



45UV5 SCANNER MODELS: 1000, 1010, 1101, 1103 (including EX and CEX Models)



APPROVED



This bulletin is directed to the licensed boiler service technicians and professional combustion engineers who are experienced in the installation and operation of Fireeye flame safeguard controls. Persons not experienced with Fireeye flame safety products should contact the nearest Fireeye representative, or a qualified service group for assistance. **IMPROPER INSTALLATION OF THESE PRODUCTS MAY BE HAZARDOUS TO LIFE AND PROPERTY.**

DESCRIPTION

Fireeye Type 45UV5 scanners are self-checking, flame sensing devices. When powered by a compatible, self-checking Fireeye control, the scanners detect the presence or absence of flames which emit ultraviolet radiation (UV). Typical fossil fuels which emit UV include natural gas, propane, methane, butane, kerosene, light petroleum distillates and diesel fuels. For burners firing steam-atomized oil or pulverized coal, Fireeye recommends the use of infrared (IR) scanners. Fireeye offers a complete line of infrared scanners best suited for these applications.

APPLICATION

When used with a Fireeye amplifier, the 45UV5 scanner provides flame failure protection on single and multi-burner industrial applications such as electric utility boilers, power boilers and large furnaces or incinerators. The 45UV5 scanner monitors the flame(s) of only one burner. The pilot and main flames may be monitored individually (2 scanners) or in combination (1 scanner). When properly sighted, the scanner should discriminate between the burner being monitored and all other burners and any background flames.

Note: Scanner response is dependent on burner configuration as well as the turbulence and spectral characteristics of the flames. Application assistance is available on request.



PRINCIPLES OF OPERATION

The 45UV5 scanner employs a detector which is a sealed, gas filled, ultraviolet-transmitting special glass envelope containing two electrodes connected to an AC voltage source. The detector responds only to a portion of the ultraviolet spectrum from common flames.

When ultraviolet radiation of sufficient energy (at wavelengths shorter than those in sunlight at the earth's surface) falls upon the electrodes, electrons are released and the inter-electrode gas becomes conductive. This results in an electric current flow from one electrode to the other.

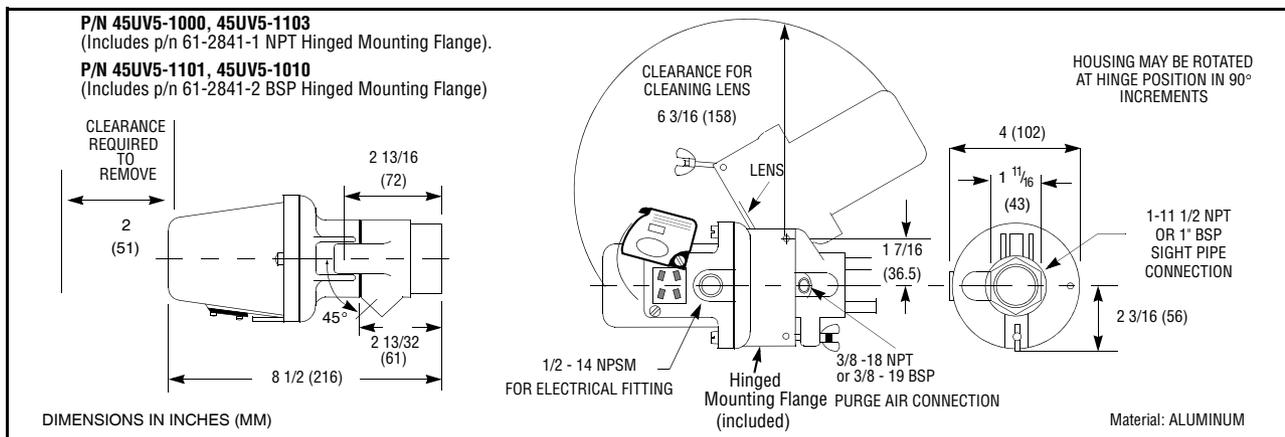
The current flow in the detector starts and ends abruptly and is known as an "avalanche." A very intense source of UV radiation will produce several thousand avalanches or pulses per second. Less radiation will produce fewer pulses per second. Upon total loss of flame, the detector output ceases except for very infrequent single pulses caused by cosmic rays. The circuitry does not respond to these infrequent pulses. Thus, the presence or absence of pulses is an indication of the presence or absence of flame; the frequency of the pulses is a measure of flame intensity. Pulses generated by the scanner are transmitted to a compatible Fireye control via scanner wiring.

FEATURES

The UV tube, quartz lens, power transformer and related electronic components are contained in an aluminum enclosure which is sealed with high temperature oil-resistant gaskets. The quartz lens is a planoconvex type which increases the scanner's sensitivity up to 400 percent. A hinged mount is provided to permit easy access for cleaning the lens. A double screw-and-keyhole slot arrangement permits quick removal of the housing from its mount. The scanner has a 1" fitting for mounting to a threaded sight pipe and a 3/8" threaded connection for purge air.

Also included in the Type 45UV5 scanner is an electromagnetic shutter that permits a self-checking circuit within an associated Fireye control to verify that the scanner and signal circuits are producing valid flame presence or absence information. During the shutter closed period the detector's optical path is blocked from flame radiation. While the shutter is open, flame presence or absence is detected. The resultant scanner output, while flame is detected, is a continuous, periodically interrupted pulsed flame signal. This is a prerequisite for energizing the associated Fireye control's flame relay.

FIGURE 1. 45UV5 SCANNER DIMENSIONS





SPECIFICATIONS

Mounting

Models are provided with 1" female thread mounting, either US NPT or British Whitworth according to model (see table below).

Housing, Including Mounting Flange

Material: Die Cast Aluminum

Design: Hinged Mounting Flange, with air fitting to be permanently installed, carries two 1/4 - 20 screws which may be loosened for quick removal of the scanner housing, such as for lens cleaning.

Weight: 3.75 lbs. (1.7kg)

Electrical

Power Requirement: 4 VA AC from associated Fireye control (see note below).

Frequency: Frequency of scanner must match frequency of Fireye control and power line supply (See Table 1).

Connection: 1/2 inch 14 NPSM tapping.

Temperature Range: Maximum operating: 200° F (93° C)
Minimum operating: -40° F (-40° C)

Optical Range: 190 to 250 nanometers. No response to infrared radiation or visible light.

Purge Air

Source: Clean ambient

Volume Required: 4 SCFM (113 L/min. @ 4" water column above furnace pressure minimum) at 3/8 inch threaded housing inlet or 4 SCFM at 1 inch wye fitting in scanner sight pipe. Temperatures near the upper limit of the scanner operating range and/or use with dirty fuels may require up to 15 SCFM (425 L/min.).

Table 1:

MODEL 45UV5	FREQUENCY HZ	MOUNTING THREADS	FM	DIN	APAVE
1000	60	NPT	✓		✓
1010	60	BSP	✓		
1101	50	BSP	✓	✓	
1103	50	NPT			

Specifications subject to change without notice.

IMPORTANT NOTE: The AC power source must be sinusoidal for proper scanner operation. The application of any waveform other than a sine wave (e.g. square wave) will damage the 45UV5 scanner.

Optional Mounting Configurations for Hazardous Areas

FIGURE 2. 45UV5 SCANNER IN NEC/NEMA HAZARDOUS AREA HOUSING

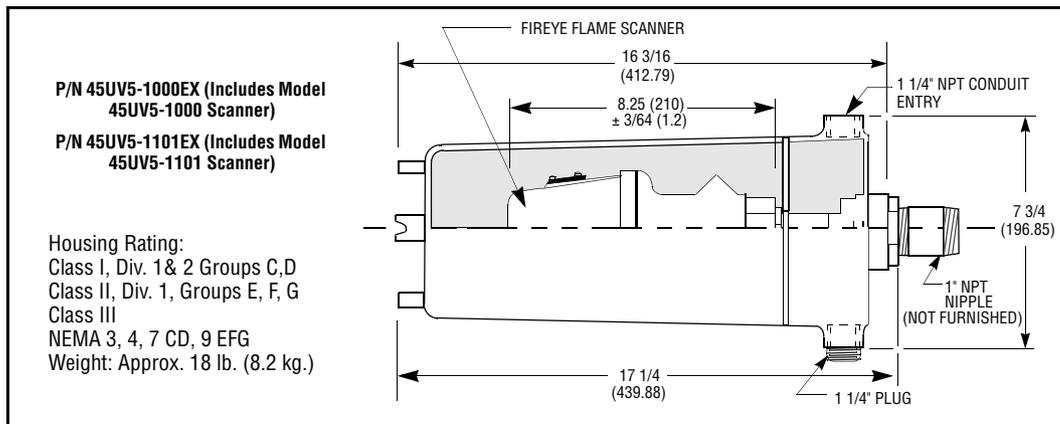
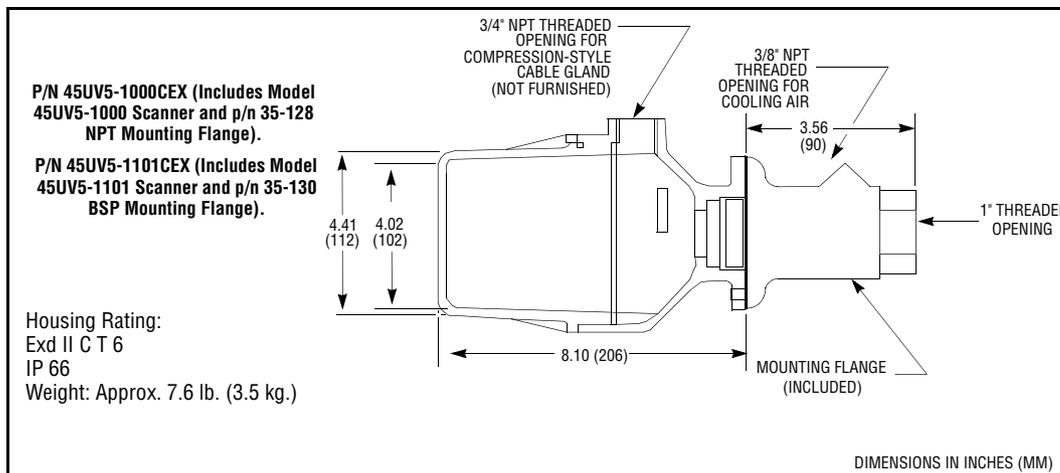


