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## 133-691, Service Note

### **Recommendations for Solving E340 Applications Issues Using Noise Reduction Kit 129-179**

Under certain circumstances during or after a burner cycle, the E340 Boiler Control may 'lose its memory' and revert back to its factory defaults. It has also been seen that erratic operation can occur at the point of pilot trial for ignition when the spark transformer is powered. After visiting several application sites with the purpose to examine the installation firsthand, observations have been made and the following conclusions and/or site modifications were implemented resulting in proper and trouble free operation.

#### 1. Cabinet wiring

The first observation to be made is how the low voltage wiring pertaining to the E340 pressure/temperature sensors and modulating motor 4-20 mA output is routed in relation to the high voltage wiring. It has been found in numerous locations that the sensor wires are tightly coupled and in fact wire-tied to the high transient generating wires such as fuel valves and blower motor contactors. With special equipment, 1500 volt spikes were measured that could easily be coupled onto the sensor leads and cause erratic operation or 'loss of memory'.

A good solution is to separate the low voltage E340 analog sensor cables from the high voltage, high current wires as much as possible. Under ideal conditions, it is best to have the sensor cables enter from one side of the cabinet and the high voltage leads enter from the other. It is **not** advisable to have both share the same terminal block as this leads to coupling them together. It is better to have low voltage wires run continuously into the E340 wiring base than to have them closely coupled on a terminal block. It is acceptable to share the terminal block if the high voltage loads are on one end and the low voltage leads on the other and separated. Within a cabinet, it is best to route the low voltage wires separate from the high voltage wires. That is, do not have the low voltage cables share the same wiring trough as the high voltage wires. This cannot be stressed enough.

On exiting the cabinet, it is also imperative to NOT share the same conduit as the high voltage leads. Some installers have found it convenient to bring high and low voltage into the same junction box as well. This is also inadvisable.

It has also been found the 4-20 mA leads for the mod motor could be susceptible to the high energy generated by the spark transformer or transients generated by the fuel valves and/or motor starter coil. Energy is transmitted from both the body of the transformer as well as the ignition cable. This becomes apparent at the beginning of the pilot trail for ignition when the transformer is first powered or at the end of cycle when the blower motor is de-energized. The solution is to physically separate the 4-20 mA cable from being in close proximity to the transformer and motor starter coil. In some installations

the spark transformer is mounted outside of the cabinet with the 4-20 mA lead wires routed behind the transformer on the inside. The metal wall of the cabinet does NOT act as an insulator so care should be take to prevent the location of the cable near the transformer body.

Along with good separation of low and high voltage signals is the use of shielded cable to carry the 4-20 mA signal to the modulator motor. This is particularly important when the flame safeguard control (E110/BurnerLogix) is used to control the high and low purge positions and then release to automatic mode for the E340 to control. **The accompanying figure details various modulator configurations and the suggested wiring methods that should be used to connect the system components.**

The 24 volt transformer should be located as close to the E340 as possible. It is better to have a longer run of the primary leads (120 VAC) than to have a long run of the secondary leads (24 VAC).

## 2. Transient Reducers.

To eliminate, or at least tolerate the transients being generated by the fuel valves, pilot solenoids and/or blower motor contactors, it is good practice to install MOV's (metal oxide resistors) across these devices. When exposed to high energy voltage transients, the MOV impedance changes from a very high standby value to very low conducting value thus clamping the transient voltage to a safe and tolerable level. The preferred place to install these is at the transient generating devices themselves rather than on the E110 or E340 terminals. The transient will be suppressed at the device rather than allow the transient to travel into the cabinet or be coupled onto adjacent cables. The pilot and main fuel valves usually have a junction box where it is convenient to connect the MOV. The coil of the blower motor contactor usually has terminals that also allow easy installation of the MOV. It is recommended to use MOV's rated for 220-260 VAC and a power dissipation of 20 joules or higher.

Fireye is providing in kit 129-179 a number of MOV's that should be installed as described above.

## 3. Shielding

The shields of the sensor wiring should all be tied together at the E340 end. Simply tie all the shields together and be sure they are connected to earth ground in the cabinet.

