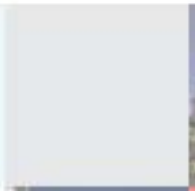
UniFlame II User's Manual

Publication 372001-05 Rev. E



Introduction

This manual contains information for the UniFlame II unitized flame detector, provided by Forney Corporation, 3405 Wiley Post Road, Carrollton, Texas.

All personnel should become thoroughly familiar with the contents of this manual before attempting to operate or maintain the system. Because it is virtually impossible to cover every situation that might occur during operation and maintenance of the equipment described in this publication, personnel are expected to use good engineering judgment when confronted with situations that are not specifically mentioned herein.

The user should review this manual whenever significant changes are made to the system. To be of value, the manual must always reflect the latest configuration of the equipment. It should be noted, however, that Forney Corporation will furnish updated pages only if a modification is authorized by Forney and accomplished under Forney supervision.

Proprietary Notice

Additional copies of this publication may be obtained from Forney. When ordering or requesting cost information, refer to the publication number appearing on the title page. Address to the attention of the Sales Department, Forney Corporation, 3405 Wiley Post Road, Carrollton, Texas 75006-5185.

Revisions

Revision	Date	Comments
A	12-2010	Initial Release
B	01-2011	Add new “MED” gain value
C	07-2011	Update coupling / add two models
D	08-2011	Add notes for NEMA 4X on *UniFlame II without Connectors*
E	04-2012	Added CEX option with blank cap, added display installation instructions

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Figures and Tables

Section 1 Description

The Forney UniFlame II is a versatile, fully microprocessor based, integrated flame detector. The system holds multiple worldwide safety agency approvals (see Model Listings for full details).

The UniFlame II detectors utilize advanced techniques for discrimination and integrate the flame detection, amplification, safety determination and flame switch functions into a single detection head. No separate amplifier or flame switch module is therefore required to interface with the main burner management system.

UniFlame II incorporates the superior detection and discrimination elements of the popular UniFlame product with additional enhanced capability, features and benefits.

The detector measures the amplitude of the modulations (the flame "flicker") that occur within the targeted flame. During the detector set-up procedure, the modulation frequency that yields the best flame ON/OFF discrimination is selected. The appropriate modulation frequency and sensor gain can be either manually or automatically selected.

UniFlame II is a dual cell detector utilizing UV and IR detector and various levels of housing type including FM Class I Div 2 and ATEX EExdIIC (see Model Listing for full description of options).

Standard features include two independently adjustable Flame Relays that can be selected to operate from the UV sensor, the IR sensor, or both sensors, 21 choices of modulation frequency, adjustable sensor gain, adjustable flame relay ON/OFF thresholds, two 4-20 mA analog signal strength outputs (one for FR1 and one for FR2), Fault Relay, four selectable programmable files (e.g. for different fuels or firing rates), and Auto Config capability with manual override. Remote communication capability is available via optional FEX UniFlame software.

Ordered separately, a blank cover or two different operator interfaces are available for the standard (non-CEX) UniFlame II detectors enabling the user to view and change the operating parameters and setpoints.

- UniFlame II Alpha Numeric Display is a two-line by sixteen-character alpha-numeric VFD display with a five-pushbutton keypad. The UniFlame II Alpha Numeric Display is installed by the user onto the end of the detector.

- UniFlame II Wireless Infrared Transmitter is installed by the user onto the end of the detector instead of a display. The Infrared transmitter provides wireless communications to a UniFlame II Wireless hand-held remote communications tool.

- The Blank Cover is installed by the user onto the end of the scanner to maintain environmental ratings when neither the Alphanumeric nor the Infrared display is installed. With the Blank Cover installed, the operator interface must either be via FEX Explorer PC software, or by temporarily installing the Alphanumeric or Infrared display.

  Refer to Section 2.4 for Display installation instructions.

The UniFlame II CEX models are available with or without an operator interface. UniFlame II CEX includes the alphanumeric VFD Display and Keypad. UniFlame II Wireless CEX includes the Infrared Transmitter. UniFlame II CEX ND uses a blank cap and has no display. For this model the user must purchase separately the alphanumeric VFD display / keypad or the FEX software to install and program

the detector. The display and software are both capable of programming multiple detectors.

All detector models are powered by 24 VDC, and contain electronic self-checking (no mechanical shutter required). Electrical connection is via quick-disconnects. Fiber optics are also available for extended viewing applications.

The *Standard UniFlame II* model is provided with two cable quick-disconnects, one 8-pin and one 12-pin, for use with the prefabricated 8- and 12- conductor cable assemblies, ordered separately.

The *UniFlame II without Connectors* model is similar to the standard UniFlame, but without the two-cable quick-disconnects. Instead of quick-disconnects, the *UniFlame II without Connectors* model has two threaded openings, one ½" NPT, and one ¾" NPT, for the customer to install their own cable connectors or cable glands. Filler plugs are installed at the factory. The customer will connect their cable(s) to two internal terminal blocks located inside the scanner. *Note: In order to maintain the NEMA 4X / IP66 rating, suitable NEMA 4X / IP66 connectors, fittings, or conduit must be used.*

The *UniFlame II for UniFlame I Retrofit* model is similar to the model standard UniFlame II model, but is intended to retrofit into existing UniFlame I installations where the customer is using the existing cable assembly. Instead of the two cable quick-disconnects, the 9 *UniFlame II for UniFlame I Retrofit* model has one 12-pin UniFlame I style quick-disconnect, for use with the UniFlame I prefabricated cable assembly. With this model, only the first flame relay (FR1) and its 4-20 ma output are accessible. The user does not have access to the second flame relay (FR2) or to its 4-20ma output. For backward compatibility with UniFlame I wiring, the Fault Relay contacts are factory wired in series with the Flame Relay contacts.

1.1 Operation

The UniFlame II has numerous adjustment options available. It can be tuned either automatically or manually to achieve the optimum level of sensitivity to the target flame balanced with superior discrimination of background radiation.

The UniFlame II detector measures the amplitude of the modulations (the flame "flicker") that occur within the targeted flame. The two sensors within the detector measure these amplitudes seen within the ultraviolet (UV) and infrared (IR) spectral ranges across a wide range of flicker frequency bands. In addition the detector has two independent flame relays (FR1 and FR2) that can be tied to the sensors in logical configurations. It is possible to set up each flame relay to operate from the UV sensor, the IR sensor, or both UV and IR sensors.

During the detector set up procedure, the logical operation for the two flame relays is selected for the desired sensors. In addition the operation and settings relative to user gain, required (flicker) frequency band and switching thresholds for the relays are selected (refer to commissioning procedure for more details on set up procedures)

The current Flame Signal Strength (FS) of the selected sensors can be viewed on the detector display via the main menu. This displayed value is the measure of amplitude within the selected modulation (flicker) frequency band, for example:

FS 1: 850 2: 999 *(Flame signal for selected sensors 0 to 999)*
1: IR&UV 2: UV
(Relay Logic operation = FR1 tied to IR & UV; FR2 tied to UV Only)

The detector set-up procedure, the operation and settings relative to the sensor signals and each of the two

flame relays are chosen either in Auto Config or Manual Config mode to provide the optimum flame ON/OFF discrimination.

The flame relays (FR1 and FR2) energize (and their normally open contacts close) when the flame quality is at or above the programmed flame ON threshold for each relay and remain on until the flame quality is at or below the programmed flame OFF threshold. Each relay operates with totally independent settings meaning that the signal strength used can be at different gains and different frequency bands. Each relay can also have independent timings and thresholds associated with it.

IMPORTANT NOTE - The FAULT RELAY is energized when the detector is powered (24 vdc) and when the detector had successfully passed all internal self-checking routines. The Fault relay is de-energized if there is a power interruption to the detector or if the detector has detected an internal fault.

WARNING – Forney recommends that the FAULT RELAY contacts MUST be wired in series with the Flame relay contacts for maximum safety applications.

1.2 Application

The UniFlame II is best suited to multi-fuel applications that require the highest level of sophistication and flexibility (addition choices of modulation frequencies, and the time-saving Auto Config function), and remote modbus communications capability (e.g. larger multi-burner boilers and furnaces).
The UniFlame II detector contains both the infrared and ultraviolet flame sensors:

- The infrared (IR) flame sensor responds to infrared radiation from 700 to 1700 nanometers wavelength.
- The ultraviolet (UV) flame sensor responds to ultraviolet radiation from 295 to 320 nanometers wavelength.

UniFlame II Detector Features (for the basic and the explosion proof model):

- Flame Relay
- Fault Relay
- 4-20 mA Output
- 21 Modulation Frequency Selections
- 4 Memory Files
- Remote PC Communications
- Auto Config

Explosion Proof Detector Features (in addition to basic features):

- Window joints are cemented using Aremco bond 568 high temperature epoxy with a temperature rating of -65 °C to +204 °C.
- Window material is fused silica with a temperature rating of +950 °C.
- O-rings are made of BUNA-N with temperature rating of +121°C.
- Suitably rated blanking elements must be used on all unused openings.
- Supply connection wiring shall have a temperature rating of at least +105 °C

NOTE: The above items are suitable for the UniFlame II scanners rated environment and conditions of use.

1.3 Dimensions

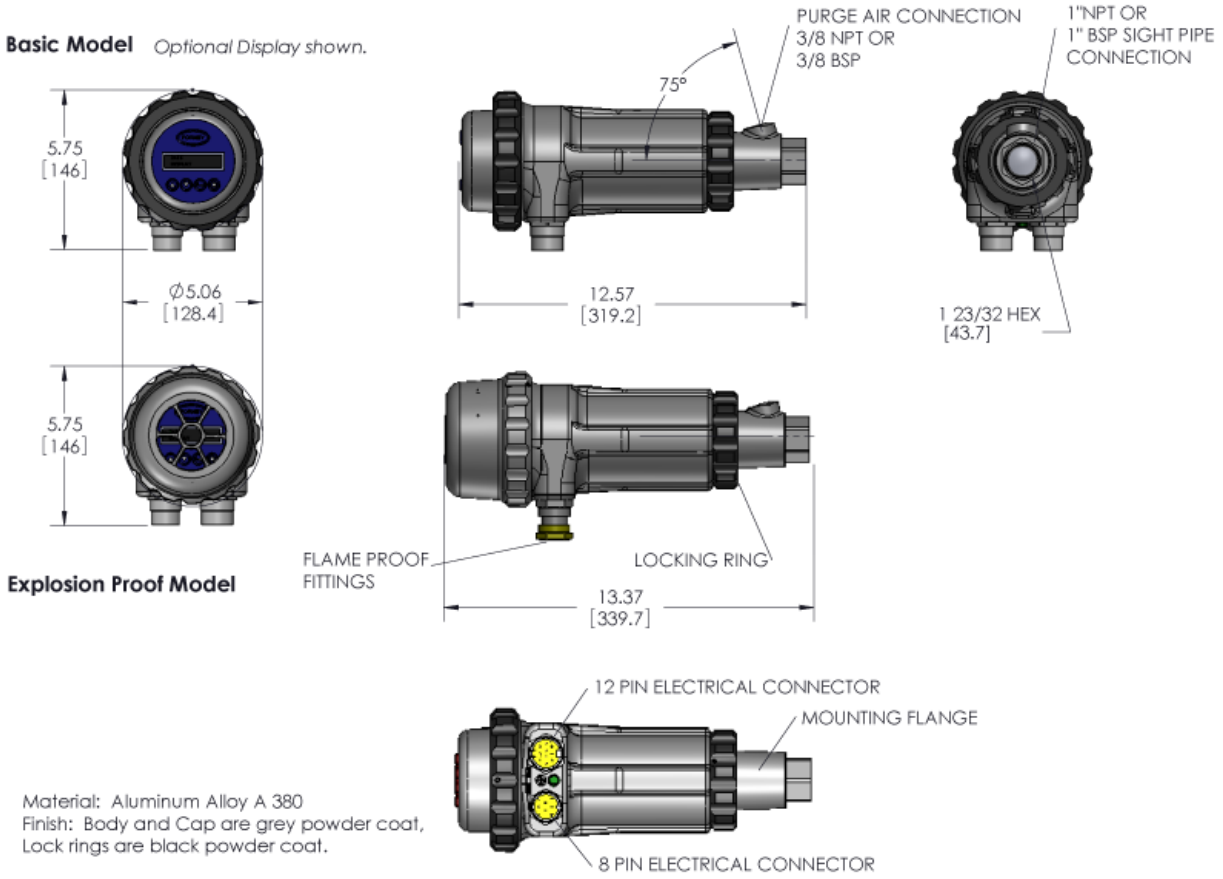


Figure 1-1 UniFlame II Dimensions

NOTE: The UniFlame II CEX models are available with or without an operator interface. The standard UniFlame II CEX includes the alphanumeric VFD Display and Keypad. UniFlame II Wireless CEX includes the Infrared Transmitter. UniFlame II CEX ND uses a blank cap and has no display. For this model the user must purchase separately the alphanumeric VFD display / keypad or the FEX software to install and program the detector. The display and software are both capable of programming multiple detectors.

Detector	Quick-Disconnect Right Side	Quick-Disconnect Left Side
Standard UniFlame II	12-pin male (for12-conductor cable)	8-pin male (for 8-conductor cable)
UniFlame II without connectors	none (3/4" NPT filler plug)	none (1/2" NPT filler plug)
UniFlame II for UniFlame I replacement	12-pin male (for 12-conductor cable)	none (1/2" NPT filler plug)

Table 1 Agency Approvals Listings

Model Name	Alpha Numeric VFD Display	Infrared Trans-mitter	12-Pin Con-nector	8-Pin Con-nector	Housing Rating (See Note 1)	Agency Approvals							
						UL C/US	FM	DIN-DVGW	DIN-CERTCO	CE	AGA	ABS	INMETRO UL-BR
UniFlame II	Order separately	Order separately	YES	YES	NEMA 4X, IP66 Class I Div 2 Groups A, B, C & D Class II Div 2 Groups F & G (see note 2) II 3 G Ex nA IIC T4 IP66 II 3 D Ex tD A22 IP66 T135 °C Ta= -40°C to -65°C (see notes 2,3)	YES	YES	YES	YES	YES	YES	YES	YES
UniFlame II without connectors (note 5)			No	No							NO	NO	NO
UniFlame II for replacing UniFlame I			Yes	NO							NO	NO	NO
UniFlame II CEX	YES	NO	NO	NO	NEMA 4X, IP66 II 2 G Ex d IIC T6 IP66 II 2 D Ex tD A21 IP66 T85°C Ta=-40°C to +65°C (see note 4)	YES	YES	YES	YES	YES	YES	YES	YES
UniFlame II Wireless CEX	NO	YES											
UniFlame II CEX ND	NO	NO											
UniFlame II Alpha Numeric Display	YES	NO				YES	YES	YES	YES	YES	YES	Yes	YES
UniFlame II Wireless IR transmitter*	NO	YES											

Notes:
1. All hazardous area ratings (Class I, Class II and ATEX) were certified by FM.
2. Hazardous area requirements for UniFlame II detectors with electrical connectors:
   The plastic “Loc Fast” retainers provided with the 8-conductor and 12-conductor cables must be installed over the quick disconnect connectors.
3. ATEX Certification number FM09ATEX0051, IECEx cert# IECEx FMG 09.008
4. ATEX Certification number FM09ATEX0026, IECEx cert# IECEx FMG 08.008
5. In order to maintain the NEMA 4X / IP66 rating, suitable NEMA 4X / IP66 connectors, fittings, or conduit must be used.

* *For use with UniFlame II Handheld Communications tool, see publication 372001-07.*

1.4 Specifications

Mechanical:	
Housing Material:	Cast aluminum with gray polyester powder coat finish
Housing Weight:	5.9 lbs. (2.69kg), 7.1 lbs. (3.22kg) “CEX” models
Environmental:	NEMA 4X, IP66, Class I Division 2, Groups A, B, C & D, Class II Division 2, Groups F& G (refer to agency approvals table)
Mounting:	Requires one of two threaded mounting flanges, ordered separately (see below). Fiber optic mount available as an option.
Cooling / Purge Air Requirements:	
Source:	Clean, dry, cool
Volume:	4 SCFM (113 l/min) at 3/8” threaded mounting flange, or 1 inch “Y” fitting, mounted on detector sight pipe. Temperature near the upper limit of the detector operating range and/or use with dirty/dusty fuels may require up to 15 SCFM (425 l/min).
Pressure:	Adequate to overcome furnace or windbox pressure
Temperature Rating:	-40°F to + 150°F (-40°C to +65°C)
Humidity:	0% to 95% relative humidity, non-condensing
Mounting Flange:	
Flange Material:	Cast aluminum with gray polyester powder coat finish. Contains an integral heat-insulating female thread insert (external heat-insulating nipple not required).
Flange Threads:	1"NPT female pipe mount with 3/8” NPT female cooling air connection. 1"BSP female pipe mount with 3/8” BSP female cooling air connection.
Flange Weight:	0.62 lbs (0.28 kg)
Electrical:	
Input Power:	24 Vdc, +10%, -15% supply current: 0.35 A, 8.5 VA, output rise time must be 20 msec Max.
Electrical Connection:	8-pin and 12-pin screw type quick-disconnect.
Relay Output:	2 FLAME RELAYS, SPDT (N.O. and N.C.) FAULT RELAY, SPST (N.O.)
Contact Rating:	Minimum: 10 mA @ 5 Vdc Maximum: 100 mA @ 30 Vdc 100 mA @ 50 Vac
Analog Output:	Two, 4-20 mA dc current, referenced to 24Vdc common, maximum connected 1oad: 750 ohms
Operator Interface:	UniFlame II Alpha Numeric Display with five pushbutton keys. UniFlame II Wireless Infrared Transmitter, used in conjunction with UniFlame II Wireless Hand-held Communications Tool.
Cable Specification:	
Multi-core, 8 and 12 conductor (color coded), 18- AWG, with foil wrap and overall braided shield and drain wire. PLTC-ER rating. Maximum cable length 1000 feet (305 meters)	
Cable Jacket:	PVC / black (flame-retardant, RoHS compliant)
Temperature Rating:	-40°F to +221°F (-40°C to +105°C)
8-Conductor Cable	Nominal O.D. 0.44" (11.2 mm), maximum O.D. 0.48” (12.2mm)
12- Conductor Cable	Nominal O.D. 0.52" (13.2 mm), maximum O.D. 0.56” (14.2mm)
Maximum cable length 1000 feet (305 meters)	

Section 2 Installation

The UniFlame II Flame Detectors determine the presence or absence of flame by monitoring the frequency spectrum of the flame. The detector should initially be mounted so that the primary combustion zone is within the detector's line of sight.

The location and sighting instructions listed in the following sections are rough guidelines for the location of the detector. The detector provides feedback via its VFD or wireless display to assist in the adjustment and proper alignment of the flame detector. Refer to Section 2.4 for display installation and Section 3 for programming instructions.

Notes: An acceptable detector location must ensure the following:
- Reliable main flame and/or igniter flame detection at all air flow and furnace loads (ranges of fuel firing).
- Rejection of the igniter flame if too short, or in the wrong position to ignite the main flame reliably, thus prohibiting the delivery of fuel to the burner.

2.1 Installation Procedure

WARNING: Protective filtered lenses should be worn when viewing flame. Infrared and ultraviolet energy from the flame can be damaging to the eyes.

1. The best results are obtained when the detector is aimed so that the detector's line of sight intersects the burner center at a slight angle (e.g. 5 degrees) and sees a maximum of the primary combustion zone, as shown in Figure 2-1 Single Burner Detector Sighting. If only one detector is used per burner, the line of sight should also intersect the igniting flame.

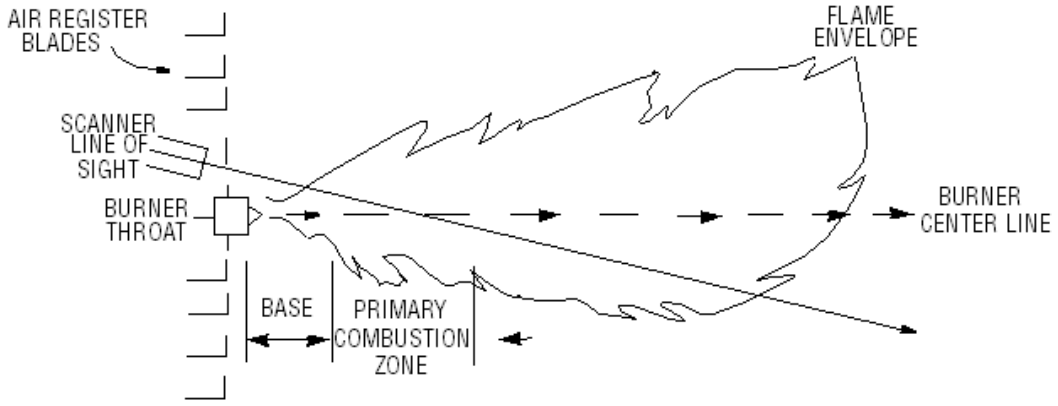


Figure 2-1 Single Burner Detector Sighting

2. For installations where separate detectors are used to monitor main and igniter flames, the main flame detector should be sighted so it does not detect the igniter flame.
3. The detector should have an unrestricted view of flame as far as possible. Physical obstructions such as air register blades, interfering vanes, or other hardware should be cut away or notched so they do not fall within the detector's line of sight as shown in Figure 2-3.

Note: Always check with the burner manufacturer before you trim the register blades.