FIGURE 3. 45UV5 SCANNER IN ATEX HAZARDOUS AREA HOUSING



INSTALLATION

1. The best scanner sighting results are obtained when the scanner is aimed so that the scanner (viewing) center line intersects the burner center line at a slight angle, as shown in Figure 4. The area of maximum ultraviolet radiation is near the base of the flame envelope. If only one scanner is used per burner, the intersection should be made so the line of sight or viewing angle can also see the igniter flame. Consideration must be given to burner air rotation (burners have clockwise or counterclockwise air rotation). Figure 5 illustrates how scanner location is influenced by the igniter position and air circulation. Physical obstructions such as air register blades should not fall within the scanner's line of sight.

FIGURE 4. SINGLE BURNER SCANNER SIGHTING

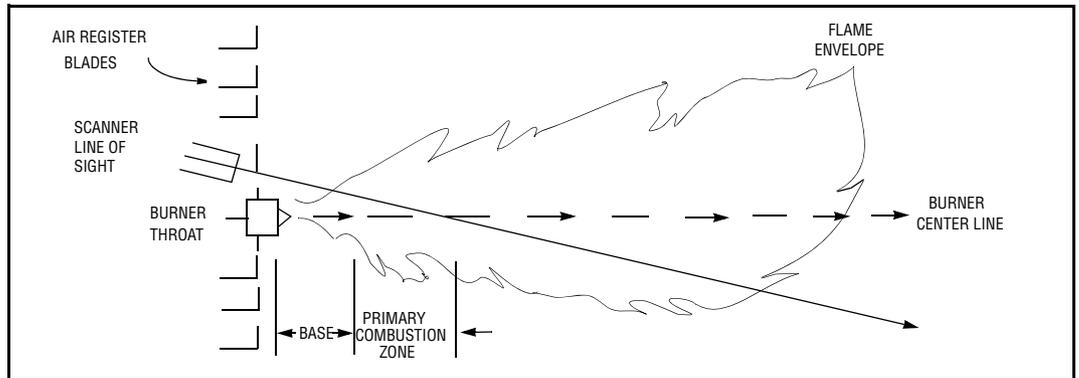
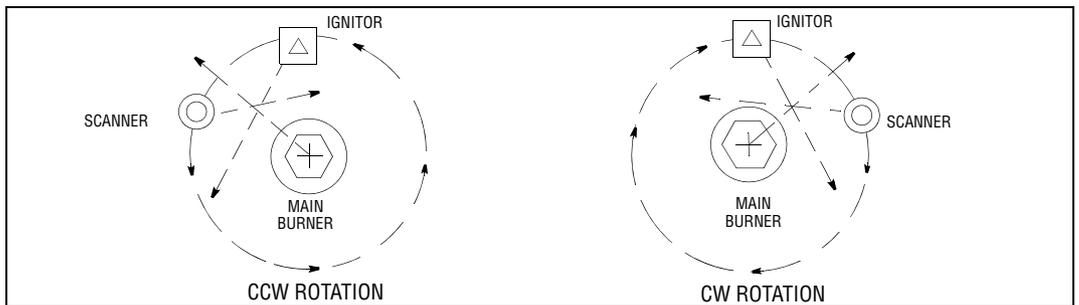


FIGURE 5. SCANNER LOCATION VS. SECONDARY AIR ROTATION

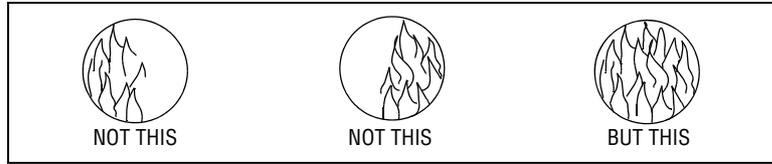


2. An acceptable scanner location must ensure the following:
 - Reliable igniter flame detection.
 - Reliable main flame detection.
 - Rejection of igniter flame too short or in the wrong position to ignite the main flame reliably.

Note: Reliable signals must be obtained at all air flows, furnace loads (ranges of fuel firing) and desirable fuel air ratios.

3. If combustion air enters the furnace with a rotational movement of sufficient velocity to deflect igniter flame in the direction of rotation, position the scanner 0 to 30 degrees downstream of the igniter and near the periphery of the throat where the ultraviolet radiation is at a maximum. (see figures 4 and 5).
4. Having determined an approximate location for the sight tube, cut a clearance hole for a 2 inch pipe through the burner plate. If register vanes interfere with the desired line-of-sight, the interfering vane(s) should be trimmed to assure an unobstructed viewing path at all firing levels.
5. Mount scanner sight pipe by either:
 - Centering a swivel mount, P/N 60-1664-3 (NPT) or 60-1664-4 (BSP) over the hole and installing the sight pipe on the swivel mount, or
 - Inserting the end of the sight pipe into the hole, aligning the pipe to the desired viewing angle and tack welding. Welding must be adequate to temporarily support the weight of the installed scanner. The sight pipe should be arranged to slant downward so that dirt and dust will not collect in it.
6. When a satisfactory sighting position has been confirmed by an operating test, (see section on alignment), the sight pipe should either be firmly welded in place or, if the swivel mount is used, the ball position should be secured by tightening the three hex head cap screws located on the swivel mount ring. In certain older style swivel mounts, tack welding may be required.

FIGURE 6. FLAME MUST COMPLETELY COVER SIGHT OPENING



- The scanner viewing window must be kept free of contaminants (oil, ash, soot, dirt) and the scanner temperature must not exceed the maximum rating. Both requirements will be satisfied by continuous injection of air at either the 3/8" housing inlet or at a 1" wye ahead of the swivel mount, as shown in Figures 7, 8, and 9.

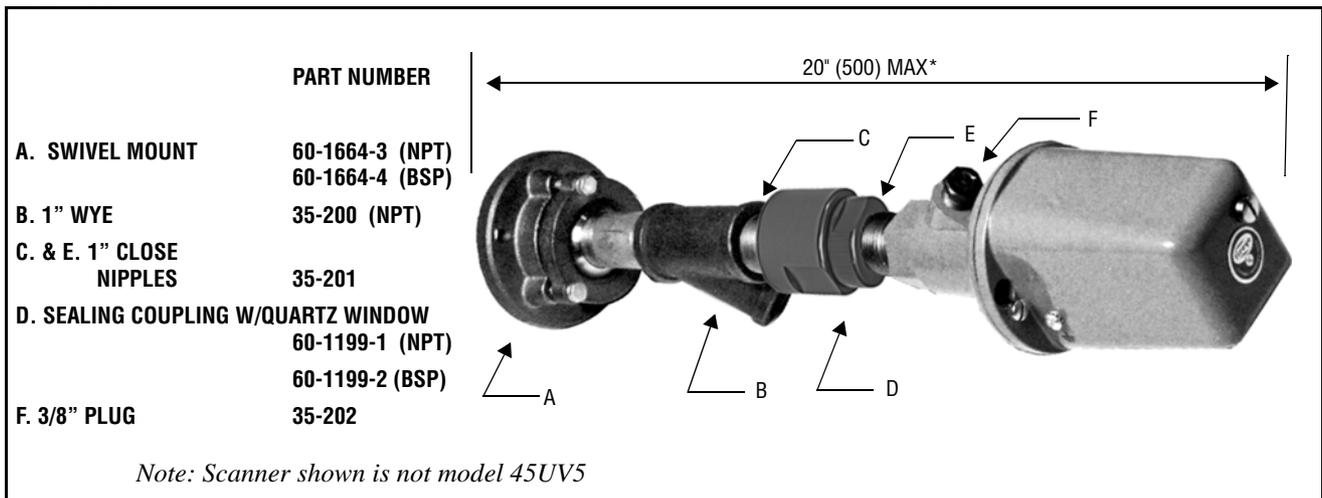
Purge air may be supplied through the 3/8" or 1" wye connection. Normally only one of the two connections is provided with purge air and the other connection is plugged. When a Fireeye sealing coupling is used as shown in Figure 7, the 1" wye connection is used for the purge air (plug 3/8" opening).

