G N ELECTRONICS, INC.

SOFTWARE and HARDWARE ENGINEERING
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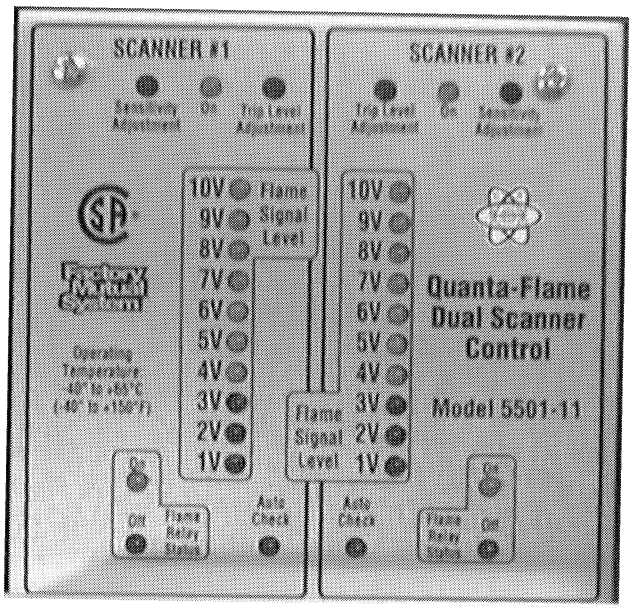
(815) 637-8624 FAX (815) 637-8626

DUAL CHANNEL SELF-CHECKING AMPLIFIER

MODEL #5501-11



USER MANUAL

TERRACENE INTERNATIONAL LTD.

Terracene International Ltd.
Instrumentation Sales, Design, and Service.
#100, 18016 - 105 Ave. Phone: 1-780-443-2299
Edmonton, Alberta Toll Free: 1-888-433-2299
T5S 2P1 Fax: 1-780-484-6074
Web: www.terracene.com e-mail: info@terracene.com

INDEX

A.	**Description**	**3**
B.	**Specifications**	**6**
C.	**Housings**	**8**
D.	**Wiring of card frame & sub-base**	**9**
E.	**Field adjustments**	**10**
F.	**Maintenance**	**11**

DESCRIPTION

1. **Features:**

* Secondary relay contacts & load circuits supervised.
* Individually adjustable trip levels for each channel.
* Individually adjustable sensitivity level for each flame input.
* Individually adjustable nuisance rejection level for each channel.
* Solid state flame signal level indicators.
* Overload protection NO/NC relay outputs supervised.
* Field adjustable trip timing.
* Auto check circuit.
* Optional dual flame "OR" operation.

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2. **Synopsis**

This solid state electronic control is intended for use with Ultra Violet or Infra Red frequency based scanners monitoring all gas, oil and coal fired burners. The control is the basis for industrial or commercial burner management systems using PLC or relay logic.

The control is powered by 120/240V, 50/60HZ power and can be either rack or base mounted. The unit comprises of two independent flame signal monitors and two timed trip detectors. All essential circuits are supervised.

The trip detector and the flame sensitivity levels are field adjustable. The two internal adjustments are done to reject nuisance flame signals by varying the "ON" time delay of the incoming flame signals.

3. **Low Flame Channels**

The processor uses two independent low flame channels to monitor the two scanner inputs. The instantaneous signal level in each channel is indicated by a solid state LED "Flame Signal Level" indicator located on the front plate of the control unit. Terminals to drive remote indicators are available.

Both channels have their own time delay and "Trip Level" adjustments. The output of each channel may be used to energize a remote low flame relay or to provide a logic signal for use in a management system. The "Trip Level" adjustment control determines the threshold or reference voltage to the flame signal detector, below which, the "Low Flame" LED is illuminated and the channel output is at ground (Logic 0) level.

4. Trip Channel

The trip channels are separated from each other. The trip delay is set to 1 second and is accurate to +/- 5%. It can be field set to 2 seconds by cutting jumper W3 for channel #1 and W3/l for channel #2 and to 3 seconds by cutting W3 and W4 for channel #1 and W4/l for channel #2.