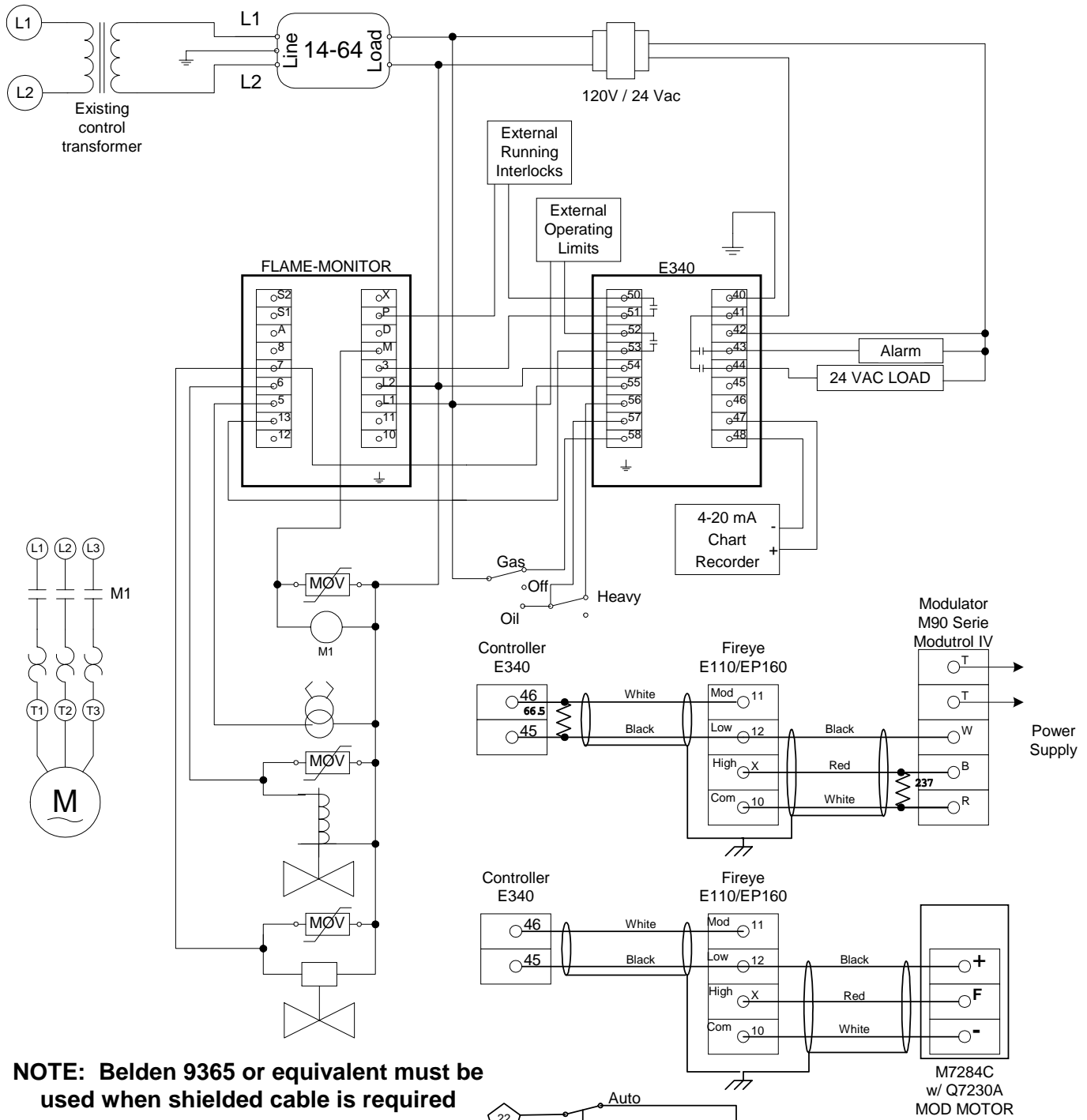
Of important consideration is also the lead wires for the modulation circuit that originate from terminals 45 and 46. It is highly recommended that these also be a shielded cable, particularly where there may be an Auto/Manual switch that causes transients to be impressed on these wires during service or running. **See accompanying figure.**

## 4. Miscellaneous

The ignition transformer is a noise generating device. Normal precautions should be taken to assure the body of the transformer is electrically connected to a grounded frame and the high energy wire is not interfering with any of the low voltage sensor wiring or 4-20mA wiring.

It doesn't take much correcting to make the E340 operate without failure, but it does take some common sense regarding low voltage and high voltage wiring. You will observe that most of the problems occur when the burner either just turns on, ignition transformer activation, fuel valves energize or at the conclusion of post purge when the blower motor is de-energized. After implementing the above procedures, it is suggested the burner be cycled as many times as is possible to determine if the recommendations are effective.

# RECOMMEND WIRING PRACTICE



**NOTE: Belden 9365 or equivalent must be used when shielded cable is required**

