SPECTROLAB

A BOEING COMPANY

SX-16 Nightsun® Searchlight
Safety and Service Bulletin # SL0600-01

Issued Date: 06/22/00
Amended Date: 01/13/2010

WARNING: TO AVOID A POTENTIALLY DANGEROUS SITUATION WHICH COULD CAUSE PROPERTY DAMAGE AND OR PERSONAL INJURY, ENSURE THAT THE AFFECTED MATERIAL IS INSPECTED AND / OR REPLACED AS DESCRIBED IN THIS BULLETIN.

Subject: SX-16 Nightsun® Junction Boxes

Affected Products:

All SX-16 Nightsun® Junction Boxes P/N 020706, revisions up to and including Rev W. The Junction Box is the power distribution box for the SX-16 Nightsun® Searchlight System.

Dear Valued Customer of the SX-16 Nightsun® Searchlight:

Under certain operational conditions, diodes CR4 and CR5 in the junction box can malfunction causing an abnormal state of continuous conduction while the searchlight is in operation. If this happens, the diode's wiring will be severely overloaded, causing the wire to overheat and generate smoke. We have incorporated a retrofit kit and detailed instructions to resolve the condition (refer to attached document # 032401). Compliance will encompass operational enhancement with respect to reliability and durability through operational requirements.

Spectrolab, Inc.
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What you should do:

Contact Spectrolab upon receipt of this service letter to order the applicable material for compliance. Please provide part and serial number(s) of the affected Junction Boxes and Spectrolab will send to you all necessary material in kit form. Upon receipt of material, comply with the service procedure described within the attached document # 032401. Subject document will guide you through the inspection and material replacement process. If you require that Spectrolab perform this service for you, please contact our Customer Service Department at 1-800-936-4888 for instructions and a return authorization number.

What is included with this bulletin:

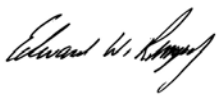
1. Document #SL0600-01 – (This letter)

2. Document #032401 – Safety Diode And Fuse Addition/Retrofit To SX-16 Junction Boxes P/N 020706

Compliance:

At aircraft's next major inspection interval, but no later than four months from receipt of material.

On behalf of Spectrolab I apologize for any inconvenience as a result of this publication.
If you have any questions or comments, please contact our Customer Service Department.



Sincerely,

Ed Ringo
Marketing Manager
Spectrolab, Inc.
(818) 898-2881
(818) 365-7680 Fax

SUBMIT TO CUSTOMER?	
YES	APPROVAL ☐
	Review/Info ☐
	No. of Copies: _____
NO	☒
	INITIALS: KF

Title

SAFETY DIODE AND FUSE ADDITION/ RETROFIT TO SX-16 JUNCTION BOXES P/N 020706

Effective for

All Revisions through Rev W

PREPARED BY: (Signature On File)
Project Engineer

APPROVED: (Signature On File)
ISP Engineering Supervisor

APPROVED: (Signature On File)
Marketing

APPROVED: (Signature On File)
Quality Assurance

CHANGE RECORD

REV	AUTHORIZATION	CHANGE DESCRIPTION	APPROVAL
N/C	K. Fricke 6/23/00	Initial Release	C. Patton 6/30/00
A	K. Fricke 8/29/00	Revised Per ECO	C. Patton 8/31/00
B	K. Fricke 8/29/00	Revised Per ECO	Y. Ramirez 8/26/02

Table of Contents

SAFETY DIODE AND FUSE ADDITION/ RETROFIT
TO SX-16 JUNCTION BOXES P/N 020706

1. SCOPE

This document applies to all SX-16 Junction Boxes, P/N 020706, revisions up to and including Rev W.

2. INTRODUCTION AND PURPOSE

Under certain conditions one of the pair of 1N1187 diodes (see Figure 1) in the booster assembly can enter an abnormal state of continuous conduction while the searchlight is running. If this happens, the diode's wiring will be severely overloaded. This can cause the wire to overheat and generate smoke.

To eliminate this condition, an extra diode and in-line 15 amp slow-blow fuse are added to the Junction Box circuitry. The diode raises the threshold for the 1N1187 diodes to begin conducting, and the fuse is there as a redundant safety element.

This document explains how to install the new components and modify the wiring as needed.

3. RESPONSIBILITY

It is the responsibility of the aircraft maintenance supervisor to insure these instructions are followed. It is the responsibility of Spectrolab's Illumination Systems Engineering Department to update this document as needed if and when changes are made to the hardware discussed in the document.

4. DEFINITIONS (DOES NOT APPLY)

5. REFERENCE DOCUMENTS

Procedure 032384, "Installation Wiring Instructions for SX-16 Junction Boxes p/n 020706, Rev V and higher, manufactured after March 1, 1999 may be referred to for those boxes.

⚠ WARNING

LETHAL VOLTAGES EXIST IN COMPONENTS

Junction Box components contain hazardous AC and DC voltages up to 150 volts when powered.

To reduce risk of death or serious injury:

- Read and follow all instructions
- Junction Box should never be opened nor work performed on components inside except by properly trained personnel
- Use only properly operating test equipment rated for these voltages
- Disconnect aircraft battery and/or de-energize 28 VDC bus before opening Junction Box
- If power is restored while Junction Box is open treat all components as live
- Do not touch live components with bare hands or conductive tools
- Never leave live open Junction Box unattended

6. PROCEDURE

6.1 PARTS INCLUDED

The following parts are included with this installation kit.

