Table B

Constant Value per Voltage System Wire Size (Maximum Voltage Drop 5%)

System	6 Volt				12 Volt					24 Volt				
Wire Size	#12	#10	#8	#6	#12	#10	#8	#6	#10	#12	#10	#8	#6	#4
Constant	534	849	1350	2148	2137	3397	5403	8590	13660	8548	13588	21613	34363	54641

Uniform Loads

The maximum circuit length data in Table A (and derived from Table B) assumes that 100% of the load is concentrated at the end of the run. If equally sized loads can be equally spaced along the run, maximum circuit length can be increased by the multipliers shown in Table C.

Table C

Multiplier for Equally Sized, Equally Spaced Loads (Maximum Voltage Drop 5%)

Number of Fixtures	2	3	4	5	6	7	8	9	10	n
Multiply Distance By	1.333	1.500	1.600	1.670	1.714	1.750	1.777	1.800	1.818	2n/(n – 1)

NOTE: Self-testing, self-diagnostic models with over 80 watts of capacity require a minimum load of 35 watts for accurate lamp failure indications.

1300650
1300654
1300666
1300754
1300823
1300886

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Spectron® Industrial Series

Self-Test, Self-Diagnostic Emergency Lighting Equipment

Instructions for
Installation • Operation • Maintenance

Series: ASI

SPECIFICATIONS

AC Supply Voltage: 120/277 VAC, ±10%, 60 Hz.

Power Consumption: 75 Watts Maximum

Discharge Duty Cycle: 90 minutes of rated output power to 87$^{1}/_{2}$% of nominal battery voltage.
Note: *Refer to unit model label for maximum wattage capacity.*

Recharge Duty Cycle: Per UL 924 specifications.

Operating Temperature: 25°C, ±5°.

Transfer Means: Transfer circuit automatically energizes lamps on loss of AC power or brownout. Circuitry incorporates a low voltage disconnect to prevent deep battery discharge and an automatic 15-minute time-delay on re-transfer.

Test Means: Electronics are programmed to automatically initiate periodic diagnostic/discharge test cycles designed to check transfer function, battery capacity and emergency lamp operation. Cycling includes a 1-minute test every 28 days, ± 3.5 hours, and a 30-minute test every 6 months ± 1 day. A manual test switch allows a user-programmable 1, 5, 30 or 60-minute diagnostic/discharge test at any time. During all automatic and user initiated self-tests, the unit's green "Operating Status" LED will blink to indicate a diagnostic cycle is in process.

Battery Type: [(1)] Maintenance-Free Sealed Lead-Calcium

[(1)] *Refer to unit model label for battery replacement part number.*

Hubbell Lighting, Inc.

IMPORTANT SAFEGUARDS

When using electrical equipment, basic safety precautions should always be followed including the following:

READ AND FOLLOW ALL SAFETY INSTRUCTIONS.

2. Do not use outdoors.
3. Do not let power supply cords touch hot surfaces.
4. Do not mount near gas or electric heaters.
5. Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in eyes, flush acid with fresh water and contact a physician immediately.
6. Equipment should be mounted in locations and at heights where it will not readily be subjected to tampering by unauthorized personnel.
7. The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition.
8. Caution: Halogen lamp(s) may be used in this equipment. To avoid shattering: Do not operate lamp in excess of rated voltage, protect lamp against abrasion and scratches and against liquids when lamp is operating, dispose of lamp with care.
9. Halogen lamps operate at high temperatures. Do not store or place flammable materials near lamp.
10. Do not use this equipment for other than intended use.
11. Servicing of this equipment should be performed by qualified service personnel only.

Important

Spectron® Series self-diagnostic units feature the ability to detect a drop in output current caused by lamp failure. ***The addition of remote lamps to these units will require the readjustment of the lamp sensing circuit.*** *Refer to "Lamp Sensing Adjustment Procedure" in this manual.*

SAVE THESE INSTRUCTIONS

VOLTAGE DROP TABLES

When connecting remote lighting fixtures and/or exit signs to emergency lighting equipment, the circuit conductors must have the capacity to maintain proper voltage to all lamps. Voltage drop must be limited to 5% of nominal, per the National Electrical Code.
The following tables will assist in planning layouts for emergency lighting systems.

