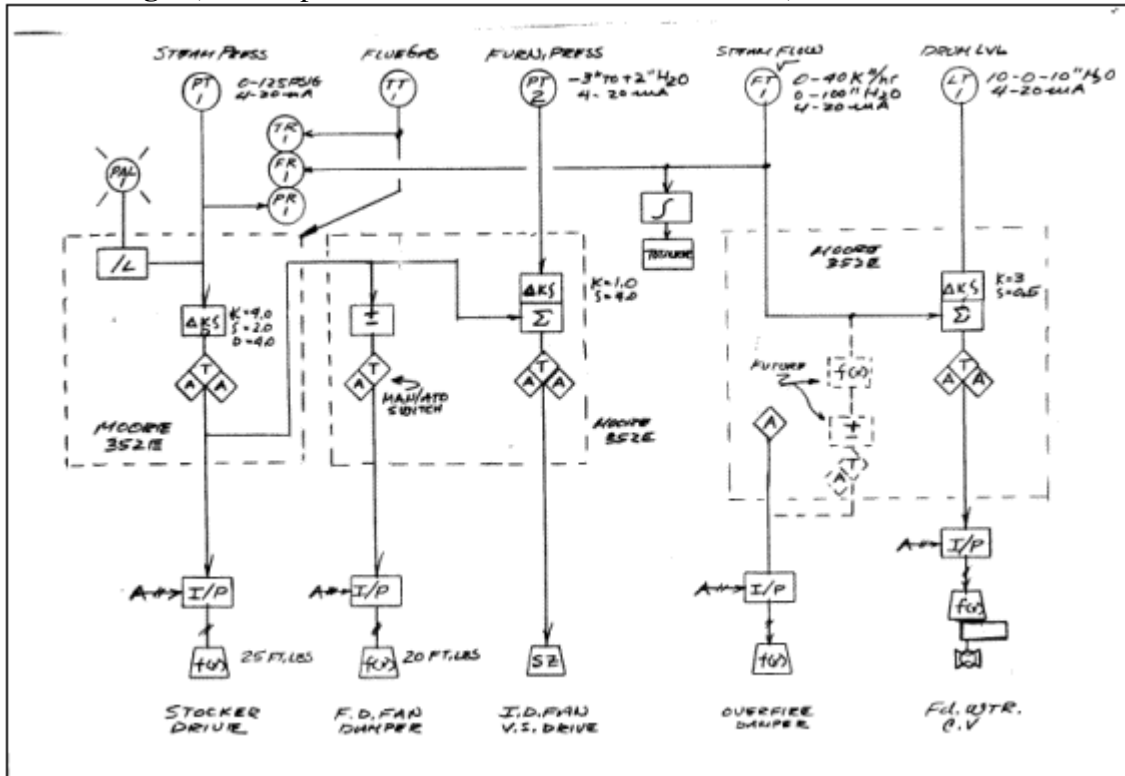


## Appendix A: Instrumentation Project Management

By Cliff Johnson, PE, CSE  
Mohican Mills Coal Fired Boiler Control System

SAMA Logic (used in place of P&ID for combustion control)



### Drawing Index

SHEET	DRAWING	DESCRIPTION	
1	II-100	INSTRUMENT INDEX	2
2	IE-101	CONTROL CABLE TABULATION	3
3	ICP-102	CONTROL PANEL DEM. & LAYOUT	3
4	ICP-103	" TERMINALS & COMPONENTS	3
5	ILS-001	LOOP SHT. - CONTROLLERS, TRANS. & I/P'S	2
6	ILS-001A	" CONFIGURATION LOGIC	2
7	ILS-002	" RECORDERS, INT. & ANNUNCIATOR	3
8	ILS-003	" OXYGEN & OPA CITY ANALYZER	2
9	ILS-003A	" OXYGEN ANA FIELD WIRING	2
10	ILS-004A	" COMBUSTION MOTOR CONTROLS	3
11	ILS-004B	SKETCH - " " "	0
12	ILS-005	LOOP SHT - COAL HDLG. SYS. INDICATORS GRAPHIC LITES	0
13	ILS-006A	" " MCC'S GRAPHIC LITES	0
14	ILS-006B	SKETCH - " LOGIC & REMOTE SW'S	0