A "Trip Level" adjustment control permits the setting of the reference for the trip level detector above which the flame relay may be energized and the "Flame On" LED will be illuminated. A Logic 1 signal is also available to indicate the flame on condition to a management system.

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5. **Flame Relay**

To obtain a fail-safe operation for false relay and relay driver transistor short circuit, two single pole relays are used to drive the load relay. The two relays flip-flop i.e. relay (KFE) is energized and relay (KFD) is de-energized for flame out.

The contacts of these relays are connected in series so that if a relay fails, or a driver shorts, the drive to the load relay will be broken by the normally de-energized relay. A safe start monitor further determines the serviceability of the relays by monitoring the contact closure of both relays in the flame off condition. Should relay failure, or a driver short have occurred, the safe start monitor will inhibit the operation of the flame relay. This condition is indicated by the flame relay status LED.

6. Scanner and Processor Supervision

The control unit supervises the connected flame scanners; it's own processor and auxiliary circuits. Only when all tested functions are normal is the flame relay safe start enabled. The following conditions must be satisfied before the flame relay can be energized.

a. Flame relay must be energized.

b. Shutter oscillator must be running.

c. Flame signal must be above the trip level.

d. The "Dark Signal" must be received when the shutter in the scanner is closed.

e. Regulated positive voltage must be available.

f. The load circuit must have continuity.

g. Flame relay trip delay greater than 0.75 seconds.

h. Safe start signal available at PA-2/B and PA-8/J.

i. Enable signal must be available at PB-6/F and PB-7/H.

7. Output Terminals

All output terminals for management use and remote scanner signal indicators are overload protected. Specifications for current ratings are on the following pages.

SPECIFICATIONS

MECHANICAL:

4.00"w x 4.5"h x 8.0"d (102mm x 115mm x 204mm) Front panel material is 1/8" (3.2mm), 6061 aluminum alloy, anodized finish, with black ornamental silk screening.

ELECTRICAL:

Power supply: 120/240V, 50/60Hz, 0.4/0.2A.

Outputs:

1. Dual SPDT relays with 10 amp maximum into resistive load. Output voltage is 120/240/v, 50/60Hz. Fail-safe for secondary relay drivers failure in open and short circuit modes, and welding of contacts. Each relay circuit has a safe start supervisory monitor that also checks the continuity of the secondary relay circuits.

2. Safe start interlock output. Sinks l50 ma when in safe start condition.

3. Shutter supply is 24V, 150ma maximum.

4. Both scanners remote flame signal indicators – 10V, l ma, 1000 ohms/volt.

5. Both scanners flame signal above trip level – logic signal 12V.

Inputs:

a. Both scanners inputs - 2500 ohms impedance for reception of 12V peak pulses with frequency range of l to 1000Hz.

b. Enable inputs with 45K impedance. Activation voltage required is 8.5V to l5V. This input enables the transfer of the flame relay contacts from a no flame condition when all conditions for safe start are satisfied.

Status Indicators:

Flame **Signal #1 above trip level**	**Green LED.**
Flame Signal #2 above trip level	**Green LED.**
Auto Check #1	**Red LED.**
Auto Check #2	**Red LED.**
Flame Relay On #1	**Green LED.**
Flame Relay On #2	**Green LED.**
Flame Relay Off #1	**Red LED.**
Flame Relay Off #2	**Red LED.**

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Specifications Cont'd.

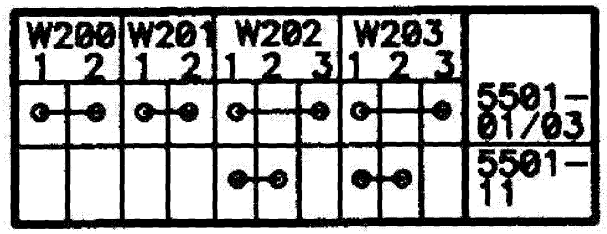
Operating Control:

The controller can operate as two independent channels or as two channels tied together ("OR") for a single relay output.