Part Number	Quantity	Description
032401-1 (consisting of)	1	
1N1187R	1	Diode
032360	1	Diode Bracket
155020U	1	Fuse Holder
313015	1	15 Amp Slow Blow Fuse
Mil-W-22759/16-16-4	2 ½ ft	Wire
R4266F	1	Ring Lug
M23053/5-105-0	1 in	3/16” Heat shrink Tubing,
MS21919WH-6	1	Clamp
NP5115	1	Wire Pigtail
032361	1	Diode Bracket Key
TYB2315MX	7	Wire Ties
032401-2	1	Nameplate

6.2 TOOLS REQUIRED

The following tools are the minimum required to open the Junction Box, make the changes and close the Box. Identifying additional tools needed to gain access to the Junction Box are the technician's responsibility.

1. Number 2 Phillips screwdriver, medium length
2. 3/8" combination end wrench
3. 5/32" Allen wrench
4. 5/8" 6 or 12 point socket wrench, ratchet driver and 2" to 6" extension

6.3 TURN OFF POWER

Turn off power, open Junction Box and determine which part of these instructions to follow for your Junction Box.

1. Remove or de-energize 28 VDC power to the Junction Box.

2. Remove seats or panels, if needed, to gain full access to the Junction Box. If access to the Junction Box is extremely limited, it may be necessary to remove it from the aircraft to add the additional components.

The following steps will describe the retrofit as if the Junction Box were still in the aircraft and it has good accessibility.

3. Deactivate the 70 amp circuit by pulling out the breaker on the end of the Junction Box.

4. Remove the four Phillips pan head screws holding the cover onto the Junction Box.

5. Lift the cover off the Junction Box and rotate it so the components on the inside are facing up. Move the cover to one side of the Junction Box so the booster assembly mounted on the cover is fully accessible. Make sure the red and black light-gauge (AWG 18) wires are not being put under tension at this time.

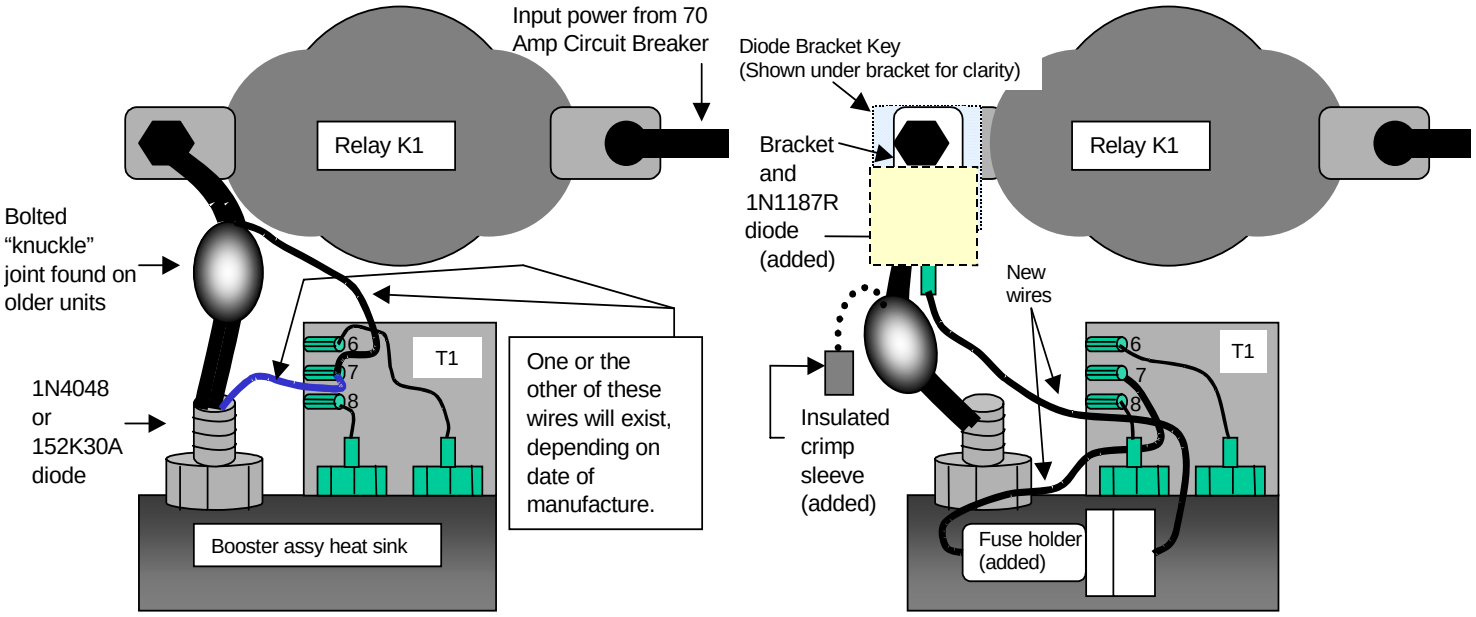
6. Depending on the date of manufacture of the Junction Box and the booster assembly, the Junction Box internal wiring will have one of three variations. They are described below, and the procedure for each variation will be explained.

