

SUBJECT : Replacing EPROM on Visibility Processor Board and Installing Visibility Crossarm Cable Guides

PURPOSE : To solve the heater diagnostic problem. The new firmware contains commands that instructs the operator on how to enable and calibrate the heater current. Cable guides are added to restrain the cables from snagging and contacting the transmitter and receiver canisters.

EQUIPMENT AFFECTED : Automated Surface Observing System (ASOS)

PARTS REQUIRED : Parts listed in the installation instructions.

MOD PROCUREMENT : Parts will be provided by the NLSC as ASOS S100-FMK029-42. No action is required by the station.

SPECIAL TOOLS REQUIRED : None

TIME REQUIRED : 2 hours

EFFECT ON OTHER INSTRUCTIONS : None

CERTIFICATION STATEMENT : This modification is authorized by Engineering Change Proposals E92SM05F054 and E93SM05F086. It was tested by the Engineering Division at Silver Spring, MD.

GENERAL

This modification note provides instructions for replacing the EPROM on the visibility sensor processor board. This change adds visibility heater diagnostic status to the maintenance screen. The updated firmware is intended to indicate visibility heater failure. The EPROM on the visibility processor board changes from version 034 to 036.

The modification also provides instructions for installing two stainless steel cable guides in the visibility sensor crossarm assembly. The guides provide strain relief and keep the cable from snagging during insertion and removal of the transmitter and receiver canisters. The modification also provides the instructions for checking the soldering of the heater wire in the visibility transmitter and receiver canisters.

PROCEDURE

FMK #029 provides instructions for installing the EPROM (U2) version 036 on the visibility processor board. FMK #42 provides installation instructions for the stainless steel cable guides. Notify the AOMC before starting the modification.

BEFORE INSTALLING FIRMWARE

1. Call the AOMC at 1-800-242-8194. Inform the person who answers the phone at which office you will be installing new firmware.
2. For commissioned sites, get approval of the responsible MIC/OIC before starting installation. For non-commissioned sites, the el tech must coordinate with the site MIC/OIC before starting installation. You may install on any day of the month if permission is granted and the restrictions in steps 3 and 4 are complied with.
3. **Commissioned Sites Only:** Do **not** start installation during bad weather, precipitation, instrument flight rule (IFR) conditions, or if any of those conditions is expected within 3 hours. These meteorological conditions will be defined by the responsible MIC/OIC.
4. Do not start firmware installation at a time that will conflict with scheduled synoptic observations at 00, 03, 06, 09, 12, 15, 18, and 21Z.
5. Immediately before beginning work at NWS staffed sites, the MIC/OIC/ Observer will inform the tower and any other critical users that ASOS visibility sensor will be shut off for firmware upgrade (unstaffed sites, the el tech will inform tower).
6. Do not begin the installation process, until immediately after an hourly observation has been transmitted. At NWS-staffed sites, normal backup observing procedures will be implemented.
7. The system voice function will automatically broadcast visibility missing message when the visibility power is turned off.
8. Make the appropriate SYSLOG entries (MAINT-ACT-FMK) #029 and #042.

AFTER INSTALLING FIRMWARE

9. When visibility is restarted at unstaffed sites, call to inform towers using CVDs and OIDs that the work is complete. (At staffed sites, the MIC/OIC observer will call the tower).
10. If on-site NWS staff provides backup while the installation is underway, no special observation is needed when ASOS is restarted. Proceed to step 11.
11. Inform office staff that ASOS is again operational. The chart below indicates how long it takes after start up for ASOS to report each observation element automatically.

Times Needed for Elements to be Reported Automatically

	<u>Minimum</u>	<u>Maximum</u>
Pressure	60 seconds	10 minutes
Precipitation Amount	60 seconds	*

Wind direction	2 minutes	7 minutes
Wind speed	2 minutes	7 minutes
Precipitation Type	2 minutes	*
Temperature	5 minutes	10 minutes
Dew Point	5 minutes	10 minutes
Visibility	10 minutes	15 minutes
Obstruction to Visibility	10 minutes	
* Ceiling	30 minutes	35 minutes

* Maximum time not applicable since phenomena may not be present. Minimum time applies if phenomena are present.