The control is manufactured as a two- (2) separate channel control. To configure the unit for two (2) input channels with a single control output, cut the following connections on the power module board (Also silk screened on the board for easy identification):

W202: 1—2
W203: 1—2

And jumper these connections:
W200: 1—2
W201: 1—2
W202: 1—3
W203: 1—3



1. Adjust Sensitivity level for full-scale indicators.

2. Adjust Trip level sets threshold to which flame relay will hold.

3. Adjust Signal Nuisance Reject level for which low frequency reflection will not trip the relay (internal adjustment)

Delay Times:

a. Flame relay tripping delay is adjustable to 1, 2, or 3 seconds, +/- 0.2 seconds. Controls are factory set at 1 second.
b. Low flame trip delay is approx. 2 seconds.

Flame Signal Indicators: Solid state with 0 delay. Calibrated in 10 1V steps. Indication is by 10 LEDs - 1 to 3V RED 4 to 6V **YELLOW**, 7 to 10V **GREEN.**

Connectors: All connections are made via 2 - 44 pole card edge connectors with 0.156" (3.87mm) contact spacing.

Environmental: Operating temperature range is -40F to +150F (-40C to +65C)

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HOUSING

The control is designed to be housed in a **VERO SYSTEM 3E card frame** for panel door flush mounting. When base mounting inside a panel is required, control sub-base 5501-10-2 must be used. The control is dropped into the sub-base, which has exposed terminals for ease of wiring.

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WIRING OF CARD FRAME AND SUB-BASE

Card Edge Connection

Card edge connectors to be used are GN ELECTRONICS part #J-004-000l, or equivalent, and are mounted at 3.5" spacing. Wiring connections between card edge connectors and bulkhead connectors are done by the use of wire wrapping techniques. The bulkhead connectors are located on the card frame sidewall. For higher currents use two wires in parallel (28AWG will carry 0.75V and 24AWG will carry 2A) All card edge connector terminals are doubled up for this purpose.

Unused terminals are provided adjacent to power line and high voltage terminals to increase isolation resistance.

Sub-Base Connection

All exposed sub-base terminals accept standard l4AWG wire and connectors. The wiring schematic for the scanners etc. is silk-screened to the sub-base.

Note

All wiring runs to the field on, or near, hot surfaces should be rated for 19SF (90C) or at least SOF (10C) higher than the surface temperature. All system wiring to and from the control and scanner should be run in accordance with the National Electrical Code and all local code requirements.