7. The actual procedure involves removing the 18 gauge wire which connects the (+) end of the large diode attached to the booster heat sink to Terminal 7 of the booster's Transformer T1. In place of that wire you will install a bracket-mounted diode onto the main power relay K1, an in-line fuse holder and fuse, and attach the pre-connected wires. Figure 1 is a sketch showing the "before" and "after" conditions. A diode bracket key is provided to prevent the new diode assembly from rotating while this assembly is being tightened.

8. On Junction Boxes with Revision Letter "U" and earlier, you will find a 6" length of Convolex ® tubing attached to the middle of the power diode lead. This tubing covers a bolted "knuckle" joint which is covered with heat shrink tubing and has an AWG 18 red wire coming out of the heat shrink tubing. The AWG 18 wire runs to Terminal 7 of transformer T1 (see Figure 1). Follow steps in Section 6.3 for these units.

9. On Junction Boxes with Revision Letter "V", the AWG 18 lead comes directly out of the power diode and goes to Terminal 7 of transformer T1. Follow steps in Section 6.4 for these units.

10. On Junction Boxes with Revision Letter "W", the AWG 18 wire is attached to the power diode via a ring lug attached to the stud on the top of the diode. Follow steps in Section 6.5 for these units.



Configuration before making changes

Wiring to Transformer T1's center tap (#7) before updates are made. Several configurations exist. The single wire to the center tap may come from (a) the "knuckle" bolted joint in the middle of the diode lead or (b) from the base of diode's flex lead, or (c) be attached via a ring lug under the diode's threaded stud. If the lead comes from the "knuckle" joint, it will be covered with heat shrink tubing and Convolex ® tubing. Convolex tubing is not shown in this sketch.

Wiring after adding new diode and fuse holder

Original lead to T1 center tap (#7) has been removed from the transformer, cut short, and terminated with an insulated crimp sleeve. The loose terminated end is anchored to the main diode lead with a cable tie. On units with serial number 3307 and up, completely remove the wire. New diode, mounting bracket, diode bracket key, fuse holder and wires are added in place of removed wire to T1. Convolex ® tubing covering the heavy main diode lead may need to be removed to access the wire which will be clipped. Replace Convolex tubing and secure over main diode wire after changes have been made.

Figure 1 Wiring before and after additions

6.4 PROCEDURE FOR JUNCTION BOXES REVISION "U" AND EARLIER

1. Remove the Convolex ® tubing from the diode lead.

2. Loosen the screw and remove the red wire from Terminal 7 of transformer T1.

3. Cut this wire approximately 1" (25 mm) from where it exits the shrink tubing in the "knuckle" joint.

4. Slip the wire pigtail (supplied with retrofit parts kit) over the cut end of the wire and crimp it in place. Secure the wire near the cut end to the diode lead with one wire tie.

5. Reinstall the Convolex tubing, centered over the knuckle joint, with 3 more wire ties. The Convolex tubing should completely cover the cut wire with the crimp sleeve installed.

6. Install the in-line fuse holder and its mounting clamp as shown in Figure 2. To do this, remove the screw, nut, and both the flat and lock washers, which hold the heavy wire in place from the existing assembly. Hold the hex nut with a 3/8" end wrench and remove the screw with the 5/32" Allen wrench. To add the fuse holder, put one of the flat washers previously removed under the screw head, slide the ring lug with the heavy wire previously removed on the screw shaft, and put the clamp on the screw. Insert the screw into the hole in the heat sink and replace the washers and nut. When the fuse holder is positioned in the clamp exactly as shown in Figure 2, tighten the screw fully. After tightening the screw, verify the fuse holder is secure in the clamp. Figure 3 shows the details of the screw, washers, etc.

7. Remove the 5/8" hex nut fastening the end of the heavy wire, marked K1A2 from power terminal A2 of power relay K1. This is the terminal nut farthest away from the 70 amp circuit breaker. See Figure 4.

8. With the nut removed, examine the ring lug at the end of the wire as it is resting on the 3/8" stud. If the lug is not oriented with the flat side up, remove it from the stud, give the wire a 1/2 turn twist and put it back on the stud, flat side up.

9. Install the new ***1N1187R*** diode with mounting bracket onto Terminal A2. Install the diode bracket key so the U-shape straddles the diode bracket. This will prevent the diode bracket from rotating as this assembly is tightened on the main relay. Install the split lock washer and the nut onto the stud. Position the diode, bracket, and key as shown in Figure 4**.** Fully tighten the 5/8" hex nut. Verify the bracket and heavy wire are tight by trying to move them by hand. The bracket must not touch the inside wall of the Junction Box housing under any circumstances.

10. Connect the other wire from the fuse holder to Terminal 7 of transformer T1.

11. Install two more wire ties on the wires, as shown in Figure 5.

12. Reinstall any other wiring removed or disconnected to gain access to the diode wiring.

13. Verify all connections are tight.

14. Replace Junction Box cover. Install cover per "Installation Wiring Instructions for SX-16 Junction Box", if your Junction Box falls into this category. Be sure to route high current wire behind large blue capacitor to prevent it from being pinched.

15. Perform full operational check of Junction Box and searchlight system prior to returning aircraft to flight worthy status.