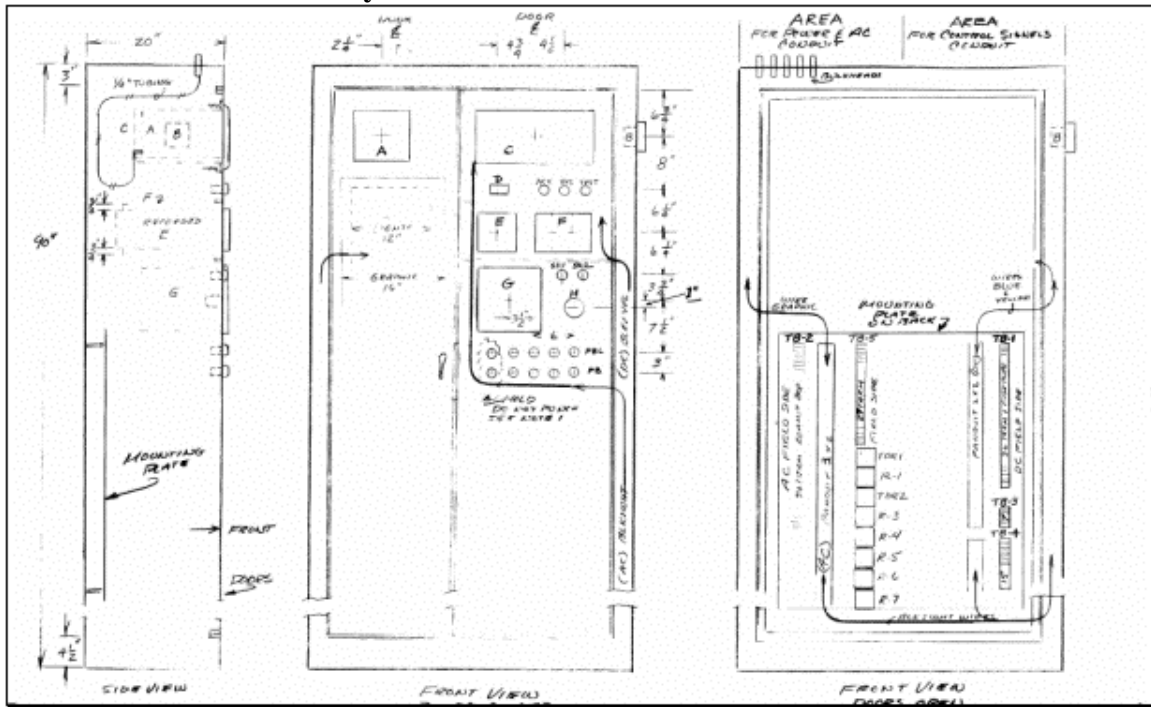
## II-100-Instrument Index

TAG	LOOP SHT	SERVICE	MEG	TYPE	MODEL NO.	RANGE	INPUT	OUTPUT	PROC. (GAIN)	NOTES	P.O. NO.	DATE
LT-1	001	DRUM LEVEL	VIA TRAN	PRESS. WP TRANSDUCER	504-24	0-10" H <sub>2</sub> O	4-20mA	1/2" FT	1			
FT-1		STEAM FLOW	"	"	504-24	0-100" H <sub>2</sub> O	"	"	1/2			
PT-1		STEAM PRESS.	FOXBORO	PRESS. TRAN.	2416M-C	0-200PSIG	"	"	3			
PT-2		FURNACE PRESS.	VIA TRAN	LOW PRESS. TRANSDUCER	504-24	-3" to 2"	"	"	4			
TT-1		FLUE GAS TEMP.	VHS	RTD TRANS. 100 Ω PLAT		249/200 °F	"	70" HPT	5			
I/P-1		F.D. WTR VALVE	BELLIFRAN	TRANSDUCER	221-961070-000	4-20 mA	4-20 mA	1/2" FT				
I/P-2		OVERFIRE FAN	"	"	"	"	"	"				
I/P-3		STORKE DRIVE	"	"	"	"	"	"				
I/P-4		F.D. FAN DRIVE	"	"	"	"	"	"				
PIC-1		BLR MASTER CONTR.	MOORE PRODUCTS	CONTINUOUS CONTROL	352R2R2UNN	1-5 VDC	4-20 mA	1/4"				
PIC-2		I.D. FAN CONTR.	"	"	"	"	"	"				
LIC-1		DRUM LVL CONTR.	"	"	"	"	"	"				
PETR-1	002	DRUM PRESS. TRAN.	CHASSIS	3/16" DIA. TRANSDUCER WITH EXTENSION	20VDC/15/100	"	4-20 mA	1/4"	6			
RVU-1	002	ANNUNCIATOR	RILEY	PAN ALARM	75" B 24	24 VDC	4-20 mA	1/4"	7			
AT-1	003A	OXYGEN ANALYZER	WESTINGHOUSE	IN SITU	XP18LT-1111-8	0-25% O <sub>2</sub>	4-20 mA	3/4"	8			
AT-2	003	FLUE GAS OXYGEN	MOORE	PROX. ANALYZER	72-1000	0-25% O <sub>2</sub>	4-20 mA	3/4"	8			
SZ-2	001	STORKE DRIVE	WESTINGHOUSE	PLUG DRIVE	BB 075T-211000, 212X5	3-15PSA	4-20 mA	3/4"				
PZ-1		F.D. FAN DRIVE	"	"	"	"	"	"				
PZ-2		OVERFIRE FAN	"	"	"	"	"	"				
LCV-1		FLOUTE VALVE	HANSON RAN	CONSOLE II	35-35102	"	"	1"	9			
LS-2	005	STORKE MOTOR LVL	INDICATOR	PADDLE	R TYPE 1	LEVEL	4-20 mA	1/2"				
LS-1	004A	DRUM LVL. ALARM	ALARMS	RELAY	"	"	"	"				
PS-3	002	F.D. WTR. PRESS. ALARM	UNITED ELECTRON	PRESS. SW	J6 270-9568	0-200PSI	4-20 mA	1/2"				
PS-4		INSTR. AIR PRESS. ALARM	"	"	"	"	"	"				
PI-101	UNIDRUM	UNDERFIRE AIR PRESS.	UNYS. PRESSURE	VISA PRESS. IND.	0-07600-00	0-12" H <sub>2</sub> O	4-20 mA	1/2" FT				
PI-102		OVERFIRE AIR PRESS.	"	"	"	0-12" H <sub>2</sub> O	"	"				
PI-103		FURNACE PRESS.	"	"	"	-2" to 2"	"	"				
PI-104		BLR. OUTLET PRESS.	"	"	"	-9" to 0"	"	"				
PI-105		D.C. OUTLET PRESS.	"	"	"	-8" to 0"	"	"				
AI-106	003	O <sub>2</sub> INDICATOR	SIMARCA	3/2" DIA. LTR	1327	0-25% O <sub>2</sub>	4-20 mA	0-25%				