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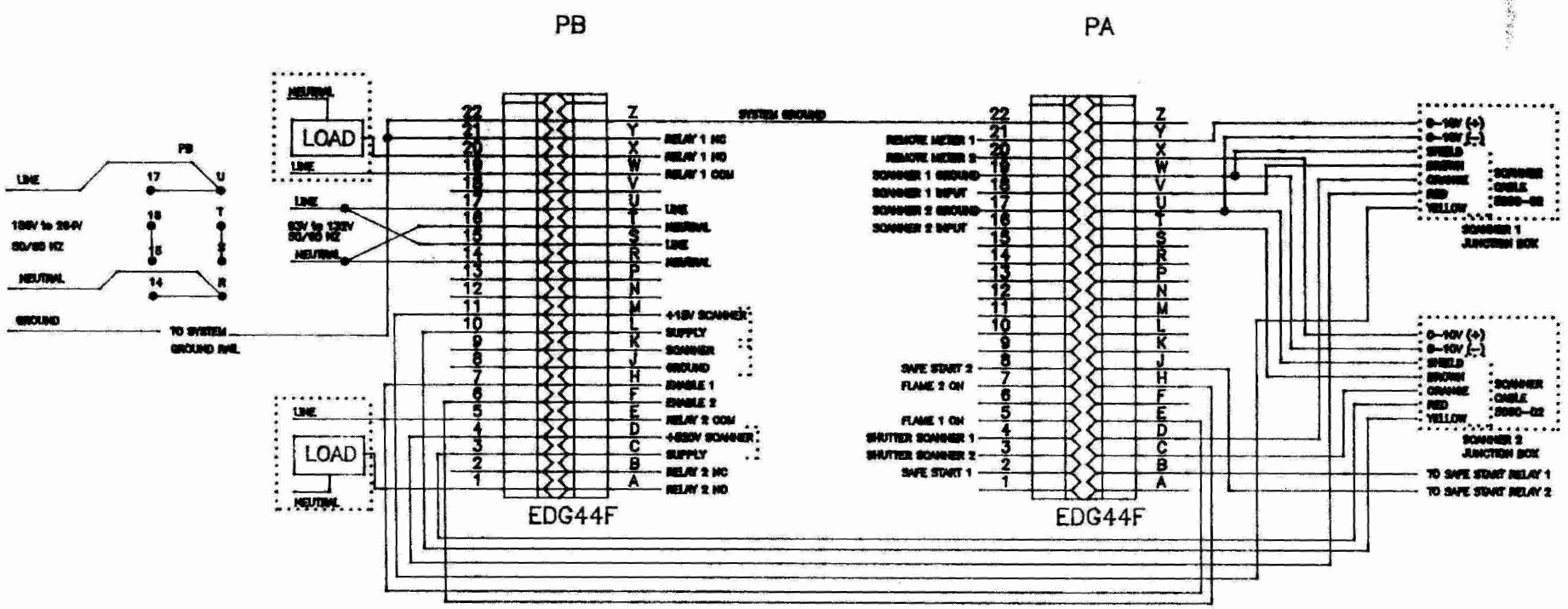
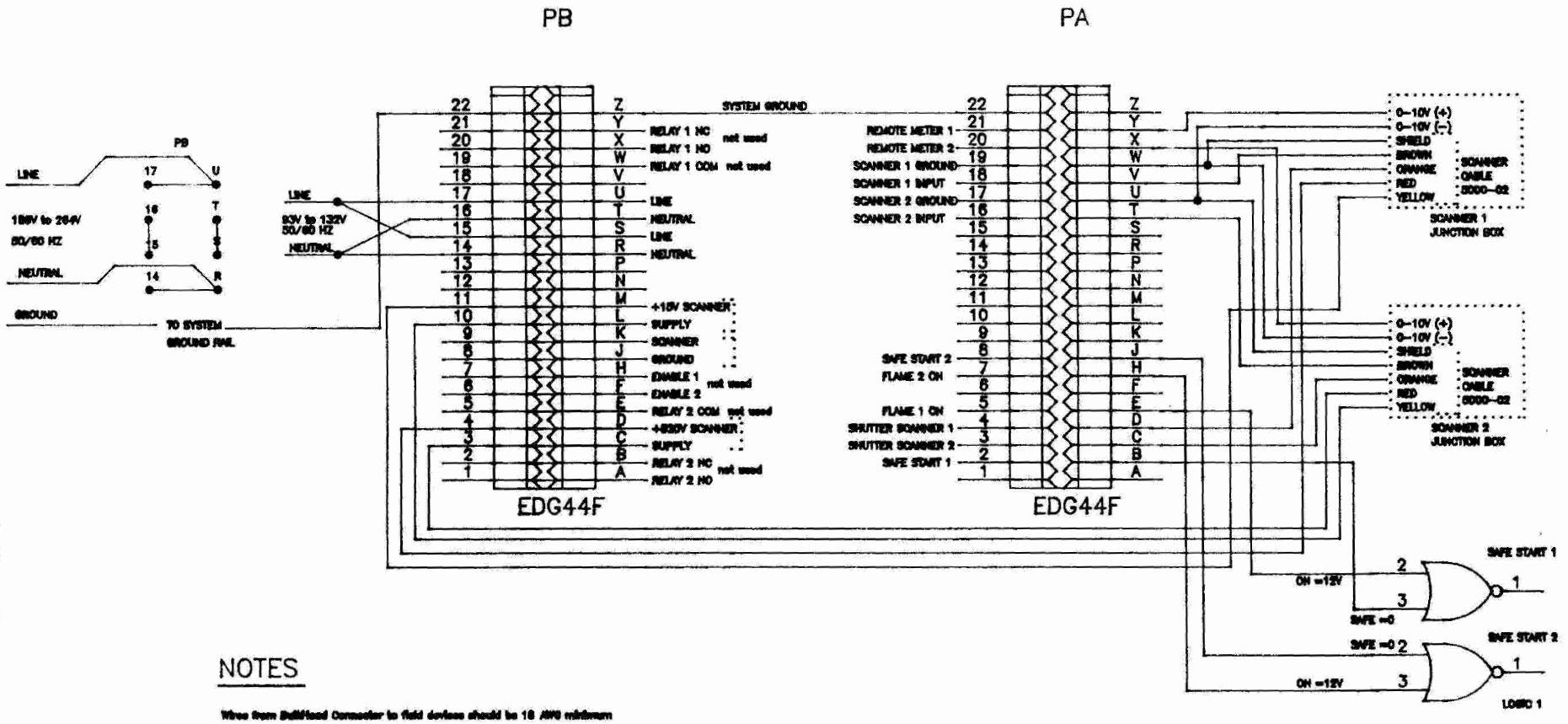


