ASTEC™

Asphalt Plant Burners

BUILT TO **CONNECT**

Missouri Asphalt Paving Association

February 2023

THE GOAL

- As time goes buy, you are not going to remember what I say
- You are going to remember little of what you see
- You will only remember what you understand
- You will only do what you understand and what makes sense
- My goal is to provide useful information and understanding

How to make a burner reliable

- **D.O.P.E.:**
- **What is it?**
- **Why are we talking about it?**

D.O.P.E

Data On Previous Engagements

D.O.P.E

Data On Previous Engagements

For Low fire and High fire and where you typically run:

- Fuel valve(s) position
- Fuel actuator position
- Fuel pressure
- Fuel meter reading

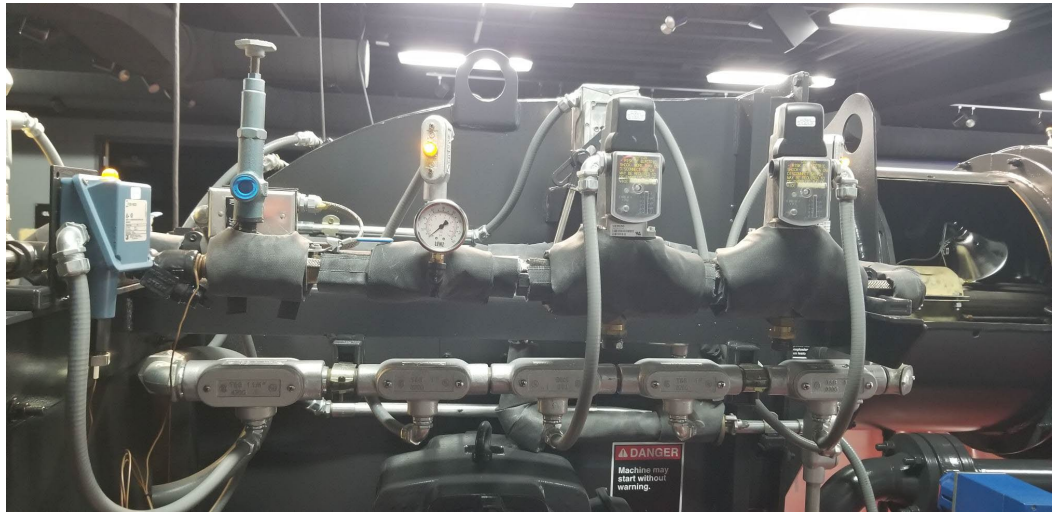
- Air valve position
- Air valve position
- Air pressure (burner body)
- Burner suction

- Burner profile in computer

How to make a burner reliable

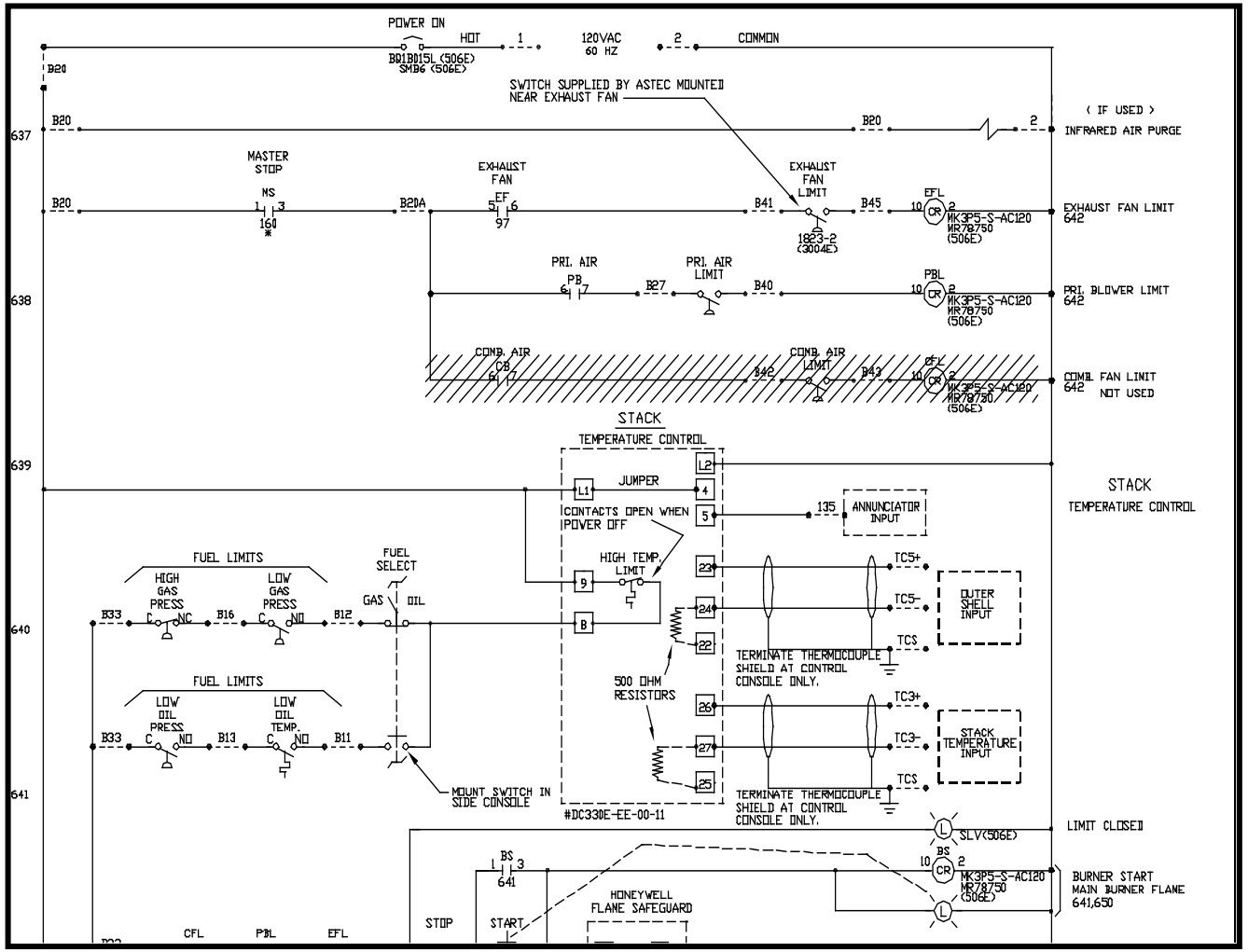
- D.O.P.E.

- **Tag each burner device with name on electrical print**



5am with trucks lined up is not the time to learn about your burner

Tag the burner components



How to make a burner reliable

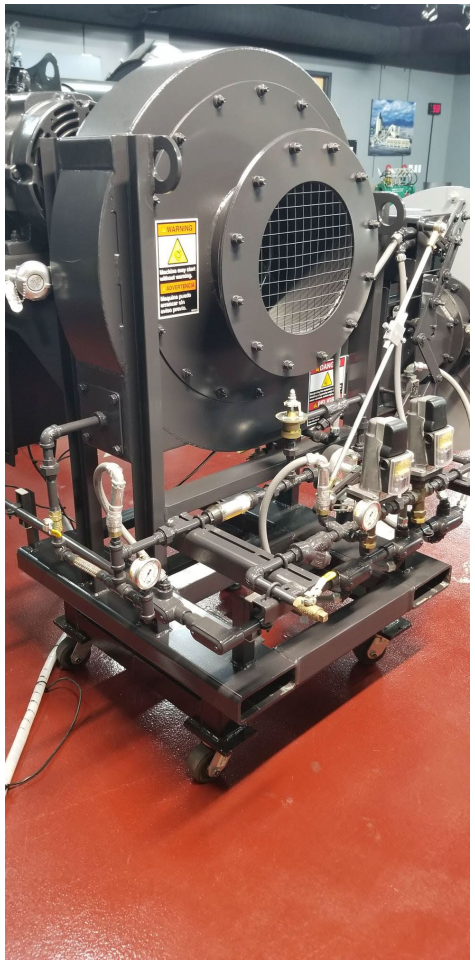
- D.O.P.E.: Data on previous engagements
- Tag each burner device with name on electrical print
- **Understand the function of each burner component**

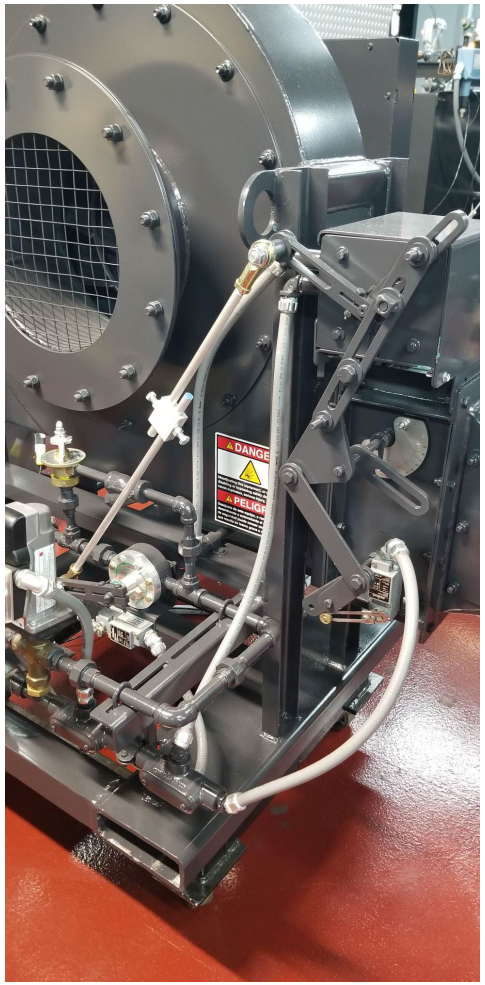
How to make a burner reliable

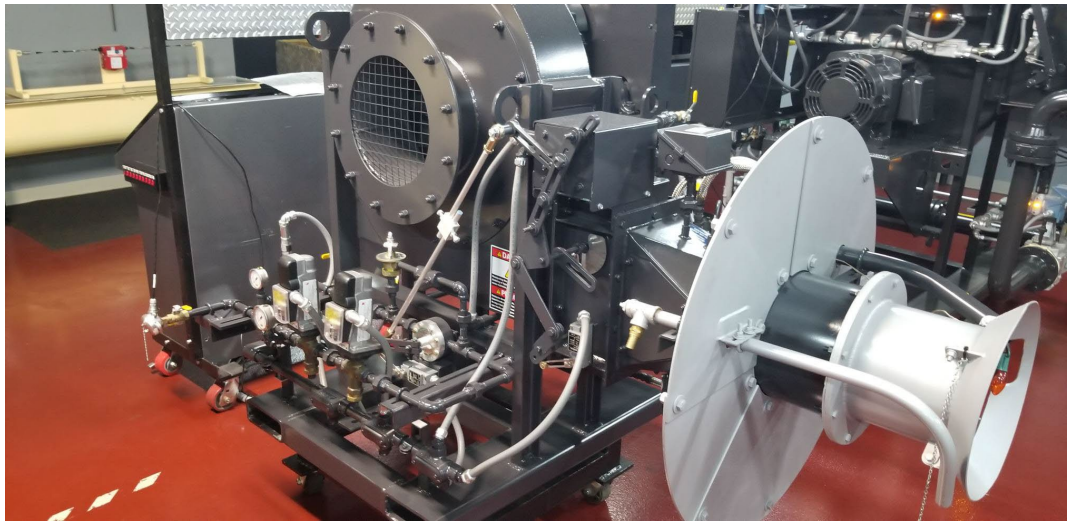
- Limit switches
- Pressure switches
- Thermocouples
- Relays
- Flame safeguard
- Control valves
- Shut-off valves
- Flow meters: Liquid and gas

Be able to have a conversation with the phone support tech – speak the same language