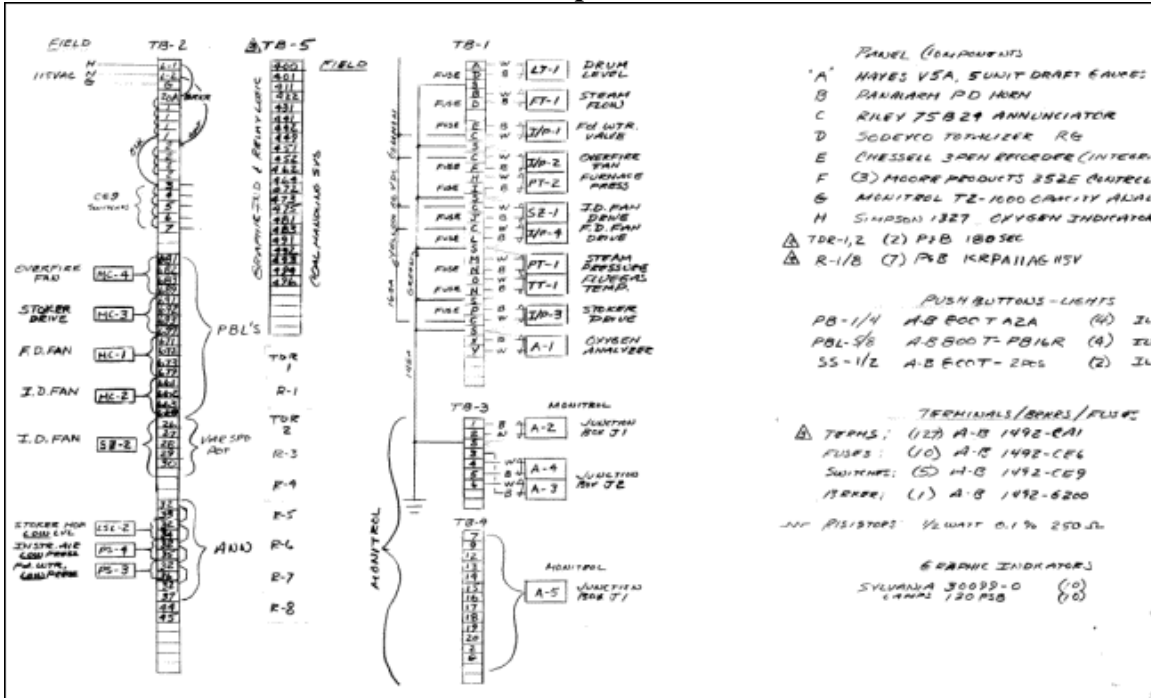
## IE-101-Cable Conduit Schedule

CABLE IDENT	FROM	TO	CONDUCTORS	MIN SIZE	SHIELD	COLOR	CODE	LOOP INT.	NOTES
0 LT-1	CONTROL PNL	DRUM LEVEL TRANS.	TWISTED PAIR	16GA	YES	BLACK	UNIDRUM	ILS-001	
0 FT-1		STEAM FLOW TRANS.							
0 PT-1		STEAM PRESS. TRANS.							
0 PT-2		FURN. PRESS. TRANS.							
0 TT-1		FLUE GAS TEMP TRANS.							
0 I/P-1		F.D. WTR VALVE I/P							
0 I/P-2		OVERFIRE FAN I/P							
0 I/P-3		STORKE DRIVE I/P							
0 I/P-4		F.D. FAN DRIVE I/P							
0 SZ-1		I.D. FAN VARIABLE SPD							
0 A-1		OXYGEN ANALYZER						ILS-003	
0 A-2		CONC. ANALYZER		14GA					1
0 A-3		" BOX JE							
0 A-4		" BOX JE							
▲ A-5		" BOX JE	16	14GA	NO	BLACK	UNIDRUM	ILS-003	
▲ LSL-2		INDICATOR	1	16GA		BLACK		ILS-005	
▲ PS-3		STORKE MOTOR SWITCH	2					ILS-002	
▲ PS-4		F.D. WTR. PRESS. SW	1						
▲ MC-1		INSTR. AIR (LOW PRESS. SW)	4					ILS-004	
▲ MC-2		F.D. FAN STARTER							
▲ MC-3		I.D. FAN STARTER							
▲ MC-4		STORKE DRIVE STARTER							
▲ MC-4		OVERFIRE FAN STARTER							
▲ PA-1	115VAC ALARM	OXYGEN ANALYZER	3	16GA	NO	BLACK	UNIDRUM	ILS-003A	
▲ A-6	O <sub>2</sub> SENSOR	"	7						9
▲ SZ-2	CONTROL PNL	I.D. FAN (VARIABLE SPD)	6	14GA	NO	BLACK		ILS-004	
▲ LWR	LOW WTR CUTOFF	MCC PANEL	2	16GA	NO	BLACK		ILS-009	