4. Consideration must be given to burner secondary air rotation, some burners have clockwise (CW) air rotation and others have counterclockwise (CCW) air rotation. If combustion air enters the furnace with a rotational movement of sufficient velocity to deflect the igniter flame in the direction of rotation, position the detector 10 to 30 degrees downstream of the igniter as shown in Figure 2-2 and close to the periphery of the burner throat (See Figure 2-1).

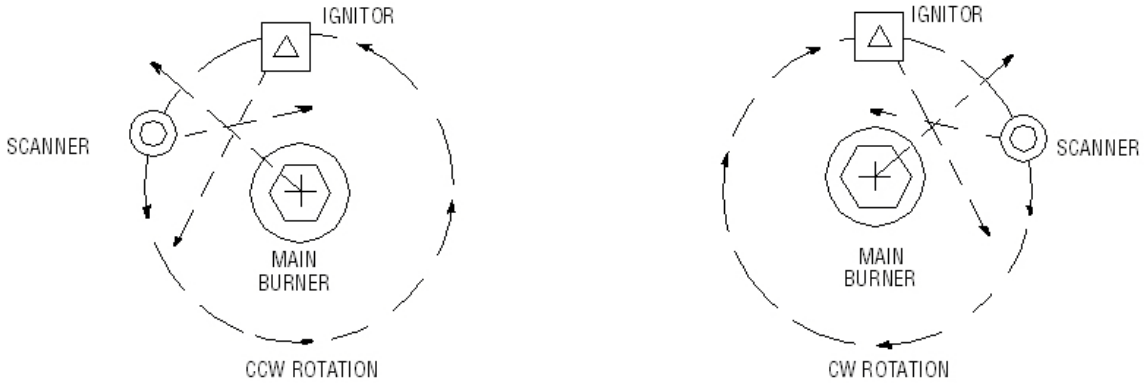


Figure 2-2 Detector Location vs. Secondary Air Rotation

5. Having determined the approximate location for the sight pipe, cut a clearance hole for a 2 inch pipe through the burner plate. Look through the hole. If register vanes interfere with the desired line of sight, the interfering vane(s) should be trimmed to assure an unrestricted viewing path at all firing levels as indicated in Figure 2-3.

Note: Always check with the burner manufacturer before you trim register vanes.

Figure 2-3 Flame Must Completely Cover Sight Opening

6. The preferred method for mounting surface mounted detectors requires the use of a swivel mount (NPT), shown in Figure 2-4, Figure 2-5 & Figure 2-6. Center the swivel mount over the two inch hole in the burner plate and secure using three hexed cap screws (not provided). Install the sight pipe on the swivel mount. If a swivel is not used, insert the end of the sight pipe into the hole, align the hole to the desired viewing angle and tack weld (welding must be adequate to temporarily support the weight of the installed detector). The sight pipe should be arranged to slant downward so that dirt and dust will not collect inside.

CAUTION: Use no more than one foot of one inch diameter sight pipe. Increase the sight pipe diameter one inch for every additional foot of sight pipe length used to avoid restricting the detector's field of view.

When a satisfactory sighting has been confirmed by operational testing, secure the swivel mount's ball position in place by tightening the three hex head cap screws located on the swivel

mount ring.

7. For ease of use, the detector should be installed on the sight pipe so the VFD display (if used) can easily be read.

Note: Operation of the VFD display is independent of position.

8. The detector lens must be kept free of contaminants (oil, ash, soot, dirt) and the detector housing temperature must not exceed its maximum rating of 150° F (65° C). Excessive temperatures will shorten detector life. Both requirements will be satisfied by a continuous injection of purge air at either the 3/8" housing inlet or the 1" "Y" connection ahead of the swivel mount as shown in Figures 6, 7 and 8.

Note: Internal detector temperature is available via the VFD display. See "Status Menu" under "Programming the Detector."

The detector mounting may be made with provision for purge air through only the 3/8" opening as shown in Figure 8 or for purge air through either the 3/8" opening or the 1" "Y" connection as shown in Figure 7. In the latter arrangements, normally only one of the two connections is provided with purge air and the other connection is plugged. When a sealing coupling is used as shown in Figure 6, the 1" "Y" connection is used for the purge air and the 3/8" opening is plugged.

It is good practice to use the sealing coupling with NPT threads on all installations to insure against unwanted furnace pressures from damaging the detector lens.

Under normal conditions, with clean burning fuels and moderate ambient temperature conditions, purge airflow of approximately 4 SCFM (113 l/min) is generally adequate. Up to 15 SCFM (425 l/min) may be required for fuels that produce high levels of ash or soot, or for hot environments to maintain the detector's internal temperature within specification.

2.2 Mechanical Accessories

Surface Mounting Flange (Required)
Cast aluminum with gray polyester powder coat finish. Contains an integral heat-insulating female thread insert (external heat-insulating nipple not required).

- 1"NPT female pipe mount with 3/8" NPT female cooling air connection.
- 1"BSP female pipe mount with 3/8" BSP female cooling air connection.

Swivel Mount (Optional)
The detector swivel mount (NPT) (see Figure 2-7) is used to adjust the detector sighting angle after the detector has been installed. The swivel mount is shown in Figure 2-4, Figure 2-5, Figure 2-6 and Figure 2-7.

Sealing Coupling with Quartz Window (Optional)
The sealing coupling (see Figure 2-4 and Figure 2-7) is used whenever a coupling or a seal is required for detector piping. The quartz window blocks furnace pressure, hot gases and soot from coming in contact with the detector and contaminating the lens. Available with 1" NPT or 1" BSP thread. When the sealing

coupling is used, a 1 inch “Y” fitting must be used downstream of it for connection of a purge air supply (plug 3/8" opening).

Orifice Kit (Optional)
An orifice may be used to restrict the detector’s field of view aiding discrimination between the target flame and other flames in the combustion chamber. An orifice may also be used to reduce the total amount of radiation reaching the detector, thereby avoiding the chance of saturation. The orifice kit contains nine different orifice sizes, and two retaining clips. The orifice can be installed either within the swivel mount, within the coupling, or the surface mounting flange (see Figure 2-8).

Orifice Kit contains an Orifice Retainer and orifices with the following diameters: 0.062", 0.078", 0.093", 0.109", 0.125", 0.187", 0.25", 0.375", 0.5"

Cooling Cover / Vortex-Tube Cooler Kit (Optional)
For high ambient temperature applications, a Cooling Cover and Vortex-Tube cooler kit are available. Consult factory for details.

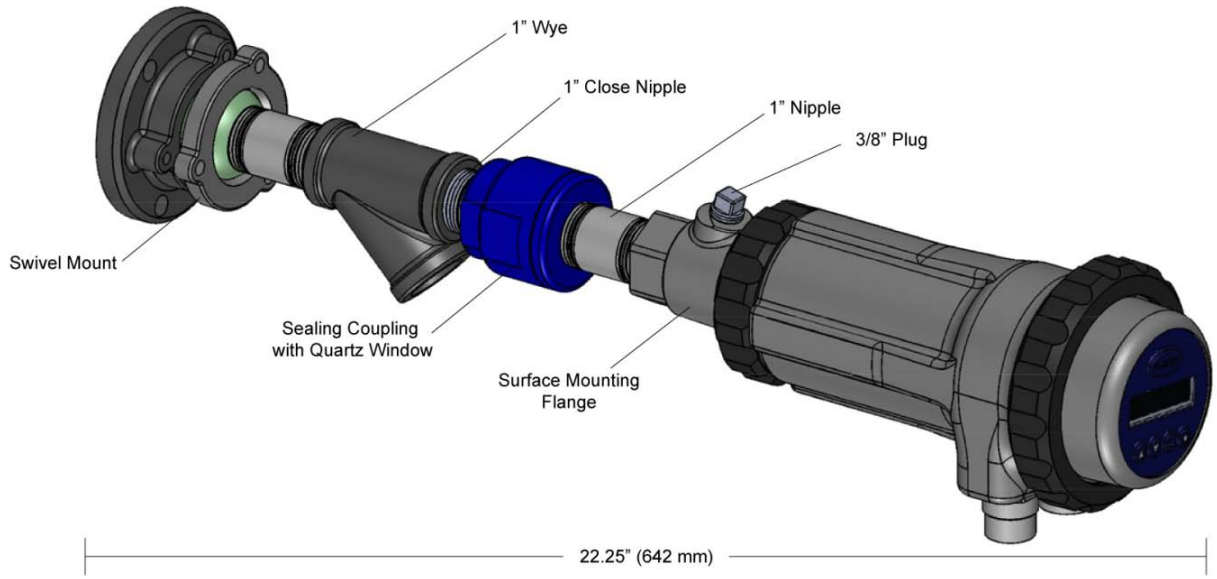


Figure 2-4 Swivel Mount, Wye, Sealing Coupling and Detector Assembly

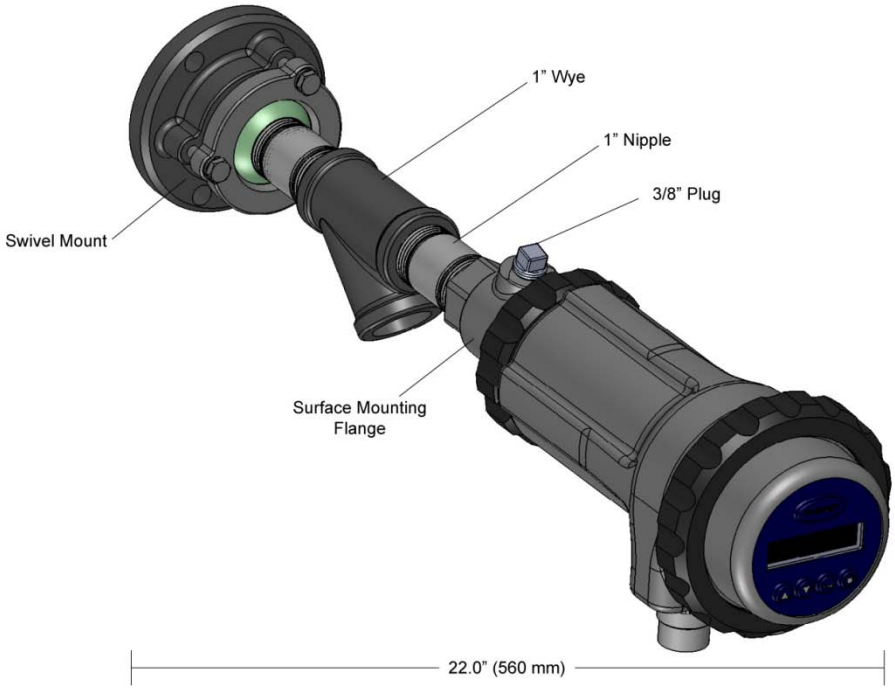


Figure 2-5 Swivel Mount, Wye and Detector Assembly

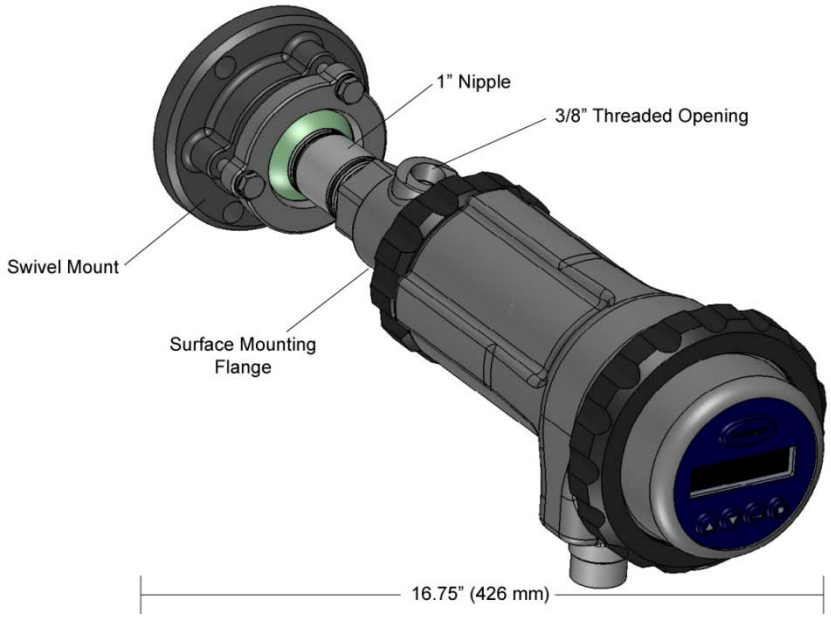


Figure 2-6 Swivel Mount and Detector Assembly

Figure 2-7 UniFlame II Accessories

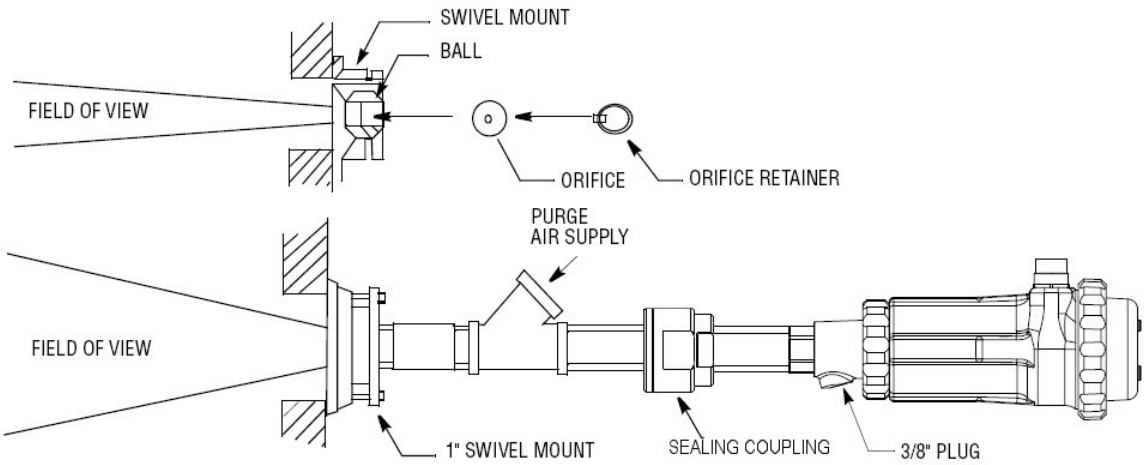


Figure 2-8 UniFlame II Arrangement Drawing

2.3 Electrical Accessories

Note: Hazardous Area requirements for UniFlame II detectors with electrical connectors:
For hazardous locations, the plastic "Lok Fast" retainer provided with 8- and 12- conductor cables must be installed over the quick disconnect connectors.

8-conductor and 12-conductor color-coded multi-core cables

This cable includes 18 AWG conductors and a flame-retardant, low smoke, zero halogen PVC jacket. Refer to Specification Table for full cable specifications. Refer to Table 2 for color code and connection information. This raw-stock cable is used as extension wiring between a junction box or Wiring Harness Assembly (below) and the burner management system. The maximum total cable length is 1000 feet (305 meters) per detector.

Note: *UniFlame II for UniFlame I Retrofit* model requires the 12-conductor cable for UniFlame I.

Detector Cable with Female Connector
Forney offers the 8-conductor and 12-conductor cables in precut lengths with a female factory installed connector. These assemblies are offered in several lengths ranging from 3-meters (9 ft., 10 in.) to 90-meters (295 ft., 3 in.)

24 Volt DC Power Supplies
Forney offers DIN rail mounted 24 vdc power supplies for use with the UniFlame II Integrated flame detector.

- 24 VDC Switching Power Supply, 100-240 vac 50/60 Hz. input, 2.0 A output at 24 vdc. Powers up to **five** detectors.
  Dimensions: 3.7"(95mm) high x 1.6" (40mm) wide x 4.3"(108mm) deep
- 24 VDC Switching Power Supply, 100-240 vac 50/60 Hz. Input, 4.0 A output at 24 vdc. Powers up to **ten** detectors.
  Dimensions: 4.5"(115mm) high x 2.0" (50mm) wide x 4.8"(121mm) deep
- 24 VDC Switching Power Supply, 100W, 120 / 240 vac 50/60 Hz. input, 4.2 A output at 24 vdc. Powers up to **ten** detectors.
  Dimensions: 3.2"(82mm) high x 5.7" (145mm) wide x 3.6"(91mm) deep

Note: Listed output is when power supply is vertically mounted and with an ambient temperature of 122ºF (50ºC) maximum. When mounted in a row, allow at least 0.79" (20mm) between adjacent power supplies.

DIN rails are available in 12" (305mm), 24" (610mm), and 36" (914mm) lengths.

Detector Displays for Standard UniFlame Models (non CEX)

- UniFlame II Alpha Numeric Display is a two-line by sixteen-character alpha-numeric VFD Display with a five-pushbutton keypad. The display is installed by the user onto the end of the detector enabling the user to view and change the operating parameters and set points at the detector itself.
- UniFlame II Wireless Infrared Transmitter - The Infrared Transmitter is installed by the user onto the end of the detector instead of a display. The transmitter provides infrared wireless communications to the hand-held remote communications tool.

CAUTION: **Damage to electronic components through electrostatic discharge (ESD)**
Before touching the internals of the UniFlame II scanner installers can discharge any static built up on their body by touching the outside of the scanner housing if the ground is already attached. If the scanner isn't already grounded, the installer could touch a nearby object that is earthed.

- UniFlame II Wireless Hand-Held Remote Communications Tool: The hand-held infrared remote communications tool contains an alpha-numeric display and pushbutton keys enabling the user to view and change the operating parameters and set-points of a UniFlame II detector when standing in line-of-sight of the detector fitted with the optional Wireless Infrared Transmitter.

Note: The UniFlame II CEX models are available with or without an operator interface. UniFlame II CEX includes the alphanumeric VFD Display and Keypad. UniFlame II Wireless CEX includes the Infrared Transmitter. UniFlame II CEX ND uses a blank cap and has no display. For this model the user must purchase separately the alphanumeric VFD display / keypad or the FEX software to install and program the detector. The display and software are both capable of programming multiple detectors.

2.4 Display Installation Instructions

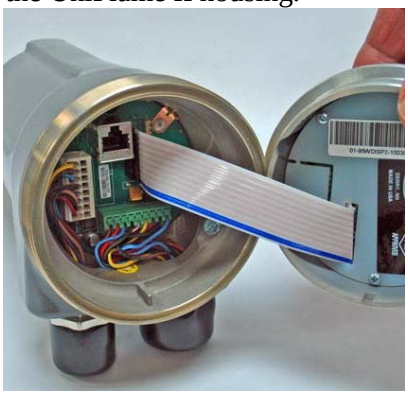
The following are the steps required to install a Display onto a UniFlame II scanner, whether it be the Alphanumeric Display, the Infrared Transmitter or the Blank Display. If you are replacing a scanner's damaged unit, you must first remove power from the scanner and move it to a clean, dry, non- hazardous area.

1. Remove the threaded Locking Ring from the UniFlame II.

2. Remove the plastic end cap.
3. Verify that the scanner housing o-ring is properly seated in the UniFlame II scanner.

4. Observe the notch on the rear of the Alphanumeric Display (left below), Infrared Transmitter (right below) or Blank Display (not shown).

5. Connect display to UniFlame II base as follows:

 **Alphanumeric Display** 401116-03	 **Infrared Transmitter** 401118-03	 **Blank Cover** (shown installed) 401116-05
Plug the Display cable into the RJ receptacle in the UniFlame II base. Position the Display in the base, making sure that the notch in the rear of the display aligns with the key in the base housing. 	Plug the transmitter ribbon cable connector onto the 9-pin receptacle in the scanner. Note: The ribbon cable can only be installed one way. The two tabs on the ribbon cable connector must face away from the RJ connector, and the cable's blue stripe must be towards the two scanner cable connectors. Position the transmitter in the UniFlame II, making sure that the notch aligns with the key in the UniFlame II housing. 	Position the Blank Cover in the UniFlame II base making sure that the notch in the rear of the cover aligns with the key in the housing.

6. Install the second o-ring into the machined groove on the outside of the display (not shown)
7. Install the threaded Locking Ring onto the scanner.

CAUTION: Damage to electronic components through electrostatic discharge (ESD)
Before touching the internals of the UniFlame II scanner installers can discharge any static built up on their body by touching the outside of the scanner housing if the ground is already attached. If the scanner isn't already grounded, the installer could touch a nearby object that is earthed.

2.5 Detector Wiring

To reduce electrical noise interference, take precautions to keep the detector cable away from any high inductive wiring associated with high inductive loads or high voltage, high energy spark ignition systems.

CAUTION: The flame detector requires 24 Vdc power for operation. Connection to a 24 Vac or 120 Vac power source will damage the detector. Refer to wiring diagrams.
External 2.0 Amp fuses are recommended to protect Flame Relay and Fault Relay contacts
All wiring to the detector should be rated at 105°C. For runs less than 1000 feet, use Forney Detector 8-conductor and 12-conductor Cables. For runs in excess of 1000 feet, consult the factory.