Astec Fury – Most basic burner

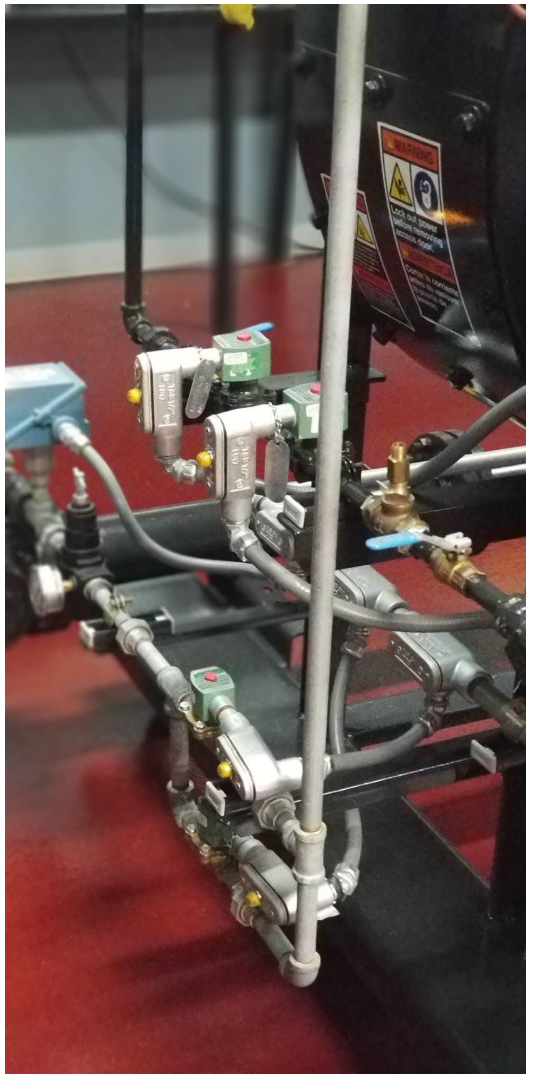






Most basic burner doesn't look so simple

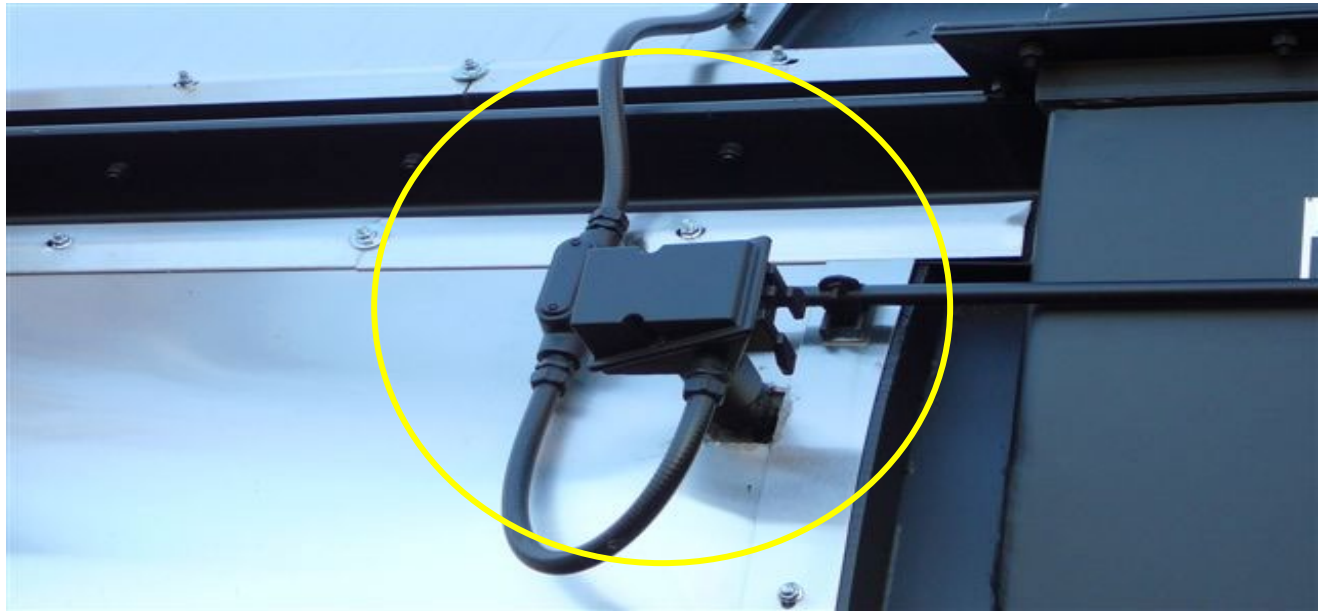
Know your burner



Flash Back Switch – a limit specific to a pre-mix burner

A limit specific to the drum design

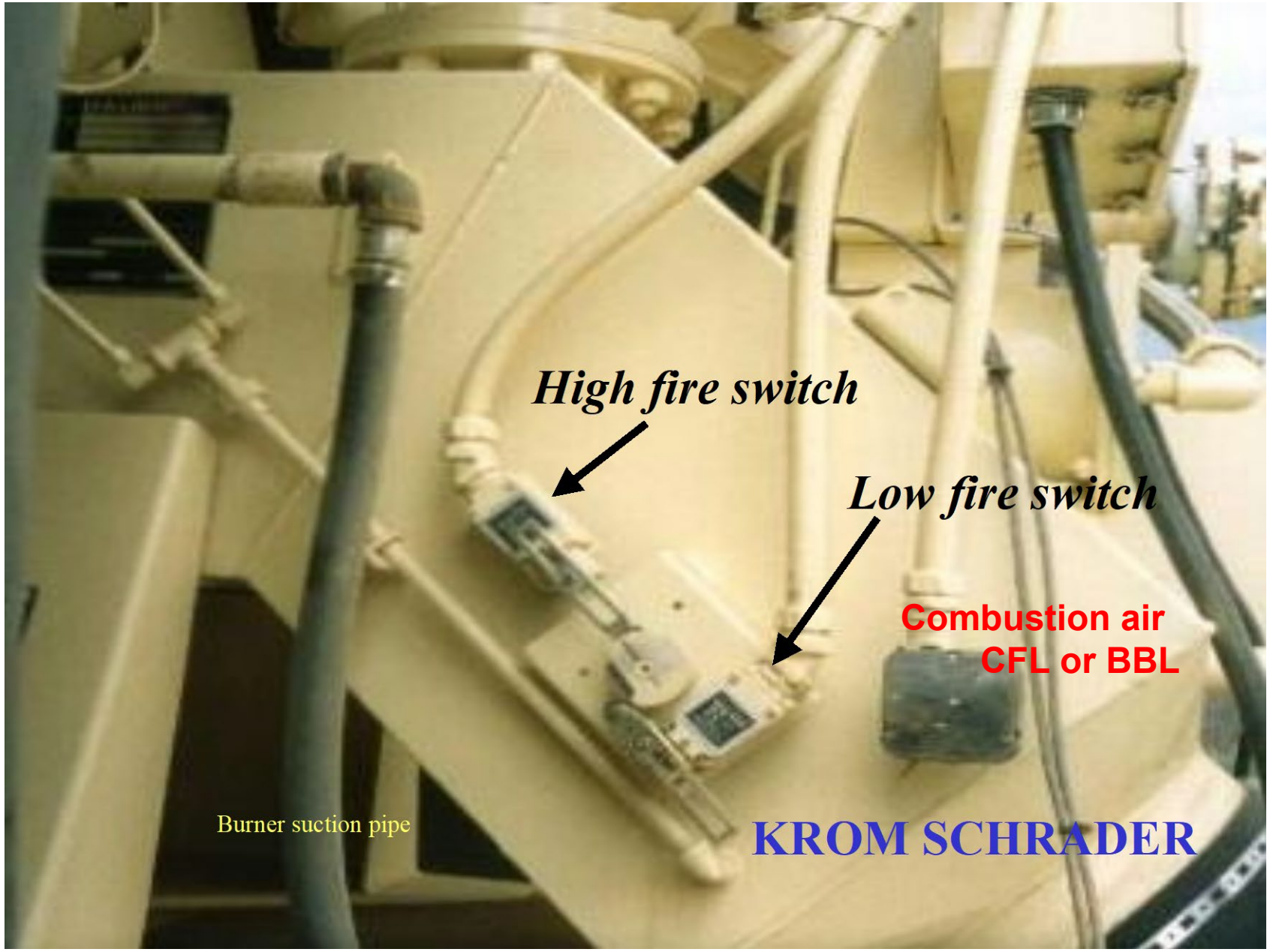
Mix Chamber Temperature Switch's 1 & 2



A limit used when compressed air is required to atomize a liquid fuel

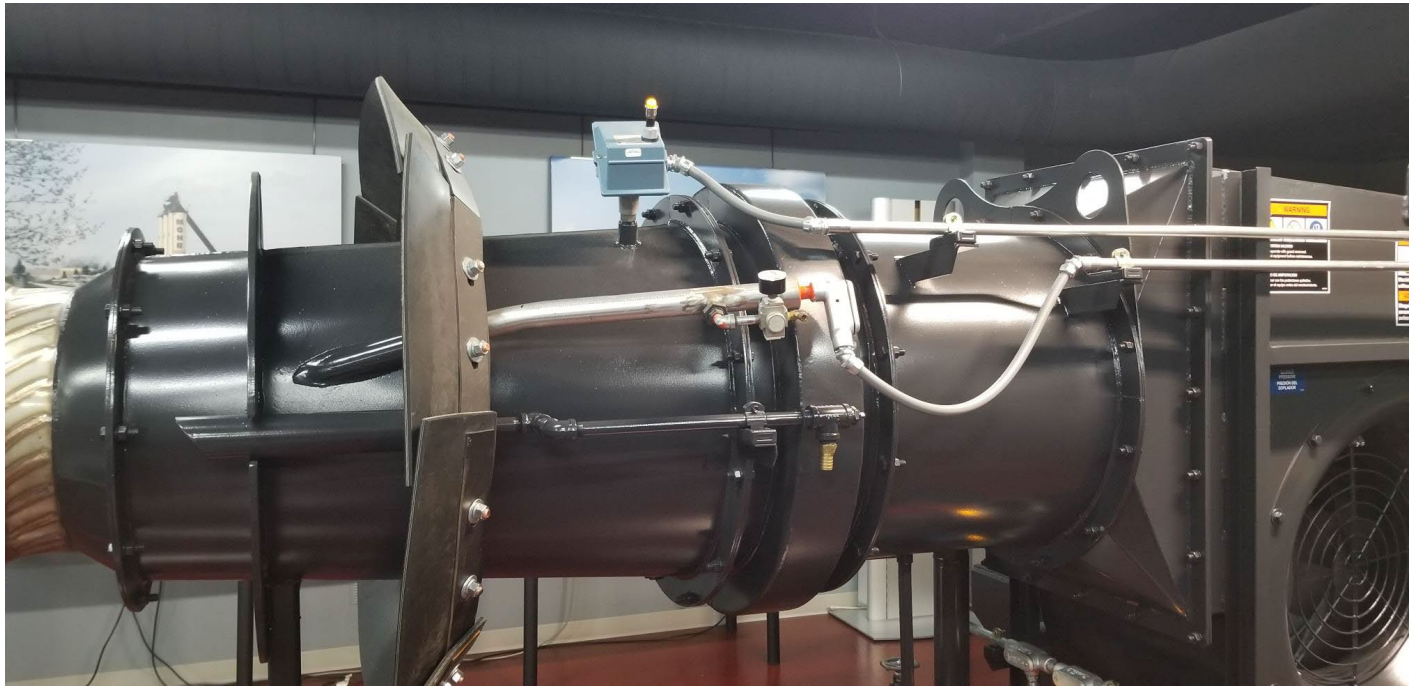
Atomizing Air Pressure Switch (AAL)

Limits used in the purge sequence

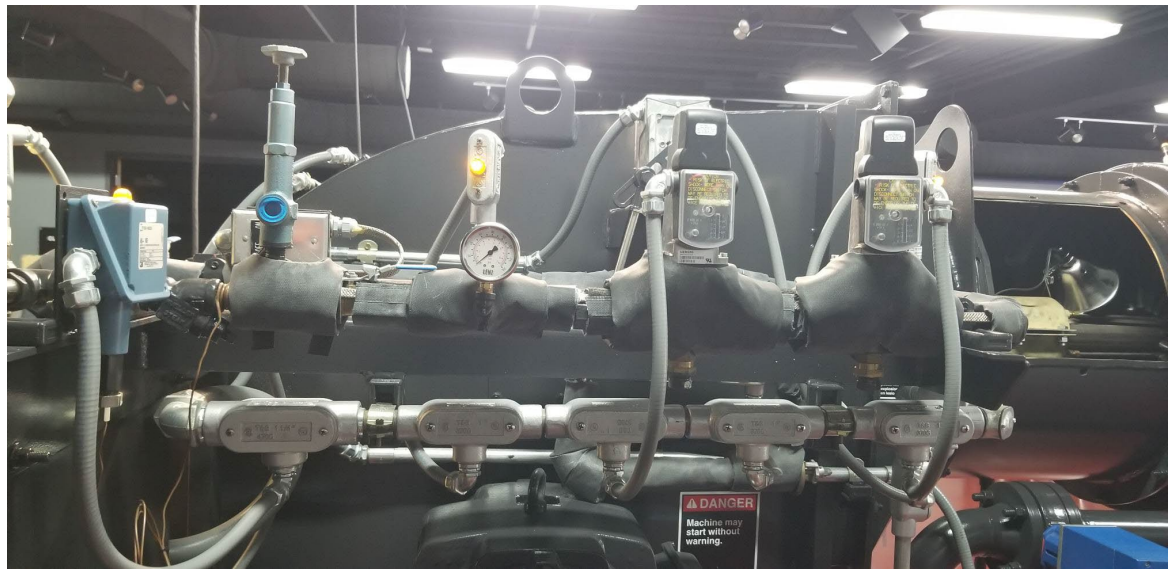


Know your burner

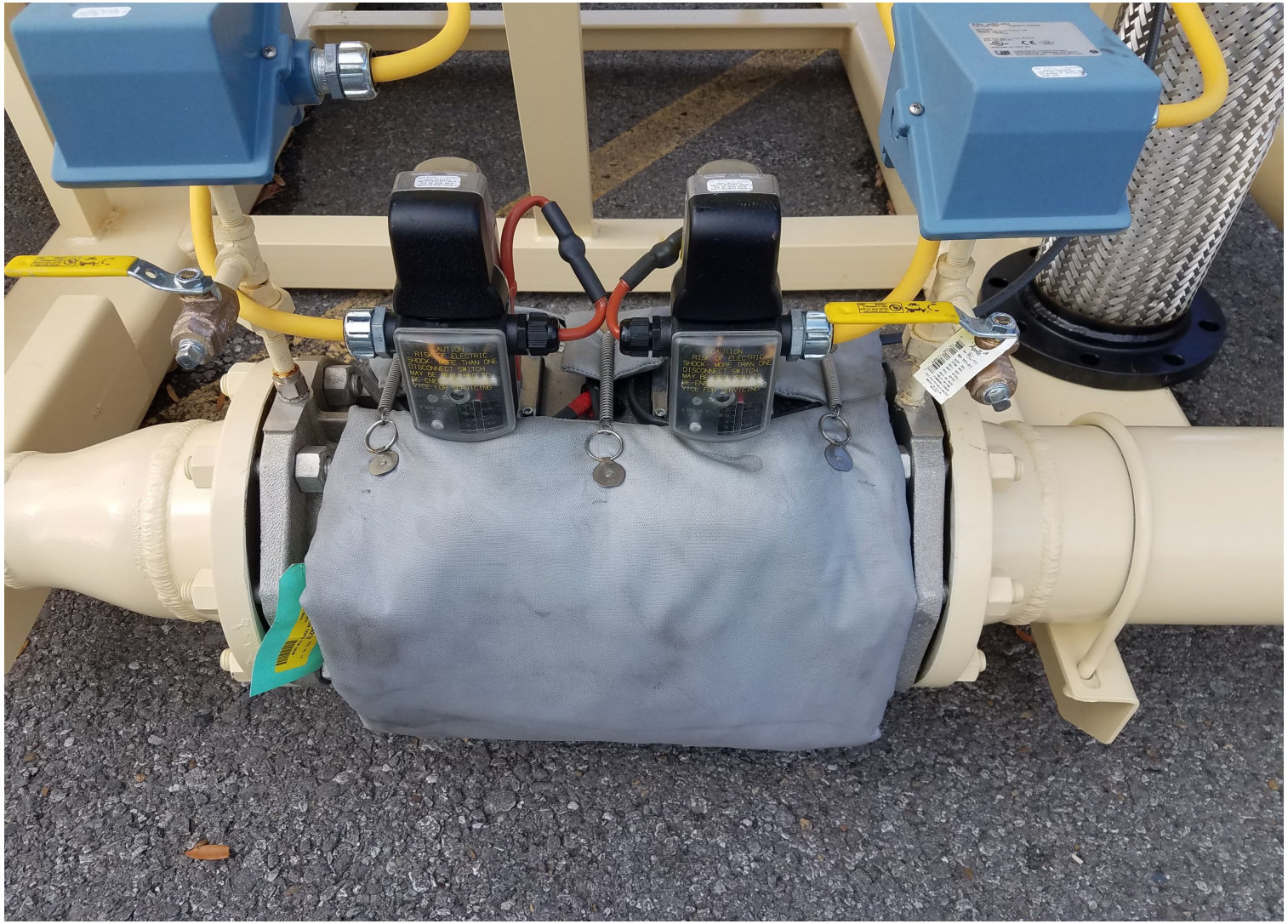
Can you identify the components?



