



Field Service Report RM030451

2/13/04

A Summary of Field Service Report

Distributor: 70800 GENERAL SERV. ADMINISTRATION
Customer: 51622 FT. STEWART FLEET MGMT CENTER
Contact: [REDACTED]
Report No: RM030451

Report Type: FSR Type: Warranty Area: CHASSIS
Origination: 4/26/03 VOC: Gross: 1800 ELECTRICAL SYSTEM
Expiration: 7/23/03 Amount/Unit: 1,625.57 Component: 1857 Switch -
Unit: 3 Item: 185701 Headlight, Parking, Clearance/Marker
Total Amount: 4,876.71 Failure: V01 Vendor Part Defective

VIN	Body No	In Service	Mileage	Model	Paid Status	Paid Amt
1T88R2D2931130436	237606	2/1/02	872	8N	Closed	0.00
1T88U2D2531131856	237971	1/1/03	1,695	8N	Closed	0.00
1T88U2D2931131861	238023		566	8N	Closed	0.00
Total Paid:						0.00

Description

Invoices sent in from Great Service Always in Hinesville GA. They report they have not been paid for following
Invoice 9614 Headlight Switch in op, \$100.66 was paid by claim #1284170
Invoice 9579 They report TBB paid \$300.49 of the \$360.49, this was for the Real seal in the rear. Check was requested for the \$60.00, #038061
Invoice 9584 replaced Light switch \$125.62, was paid on claim #1284171.
Replace bad alternator. Check request CV034815 requested 9/16/03. MA

* Maintenance Now by
Good Service Always [REDACTED]



A Subsidiary of FARMINGTON

Field Service Report RM001263

3/2/2004

Distributor: 43045
Customer: 28294
Contact:

Report No: RM001263
Report Type: Authorization

Type: Policy

Area:

CHASSIS

Origination: 12/14/2000
Expiration: 3/30/2002

VDC:

Ground:

1800 ELECTRICAL SYSTEM

Amount/Units 100.00

Comments:

1857 Switch -
Headlight, Parking, Clearance/Marker
Lights

Unit: 1

Item:

185701 None

Total Amount: 100.00

Failure:

Q01 Various

VIN	Body No	In Service	Mileage	Model	Paid Status	Paid Amt
1T88N3B21X1164753	9942198	8/13/1998		SS	Paid	100.00
					Total Paid:	100.00

Description

H

headlights flicker as going down the road. He will review the Switches and connections.

8/27/01 Roland had this unit brought back in, for the Ambers would Flash when the Heaters were turned on. Lights in the dash were dim. He reviewed all the grounds found the Body Side panel was loose. He Tighten the Panel added another Ground lead direct with the Chassis Ground. They questioned to help the customer as policy for the electrical issue. Waiting on work order

1/21/02 They report had \$161.23 on the repairs, I will honor, \$100.00

3/18/02 I changed Expiration request they need to send in without being Cut more on the Price

Call:



A Subsidiary of FORD CREDIT CORPORATION

Field Service Report RM010342

3/1/2004

Distributor: 26827
Customer:
Contact:

Report No: RM010342
Report Type: PSR

Type: Informational

Area:

CHASSIS

Origination: 3/12/2001
Expiration: 3/12/2001

VOC:

Amount/Unit: 0.00

Grade:

1800 ELECTRICAL SYSTEM

Component:

1857 Switch -
Headlight, Parking, Clearance/Marker
Lights

Units: 1

Ign:

185701 None

Total Amount: 0.00

Failure:

Q01 Various

VIN
1T88N3B14X1167900

Body No
9943208

In Service
6/30/1998

Mileage:

Model
8S

Paid Status
Closed
Total Paid:

Paid Amt
0.00
0.00

Description

Schematic needed for the Headlight Switch. Unit keeps having switch 61200880 failures. Sent schematic 62201470, and Harness 62201378, with Switch Diagram 61200880.