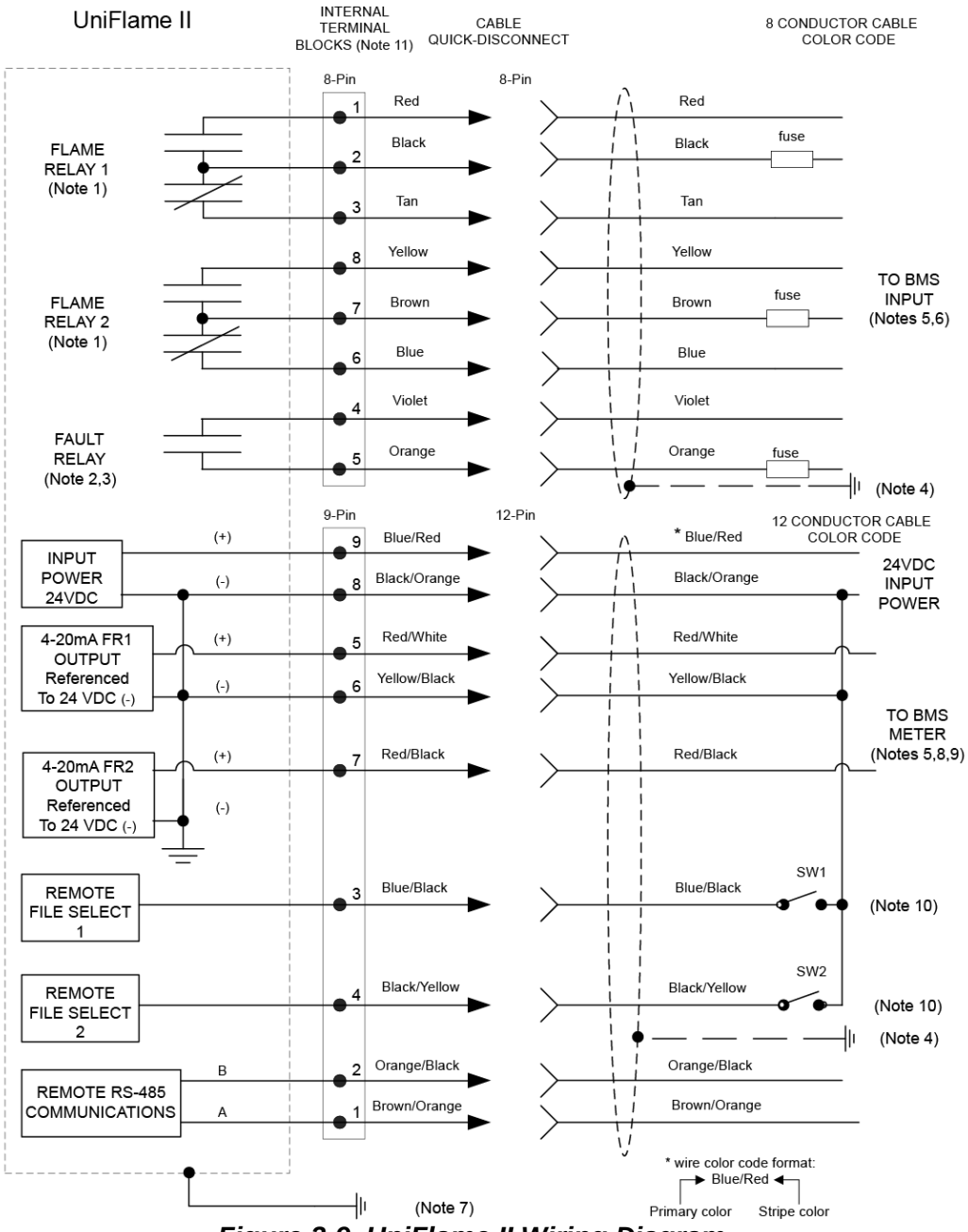


Figure 2-9 UniFlame II Wiring Diagram

Notes:

1. Flame relay contacts are shown in de-energized (no flame).
2. Fault relay contacts are shown in de-energized (fault condition)
3. Forney recommends that the FAULT RELAY contacts MUST be wired in series with the Flame relay contacts for maximum safety applications.
4. Connect cable shield to earth ground at power source.
5. BMS = Burner Management System
6. External 2.0 Amp fuses recommended.
7. A ground screw is provided on the detector body. An external ground wire may be required by local codes.
8. The detector's 4-20 ma output is internally powered and must be connected to a passive (voltage-free) device. Do not connect to an externally powered 4-20 ma loop or the detector may be damaged.
9. The return (-) for the customer's 4-20 ma device may be connected to either detector pin 6 or pin 8.
10. With Remote File Select programmed as "LINE", external switches SW1/SW2 (not furnished) switch between internal memory files when connected to 24Vdc (-) supply.
11. The numbers shown refer to the scanner's internal 8-pin and 9-pin terminal blocks. The actual quick-disconnect pins are not numbered.
12. The following peripherals must be SELV/PELV by an approval according to DIN EN 60950 or an external isolator must be used to provide an SELV system:
    - 24Vpower supply
    - RS485
    - 4-20mA wiring
    - Remote file select monitoring
    - Relay contacts
13. Cable quick-disconnect pins E and F (Red and Green wires) are not connected to the *UniFlame II for UniFlame I Retrofit Model* internal terminal blocks. Because the Fault Relay contacts are internally wired in series with the Flame Relay contacts, the Fault Relay contacts are not available for independent monitoring in the model *UniFlame II for UniFlame I Retrofit Model*.

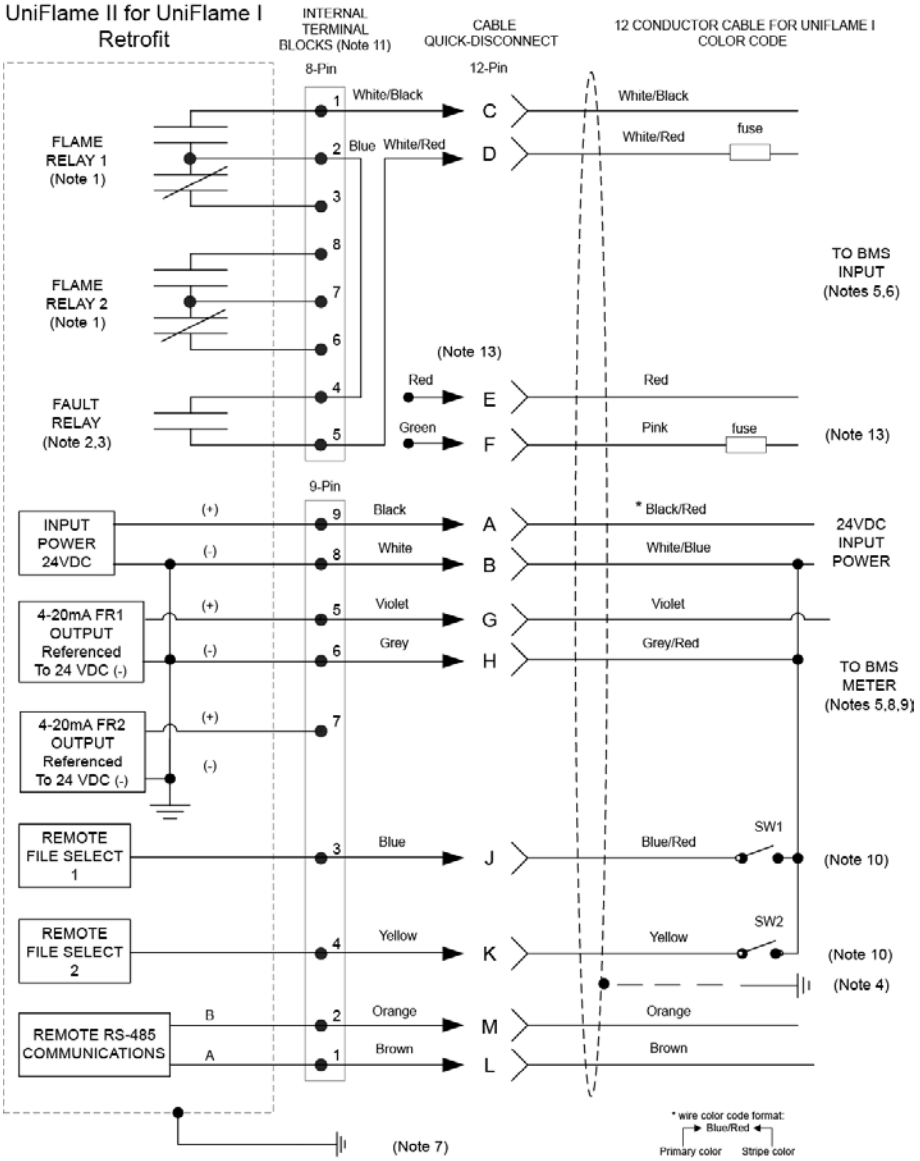
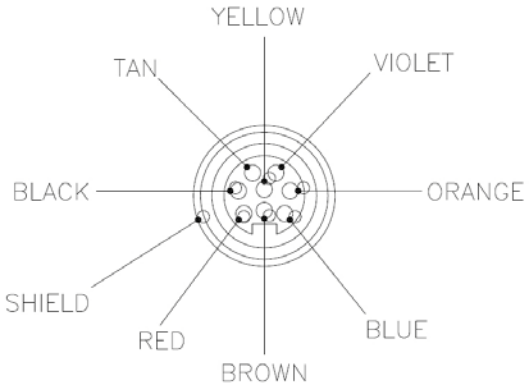


Figure 2-10 UniFlame II for UniFlame I Retrofit Wiring Diagram

Quick Disconnect 8 Conductor Cable
Female End View



Quick Disconnect 12 Conductor Cable
Female End View

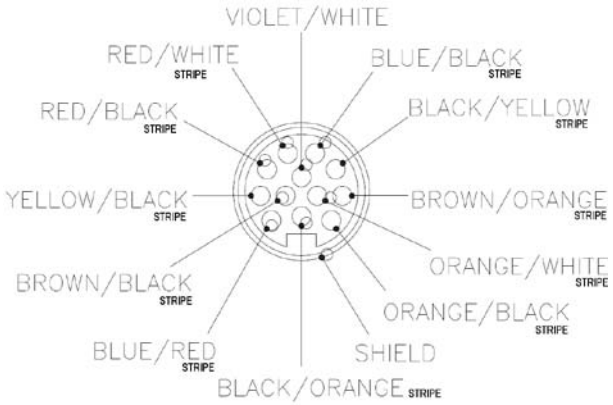


Table 2 Quick Disconnect / Terminal Block Pins

8-Conductor Cable		
Quick Disconnect/ Terminal Block Cable Color	**Pin # of Terminal Block**	**Function**
Red	1	FR1-Relay NO
Black	2	FR1-Relay COM
Tan	3	FR1-Relay NC
Violet	4	Fault-Relay NO
Orange	5	Fault-Relay COM
Blue	6	FR2-Relay NC
Brown	7	FR2-Relay COM
Yellow	8	FR2-Relay NO

12-Conductor Cable		
Quick Disconnect / Terminal Block Cable Color	**Pin # of Terminal Block**	**Function**
Brown/Orange stripe	1	Comm - A
Orange/Black stripe	2	Comm - B
Blue /Black stripe	3	RFS1
Black/Yellow stripe	4	RFS2
Red/White stripe	5	4-20 mA OUT (+)(FR1)
Yellow/Black stripe	6	4-20 mA OUT RTN (-)
Red/Black stripe	7	4-20 mA OUT (+) (FR2)
Black/Orange stripe	8	Power (-) 24 VDC and 4-20 mA OUT RTN(-)
Blue/Red stripe	9	Power (+) 24 VDC
Brown/Black stripe	Cut	No connection
Violet/White stripe	Cut	No connection
Orange/White stripe	Cut	No connection

Wiring Notes:
Cage-clamp style terminal blocks. Small screwdriver required.
Wire Gauge: 24 AWG min., 16 AWG max.
Wire strip length (8-Pin): 0.313" (8 mm)
Wire strip length (9-pin): 0.375" (9-10 mm)

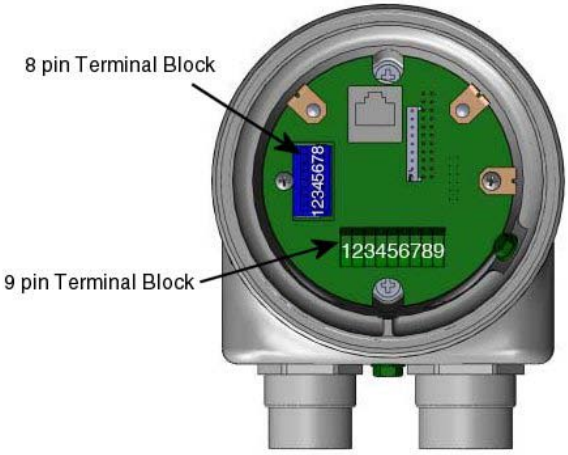


Figure 2-11 Wiring of UniFlame "CEX" Detectors – Internal Terminal Block Locations

2.6 Wiring for Remote Communications

Remote communications with the UniFlame II detector uses an RS485 Interface to carry the communication signals. A Windows® compatible PC running FEX software is required to communicate with the flame detectors. **The wiring configuration for remote communications is dependent on the distance between the detector and amplifier.**

For distances less than 200 feet, wire the Forney 8-Conductor Cable and 12-Conductor Cable to the female quick disconnect in the manner previously described, and run the cable directly back to the burner management system.

For wiring distances greater than 200 feet, remote communications requires wiring a twisted, shielded pair of wires in a "multi-drop" wiring configuration, and then use a terminating resistor at the detector located farthest from the communication source.

Note: The maximum distance for the communication wiring for all associated UniFlame detectors is 1,000 feet at 19200 baud. The maximum number of detectors connected to the communication link is 32 detectors. Exceeding this total wiring length or number of detectors requires the installation of bi-directional repeaters or amplifiers. Consult factory for additional information.

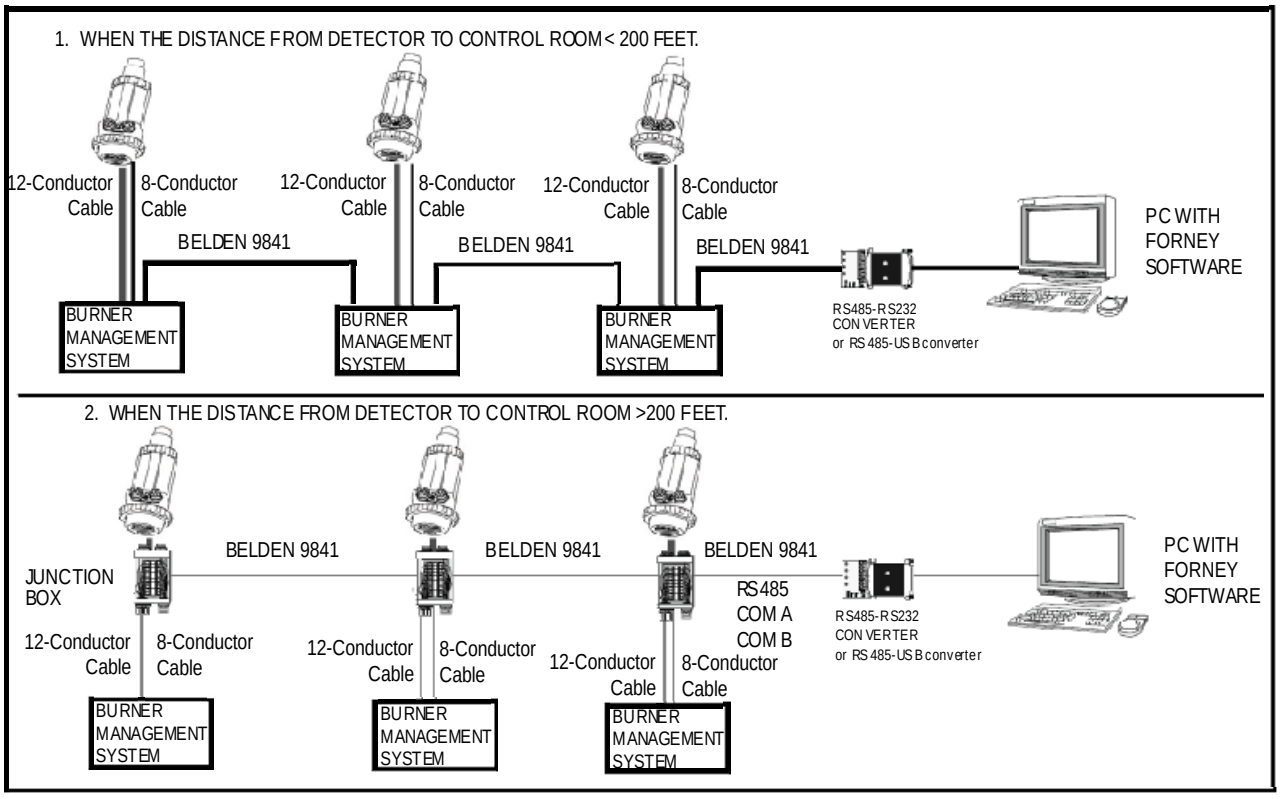


Figure 2-12 Wiring for Remote Communications

2.7 UniFlame I to UniFlame II Conversion Harness

Forney offers a Conversion Harness to allow users to replace a UniFlame detector with a UniFlame II detector by attaching their existing UniFlame cable to the connector on the harness junction box. The Conversion Harness includes two 3-meter (9 ft. 10 inch) cables, one 8-conductor and one 12 conductor, to connect the harness to the UniFlame II detector.

Note: The conversion harness is not required when using the *UniFlame II for UniFlame I Retrofit model.*

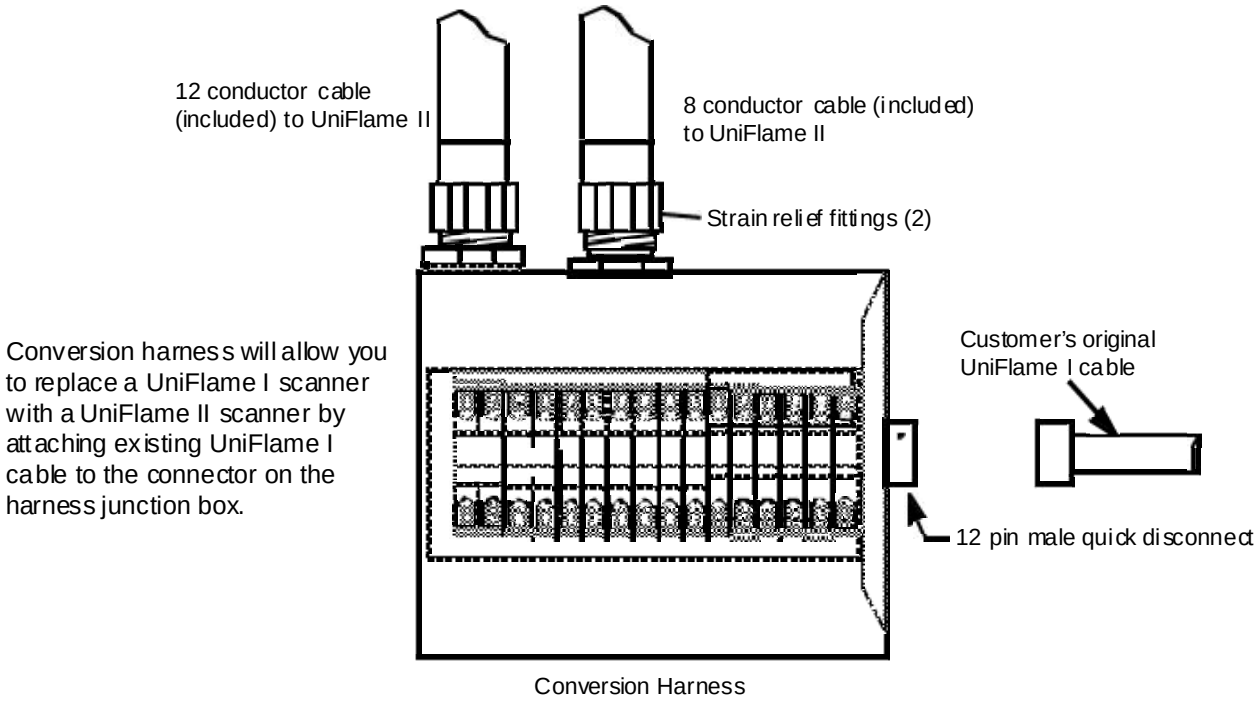


Figure 2-13 UniFlame I to UniFlame II Conversion Harness using UniFlame I Cable

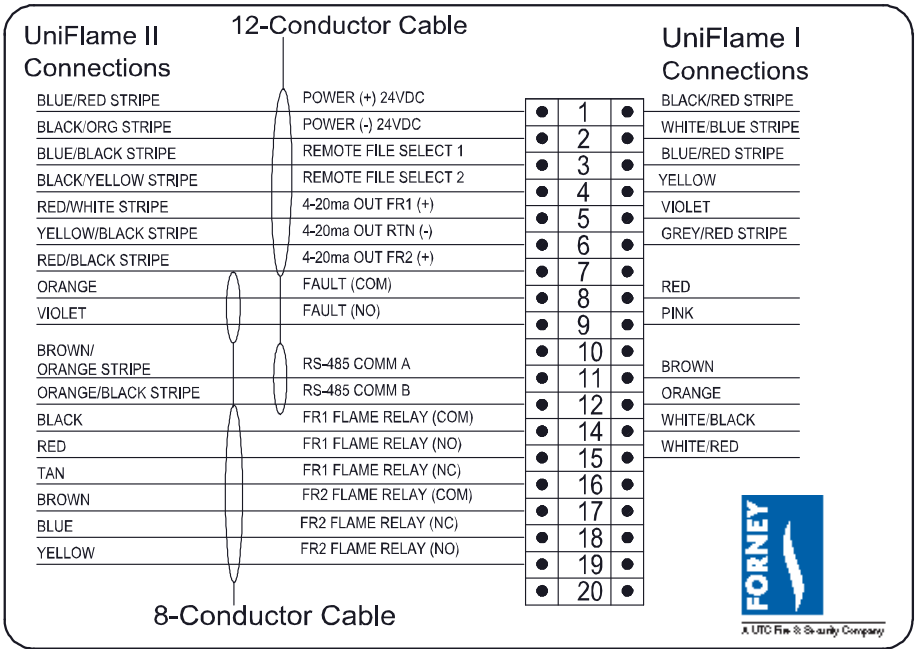


Figure 2-14Wiring Diagram for Conversion Harness

2.8 Grounding and Shielding Techniques

FOR USE ON DETECTORS OR DETECTOR CABLE LOCATED WITHIN 12" OF A HIGH ENERGY OR HIGH VOLTAGE SOURCE.