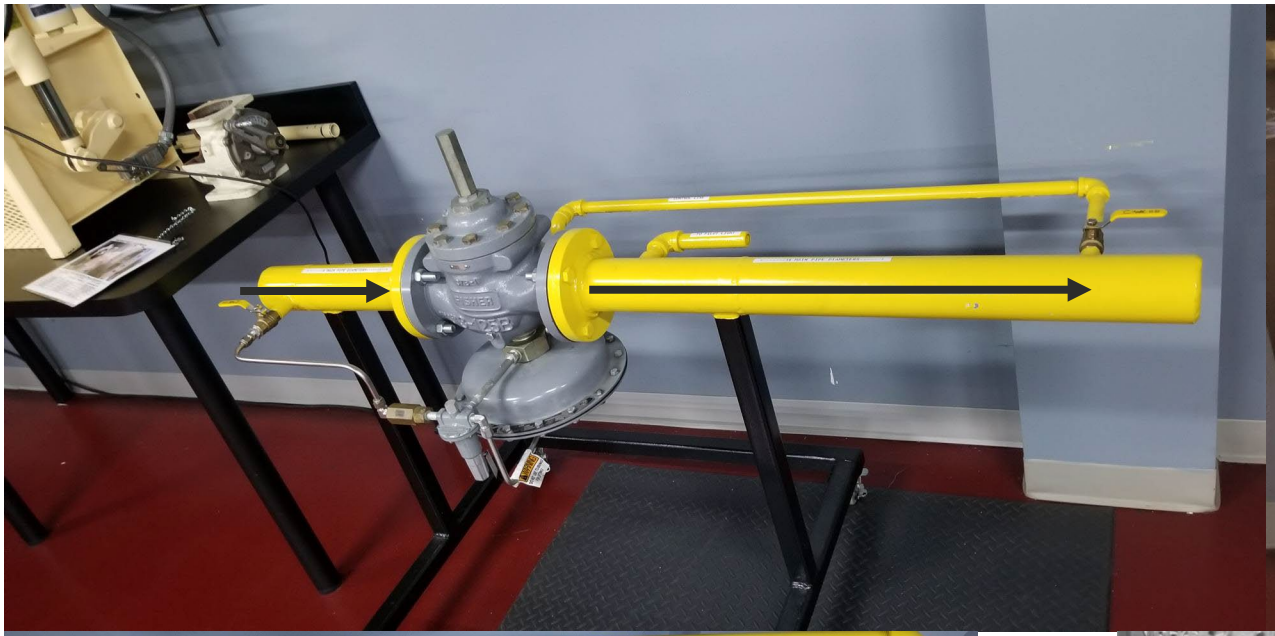
Know your burner – inside and out

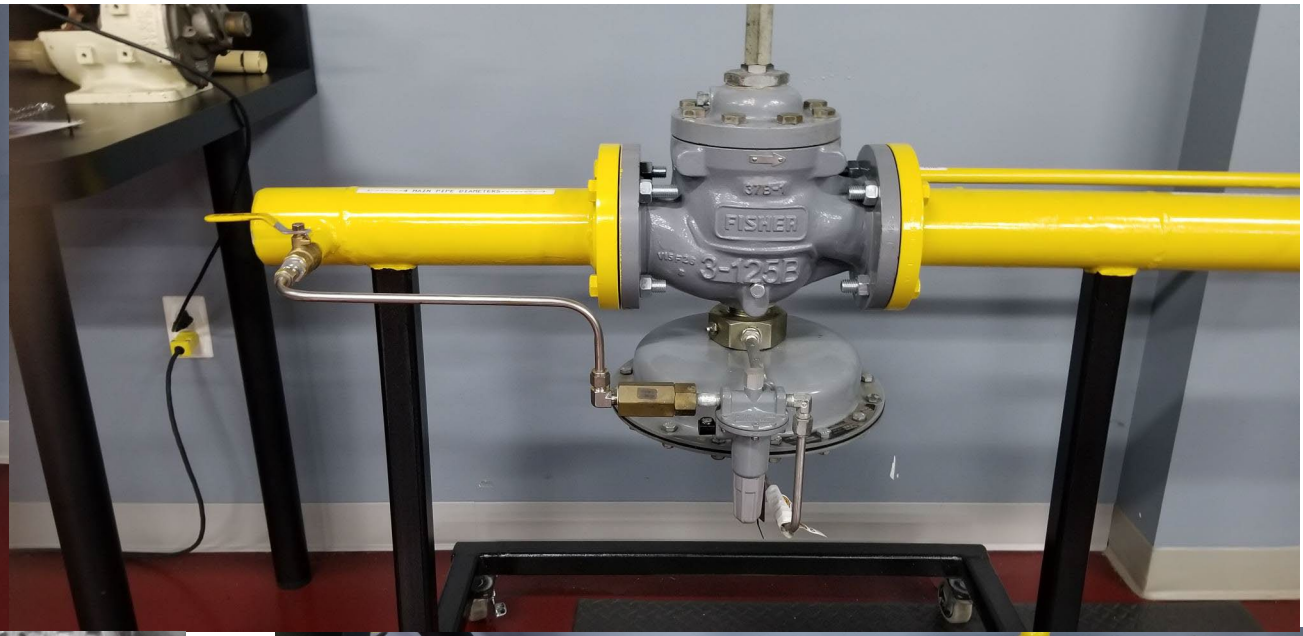


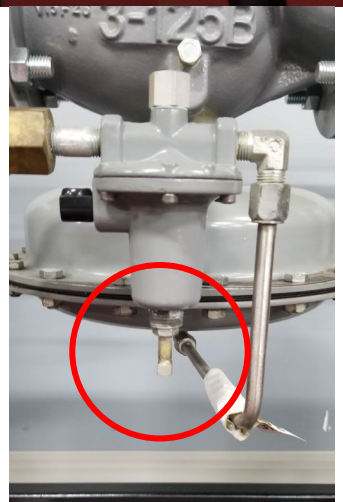
Name that part



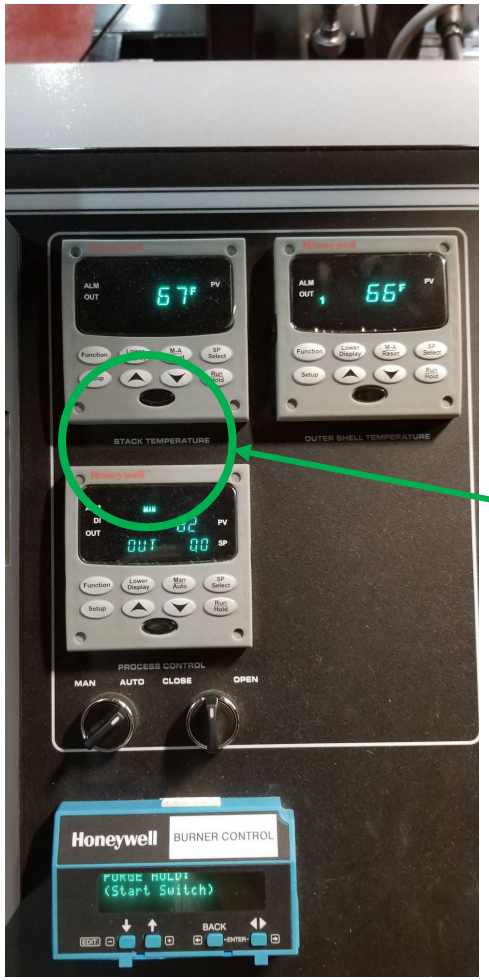
Natural Gas Regulator







Know the Nomenclature



On Astec plants "stack temperature" is measured at the baghouse inlet

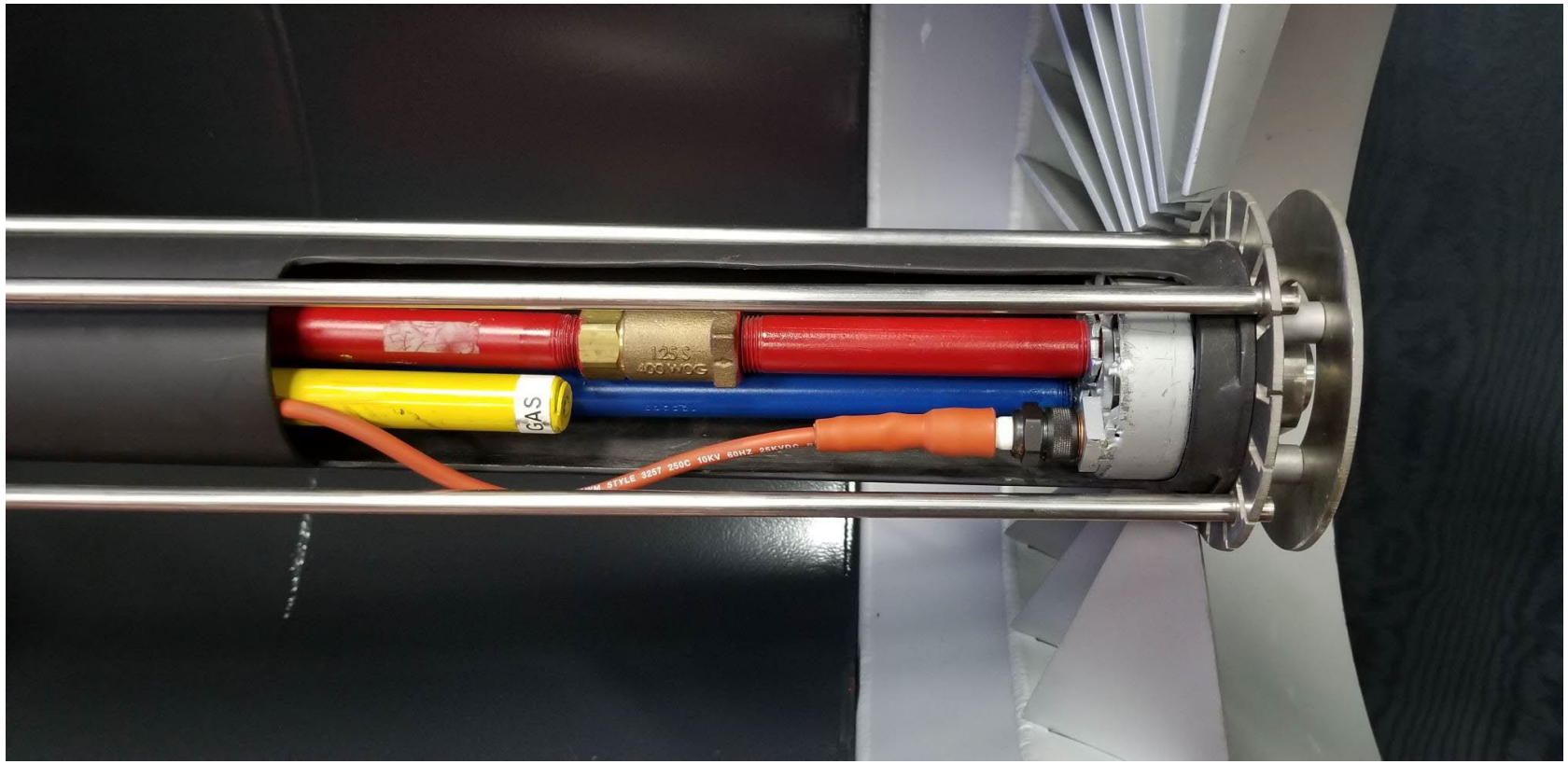
The temperature at the baghouse exit is called "excess temperature"

"stack temperature"

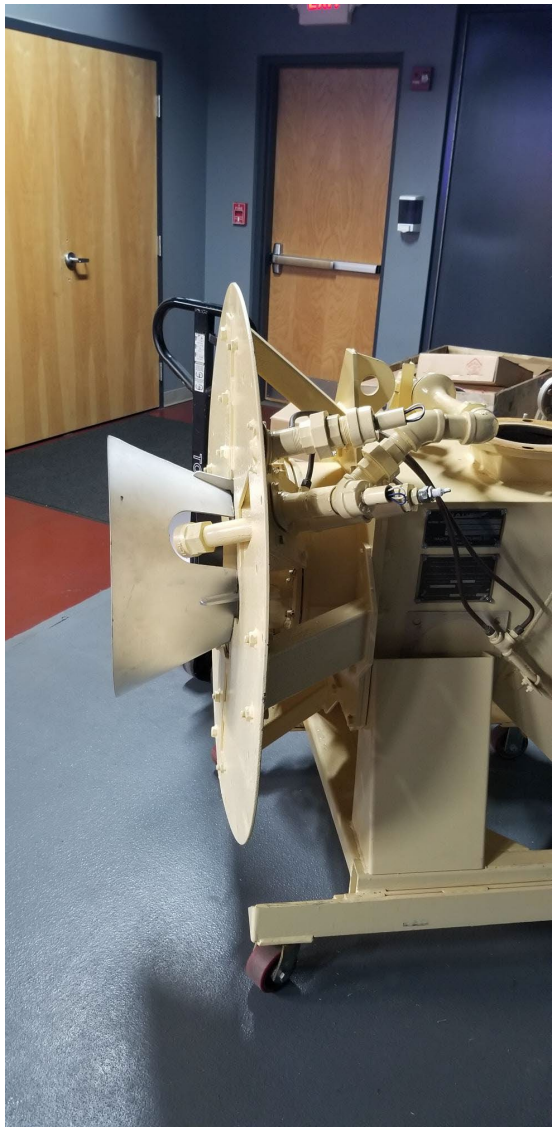
How to make a burner reliable

- D.O.P.E.: Data on previous engagements
- Tag each burner device with name on electrical print
- Understand the function of each component
- **Understand how your burner works inside and out**

Know what is going on inside



Hauck Star Jet



Understanding Combustion

- Combustion requirements
  - **Air: Stoichiometric and excess air**
  - Fuel: Liquid and gas
  - Air to fuel ratio
  - Mixing: Combustion and emissions
  - Ignition: Pilot
  - Turndown: Low fire to high fire
  - Premix and nozzle mix
  - Control: Manual and automatic

Stoichiometric and excess air

- What is it?
- Why is it required?
- How much is needed?
- What if there is too little? Too much?
- Are all burners the same?
- Is it the same at different burner outputs ?
- What about burner controls – one motor vs. separate air / fuel control motors
- How do you tell if too much excess air?
  - Gas analyzer – not so fast…leakage changes the readings
  - Out of baghouse cfm at a low production rate

Understanding Combustion

- Combustion requirements
  - Air: Stoichiometric and excess air
  - **Fuel: Liquid and gas**
  - Air to fuel ratio
  - Mixing: Combustion and emissions
  - Ignition: Pilot
  - Turndown: Low fire to high fire
  - Premix and nozzle mix
  - Control: Manual and automatic

- **Natural gas**
  - Sounds easy to mix with air
  - Nat gas SG = 0.6
  - Vaporized propane (warning)
- **Liquid fuels**
  - No. 2 Diesel
  - Blended fuels
  - Waste Fuel
  - LP Liquid Propane (warning)
  - Atomization

Understanding Combustion

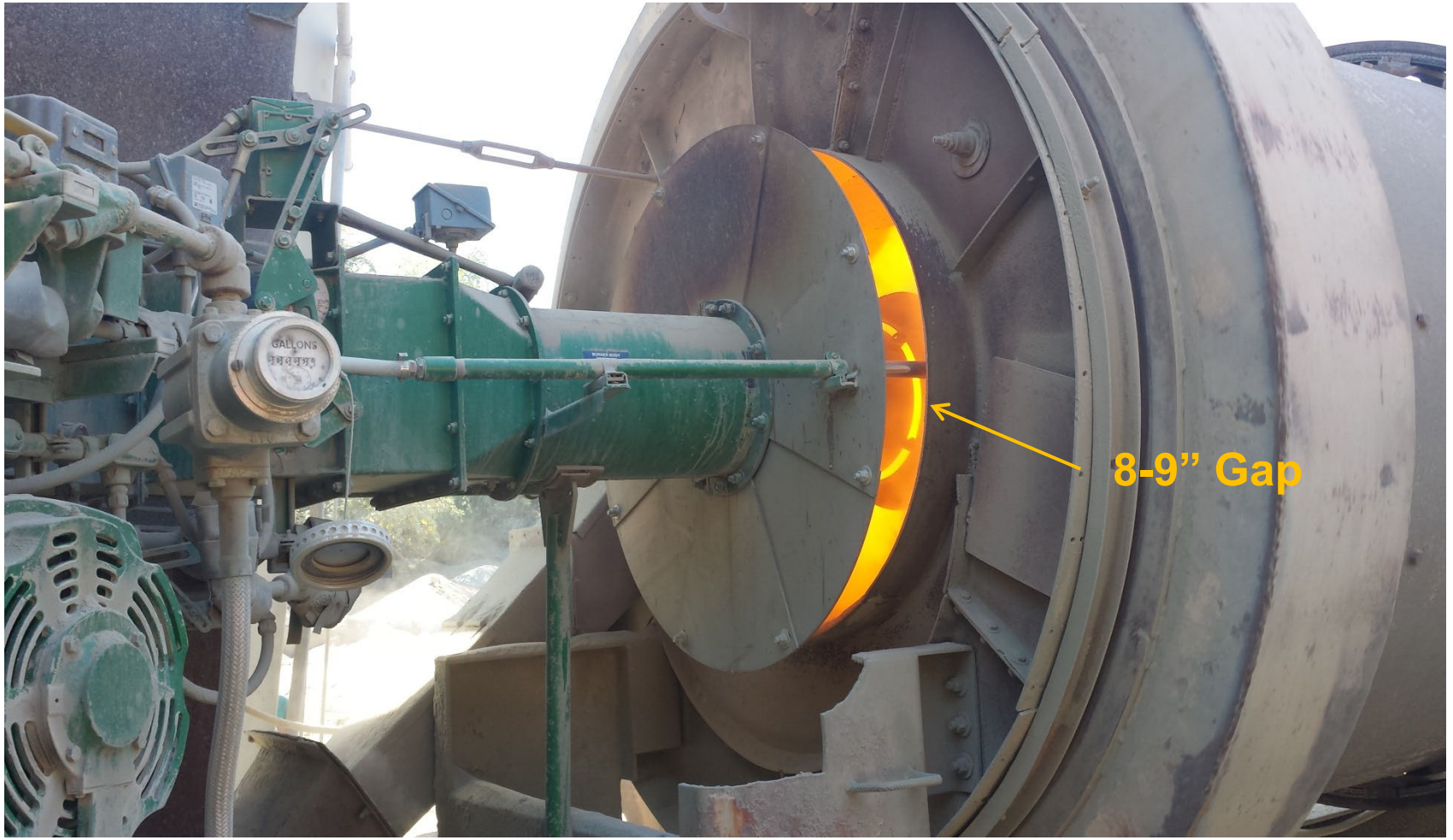
- **Combustion requirements**
  - Air: Stoichiometric and excess air
  - Fuel: Liquid and gas
  - **Air to fuel ratio**
  - Mixing: Combustion and emissions
  - Ignition: Pilot
  - Turndown: Low fire to high fire
  - Premix and nozzle mix
  - Control: Manual and automatic

What happens if…

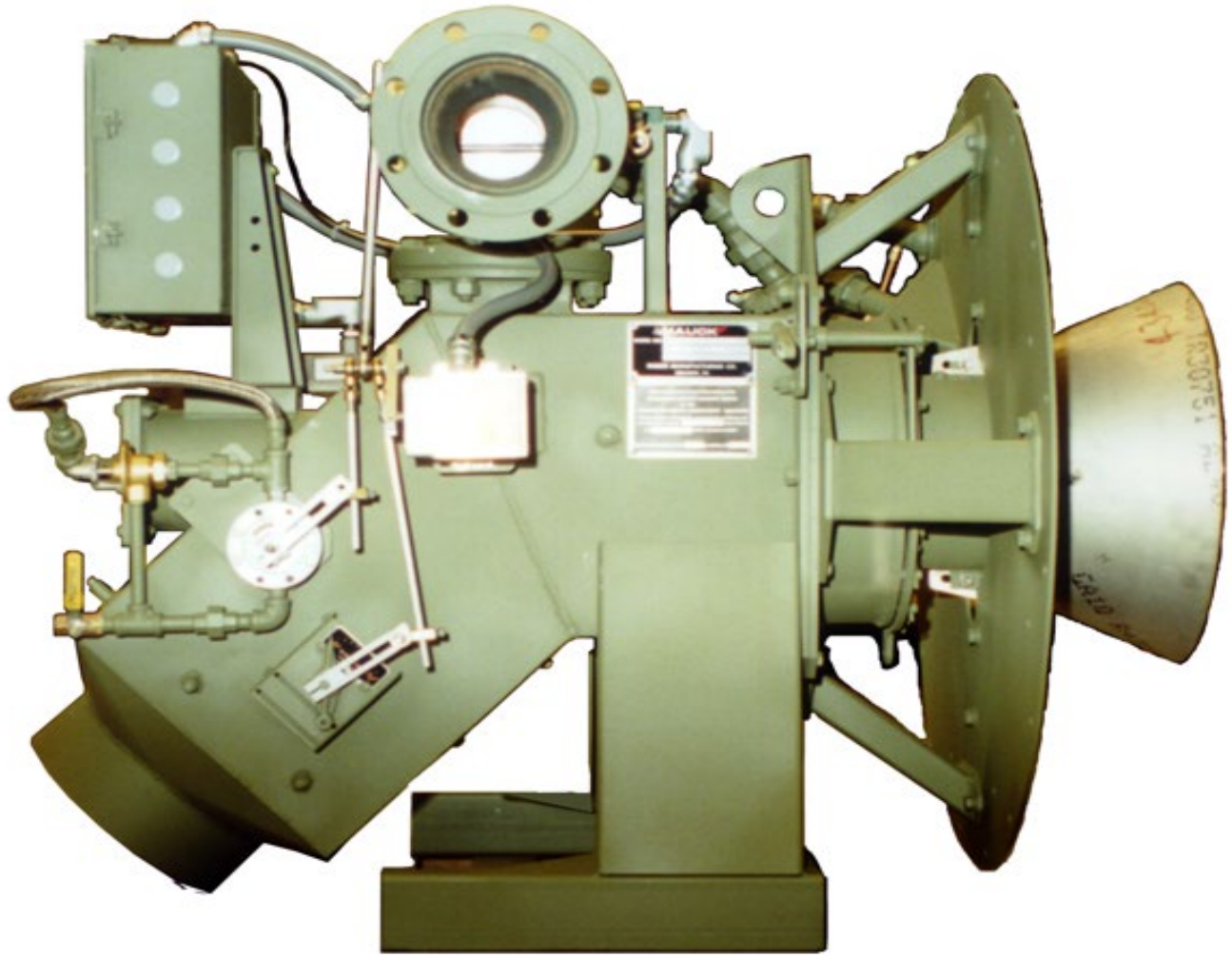
Too rich
- Emissions
- High production
- Big flame
- Hot flame