NOTES

Wire from Building Controller to field device should be 18 AWG minimum insulating rating 600V minimum

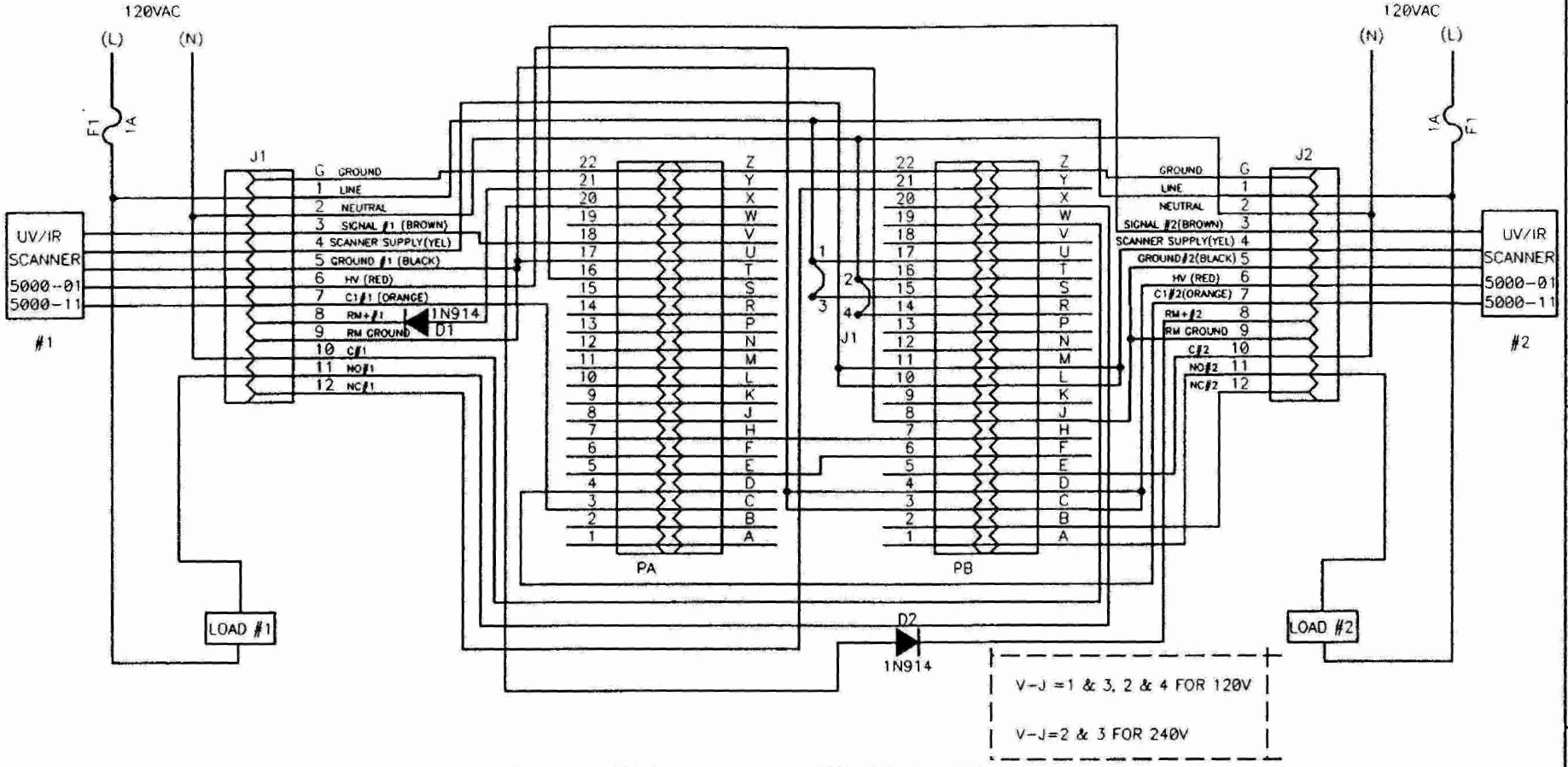
Title	DUAL SCANNER CONTROL UNIT	
Size A	Number 5501–11 RELAY SYSTEM WIRING	Rev 00
Date July, 3, 1990		Drawn by G. Wild
Filename 5501–11		Sheet 1 of 1