1. Connect a safety ground to detector housing (Figure 2-9).
2. The detector and detector cable MUST be located at least 12" from the ignition source.
3. Run a ground wire from the ignition transformer chassis to the igniter assembly.
4. Replace all frayed, cracked, or dirty (oily) ignition wire. Ignition wire must be in good working condition.
5. Electrically isolate the detector from the burner using the surface mounting flange with integral heat-insulating female thread insert.
6. Cooling/Purge Air must be electrically isolated from the detector (e.g. isolated short rubber hose).

DETECTOR TO CONTROL ROOM	SHIELDING TECHNIQUES
Detector with detector cables wired directly back to burner management system. See below for remote communications.	Connect braided shield of cable to earth ground at power supply.
REMOTE COMMUNICATIONS: LESS THAN 200 FEET	
Detector with detector cables wired directly back to control room.	Connect braided shield of cable to earth ground at power supply.
REMOTE COMMUNICATIONS: GREATER THAN 200 FEET	
RS485 communications for detectors wired in a multi-drop configuration (Belden 9841) using wiring harness or junction box.	Connect braided shield of 8- and 12- conductor cables to earth ground at power supply. Twist together and tape (to electrically isolate) shield drains from Belden 9841 cables inside each wiring harness or junction box. Connect to earth ground at RS485 source (e.g. IBM computer).

2.9 Remote File Selection

The UniFlame II detectors have four (A, B, C, & D) programmable memory files. The user has the option of storing different detector setpoints for different operating conditions (e.g. Gas / Oil, Pilot / Main, Low Fire / High Fire, etc.) in these files. With RFS selected as “Line Inputs”, one or two external switches (supplied by user) will select between the files when the RFS1 or RFS2 wires are connected to 24 vdc (-).

RFS1 (Blue/Black stripe)	RFS2 (Black/Yellow stripe)	File Selected
Open	Open	A
Closed	Open	B
Open	Closed	C
Closed	Closed	D

The default is RFS = “Key Pad” which allows manual file selection at the detector keypad only. The user may also select RFS = “Comms” which will allow manual selection at a remote computer running FEX UniFlame software. Forney recommends the use of shielded cable for the two remote file select switches (or relays). The switch contacts should be rated for low current operation (3mA dc).

Section 3 Programming the UniFlame II Detector

Keypad/Display: The UniFlame II flame detector uses a two (2) line x sixteen (16) character alphanumeric VFD Display and five (5) pushbuttons to review and program the various setpoints and operating parameters. The functions of the pushbuttons are:

UP/DOWN	▲ ▼	The UP and DOWN buttons are used to scroll through the detector menus. When in the EDIT menu, after selecting a setpoint to edit, (see SELECT button), the UP and DOWN buttons are used to change that setpoint.
SELECT	↳	When in the EDIT menu, the UP / DOWN buttons are used to display the setpoints. Pressing the SELECT button displays the stored value of the setpoint, allowing it to be changed.
PROGRAM	◉	The PROGRAM button saves a change made to a setpoint. It is also used to execute the Auto Tune function. ***Note: Pressing and Holding the PROGRAM key for four (4) seconds will cause the detector to RESET (flame relays and fault relay will de-energize). Normal operation will be restored once the PROGRAM button is released.***
HELP	Forney	Pressing the oval Forney key displays expanded text in the Main Status Menu.

3.1 UniFlame II Menu Structure

For ease of operation, the UniFlame II detector contains five primary menus (or loops) accessed via the keypad and viewed on the detector's display.

MAIN STATUS MENU
The Main Status menu is the default display, and appears as soon as power is applied. Use the UP and DOWN buttons to scroll through the menu and view the current operating status. No operating parameters can be changed from the Main Status menu. To change any setpoint, you must select the Configure Menu option and then enter a four digit password to enter the Configuration menu. Error History can also be viewed from the Main Menu.

CONFIG MENU
The Config Menu accesses all of the sub-menus and setpoints for the UniFlame II detector. The Config menu is entered from the Main menu after first entering a four-digit password. From the Config menu the user can enter the Automatic Config, Manual Config and other menus.

AUTOMATIC CONFIG MENU
From the Automatic Config Menu, the user views the flame signal intensity while physically aiming the detector for optimum signal. With the target burner ON (firing), and the detector properly aimed, the user can command the UniFlame II detector to Learn the Flame ON condition. With the target burner OFF (not firing), the user can command the UniFlame II detector to Learn the Flame OFF condition. The detector will then automatically select the optimum flame relay and sensor setpoints. The Automatic Config Menu is entered from the CONFIG menu.

MANUAL CONFIG MENU
Two Manual Config Menus exist, one for FR1 (flame relay 1) and the other for FR2 (flame relay 2) values. From the Manual Config Menu the user selects the desired FFRT (Flame Failure Response Time) and On Time Delay for the flame relays. From this menu, the user may also manually adjust all other flame relay and sensor setpoints. The Manual Config Menu is entered from the CONFIG menu.

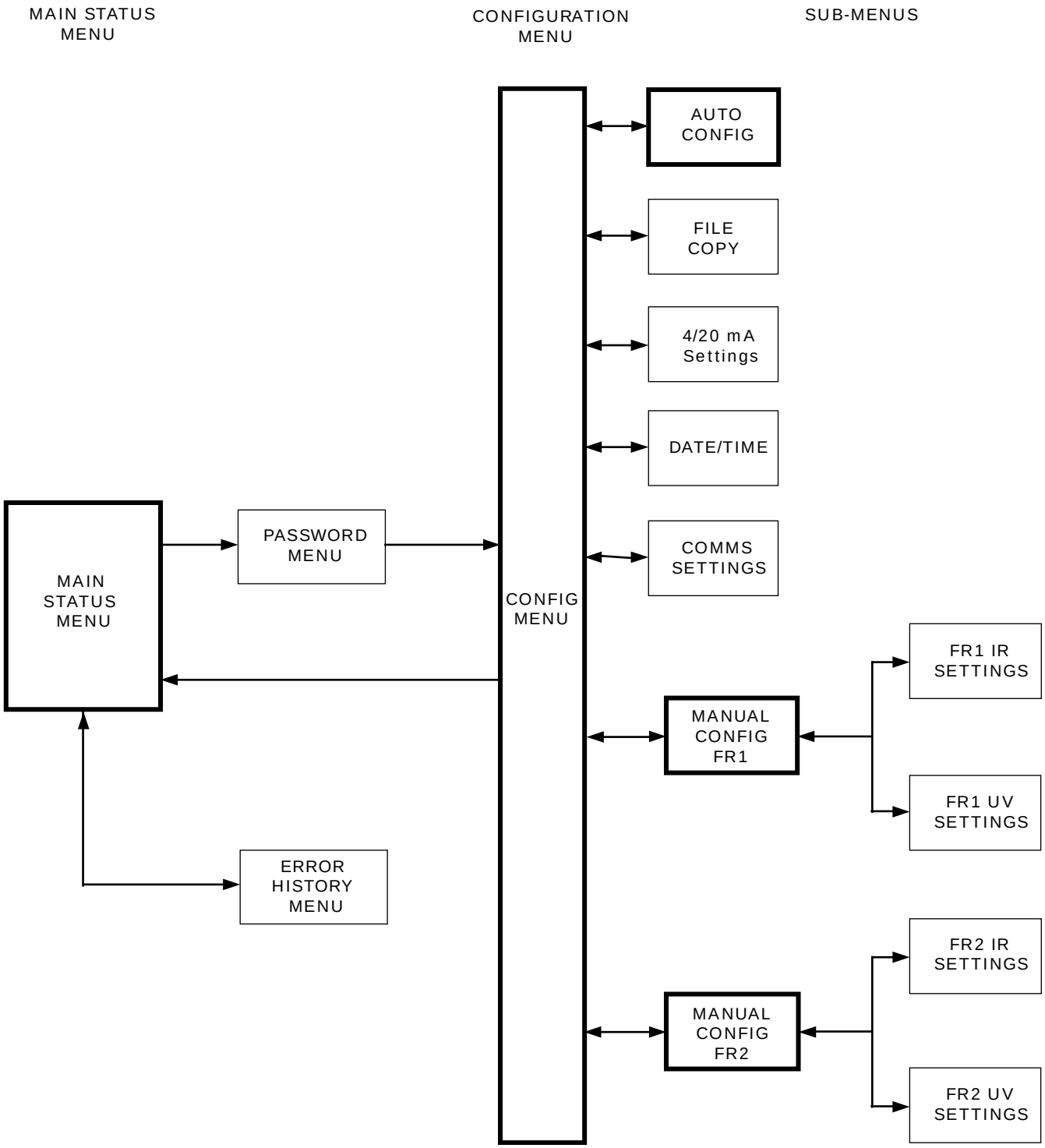


Figure 3-1 UniFlame II Detector Menu Structure

3.2 Main Status Menu

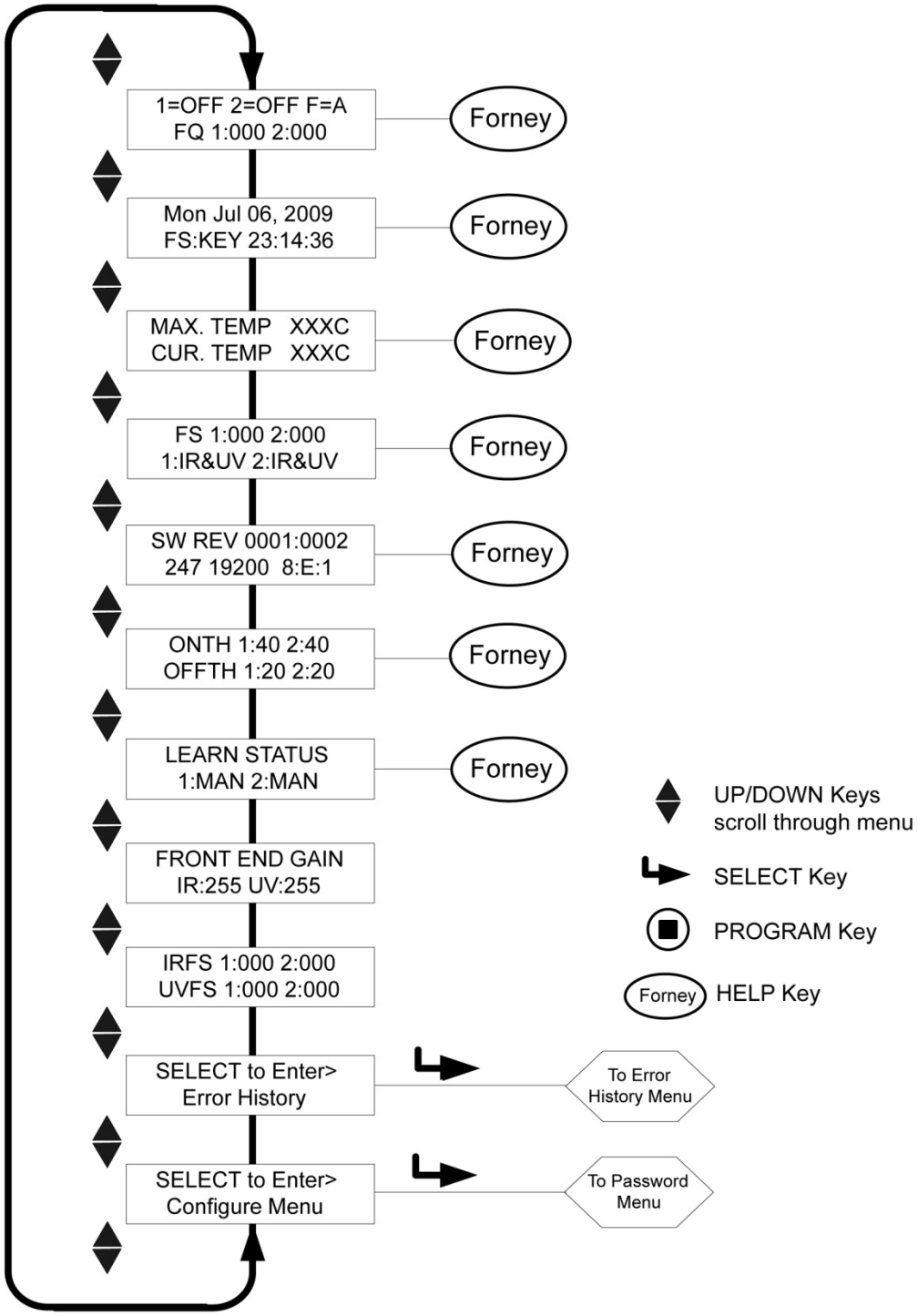


Figure 3-2 Main Status Menu Loop

Note: HELP text information for many main menu functions is displayed when you press the Forney oval. The text will appear in the display for 3 seconds. If multiple lines of help information are available, it will appear on sequential screens.

The first display in the Main Status Menu shows Flame ON/OFF status and the File selected (F=x) on the first line. The Flame Quality (FQ= xxx) for each of the two (2) flame relays is shown on the second line.

Table 3 Main Status Menu Loop Displays Defined

1=OFF 2=OFF F=A **FQ 1:000 2:000**	• **Flame ON/OFF** refers to the energized / de-energized status of the internal flame relays (FR1, FR2). 1=ON or 2=ON is displayed when the flame quality rises above the On Threshold set in the Config Menu. When the flame quality drops below the relay Off Threshold, 1=OFF or 2=OFF will be displayed. • **File Selected** (F=x) displays the current running file. Four file choices are available (A, B, C, D). • **Flame Quality** number (FQ 1:xxx 2:xxx) for FR1 and FR2 can range from 0 to 100. The "Flame Quality" number is determined by the input sum of the IR and/or UV sensors. This sensor signal strength value can be viewed in the Main menu as "FQ 1:xxx 2:xxx", see description below. For clarity, the "Flame Quality" number is capped at 100, while under certain firing conditions, the sum of IR or UV signal strength may normally exceed 100 (maximum of 999). In normal burner operation after the detector has been properly setup, "FQ 100" will be displayed with occasional movement depending on the stability of the flame. **Important Note:** *The Flame Quality number is the Flame Signal number, but is capped at 100. It is the sum of the IR + UV Signal Strength numbers, assuming both sensors are used, but the sum is capped at 100.*
Mon Jul 06, 2009 **FS:KEY 23:14:36**	• **Date/Time -** The current Date and Time of day is displayed. If the detector is powered off for more than 36 hours, this information will revert to system default values (Jan. 1, 2010) and the current Date and Time must be re-entered. • **File Select Method -** The Remote File Select option, KEY, LINE, COMM is displayed on this screen. (FS:KEY) indicates that the file selection can be made only via the Key Pad. (FS:COMM) indicates the file selection can be made only via an external computer running FEX UniFlame software, and (FS:LINE) indicates the file selection can be made via an external switch or relay.
MAX. TEMP XXXC **CUR. TEMP XXXC**	• **Maximum Temp** (MAX TEMP) displays the highest internal detector temperature recorded. This value toggles between degrees Fahrenheit and Celsius. • **Current Temp (CUR TEMP)** displays the current internal temperature of the detector unit. This value toggles between degrees Fahrenheit and Celsius.

FS 1:00 2:00 **1:IR&UV 2:IR&UV**	**Flame Signal Strength, Combined Sensors** The Flame Signal for FR1, FR2 (FS 1:xxx 2:xxx) number represents the intensity of the Flame Flicker as sensed by the IR and/or UV sensors, and is a function of the individual sensor Gain and Bandpass (flicker frequency) settings. If IR & UV is selected, the sum of their signals is displayed. The Signal Strength number is related to the Flame Quality number but has a value of 0-999. **Important Note:** *The Flame Quality number is the Flame Signal number, but is capped at 100. It is the sum of the IR + UV Signal Strength numbers, but the sum is capped at 100.* **Example**: If "FS 1:080 2:015" is displayed as signal strength, you would see a Flame Quality number (the IR and UV signal sum) of "FQ 95" displayed on the Flame Quality screen. If "FS 1:070 2:040" is displayed as signal strength, although the sum is 110, you would see a Flame Quality number of "FQ 100" on the Flame Quality screen, because Flame Quality is capped at 100. **Active Sensor -** The active sensor in use for FR1 and FR2 is displayed on this screen. Valid values can be 1:IR, 1:UV, 1:IR&UV and 2:IR, 2:UV, 2:IR&UV to represent the possible combinations available.
SW REV 0001:0002 **247 19200 8:E:1**	**Software Revision** - displays the current internal software revision, ex: SW REV 0033:0010 **Comms** - This screen indicates the remote communications address, baud rate, bits, parity, and stop bit. The address can range from 1 to 247, as selected in the Config Menu. No two detectors in a communications loop should have the same address. Default comm values are: 247 19200 8:N:1 indicating address 247, 19200 baud, 8 bits, No parity, 1 stop bit.
ONTH 1:40 2:40 **OFFTH 1:20 2:20**	**Flame Relay Thresholds** Each flame relay has a factory programmed FLAME ON threshold of 40, and a FLAME OFF threshold of 20 (0-100 scale). Other ON and OFF thresholds may be programmed to suit particular applications. **On Threshold** - Flame ON threshold (ONTH 1:xxx 2:xxx) refers to the "pull-in" threshold of the internal Flame Relay in terms of Flame Quality. When the flame quality is equal to or greater than the ON threshold (for a time equal to the On Time Delay setting), the flame relay will energize. • The ON threshold can be set from 5 to 100. • The ON threshold must be at least 5 units higher than the OFF threshold. • Factory default ONTH value for FR1, FR2 is 40 **Off Threshold** - Flame OFF threshold (OFFTH 1:xxx 2:xxx) refers to the "drop-out" threshold of the internal flame relay in terms of Flame

	Quality. When the Flame Quality is equal to or less than the OFF threshold (for a time equal to the Flame Failure Response Time setting), the flame relay will de-energize. • The OFF threshold can be set from 0 to 95. • The OFF threshold must be at least 5 units lower than the ON threshold. • Factory default OFFTH value for FR1, FR2 is 20
LEARN STATUS **1:MAN 2:MAN**	**Learn Status** - Status values can be MAN, ON, OFF, or BOTH. • MAN: Manual mode, no Learning done or USER has changed at least ONE of the learned parameters. • ON: Learn ON is done, OFF is not done. • OFF: Learn OFF is done ON is not done. • BOTH: Both Learn ON and OFF have been done. **Note:** If a user conducts both a Learn On and a Learn Off, then changes any value effecting the flame calculations, the status will read MANUAL.
FRONT END GAIN **IR:255 UV:255**	**Front End Gain** - The UniFlame II has automatic gain control circuitry that continuously adjusts the detector's Front End Gain (FEG) to keep the raw flame signal within measurable limits. The FEG value can range from 5 to 255. The current "real-time" Front End Gain value is displayed on this screen. With a very weak dim flame (or in darkness) the automatic gain control circuit would increase the FEG, (up to a maximum value of 255). With a very bright flame, the automatic gain control would decrease the FEG, (down to a minimum value of 5). The detector stores the current real-time FEG value any time a Learn Flame ON procedure is performed. To assist in proper flame discrimination, the Flame Quality number will be automatically reduced whenever the real-time FEG value is higher than the Learned FEG value. **Example:** If the Learned FEG value was 20, and the real-time FEG is now 40, (indicating a dimmer flame), the detector will decrease the Flame Quality number by 50% (20/40). However, if the Learned FEG value was 20, and the real-time FEG is now 10, (indicating a brighter flame), the Flame Quality number will not be affected.
IRFS 1:000 2:000 **UVFS 1:000 2:000**	**Flame Signal Strength, Individual Sensors** - This screen shows the individual sensor's contribution to the Flame Quality (FQ) number. Each value is identified by the corresponding Flame Relay (1:, 2:) indicating whether it is the IR or UV sensor. Example 1: "IRFS 1:060 2:010, UVFS 1:030 2:070" For Flame Relay 1, the infrared sensor has a current Flame Signal of 60, and the ultraviolet sensor has a Flame Signal of 30. The Flame Quality displayed would be their sum of 90. For Flame Relay 2, the infrared sensor has a current Flame Signal of 10, and the ultraviolet sensor has a Flame Signal of 70. The Flame Quality

	displayed would therefore be their sum of 80. Example 2: "IRFS 1:120 2:150, UVFS 1:220 2:000" For Flame Relay 1, the infrared sensor has a current Flame Signal of 120, and the ultraviolet sensor has a Flame Signal of 220. Although their sum is 340 the Flame Quality display will be capped at 100. For Flame Relay 2, the infrared sensor has a current Flame Signal of 150, and the ultraviolet sensor has a Flame Signal of 0. Although their sum is 150 the Flame Quality display will be capped at 100.
SELECT to Enter> **Error History**	**Select To Enter Error History** - Press Select Key to enter the Error History screen to view error status and codes. The most recent Error is displayed first. It also tells the NUMBER of errors that have occurred to date. The date and time of each error is displayed along with the Caller and Reason number. The Error menu displays the last 10 errors, then cycles back around to the top level. In the event that an internal detector fault is detected, the detector will turn off its output and an error code will appear on the display. To clear the error code and restart the detector, either the 24 vdc power can be cycled off then on, or the PROGRAM key can be pressed and held for four (4) seconds. **Note:** Pressing and Holding the PROGRAM key for four (4) seconds will cause the detector to RESET (flame relays and fault relay will de-energize). Normal operation will resume once the PROGRAM button is released.
SELECT to Enter> **Configure Menu**	**Select To Enter Configure Menu –** Pressing the Select Key will bring you to the Password Entry Screen before accessing the Configuration menu. The Configuration Menu will allow the user to select Active File, Change Password, Select IR & UV Gain, enter Automatic Configuration menu, enter File Copy, COMMs Settings, change Date/Time, enter 4/20 mA settings and Manual Configuration menus.