Table A

Wiring Distance in Feet (Maximum Voltage Drop 5%)

Total	6 Volt Wire Size				12 Volt Wire Size				24 Volt Wire Size			
Watts	#12	#10	#8	#6	#12	#10	#8	#6	#12	#10	#8	#6
6	89	141	225	357	356	566	900	1431	1424	2264	3602	5727
7.2	74	118	187	298	296	471	750	1193	1187	1887	3001	4772
8	67	106	168	268	267	424	675	1073	1068	1698	2701	4295
9	59	94	150	238	237	377	600	954	949	1509	2401	3818
12	44	70	112	178	178	283	450	715	712	1132	1801	2863
13	42	65	103	165	164	261	415	660	657	1045	1662	2643
18	30	47	75	119	118	188	300	477	474	754	1200	1909
25	21	34	54	85	85	135	216	343	341	543	864	1374
28	19	30	48	77	76	121	193	306	305	485	771	1227
36	15	23	37	60	59	94	150	238	237	377	600	954
44	12	19	30	48	48	77	122	195	194	308	491	780
50	10	17	27	43	42	67	108	171	171	271	432	687
56	9	15	24	38	38	60	96	153	152	242	385	613
70	7	12	19	30	30	48	77	122	122	194	308	490
100	5	8	13	22	21	33	54	86	85	135	216	343
150		5	9	15	14	22	36	57	57	90	144	229
200			6	10	10	17	27	43	42	67	108	171
250			5	8	8	13	21	34	34	54	86	137
300				7	7	11	18	28	28	45	72	114
400				5	5	8	13	21	21	34	54	85
500						6	10	17	17	27	43	68

Values not shown in Table A may be calculated using the following formulas.

I. Maximum Length (Feet) = $\frac{\text{Table B Constant Value}}{\text{Maximum Load (Watts)}}$

Example: Find the maximum circuit length for #8 wire on a 24 volt system with an 80 watt load.

Maximum Length (Feet) = 21613 ÷ 80 = 270 feet.

II. Maximum Load (Watts) = $\frac{\text{Table B Constant Value}}{\text{Maximum Length (Feet)}}$

Example: Find the maximum circuit load for 120 feet of #12 wire on a 12 volt unit.

Maximum Load (Watts) = 2137 ÷ 120 = 17 watts.

Maintenance

Taking a Unit Out of Service

If a unit is to be deliberately taken out of service for an extended period of time, ensure that the unit is in the ready state (battery fully charged). Disconnect the positive (red) battery lead and insulate.

Battery Maintenance, Cleaning, etc.

Batteries must be kept clean and terminals should be coated with vaseline oil. Vaseline oil is recommended in place of grease. The oil can be applied with a brush and will cover and flow easier into place. Battery oils are not included with the service kits.

Vaseline oil can be prepared in the following manner:
Purchase a large jar of vaseline and an equal amount of mineral oil. Place the vaseline into a pot and heat until melted. Add an equal amount of mineral oil to the melted vaseline and mix thoroughly. The mixture of the two will provide a heavy oil that will stay solvent and allow for application to the battery with a brush.

Replacing an Emergency Lamp

De-energize AC input power. Disconnect red battery lead. Turn lamp ring one half turn counterclockwise.
With one hand, push the top two lamp lead wires up to the swivel while pulling on the Emergency Lamp until the lamp base is reachable. If both the lamp that is being replaced and the replacement lamp have terminals, change directly. If either lamp has wire leads attached, the following must be done:

1. Cut leadwires on the lamp being replaced as close to lamp as possible.
2. If replacement lamp has wire leads: cut them to approximately three inches and attach to leadwires from unit, using mechanical wire connectors.

Installation

Mounting the Unit

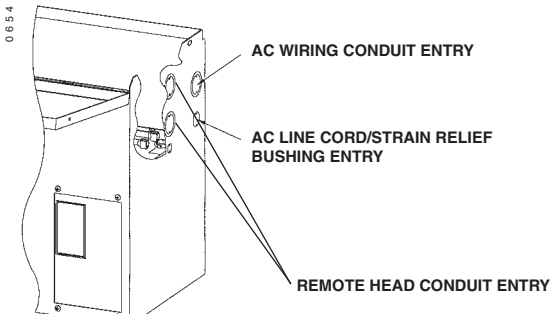
Installation of batteries is recommended following cabinet mounting. Keyhole openings and hardware knockouts are provided at rear of cabinet for mounting purposes.