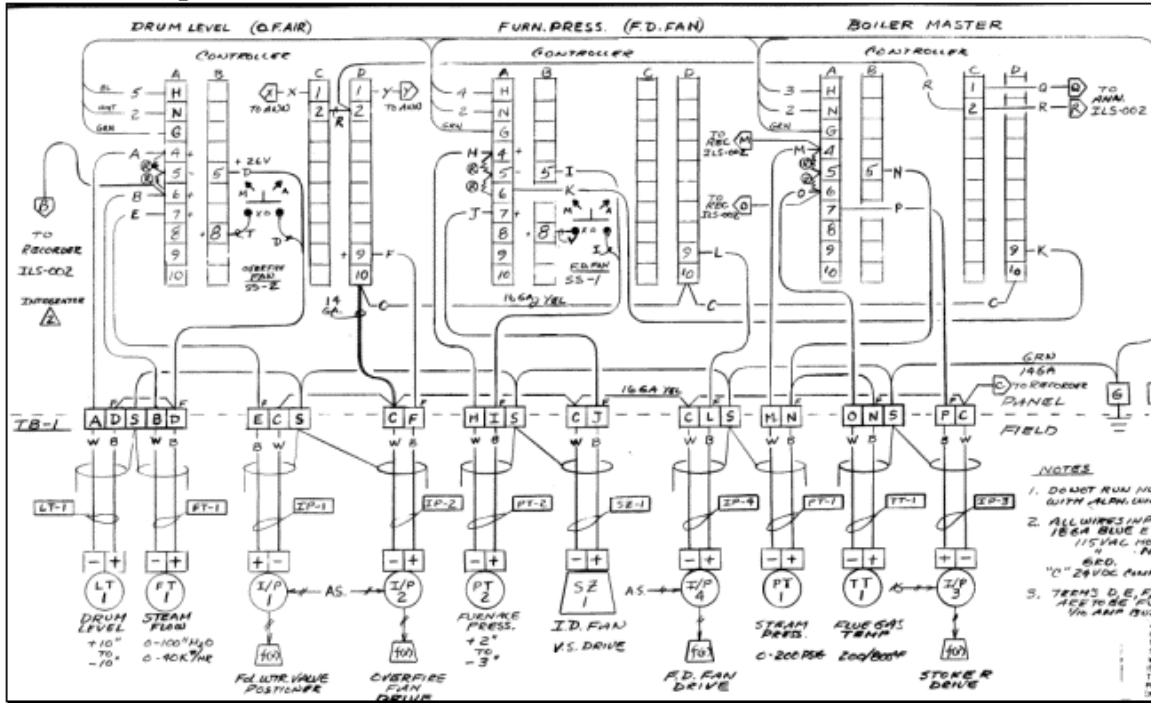
# ICP-102-Control Panel Layout



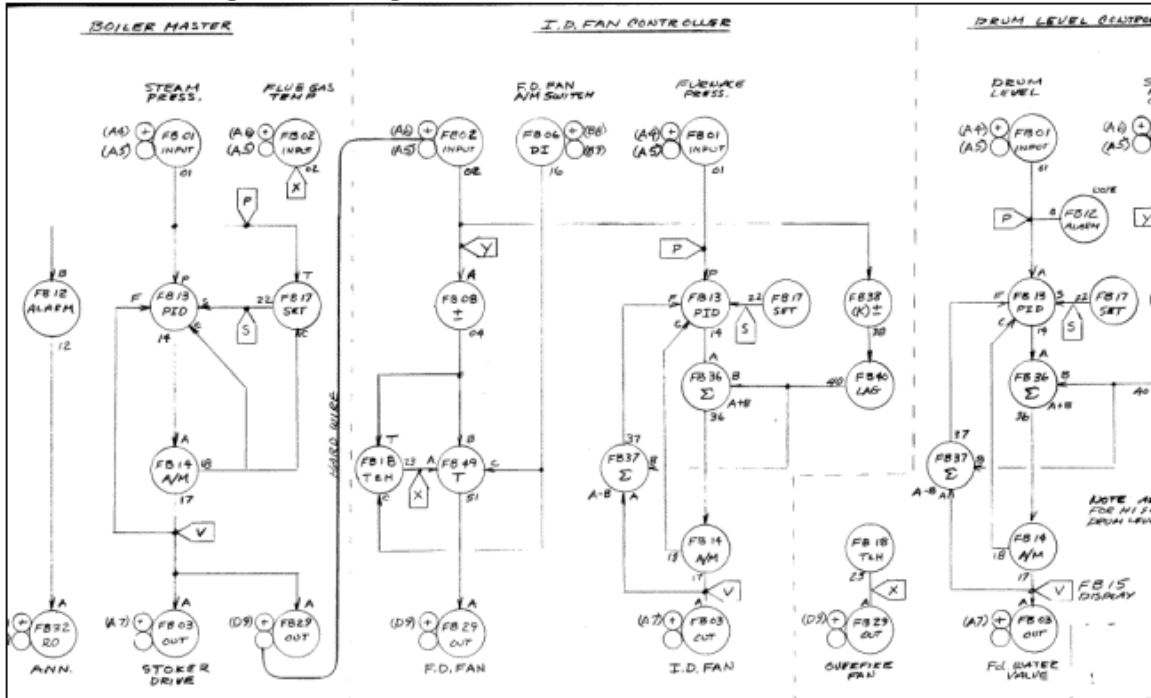
# ICP-103-Control Panel Terminals & Components