3.3 The Error History Menu

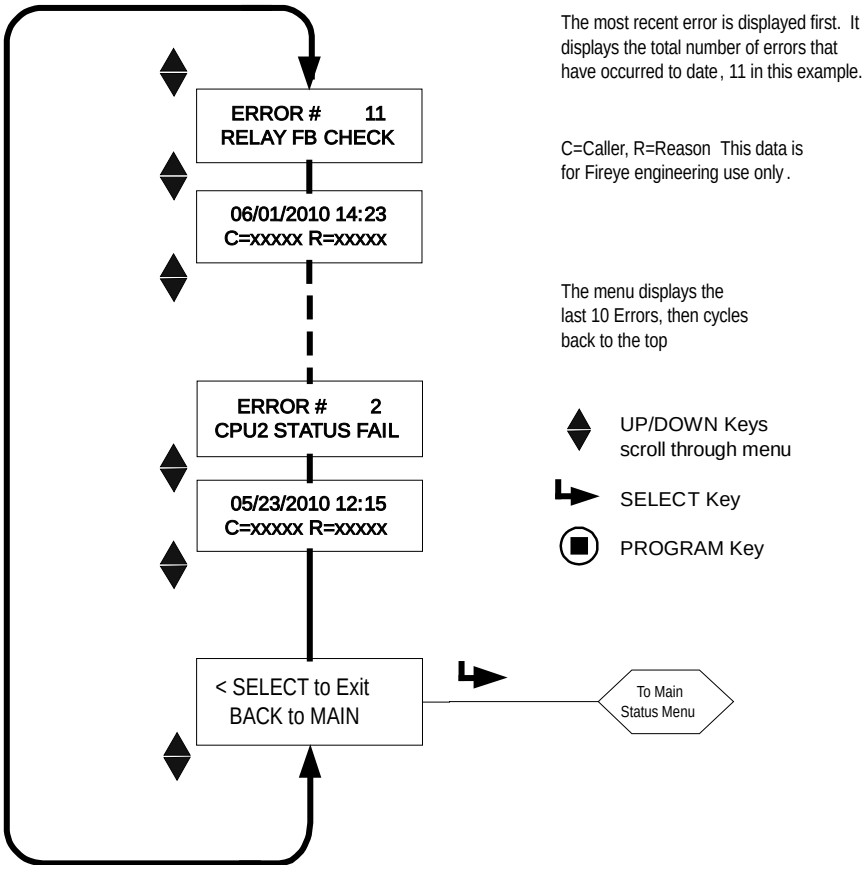


Figure 3-3 Error History Menu Loop

3.3.1 Internal Error Messages

DISPLAYED WHEN ERROR OCCURS	DISPLAYED LATER IN ERROR HISTORY MENU
INTERNAL STORAGE R/W ERROR	FRAM WRITE FAIL
INTERNAL STORAGE R/W ERROR	FRAM READ FAIL
WATCH DOG FAILURE	WATCH DOG FAIL
INTERNAL RAM CHECK FAILURE	RAM TEST FAIL
INTERNAL RAM CHECK FAILURE	BI RAM TEST FAIL
INTERNAL VOLTAGE CHECK FAILURE	VOLTAGE TEST
RELAY FEEDBACK CHECK FAILURE	RELAY FB CHECK
INTERNAL CPU1 INIT FAILURE	FAILED INIT
INTERNAL STORAGE MEMORY CORRUPTED	INVALID FRAM
INTERNAL STORAGE MEMORY CORRUPTED	WRONG FRAM REV
INTERNAL CPU2 STATUS FAILURE	CPU2 STATUS FAIL
INTERNAL CPU1 CRC FAILURE	CRC ERROR
CONFIGURATION CHECK FAILED	CONFIG ERROR
CPU1 SELF CHECK FAILED TEST # xx	SELF CHECK ERROR
GENERAL FIRMWARE CHECK FAILED	GENERAL ERROR
LOCKOUT UNDEFINED ERROR	UNKNOWN REASON

3.3.2 Warning Messages

In the event of an abnormal operating condition, the detector will automatically display a warning message informing the user of the condition. The warning message will be displayed for two (2) seconds, then the standard status message will be displayed for ten (10) seconds. This pattern will be repeated until the abnormal condition no longer exists, or until the user presses any key. If the user presses any key, the warning message will be suppressed for thirty (30) seconds.

Group I Warning Messages (Always Active)

Warning Message	Condition	Effect
TOO COLD < -40C Currently –xxC FLAME SIGNALS SET TO 0	The detector's internal temperature has fallen to -40C (-40F) or below.	The UV and IR flame signals are driven to zero. The Fault relay and Flame relays will be de-energized.
COLD WARNING Currently –xxC	The detector's internal temperature has fallen to -35C (-31F) or below.	The Fault relay will be de-energized.
HOT WARNING Currently +xxC	The detector's internal temperature has risen to +80C (+176F) or higher	The Fault relay will be de-energized.
TOO HOT > 85C Currently +xxC FLAME SIGNALS SET TO 0	The detector's internal temperature has risen to +85C (+185F) or higher.	The UV and IR flame signals are driven to zero. The Fault relay and Flame relays will be de-energized.
IR SENSOR IS SATURATED	The steady (DC) component of the IR source is too strong (the flame is too bright). The detector cannot properly detect the flame flicker. (See notes 3, 4).	The IR flame signal will become erratic or go to zero.

Group II Warning Messages (Can be suppressed, see Note 1)

Warning Message	Condition	Effect
FRx IR FEG LESS THAN MINIMUM	The IR FEG (Front-End-Gain) has dropped below the MIN value selected by the user in the IR Settings Menu (see Note 2).	The IR flame signal is driven to zero.
FRx IR FEG GREATER THAN MAXIMUM	The IR FEG (Front-End-Gain) has risen above the MAX value selected by the user in the IR Settings Menu (see Note 2).	The IR flame signal is driven to zero.
FRx UV FEG LESS THAN MINIMUM	The UV FEG (Front-End-Gain) has dropped below the MIN value selected by the user in the UV Settings Menu (see Note 2).	The UV flame signal is driven to zero.
FRx UV FEG GREATER THAN MAXIMUM	The UV FEG (Front-End-Gain) has risen above the MAX value selected by the user in the UV Settings Menu (see Note 2).	The UV flame signal is driven to zero.
FRx FAILED THE IR LIGHT CHECK	The IR source is likely not a real flame. The detector uses a "single-source" light check to reject incandescent or fluorescent light sources.	The IR flame signal is driven to zero.
FRx FAILED THE UV LIGHT CHECK	The UV source is likely not a real flame. The detector uses a "single-source" light check to reject incandescent or fluorescent light sources.	The UV flame signal is driven to zero.
TOO MUCH IR SIGNAL	The flickering (AC) component of the IR source is too strong. The detector cannot properly detect the flame flicker. (See notes 3, 4).	The IR flame signal will become erratic or go to zero.
TOO MUCH UV SIGNAL	The flickering (AC) component of the UV source is too strong. The detector cannot properly detect the flame flicker. (See notes 3, 4).	The UV flame signal will become erratic or go to zero.

Notes:

1. Group II Warning messages are suppressed whenever "Do NOT Display" is selected under the FS Squelch Msgs parameter in the CONFIG menu. This is the default setting. Although the message will be suppressed, if the Group II Warning condition exists, the appropriate flame signal will still be driven to zero. To display the Warning messages, select "Display" under the FS Squelch Msgs parameter.
2. An "FEG" Warning condition can only exist if the user manually changed the MIN or MAX value for the FEG range in the IR and UV Settings Menus. The default settings for these parameters are 5 and 255 respectively.
3. This message is only active if the affected sensor, IR or UV, has been selected.
4. Excess signal may be addressed by reducing the appropriate sensor Gain Range to MED or LOW, or by installing a sight-pipe orifice.

3.4 Password Menu

This menu can be used to either ENTER the password (from the Main Status Menu) or it can be used to CHANGE the password (from the Configuration Menu). In the first case the menu will appear as shown below. In the Second case "CHNGE" replaces the word "ENTER".

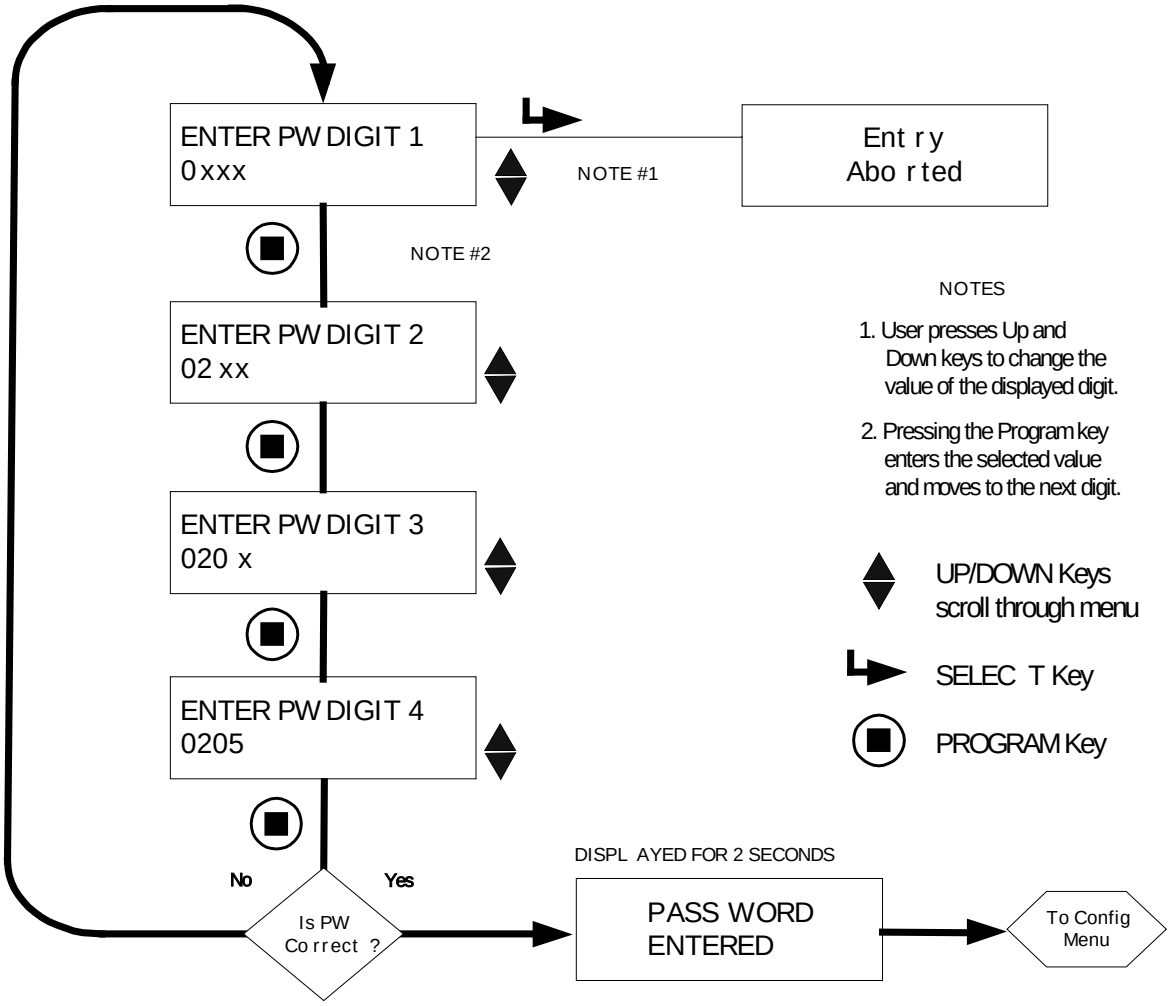


Figure 3-4 Password Menu Loop

A four-digit Password is required to enter the CONFIG menus. If a Password is not entered, pressing the SELECT key will advance directly to the "Flame Quality" display.

To enter the CONFIG menus, you must enter the four-digit Password. The following example is for the factory installed password of 0205:

1. With "SELECT to Enter Configure Menu" displayed, press the SELECT key. "0xxx" will be displayed; the first digit ("0") is adjustable. (If the factory password was changed, use the UP/DOWN keys to select the appropriate first digit.)
2. With the first digit selected (e.g. "0xxx") press the PROGRAM key. "00xx" will be displayed; the second digit ("0") is adjustable. Press the UP key twice to display "2". (If the factory password was changed, use the UP/DOWN keys to select the appropriate second digit.)
3. With the second digit selected (e.g. "02xx") press the PROGRAM key. "020x" will be displayed, the third digit ("0") is adjustable. (If the factory password was changed, use the UP/DOWN keys to select the appropriate third digit.)

4. With the third digit selected (e.g. “020x”) press the PROGRAM key. “0200” will be displayed, the fourth digit (“0”) is adjustable. Press the UP key five times to display “5”. (If the factory password was changed, use the UP/DOWN keys to select the appropriate fourth digit).
5. With all four digits selected (e.g. “0205”) press the PROGRAM key.

If the Password was not entered correctly, the display will return to “ENTER PW DIGIT 1”. Use the UP/DOWN keys to select the appropriate first digit.

If the Password was entered correctly, the display will read “PASSWORD ENTERED. To change the password, Press DOWN key once to PASSWORD. If you wish to change the password at this time, Press the SELECT key see the “Change Password” section below. Otherwise, press the DOWN key to advance to the CONFIG menus.

Entering the correct Password allows the user 20 minute access to the CONFIG menus. Saving any parameter will re-start this 20 minute time-out period. When the user returns to the MAIN STATUS menu, the password will immediately expire. The password must be re-entered if it is necessary to return to the CONFIG menu.

3.4.1 Change Password

The user may change the password (the factory set password is “0205”) to any four-digit code desired. To change the password, you first enter the current password as described above.

When the display reads “PASSWORD, Press SELECT to change password”, press the SELECT key and “0xxx CHNGE PW DIGIT 1” is displayed, the first digit (“0”) is adjustable. For example, enter a NEW password of “1357”. Use the UP/DOWN key and the PROGRAM key (as described in the above section) to enter the new password. When complete, in this example the display will now read “PASSWORD CHANGED 1357”. Press the UP/DOWN keys to return to the menu loops.

3.4.2 Removing Password Protection

The user may choose to disable / remove password protection for an extended period of time during commissioning, and then restore password protection at a later time when commissioning is complete.

To remove password protection, first enter the current password, and then change it to "0000" following the steps described in the Change Password section above. When the password has been changed to "0000", the user will no longer be prompted to enter a password to gain access to the CONFIG menus.

To restore password protection, enter the CONFIG menu and press the DOWN key until "PASSWORD 0000" is displayed. Press the SELECT key and follow the steps in the Change Password section to change from "0000" to either the as-shipped password of "0205", or to any other four-digit code desired.

3.5 Config Menu

To select a specific item to change from the Config Menu, scroll to it using the UP and DOWN arrows, then press the SELECT button. (To exit the viewed value without changing it, press the SELECT button again). To change a value, press the UP / DOWN keys until the desired value is displayed. Press the PROGRAM button. The display will scroll "NEW VALUE SAVED", then automatically de-select the menu choice as if the SELECT button had been pressed.

Note: You may only Edit the File that the detector is currently running. For example, to Edit file "B", you must be currently running file "B". (See File Select section).

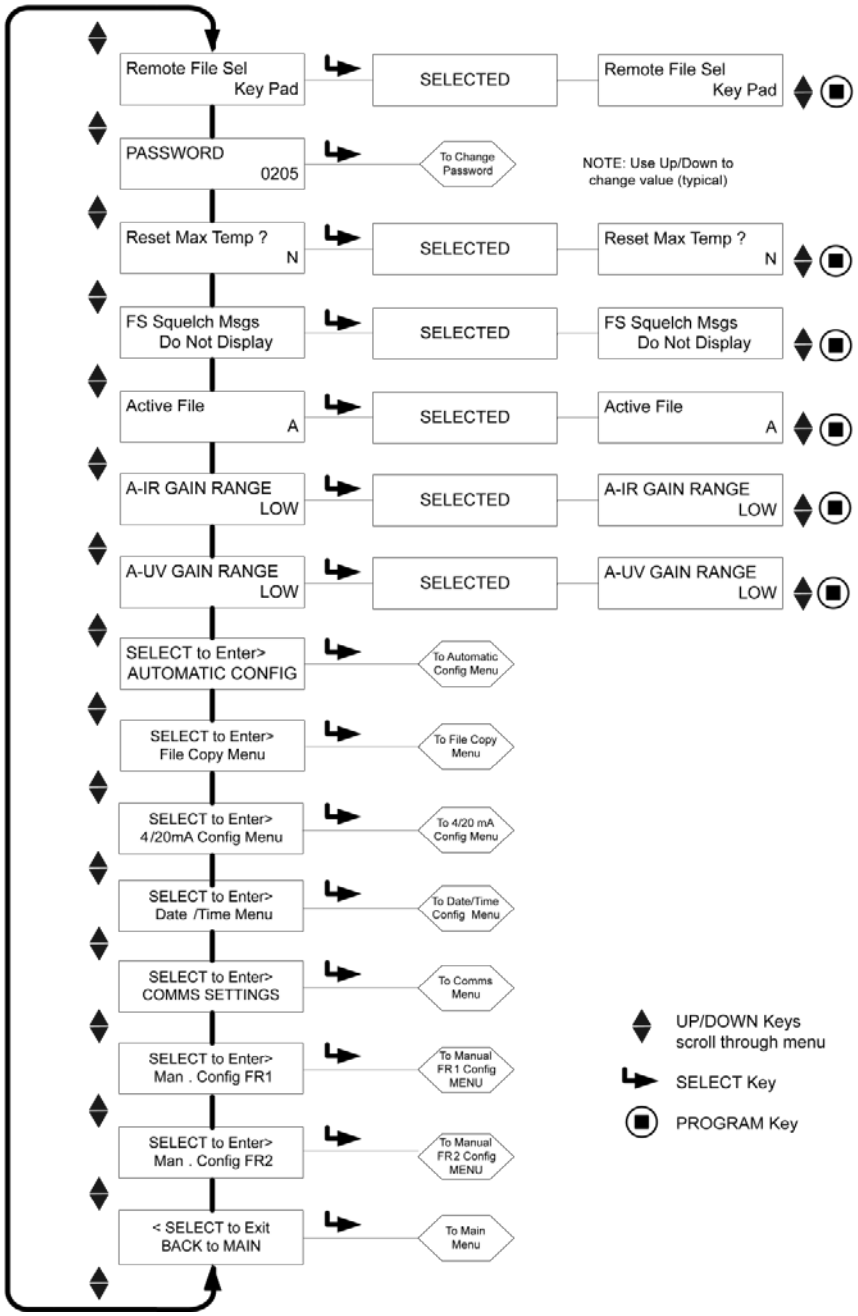


Figure 3-5 CONFIG Menu Loop

Remote File Select Key Pad	**Remote File Sel** – Affects all files. Choices for Remote File Select are: Key Pad, Line Inputs and Comms. **KEY PAD** allows the file selection to be made only at the detector keypad **LINE INPUT** allows the file selection to be made only via an external switch or relay. **COMMS** allows the file selection to be made only via an external computer running FEX UniFlame Software.
PASSWORD 0205	The user may change the password to any four-digit code desired. See Password Menu for details.
RESET MAX TEMP ? N	The user may reset the highest internal temperature value that the detector has recorded. The Max Temp will then be equal to the current internal temperature value.
FS Squelch Msgs	Under certain operating conditions, such as Front End Gain (FEG) out-of-limits, the UV or IR Flame Signal may be driven to zero (squelched) by the scanner's control algorithm. The user can choose to Display, or to NOT Display, the Warning Messages that notify the user that the flame signal is being squelched. The default choice is to NOT Display these messages. The specific messages affected are listed in the Group II Warning Messages section.
ACTIVE FILE A	The user can manually choose which file to run (and to Edit) by selecting this menu choice *provided the Remote File Select "Key Pad" choice is selected* (see above). If the user wants to Edit the contents of a file, they must first select and run that particular file, (A, B, C, D).
A-IR GAIN RANGE LOW	The "A" indicates the active file selected. There are selectable internal "ranges" for the IR sensor Gain. • If, when "Aiming" the detector, a flashing "IR TOO HIGH" message is observed, then the signal is over-range and the "Range" should be reduced. • If, when "Aiming" the detector, an IR number of less than 10 is observed, then the gain Range should be increased. See Note at end of table.
A-UV GAIN RANGE LOW	The "A" indicates the active file selected. There are selectable internal "ranges" for the UV sensor Gain. • If when "Aiming" the detector, a flashing "UV TOO HIGH" message is observed, then the signal is over-range and the "Range" should be reduced. • If when "Aiming" the detector, a UV number of less than 10 is observed, then the gain Range should be increased. See Note at end of table.
SELECT to Enter> AUTOMATIC CONFIG	Press the SELECT key to enter Automatic Configuration menu. This option will walk through the configuration process beginning with AIM, Set IR and UV Gain Range, Learn ON (FR1, FR2 or FR1 & FR2), and Learn OFF (FR1, FR2 or FR1 & FR2). **Refer to AUTOMATIC CONFIG Menu.**
SELECT to Enter> File Copy Menu	Allows the user to copy the contents of one internal detector file to another. Four user configurable files are available, "A, B, C, D", plus three factory configured files, "F1, F2, F3". **Refer to "FILE COPY MENU" for details.**

