On The Job
ONWATCH®

Number 11

Excessive Vacuum - Oil System

How do you diagnose a burner that fails after hundreds of successful start-ups? An oil company in western Massachusetts was faced with this situation.

The house had a simple heating system: a boiler with one heating zone, a domestic hot water coil, a Beckett burner with a Honeywell 8184G controller. The significant fact was that there was an overhead oil line that was approximately 70 feet long.

The burner would run without a problem all summer. However when cold weather arrived, and only once in a great while, it would go to safety lockout. With an OnWatch Model 51 attached, the burner locked out after 561 starts. By looking at the recorded data, one can see that over a couple of months an excessive vacuum condition had developed in the oil supply line. Remember the words of the wise old service manager: "The solution to any problem is obvious, once it is found."

The OnWatch Model 51 was connected in the conventional manner with the Amp Clamp attached to the transformer lead. The PV wire was not connected.

NOTE: Keep watching the Event column. It says why the Model 51 takes a "snapshot" of data. The events labeled Sample are the regular snapshots that are taken after each start up. This is the Detailed Recording phase. That phase is followed by Monitor Mode when snapshots are taken only when some operating parameter changes by a significant amount.

SET: 561 Start Time: 01:41:14 Start Date: 12:22:2001
Recording Mode: Oil

Elapsed	TT	VOLT	CAD	TEMP	PSI	VAC	PV	AMPS	Event
00:00:01	ON	107	4.0v	101	0	8	N/C	1.3	Sample
00:00:03	ON	120	3.9v	101	97	9	N/C	1.9	Sample
00:00:05	ON	120	<1.0v	101	97	9	N/C	2.2	Sample
00:00:07	ON	120	<1.0v	101	97	9	N/C	2.1	Sample
00:00:09	ON	120	<1.0v	102	97	9	N/C	2.0	Sample
00:00:14	ON	120	<1.0v	103	97	9	N/C	2.2	Sample
00:00:19	ON	120	<1.0v	105	97	9	N/C	2.0	Sample
00:00:24	ON	119	<1.0v	108	97	9	N/C	2.1	Sample
00:00:29	ON	120	<1.0v	111	97	9	N/C	2.2	Sample
00:00:34	ON	120	<1.0v	114	97	10	N/C	2.0	Sample
00:00:39	ON	120	<1.0v	117	97	10	N/C	2.0	Sample
00:00:44	ON	120	<1.0v	120	96	10	N/C	2.2	Sample
00:00:49	ON	120	<1.0v	123	96	10	N/C	2.1	Sample

00:00:54	ON	120	<1.0v	127	96	10	N/C	2.0	Sample
00:01:01	ON	120	<1.0v	132	95	10	N/C	2.1	Stack Temp Change
00:01:08	ON	120	<1.0v	137	95	10	N/C	2.1	Stack Temp Change
00:01:15	ON	120	<1.0v	142	95	10	N/C	2.1	Stack Temp Change
00:01:21	ON	120	<1.0v	147	95	10	N/C	2.2	Stack Temp Change
00:01:25	ON	120	<1.0v	149	91	10	N/C	1.7	Amps Change
00:01:28	ON	120	<1.0v	152	95	10	N/C	2.1	Stack Temp Change
00:01:29	ON	120	<1.0v	153	95	10	N/C	2.2	Amps Change
00:01:35	ON	120	<1.0v	157	96	10	N/C	2.1	Stack Temp Change
00:01:43	ON	120	<1.0v	162	95	10	N/C	2.2	Stack Temp Change
00:01:50	ON	120	<1.0v	167	95	10	N/C	2.1	Stack Temp Change
00:01:57	ON	120	<1.0v	172	95	10	N/C	2.1	Stack Temp Change
00:02:04	ON	120	<1.0v	177	94	10	N/C	2.2	Stack Temp Change
00:02:11	ON	120	<1.0v	182	94	10	N/C	1.9	Stack Temp Change
00:02:12	ON	120	1.2v	182	95	10	N/C	2.2	Cad Cell Change
00:02:14	ON	120	<1.0v	183	93	10	N/C	2.2	Cad Cell Change
00:00:20	ON	120	<1.0v	187	93	10	N/C	2.0	Stack Temp Change
00:02:27	ON	120	<1.0v	192	94	10	N/C	2.2	Stack Temp Change
00:02:32	ON	120	1.7v	195	83	10	N/C	2.1	Pressure Change
00:02:32	ON	120	1.7v	195	83	10	N/C	2.1	Cad Cell Change
00:02:33	ON	120	<1.0v	195	91	10	N/C	2.2	Cad Cell Change
00:02:34	ON	120	<1.0v	196	93	10	N/C	2.0	Pressure Change
00:02:35	ON	120	<1.0v	197	91	10	N/C	2.0	Stack Temp Change
00:02:43	ON	119	<1.0v	202	91	10	N/C	2.0	Stack Temp Change
00:02:46	ON	120	6.5v	203	8	10	N/C	2.0	Pressure Change
00:02:46	ON	120	6.5v	203	8	10	N/C	2.0	Cad Cell Change
00:02:47	ON	120	4.1v	204	13	10	N/C	2.0	Cad Cell Change
00:02:53	ON	120	3.9v	207	10	10	N/C	2.1	Stack Temp Change
00:03:06	ON	120	3.9v	212	18	9	N/C	2.2	Stack Temp Change
00:03:06	ON	120	3.9v	212	18	9	N/C	2.2	Pressure Change
00:03:22	ON	120	3.9v	213	30	9	N/C	2.0	Pressure Change
00:03:24	ON	120	<1.0v	213	93	9	N/C	2.1	Pressure Change
00:03:24	ON	120	<1.0v	213	93	9	N/C	2.1	Cad Cell Change
00:03:29	ON	OFF	4.2v	213	93	9	N/C	<0.1	Output Volts Off
00:05:29	ON	OFF	3.8v	146	0	8	N/C	<0.1	Fault Detected

Analysis The data shows that over time a high vacuum situation had developed in the oil supply line. In fact there was a steady 8 in/Hg vacuum even when the system was not running. In Set 561, above, the burner started running satisfactorily even with this high vacuum condition. However at 3:06 minutes elapsed time, the pump pressure dropped to only 8 psi as the supply of oil through the overhead line dwindled. Although the pressure did return 38 seconds later, the controller was already well on the way to lockout.

NOTE: The Model 51 can record amperage with the optional Amp Clamp. Amperage data will gather data on the operation of the transformer or ignitor. The compatible Amp Clamp is the Fluke Model i200s. For more information on the Amp Clamp, contact OnWatch Electronics.

If you collect data that you think would be helpful to others, please forward it to us. Names will not be used without permission. In all cases, it helps the industry.