Specifically designed wall bracket or shelf is available from Dual-Lite for mounting cabinet.

AC Wiring

AC supply wiring (or optional line cord) enters through KO on right side of cabinet. See Fig. 1.

Fig. 1



Connect non-energized, unswitched 120 or 277 VAC, 60 Hz to the following transformer leads (See Fig. 3):

- 120 VAC - Black and white leads
- 277 VAC - Red and white leads

Important: Cap off unused transformer lead and connect ground conductor to green screw located at the top rear of insert. See Fig. 2.

Lighting Head Connection

Unit mounted heads:

Remove appropriate KOs in top cover. Install lamp heads using supplied hardware. Bend anti-rotation tabs to the vertical position. Connect blue leads to OUTPUT (+) lamphead pins and yellow leads to OUTPUT (–) lamphead pins. See callout 1 in Fig. 2.

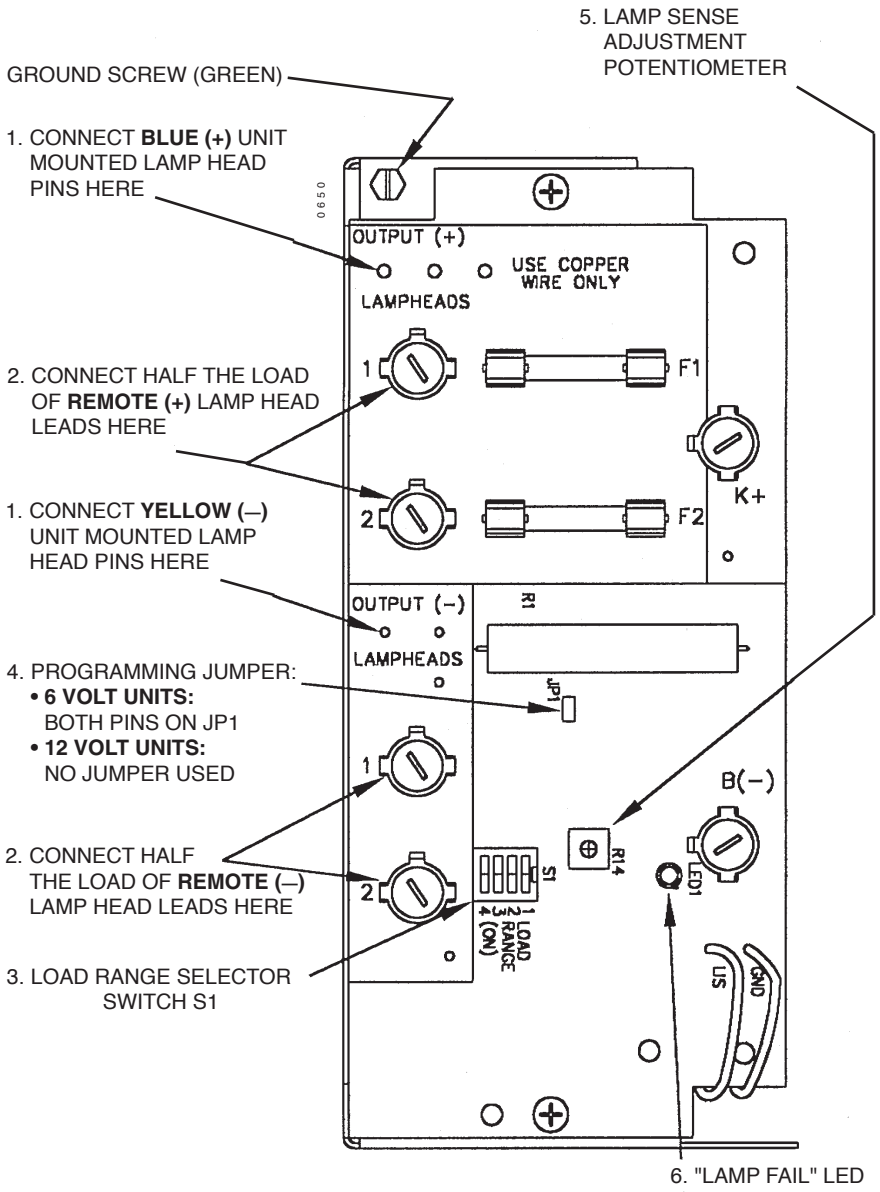
Remotely mounted heads:

Remotely mount lighting heads using appropriately sized conductors for run length to prevent voltage drop. See Voltage Drop "Table A". Route remote conductors through selected knockout(s) in side of cabinet using approved conduit and connectors (supplied by others). Connect one half of remote load across OUTPUT (+) 1 and OUTPUT (–) 1 lamphead terminals and the other half across OUTPUT (+) 2 and OUTPUT (–) 2 lamphead terminals on distribution board. See callout 2 in Fig. 2.