6.5 PROCEDURE FOR JUNCTION BOXES REVISION "V"

1. Loosen the screw and remove the red wire from Terminal 7 of transformer T1.

2. Cut this wire approximately 1" (25 mm) from where it comes out of the base of the heavy braided power diode wire.

3. Slip the wire pigtail (supplied with retrofit parts kit) over the cut end of the wire and crimp it in place. Secure the wire near the cut end to the diode lead with one wire tie.

4. Install the in-line fuse holder and its mounting clamp as shown in Figure 2. To do this, remove the screw, nut, and both the flat and lock washers, which hold the heavy wire in place from the existing assembly. Hold the hex nut with a 3/8" end wrench and remove the screw with the 5/32" Allen wrench. To add the fuse holder, put one of the flat washers previously removed under the screw head, slide the ring lug with the heavy wire previously removed on the screw shaft, and put the clamp on the screw. Insert the screw into the hole in the heat sink and replace the washers and nut. When the fuse holder is positioned in the clamp exactly as shown in Figure 2, tighten the screw fully. After tightening the screw, verify the fuse holder is secure in the clamp. Figure 3 shows the details of the screw, washers, etc.

5. Remove the 5/8" hex nut fastening the end of the heavy wire, marked K1A2 from power Terminal A2 of power relay K1. This is the terminal nut farthest away from the 70 amp circuit breaker. See Figure 4.

6. With the nut removed, examine the ring lug at the end of the wire as it is resting on the 3/8" stud. If the lug is not oriented with the flat side up, remove it from the stud, give the wire a 1/2 turn twist and put it back on the stud, flat side up.

7. Install the new ***1N1187R*** diode with mounting bracket onto Terminal A2. Install the diode bracket key so the U-shape straddles the diode bracket. This will prevent the diode bracket from rotating as this assembly is tightened on the main relay. Install the split lock washer and the nut onto the stud. Position the diode, bracket, and key as shown in Figure 4. Fully tighten the 5/8" hex nut. Verify the bracket and heavy wire are tight by trying to move them by hand. The bracket must not touch the inside wall of the Junction Box housing under any circumstances.

8. Connect the other wire from the fuse holder to Terminal 7 of transformer T1.

9. Install two more wire ties on the wires, as shown in Figure 5.

10. Reinstall any other wiring removed or disconnected to gain access to the diode wiring.

11. Verify all connections are tight.

12. Replace Junction Box cover. Install cover per "Installation Wiring Instructions for SX-16 Junction Box", if your Junction Box falls into this category. Be sure to route high current wire behind large blue capacitor to prevent it from being pinched.

13. Perform full operational check of Junction Box and searchlight system prior to returning aircraft to flight worthy status.

6.6 PROCEDURE FOR JUNCTION BOXES REVISION "W"

1. Loosen the screw and remove the red AWG 18 wire from Terminal 7 of transformer T1.

2. Loosen the nut and remove the other end of the AWG 18 red wire from the stud terminal of the power diode on the booster heat sink. (See Figure 6).

3. Replace, if needed the AWG 6 wire onto the stud of the booster power diode. Reinstall the nut and tighten fully.

4. Install the in-line fuse holder and its mounting clamp as shown in Figure 2. To do this, remove the screw, nut, and both the flat and lock washers, which hold the heavy wire in place from the existing assembly. Hold the hex nut with a 3/8" end wrench and remove the screw with the 5/32" Allen wrench. To add the fuse holder, put one of the flat washers previously removed under the screw head, slide the ring lug with the heavy wire previously removed on the screw shaft, and put the clamp on the screw. Insert the screw into the hole in the heat sink and replace the washers and nut. When the fuse holder is positioned in the clamp exactly as shown in Figure 2, tighten the screw fully. After tightening the screw, verify the fuse holder is secure in the clamp. Figure 3 shows the details of the screw, washers, etc.

5. Remove the 5/8" hex nut fastening the end of the heavy wire, marked K1A2 from power terminal A2 of power relay K1. This is the terminal nut farthest away from the 70 amp circuit breaker. See Figure 4.

6. With the nut removed, examine the ring lug at the end of the wire as it is resting on the 3/8" stud. If the lug is not oriented with the flat side up, remove it from the stud, give the wire a 1/2 turn twist and put it back on the stud, flat side up.

7. Install the new ***1N1187R*** diode with mounting bracket onto Terminal A2. Install the diode bracket key so the U-shape straddles the diode bracket. This will prevent the diode bracket from rotating as this assembly is tightened on the main relay. Install the split lock washer and the nut onto the stud. Position the diode, bracket, and key as shown in Figure 4. Fully tighten the 5/8" hex nut. Verify the bracket and heavy wire are tight by trying to move them by hand. The bracket must not touch the inside wall of the Junction Box housing under any circumstances.

8. Connect the other wire from the fuse holder to Terminal 7 of transformer T1.

9. Install two more wire ties on the wires, as shown in Figure 5.

10. Reinstall any other wiring removed or disconnected to gain access to the diode wiring.

11. Verify all connections are tight.

12. Replace Junction Box cover. Install cover per "Installation Wiring Instructions for SX-16 Junction Box", if your Junction Box falls into this category. Be sure to route high current wire behind large blue capacitor to prevent it from being pinched.

13. Perform full operational check of Junction Box and searchlight system prior to returning aircraft to flight worthy status.