Under normal conditions, with clean burning fuels and moderate ambient temperature conditions, purge air flow of approximately 4 SCFM (113 L/min.) @ 4" water column above furnace pressure is generally adequate. Up to 15 SCFM (425 L/min.) may be required for fuels that may produce high levels of flash or soot or for hot environments to maintain scanner internal temperature within specification.

- The scanner sight pipe should be as large as is practical. Ideally, the sight pipe should increase one inch in diameter (ID) for every foot in length. Under most circumstances, a sight pipe diameter increase of one inch should be adequate for an increase in length of three feet (1m). When applying the scanner to long sight tubes (more than three feet), minimize the use of one inch pipe. Avoid using pipe less than one inch (ID), and avoid using stainless steel sight pipes.
- Temperature in the scanner housing should not exceed 200°F.
- Where separate scanners are used to monitor main and igniter flames, the main flame scanner should be sighted to not detect the igniter flame. If it *does* detect the igniter flame, re-aim the main flame scanner.

PIPING ARRANGEMENTS

FIGURE 7.



PIPING ARRANGEMENTS

FIGURE 8.

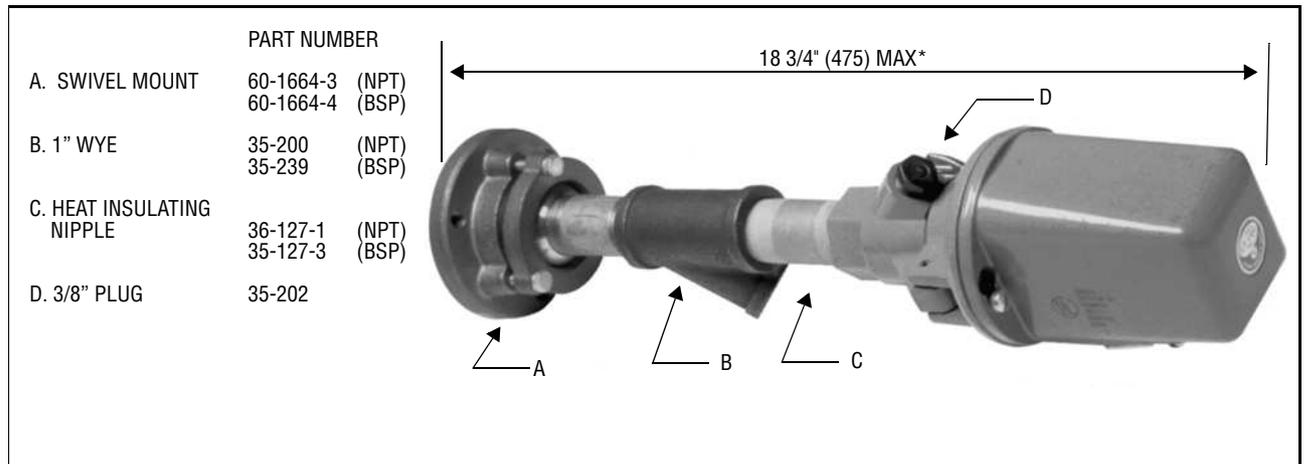
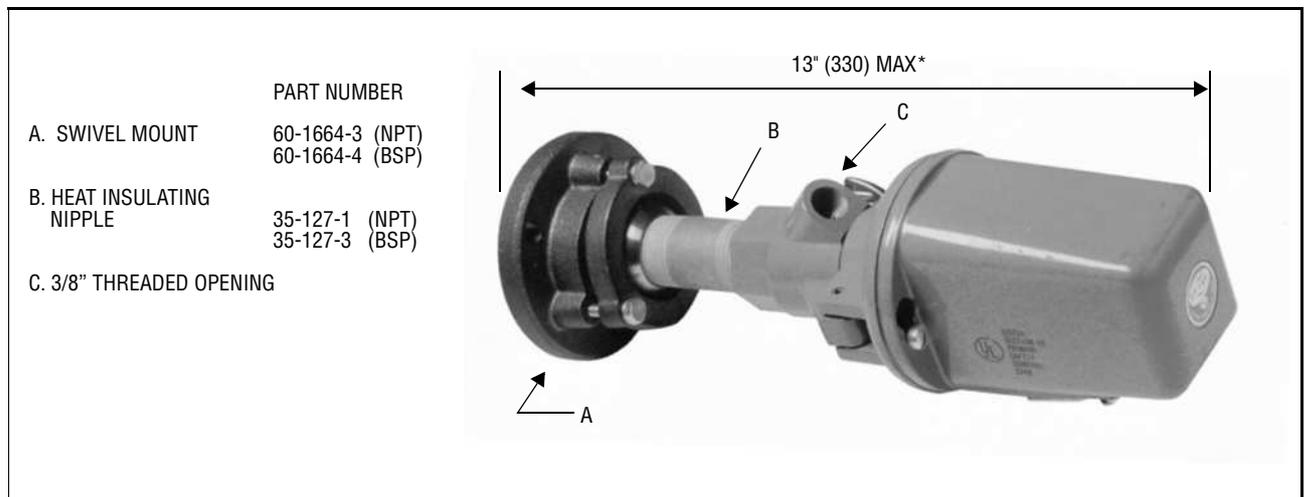


FIGURE 9.



ALIGNMENT AND ADJUSTMENTS

Before installing or adjusting scanners, thoroughly plan the scanning objectives in reference to the boiler/furnace mode of operation.

The following procedures are recommended to ensure optimum flame detection and discrimination. Flame discrimination is the ability to see the flame of only one burner or one igniter with other burners or igniters operating nearby.

These procedures should be used whenever parts are replaced, when the scanner has been moved, when the flame shape is altered (additional fuels, new burners, burner/register modifications) as well as on all new installations. Signal readings referred to in this procedure are as displayed on a 0-3 VDC Fireeye flame signal meter. (P/N 38-54, 38-55, 38-56).^{1,2}

¹ If using analog bargraph meter (P/N 38-88), the flame will be properly sighted when there are 5-8 LEDs illuminated.

² When used with the 25SU3-2000 series amplifiers and appropriate power supply, the required flame signal strength (in terms of "pulses-per-second," will be determined by the "Flame-On" and "Flame-Off" thresholds programmed into the amplifier. Refer to bulletin CU-34 for additional information.

Igniter Flame Scanner

1. Apply power to scanner and associated control.
2. Start Igniter.
3. Adjust scanner sighting to detect igniter flame in the manner shown in Figure 4.
4. When flame is properly sighted and the control sensitivity properly adjusted (see Caution below) the signal meter should register between 4 and 16. If readings fluctuate widely, readjust scanner sighting until highest steadiest reading is obtained.
5. When the proper signal reading has been obtained, make sure that the scanner and the associated control do not respond to the ignition spark. This is accomplished by cutting off the fuel to the igniter and attempting to start the igniter using the spark igniter. If the system responds to the spark, the sighting should be realigned.



CAUTION: Do not increase sensitivity any more than necessary to provide proper detection of the minimum igniter flame. Minimum igniter flame is the minimum flame required to ignite the main burner reliably. Be sure to test for reliable signals under maximum air flow conditions when the igniter flame may be deflected outside the line of sight. If this occurs, resighting is required.

Main Flame Scanner

1. Apply power to scanner and control.
2. Start igniter.
3. Adjust scanner sighting so that ignition spark and igniter flame are not detected. Test should be conducted with **maximum** igniter flame and with both minimum and maximum air flow.

Note: This step may not be practical with Class 1 igniters, but may be desirable with Class 3.

4. Start main burner.
5. Adjust scanner sighting to detect main burner flame. When sighting is correct (see Figure 6), the signal should read between 4 and 32 on a Flame Signal Meter, Fireye P/N 38-54 or 38-55, without extreme fluctuations in the signal reading.
6. When proper signal is established, manually close off the main burner fuel supply. When burner flame becomes unstable or is extinguished, the associated Fireye control should register a “No Flame” condition.
7. Start an adjacent burner and vary its firing rate under normal air flow conditions. Make certain that the main flame scanner on the burner *not in service* does not respond to the adjacent burner.

