustion Sales & Engineering - BOYNTON BEACH, FLORIDA 33426			
DATE	05-20-10				
CHK					
R&D		BURNER SAFETY INTERFACE BOILER 1 & 2 FIRING RATE CONTROLS VA MEDICAL CENTER - CLARKSBURG, WV 26301			
MFG					
SCALE	none	DWG. NO.	B68156	REV	C
SHEET	2 OF 4				

- LEGEND**
- IN PANEL WIRING
  - - - FIELD WIRING
  - PANEL I/O BLOCKS
  - INTERCONNECTS, ANALOG OR SIGNAL BUS
  - ◇ INTERCONNECTS, DIGITAL

FIREYE E110 CONTROLLERS ARE MODBUS CAPABLE AT 4,800 BAUD AND CAN NOT COMMUNICATE WITH UPAC™ SYSTEMS. RECOMMEND UPDATING TO FIREYE YB110 CONTROLLERS, WHICH ARE MODBUS CAPABLE AT 19,200 BAUD, IF FURNISHED WITH SHORT ED-512 CABLES TO ED-610 MULTI-PORT CONNECTORS.

HONEYWELL SERIES 7800 CONTROLLERS ARE MODBUS CAPABLE AT 19,200 BAUD IF FURNISHED WITH S7810 MODBUS MODULES, AND ARE CAPABLE OF INTERFACING TO THE UPAC™ CONTROL SYSTEM.

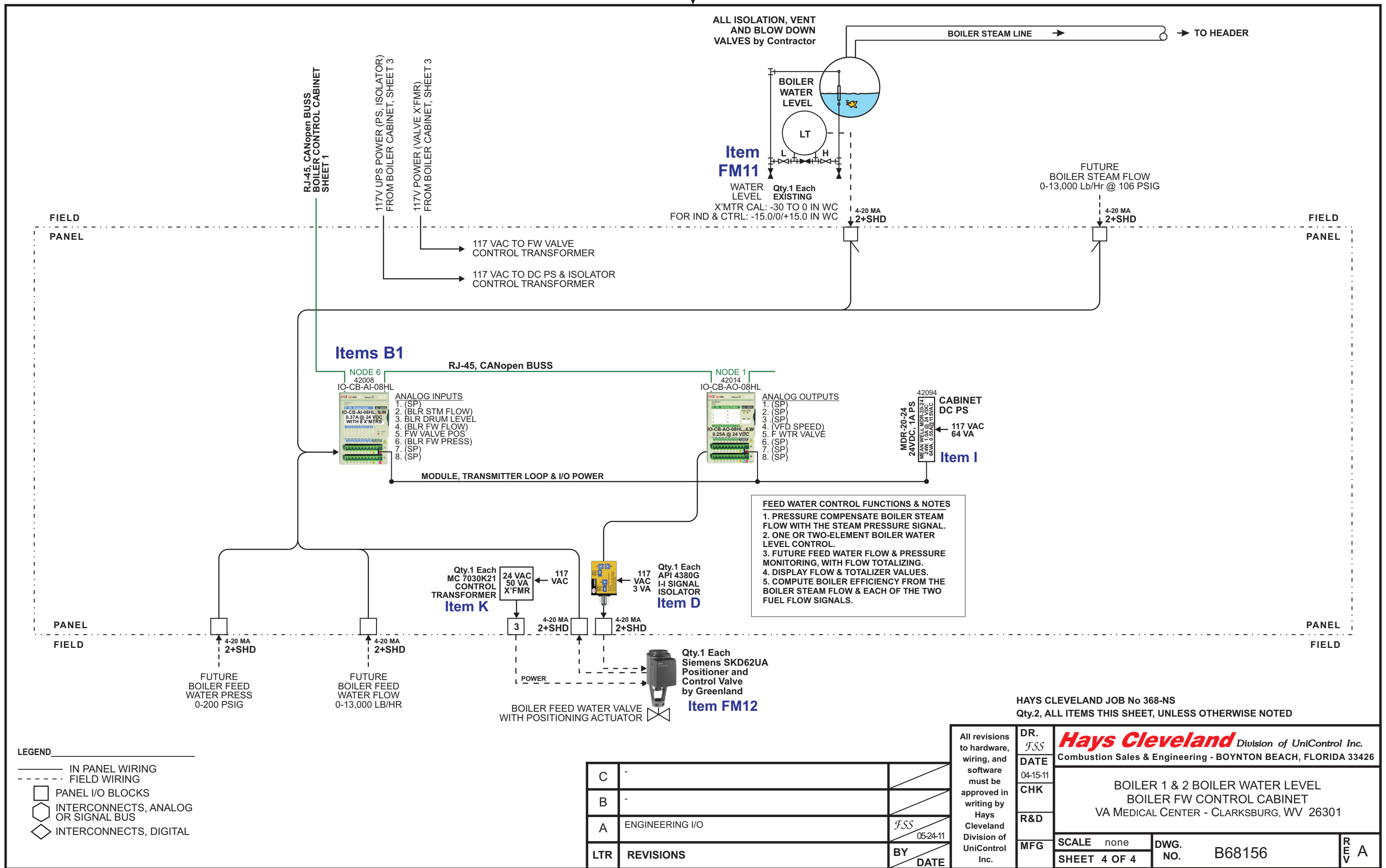


HAYS CLEVELAND JOB No 340-MS  
Qty.2, ALL ITEMS THIS SHEET, UNLESS OTHERWISE NOTED

LTR	REVISIONS	BY	DATE
C	POWER TO BOILER FEED WATER LEVEL I/O CABINET.	FSS	04-15-11
B	AS BUILT	FSS	08-31-10
A	AS RELEASED	FSS	07-09-10

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DR.	FSS	<b>Hays Cleveland</b> Division of UniControl Inc. Combustion Sales & Engineering - BOYNTON BEACH, FLORIDA 33426
DATE	05-20-10	
CHK		
R&D		CONTROL CPU, DISPLAY, LAN BOILER 1 & 2 FIRING RATE CONTROLS VA MEDICAL CENTER - CLARKSBURG, WV 26301
MFG	SCALE none	DWG. NO. B68156
	SHEET 3 OF 4	REV C



HAYS CLEVELAND JOB No 368-NS  
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	FSS	Combustion Sales & Engineering - BOYNTON BEACH, FLORIDA 33426	
	DATE	04-15-11	
	CHK		
R&D	BOILER 1 & 2 BOILER WATER LEVEL BOILER FW CONTROL CABINET VA MEDICAL CENTER - CLARKSBURG, WV 26301		
MFG	SCALE	none	DWG. NO. B68156
	SHEET	4 OF 4	
REV	A		