Field Service Report RS030229 ✓

2/13/04

A subsidiary of FORD CREDIT FINANCIAL
CREDIT CORPORATION

Distributor: 70600

Customer:

Contact:

Report No: RS030229

Report Type: FSR

Type: Informational

Area:

CHASSIS

Origination: 2/12/03

VOC: YES Open

Group:

1800 ELECTRICAL SYSTEM

Expiration: 5/13/03

Amount/Unit: 0.00

Component:

1857 Switch -
Headlight, Parking, Clearance/Marker
Items: 185701 Nghts

Units: 1

Total Amount: 0.00

Failure:

V01 Vendor Part Defective

<u>VIN</u>	<u>Body No</u>	<u>In Service</u>	<u>Mileage</u>	<u>Model</u>	<u>Paid Status</u>	<u>Paid Amt</u>
1T88N3B2421115670	135338	9/1/01		8S	Closed	0.00
Total Paid:						0.00

Description

1st Student requested we look into the failures of our headlight switch. First Student contacted Colr Harvee and they reported a date code was stamped on the improved switches and no stamp on questionable ones. Part# 21000880. Attachments, Failure list Attached.



A Subsidiary of FLEET MANAGEMENT CORPORATION

Field Service Report TM020651

3/1/2004 ✓

Distribution
Customer
Contact



Report No: TM020651
Report Type: PSR

Trans Policy

Area

CHASSIS

Origination: 6/21/2002
Expiration: 9/19/2002

YOC:
Amount/Unit: 37.90

Group: 1800
Component: 1857

ELECTRICAL SYSTEM
Switch -
Headlight, Parking, Clearance/Marker
Lights
Item: 185701 **Name**

Units: 1

Item

Total Amount: 37.90

Failure

V01 Vendor Part Defective

VIN
1T68R3B1611097800

Body No
9931857

In Service
4/1/2001

Mileage
55,874

Model
88

Paid Status
Paid
Total Paid:

Paid Amt
37.90
37.90

Description

HEADLIGHTS DO NOT WORK. FOUND HEADLIGHT SWITCH INOP. REPLACE.



Product Recall

To: ALL DEALERS
From: RON HUGHES
CUSTOMER SUPPORT DIVISION
Subject: RECALL 00V-174 - Modification of Marker Light Circuit
Date: October 9, 2000

Enclosed are copies of the customer notification letter and repair procedure for Recall 00V-174. Thomas Built MVP-EF, MVP-ER and ER Transit school buses with option B3840-03-000, Weldon Technologies' 5050-1400 surface mount marker lights manufactured December 1994 through July 2000 are involved in this recall. These marker lights may overload the headlight switch and result in a loss of headlamps without prior warning.

This is a universal notification sent to all dealers. You may or may not have customers in your area affected by this recall. If owners in your area are subject to this recall, we have enclosed a printout listing those customers' names and addresses. If there is no printout enclosed, according to our records there are no units in your area involved. If you have a printout and any of the units on it is still in your possession, it is your responsibility to ensure the recall is performed before the unit is delivered to the customer.

Thomas Built Buses has elected to notify all customers directly. Each dealer should order the necessary parts from your servicing parts distribution center. Your customers will be contacting you for the repair parts. Reimbursement for the parts, as well as labor, (if requested) may be obtained by filing a warranty claim.

If you know of any customers who own or operate a Thomas bus in this recall, whose name and address is NOT listed or is INCORRECTLY listed on the enclosed printout, please promptly notify Thomas Built Buses of that additional information in writing. Thank you for your cooperation and assistance.

Ron 

Enclosures: Customer Letter Repair Procedure Printout (if applicable)

Page 1 of 1

5-24-99

A Division of ~~Postcard~~ ~~Postcard~~

October 16, 2000

Recall 00V-174

Thomas Built Buses, Inc.
PO Box 8480 (87881)
1404 Country Road
High Point, NC 27260
(336) 885-4471 From
(336) 885-4444 For

Dear Thomas Bus Owner,

This notice is sent to you in accordance with the requirements of the National Safety Traffic and Motor Vehicle Safety Act. Thomas Built Buses, Inc. has decided that a defect which relates to motor vehicle safety exists in the vehicle identified on the enclosed postcard (Form PSD 304).

The defect involves Thomas MVP-ER, MVP-EF, and ER Transit units manufactured by Thomas Built Buses between December 1994 and July 2000 equipped with option 83640-03-000 (Weldon Technologies' 6050-1400 surface mount marker lights). These marker lights may overload the headlight switch and result in a loss of headlamps without prior warning. This may result in a loss of vehicle control and potential vehicle crash.

You should immediately contact your Thomas Built Buses dealer for an appointment to have your vehicle modified. Thomas Built Buses will remedy this defect without charge. Reimbursement is available upon request. The repair consists of installing a relay to reduce the current draw through the headlight switch. The amount of time necessary to perform this repair is estimated to be .5 hour per vehicle. Details are included in the repair procedure.