12. Verify that ASOS transmitted an hourly observation. Call the AOMC at 1-800-242-8194 and tell the operator:
 - a. Your location,
 - b. That installation of the new firmware has been completed, and
 - c. That ASOS is operational.

13. Enter in the SYSLOG that maintenance has been completed.

14. At an expansion site with ATCT, the el tech will contact ATCT and supply information on the following:
 - a. ASOS maintenance completed,
 - b. ASOS visibility has been restored to service.

VISIBILITY HEAD INSPECTION

See ASOS Site Manual S-100 for removal and installation procedures for the Visibility Receiver (table 6.5.7) and Transmitter (table 6.5.8).

With the Receiver and Transmitter canisters removed from the sensor head, the procedure to inspect for proper solder connection of the internal heater wiring is the same for both units.

1. Use a #1 Phillips screwdriver to remove the three screws located approximately 2.5 inches from the connector end and at approximately 120 degree intervals around the canister.

NOTE: BE EXTREMELY CAREFUL as the internal portion of the canister will freely slide out toward the lens end with these screws removed. Do not allow the optic end of the canister to impact on the work surface.

2. Locate the gold colored heater resistor attached to the rod that runs the length of the canister above the circuit board.

3. Gently tug on both ends of the wires that connect the gold resistor to the circuit board to ensure that the connections are securely soldered and not merely pushed into the terminations. If a loose connection is found replace the canister.

4. Reverse the disassembly procedure to reassemble the canister. The three retaining screws will only line up with the case in one position. Simply rotate the housing around the internal portion until all screw holes are visible.

5. When it has been verified that the heater wiring is properly soldered, place a small dot of red nail polish near the DB9 connector on the end of the canister to indicate that the unit has been checked and verified.

NOTE: Clean lenses before placing canisters back into sensor head.

REPORTING MODIFICATION

Target date for completing this modification is 90 days after receipt of parts. Report completed modification on WS Form H-28, Engineering Progress Report, per instructions in EHB-4, part 2, using reporting code ASOS.

Make appropriate entries in the SYSLOG using the Maintenance Action keys, Field Modification keys, and comment fields. Follow these steps:

1. Log on as TECH.
2. Key the MAINT screen.
3. Key the ACTION page.
4. Key START - Stop here and perform the modification FMK-029.
After FMK-029 is complete, log on system.
5. Key the MAINT screen.
6. Key the ACTION page.
7. Key FMK - Enter the Field Mod Kit (FMK) number as follows: **FMK029**
On the second line of the screen verify that only **FMK029** is displayed. Complete by entering **Y** in the Y/N if only FMK029 is displayed.
8. Check the SYSLOG and verify the FMK message.
9. Repeat steps 7 and 8, using FMK42 in place of FMK029. Notify the AOMC via telephone that FMKs 029 and 42 are complete.

NOTE:

Visibility canisters that do not have soldered wires should be returned to NRC for repair. Unused parts should be returned to NRC as S100-FMK-029.OLD
This should include the visibility EPROM, NRC will reprogram for other applications.

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Chief, Engineering Division

Attachments

W/OSO321:BGMcCormick:713-1834:2/18/94:rev.5/11/94:5/19/94
WP51 Files: ASOMOD13.H11, EHB-11 disk,11d, spellcheck 5/19/94

EHB-11
Issuance 94-

INSTRUCTIONS

FIELD MODIFICATION KIT - ASOS SOFTWARE VERSION UPGRADE

1.0 UPGRADING ASOS SOFTWARE

1.1 GENERAL

The EPROM on the visibility processor board changes from version 034 to 036. This change is accomplished by replacing the EPROM with the new version EPROM. The old EPROM must be returned to NRC with this completed form so reprogramming and reissuance can occur. Refer to the attached instructions to accomplish the modification.