Too lean
- Emissions
- Low production
- High dust carry-out

PHOENIX FURY - ASTEC'S OPEN FIRED BURNER



HAUCK STARJET- ONE ACTUATOR – EA 57 DRIVE THE AIR, OIL AND GAS VALVES



Understanding Combustion

- **Combustion requirements**
  - Air: Stoichiometric and excess air
  - Fuel: Liquid and gas
  - Air to fuel ratio
  - **Mixing: Combustion and emissions**
  - Ignition: Pilot
  - Turndown: Low fire to high fire
  - Premix and nozzle mix
  - Control: Manual and automatic

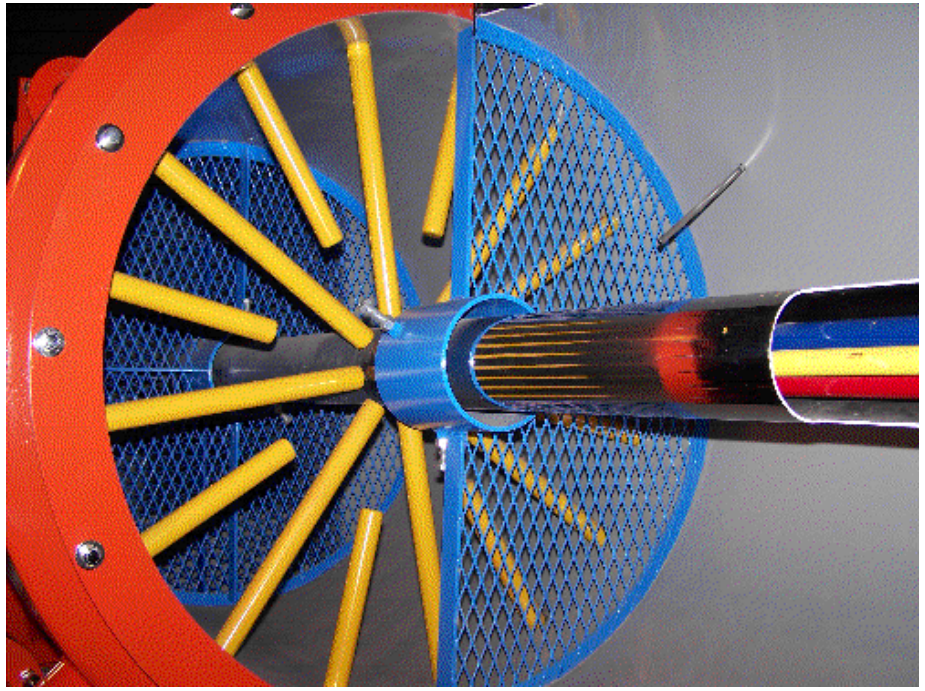
Why is Carbon Monoxide produced?

- CO – What is it?
- Incomplete combustion produces CO
- How much CO ok?
- Must consider percent excess air

Fuel (HC) + Oxygen (Air) = Heat + CO2 + H2O

Fuel (HC) + Oxygen (Air) = Heat + CO → CO2 + H2O

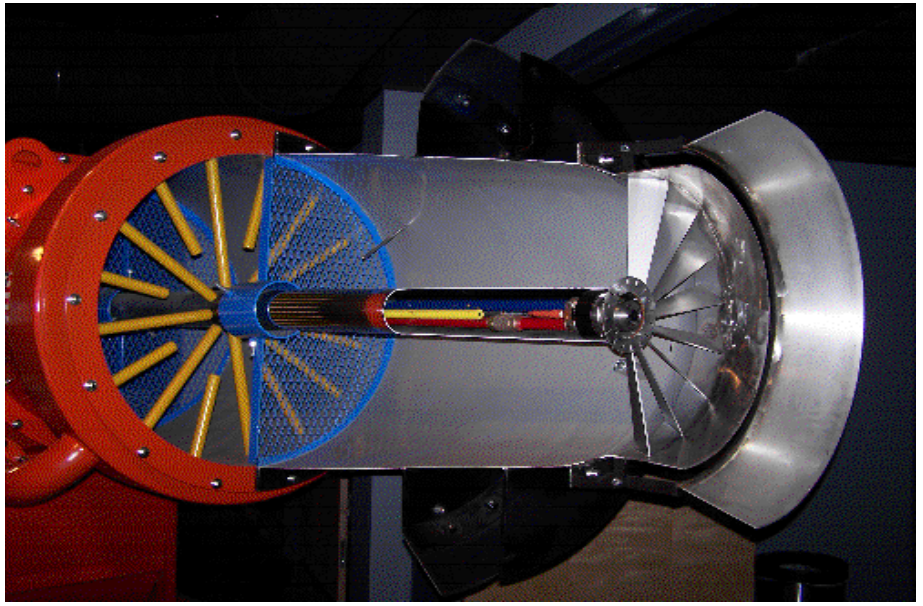
H2 + Oxygen (Air) = Heat + H2O



Phoenix Talon

Pre-Mix On Natural Gas

Know your burner inside and out

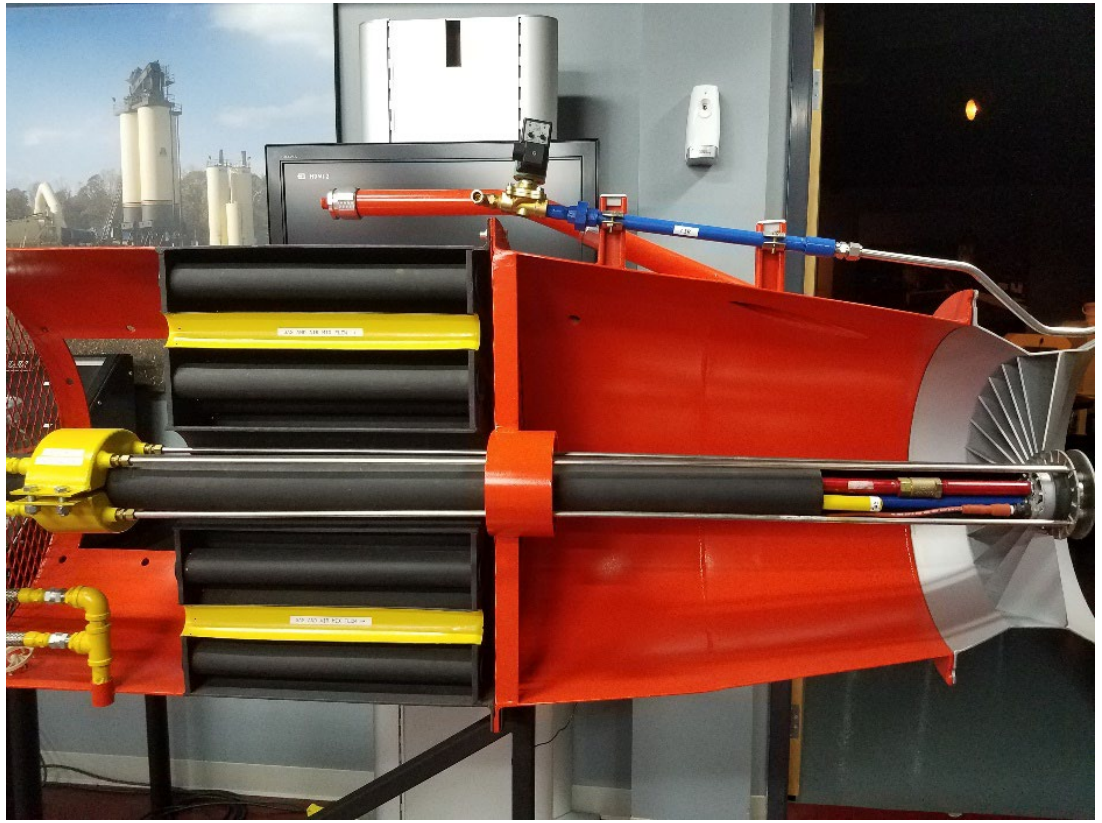


Nozzle/Atomizer mix using

Oil's

ASTEC

Phoenix Talon II Gas Injection Section



Understanding Combustion

- **Combustion requirements**
  - Air: Stoichiometric and excess air
  - Fuel: Liquid and gas
  - Air to fuel ratio
  - Mixing: Combustion and emissions
  - **Ignition: Pilot**
  - Turndown: Low fire to high fire
  - Premix and nozzle mix
  - Control: Manual and automatic

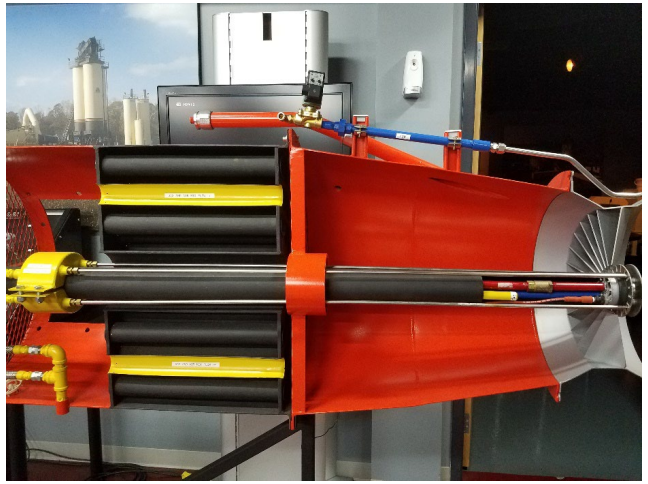
Understanding Combustion

- **Combustion requirements**
  - Air: Stoichiometric and excess air
  - Fuel: Liquid and gas
  - Air to fuel ratio
  - Mixing: Combustion and emissions
  - Ignition: Pilot
  - **Turndown: Low fire to high fire**
  - Premix and nozzle mix
  - Control: Manual and automatic

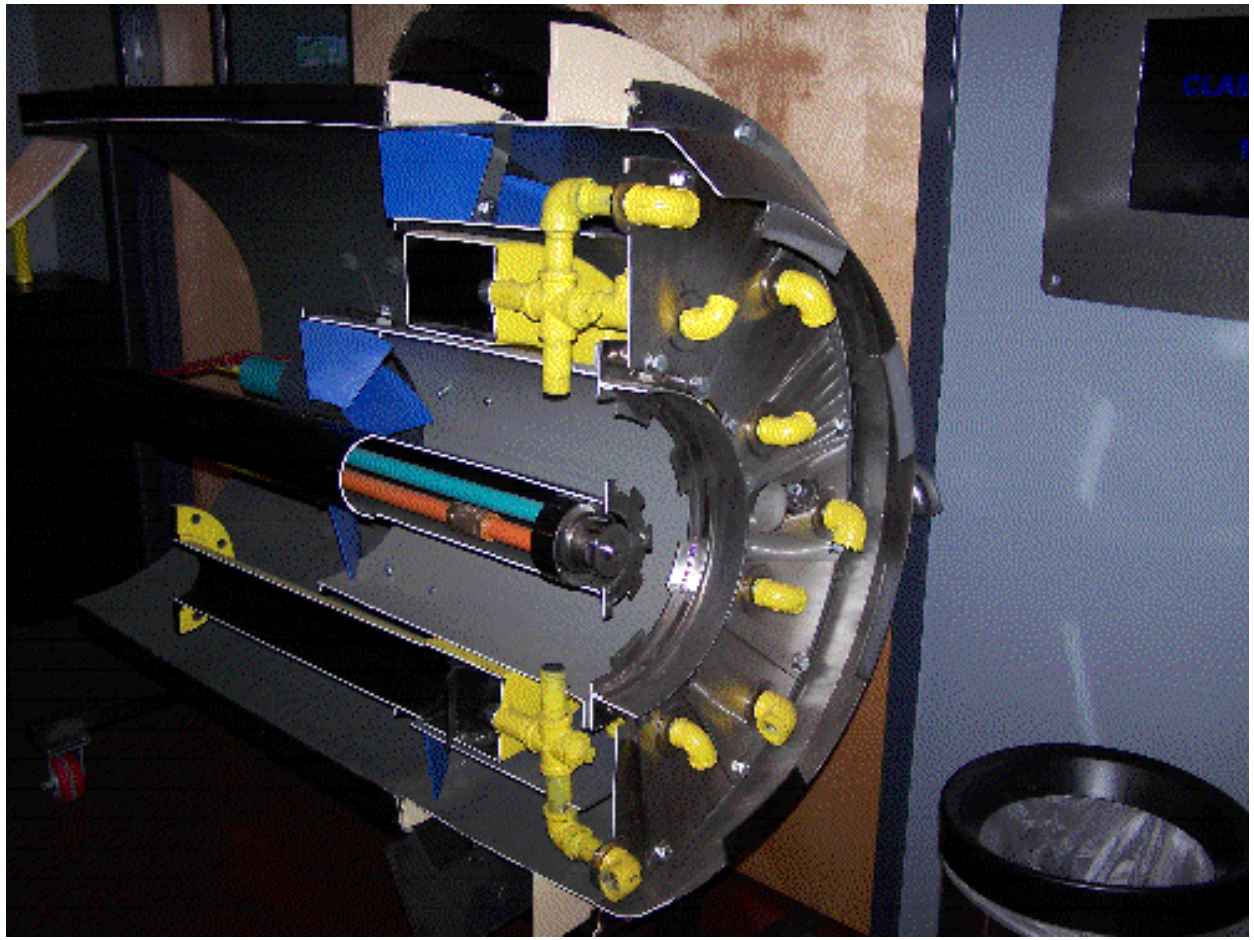
- What is "turn down"?
- Reasonable turndown?
- What is "low fire" for?
- What can happen at low firing rates?

Understanding Combustion

- **Combustion requirements**
  - Air: Stoichiometric and excess air
  - Fuel: Liquid and gas
  - Air to fuel ratio
  - Mixing: Combustion and emissions
  - Ignition: Pilot
  - Turndown: Low fire to high fire
  - **Premix and nozzle mix**
  - Control: Manual and automatic



Nozzle mix for Oil and gas



Understanding Combustion

- **Combustion requirements**
  - Air: Stoichiometric and excess air
  - Fuel: Liquid and gas
  - Air to fuel ratio
  - Mixing: Combustion and emissions
  - Ignition: Pilot
  - Turndown: Low fire to high fire
  - Premix and nozzle mix
  - **Control: Manual and automatic**

Manual:

What does "manual" mean here?
What's good about "manual"?