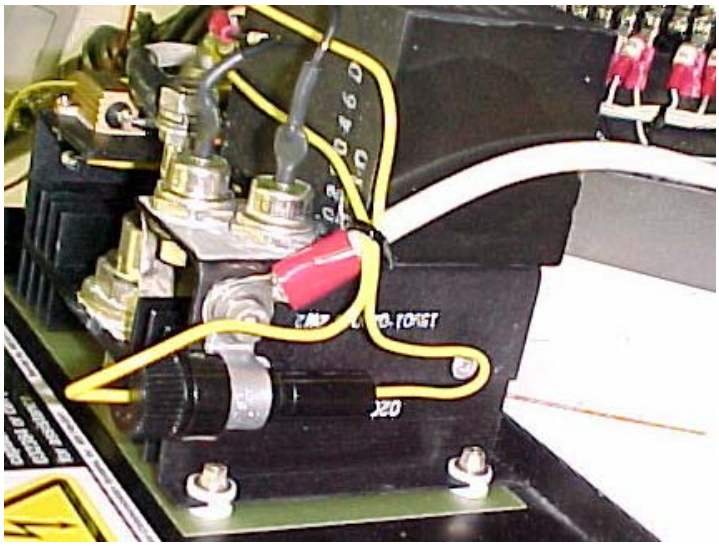


Figure 2 Booster assembly with fuseholder installed

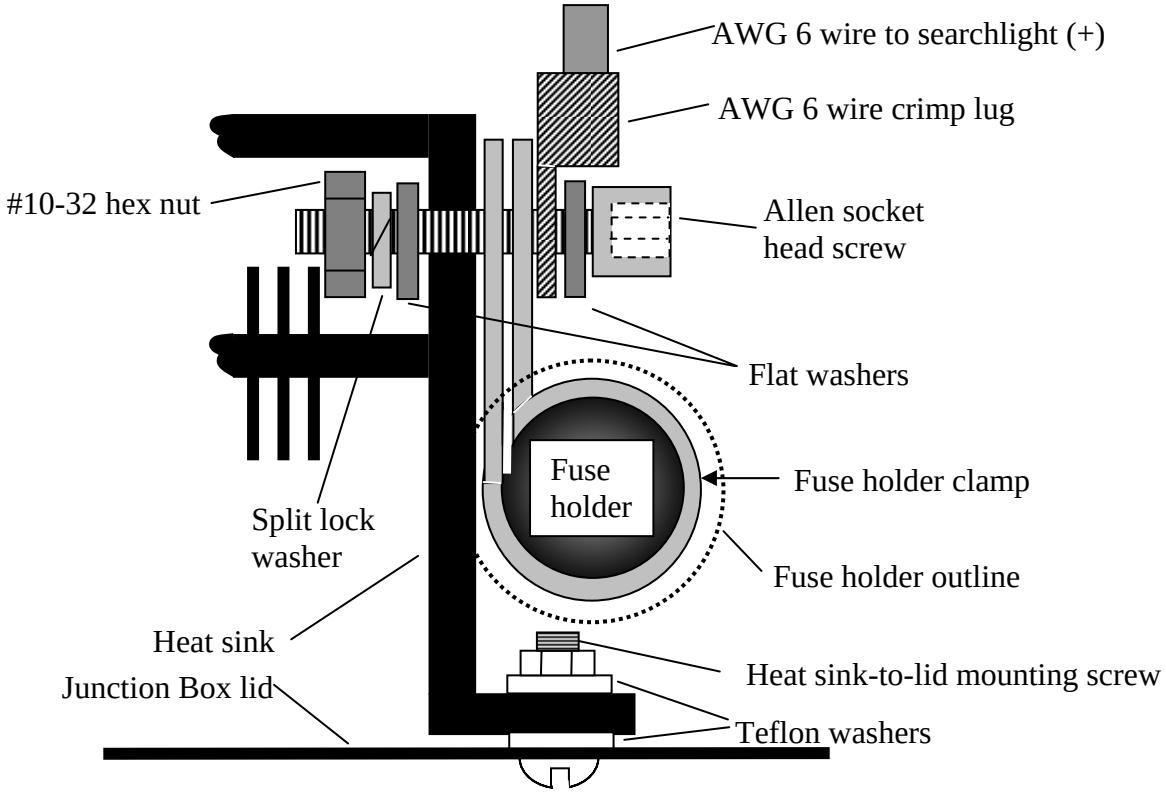


Figure 3 Detail of heat