1.2 SOFTWARE UPGRADE PROCEDURE

Table 1 provides the procedure to remove and install the visibility firmware by removing and replacing EPROM U2. Figure 2 illustrates the location of the EPROM U2. After completion of the firmware upgrade procedure, the EPROM removed from the visibility processor board should be packaged in appropriate electrostatic discharge protective material for return to NRC.

NOTE: There may be an approximate 15-minute wait required to access the AOMC.

Table 1. Replacing Visibility Firmware

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Step	Procedure
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VISIBILITY SENSOR FIRMWARE REMOVAL AND REPLACEMENT PROCEDURE

Tools Required: Large flat-tipped screwdriver
No. 1 Phillips screwdriver

WARNING

Death or severe injury may result if power is not removed from sensor before performing maintenance activities.

1. Coordinate with site observer, if applicable, and make an entry in the SYSLOG.
2. At the DCP cabinet, set the visibility sensor circuit breaker module to OFF (right) position.
3. Using large flat-tipped screwdriver, open visibility sensor electronics enclosure access door and locate the processor board A1A1 (P/N 32194-1). Using Phillips screwdriver, remove captive screw securing processor board to standoff. This screw is on the bottom side of the board. See figures 1 and 2.
4. Carefully remove processor board by pulling it free from backplane connector XA1.
5. Using the drawing supplied, locate microcircuit U2. If version number is 034 or lower, remove U2.
6. Install supplied version 036 microcircuit, using care to match the index notch with the notch in the chip socket. Press firmly into socket.
7. Install processor board into backplane connector XA1.
8. Using Phillips screwdriver, install screw securing processor board to standoff.
9. Perform the Visibility Sensor Heater Calibration Procedure (attached) starting at step 3.5 and continuing through step 6.7.
10. Using large flat-tipped screwdriver, close visibility sensor electronics enclosure access door.
11. At the DCP cabinet, set the visibility sensor circuit breaker module to ON (left) position.

NOTE: Calibration of visibility sensor is not required.

Table 1.(continued)

12. Coordinate with site observer, if applicable, and clear any maintenance flags generated, making an entry in the SYSLOG.
13. Return signed front page of FMK, along with version 034 EPROM, to NRC.

VISIBILITY SENSOR HEATER CALIBRATION PROCEDURE

1. INTRODUCTION

Use this procedure when installing firmware containing changes to solve the heater diagnostic problem. The new firmware contains a command "V3" which instructs the operator to "calibrate the heater current readings." The "V3", command tells the operator exactly how to enable the firmware to measure the actual current drawn by each of the heaters. There are no special fixtures needed to perform "V3", and it does not matter if the sensor is in "ASOS mode" or not.

Calibration procedures 4 and 5 must be run any time the visibility crossarm, transmit canister, receiver canister, or day/night sensor are replaced.

2. TOOLS AND EQUIPMENT

PC with Procomm Plus or equivalent software
RS232 adapter cables
Digital Multimeter (DMM)
Jumper for the contacts of J7 connector on backplane
Small flat-tipped screwdriver

3. SETUP PROCEDURE

- 3.1 At the DCP, locate the circuit breaker for the visibility sensor and switch to the OFF position.
- 3.2 At the visibility sensor, remove hinge pin and lower sensor.
- 3.3 Open the electronics enclosure. Locate U2 on the processor board and remove the microcircuit using standard ESD precautions. See figure 2.
- 3.4 Install the new microcircuit supplied into U2 socket, assuring that pin 1 of the microcircuit matches pin 1 of the socket.
- 3.5 Disconnect the DB-9 cable connector from the fiber optic modem on top of the Faraday box.
- 3.6 Connect the PC to the DB-9 cable connector in the electronics enclosure. Set the PC to "2400, N, 8, 1" with CAPS LOCK to establish the correct communications protocol with the sensor.