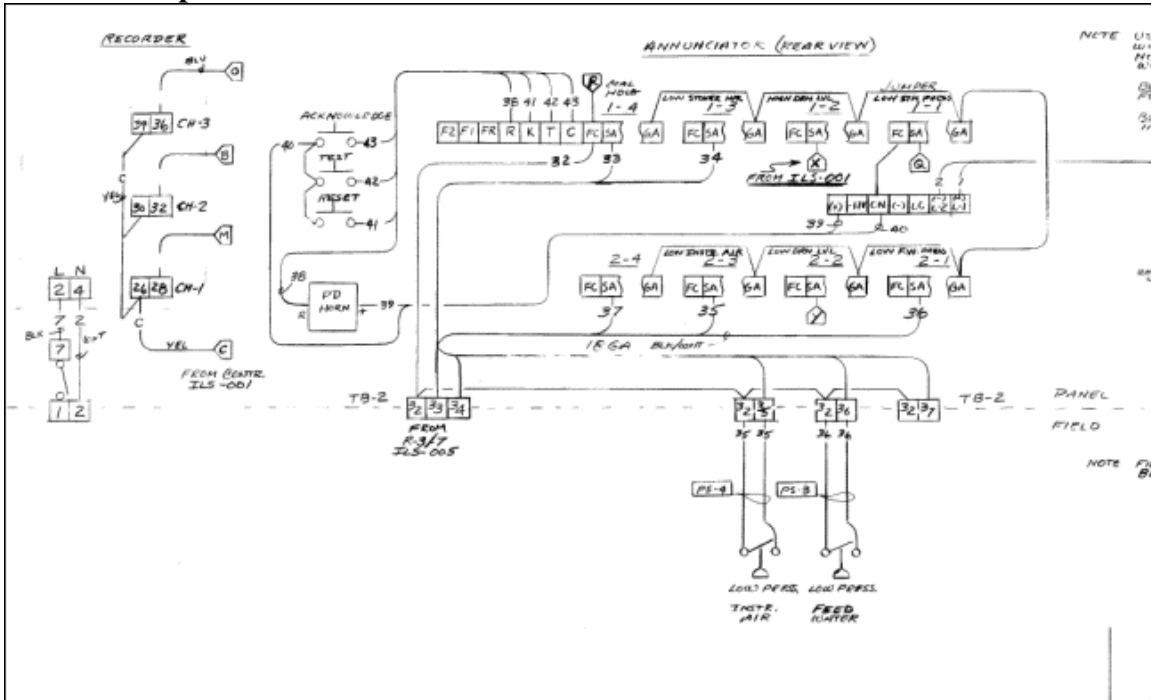
# ILS-001-Loop Sheet: Controllers, Transmitters & I/Ps



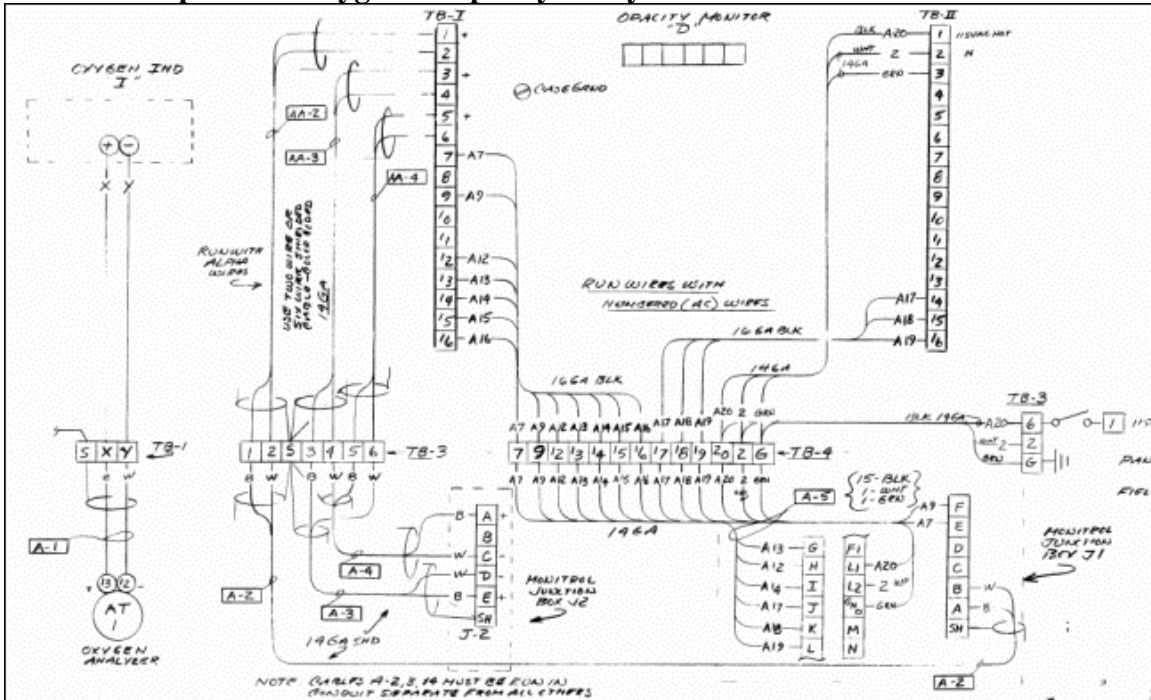
# ILS-001A-Configuration Logic for Moore Products 352 Controller