NOTES

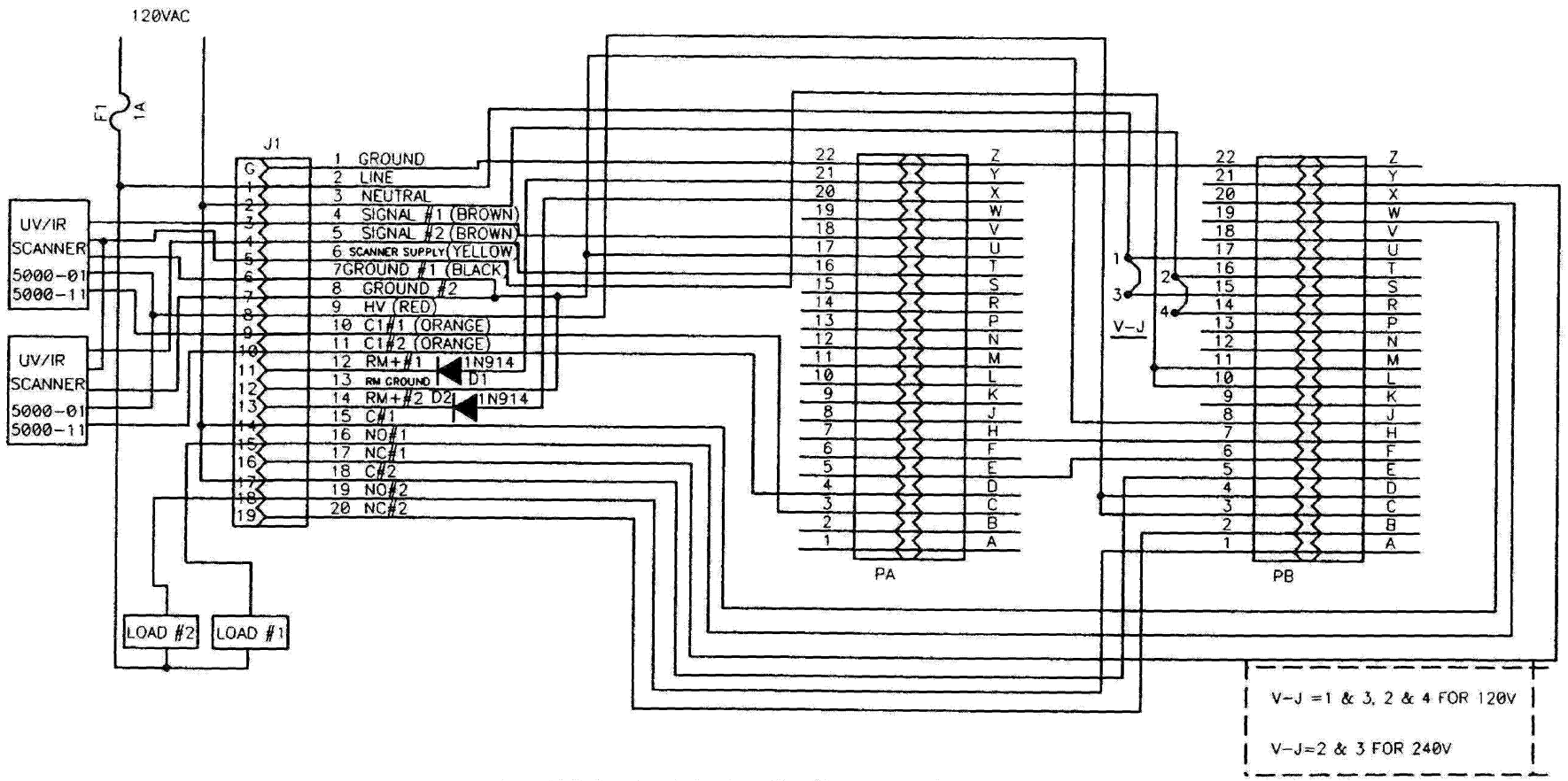
Wires from bulkhead Connector to field devices should be 18 AWG minimum
Insulating rating 600V minimum