To receive free repair parts, contact your local Thomas Built Buses dealer. The body number for each vehicle involved in this recall campaign can be found just above the address on the enclosed postcard. After receiving parts and completing the repair please complete each postage paid card separately and return it to Thomas Built Buses to verify completion.

In addition to being used to verify repair completion, the postcard must be completed and returned if the vehicle does not need repair. If you no longer own the vehicle, or the vehicle identified on the postcard has been exported, stolen, or destroyed/totaled.

You may notify the Administrator, National Highway Traffic Safety Administration, 400 Seventh Street SW, Washington, DC 20590 or call 1-888-327-4236 if you believe that (1) the notification or remedy described is inadequate; (2) the manufacturer has failed or is unable to remedy the defect in accordance with the notification; (3) the manufacturer has failed or is unable to remedy the defect within 60 days after your first attempt to obtain remedy.

If you have additional questions, please contact Tracy Sauerbrey at (336) 841-8992.

Sincerely,


Ron Hughes, Manager
Customer Support Division

RH/ts
Enclosures Postcard

Freightliner Corporation is
a DaimlerChrysler Company

Recall #00V-174

Repair Procedure #83490007

Title: Modification of Marker Light Circuit on MVP-EP, MVP-ER, & ER Transit models.

One kit required per vehicle

Time Allowance: .5 hour per vehicle

This repair procedure contains two different installations. The first is for the MVP-ER and the ER Transit. The second is for the MVP-EP. Check your vehicle and use the correct installation. Prior to beginning the following repair procedure, ensure that all clearance lights work properly. Repair if necessary, then continue with procedure.

Read all instructions before beginning repairs.

MVP-ER and ER Transit

1. Park vehicle, remove keys, and chock the wheels.
2. Disconnect negative cable on battery.
3. Open the side electrical compartment door located below the driver's window.
4. Locate the body electrical panel, which is to the rear of the compartment. Mount the relay base, which is part of harness #52004602, to the body panel, as shown in figure 1, with a #10 tapping screw, #27161648. (Harness and Screw are provided in kit #83490007)
5. Install relay, #52003303, into the mounting base. (Relay is provided in kit #83490007)
6. Route the white ground wire in the provided harness and ground it to the panel.
7. Locate an open fuse position on the small distribution panel marked "battery". Install the 15 amp fuse, #52000514, in this position and attach the red wire to the post. (Fuse is provided in kit #83490007.)

Note: If there are no open fuse positions marked "battery" on the small distribution panel, procure an inline 15 amp fuse locally and connect it to the power bus bar.
8. Locate the brown "B11" wire connected to the 3rd post down of the rearmost junction block on the chassis panel. See figure 1. Cut the wire approximately 6" from the end connecting to the junction block.

9. Butt splice the orange wire in the new harness to the 6" lead of wire "B11" coming from the junction block.
10. Butt splice the brown wire in the new harness to the lead of wire "B11" going to the body.
11. Connect battery and check the circuit to make sure it functions properly.
12. Release bus for service.

MVP-EE

1. Park vehicle, remove keys, and chock the wheels.
2. Disconnect negative cable on battery.
3. Open the side electrical compartment door located below the driver's window.
4. Locate the body electrical panel, which is to the rear of the compartment. Mount the relay base, which is part of harness #52004602, to the body panel, as shown in figure 2, with a #10 tapping screw, #27161648. (Harness and Screw are provided in kit #85490007.)
5. Install relay, #52003303, into the mounting base. (Relay is provided in kit #85490007.)
6. Route the white ground wire in the provided harness and ground it to the panel.
7. Locate an open fuse position on the small distribution panel marked "battery". Install the 15 amp fuse, #52000514, in this position and attach the red wire to the post. (Fuse is provided in kit #85490007.)

Note: If there are no open fuse positions marked "battery" on the small distribution panel, procure an inline 15 amp fuse locally and connect it to the power bus bar.

8. Locate the Rectangular shaped connector in front of the body panel as shown in figure 2. The third wire should be a brown wire with a white tracer "34". Cut the wire approximately 6" from the end of the connector.
9. Butt splice the orange wire in the new harness to the lead coming from the chassis panel.

10. Butt splice the brown wire in the new harness to the 6" lead of wire "34" going to the rectangular connector.
11. Connect battery and check the circuit to make sure it functions properly.
12. Release bus for service.