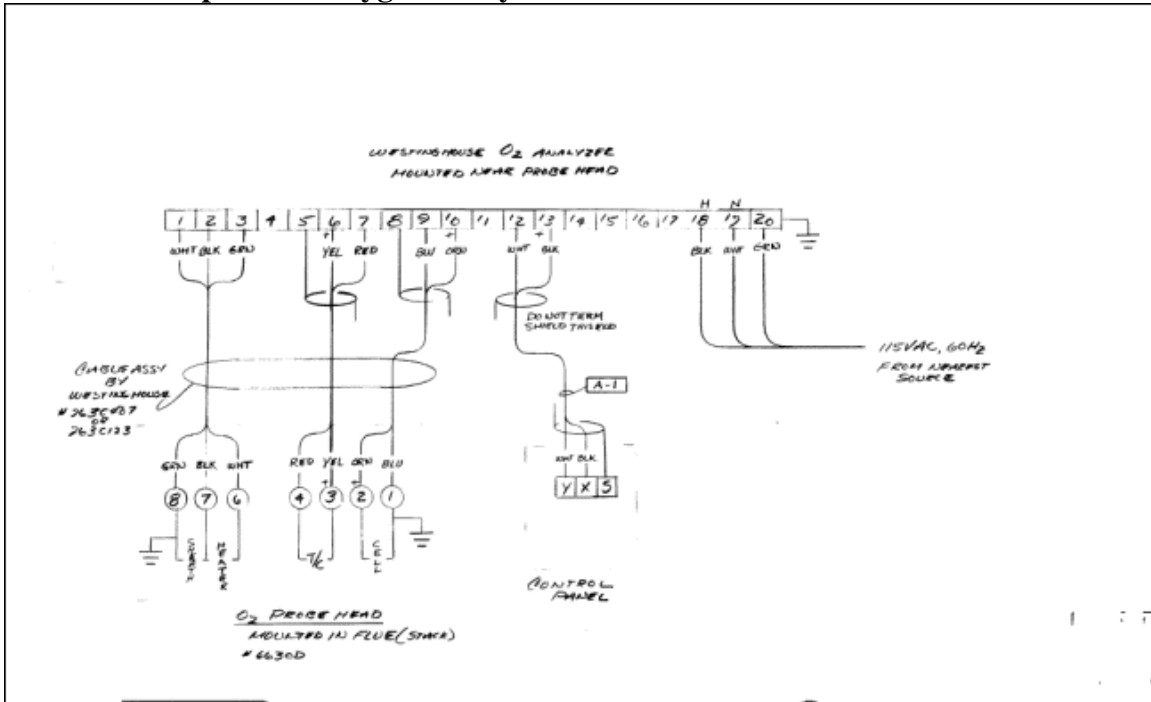
### ILS-002-Loop Sheet: Recorders & Annunciator