Table 1.(continued)

- 3.7 At the DCP, turn the visibility sensor circuit breaker to ON.

- 3.8 Verify that the PC displays the sensor initialization message shown below.

*** VIS VER XXX - 6220 ***

The "XXX" refers to the sensor firmware version number and the "6220" refers to the sensor model number.

- 3.9 At the PC, type "VG". The sensor will enter the V mode (Extended Diagnostics) and respond with:

VPXXXXXXXXPPPP PPPOPP PPP PPPP XXXX XX

The sensor status bytes reported above should be all "P" for pass with the exception of byte 22, which should be "0" or "1". A "1" indicates the "Heater Diagnostics" for the hood and electronics heaters are being used, a "0" indicates they are not. If any of the "P"s are reported as "F"s, refer to the ASOS Site Maintenance Manual troubleshooting procedures before proceeding. The values marked with "X" are irrelevant to this procedure and should be ignored.

4. HEATER POWER SUPPLY CHECK

- 4.1 Disconnect the hood/electronics heater thermostat from backplane connector J7.
- 4.2 Jumper the contacts on the J7 backplane connector together using the jumper assembly supplied with the visibility calibration kit. This will enable the hood/electronics heaters.
- 4.3 Set the DMM for DC volts and connect the (-) lead to the heater power supply capacitor C2 negative terminal. Connect the (+) lead to the C2 positive terminal. See attached drawing of power supply, Figure 3.
- 4.4 At the heater power supply regulator board, adjust R4 for 24.00 ± 0.25 VDC as read on the DMM. See attached drawing of power supply, Figure 3.
- 4.5 Disconnect the DMM and remove jumper from J7.

5. HEATER CALIBRATION

- 5.1 Unlatch two fasteners and carefully remove transmitter assembly cap from the back of transmitter assembly.

Table 1.(continued)

- 5.2 Using small flat-tipped screwdriver, slide locking mechanism (plate at front of connector) downward to unlock DB-9 connector. **DO NOT** disconnect the DB-9 connector at this time. See attached drawing of canister end view for connector location, Figure 4.
- 5.3 Repeat steps 5.1 and 5.2 for the receiver assembly.

- 5.4 At the PC, type "V3". The sensor will enter the "Heater Calibration" mode. Follow the instructions displayed on the PC screen. The "Heater Calibration" mode can be aborted at any time by striking the <ESC> key. See attached drawing of canister end view for connector location, Figure 4.
6. TEAR DOWN
 - 6.1 At the PC, type "VG". Byte 20 of the sensor response will be "F". Type "VG" again. The sensor should respond as outlined in step 3.9.
 - 6.2 At the DCP, turn the visibility sensor circuit breaker to OFF.
 - 6.3 At the receiver assembly DB-9 connector, using a small flat-tipped screwdriver, press up on locking mechanism to lock DB-9 connector.
 - 6.4 Repeat step 6.3 for the transmitter assembly.
 - 6.5 Install transmitter assembly cap and latch two fasteners.
 - 6.6 Install receiver assembly cap and latch two fasteners.
 - 6.7 Disconnect the PC DB-9 cable connector from the fiber optic modem and install the DB-9 cable connector removed in step 3.5.
 - 6.8 Close the electronics enclosure door and secure.
 - 6.9 Raise visibility sensor and install hinge pin.
 - 6.10 At the DCP, turn the visibility sensor circuit breaker to ON.