SELECT to Enter> 4/20 Config Menu	Allows the user to select which parameter the 4-20 ma analog output represents. The choices are "Flame QUALITY" or "Flame SIGNAL". **Refer to "THE 4/20 mA MENU" section for details.** • When Flame QUALITY is selected, the 4-20 ma range (20 mA MAP Value) may be set anywhere from 40 to 100. • When Flame SIGNAL is selected, the 4-20 ma range (20 mA MAP Value) may be set anywhere from 400 to 999.
SELECT to Enter> Date/Time Menu	Allows the user to enter the current date and time into the detector. • Press the select key to see the year value. To change the year, press SELECT again, then use the UP and DOWN arrows to scroll to the correct year. Press PROGRAM to save this value. • Press DOWN arrow to view the MONTH. To change the month value, press SELECT, scroll UP or DOWN to the correct MONTH and press PROGRAM. • Press DOWN arrow to DAY of the MONTH. Press SELECT, scroll to current DAY and press PROGRAM to Save. • You can enter HOUR, MINUTES, SECONDS by following the process outlined above. **If the detector is turned off for more than 36 hours, the date/time will revert back to the system default (Jan. 1, 2010) and current settings must be reentered.** **Refer to "DATE/TIME MENU" for details.**
SELECT to Enter> COMMS Settings **(Affects all files)**	• The communications address selected may range from 1 to 254. • Each detector must have a unique address. • No two detectors in a communications loop can have the same address. Press SELECT to change COMMS values. Press SELECT to change MODBUS Address. Scroll UP/DOWN to the address desired and press PROGRAM key to save value. Default address is 247. Press DOWN key to see BAUD rate. Default BAUD rate is set at 19200. To change this value, press Select, scroll UP/DOWN to rate desired and press PROGRAM key to save. Default PARITY is set to 8/N/1. Other Parity values available are 8/O/1, 8/N/2 and 8/E/1. Follow the procedure above to change the PARITY. **See "THE COMMS MENU" for details.**
SELECT to Enter > Man. Config FR1	This option allows the user to enter Manual Configuration mode for Flame Relay 1 (FR1). See Manual Configuration section.
SELECT to Enter> Man. Config FR2	This option allows the user to enter Manual Configuration mode for Flame Relay 2 (FR2). See Manual Configuration section.
<SELECT to EXIT BACK to MAIN	Returns user to the Main Status Menu

Note: The detector has selectable internal Gain "Ranges" for each IR and UV sensor. Detectors with Engineering Code 00 through 04 have two ranges for each sensor, "LOW" and HIGH".
Detectors with Engineering Code 05 and higher have three ranges for each sensor, "LOW", "MED" and "HIGH".

3.6 Auto Config Menu

Auto Configuration is an automatic calibration function whereby the UniFlame II detector scans the flame flicker frequency spectrum with flame ON and with flame OFF (background radiation present). The detector will then select the appropriate sensor, sensor gain, and bandpass frequency for optimum flame ON: OFF discrimination.

Note: The Auto Config function allows the user to perform the Learn Flame ON and Learn Flame OFF procedures for flame relays FR1 and FR2 either together or separately.

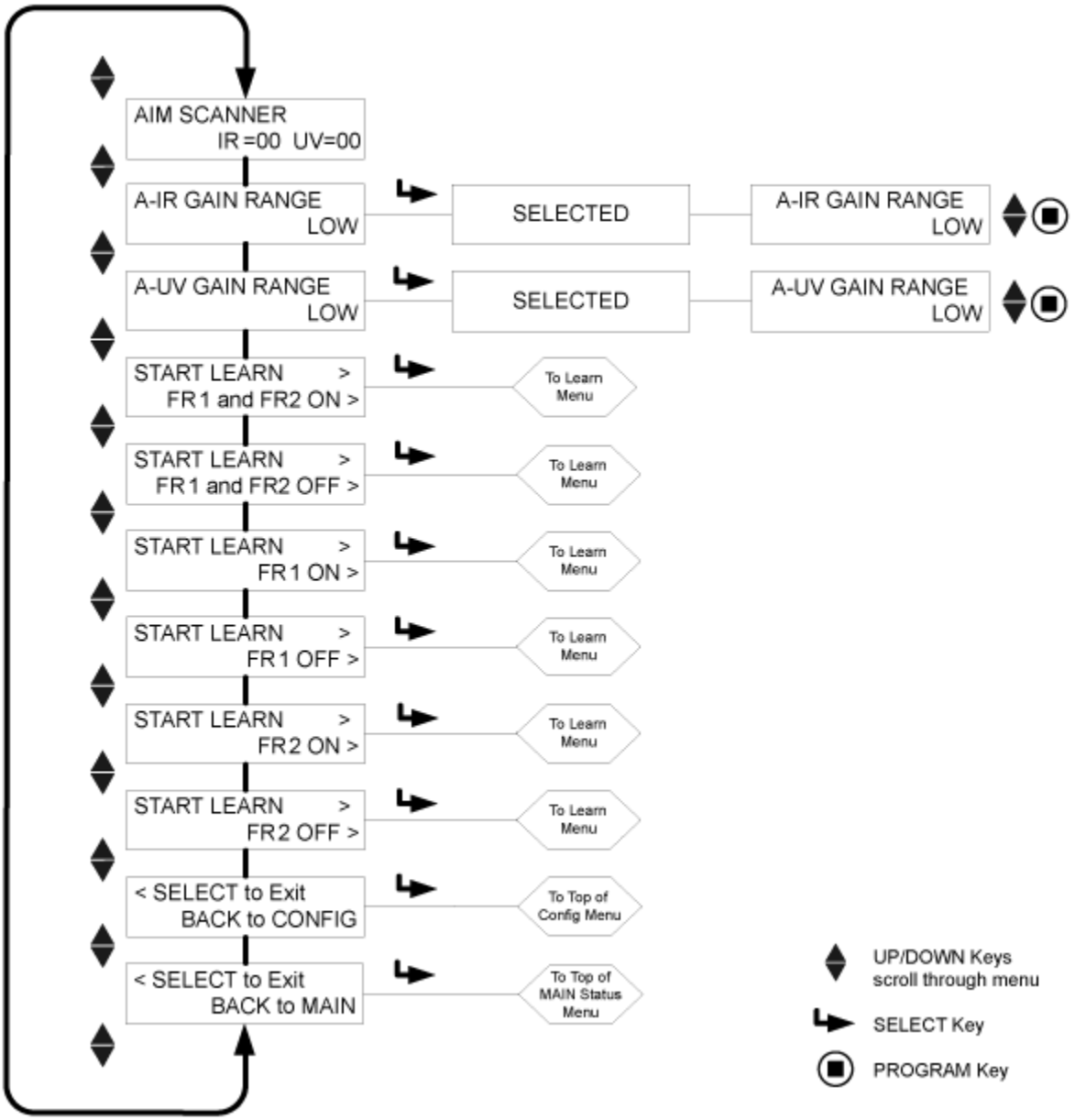


Figure 3-6 AUTO CONFIG MENU LOOP

AutoConfig is performed in 3 steps:

1. Run the target flame at the low firing rate. Enter the Automatic Config menu loop, and "AIM SCANNER" is displayed. Physically aim the detector for peak signal strength as described in the "Aim Scanner" section below. Press the DOWN key when complete.
2. Press the DOWN key until the appropriate "START LEARN… ON" message is displayed then press SELECT. Press PROGRAM and the detector will memorize the flame ON condition as described in the "Learn ON" section below. Press the DOWN key when complete.
3. Turn the target flame off. Press the DOWN key until the appropriate "START LEARN… OFF" message is displayed then press SELECT. Press PROGRAM and the detector will memorize the flame OFF condition as described in the "Learn OFF" section below. Press the DOWN key when complete.

Note: For proper operation, both a Learn Flame ON and a Learn Flame OFF procedure must be performed.

Application Note: In rare applications where the flame is extremely bright, it is possible to saturate the sensor. The symptom could be a very low signal, an erratic signal, or no signal at all. In this situation, installation of a sight-pipe orifice kit is recommended.

Note: The detector has selectable internal Gain "Ranges" for each IR and UV sensor. Detectors with Engineering Code 00 through 04 have two ranges for each sensor, "LOW" and HIGH". Detectors with Engineering Code 05 and higher have three ranges for each sensor, "LOW", "MED" and "HIGH".

Table 4 Auto Config Menu Loop Displays Defined

AIM SCANNER IR=00 UV=00	1. Scroll to "SELECT to Enter AUTOMATIC CONFIG" and press the SELECT key. 2. When SELECT is pressed, "AIM SCANNER IR=xx UV=xx" is displayed. The value of "x" may range from 0 to 60. The value displayed represents the flame flicker intensity of the flame for the entire flicker frequency spectrum as individually sensed by the UV (U) sensor and/or IR (I) sensor(s). The numbers should be at their peak (highest numerically) when the detector is aimed at the primary combustion zone (first 1/3) of the flame. If the detector is utilizing both the IR and UV sensors, priority should be given to maximizing the UV intensity. 3. Run the flame at low fire rate and observe the signal intensity. 4. Physically aim the detector at the first 1/3 of the flame to maximize the intensity reading. (Allow the detector reading to stabilize at least two seconds after each movement). If the reading is 10 or less, the intensity is marginal and it may be necessary to increase the IR and/or UV Gain Range. Press the DOWN key to view the current IR Gain Range and UV Gain Range settings. Increase the setting from LOW to MED or HIGH as required. 5. When detector is properly aimed, press the DOWN key. **Refer to notes above.**
A-IR GAIN RANGE LOW	If when "Aiming" the detector: • A flashing "IR Too High" message is observed, then the signal is over-range and the "Range" should be reduced to either "MED" or "LOW". • An IR number of less than 10 is observed, then the gain Range should be increased to either "MED" or "HIGH". **Refer to notes above.**

A-UV GAIN RANGE LOW	If when "Aiming" the detector: • A flashing "UV Too High" message is observed, then the signal is over-range and the "Range" should be reduced to either "MED" or "LOW". • An UV number of less than 10 is observed, then the gain Range should be increased to either "MED" or "HIGH". **Refer to notes above.**
START LEARN >> FR1 & FR2 ON >	To begin LEARN Flame ON for Both FR1 & FR2, make sure flame is at LOW Fire position and press the PROGRAM key. A prompt will display "MAKE SURE FLAME AT LOW EMISSION, PRESS PROG KEY TO START LEARN." When the LEARN has completed, press any key to continue.
START LEARN >> FR1 & FR2 OFF >	To begin LEARN Flame OFF for Both FR1 & FR2, make sure flame is OFF, then press PROGRAM key. A prompt will display "MAKE SURE FLAME IS OFF! THEN…PRESS PROG KEY TO START LEARN.". When the LEARN has completed, press any key to continue.
START LEARN >> FR1 ON >	To begin LEARN Flame ON for only FR1, make sure flame is at LOW Fire position and press PROGRAM key. A prompt will display "MAKE SURE FLAME AT LOW EMISSION, PRESS PROG KEY TO START LEARN.". When the LEARN has completed, press any key to continue.
START LEARN >> FR1 OFF >	To begin LEARN Flame OFF for only FR1, make sure flame is OFF and press PROGRAM key. A prompt will display "MAKE SURE FLAME IS OFF! THEN…PRESS PROG KEY TO START LEARN.". When the LEARN has completed, press any key to continue.
START LEARN >> FR2 ON >	To begin LEARN Flame ON for only FR2, make sure flame is at LOW Fire position and press PROGRAM key. A prompt will display "MAKE SURE FLAME AT LOW EMISSION, PRESS PROG KEY TO START LEARN.". When the LEARN has completed, press any key to continue.
START LEARN >> FR2 OFF >	To begin LEARN Flame OFF for only FR2, make sure flame is OFF and press PROGRAM key. A prompt will display "MAKE SURE FLAME IS OFF! THEN…PRESS PROG KEY TO START LEARN.". When the LEARN has completed, press any key to continue.
<SELECT to EXIT BACK to CONFIG	Return to top of the Config Menu
<SELECT to EXIT BACK to MAIN	Return to top of the Main Status Menu

Application Notes:

1. The detector stores the current real-time FEG value any time a Learn Flame ON procedure is performed.
2. The detector will automatically select the appropriate sensor, sensor gain, and bandpass frequency for optimum discrimination, only after both the Learn Flame ON and the Learn Flame OFF procedures are performed once.
3. The Learn Flame ON and Learn Fame OFF procedures may be performed in either order. However, for proper operation the Learn Off procedure must be performed with the same level of background radiation that would be present in typical use. For example, in a multi-burner application, the Learn Flame OFF procedure should be performed with the adjacent or opposed burners firing, not with a black boiler.
4. After a Learn Flame ON and a Learn Flame OFF procedure is initially performed, you may perform additional Learn ON or Learn OFF procedures if needed. Each time you perform either procedure, the detector will automatically again select the appropriate sensor, sensor gain, and bandpass frequency for optimum discrimination.

3.7 File Copy Menu

The FILE COPY function allows the user to copy the contents of one internal detector file to another. Models have four user configurable files, “A, B, C, D”, plus three factory configured files, “F1, F2, F3”.

You may copy *from* any file *to* a user file. You are not allowed to copy *from* a user file to a *factory* file. You must first enter the source file, then the destination file.

The Factory Configured Files (“F1, F2” and “F3”) contain the following factory default settings.

File	Factory Default Settings			*Notes*
	IR & UV User Gain	**IR & UV Flicker Frequency (Band)**	**IR & UV FEG LRNED**	
F1	31	23 Hz	255	At these settings the detector will respond to flame but will not likely discriminate between the target flame and other nearby flames.
F2	15	23 Hz	255	At these intermediate settings the detector may not respond to flame, and/or may not properly discriminate until the detector is further tuned.
F3	1	179 Hz	5	At these settings the detector will not likely respond to flame until the detector gain is increased.

Note: As shipped, all user files (A, B, C, D) contain the same setpoints as factory file “F3”.

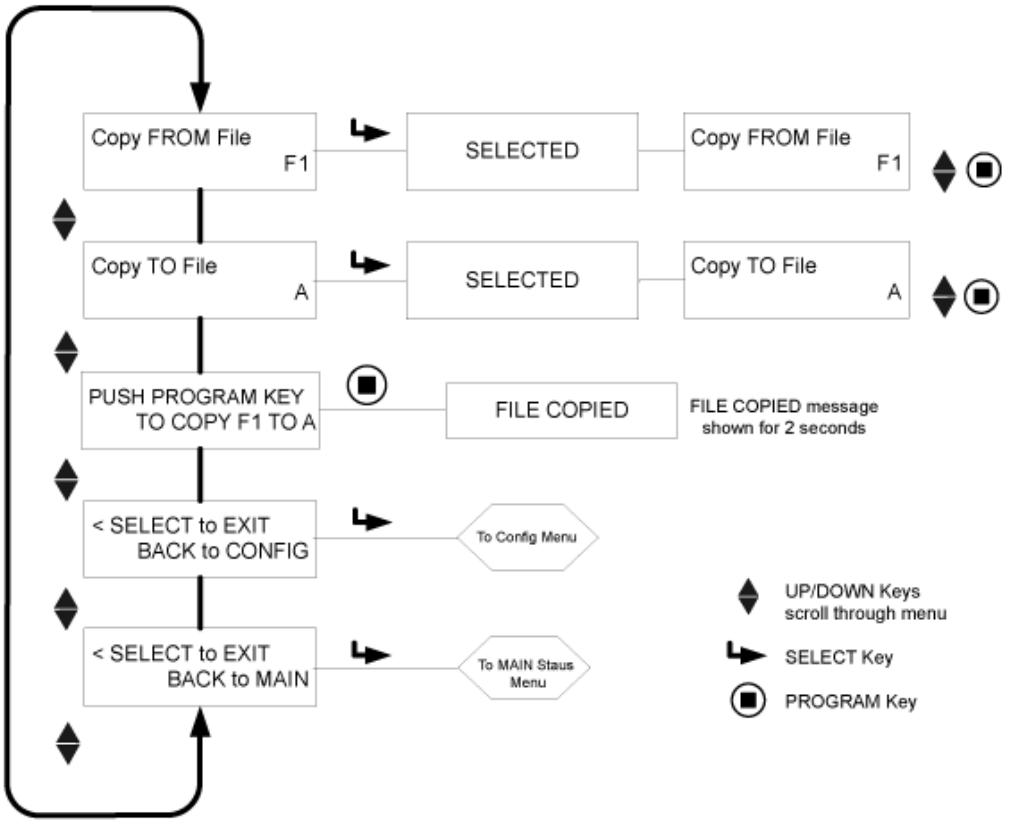


Figure 3-7 FILE COPY MENU LOOP

Table 5 File Copy Menu Displays Defined

Copy FROM File F1	The source file to Copy from. Valid files are 3 factory configured files (F1, F2, F3) and user configurable files (A, B, C, D).
Copy TO File A	The destination file where the source is copied to. You may copy from any file to a user file. You are not allowed to copy from a user file to a factory file. Valid files are (A, B, C, D).
Push PROGRAM Key To COPY xx To x	When the Source file and Destination file have been selected, press PROGRAM to complete the file copy action. The display will read File Copied when the copy is complete. ***Note:*** *You are not allowed to copy to the file you are copying from. i.e. if you attempt to copy from A to A you'll get "Aborted Copy".*
<SELECT to EXIT Back to Config	Return to top of the Config Menu.
<SELECT to EXIT BACK to MAIN	Return to top of the Main Status Menu.

EXAMPLE:

1. With "SELECT to Enter File Copy Menu" displayed (CONFIG menu), press the SELECT key. The display will read "Copy FROM File F1" with "F1" being the source file. Press SELECT and use the UP/DOWN keys to select a different source file if desired. (F1, F2, F3, A, B, C, D)
2. With the desired source file displayed, press the PROGRAM key. NEW VALUE SAVED will appear.
3. Press DOWN key to "Copy TO File" display and the destination file will appear (e.g. "Copy TO File A"). Press SELECT and use the UP/DOWN keys to select a different destination file if desired (A, B, C, or D). Press PROGRAM to SAVE new destination value.
4. Press the DOWN key to display "PUSH PROGRAM KEY TO COPY F1 TO A", then press PROGRAM key to copy the source file to the destination file. The display will read "FILE COPIED".

3.8 4/20 mA Menu

The 4/20 Config Menu allows the user to select 4/20 Flame Signal or Flame Quality for FR1 and FR2 and 20mA MAP Value for both FR1 and FR2. MAP Value number can range from 40-100 for FQ and 400-999 for FS.

To set 4/20 mA values while in the CONFIG mode, press the DOWN key until SELECT to ENTER 4/20 Config Menu is displayed then Press SELECT.

