33 Lights

CHAPTER 33

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CHAPTER 33 - LIGHTS

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GENERAL - DESCRIPTION AND OPERATION

HIGH INTENSITY LIGHTS - HOSKINS

The high intensity light system greatly increases the visibility of the airplane to other airplanes during night flight by means of pulsating strobe lights mounted adjacent to the wing tip and tail lights. The system is actuated by a switch in the exterior lighting group on the pilot's subpanel and is protected by a 10 amp circuit breaker on the copilot's circuit breaker panel. The strobe lights are powered by the master power assembly mounted in the aft fuselage directly behind the access door in the belly of the airplane. This assembly consists of three power supply modules (one for each strobe light) and a timing circuit module mounted on a common, negatively ground subchassis. The timing circuit module contains a small DC motor that rotates a notched transistorized power pack cam to actuate two switches mounted 180 degrees apart. Each time one of the switches is actuated, a relay in the affected power supply module closes to trigger its respective strobe light. A transistorized circuit in the power supply unit steps up the voltage of the airplane electrical system to the level (450 volts) required to operate the strobe light. The stepped-up voltage is stored in a condenser until released to the strobe light by the timer. The current from the power supply assembly is conducted to the flash tube of the strobe light by a specially shielded power cable. A charge of high voltage electricity is momentarily released to a coil in the flash tube assembly. The coil further steps up the charge to the point where it ionizes the xenon gas in the flash tube. The high voltage stored in the condenser then surges through the gas to produce the brilliant burst of energy that characterizes the strobe light.

HIGH INTENSITY LIGHTS-GRIMES AND SYMBOLIC DISPLAYS INC.

The function of the Grimes and SDI Strobe Light Systems are essentially the same as the Hoskins Strobe Light System. The Grimes and SDI systems do not incorporate a timing circuit, as the lights all flash at the same time. An electronic power supply module steps up the voltage of the airplane system to the level required to ionize the xenon gas in the flash-tubes. Each module contains a built-in flasher and the unit receiving input power acts as a master unit. An interconnecting unit located on the sides of each unit handles the input power and trigger pulsing of the system: these snap together when the units are placed side by side.

"END"

TROUBLESHOOTING
EXTERIOR LIGHTS

STROBE LIGHTS

TROUBLE	*PROBABLE CAUSE*	*REMARKS*
1. Lights inoperative.	a. Circuit breaker tripped.	a. Check for short circuit. Reset circuit breaker.
	b. Loose connection.	b. Check and tighten electrical connections.
	c. Battery defective.	c. Replace battery or use external power.
2. One bulb does not light.	a. Bulb burned out.	a. Replace bulb.
	b. Fixture not grounded.	b. Check for good bonding between fixture and structure. Tighten mounting screws.
	c. Loose connection.	c. Check all connections in circuit.
	d. Defective fixture or switch.	d. Replace fixture or switch.

LANDING LIGHTS

1. Lamp fails to light.	a. Circuit breaker tripped.	a. Check for short circuit. Reset circuit breaker.
	b. Lamp burned out.	b. Replace lamp.
	c. Loose connection or defective.	c. Tighten connections and check wire circuit continuity. Replace or repair wire if necessary.
	d. Landing-light switch defective.	d. Check continuity through switch. Replace if necessary.

"END"

EXTERIOR - MAINTENANCE PRACTICES

HIGH INTENSITY LIGHTS-HOSKINS

POWER CABLE CHECKS

a. Check that the individual conductors of the power cable are soldered to the connector pins as follows: red wire to the "A" pin, white wire (or striped wire of red and white) to the "B" pin, and black wire (or striped wire of red and black) to the "C" pin.

CAUTION

Failure to hook up the conductors and pins in this manner will result in extensive damage to both the light units and the power supply modules.

b. Use a 500 volt megger, check that the power cable resistance between the connector pins and between all the pins and ground (the cannon plug) is 15 megohms or greater.

c. Check the condition of the potting for the power supply cable at the terminals, connectors, and clamp cavities. The potting compound used to protect the system against moisture is RTV No. 102 silicon rubber.

d. Make sure the cable clamps are not tight enough to cause a short in the cable.