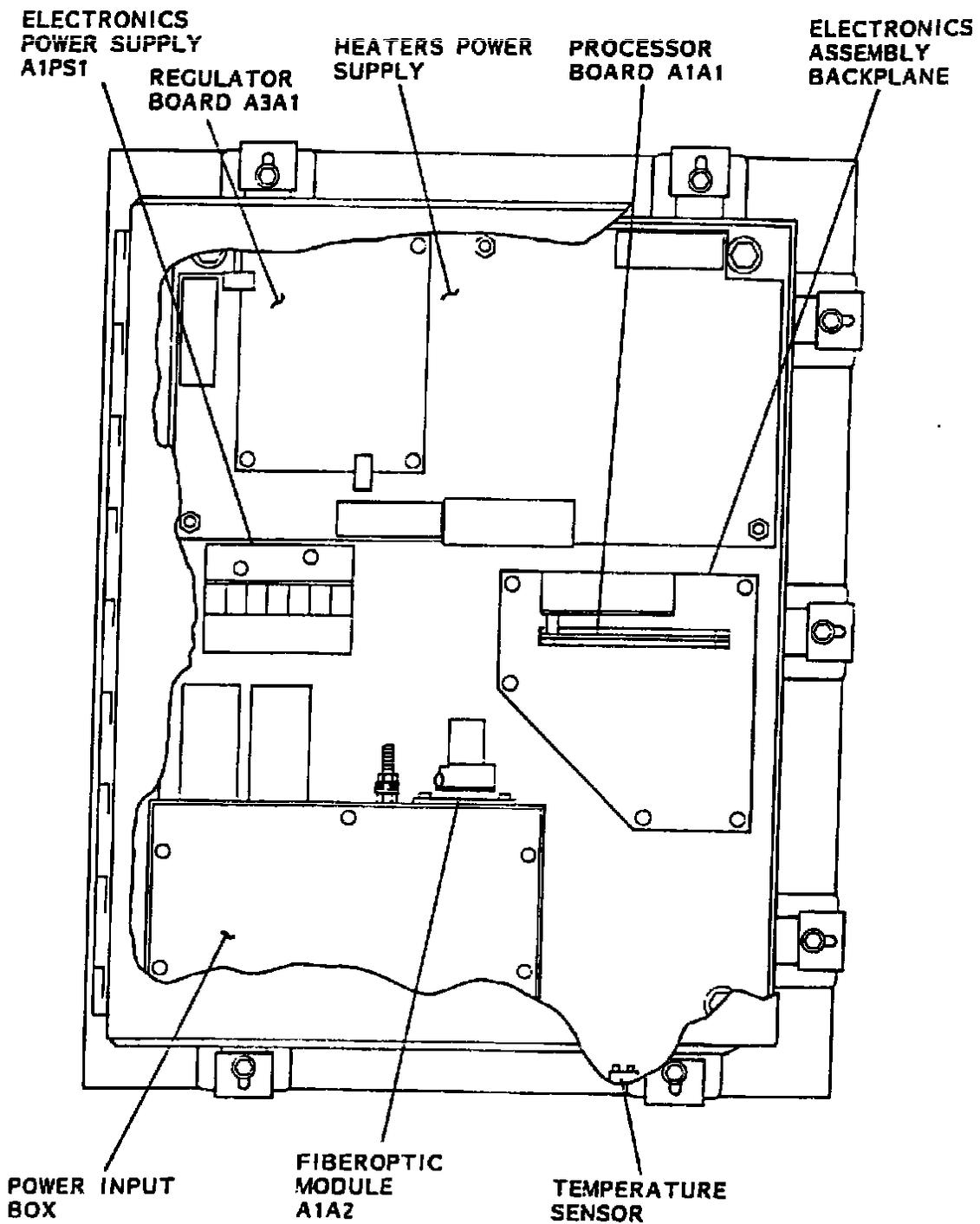