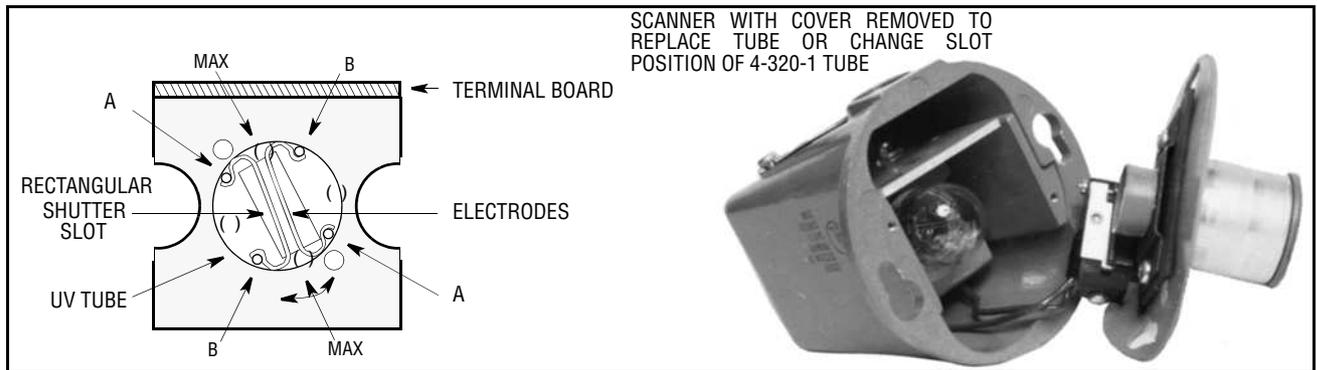
SCANNER SENSITIVITY ADJUSTMENT

Excessive scanner flame signal can affect flame discrimination and prevent the associated 25SU3 or 25SU5 control from operating properly. Weak signals may cause unnecessary burner shutdown or alarms. The sensitivity of the 45UV5 scanner can be adjusted by one of two methods determined by the Engineering Code of the scanner.

METHOD 1: 45UV5 SCANNERS WITH ENGINEERING CODE 00-03 (built through mid- 2008)

Sensitivity is adjusted by changing the position of the p/n 4-320-1 UV tube in its socket (Figure 10).

FIGURE 10. 45UV5 -ENGINEERING CODE 00-03 UV TUBE POSITION



Note: To change UV Tube position, pull tube out of eight pin (octal) socket, rotate to desired position, and then insert.

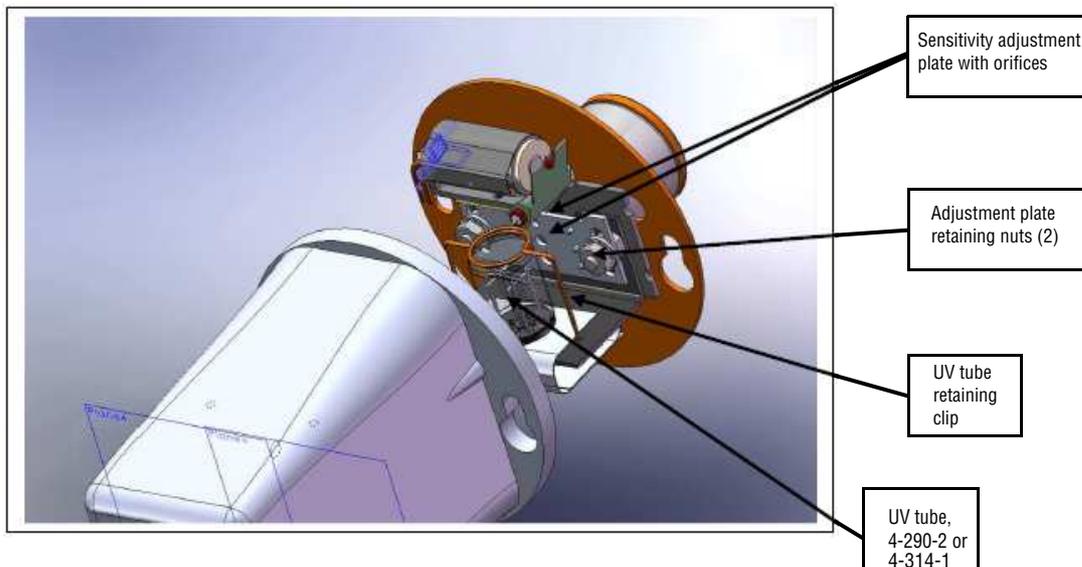
The tube has four different positions. When the electrodes are almost perpendicular to the Terminal Board and approximately parallel to the shutter slot, the detector tube will generate maximum signal. This is the "MAX" position shown in Figure 10. When the electrodes are 90° from the "MAX" position, minimum signal will be generated. The intermediate positions, "A and B" will yield intermediate signals. Position "A" will yield a slightly higher signal than position "B" since more electrode will be exposed to the radiation entering the shutter slot. To adjust the signal further, use the appropriate sensitivity adjustment in the 25SU3 or 25SU5 control. Refer to the control bulletin for further information. **The detector is shipped in the "MAX" signal position.**

If the tube position is changed in the field, and the scanner is later replaced, verify that the signal strength is not excessive.

METHOD 2: 45UV5 SCANNERS WITH ENGINEERING CODE 04 AND HIGHER (built after mid-2008)

The sensitivity is adjusted by changing the position of the orifice plate in front of the p/n 4-290-2 or 4-314-1 UV tube. See Figure 11.

FIGURE 11. 45UV5 -ENGINEERING CODE 04 or HIGHER ORIFICE PLATE POSITION



Sensitivity adjustment - loosen but do not remove the two adjustment plate retaining nuts. Pull orifice plate back toward retaining nuts to detach from locating pins. Slide the orifice plate up toward the shutter coil for more sensitivity or down from the shutter coil for less sensitivity. Position the plate onto locating pins to lock in place. Tighten the adjustment plate retaining nuts.

FIGURE 12. RECOMMENDED SPARE PARTS

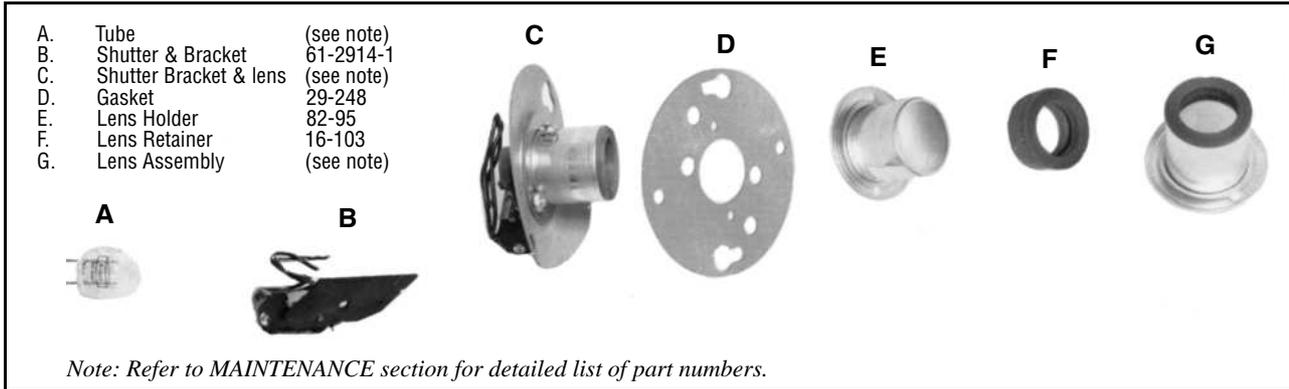


FIGURE 13. ACCESSORIES

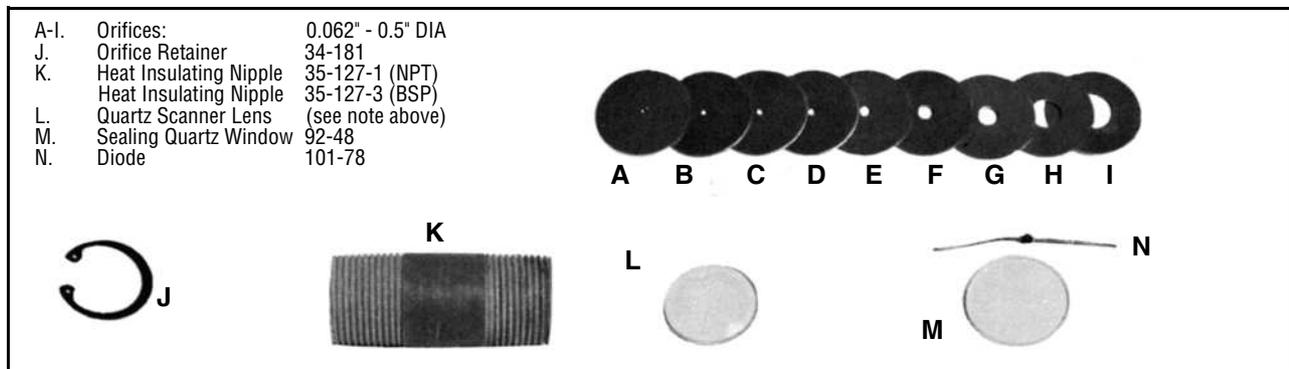
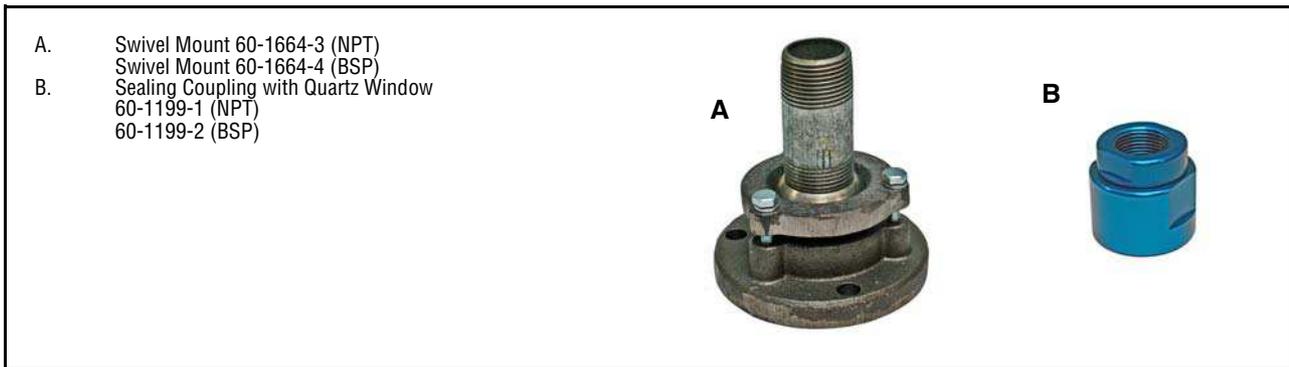