Title	DUAL SCANNER CONTROL UNIT	
Size A	Number 5501-11 SOLID STATE SYSTEM WIRING	Rev 00
Date July, 3, 1990		Drawn by G. Wild
Filename 5501-11/1		Sheet 1 of 1



WIRING FOR 5501-11 ONLY

Title	DUAL SCANNER BASE UNIT	
Size A	Number 5501-10-3 WIRING AS 5501-11 BASE	Rev 1
Date Dec. 9, 1996		Drawn by G. Wild
Filename\550110-3\55011013.S01		Sheet 1 of 1



WIRING FOR 5501-11 ONLY

Title	DUAL SCANNER BASE UNIT	
Size A	Number 5501-10-2 WIRING AS 5501-11 BASE	Rev 2
Date Dec. 13, 1992		Drawn by G. Wild
Filename \5501111\55011013.S01		Sheet 1 of 1

FIELD ADJUSTMENTS

Flame Failure Response Time

The control is factory set to 1 second. To set at 2 seconds cut wire loop W4 for channel #1 and W4/1 for channel #2. To set at 3 seconds cut wire loops W3 and W4 for channel #1 and W3/1 and W4/1 for channel #2.

Leave the W1 and W2 loops undisturbed as they are only for factory trimming. All wire loops are centrally located on the processor board, which is the left board when viewed from the front.

Scanner Signal Sensitivity Level

1. Turn the pilot flame on and adjust "**Sensitivity**" to an acceptable level of 8V to 10V.

2. Turn the main flame on and adjust "**Sensitivity**" to an acceptable level of 8V to 10V.

Scanner Signal Trip Level

Using a 1/8" flat screwdriver turn the **"Trip Level"** control fully CCW. Turn the adjacent burner on and adjust the "Trip Level"
control slowly CW until the **"Flame Signal Above Trip Level"** LED extinguishes.