Each set of remote output terminals on the distribution board is fused for one half of the rated unit capacity. Refer to unit model label for maximum wattage of unit.

Important: Units operating remote lighting heads require field adjustment of the sensing circuit that detects lamp failures. Refer to "Lamp Sensing Adjustment Procedure" on page 9.

Fig.2



Lamp Sensing Adjustment Procedure

Depending on the amount of connected load, one of several different load ranges will need to be selected. It is important to select the range which most closely matches the actual total connected load in order to achieve the best resolution in detecting loss of connected lamp heads.

1. Refer to the Load Range Selector Chart to determine the correct load range.

Load Range Selector Chart

Load Wattage		
Load Range	6 Volt Units	12 Volt Units
1	7.2 - 18	14.4 - 36
2	19 - 48	37 - 96
3	49 - 90	97 - 180
4	91 - 162	181 - 350

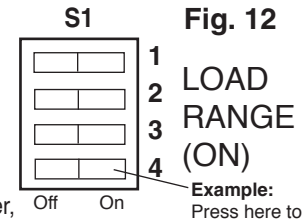
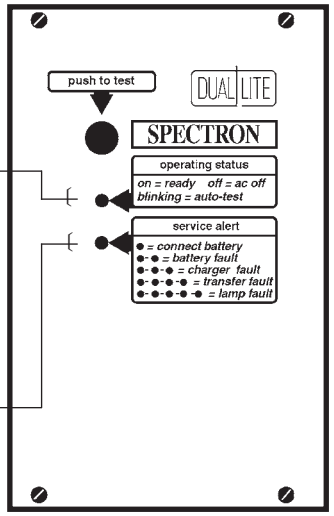


Fig. 12

2. See Fig. 12 above. Using a pen or a small screwdriver, select the proper load range by pressing the appropriate rocker on switch S1 (see callout 3 in Fig. 2 for location) to the right. Only one rocker must be selected.
3. On 6 Volt units, the programming jumper should be inserted onto both pins of JP1 (see calloutt 4 in Fig. 2 for location). On 12 Volt units the programming jumper should not be installed.
4. With a small screwdriver, turn the Lamp Sense Adjustment Pot fully **clockwise** (see callout 5 in Fig. 2 for location).
5. Press the test switch twice. The emergency lamps will illuminate and 5-minute self-test will begin. Verify that all connected lamps are illuminated.
6. The green "Operating Status" LED on the unit's Spectron control panel will also begin to flash. The "Lamp Fail" LED on the distribution board (see callout 6 in Fig. 2 for location) should notbe illuminated at this time. If the "Lamp Fail" LED on the distribution board is illuminated, select the next lower load range. For example, if load range 4 was selected and the "Lamp Fail" LED on the distribution board was lit, then select load range 3.
7. Slowly turn the Lamp Sense Adjustment Pot **counterclockwise** until the "Lamp Fail" LED on the distribution board illuminates. Then turn the adjustment pot **clockwise** just slightly beyond the point where the "Lamp Fail" LED on the distribution board turns off, to avoid false failure indications. At this point, the red "Service Alert" LED on the unit's Sectron control panel will begin a repetitive cycle of flashing five times followed by a pause ("Lamp Fail" service alert).
8. While the self-test is still in progress, disconnect one of the emergency lamps. The "Lamp Fail" LED on the distribution board should turn on. (Note: the "Lamp Fail" LED on the Spectron bezel will remain flashing at this point since the Spectron chip has alread sensed and stored the lamp failure). Reconnect the lamp; the "Lamp Fail" LED on the distribution board should turn off. If it remains on, turn the "Lamp Sense Adjustment" potentiometer fully **clockwise** and repeat step 6.
9. Allow the 5 minute self-test to end (or press the test switch again to cancel the self-test cycle).
10. Press the test switch again. Verify that the "Lamp Fail" LED and "Service Alert" LED are not illuminated. Press the Test switch to cancel the remainder of the self-test.