Automatic:

What does "automatic" mean?
Parallel flow vs. counter flow

How to make a burner reliable

- D.O.P.E.: Data on previous engagements
- Tag each burner device with name on electrical print
- Understand the function of each component
- Understand how your burner works inside and out
- **Have access to a burner data sheet**

Burner Data Sheet from Astec

Gas Performance Data												
WJ-100-G-2021		1	2	3	4	5	6	7	8	9	10	11
% Burner output		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Heat Input	MMBtu/hr	11	21	31	41	51	61	70	80	90	100	110
Gas Flow	SCFH	11,000	20,900	30,800	40,700	50,600	60,500	70,400	80,300	90,200	100,100	110,000
	M^3	311	592	872	1,152	1,433	1,713	1,994	2,274	2,554	2,835	3,115
Control Valve Position	Dial (Deg.)	16	22	27	31	33	41	45	48	54	62	90
Gas Pressure in Train	PSI	4.16	4.16	4.16	4.15	4.15	4.15	4.15	4.16	4.16	4.19	4.19
	kPa	28.7	28.7	28.7	28.6	28.6	28.6	28.6	28.7	28.7	28.9	28.9
Gas Pressure in gas manifold	inWC	0.0	2.6	5.9	9.6	12.9	18.7	25.4	31.9	38.0	46.0	54.5
	Pa	0	648	1,470	2,391	3,213	4,658	6,327	7,946	9,465	11,458	13,575
Differential Pressure at Gas Orifice	inWC	0.50	0.77	0.88	1.48	1.96	2.92	3.88	5.30	6.34	7.82	9.37
	Pa	125	192	219	369	488	727	966	1,320	1,579	1,948	2,334
Damper Position	Dial	0.00	1.00	2.00	2.50	3.00	3.75	4.50	5.00	5.75	6.75	9.00
Blower Pressure	inWC	20.0	20.7	21.0	21.2	21.8	22.0	22.5	22.7	23.1	22.8	22.7
	Pa	4,982	5,156	5,231	5,281	5,430	5,480	5,604	5,654	5,754	5,679	5,654
Burner Body Pressure	inWC	0.4	1.3	2.3	4.1	5.8	8.7	11.2	13.1	15.0	16.7	16.4
	Pa	102	324	580	1,026	1,435	2,157	2,777	3,273	3,736	4,160	4,085
Combustion Air Motor Power	HP	61.1	69.3	76.4	83.2	88.1	95	100	103	105	109	107
Combustion Air Motor Current	Amp.	70.8	77.6	84.7	90.6	94.5	101	105	108	112	114	113
Main Air Flow	SCFH	361,115	493,884	632,555	739,581	880,296	1,021,159	1,145,024	1,233,957	1,290,228	1,361,344	1,385,086
	M^3	10,226	13,985	17,912	20,943	24,927	28,916	32,423	34,942	36,535	38,549	39,221
Flame Length	Feet	4.00	4.00	4.50	4.50	5.00	5.00	5.50	6.50	8.00	8.00	8.00
Flame Diameter	Feet	3.00	3.00	3.00	3.50	3.50	3.50	3.50	4.00	4.50	4.50	4.50
Excess air	%	226%	135%	104%	81%	73%	68%	62%	53%	42%	35%	25%
20-284 Single Actuator Setup		46°F										

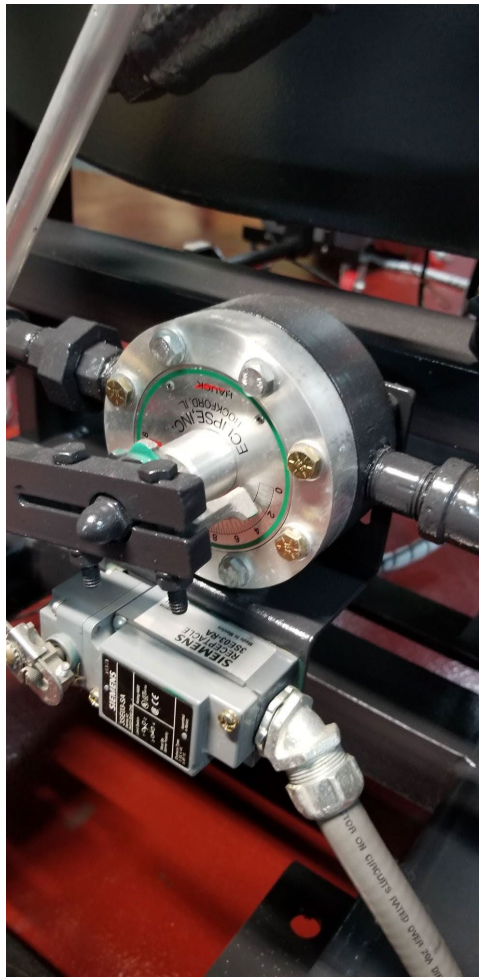
How to make a burner reliable

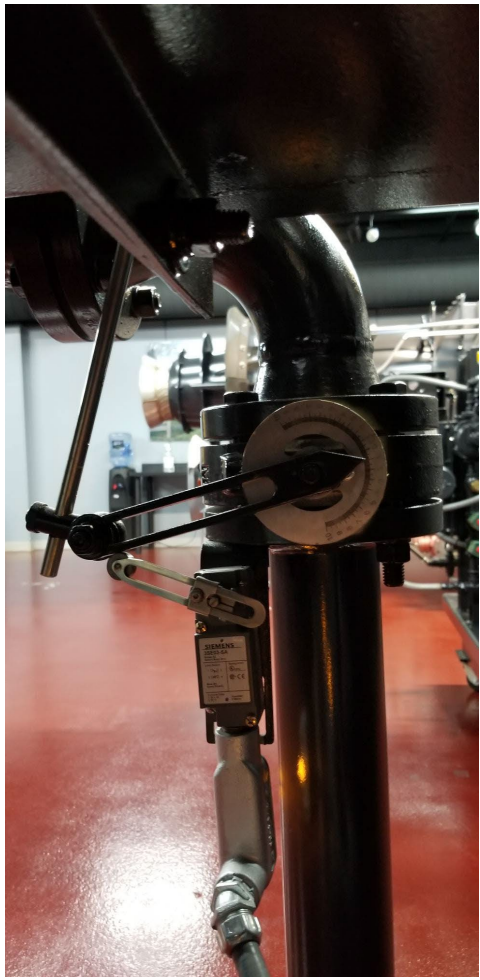
- **Record valve settings and linkage settings for low and high fire**
  - Write down in plant journal
  - Photograph and print copies for journal
  - Paint or mark linkage settings
  - Put burner settings in burner junction box (write on inside of door)

- **Re-record these values whenever the burner is adjusted**

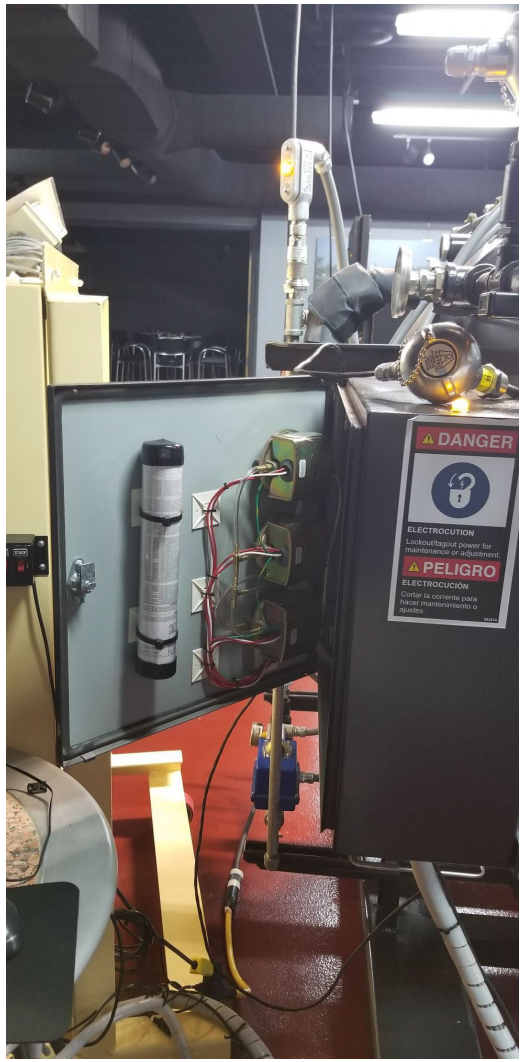
- **Follow burner tech around 2x per year: Start-up and mid-year**

Valve and damper positions





Burner Panel



- Keep Closed
- Keep Clean
- Make sure documents reside in panel
- Record valve / linkage settings for low and high fire

How to make a burner reliable

- **Make sure that the flow meters are in place and functioning**
- Use liquid filled pressure gages
- Record all fuel and air pressures at different firing rates
- Record nozzle settings in case something vibrates loose
- Regularly inspect the burner nose
- Decide on a tuning frequency. Don’t wait for a crisis.

Fuel Flow Meters

How to make a burner reliable

- Make sure that the flow meters are in place and functioning
- **Use liquid filled pressure gages**
- Record all fuel and air pressures at different firing rates
- Record nozzle settings in case something vibrates loose
- Regularly inspect the burner nose
- Decide on a tuning frequency. Don’t wait for a crisis.

How to make a burner reliable

- Make sure that the flow meters are in place and functioning
- Use liquid filled pressure gages
- **Record all fuel and air pressures at different firing rates (D.O.P.E.)**
- Record nozzle settings in case something vibrates loose
- Regularly inspect the burner nose
- Decide on a tuning frequency. Don't wait for a crisis.

Place slack tube photo here

Pressure measurement

Dwyer slack-tube manometer

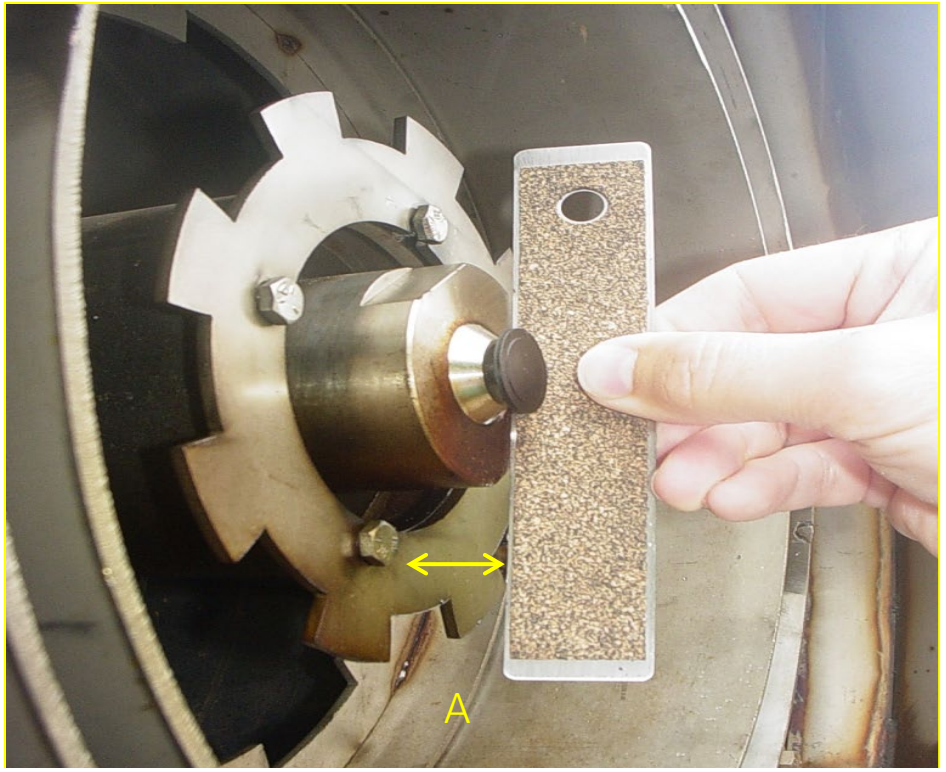
Dwyer Magnehelic 0-3 inches

How to make a burner reliable

- Make sure that the flow meters are in place and functioning
- Use liquid filled pressure gages
- Record all fuel and air pressures at different firing rates (D.O.P.E.)
- **Record and verify nozzle settings in case something vibrates loose**
- Regularly inspect the burner nose
- Decide on a tuning frequency. Don't wait for a crisis.

Place slack tube photo here

ADJUSTMENT SHOULD BE MADE ACCORDING TO YOUR BURNER SIZE



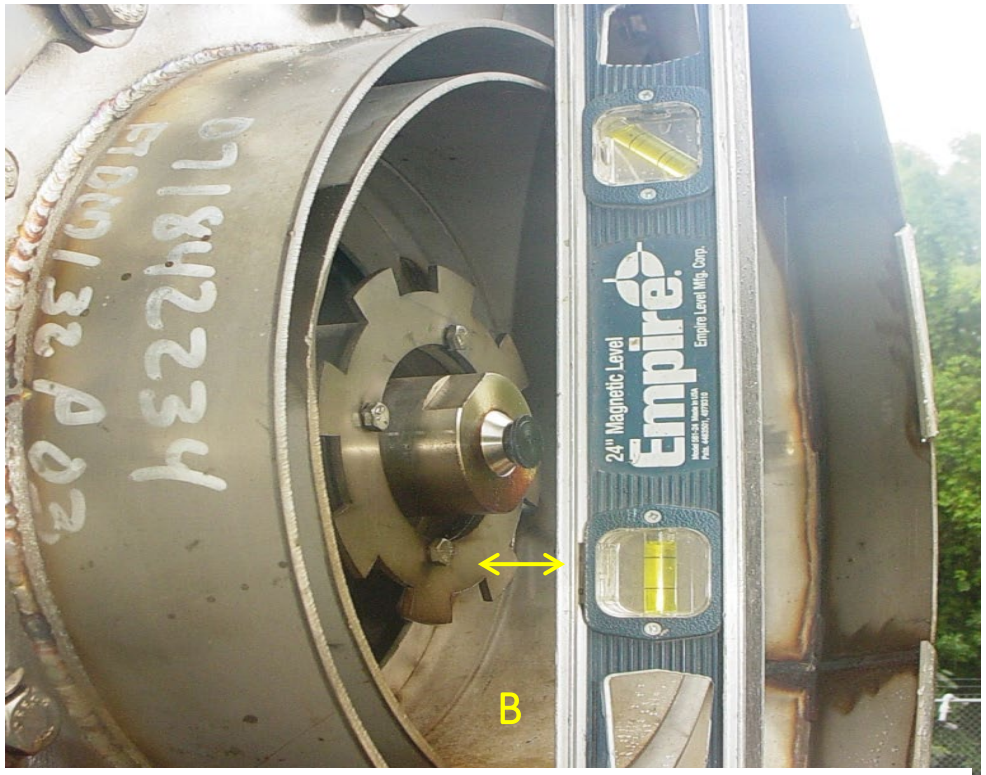


Table 1. Whisper-jet Front-end Set-up Dimensions

Burner Size	A in. (mm) Oil Nozzle Position	B in. (mm) Atomizing Air Tube Position
WJ-50	7/8" (22.2)	1 7/8" (47.6)
WJ-75	¾" (19.1)	1 7/8" (47.6)
WJ-100	¾" (19.1)	1 7/8" (47.6)
WJ-125	¾" (19.1)	1 ½" (38.1)
WJ-150	½" (12.7)	2 3/8" (60.3)

How to make a burner reliable

- Make sure that the flow meters are in place and functioning
- Use liquid filled pressure gages
- Record all fuel and air pressures at different firing rates (D.O.P.E.)
- Record nozzle settings in case something vibrates loose
- **Regularly inspect the burner nose**
- Decide on a tuning frequency. Don't wait for a crisis.

WARPED CONES

T-Flights (Combustion) Flights, Shell and Outer Shell (DBBRL) Over Heat

How to make a burner reliable

- Make sure that the flow meters are in place and functioning
- Use liquid filled pressure gages
- Record all fuel and air pressures at different firing rates (D.O.P.E.)
- Record nozzle settings in case something vibrates loose
- Regularly inspect the burner nose
- **Decide on a tuning frequency. Don't wait for a crisis.**

Why should this not happen?

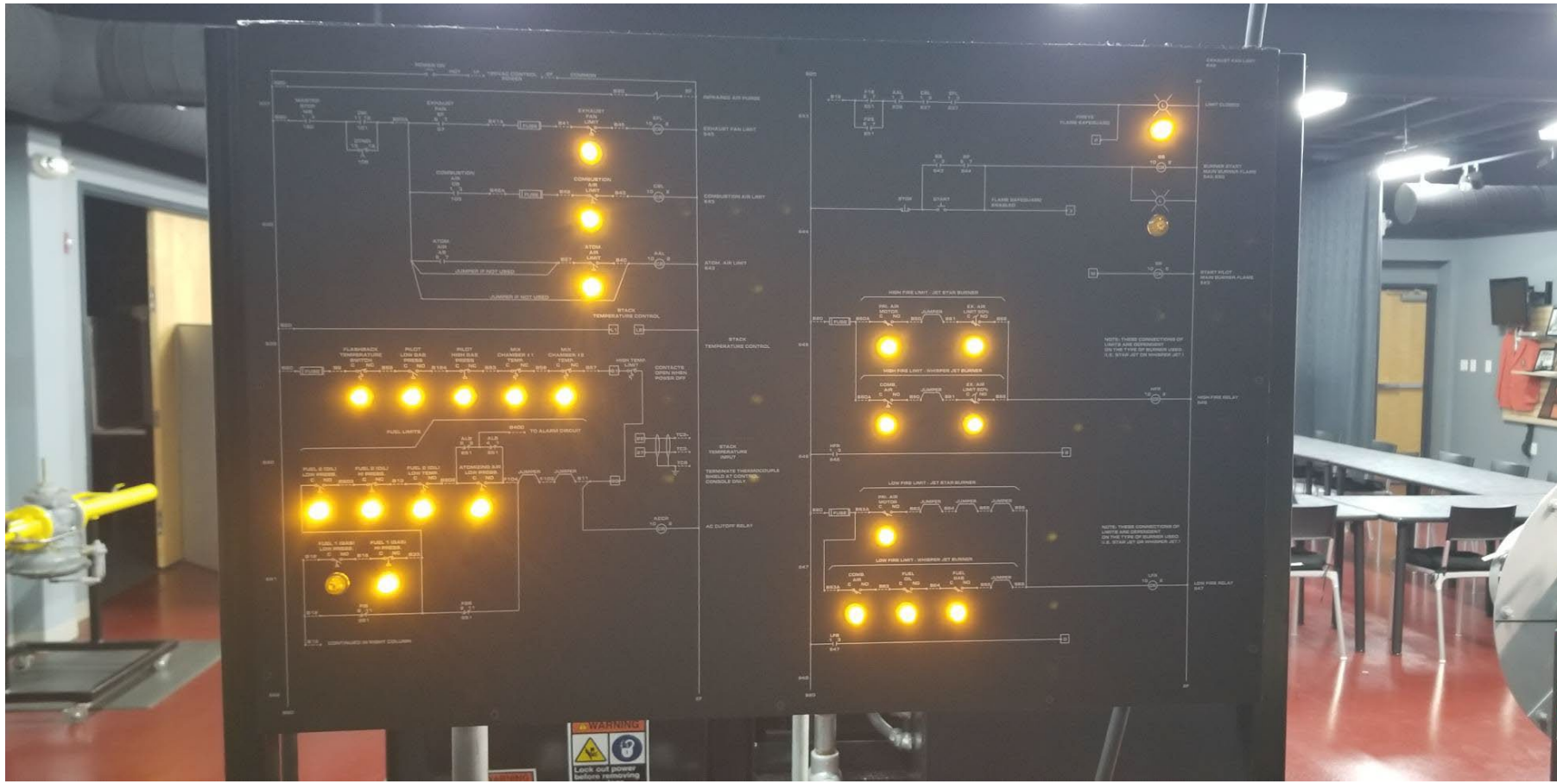
Why should this not happen?