SYSTEM CHECK-OUT

The following check is recommended when the flash tube of a strobe light unit fails to fire:

a. Check that the flash tube is not broken and that the connectors are tight.

b. Disconnect the power cable from the inoperative light at the power supply module.

NOTE

To avoid the chance of shock through contact with the cable at the light fixture or with connector pins "A" and "B" at the power supply module, short out these pins to pin "C" (ground) to dissipate any residual charge left in the condenser after the system has been turned off.

Disconnect the power cable from one of the functioning lights and plug it into the power supply unit of the inoperative light. If the flash tube of the good light then fails to fire, the power supply unit has either failed or has a blown fuse.

CAUTION

Never place the power supply unit of the functioning light circuit into the circuit of the inoperative light, for a short in the defective circuit would then damage the functioning power supply unit.

A short in the power cable will normally blow a fuse in the power supply unit. Replace defective fuses only with those that have a three ampere rating.

CAUTION

Fuses with a higher capacity may permit operation of the power supply unit despite a short in the system, to the ultimate damage of the unit and related components.

POWER SUPPLY UNIT CHECKS

The most likely reasons for malfunctions of this unit are shorts in either the power cable or the lamp assembly, shorts caused by contact of the transistor case with a foreign object during operation of the unit, moisture in the connectors, and the buildup of excessive heat within the unit due to inadequate ventilation. When the system is operating properly, the action of the relays in each power supply unit can be heard. If the sound of these relays closing at the pulse rate of once per second cannot be heard, perform the timer check to ascertain that the cam is actuating the two switches properly. After 500 hours and 1000 hours of aircraft operation, perform the following check:

a. Open each power supply module and check the relay contacts for pitting. Replace those that are excessively pitted and clean the others.

b. Perform a capacitance check on the condensers by charging them to 450 volts DC and checking for leakage. Replace condensers whose leakage exceeds 1.5 milliamperes only with condensers obtained from the vendor (Hoskin Inc., 34 N. Bennett, Geneva, Illinois) or his authorized dealers. It should be noted that the foregoing capacitance check can be performed without removing the condensers from the power supply module.

CAUTION

To prevent short circuiting the system, avoid contact with the exposed transistors on the ends of the power supply modules.

TIMER MODULE CHECK

Remove the cover from the module and slowly rotate the

motor mechanism so that the notched timing wheel between the two switches moves under the switch cam riders. A click should be heard as the rider touches bottom and another click as it reaches top. If necessary, loosen the top screw on the switch mounting plate and slide it in or out until the switches respond properly.

POWER SUPPLY UNIT REMOVAL

Remove the panel from the underside of the fuselage just aft of the rear pressure bulkhead to gain access to the power supply unit. This unit consists of three power supply modules (one for each light) and a timer module mounted on a common subchassis. The entire unit may be removed by disconnecting the wiring from the modules and removing the screws anchoring the subchassis to the support structure in the aft fuselage. Any one of the modules can be removed and replaced separately by simply disconnecting the wiring and removing the screws securing it to the subchassis.

CAUTION

If the exposed transistors on the end of each power supply unit are contacted during removal, the resultant damage will cause them to short out. Make sure the unit is hooked up as indicated in the wiring diagram, for it will be permanently damaged by reversed polarity.

POWER SUPPLY UNIT INSTALLATION

CAUTION

If the exposed transistors on the end of each power supply unit are contacted during installation, the resultant damage will cause them to short out. Make sure the unit is hooked up as indicated in the wiring diagram, for it will be permanently damaged by reversed polarity.

NOTE

A harness wring-out and high potential test of 500 vac on the harness wiring should be conducted on the strobe light harness in the wing and fuselage prior to connection of either the strobe light or strobe power supply.