FIGURE 14. ACCESSORIES



ACCESSORIES

Swivel Mount

The scanner swivel mount (P/N 60-1664-3, -4) is used to adjust the scanner sighting angle after the scanner has been installed. The swivel mount is used as indicated in Figures 7 and 8.

Orifices

The orifice is used to restrict field of view (target area), reduce air flow, maintain air block, and increase discrimination between flame and background radiation. The orifice is secured within the ball of a swivel mount with an orifice retainer or the orifice can be placed within a 1 inch union (not provided).

The scanner should ideally sight a target area of 4 to 25 square inches (25-250cm²) of the flame front. The flame front is a plane within the combustion space separating the region of unburned fuel from the burning fuel. For example, if a 1/2 inch diameter orifice is placed within a mounting swivel one foot from the scanner lens, and the swivel mount is located on the surface of a 4 foot deep wind-box, and if the range of stable flame is 5 feet beyond the windbox, the flame front target area is 19.6 square inches as shown in figure 16 below.

ORIFICES

Figure	Qty.	Part Number	Description
13	1	53-121	Orifice Kit: Contains following items:
13A	1	53-121-2	Orifice: Diameter = 0.062"
13B	1	53-121-3	Orifice: Diameter = 0.078"
13C	1	53-121-4	Orifice: Diameter = 0.093"
13D	1	53-121-5	Orifice: Diameter = 0.109"
13E	1	53-121-6	Orifice: Diameter = 0.125"
13F	1	53-121-7	Orifice: Diameter = 0.187"
13G	1	53-121-8	Orifice: Diameter = 0.250"
13H	1	53-121-9	Orifice: Diameter = 0.375"
13I	1	53-121-10	Orifice: Diameter = 0.500"
13J	2	34-181	Orifice Retainer

FIGURE 15. ORIFICE LOCATION

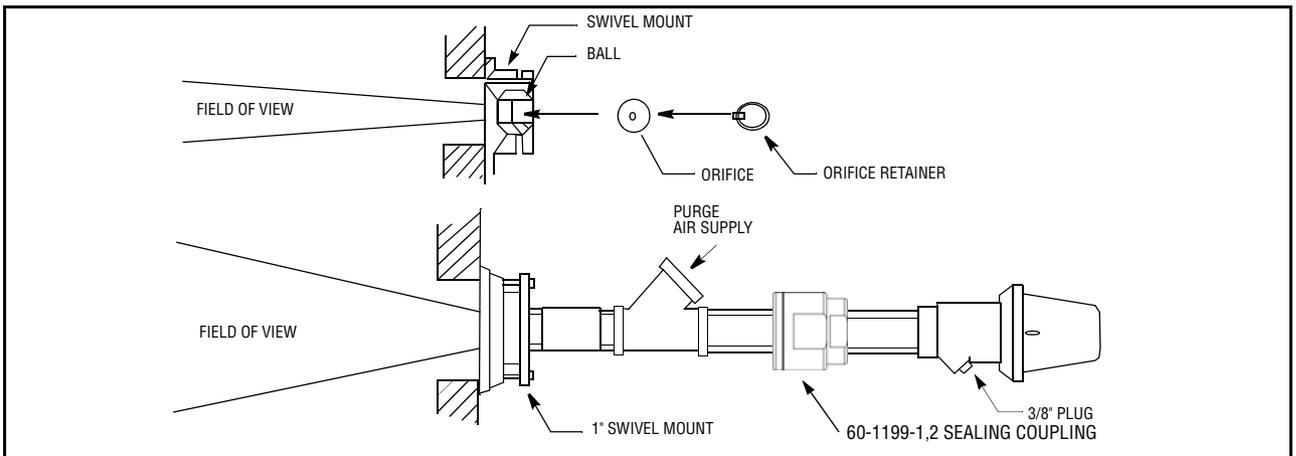
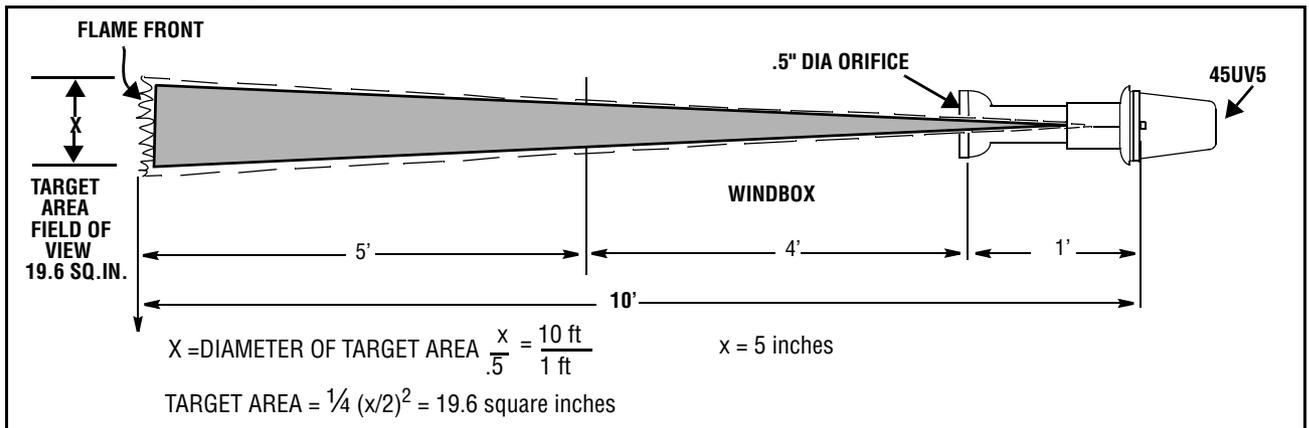


FIGURE 16. SCANNER WITH ORIFICE



Note: There is an inverse relationship between discrimination and sensitivity.

Heat Insulating Nipple

The heat insulating nipple (P/N 35-127-1, -3) is used to prevent heat transfer from the hot sight pipe to the scanner head.



Sealing Coupling with Quartz Window

The sealing coupling, PN 60-1199-x is used whenever a coupling or seal is required for scanner piping. The quartz window blocks furnace pressure, heat, gases and soot from coming in contact with the scanner and contaminating the lens. The size is one inch U.S. standard taper pipe thread (Schedule 40, 1" NPT). When the sealing coupling is used, a 1" wye fitting must be used downstream from it for connection of a purge air supply (plug 3/8" opening).

Electrical Accessories

The diode (101-78) is used whenever a solid state scanner (45RM1, 45RM2, 45RM4, 45FS1, or 45UVFS1) is operated with a Type 45UV5 scanner. Refer to the "Control and Scanner Wiring" section, for further information. Fireeye scanner cable Part No. 59-470 (4 conductors 18 AWG, 2 conductors 22 AWG, common shield) or Part No. 59-471 (4 conductors 18 AWG, 4 conductors 22 AWG, common shield) is used for wiring connections between the scanner(s) and the control terminals. Each wire is color coded for connection as follows:

BLACK	"L" or AC hot terminal.
RED	"1" or shutter terminal.
WHITE	"C" or common terminal.
GREEN	"14" or flame signal terminal.
SHIELD	Connect the shield to terminal C at the control end only. The shield at the scanner end should be left disconnected.
BLUE	Not Used.
YELLOW	Not Used.
BROWN	(59-471 only) Not Used.
ORANGE	(59-471 only) Not Used.

Note: If the application requires only model 45UV5 scanners, specify Fireeye Part Number 59-470 cable. Clip and tape the blue and yellow wires.

MAINTENANCE



CAUTION: Disconnect or shut off electric power when working on scanner.