sink, fuse holder, clamp and fasteners

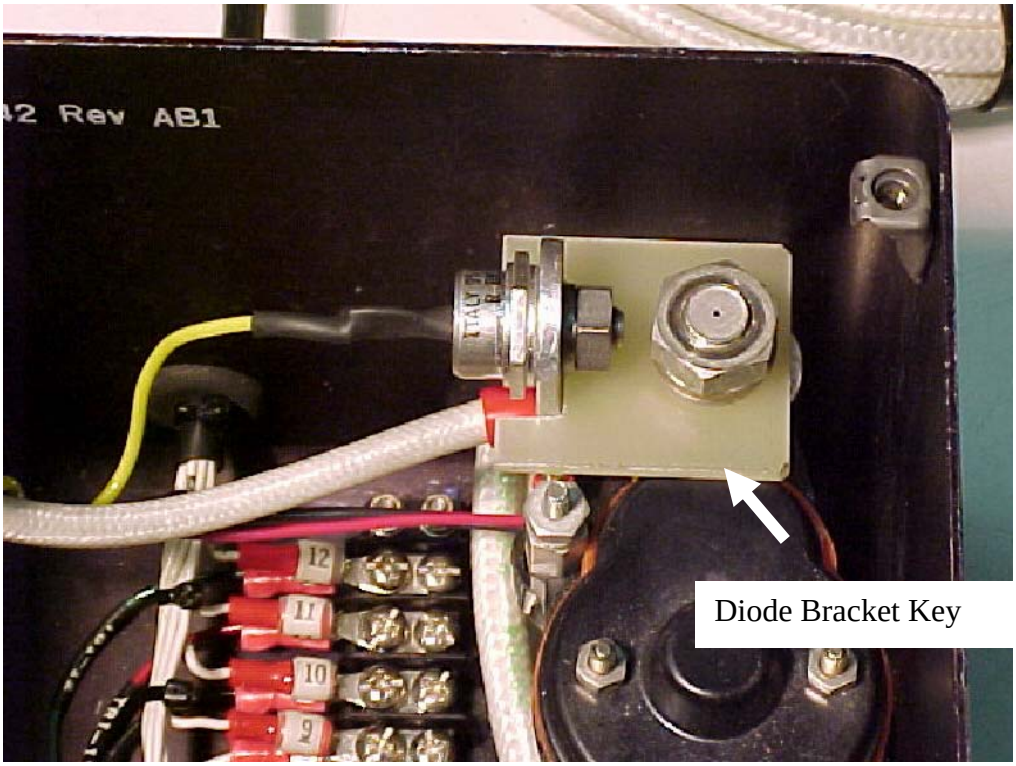


Figure 4 Diode mounting bracket installed onto Terminal A2 of relay K1