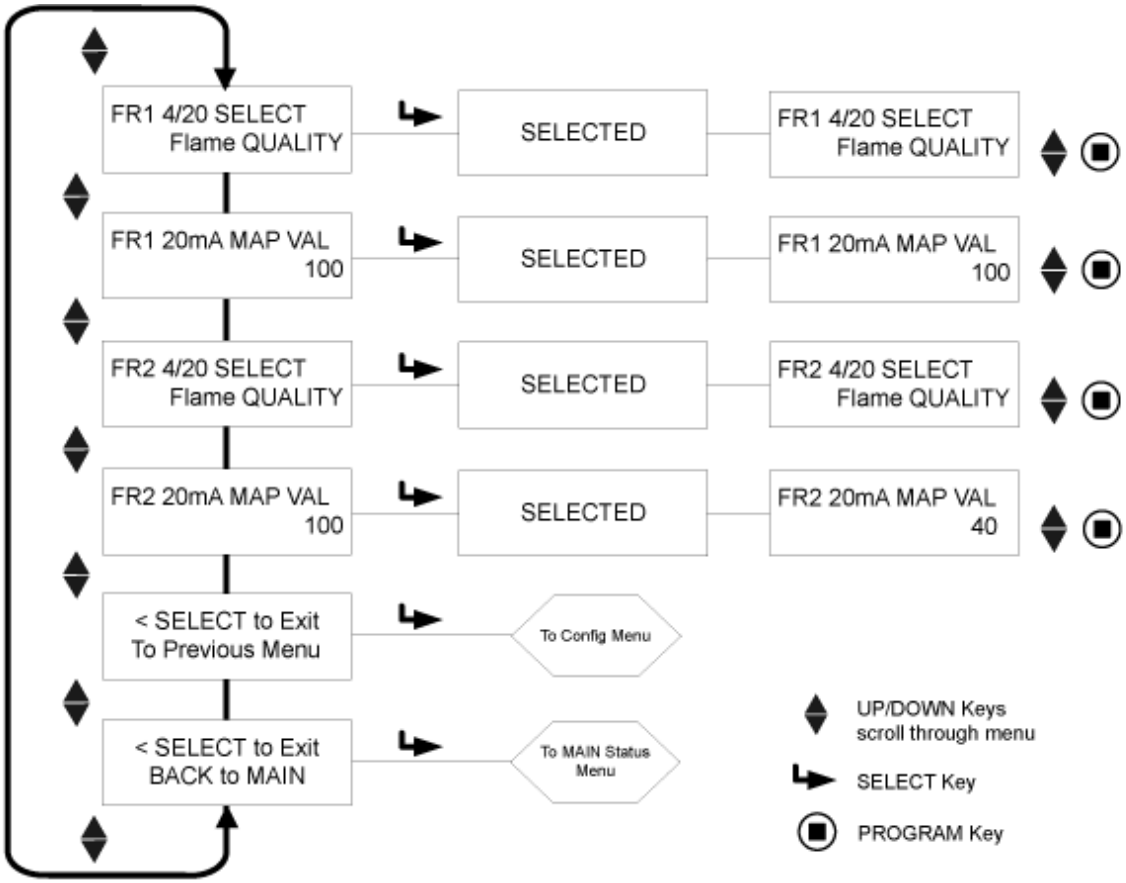
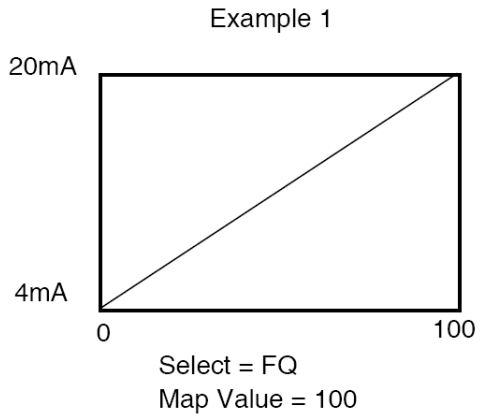


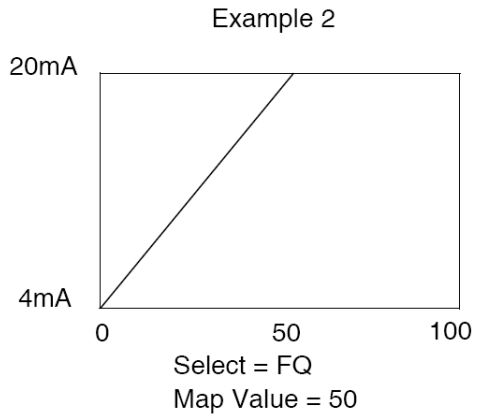
Figure 3-8 4/20mA MENU LOOP

Table 6 4/20mA Menu Loop Displays Defined

FR1 4/20 SELECT Flame QUALITY	Allows the user to select which parameter the 4-20 mA analog output represents for FR1. • Choices are **Flame QUALITY** or **Flame SIGNAL**. • Factory default is **Flame QUALITY**. Press SELECT to enter option; use UP or DOWN key to pick Flame QUALITY or Flame SIGNAL; press PROGRAM to SAVE.
FR1 20mA MAP VAL (Range) 100	Allows the user to select the 4-20 mA range (MAP VAL) of the parameter selected above. • If **Flame QUALITY** was selected, the analog output will be 4 mA when the FQ=0. The range, or Flame Quality value for 20 mA (20 mA MAP VAL), is user selectable anywhere between 40 and 100. o The factory default value is 100. (see Example 1 below). o If the user selects a value of 50, when the Flame Quality reaches 50, the analog output will be 20 mA (see Example 2 below).

	• If **Flame SIGNAL** was selected, the analog output will be 4 mA when the flame signal is 000. The range, or Flame Signal value for 20 mA (20mA MAP VAL), is user selectable anywhere between 400 and 999. o The factory default is 999. o If the user selects a MAP VAL of 500, when the Flame Signal reaches 500, the analog output will be at 20 mA. Press SELECT to enter option and then use UP or DOWN key to pick MAP Value (between 40-100 for FQ, or between 400-999 for FS), then press PROGRAM to SAVE.
FR2 4/20 SELECT Flame QUALITY	Allows the user to select which parameter the 4-20 mA analog output represents for FR2. • Choices are **Flame QUALITY** or **Flame SIGNAL**. • Factory default is **Flame QUALITY**. Press SELECT to enter option; use UP or DOWN key to pick Flame QUALITY or Flame SIGNAL; press PROGRAM to SAVE.
FR2 20mA MAP VAL (Range) 40	Allows user to select the 4-20 mA range (MAP VAL) of the parameter selected above. • If **Flame QUALITY** was selected, the analog output will be 4 mA when the FQ=0. The range, or Flame Quality value for 20 mA (20mA MAP VAL), is user selectable anywhere between 40 and 100. o The factory default value is 100 (see Example 1 below). o If the user selects a value of 50, when the Flame Quality reaches 50, the analog output will be 20 mA (see Example 2 below). • If **Flame SIGNAL** was selected, the analog output will be 4 mA when the flame signal is 000. The range, or Flame Signal value for 20 mA (20mA MAP VAL), is user selectable anywhere between 400 and 999. • The factory default is 999. • If the user selects a MAP VAL of 500, when the Flame Signal reaches 500, the analog output will be at 20 mA. Press SELECT to enter option and then use UP or DOWN key to pick MAP Value (between 40-100 for FQ or between 400-999 for FS), then press PROGRAM to SAVE.
< SELECT to EXIT to Previous Menu	Return to top of the Config Menu
< SELECT to EXIT BACK to MAIN	Return to top of the Main Status Menu





3.9 Date Time Menu

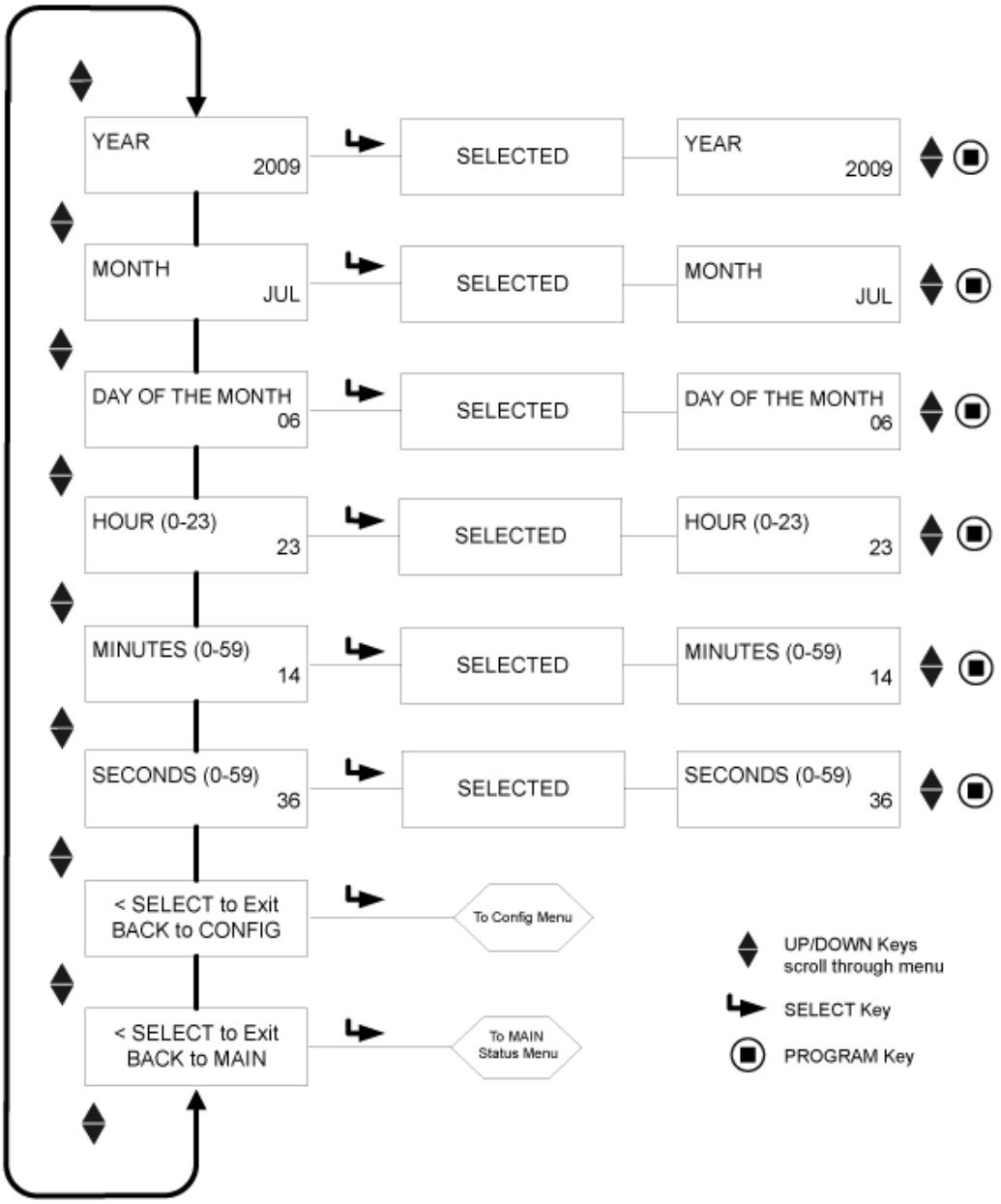


Figure 3-9 Date Time Menu Loop

The UniFlame II detector has a real time clock for date/time stamping error information. The user must set the clock to the current date and time where the detector is located. In the event the detector is shut off for more than 36 hours, the date and time will have to be re-entered.

To set Date and Time while in the CONFIG mode, press the DOWN Key until SELECT to ENTER Date/Time Menu is displayed then Press SELECT.

Table 7 Date Time Menu Loop Defined

YEAR 2009	Allows the user to set current YEAR. • While YEAR 2xxx is displayed, press SELECT. • Use UP or DOWN key to select current YEAR, then press PROGRAM key. NEW VALUE SAVED will appear.
MONTH JUL	Allows the user to set current MONTH. • Press the DOWN key until MONTH is displayed. • While MONTH is displayed, press SELECT. • Use UP or DOWN key to select current MONTH, then press PROGRAM key. NEW VALUE SAVED will appear.
DAY OF THE MONTH 06	Allows the user to set current DAY • Press the DOWN key until DAY OF THE MONTH is displayed. • While DAY OF THE MONTH is displayed, press SELECT. • Use UP or DOWN key to select current DAY, then press PROGRAM key. NEW VALUE SAVED will appear.
HOUR (0-23) 23	Allows the user to set current HOUR. • Press the DOWN key until HOUR (0-23) is displayed. The detector uses a 24 hour time frame. • While HOUR (0-23) is displayed, press SELECT. • Use UP or DOWN key to select current HOUR, then press PROGRAM key. NEW VALUE SAVED will appear.
MINUTES (0-59) 14	Allows the user to set current MINUTES. • Press the DOWN key until MINUTES (0-59) is displayed. • While MINUTES (0-59) is displayed, press SELECT. • Use UP or DOWN key to select current MINUTES, then press PROGRAM key. NEW VALUE SAVED will appear.
SECONDS (0-59) 36	Allows the user to set current SECONDS. • Press the DOWN key until SECONDS (0-59) is displayed. • While SECONDS (0-59) is displayed, press SELECT. • Use UP or DOWN key to select current SECONDS, then press PROGRAM key. NEW VALUE SAVED will appear.
<SELECT to EXIT BACK to CONFIG	Return to top of the Config Menu
<SELECT to EXIT BACK to MAIN	Return to top of the Main Status Menu

3.10 Comms Menu

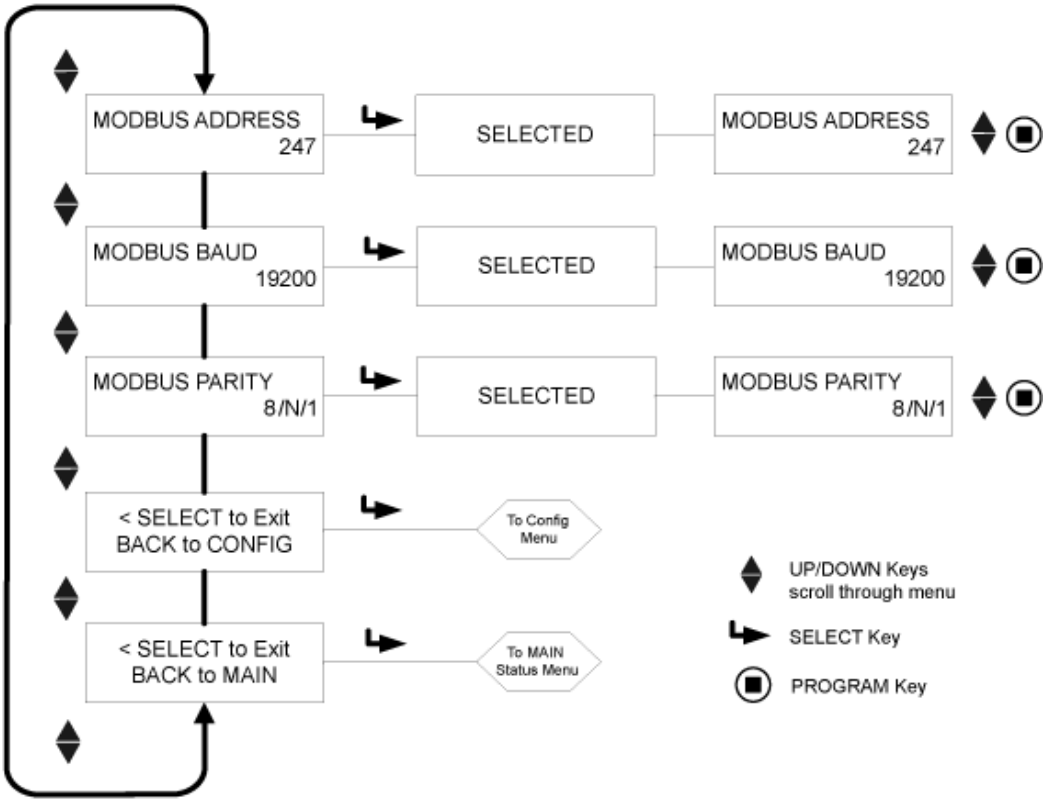


Figure 3-10 COMMS Menu Loop

Table 8 COMMS Menu Loop Displays Defined

MODBUS ADDRESS 247	Allows the user to select the device modbus address. (Affects all files) • The communications address selected may range from 001 to 247. • Each detector must have a unique address. • No two detectors in a communications loop can have the same address. • Default factory address for UniFlame II is 247.
MODBUS BAUD 19200	Allows the user to set modbus communication baud rate. • Valid values are 4800, 9600, 19200 • The factory default baud rate is 19200
MODBUS PARITY 8/N/1	Allows the user to set communication parity. • Valid values are 8/N/1, 8/E/1, 8/N/2, 8/O/1. • Default factory parity is 8/N/1.
<SELECT to EXIT BACK to CONFIG	Return to top of the Config Menu
<SELECT to EXIT BACK to MAIN	Return to the top of the Main Status Menu

3.11 Manual Config Menus

Two MANUAL CONFIG menus exist, one for each flame relay, FR1 and FR2. In each MANUAL CONFIG menu, the user may select the appropriate Flame-Failure-Response-Time (FFRT) for the flame relay as well as the on-time-delay setting. The user may also manually adjust the relay's Flame ON and Flame OFF thresholds, if desired.

Each MANUAL CONFIG menu contains two additional sub-menus, IR SETTINGS and UV SETTINGS, (described on the following pages). In the IR and UV SETTINGS menus, the user may manually adjust the sensor Flame Flicker Frequency (BAND), the sensor's USER GAIN, and the sensor's front-end-gain (FEG) settings, if desired.

Each heading begins with three characters, in this example “R1A”. The first two characters (R1 or R2) indicate which relay (FR1 or FR2) is selected. The third character (A,B,C, or D) indicates which memory file is selected.

The following descriptions refer to the MANUAL CONFIG FR1 menu.

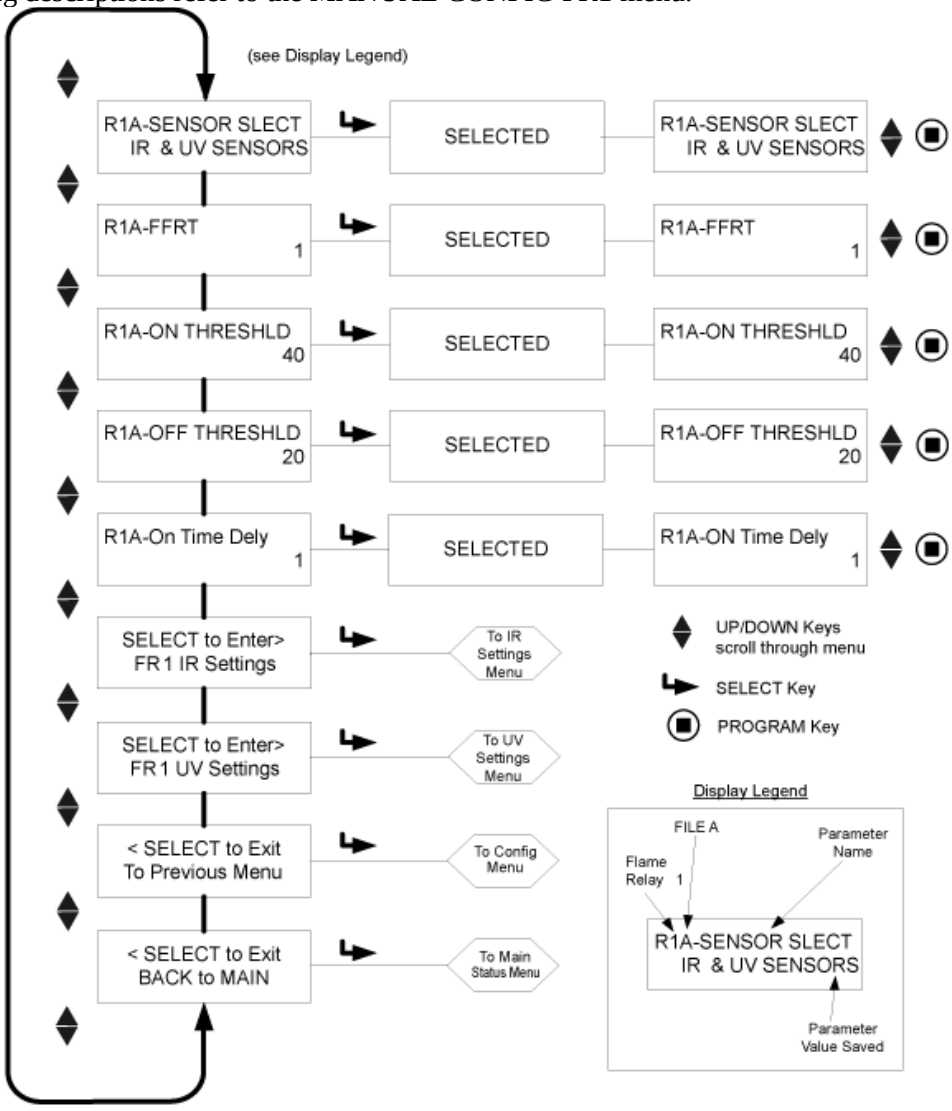


Figure 3-11 Manual Config Menu Loop for FR1 (FR2 is similar)

Table 9 Manual Config Menu Displays Defined

R1A-SENSOR SLECT *UV & IR SENSORS*	Allows the user to select the type of sensor to be used for R1 file selected (A, B, C, D). • Choices include: IR & UV sensors, IR sensor only, UV sensor only. • This parameter is used to manually select which sensor(s) are used in a particular file. • Factory default is IR & UV sensors. • The active file that this option will affect is identified in the third position (e.g. R1B is active file "B")
R1A-FFRT 1	When the Flame Quality drops to or below the Flame Relay OFF Threshold, the relay will de-energize after the selected Flame Failure Response Time (FFRT). • The choices are 1 to 4 seconds. • The maximum *allowable* FFRT setting is determined by local safety code. • The default is 1 second.
R1A-ON THRESHLD 40	This refers to the "pull-in" threshold of the internal Flame Relay FR1, in terms of "Flame Quality". • The ON Threshold can be set from 5 to 100. • The ON Threshold must be at least 5 units higher than the OFF Threshold. • Factory default value is 40.
R1A-OFF THRESHLD 20	This refers to the "drop-out" threshold of the internal Flame Relay FR1, in terms of "Flame Quality". When the Flame Quality is equal to or less than the OFF Threshold for a time equal to the "Flame Failure Response Time" setting (see below), the flame relay will de-energize. • The OFF Threshold can be set from 0 to 95. • The OFF Threshold must be at least 5 units lower than the ON Threshold. • Factory default value is 20.
R1A- ON TIME DELAY 1	When the Flame Quality rises to or above the Flame Relay ON Threshold, the relay will energize after the selected On Time Delay (OTD). • The choices are 1 to 6 seconds. • The default is 1 second.
SELECT to Enter> FR1 IR Settings	Allows the user to select IR Band (Frequency default is 179Hz), User Gain (default is 1), FEG Learned (5), MIN FEG (5), and MAX FEG (255) values for the current active file.
SELECT to Enter> FR1 UV Settings	Allows the user to select UV Band (Frequency default is 179Hz), User Gain (default is 1), FEG Learned (5), MIN FEG (5), and MAX FEG (255) values for the current active file.
<SELECT to EXIT BACK To Previous Menu	Return to top of the Config Menu.
<SELECT to EXIT BACK to MAIN	Return to Main Status Menu

3.11.1 The IR and UV Settings Menus

Each MANUAL CONFIG menu contains two sub-menus, IR SETTINGS and UV SETTINGS. In the IR and UV SETTINGS menus, the user may manually adjust the individual sensor values. Each heading begins with five characters, for example "R1AIR". The first two characters (R1 or R2) indicate which relay (FR1 or FR2) is selected. The third character (A, B, C, or D) indicates which file is selected. The last two characters (IR or UV) indicate which sensor's settings are being edited.