My burner won't light – what now?

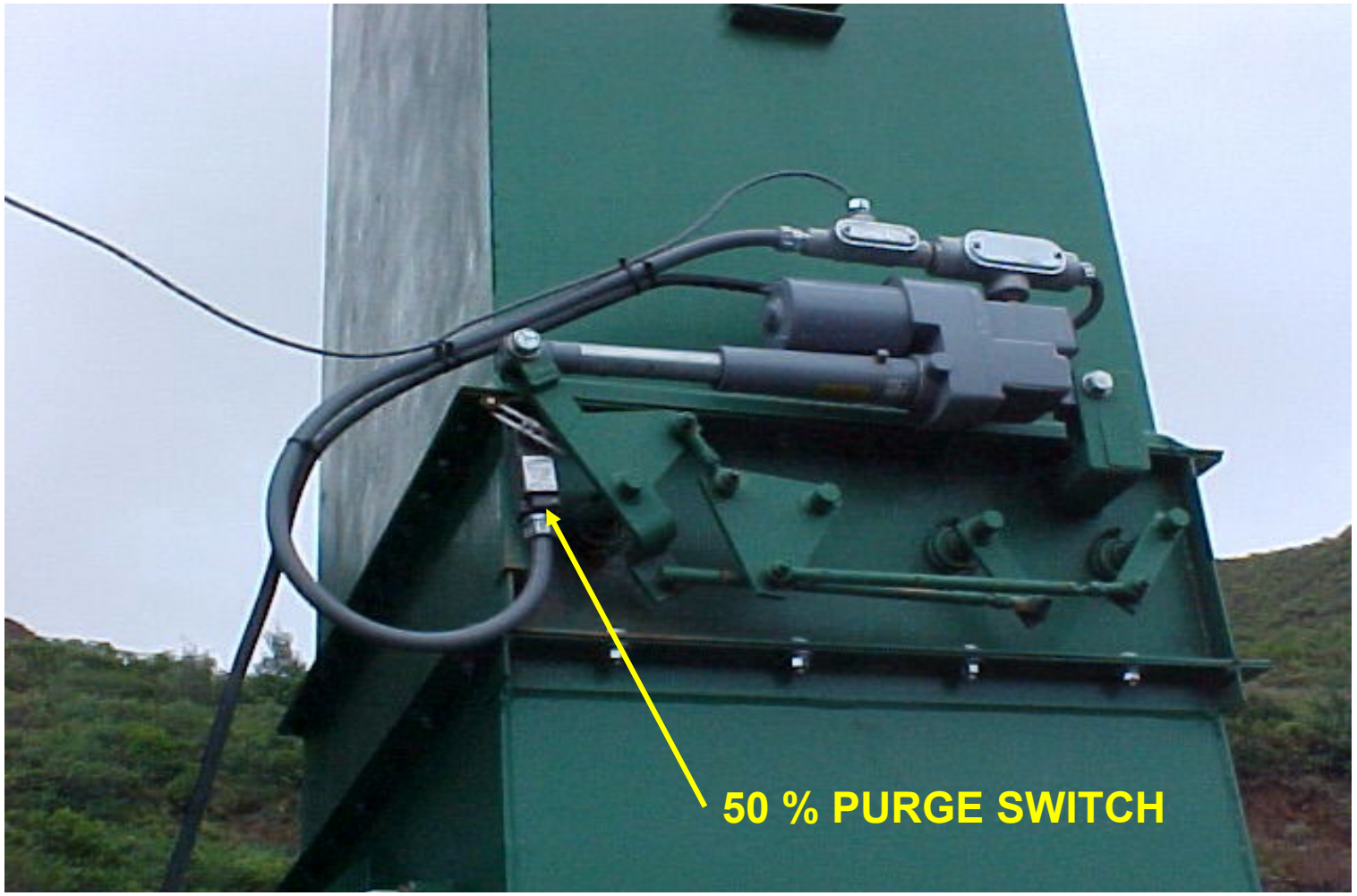
- **Most likely causes:**
  - **Lost a "limit"**
  - **What is a "limit"?**
  - **Troubleshooting the "limit" circuit**
    - **Who is qualified?**
    - **How does the Astec service department evaluate?**

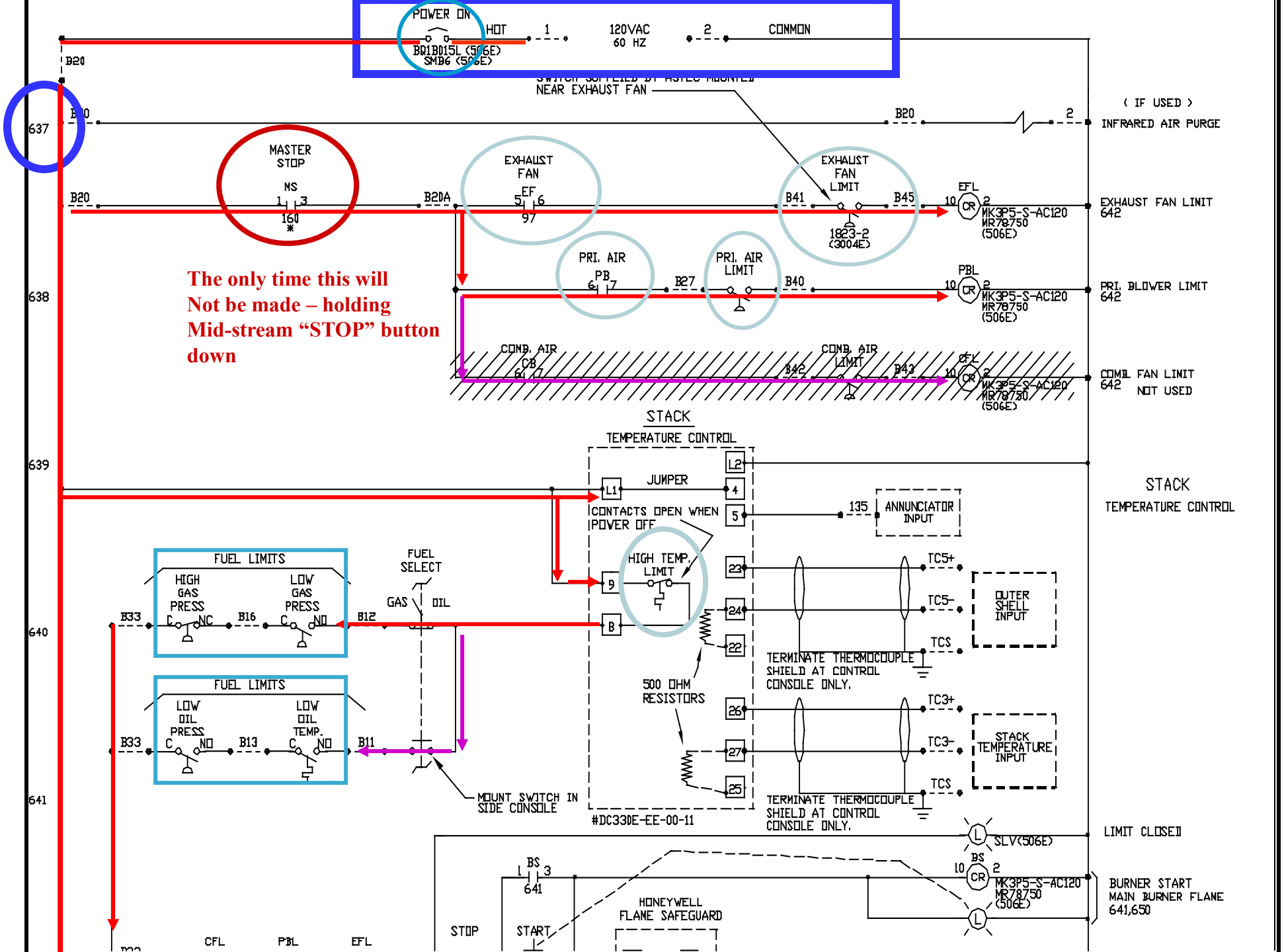
Damper must be in manual to light

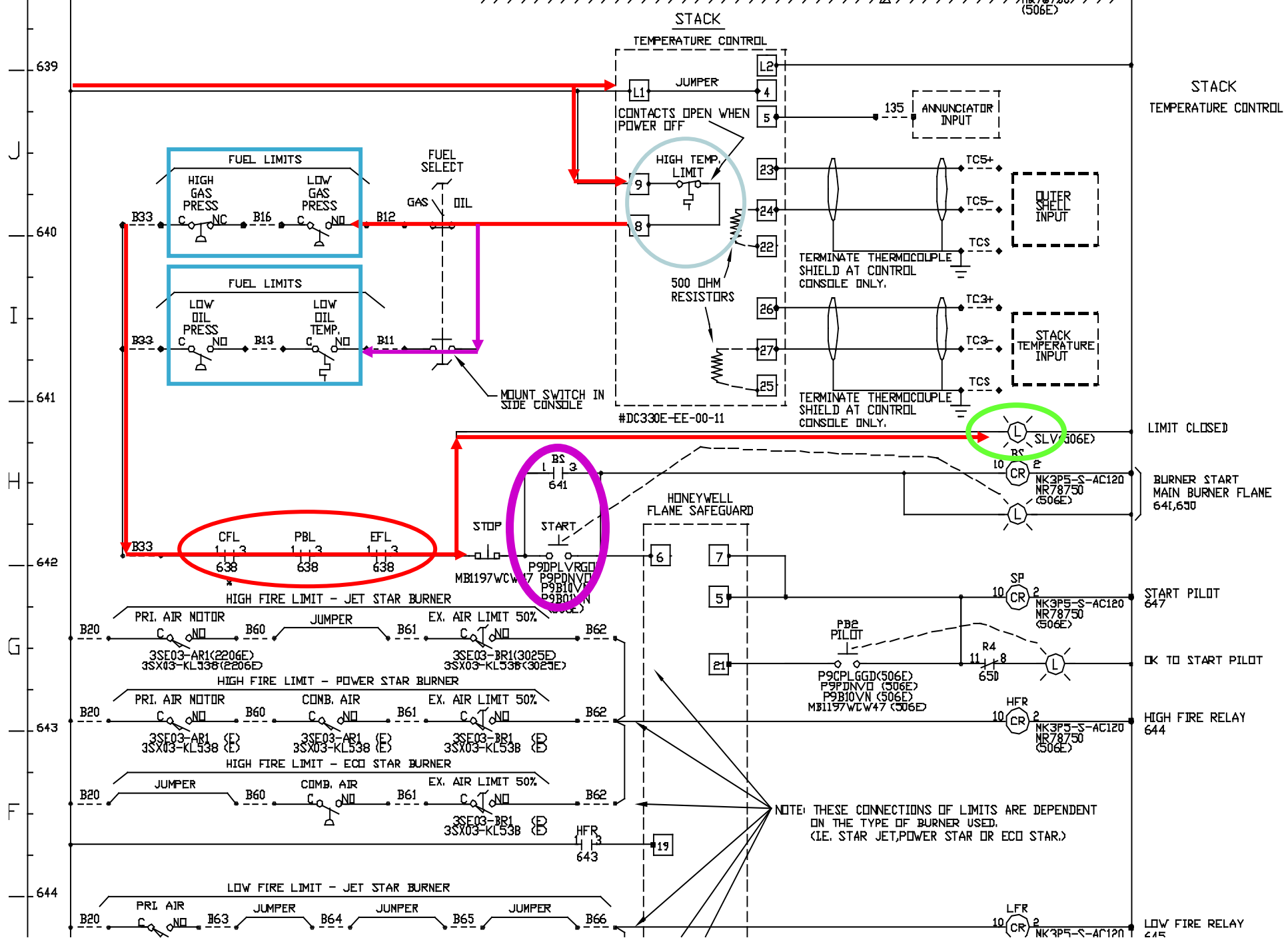
“A mans got to know his limits”