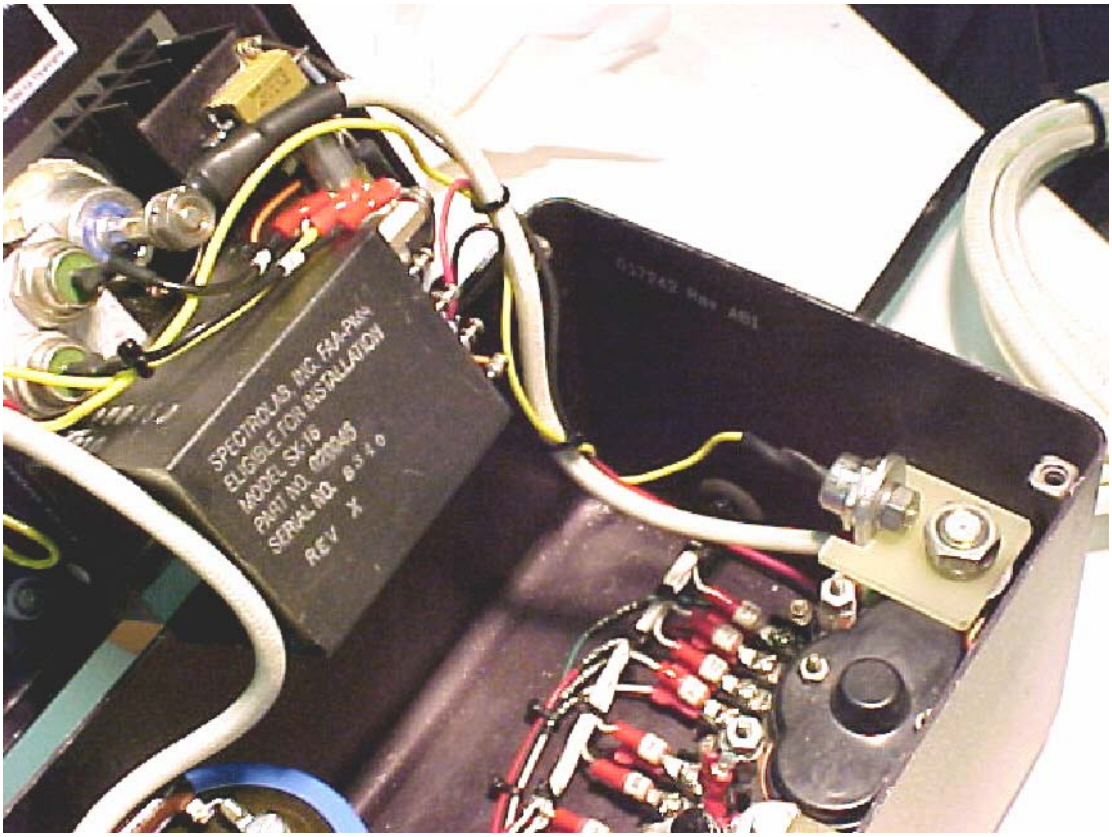


Figure 5 Completed wiring showing wire ties in place

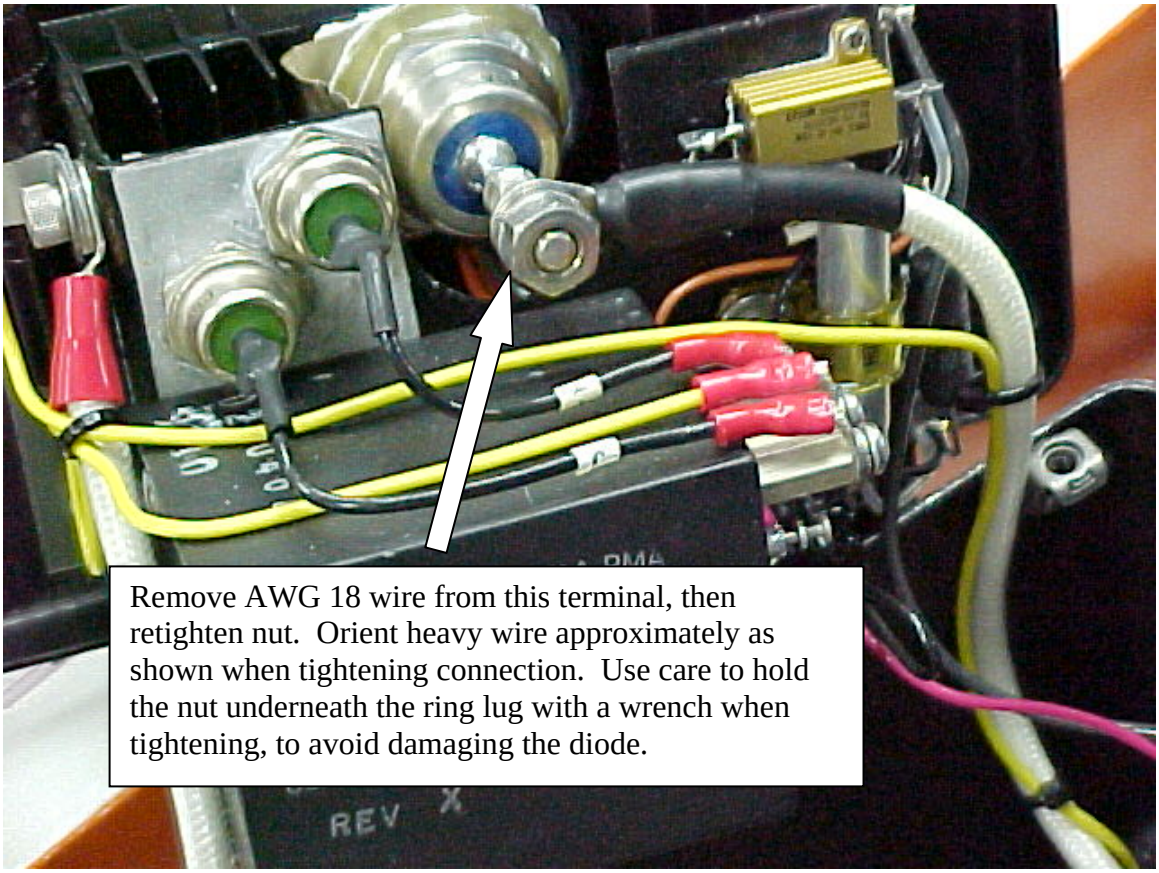
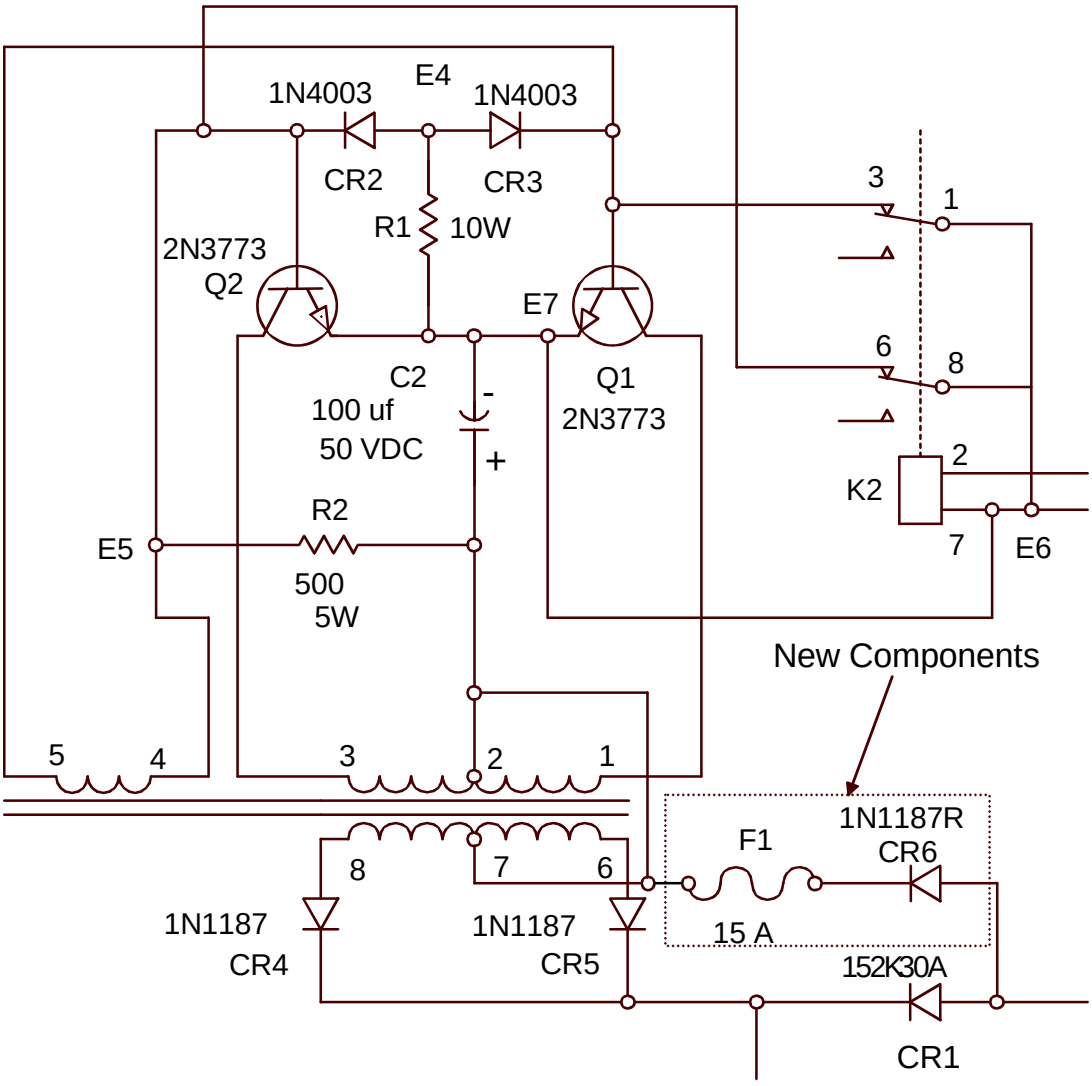