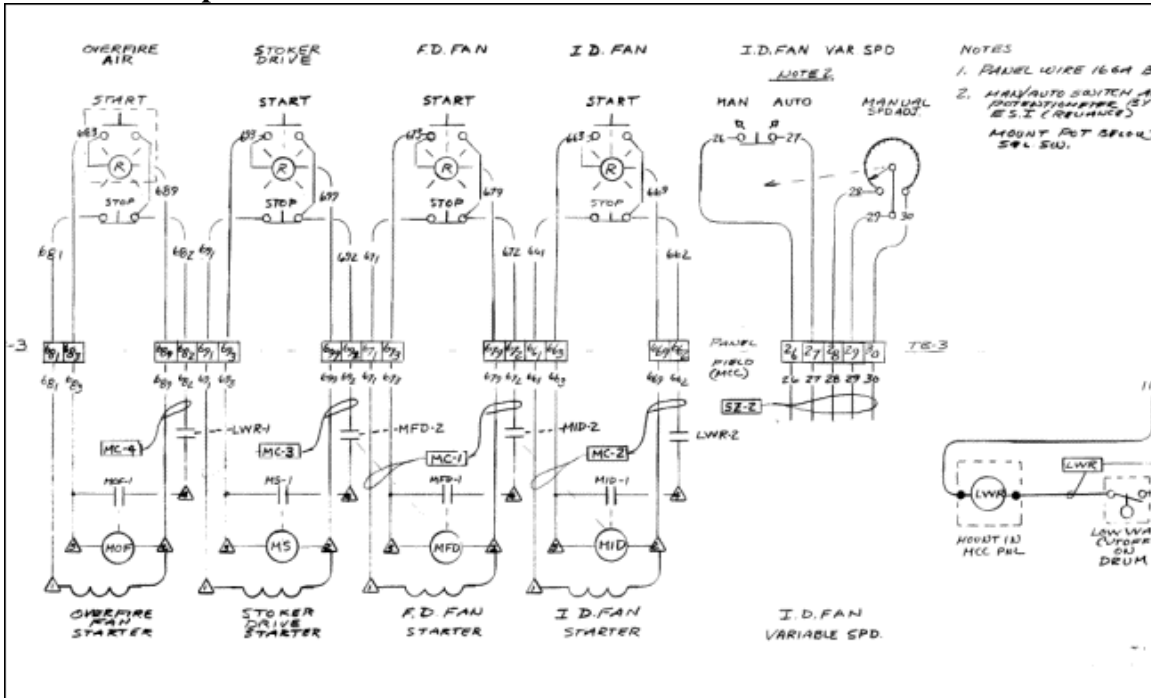
### ILS-003-Loop Sheet: Oxygen & Opacity Analyzers



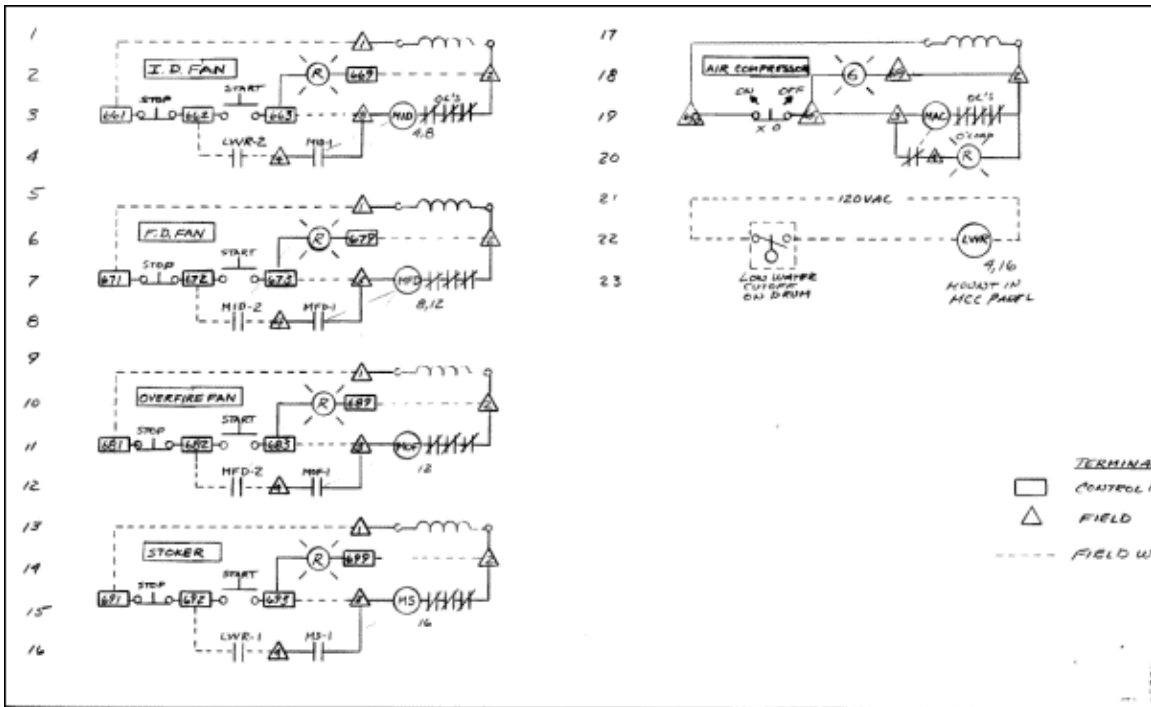
## ILS-003A-Loop Sheet: Oxygen Analyzer Field