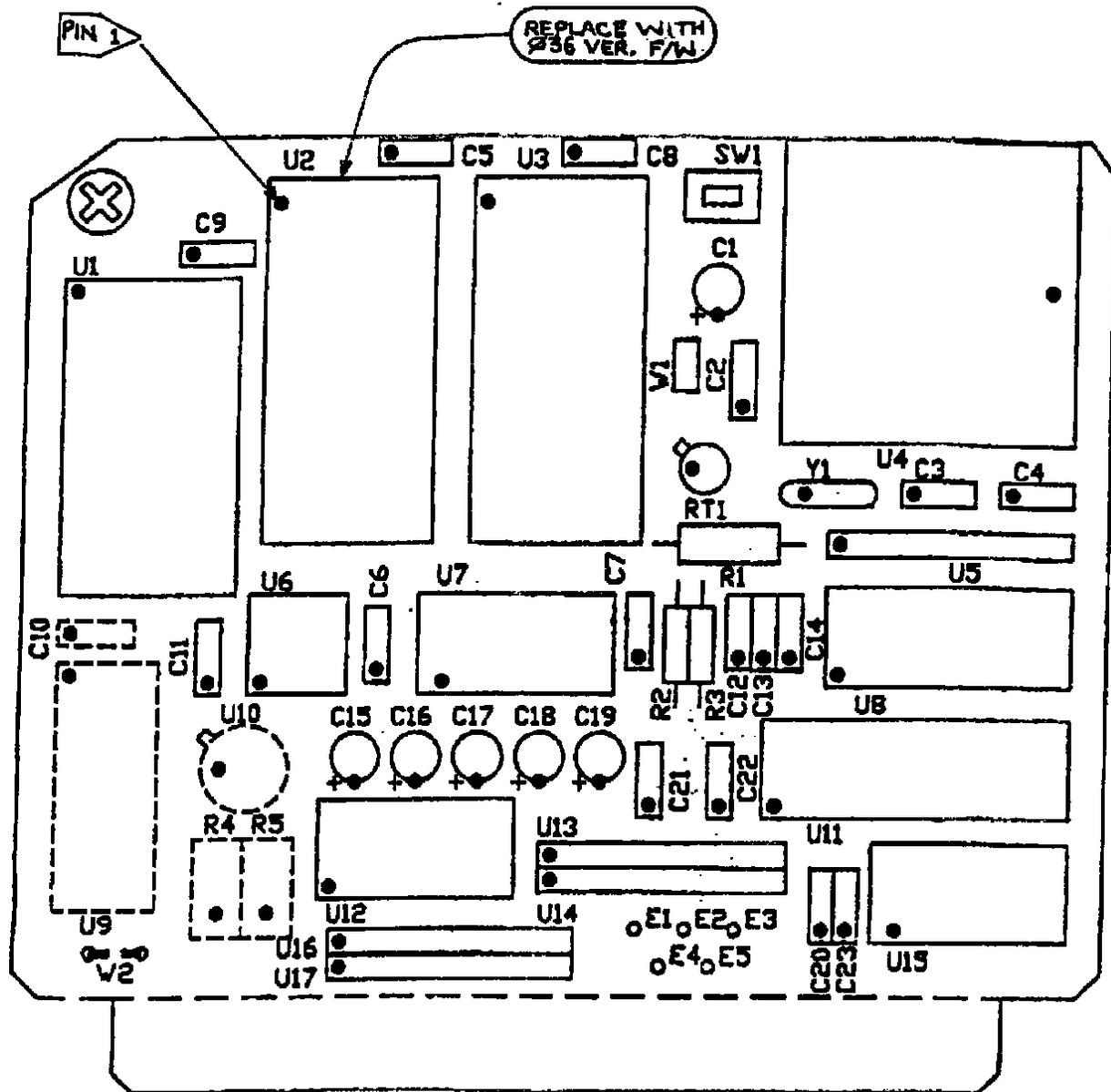