Spectron® Components



LED Indicators

Two status indicators, one green and one red, are provided on the control panel of all models equipped with the Spectron option.

Green Operating Status LED

The green Operating Status LED serves as both an AC power and a self-test indicator. During normal operation, the Operating Status LED will be illuminated, indicating the presence of AC power. During all automatic or manual self-test cycles, the Operating Status LED will blink at a 1 Hz. rate.

Red Service Alert LED

Under normal operating conditions, the Service Alert LED indicator will remain off. In the event the Spectron Controller detects a malfunction, the Service Alert LED will blink at a 1 Hz. rate, based on the following table:

Red Status LED Code	Description
One blink ON/pause	Battery not connected
Two blinks ON/pause	Battery fault
Three blinks ON/pause	Charger fault
Four blinks ON/pause	Transfer circuit fault
Five blinks ON/pause	Emergency Lamp fault

Manual Tests

Using the unit test switch, users can initiate different duration test cycles based on the following table:

Initiating Action	Test Cycle
Press test switch once	1 minute
Press test switch twice	5 minutes
Press test switch 3 times	30 minutes
Press test switch 4 times	60 minutes

Note: Pressing test switch at any time after a test cycle has begun cancels remainder of test and returns unit to normal operation.

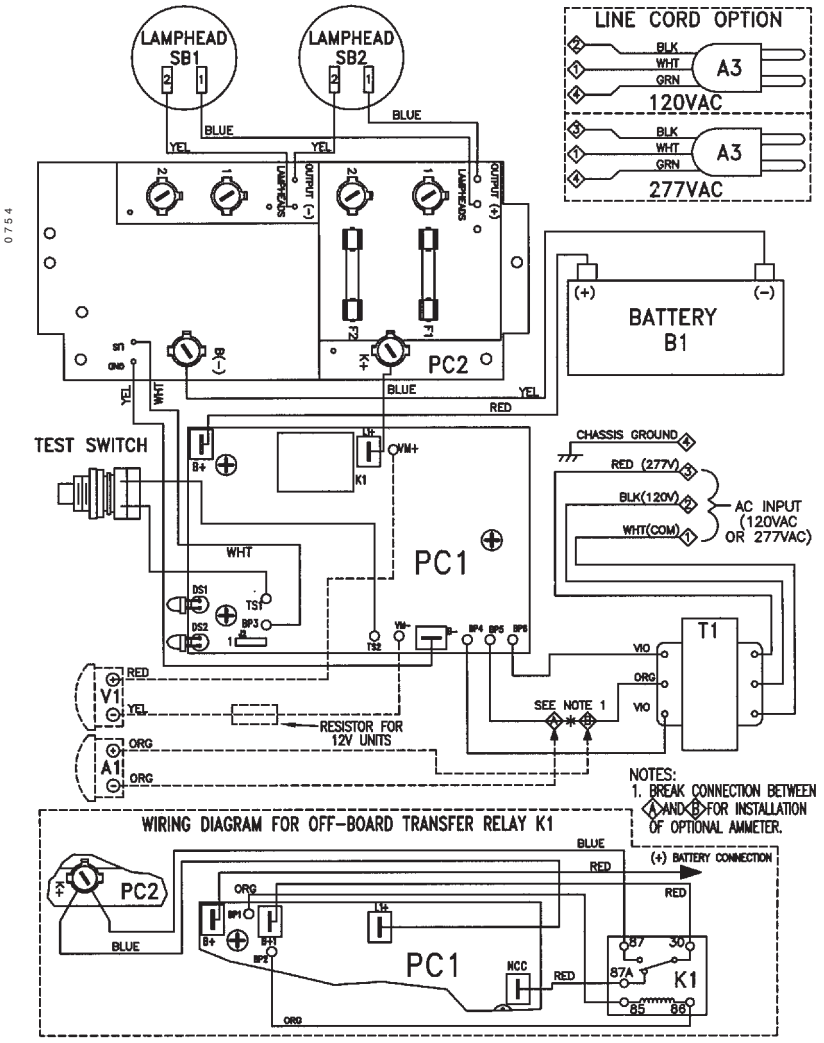
Automatic Tests

The unit will automatically initiate a self-test/self-diagnostic cycle based on the following table:

Testing Period	Duration of Test
Once a month	1 minute
Once every 6 months	30 minutes

Fig. 3

Wiring Diagram



Battery Installation

Important: Battery must be connected before AC power is applied to unit. Do not connect battery if AC power is not available. Extended discharge damage to the battery may occur if connected to an unenergized unit for prolonged periods.