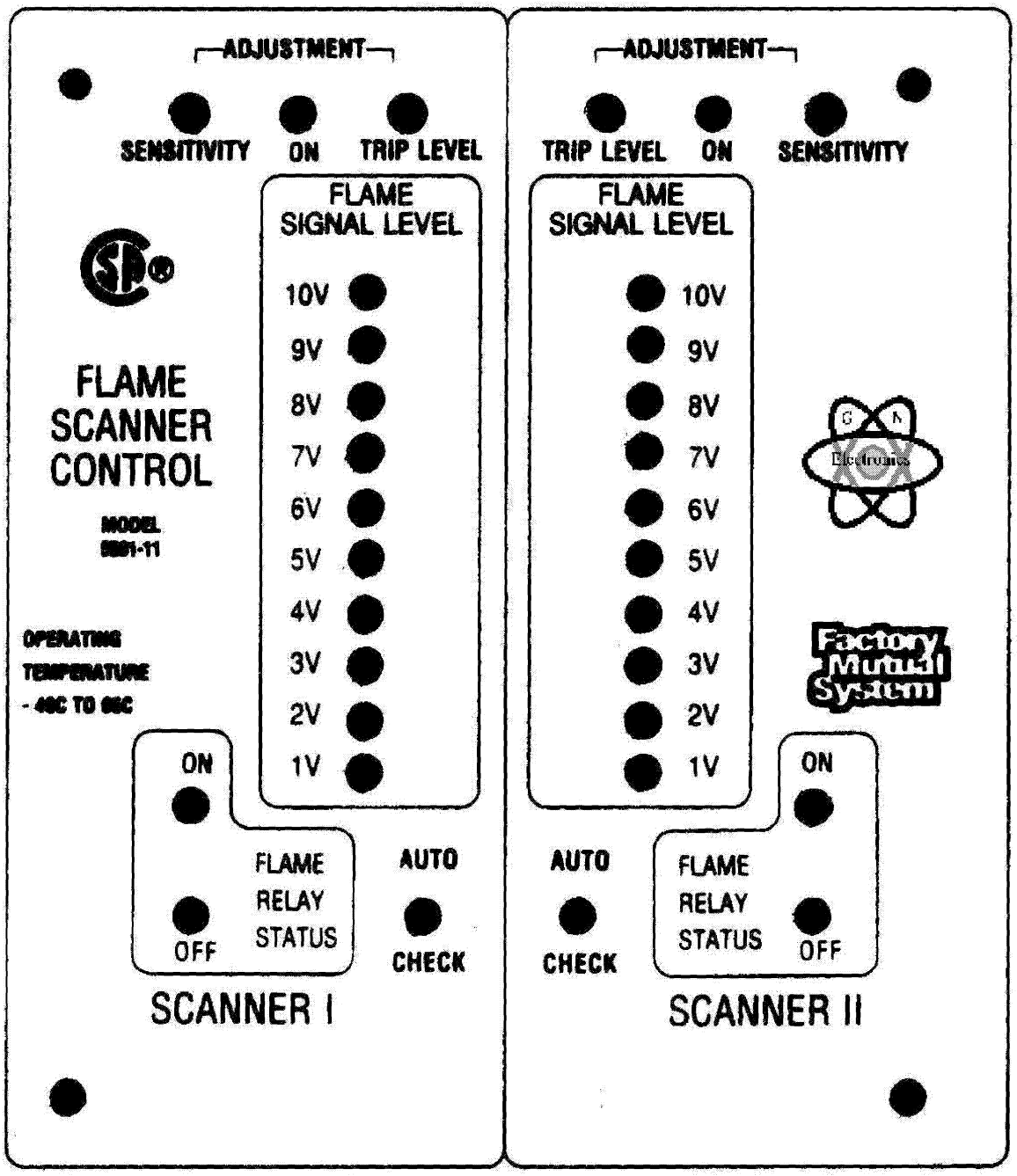
The same steps must be used for setting up both channels.

Scanner Nuisance Flame Adjustment

1. Unplug the control from the system.

2. Adjust the internal controls on the processor board fully CW for no rejection - R4 for channel #1 and R4/1 for channel #2.

3. Adjusting the internal controls CCW will increase the response time and thereby reject nuisance signals from the furnace.



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MAINTENANCE

As the control is completely solid state no routine maintenance is required. However, system adjustments should be checked at least once a year, or when the fired unit is shut down.

Defective controls should be returned to **GN ELECTRONICS, INC** for repair. Controls should be well packed in a suitable container encased in appropriate stuffing.

All controls should be shipped **prepaid to:**

GN ELECTRONICS, INC
9958 N. ALPINE ROAD
UNIT 104
MACHESNEY PARK, IL 61115

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