Parts list:

85490007	1	Kit - Recall, #00V-174, Modification of Marker Light Circuit, includes:
52003303	1	Relay - High Capacity
52004602	1	Harness - Marker Light Relay
52000514	1	Fuse - 15 Amp
27161648	1	Screw - Tapping, #10-5/8" Phillips Round Head
85490008	1	Procedure - Repair, Marker Light Circuit Modification

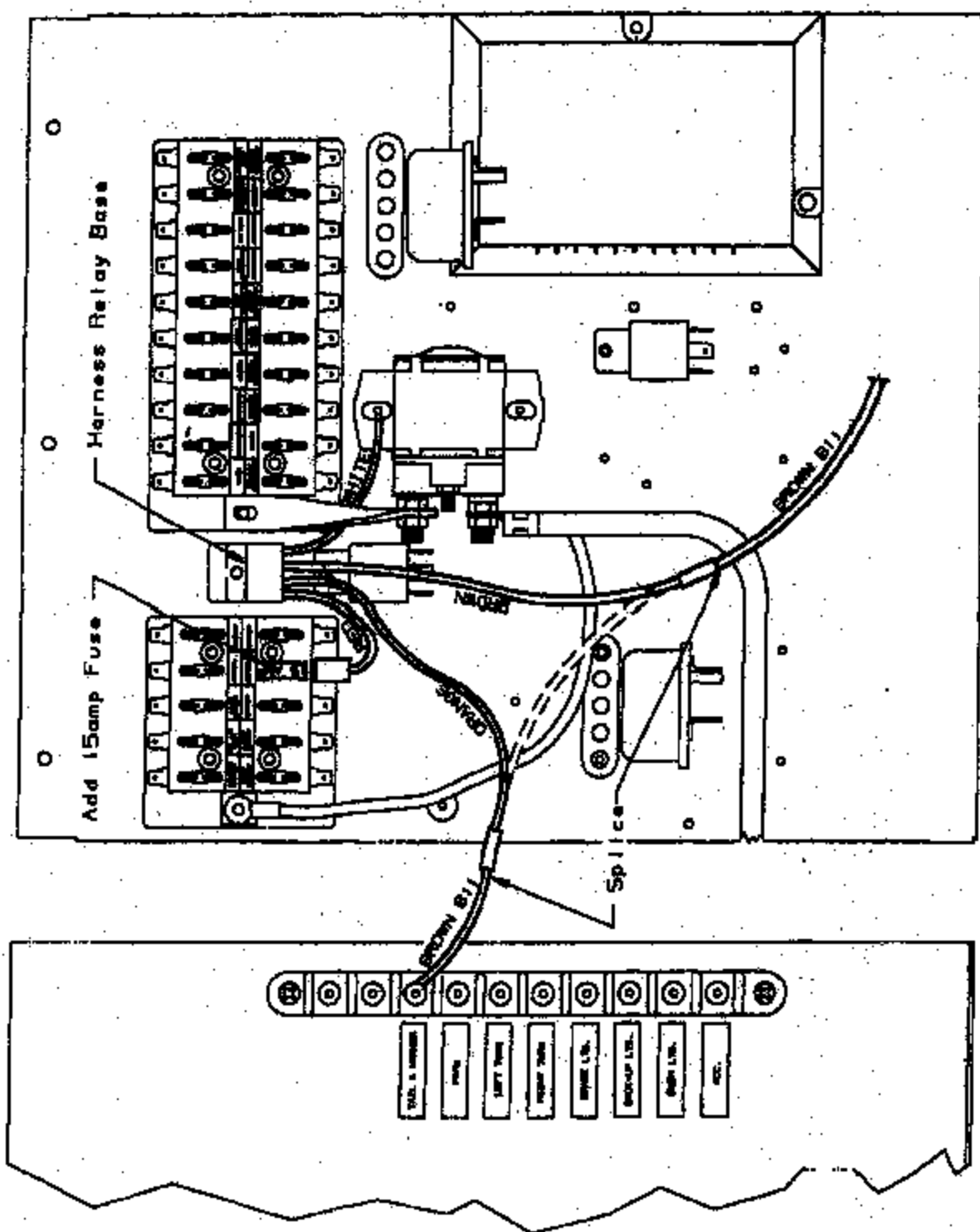


Figure 1

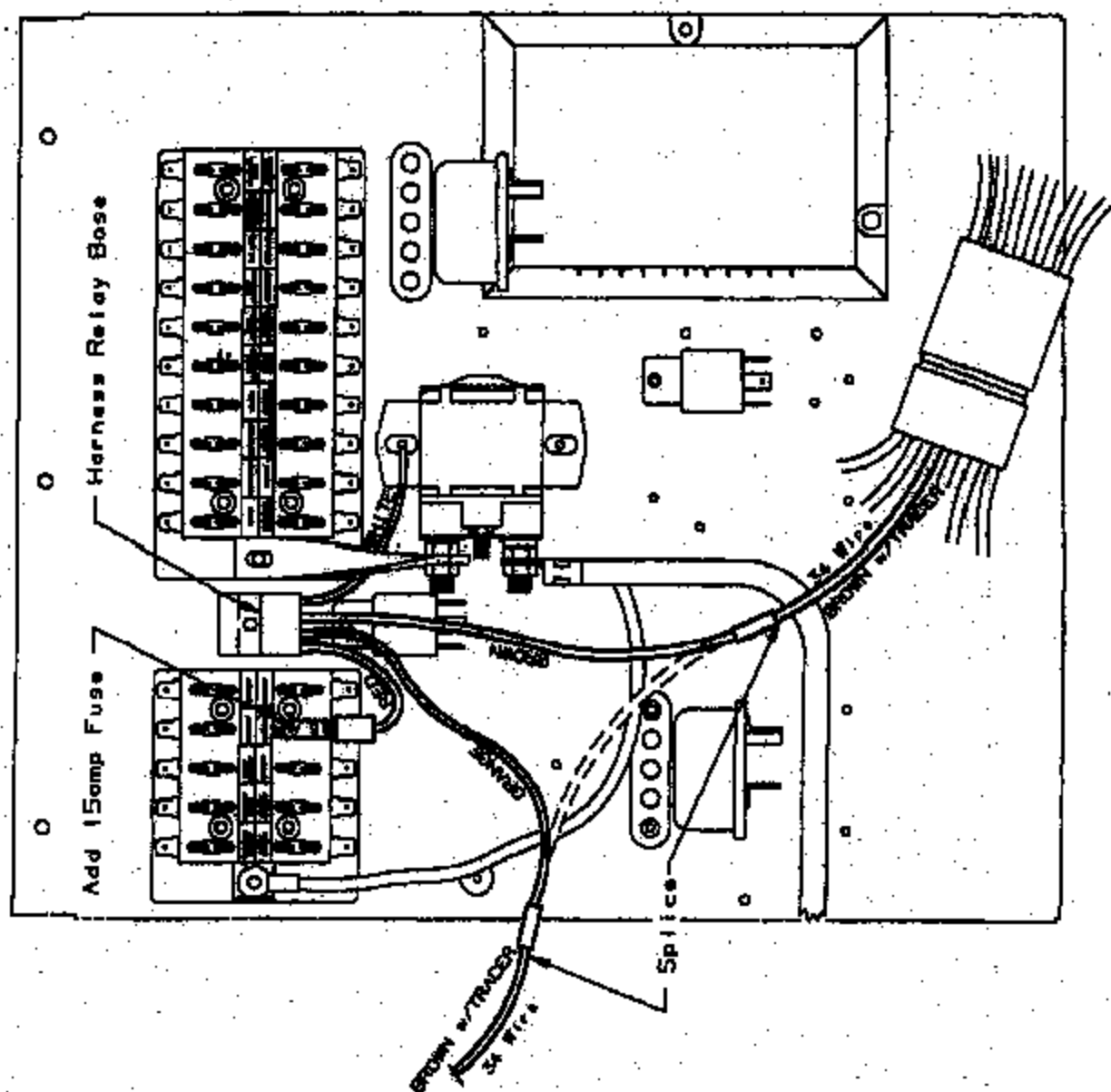


Figure 2

Mr. Thomas Z. Cooper
Vehicle Integrity Division
Office of Defects Investigations
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

SUBJECT: NSA-12aby / PE00-008

Dear Mr. Cooper,

This responds to your February 23, 2000 letter requesting information regarding the headlight switch and headlight switch wiring in 1998 Thomas Built Buses Saf-T-Liner MVP-EF and MVP-ER school buses. Each question is repeated verbatim in the attachment followed by the appropriate responses in bold.