1. The Fireye (25SU3 or 25SU5) control and scanner should be powered at all times (except for repair, cleaning or replacement) to reduce any harmful effects of atmospheric humidity.
2. The scanner and sight pipe must be kept clean to prevent overheating and assure optical qualities.
3. When replacing or cleaning the UV tube, note the position of the tube electrodes in relation to the rectangular slot in the shutter assembly. Replace tube in the same slot location.
4. Clean the quartz lens with glass detergent or glass cleaning agents which contain no abrasives. After cleaning remove all cleaning films with a soft lint-free cloth.
5. Use original Fireye repair parts to maintain optimum operation

RECOMMENDED SPARE PARTS				
FIGURE	PART NUMBER			DESCRIPTION
	Engineering Code 00-03 (Through mid- 2008)	Engineering Code 04 and 05 (2008 to 2012)	Engineering Code 06 and higher (July 2012)	
12A	4-320-1	4-290-2	4-314-1	UV Tube
12B	61-2914-1	61-2914-1	61-2914-1	Shutter & Bracket Ass'y.
12C	61-2913-1	61-7203	61-7203	Shutter, Bracket, and Lens Ass'y. (includes 61-2914-1).
12D	29-248	29-248	29-248	Flange Gasket
12E	82-95	82-95	82-95	Lens Holder
12F	16-103	16-103	16-103	Lens Retainer (grommet)
13L	46-38	46-179	46-179	Lens
12G	61-2275-2	61-2275-4	61-2275-4	Lens Assembly (includes Holder, Retainer, and Lens)
13M	92-48	92-48	92-48	Quartz Window (Part of Sealing Coupling 60-1199-x)

CONTROL AND SCANNER WIRING

All wiring to the scanner should be rated at 600 volts and 90° C. For runs less than 1000 feet Fireye recommends the use of scanner cable Part No. 59-470 (4 conductors 18 AWG, 2 conductors 22 AWG, common shield) or Part No. 59-471 (4 conductors 18 AWG, 4 conductors 22 AWG, common shield). For runs in excess of 1000 feet, consult the factory. For ease of installation and occasional service, the wires should be routed to the screw terminals in the scanner via a flexible conduit per the following groups. Always refer to the appropriate flame safeguard control bulletin.

Group I Fireye Controls

A blocking diode, Fireye Part Number 101-78, must be used when a solid state type scanner is used in parallel with a UV scanner. Connect the diode in series with the lead from terminal 14 in the UV scanner as shown in Figures 16 and 20. This is to avoid damaging the solid state scanner. If the application requires that only one scanner be in use at any time, the other unit can be removed from operation by breaking the power lead (LA or LB).

Group II Fireye Controls

If the intended use requires that the amplifier input signal come from one of two or more scanners, the power and shutter drive signals should be switched between scanners using a single relay "S" or selector switch. This permits the operation of one scanner at a time. As with Group I amplifiers, the blocking diode is necessary when using the solid state scanner with a UV unit (see Figure 17).

Group III Fireye Controls (non-self-checking type)

With these amplifiers, terminal 1 on the scanner, the self-checking shutter connection, is not used. If more than one scanner is used, power for additional units can be obtained from terminal 1 of the amplifier through a special 0.33 μ F capacitor (Part No. 7-1143) and 1 meg ohm, 1/4 watt resistor. With the connections as shown, the unwanted scanner can be turned off by breaking the power lead at LA or 1A. As with Group I and II amplifiers, the diode must be used when a solid state scanner is used with a UV unit. (see Figure 18).

Group IV Amplifiers (25SU3-5170 Series)

A blocking diode is not required when a solid state scanner is used with a UV unit (See Figure 19).

Notes:

1. Connect the scanner cable shield to terminal C at the control end only; the shield at the scanner end should be left disconnected.
 - Strip six inches of insulation from scanner end of cable.
 - Cut off the six inches of cable shield that is visible.
 - Tape the cable's insulation where it terminates so the cable shield is not visible.
2. Flame amplifier rack, Part Number 60-1706 has a blocking diode between terminals 14A and 14D.

Group V Amplifiers (5000 Series)

A blocking diode, Fireye part number 101-78, must be used when a solid state scanner is used in parallel with a UV scanner. Connect the diode in series with the lead from terminal 14 in the UV scanner as shown in figures 20 and 21.

Group VI Amplifiers (2000 Series)

A blocking diode is not required when a solid state scanner is used with a UV unit (See Figure 22).