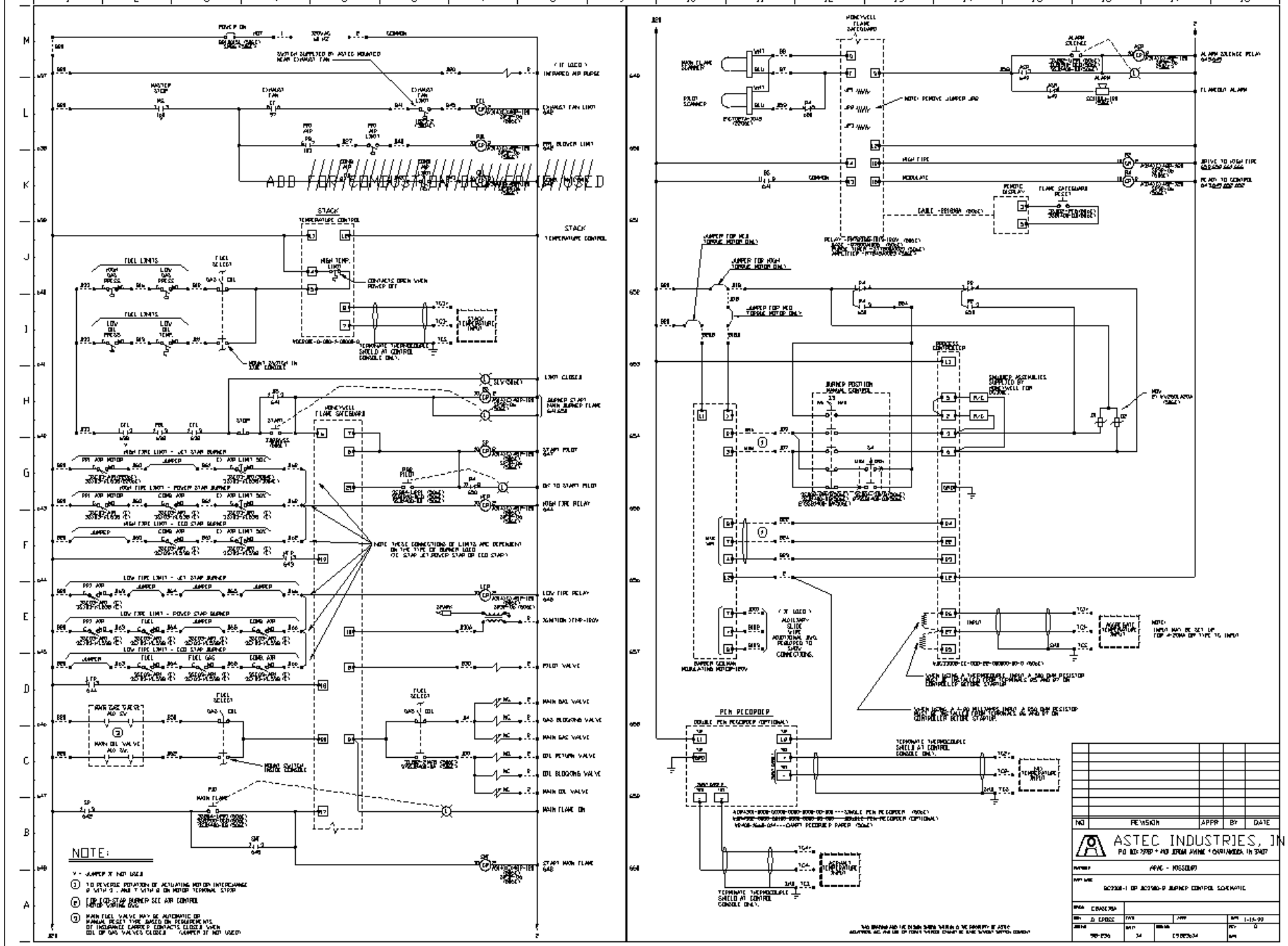


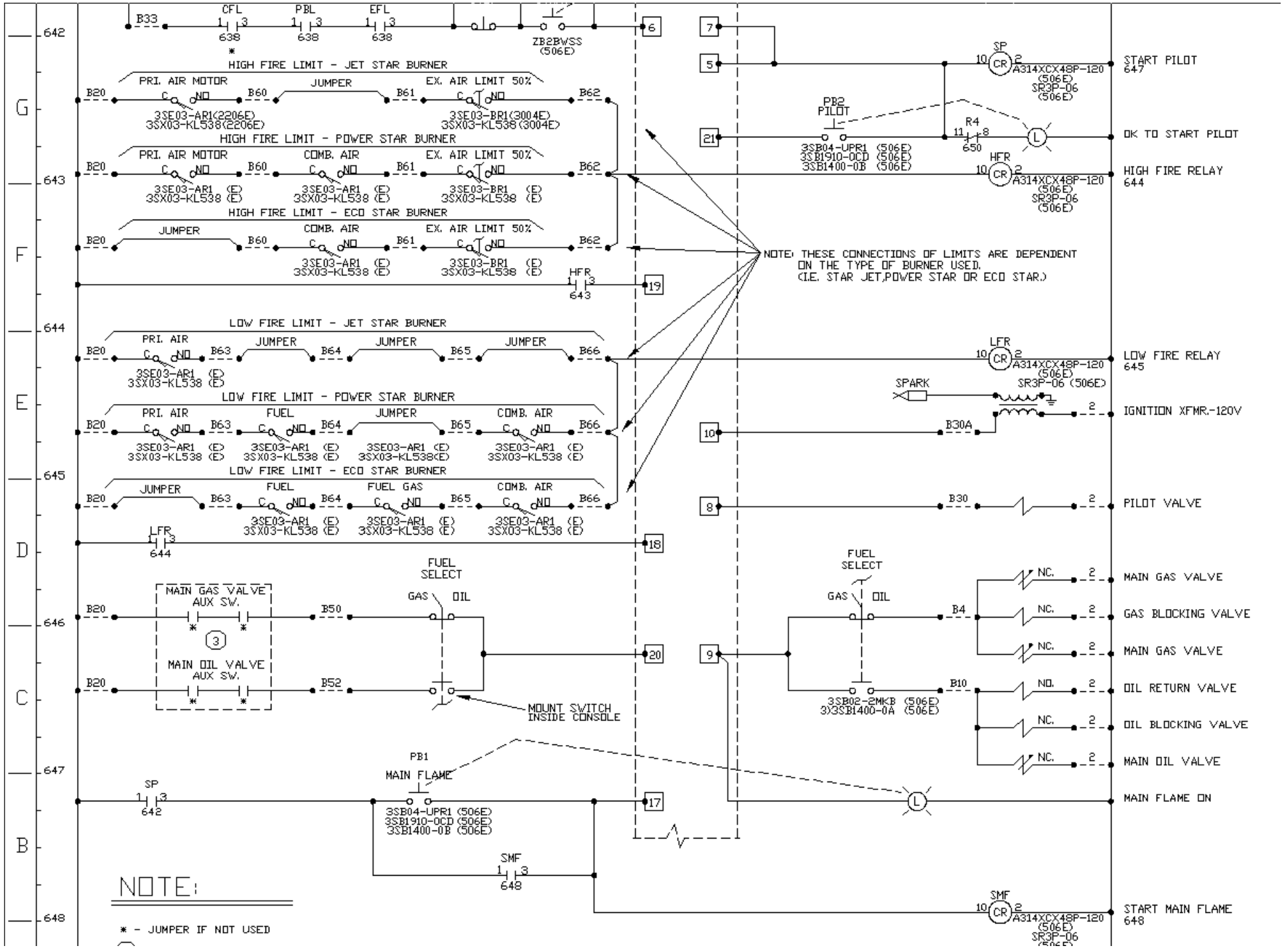
Know where the limit components are located

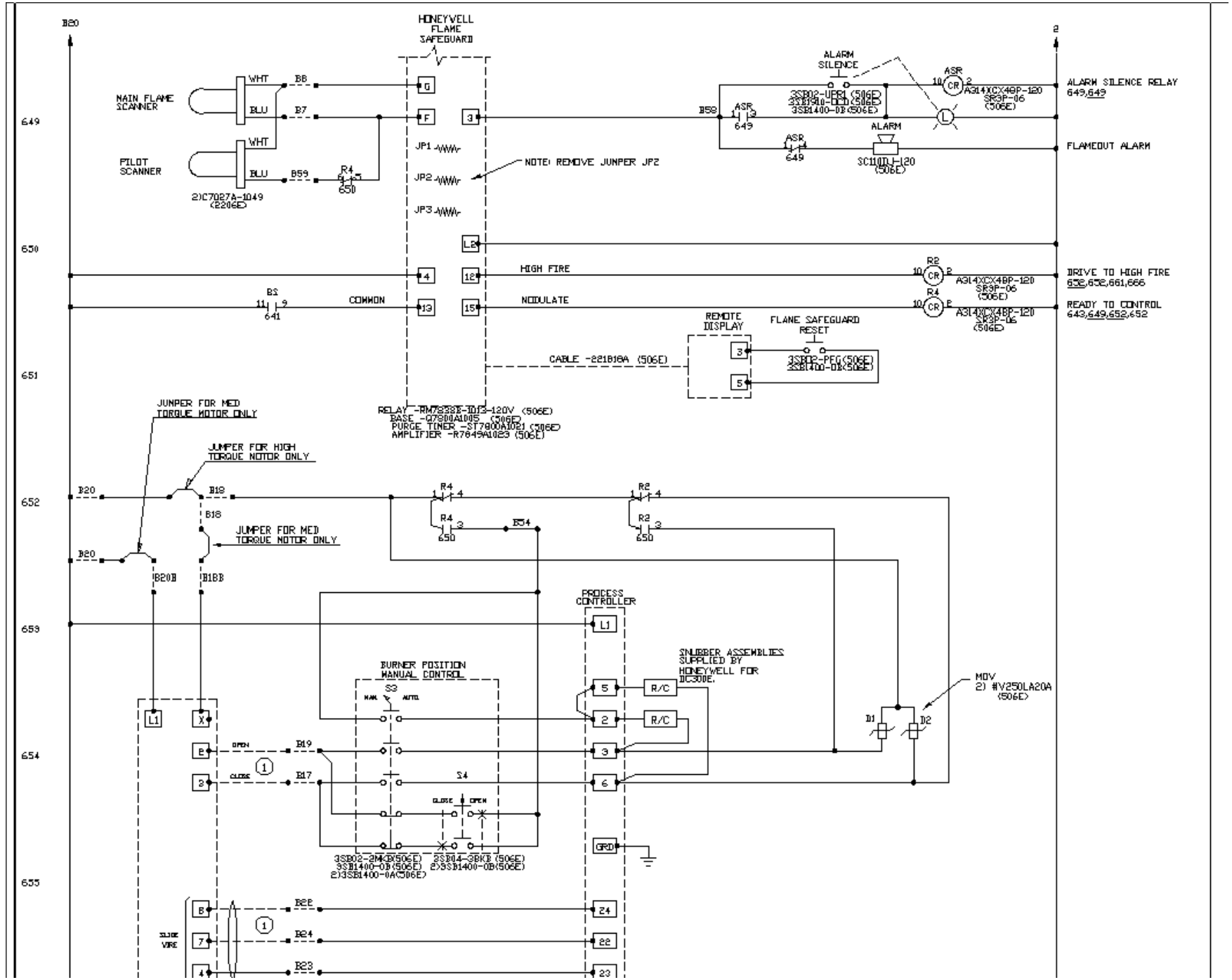


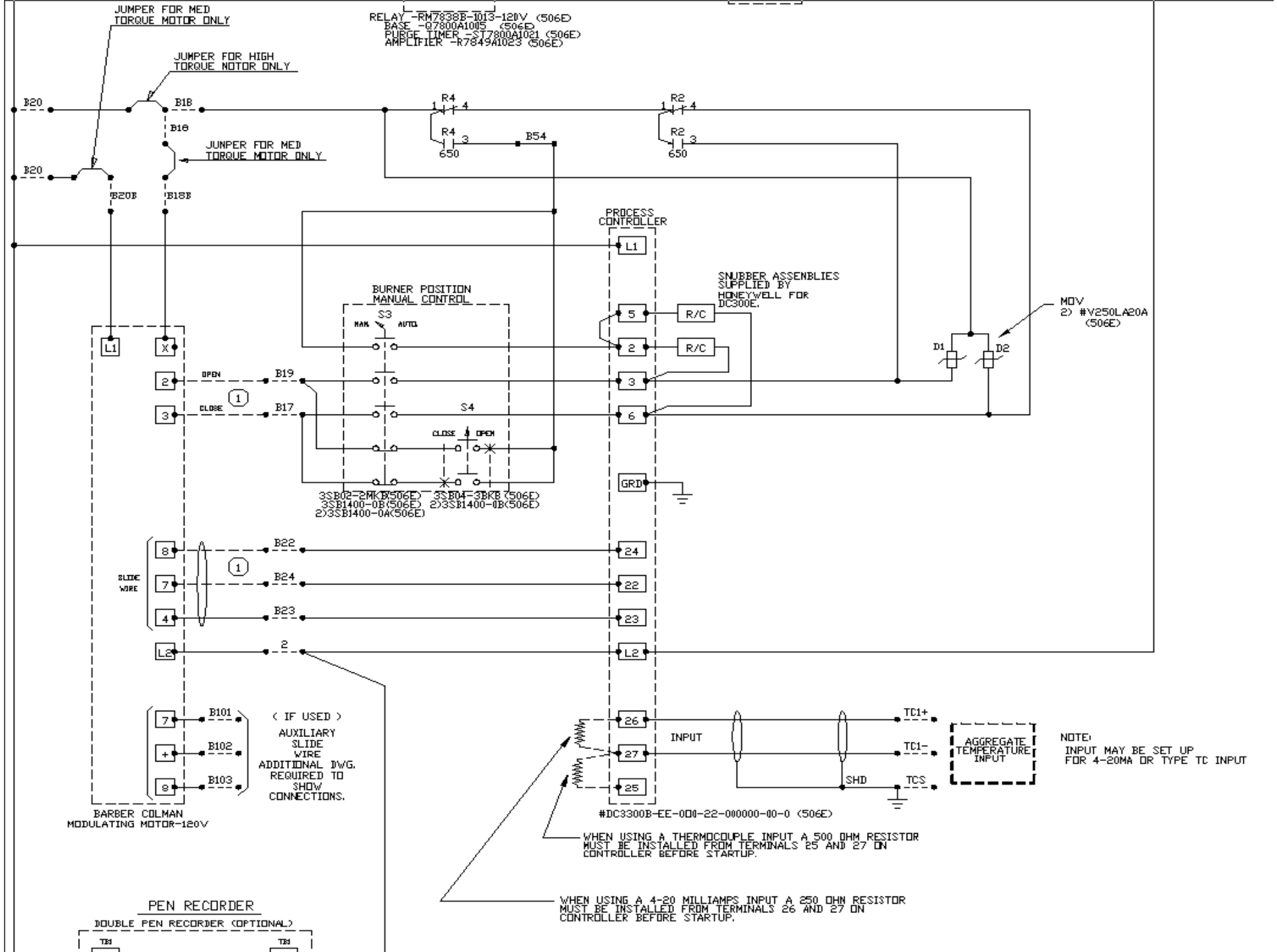

POWER ON
HOT
1
120VAC
60 HZ
2
COMMON
B20
637
NEAR EXHAUST FAN
(IF USED)
INFRARED AIR PURGE
MASTER STOP
MS
EXHAUST FAN
EF
EXHAUST FAN LIMIT
B20A
B41
B45
EFL
EXHAUST FAN LIMIT
642
1823-2
(3004E)
MK3P5-S-AC120
MR78750
(506E)
The only time this will
Not be made – holding
Mid-stream "STOP" button
down
638
PRI. AIR
PB
PRI. AIR LIMIT
B27
B40
PBL
PRI. BLOWER LIMIT
642
COMB. AIR
CB
COMB. AIR LIMIT
B42
B43
CFL
COMB FAN LIMIT
642
NOT USED
STACK
TEMPERATURE CONTROL
639
JUMPER
CONTACTS OPEN WHEN
POWER OFF
135
ANNUNCIATOR INPUT
STACK
TEMPERATURE CONTROL
640
FUEL LIMITS
HIGH GAS PRESS
LOW GAS PRESS
B33
B16
B12
FUEL SELECT
GAS
OIL
HIGH TEMP. LIMIT
TC5+
TC5-
TC5
OUTER SHELL INPUT
TERMINATE THERMOCOUPLE
SHIELD AT CONTROL
CONSOLE ONLY.
500 OHM
RESISTORS
FUEL LIMITS
LOW OIL PRESS
LOW OIL TEMP.
B13
B11
TC3+
TC3-
TC3
STACK TEMPERATURE INPUT
641
MOUNT SWITCH IN
SIDE CONSOLE
#DC330E-EE-00-11
LIMIT CLOSED
SLV(506E)
BS
641
HONEYWELL
FLAME SAFEGUARD
STOP
START
BURNER START
MAIN BURNER FLAME
641,650
CFL
PBL
EFL

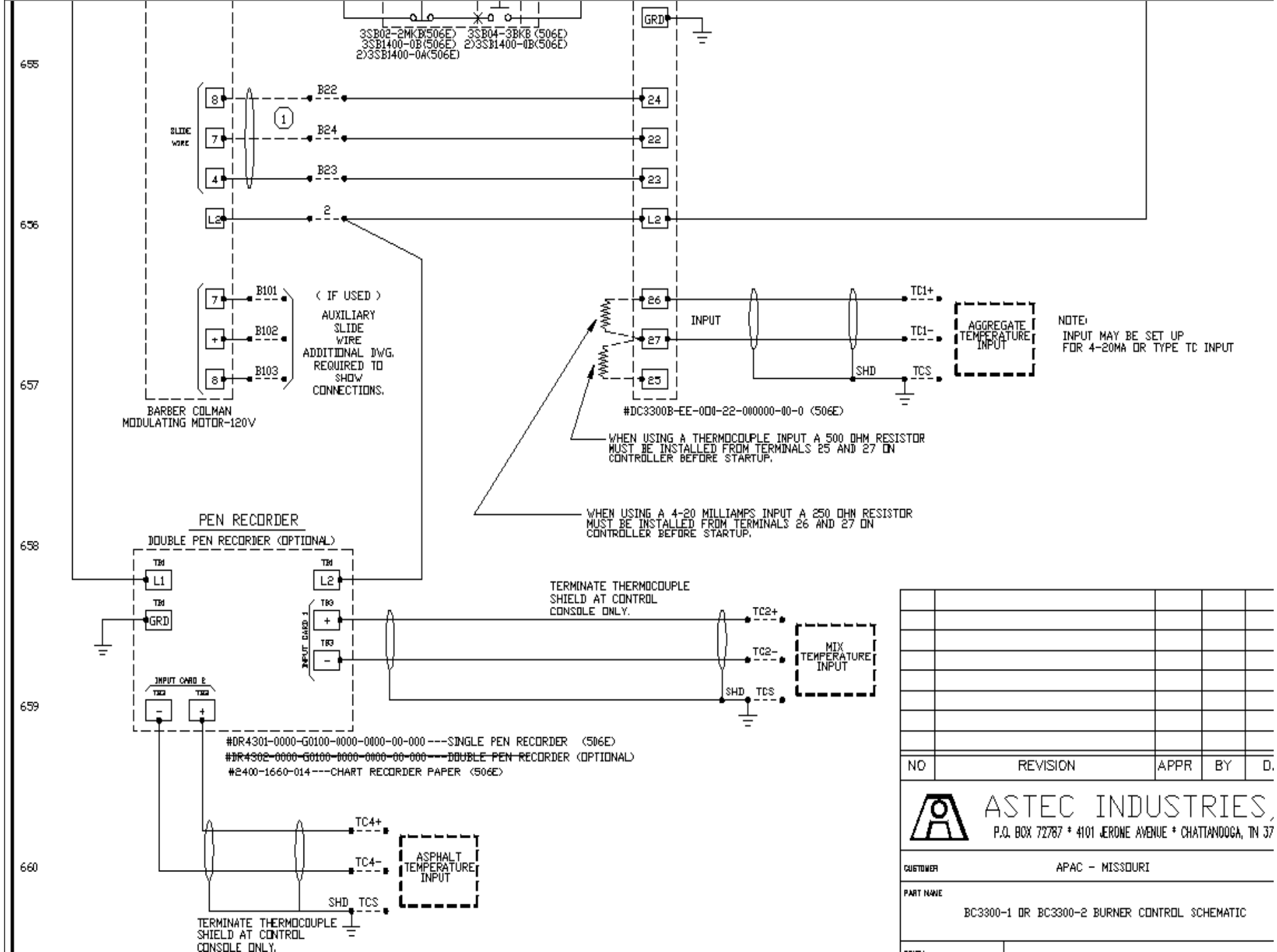

STACK
TEMPERATURE CONTROL
JUMPER
CONTACTS OPEN WHEN POWER OFF
135 ANNUNCIATOR INPUT
HIGH TEMP. LIMIT
500 OHM RESISTORS
TC5+
TC5-
TC5
OUTER SHELL INPUT
TERMINATE THERMOCOUPLE SHIELD AT CONTROL CONSOLE ONLY.
TC3+
TC3-
TC3
STACK TEMPERATURE INPUT
#DC330E-EE-00-11
FUEL LIMITS
HIGH GAS PRESS
LOW GAS PRESS
FUEL SELECT
GAS
OIL
FUEL LIMITS
LOW OIL PRESS
LOW OIL TEMP.
MOUNT SWITCH IN SIDE CONSOLE
LIMIT CLOSED
BURNER START
MAIN BURNER FLAME
641,650
HONEYWELL FLAME SAFEGUARD
STOP
START
CFL
PBL
EFL
HIGH FIRE LIMIT - JET STAR BURNER
PRI. AIR MOTOR
EX. AIR LIMIT 50%
HIGH FIRE LIMIT - POWER STAR BURNER
COMB. AIR
HIGH FIRE LIMIT - ECO STAR BURNER
LOW FIRE LIMIT - JET STAR BURNER
PRI. AIR
START PILOT
647
PB2 PILOT
OK TO START PILOT
HIGH FIRE RELAY
644
LOW FIRE RELAY
NOTE: THESE CONNECTIONS OF LIMITS ARE DEPENDENT ON THE TYPE OF BURNER USED. (I.E. STAR JET, POWER STAR OR ECO STAR.)