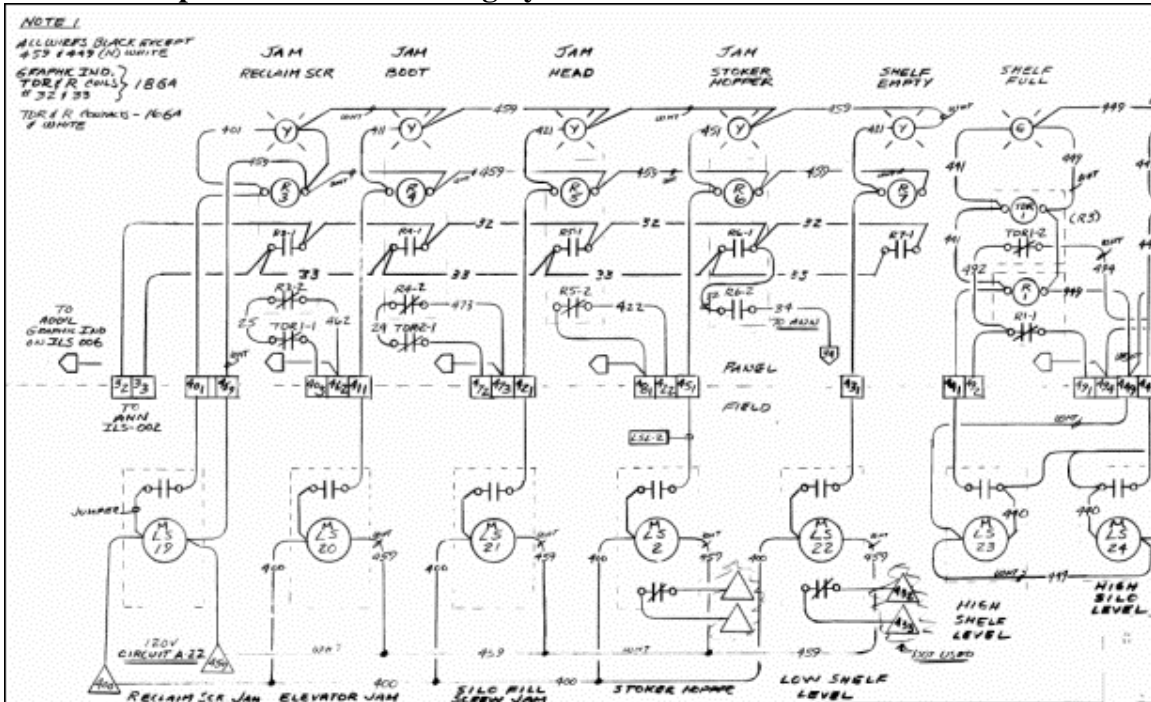
## ILS-004A-Loop Sheet: Motor Controls



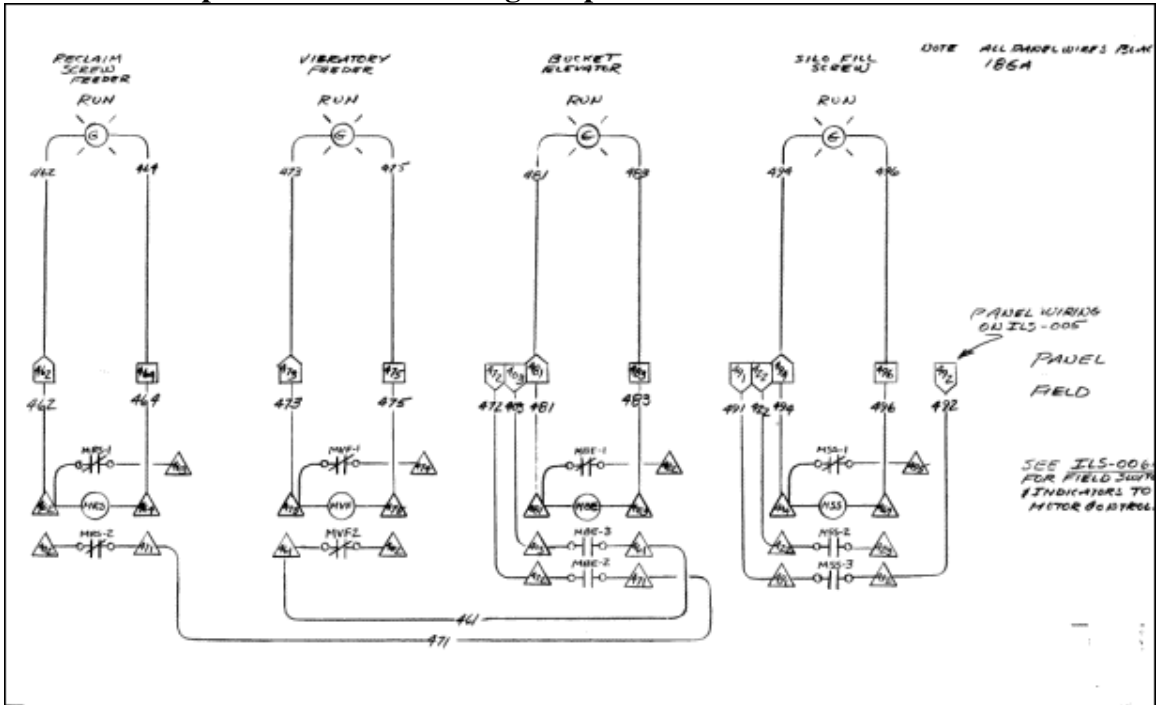
## ILS-004B-Electrical Schematic: Motor Controls



## ILS-005-Loop Sheet: Coal Handling System



# ILS-006A-Loop Sheet: Coal Handling Graphic



# ILS-006B-Schematic: Coal Handling Logic