Figure 1 Visibility Sensor Electronics Enclosure



VISIBILITY PROCESSOR BOARD
 P/N 32194-1
 FIGURE 2

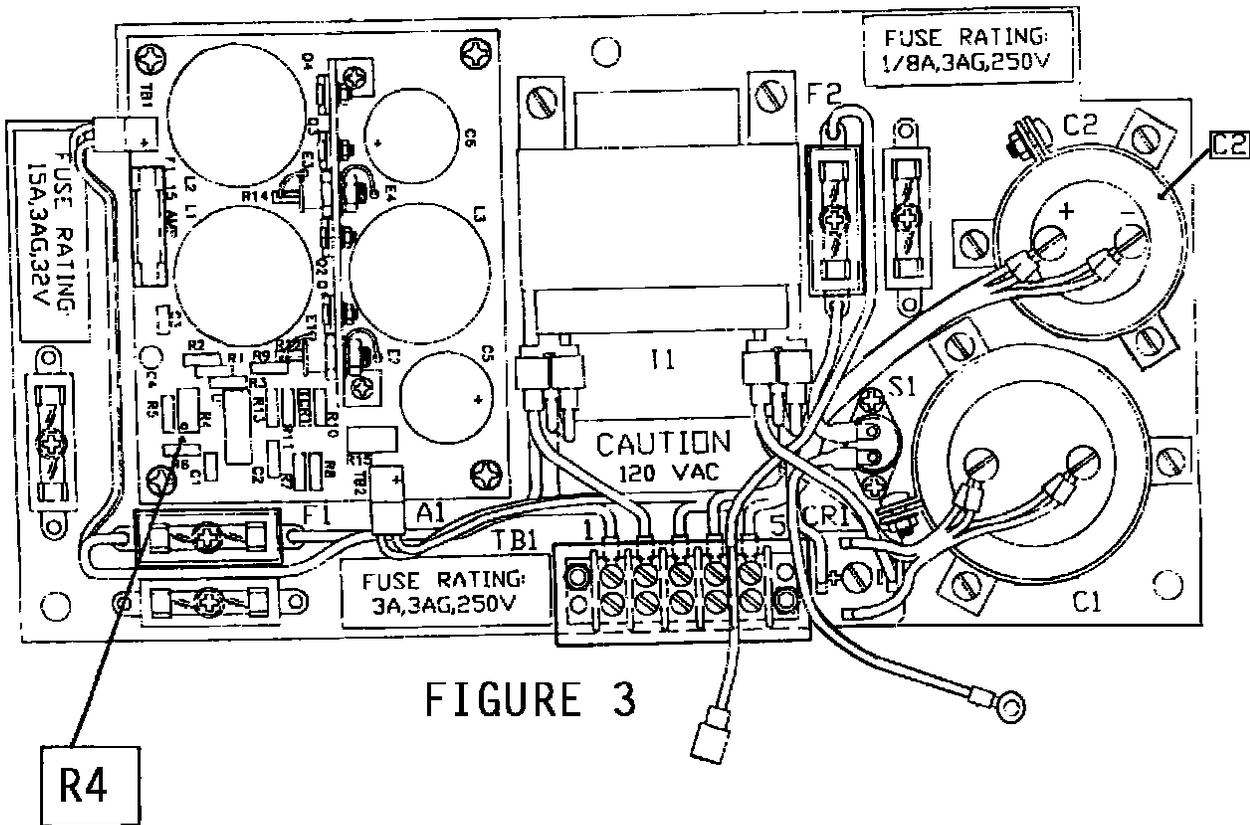
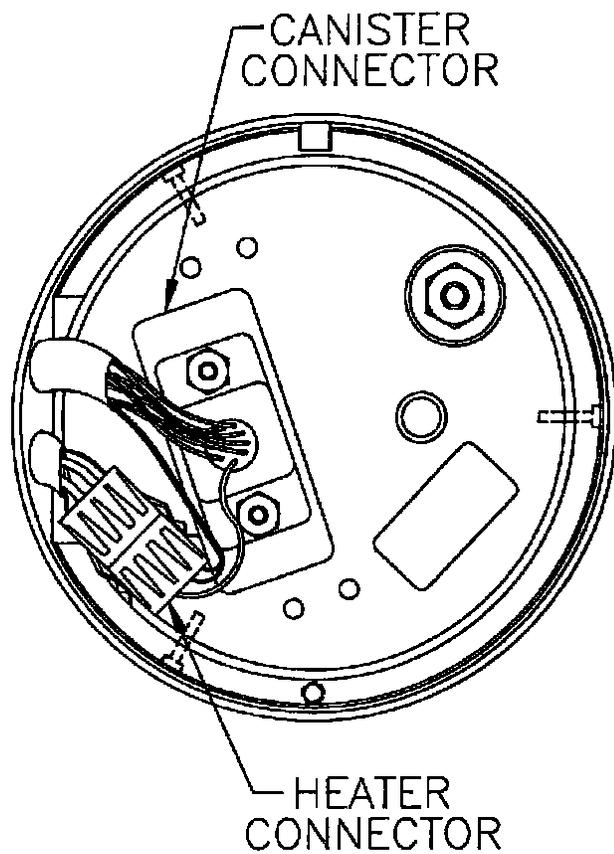