Place the power supply module on the support structure and secure in place with the attaching screws. Connect the power supply module to the airplane wiring in accordance with the Wiring Diagram Manual (P/N 60-590001-29).

HIGH INTENSITY LIGHTS-GRIMES AND SYMBOLIC DISPLAYS INC.

POWER SUPPLY UNIT REMOVAL

Remove the panel from the underside of the fuselage just aft of the rear pressure bulkhead to gain access to the power supply unit. The entire unit may be removed by disconnecting the wiring from the power supply and removing the screws anchoring the modules to the support structure.

CAUTION

Observe the precautions noted under STROBE LIGHT WIRING procedure when removing the power supply.

POWER SUPPLY UNIT INSTALLATION

NOTE

A harness wring-out and high potential test of 500 vac on the harness wiring should be conducted on the storbe light harness in the wing and fuselage prior to connection of either the strobe light or strobe power supply.

a. Place the power supply module on the support structure and secure it in place with the attaching screws.
b. Connect the power supply module to the airplane wiring in accordance with the Wiring Diagram Manual (P/N 60-590001-29).

STROBE LIGHT WIRING

NOTE

A harness wring-out and high potential test of 500 vac on the harness wiring should be conducted on the strobe light harness in the wing and fuselage prior to connection of either the strobe light or strobe power supply.

An incorrect hook-up of the wires at either the power input or between the strobe light assemblies and the power

supply unit will cause a reversal of polarity that results in serious component damage and failure. Care must be taken to ensure that the red wire is connected to positive power and the black wire to ground. On airplane serials prior to P-433 make sure that the red, white, and black wires are connected to pins "A", "B", and "C" of the connector respectively and that the connectors are properly assembled. On airplane serials P-433 and after make sure that the red, blue, and yellow wires are connected to pins "A", "B", and "C" of the connector respectively and that the connectors are properly assembled.

The shield for the wing cables should be grounded to the airplane structure at the wing break and the shield for the tail light cables should be grounded to the airplane structure at the power supply.

WARNING

Although a bleed-off resistor is incorporated in the power supply circuit, high voltage is involved in the circuit between the power supply and light assemblies. For this reason, turn the control switch for the strobe lights OFF and wait for at least 10 minutes to elapse before disconnecting the cables at the power supply or light assemblies and before handling or disassembling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

STROBE LIGHT REPLACEMENT

CAUTION

To avoid damage to the strobe light system or possible physical injury from electrical shock, observe the precautions outlined under strobe light wiring before removing or installing the strobe light assembly.

CHART 201
LAMP BULB REPLACEMENT

LOCATION	*BULB PART NUMBER*
Annunciator Panel Lights	327
Edge Lights	D158-100-5T1
Post Lights	327
Compass Light	327
Instrument Flood Lights (Red)	1846R
Instrument Flood Lights (White)	1846
Map Light	1495
Flap Position Indicator Lights	FB-59
Landing Gear Position Lights	327
Reading Lights	1495
Threshold Light	313
Nose Baggage Compartment Light	303

CHART 201
LAMP BULB REPLACEMENT (Cont'd)

LOCATION	*BULB PART NUMBER*
Navigation Lights (Wing)	1524
Navigation Light (Tail)	1683
Rotating Beacon (Upper and Lower)	A7079B-24
Ice Light (P-4 thru P-402) (P-403 and after)	A7796A24 A7079B-24
Landing Lights	4596
Taxi Light (Nose Landing Gear)	4587
Strobe Light, Tail (Flashtube) (Hoskins)	31-0725-1
Strobe Light, Tail (Flashtube) (Grimes)	55-0221-1
Strobe Light, Wing (Flashtube) (SDI)	202331
Strobe Light, Wing (Flashtube) (Grimes)	55-0221-1
Recognition Lights (Wing) (P-386, P-401 and after)	1982

"END"