FIGURE 17. GROUP I CONNECTIONS

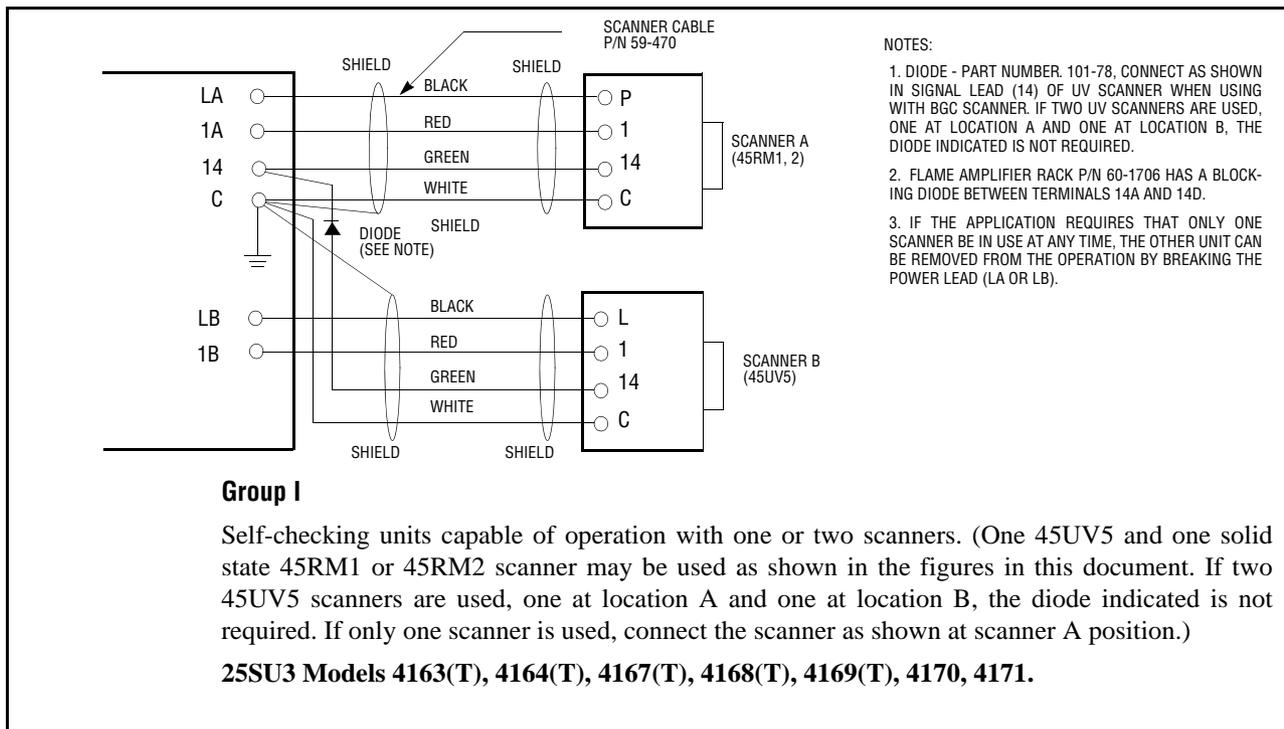


FIGURE 18. GROUP II CONNECTIONS

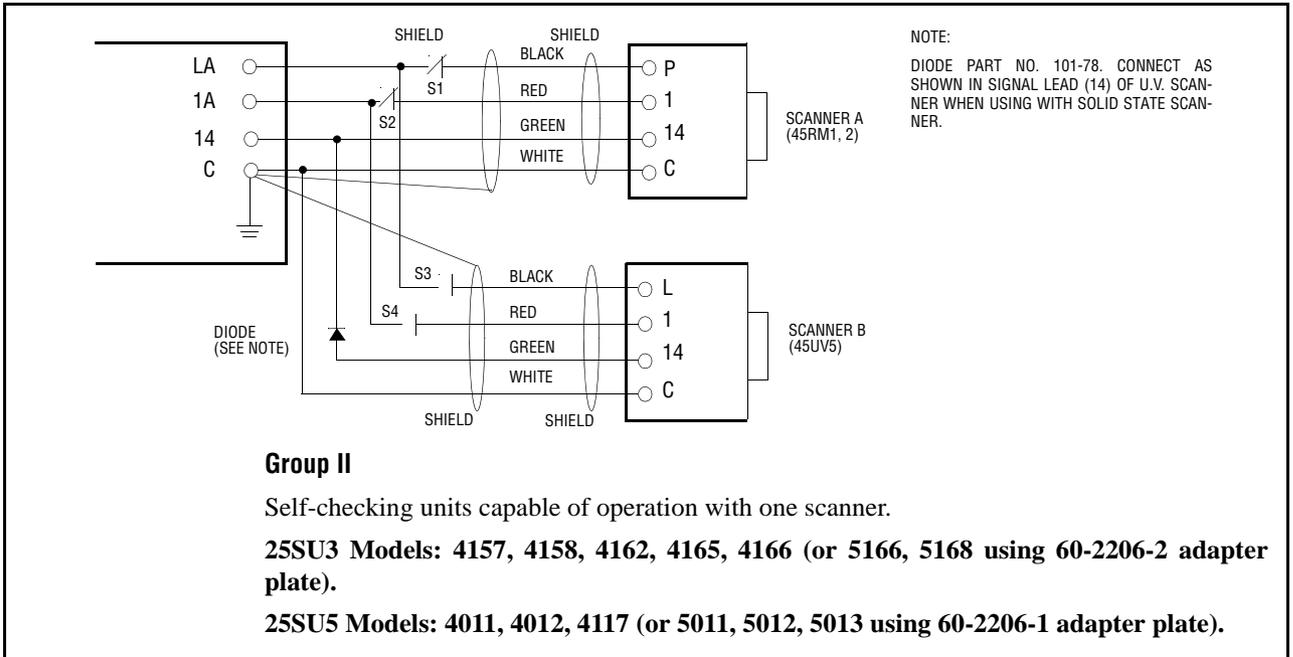


FIGURE 19. GROUP III CONNECTIONS

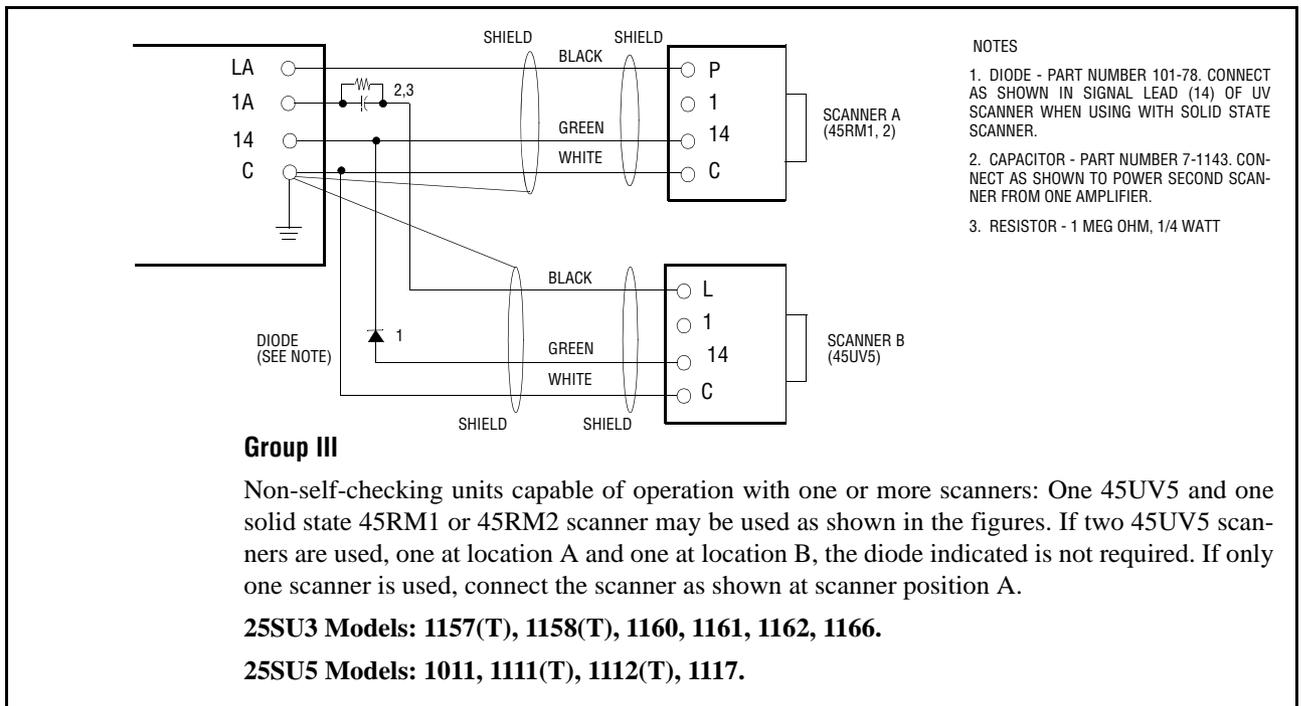


FIGURE 20. GROUP IV CONNECTIONS

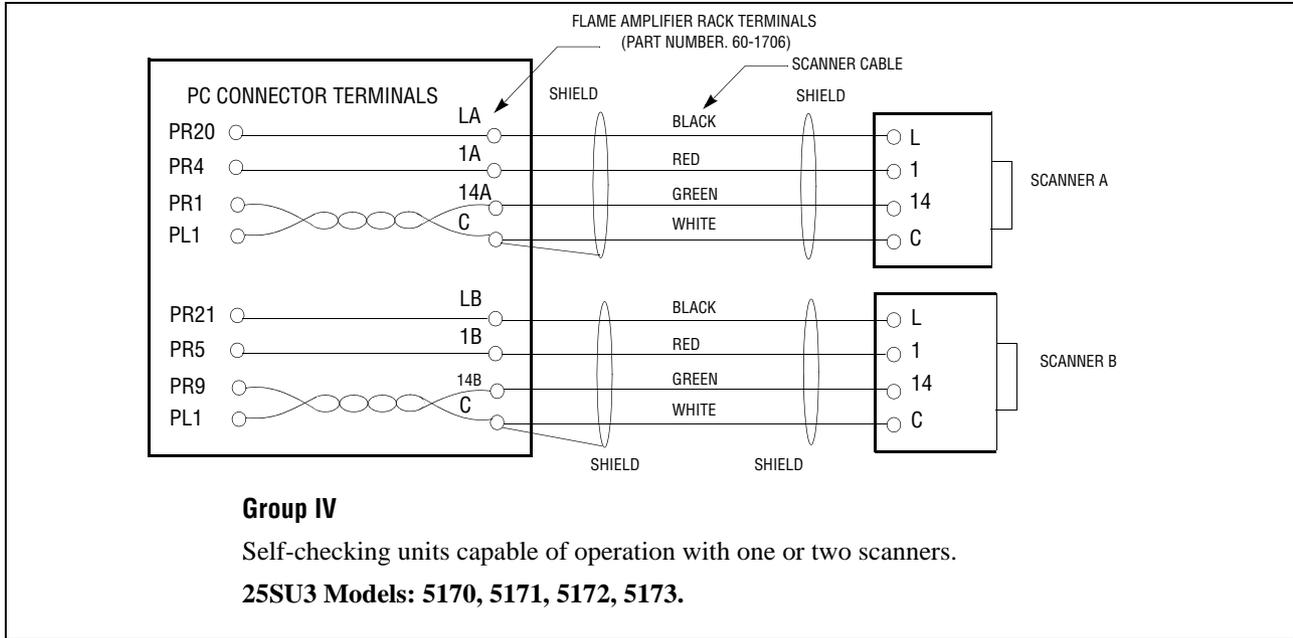


FIGURE 21. BLOCKING DIODE CONNECTIONS

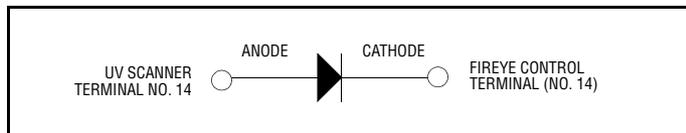


FIGURE 22. GROUP V CONNECTIONS

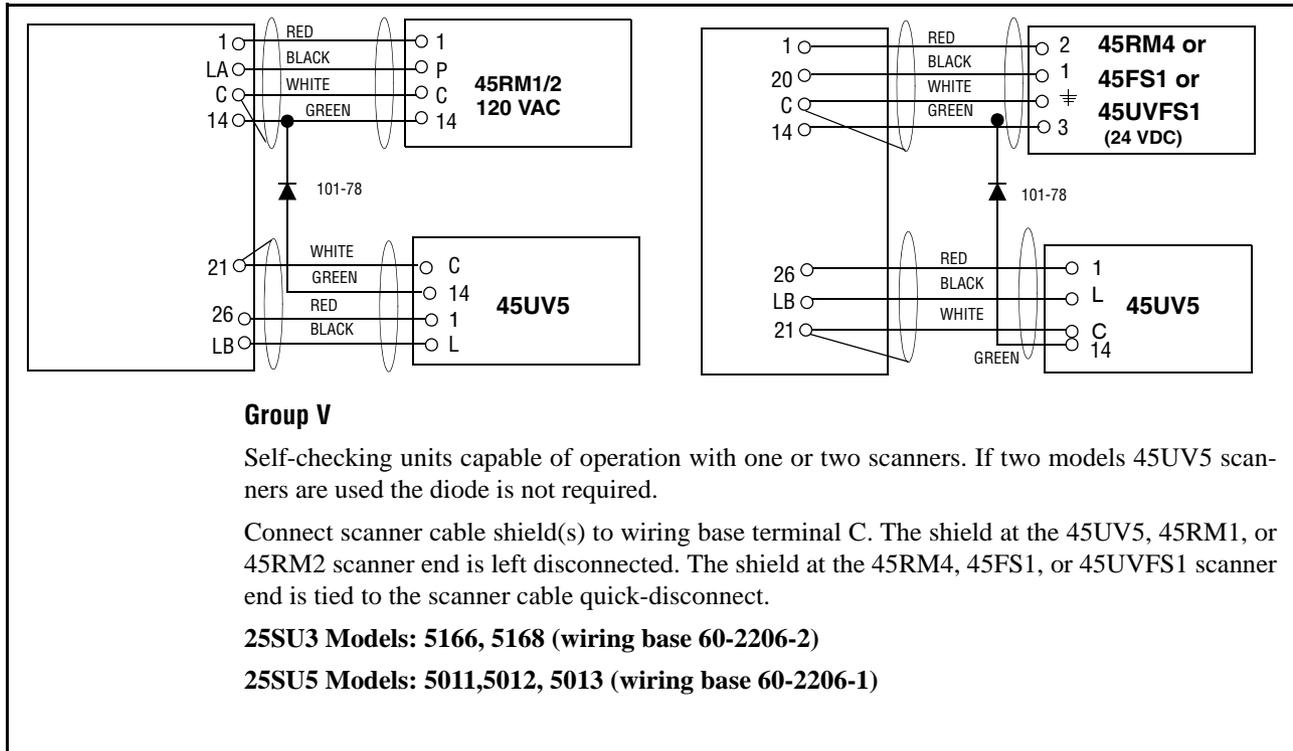
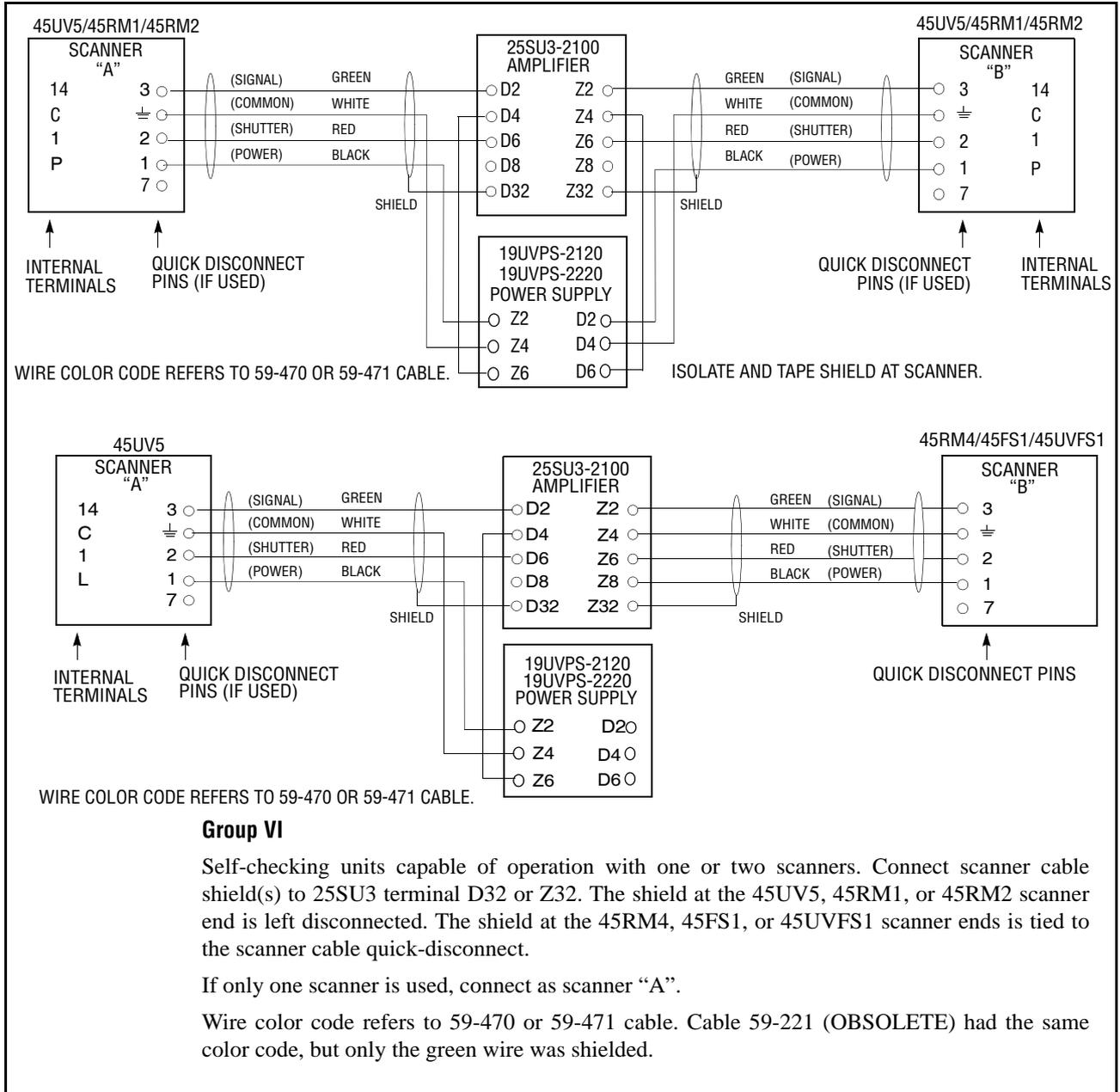


FIGURE 23. GROUP VI CONNECTIONS



Group VI

Self-checking units capable of operation with one or two scanners. Connect scanner cable shield(s) to 25SU3 terminal D32 or Z32. The shield at the 45UV5, 45RM1, or 45RM2 scanner end is left disconnected. The shield at the 45RM4, 45FS1, or 45UVFS1 scanner ends is tied to the scanner cable quick-disconnect.

If only one scanner is used, connect as scanner "A".

Wire color code refers to 59-470 or 59-471 cable. Cable 59-221 (OBSOLETE) had the same color code, but only the green wire was shielded.



45UV5 SCANNER COMPATIBILITY CHART

FIREYE CONTROL		45UV5 MODEL		FIREYE CONTROL		45UV5 MODEL	
TYPE	MODEL	1000, 1010 (60 HZ)	1101, 1103 (50 HZ)	TYPE	MODEL	1000, 1010 (60 HZ)	1101, 1103 (50 HZ)
25SU3	1157(T)	X	X	25SU3	4171	X	X
	1158(T)		X		5166	X	X
	1160	X	X		5168	X	X
	1161		X		5170	X	X
	1162	X	X		5171	X	X
	Series 2000	X	X		5172	X	X
	1166		X		5173	X	X
	4157	X	X		SYSTEM 126	X	X
	4158		X				
	4162	X	X	25SU5	1011	X	
	4163(T)	X	X		1111(T)	X	X
	4164(T)		X		1112(T)		X
	4165		X		1117		X
	4166	X	X		4011	X	X
	4167(T)	X	X		4012		X
	4168(T)	X	X		4117	X	X
	4169T	NOTE 2	NOTE 2		5011	X	X
	4170	X	X		5012	X	X

NOTE 1: Scanner and control frequency must be compatible with frequency of power line.
 NOTE 2: For 25SU3 Model 4169T code 17 and earlier, use 45UV5 Model 1101 or 1103 (50HZ).For 25SU3 Model 4169T code 18 and later use 45UV5 Model 1000 or 1010 (60HZ).