FIGURE 3



RECEIVER & TRANSMITTER
CANISTER, END VIEW

FIGURE 4

INSTRUCTIONS

FIELD MODIFICATION KIT - Visibility Sensor Crossarm P/N 31830

1.0 Prevention of Cables Snagging

1.1 GENERAL

Description of Change:

A stainless steel shield will be inserted into each visibility sensor crossarm housing to restrain the cables from contacting the transmitter and receiver canisters. This will prevent the canisters from snagging the cables during insertion and removal. The intent is to prevent undue stress on the cables and thus improve service life.

1.2 PROCEDURE

Table 2 provides the procedure to remove and install the hood cable guides.

Material Required: 2 each Hood Cable Guides

captured. Slowly press inward, keeping a slight pulling pressure on the wires to keep them from being snagged by the leading edge of the guide. Some "wiggling" might be required. The guide has been completely inserted when it "bottoms-out" against the window assembly.

- d. The angular shape of the ends of the guides allows the wiring to be reattached to the canister assemblies as usual.
5. Re-install the receiver canister into the crossarm in accordance with the Site Technical Manual Table 6.5.7.
6. Remove the transmitter canister from the visibility crossarm in accordance with the Site Technical Manual Table 6.5.7.
7. Install the hood cable guide as follows:
 - a. Using the seam ripping tool provided, strip the tubing from the wire bundles. With steady pressure, the tool will slit the tubing as it is pressed inward.

Remove all of the tubing from the heater wire bundle.

Remove enough tubing from the signal wire bundle so none remains in the hood cavity; about 1 inch beyond the point where it enters the hood from the crossarm. There is sufficient slack in the bundle to allow it to be pulled far enough into the cavity.
 - b. With the tubing removed, the wire bundles can be "flattened" against the side of the hood. Arrange the wires so the larger heater wires, the green ground wire, and the coax cable are at the bottom as shown in the attached drawing.
 - c. The cable guides are symmetrical, so they will fit in either hood. Holding the wires against the side of the hood, insert the guide so it is positioned between the upper and innermost of the canister slides. You will feel a positive indication that it is captured. Slowly press inward, keeping a slight pulling pressure on the wires to keep them from being snagged by the leading edge of the guide. Some "wiggling" might be required. The guide has been completely inserted when it "bottoms-out" against the window assembly.
 - d. The angular shape of the ends of the guides allows the wiring to be reattached to the canister assemblies as usual.
8. Re-install the transmitter canister into the crossarm in accordance with the Site Technical Manual Table 6.5.7.

Table 2.(continued)

9. At the DCP cabinet, set the visibility sensor circuit breaker module to ON (left) position.
10. Coordinate with site observer, if applicable, and clear any maintenance flags generated, making an entry in the SYSLOG.

NOTES:

- 1. INTERPRET DRAWING PER DOD-STD-100
- 2. WORKMANSHIP PER MIL-STD-45A, REQUIREMENT NO. 9
- ⚠ INSERT CABLE GUIDE AFTER THE WIRES HAVE BEEN ARRANGED IN REAR HOOD (AS SHOWN)