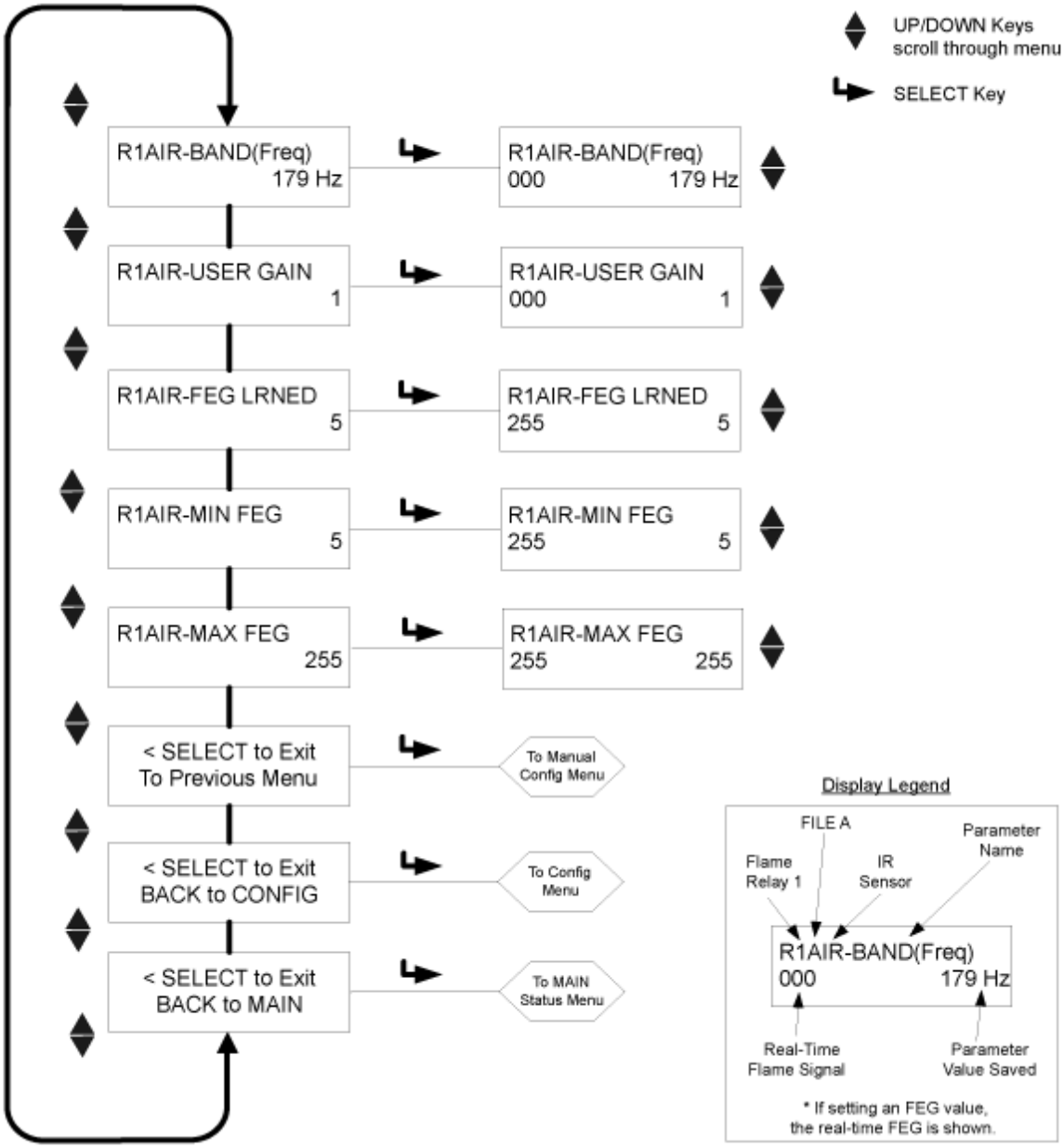


Figure 3-12 IR Settings Menu Loop (UV is similar)

The following descriptions refer to the FR1 IR SETTINGS menu for file A.

Table 10 IR & UV Settings Menus Displays Defined

R1AIR - BAND (Freq) 179	There are twenty-one choices of flame-flicker-frequencies (BANDS): 23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171 and 179Hz.
R1AIR-USER GAIN 1	Adjust the sensor gain (1-31) so that the flame ON signal strength is well above the flame relay ON threshold, and the flame OFF signal strength is well below the flame relay OFF threshold. • Each upward step in the User Gain setting will increase the Signal Strength number for the selected sensor by approximately 50%. • Each downward step in the User Gain setting will decrease the Signal Strength number for the selected sensor by approximately 33%. o Example 1: Assume that you observe an IR Signal Strength of "080" when the IR User Gain setting is 12. If you then increase the IR User Gain setting from 12 to 13 you should expect to see the IR Signal Strength increase to approximately "120". o Example 2: Assume that you observe an IR Signal Strength of "240" when the IR User Gain setting is 20. If you then decrease the IR User Gain setting from 20 to 19 you should expect to see the IR Signal Strength decrease to approximately "160".
R1AIR FEG LRNED 5	Front End Gain Learned setting has a range of (5-255).
R1AIR MIN FEG 5	Minimum Front End Gain value is (5).
R1AIR MAX FEG 255	Maximum Front End Gain value is (255). *Note: On the FEG settings screens, the current "real-time" FEG value is also shown on the left side of the display.*
<SELECT to Exit to Previous Menu	Return to Manual Config FR1 or FR2 Sensor Select screen
<SELECT to Exit BACK to CONFIG	Returns to Main CONFIG Menu
<SELECT to Exit BACK to MAIN	Returns to Main Status Menu

3.11.2 Manual Set-up in Manual Config FR1 & FR2 Menus

In Manual Configuration, the user may set values for FR1 and FR2. There are separate displays to show the BAND (Freq), User Gain (1-31), FEG Learned, FEG Min and Max for the IR and UV sensor.

In the Manual Config Menu with the target flame ON (at low fire), record the sensor signal strength and stability at each of the twenty-one modulation BANDS: 23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171 and 179 Hz. The signal strength range is 0-999.

It may be necessary to adjust the sensor GAIN in order to keep the signal strength value on scale. If so, observe and record the sensor GAIN value (1-31) selected. Perform this step for each sensor.

In the Manual Config Menu with the target flame OFF (leaving other burners firing), observe and record the sensor signal strength and stability at each of the twenty-one modulation BANDS: 23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171 and 179 Hz. *Do not adjust the sensor GAIN at this time.* Perform this step for each sensor.

At each of the twenty-one BAND settings, compare the recorded Flame ON signal strength to the recorded Flame OFF signal strength. Select the BAND setting that yielded the greatest Flame ON to Flame OFF signal ratio and the greatest stability. Perform this step for each sensor.

Adjust the sensor gain (1-31) so that the flame ON signal strength is well above the flame relay ON THRESHOLD, and the flame OFF signal strength is well below the flame relay OFF THRESHOLD (see "Flame Relay Thresholds").

When sensor select is "IR & UV", the flame relay and 4-20 mA output operate on the SUM of the IR and UV signals. When setting the GAIN adjustments, the user should favor the sensor (IR or UV) which exhibited the greatest flame ON:OFF signal ratio, and/or greatest stability. The user may choose to use the input from only one sensor by selecting "IR ONLY" or "UV ONLY".

Note: For best detector operation, the total Flame ON Signal Strength (IR Signal Strength + UV Signal Strength) should be between 100 and 150 or higher even though the Flame Quality display is capped at 100.

Each upward step in the User Gain setting will increase the Signal Strength number for the selected sensor by approximately 50%. Each downward step in the User Gain setting will decrease the Signal Strength number for the selected sensor by approximately 33%.

Example: Assume that after selecting the best BAND settings for IR and UV, the flame signals are as shown in Table 11. Assume that the Flame Relay ON threshold is 40 and the OFF is 20:

Table 11 Manual Config Set-up Example 1

Target Burner Status	Flame Signal Strength (0-999)			Flame Quality (0-100) "FQ"	Flame Relay Status
	"IRFS" (IR)	"UVFS" (UV)	"FS" (Combined)		
Burner ON	300	460	760	100	Energized
Burner OFF	40	10	50	50	Energized

In Table 11, the background flame signal (Target Burner OFF) is too high and is preventing the Flame Relay from de-energizing. The User Gains should be reduced to drop the Flame Quality number below the Flame Relay Flame OFF Threshold of 20.

Table 12 shows the results of lowering each User Gain setting by 4 steps (e.g. from User Gain=23 to User Gain=19):

Table 12 Manual Config Set-up Example 2

Target Burner Status	Flame Signal Strength (0-999)			Flame Quality (0-100) "FQ"	Flame Relay Status
	"IRFS" (IR)	"UVFS" (UV)	"FS" (Combined)		
Burner ON	59	91	150	100	Energized
Burner OFF	8	2	10	10	De-energized

Flame Relay Thresholds

The flame relay has a factory programmed FLAME ON threshold of 40, and a FLAME OFF threshold of 20 (0-100 scale). With these settings, it is recommended that the flame ON signal normally be at least 150. Other on and off thresholds may be selected to suit particular applications.

CAUTION: After selecting Sensor TYPES used, Sensor BANDS, Sensor GAINS, and Flame Relay ON & OFF Thresholds, proper flame detection and flame discrimination must be verified by starting and stopping the burner several times. The flame relay must reliably de-energize for all flame out conditions. This testing should be done with various adjacent burners on and off, and at various load levels. This is a requirement for proper operation.

3.12 UniFlame II Factory Default Settings, User Files A, B, C, D and Factory File F3

PARAMETER	DEFAULT VALUE	ALLOWABLE VALUES
Config Menu:		
Remote File Sel	Key Pad	Key Pad, Line Inputs, Comms
PASSWORD	0205	0000-9999
FS Squelch Msgs	Do NOT Display	Display, Do NOT Display
IR GAIN RANGE	LOW	HIGH, MED*, LOW
UV GAIN RANGE	LOW	HIGH, MED*, LOW
		*(“MED” range available in engineering code 05 or higher)
4/20mA Config Menu:		
FR1 4/20 SELECT	Flame QUALITY	Flame QUALITY, Flame SIGNAL
FR1 4/20 MAP VAL	100	For Flame Quality: 40-100 For Flame SIGNAL: 400-99
FR2 4/20 SELECT	Flame QUALITY	Flame QUALITY, Flame SIGNAL
FR2 4/20 MAP VAL	100	For Flame Quality: 40-100 For Flame SIGNAL: 400-999
Date/Time Menu:		
YEAR	2010	2008-4095
MONTH	JAN	JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
DAY OF THE MONTH	01	01-31 (dependent on current value of MONTH)
HOUR (0-23)	00	00-23
MINUTES (0-59)	00	00-59
SECONDS (0-59)	00	00-59
COMMS SETTINGS Menu:		
MODBUS ADDRESS	247	001-247
MODBUS BAUD	19200	4800, 9600, 19200
MODBUS PARITY	8/N/1	8/N/1, 8/E/1, 8/N/2, 8/O/1
Man. Config FR1 Menu:		
R1- SENSOR SLECT	IR & UV SENSORS	IR & UV SENSORS, IR SENSOR ONLY, UV SENSOR ONLY
R1- FFRT	1	1, 2, 3, 4
R1- ON THRESHLD	40	5-100
R1- OFF THRESHLD	20	0-95
R1- On Time Dely	1	1, 2, 3, 4, 5, 6

PARAMETER	DEFAULT VALUE	ALLOWABLE VALUES
FR1 IR Settings Menu:		
R1 IR-BAND (Freq)	179Hz	23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171, 179
R1 IR-USER GAIN	1	1-31
R1 IR-FEG LRNED	5	5-255
R1 IR-MIN FEG	5	5-255
R1 IR-MAX FEG	255	5-255
FR1 UV Settings Menu:		
R1 UV-BAND (Freq)	179Hz	23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171, 179
R1 UV-USER GAIN	1	1-31
R1 UV-FEG LRNED	5	5-255
R1 UV-MIN FEG	5	5-255
R1 UV-MAX FEG	255	5-255
Man. Config FR2 Menu:		
R2- SENSOR SLECT	IR & UV SENSORS	IR & UV SENSORS, IR SENSOR ONLY, UV SENSOR ONLY
R2- FFRT	1	1, 2, 3, 4
R2- ON THRESHLD	40	5-100
R2- OFF THRESHLD	20	0-95
R2- On Time Dely	1	1, 2, 3, 4, 5, 6
FR2 IR Settings Menu:		
R2 IR-BAND (Freq)	179Hz	23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171, 179
R2 IR-USER GAIN	1	1-31
R2 IR-FEG LRNED	5	5-255
R2 IR-MIN FEG	5	5-255
R2 IR-MAX FEG	255	5-255
FR2 UV Settings Menu:		
R2UV-BAND (Freq)	179Hz	23, 31, 39, 46, 54, 62, 70, 78, 85, 93, 101, 109, 117, 125, 132, 140, 148, 156, 164, 171, 179
R2 UV-USER GAIN	1	1-31
R2 UV-FEG LRNED	5	5-255
R2 UV-MIN FEG	5	5-255
R2 UV-MAX FEG	255	5-255

Factory Files F1, F2, F3:

F1 (High Sensitivity): The IR and UV BAND settings are 23 Hz. The IR and UV USER GAIN settings are 31.
The IR and UV FEG LRNED settings are 255. All other settings are the same as the File A, B, C & D Factory Defaults.

F2 (Medium Sensitivity): The IR and UV BAND settings are 23 Hz. The IR and UV USER GAIN settings are 15.
The IR and UV FEG LRNED settings are 255. All other settings are the same as the File A, B, C & D Factory Defaults.

F3 (Low Sensitivity/Defaults): All settings are same as the File A, B, C & D Factory Defaults.

UniFlame II Configuration Record

Date:

Parameter	FILE A	FILE B	FILE C	FILE D
Config Menu:				
Remote File Sel				
PASSWORD				
FS Squelch Msgs				
IR GAIN RANGE				
UV GAIN RANGE				
4/20mA Config Menu:				
FR1 4/20 SELECT				
FR1 4/20 MAP VAL				
FR2 4/20 SELECT				
FR2 4/20 MAP VAL				
COMMS SETTINGS Menu:				
MODBUS ADDRESS				
MODBUS BAUD				
MODBUS PARITY				
Man. Config FR1 Menu:				
R1- SENSOR SLECT				
R1- FFRT				
R1- ON THRESHLD				
R1- OFF THRESHLD				
R1- On Time Dely				
FR1 IR Settings Menu:				
R1 IR-BAND (Freq)				
R1 IR-USER GAIN				
R1 IR-FEG LRNED				
R1 IR-MIN FEG				
R1 IR-MAX FEG				
FR1 UV Settings Menu:				
R1 UV-BAND (Freq)				
R1 UV-USER GAIN				
R1 UV-FEG LRNED				
R1 UV-MIN FEG				
R1 UV-MAX FEG				

Parameter	FILE A	FILE B	FILE C	FILE D
Man. Config FR2 Menu:				
R2-SENSOR SLECT				
R2-FFRT				
R2-ON THRESHLD				
R2-OFF THRESHLD				
R2-On Time Dely				
FR2 IR Settings Menu:				
R2 IR-BAND (Freq)				
R2 IR-USER GAIN				
R2 IR-FEG LRNED				
R2 IR-MIN FEG				
R2 IR-MAX FEG				
FR2 UV Settings Menu:				
R2 UV-BAND (Freq)				
R2 UV-USER GAIN				
R2 UV-FEG LRNED				
R2 UV-MIN FEG				
R2 UV-MAX FEG				

3.13 UniFlame II Replacement Procedure

This procedure may be followed when replacing a damaged UniFlame II detector. It assumes that the UniFlame II Configuration Record (previous pages) was completed and kept as a reference when the original detector was installed and calibrated. If not, the replacement detector must be completely reprogrammed as describes earlier in this document.

1. Install the new detector and apply power.
2. Enter the programming password and enter the CONFIG menu.
3. Manually enter the values from the UniFlame II Configuration Record into the new detector.

Important Note: After Step 3, the detector should detect flame ON, but may not properly indicate flame OFF until Step 4 is performed.

4. Create the burner firing conditions that existed when the detector was originally installed and calibrated, typically the low-fire condition.
   a. Enter the AUTO CONFIG menu.
   b. Press the Up button until "START LEARN ON" is displayed.
   c. Press the Select button then the Program button.
   d. The detector will set its internal Front End Gain Reference, count down from 16 to 0, then display "Learn Passed". Note: If the proper data was manually entered into the EDIT menu, it should not be necessary to learn the flame OFF condition.
5. Turn the burner OFF and ON to verify proper flame detection and discrimination.
6. Repeat Steps 2 through 5 for each detector memory file used (A, B, C, D) or Copy "Upload/Download" saved parameters using FEX UniFlame software.

Section 4 Storage

Store the UNIFLAME II detector in its shipping box until used. Refer to the mechanical specifications for storage temperature range.

Section 5 Warranty

Forney Corporation warrants this product to be free of defective material and workmanship. Forney will repair or replace this equipment if it is found to be defective upon receipt, but not later than 1 year (12 months) from the date of shipment.

Section 6 Return or Repair Service

Forney Corporation warrants this product to be free of defective material and workmanship. Forney will repair or replace this equipment if it is found to be defective upon receipt, but not later than 90 days from the date of shipment.

Prior to returning any material to Forney, a Return Material Authorization (RMA) identification number must be obtained from Forney. Clearly mark the RMA number on all shipping containers and accompanying documents. Forney accepts only materials submitted in accordance with these RMA instructions.

To issue an RMA, Forney must have the following information:

- List of equipment to be returned by stock number/model number.
- Reason for return.
- Company name and address of the customer.
- Customer's requested mode for return shipping.
- Customer's purchase order number for repairs (if applicable).
- Customer's requested return date.
- Name and address to which Forney is to return-ship and any special container marking information that may be required.
- Name of individual (customer's representative) requesting the RMA.

Any one of the following methods may be used to obtain an RMA:

Phone: (972) 458-6100 or 458-6142
1-800-356-7740 (24-hour direct line)

Fax: (972) 458-6600

FORNEY CORPORATION IS NOT RESPONSIBLE FOR MATERIALS RETURNED WITHOUT PROPER AUTHORIZATION AND IDENTIFICATION.

Exercise care in packing the materials to be returned. The shipper will be advised of any damage due to improper packing, and no further action will be taken in connection with this material return until the shipper provides clearance for further disposition.

Section 7 Spare Parts

When ordering spare parts, contact Forney's Spares Department via any one of the following methods and furnish the following information.

Mail	Phone	Fax
Attn: Spare Parts Forney Corporation 3405 Wiley Post Road Carrollton, TX 75006-5185	(972) 458-6100 or (972) 458-6142 or 1-800-356-7740 (24-hour direct line)	(972) 458-6600

- Contract number.
- Customer purchase order number.
- For each part ordered, provide the following information:
  - Part number
  - Part description
  - Quantity required

The recommended spare parts list in the table below advises of replacement parts that should be in the customer's stock.

Table 13 Recommended Spare Parts List

Part Description	Part Number	Quantity
Flame Detector	40111x-01	10% of qty. required for boiler
Power Supply	79508-70 or 79508-51 / 79508-71	1 for every 5 1 for every 10
12 Cond. Pre-fab Cable 8 Cond. Pre-fab Cable	401120-xx 401119-xx	1 for every 10 1 for every 10
Wiring Harness	92527-04	1 for every 10

Table 14 UniFlame II Part Numbers

Part Number	Part Description
401116-01	UniFlame II - standard
401117-01	UniFlame II CEX
401117-02	UniFlame II CEX with blank cap, no display
401118-01	UniFlame II Wireless CEX
401116-11	UniFlame II without connectors (internal terminal blocks)
401116-10	UniFlame II for UniFlame I retrofit (1 - 12 pin quick disconnect connector)
401116-03	UniFlame II Alpha Numeric Display
401118-03	UniFlame II Wireless IR transmitter
401118-04	Hand-held Communications Tool
401116-05	UniFlame II Blank Cap, no display (cap only)
92527-01	UniFlame II Cooling Chamber Standard
92527-02	UniFlame II Cooling Chamber CEX
92527-03	Conversion Box for UniFlame I to UniFlame II
92527-04	Wiring Harness
401119-xx	8-Conductor Cable with Quick Disconnect
401120-xx	12-Conductor Cable with Quick Disconnect
401119-00	Bulk 8-Conductor Cable
401120-00	Bulk 12-Conductor Cable
401116-04	FEX Software
91016-63	Swivel Mount
401116-50	Mounting Flange 1” NPT
401116-60	Mounting Flange 1” BSP
79508-70	24VDC, 2A Power Supply (powers up to 5 detectors)
79508-71	24VDC, 4A Power Supply (powers up to 10 detectors)
79508-51	24 VDC 4.2 A Power Supply (powers up to 10 detectors)