 NOTE 3: With 25SU3-2000 series controls, the 120 VAC to the scanner must be provided by a separate Fireye power supply, or modernization adapter.
 NOTE 4: The AC power source must be sinusoidal for proper scanner operation. The application of any waveform other than a sine wave (e.g. square wave) will damage the 45UV5 scanner.



TROUBLESHOOTING

The following steps should be performed if flame is not detected:

NOTE: *Wear protective filtered lenses when viewing flame.*

1. Check scanner wiring for breaks and proper connections.
2. Look down the sight pipe.
 - Scanner should have an unrestricted view for all firing conditions.
 - The flame's primary combustion zone (first 1/3 of flame) should be within the scanner's field of view for all firing loads.
3. Clean the scanner lens with a glass detergent or glass cleaning agent which contains no abrasives. After cleaning remove all cleaning films with a soft lint-free cloth. (Some cleaning films may reduce or filter UV).
4. Measure voltage across scanner terminals.
 - Between terminals 14 and C there should be 70 VAC pulses of 6 microseconds (use oscilloscope). Between terminals L and C there should be 200 to 250 VAC for units manufactured before 1994. For later units, there should be 130 to 150 VAC.
5. Scanner operation can be checked by aiming the scanner at a source of ultra-violet radiation, (lighter or propane torch). The meter on the associated control should indicate flame.
6. Check to see that an external selector switch is connected to the associated control's sensitivity/threshold select or scanner enable terminals.
7. Reposition scanner so it is properly aligned for best flame signal.
8. If the scanner still does not indicate the presence of flame (DC voltage on Flame Signal Meter) replace the UV tube and repeat steps 4 through 7.



NOTICE

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