WARNING: Batteries can produce high current. Avoid contact with battery terminals. Use insulated tools during installation.

Batteries are packed in unit shipping carton. Wiring harness (packed inside unit) must be affixed to batteries, and batteries placed into unit in proper orientation. Connect red insert lead to positive (+) battery terminal lead, and yellow insert lead to negative (–) battery terminal lead. Refer to chart (below) for proper wiring diagram and battery placement inside unit.

Model	Battery System	Battery Connection	Battery Placement
AS80I	Four 6V, parallel	Fig. 4	Fig. 7
AS130I	Four 6V, parallel	Fig. 4	Fig. 8
AS180I-12V	Two 12V, parallel	Fig. 5	Fig. 9
AS270I-12V	Two 12V, parallel	Fig. 5	Fig. 10
AS360I-12V	Four 12V, parallel	Fig. 6	Fig. 11

Energizing The Unit

Prior to applying AC power to the unit, review the following checklist:

- *Unit is connected to an unswitched AC circuit*
- *AC input voltage matches transformer connections*
- *Unused transformer lead is capped off*
- *All electrical connections are tight and properly insulated*
- *Unit battery is installed and connected properly*

Once these criteria are checked, it is safe to energize the unit with AC power.

Operational check

Allow unit to charge for 24 hours. The "Operating Status" LED (see "Operation" section) should glow in the constant green (float) mode indicating unit ready state. Press unit test switch twice to initiate a 5 minute diagnostic/discharge test. Check for proper transfer circuit and lighting head operation.

Emergency Lamp Sensing Circuit

This circuit is designed to detect a drop in output current caused by emergency lamp failure. This sensing circuit is factory set in all units supplied with one, two or three lamp heads.

Important: Units operating remote lighting heads require field adjustment of the Lamp Sensing Circuit. Refer to the "Lamp Sensing Adjustment Procedure" on page 11.

Fig. 4

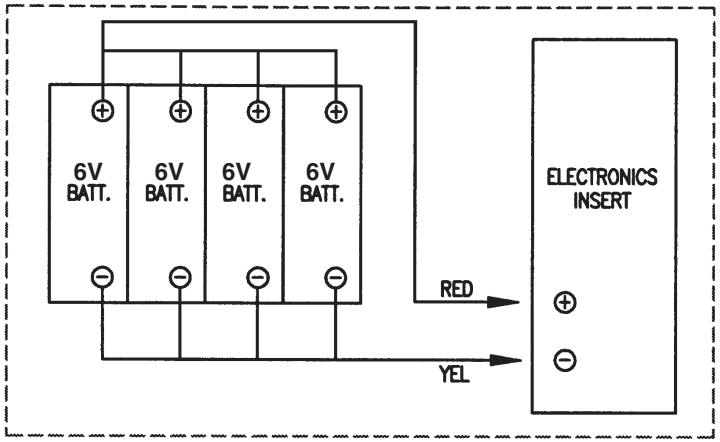


Fig. 5

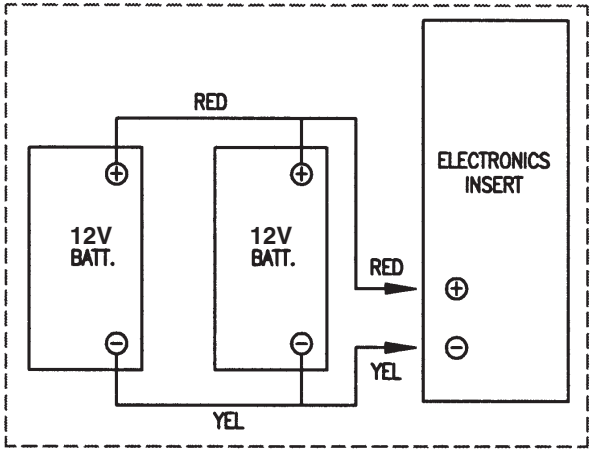


Fig. 6