Figure 6 Location of removal of AWG 18 red wire on Junction Boxes revision "W"

7. CONTROL PLAN (DOES NOT APPLY)

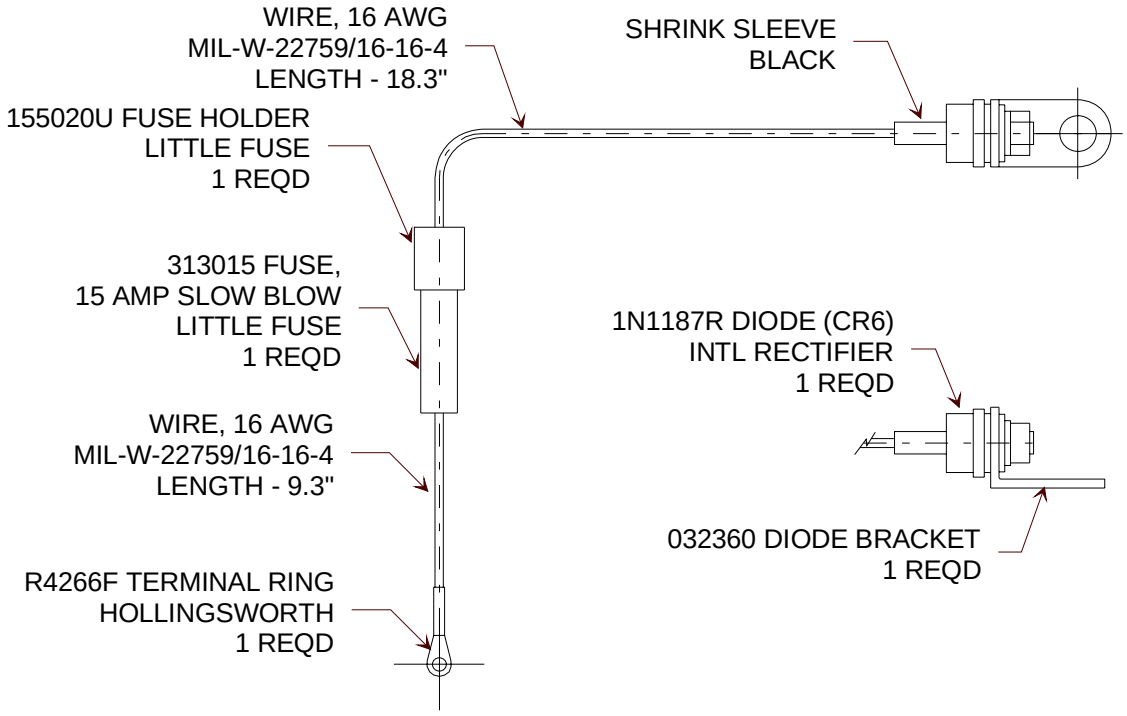
8. APPENDIX

8.1 ELECTRICAL SCHEMATIC OF EFFECTED CHANGE AREA



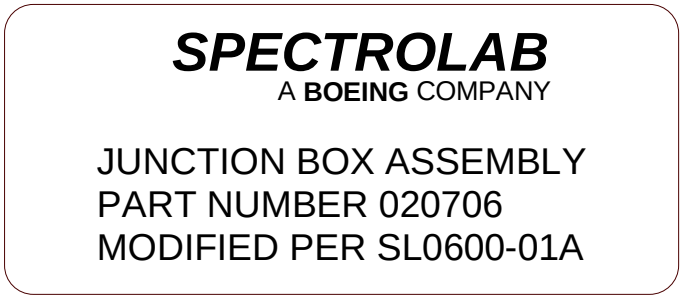
BOOSTER ASSEMBLY

8.2 032401-1 DIODE SUBASSEMBLY



032401-1 SUB ASSY

8.3 032401-2 NAME PLATE



032401-2 NAME PLATE

8.4 JUNCTION BOXES WIRING INSTRUCTIONS 032384