ADD FAN/COMBUSTION AIR BLOWER LIMIT IF USED
STACK TEMPERATURE CONTROL
FUEL LIMITS
HIGH GAS PRESS
LOW GAS PRESS
LOW OIL PRESS
LOW OIL TEMP
FUEL SELECT
HIGH TEMP LIMIT
CONTACTS OPEN WHEN POWER OFF
TEMPERATURE INPUT
HONEYWELL FLAME SAFEGUARD
START PILOT
HIGH FIRE RELAY
LOW FIRE RELAY
IGNITION STEP-1804
PILOT VALVE
MAIN GAS VALVE
MAIN OIL VALVE
MAIN FLAME ON
START MAIN FLAME
NOTE THESE CONNECTIONS OF LIMITS ARE DEPENDENT ON THE TYPE OF BURNER USED (IE STAR JET POWER STAR OR ECO STAR)
NOTE:
MAIN FLAME SCANNER
PILOT SCANNER
REMOTE DISPLAY
FLAME SAFEGUARD RESET
BURNER POSITION MANUAL CONTROL
BURNER SCEMAN MODULATING MOTOR-1804
PEN RECORDER
DOUBLE PEN RECORDER (OPTIONAL)
TERMINATE THERMOCOUPLE SHIELD AT CONTROL CONSOLE ONLY.
ASTEC INDUSTRIES, IN
PO BOX 72787 • 405 JORDAN AVENUE • CHATTANOOGA, TN 37407
BC2308-1 OR BC1980-P BURNER CONTROL SCHEMATIC


642
643
644
645
646
647
648
G
F
E
D
C
B
B33
CFL
PBL
EFL
638
ZB2BWSS (506E)
HIGH FIRE LIMIT - JET STAR BURNER
PRI. AIR MOTOR
JUMPER
EX. AIR LIMIT 50%
B20
B60
B61
B62
3SE03-AR1(2206E) 3SX03-KL538(2206E)
3SE03-BR1(3004E) 3SX03-KL538(3004E)
HIGH FIRE LIMIT - POWER STAR BURNER
COMB. AIR
3SE03-AR1 (E) 3SX03-KL538 (E)
3SE03-BR1 (E) 3SX03-KL538 (E)
HIGH FIRE LIMIT - ECO STAR BURNER
HFR
643
19
LOW FIRE LIMIT - JET STAR BURNER
PRI. AIR
B63
B64
B65
B66
LOW FIRE LIMIT - POWER STAR BURNER
FUEL
LOW FIRE LIMIT - ECO STAR BURNER
FUEL GAS
LFR
644
18
MAIN GAS VALVE AUX SW.
MAIN OIL VALVE AUX SW.
FUEL SELECT
GAS
OIL
B50
B52
20
MOUNT SWITCH INSIDE CONSOLE
PB1
MAIN FLAME
SP
642
3SB04-UPR1 (506E) 3SB1910-0CD (506E) 3SB1400-0B (506E)
17
SMF
648
NOTE:
* - JUMPER IF NOT USED
6
7
5
21
SP
A314XCX48P-120 (506E) SR3P-06 (506E)
START PILOT
647
PB2 PILOT
R4
650
OK TO START PILOT
HFR
HIGH FIRE RELAY
644
NOTE: THESE CONNECTIONS OF LIMITS ARE DEPENDENT ON THE TYPE OF BURNER USED. (I.E. STAR JET,POWER STAR OR ECO STAR.)
LFR
LOW FIRE RELAY
645
SPARK
SR3P-06 (506E)
IGNITION XFMR.-120V
10
B30A
8
B30
PILOT VALVE
9
B4
B10
3SB02-2MKB (506E) 3)3SB1400-0A (506E)
NC.
NO.
MAIN GAS VALVE
GAS BLOCKING VALVE
MAIN GAS VALVE
OIL RETURN VALVE
OIL BLOCKING VALVE
MAIN OIL VALVE
MAIN FLAME ON
SMF
START MAIN FLAME
648


HONEYWELL FLAME SAFEGUARD
NAIN FLAME SCANNER
PILOT SCANNER
WHT
BLU
B8
B7
B59
R4
650
2)C7027A-1049 (2206E)
JP1
JP2
JP3
NOTE: REMOVE JUNPER JP2
ALARM SILENCE
ASR
649
ALARM
SC110D1-120 (506E)
ALARM SILENCE RELAY 649,649
FLAMEOUT ALARM
HIGH FIRE
MODULATE
COMMON
B5
641
DRIVE TO HIGH FIRE 632,632,661,666
READY TO CONTROL 643,649,652,652
REMOTE DISPLAY
FLAME SAFEGUARD RESET
CABLE -221B16A (506E)
RELAY -RM7838B-1013-120V (506E)
BASE -Q7900A1005 (506E)
PURGE TIMER -ST7900A1021 (506E)
AMPLIFIER -R7849A1023 (506E)
JUMPER FOR MED TORQUE MOTOR ONLY
JUMPER FOR HIGH TORQUE MOTOR ONLY
B20
B19
B18
B20B
B18B
PROCESS CONTROLLER
BURNER POSITION MANUAL CONTROL
MAN
AUTO
OPEN
CLOSE
B17
B54
SNUBBER ASSEMBLIES SUPPLIED BY HONEYWELL FOR DC300E.
MOV 2) #V250LA20A (506E)
D1
D2
R/C
GRD
3SB02-2MKB(506E)
3SB1400-0B(506E)
2)3SB1400-0A(506E)
3SB04-3BKB (506E)
2)3SB1400-0B(506E)
SLIDE WIRE
B22
B24
B23
649
650
651
652
653
654
655


JUMPER FOR MED TORQUE MOTOR ONLY
JUMPER FOR HIGH TORQUE MOTOR ONLY
JUMPER FOR MED TORQUE MOTOR ONLY
RELAY -RM7838B-1013-120V (506E)
BASE -Q7800A1005 (506E)
PURGE TIMER -ST7800A1021 (506E)
AMPLIFIER -R7849A1023 (506E)
B20
B1B
B1B
B20
B20B
B18B
R4
R4
650
B54
R2
R2
650
PROCESS CONTROLLER
L1
BURNER POSITION MANUAL CONTROL
S3
MAN
AUTO
S4
CLOSE
OPEN
SNUBBER ASSEMBLIES SUPPLIED BY HONEYWELL FOR DC300E.
R/C
R/C
MOV
2) #V250LA20A (506E)
D1
D2
L1
X
2
OPEN
B19
3
CLOSE
B17
1
5
2
3
6
GRD
3SB02-2MKB(506E) 3SB04-3BKB(506E)
3SB1400-0B(506E) 2)3SB1400-0B(506E)
2)3SB1400-0A(506E)
8
7
4
SLIDE WIRE
B22
B24
B23
1
24
22
23
L2
2
L2
7
+
8
B101
B102
B103
(IF USED)
AUXILIARY SLIDE WIRE ADDITIONAL DWG. REQUIRED TO SHOW CONNECTIONS.
BARBER COLMAN MODULATING MOTOR-120V
26
27
25
INPUT
TC1+
TC1-
SHD
TCS
AGGREGATE TEMPERATURE INPUT
NOTE:
INPUT MAY BE SET UP FOR 4-20MA OR TYPE TC INPUT
#DC3300B-EE-000-22-000000-00-0 (506E)
WHEN USING A THERMOCOUPLE INPUT A 500 OHM RESISTOR MUST BE INSTALLED FROM TERMINALS 25 AND 27 ON CONTROLLER BEFORE STARTUP.
WHEN USING A 4-20 MILLIAMPS INPUT A 250 OHM RESISTOR MUST BE INSTALLED FROM TERMINALS 26 AND 27 ON CONTROLLER BEFORE STARTUP.
PEN RECORDER
DOUBLE PEN RECORDER (OPTIONAL)



NO	REVISION	APPR	BY	D.

ASTEC INDUSTRIES,

P.O. BOX 72787 * 4101 JEROME AVENUE * CHATTANOOGA, TN 37

CUSTOMER: APAC - MISSOURI

PART NAME: BC3300-1 OR BC3300-2 BURNER CONTROL SCHEMATIC

My burner won't light – what now?

- **Pilot won't light – Gain understanding of pilot system ahead of time**
  - **Propane bottle empty?**
  - **Propane bottle valve open?**
  - **Pressure?**
  - **Got a spark?**
    - **Ignition transformer have power?**
    - **Got fuel? Pilot gas solenoid energized? It is working?**
    - **Scanner working?**
  - **Look in drum and see if pilot lights**

My burner won't light – what now?

- **Is the burner getting the right amount of fuel at the right time?**
  - **Natural Gas**
    - 2-5 psig Hauck
    - 4-6 psig Astec
    - Verify with burner data sheet from the manufacturer
    - Look at your D.O.P.E.
    - Blocking valves must open at the same time
    - Blocking valves must open quickly
    - Has a linkage, actuator arm, or coupling slipped?
    - Look at where you "painted" the linkage connections, and where valve pointers should be.

My burner won't light – what now?

- **Fuel Issues**
  - **Heavy oil not the correct temperature**
    - **Verify with Viscosity cup, thermometer, and hot plate (D.O.P.E)**
    - **Don't believe the supplier – he might not know what changed**
    - **Burning rag test**
    - **Local lab – test oil when it works for a base line**
    - **Look out for synthetics and transmission oil**
  - Water in fuel tank – settles to the bottom – can make starting up BAD
    - Place fuel in a glass jar – see if it settles
  - Don't forget to check the oil strainer

Viscometer

Figure 47. Viscometer test

Figure 48. Correct vs incorrect (deflected) flow

Astec Burners- 70-80 SSU
Hauck Burners- 80-90 SSU
Gencor Burners- 110-125 SSU

Heavy Fuel Preheater

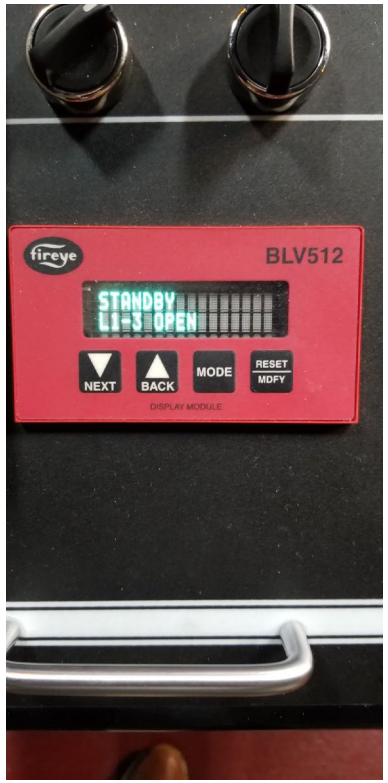
Heating all of the oil being pumped

Heating just the oil being used

My burner won't light – what now?

- Fuel Issues
  - Heavy oil not the correct temperature
    - Verify with Viscosity cup, thermometer, and hot plate (D.O.P.E)
    - Don't believe the supplier – he might not know what changed
    - Burning rag test
    - Local lab – test oil when it works for a base line
    - Look out for synthetics and transmission oil
  - **Water in fuel tank – settles to the bottom – can make starting up BAD**
    - **Place fuel in a glass jar – see if it settles**
  - **Don't forget to check the oil strainer**

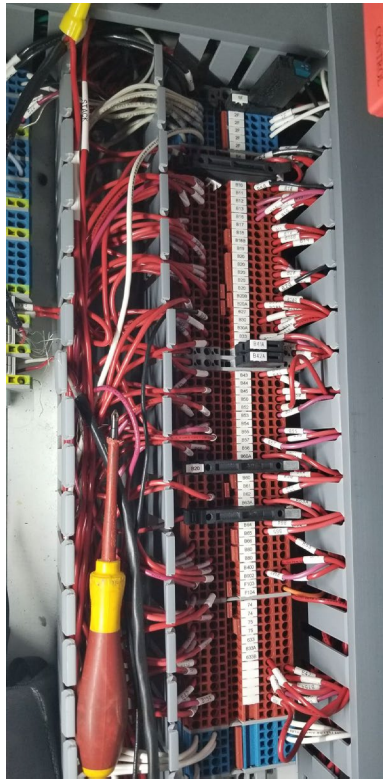
Flame Safeguard

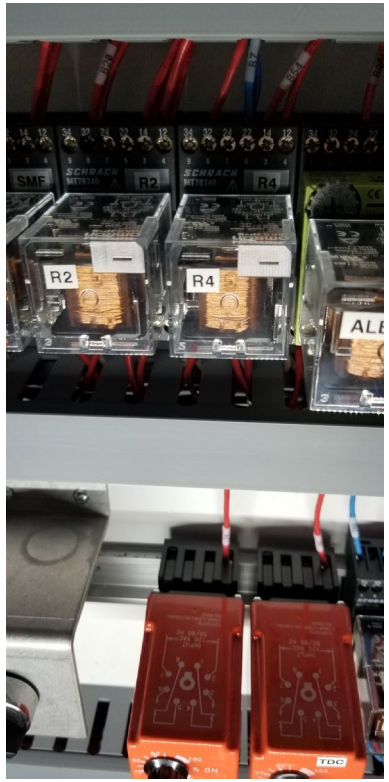


Flame Safeguard and Management

- Required by NFPA
- Limits “satisfied” is an input
- Allows purge sequence
- Allows pilot to light
- Allows main flame to light
- Monitors flame strength
- Purge time is built in

Burner “stroking” tip





Test leads to XX – YY, Pull R4 to run actuator through range with burner off

Questions?

PMIII


Menu
P&S Paving
3/20/2015 10:23:10 AM
TARGET
ACTUAL
AGG
RAP
MF
DUST
AC
TOTAL RUN
MIX (IR) TEMP °F
MIX (TC) TEMP °F
AC TEMP °F
AGG TEMP °F
275
284
99
172
0
0
13
225
+334
+333
+291
+610
Mix Temperature TC
+332.53
Mix Temperature IR
+333.91
AGG Temperature IR
+609.85
Drum Shell Temperature
+355.80
Drum Speed (Hz)
Exhaust Fan
Drag
Pugmill
Drum
Mode: Man
Auto Setpoints
Limits Closed
300.0 SP °F
148.9 SP °C
41.00
BURNER
41.00
DEMAND
Low Fire Hold
LIGHT PILOT
MAIN ON
40.90
AIR (MOTOR) POSITION
97.88
42.92
FUEL 1 POSITION
Fuel 1 (Gas)
Mode: Auto
Stack Temperature
+384.90
Baghouse Exit Temperature
+320.00
0.32
SUCTION
2.58
PRESSURE
PULSE
Open LS
50 % LS
Close LS
Mode: Drive %
+76.16
DAMPER
57.00
DEMAND
MID-STREAM
AC HOLD
AC SPRAY (FORCE)
BYPASS AGG
BYPASS RAP
DRAG DROP-OUT
PLC CONTROL
RESET
START UP HORN
PRESSURE OK
Burner
Alarms
RAP 2 Tolerance Warning
RAP 2 Out of Tolerance
RAP 1 Tolerance Warning
Move the mouse to this area to send keyboard input to the remote device


OPENING
DAMPER POSITION
CLOSING
MIX
STACK
ALARM
PROCESS CONTROL
FLAME RELAY RESET
LIMITS CLOSED
ALARM SILENCE
BURNER STOP / START
PILOT
MAIN
ASTEC