1. State the total number of the subject vehicles sold in the U.S. Include a list of the five largest fleets or purchasers of the subject vehicles, including the size of the fleet and the contact person and phone number for each fleet.

MVP-EF	MVP-ER
Total 1998 School Buses: 1206	Total 1998 School Buses: 1080
Clark County School District, 52 Las Vegas, NV Frank Giordano - 702 799-8105	Fairfax County Public Schools, 131 Fairfax, VA Ernie Green - 703 446-2000
Chicago School Transit, 23 Chicago, IL Roger Bannerman - 773 373-2100	Montgomery County BOE, 63 Rockville, MD Mike Vernon - 301 840-8136
Longhorn Bus Sales, 44 Houston, TX Jack Connell - 713 631-9306	Prince William County Schools, 38 Bristow, VA Jim Bettis - 703 368-0566
Ashburnham-Westminster Reg, 25 Westminster, MA Ernest Masserello - 978 874-1501	Chesapeake City Public Schools, 25 Chesapeake, VA Blanford Sloan - 757 547-1617
Double A Transportation, 25 Rocky Hill, CT Larry Brush - 860 563-3126	Forsyth Co. School Bus Garage, 24 Winston Salem, NC Spencer Glenn - 336 661-4994

Source: Thomas Built Buses, April 2000

2. State the number and provide copies of the following and all documents related to the following, from all sources, of which Thomas is aware and which relate, or could relate to the subject alleged defect.

- a. owner/fleet complaints;
- b. field reports;
- c. fire/incident claims;
- d. subrogation claims;
- e. lawsuits; and
- f. third-party arbitration proceedings (where Thomas is a party to the arbitration)

a. Thomas Built Buses is not aware of any owner/fleet complaints relating to this matter, except those brought to our attention by NHTSA as a result of this investigation.

b. Thomas Built Buses has published 1 field service report, which could relate to the subject alleged defect. Report number RM990504 is attached (Attachment 2b.1). This report was issued May 3, 1999 and involved a 2000 model year MVP-EF school bus. This report resulted in a Customer Corrective Action Request (CCAR), a nine-step problem solving process and a Supplier Corrective Action Request (SCAR) being generated (Attachments 2b.2, 2b.3, 2b.4). Source: Thomas Built Buses, April 2000.

c. Thomas Built Buses is not aware of any fire/incident claims relating to this matter.

d. Thomas Built Buses is not aware of any subrogation claims relating to this matter.

e. Thomas Built Buses is not aware of any lawsuits relating to this matter.

f. Thomas Built Buses is not aware of any third-party arbitration proceedings relating to this matter.

3. If Thomas has issued any service or technical bulletins, advisories, or other communications to dealers, zone offices, or field offices pertaining to the alleged defect in the subject devices, provide a copy of each such document. If no such documents have been issued, so state.

No such documents have been issued.

4. State the number and provide copies of warranty claims, including extended warranty claims, and requests for "good will," field, or zone adjustments, to date, that relate to the alleged defect. Each problem claim code must be identified. For each warranty claim, include VIN, vehicle build date, incident date, and warranty claim date.

For model year 1998, Thomas received 24 claims involving replacement of the headlight switch. They are enclosed along with a summary, under the heading "Supporting Documents for Request No. 4".

Source: Thomas Built Buses, March 2000.

5. Identify and provide copies of all documents, for each of the following, pertaining to the alleged defect.

- a. studies;
- b. surveys; and
- c. investigations.

- a) - b) Thomas did not conduct any studies or surveys regarding the alleged defect in the subject vehicles.
- c) In 1999, an investigation was made after a field service report indicated that the headlight switch was failing. See 2b. A Customer Corrective Action Request was issued (Attachment 5c.1). Two potential causes of failure were identified, terminal misalignment and broken rheostat coil. For the terminal misalignment, a problem solving process was conducted (Attachment 5c.2). The results of the problem solving process showed that Thomas Built Buses was in 100% compliance with the installation process. The switch supplier, Cole-Hersee, was contacted concerning the broken rheostat coil. To date, Thomas has not received a response (Attachment 5c.3).

This investigation was reopened March 31, 2000. A bench test was conducted to simulate the same load conditions on the headlight and taillight circuit as school buses built to specifications established by the state of Ohio, a state known for its unique requirements for school bus lights. Test results show the headlight and taillight circuit design was proper for the switch capacity.

Source: Thomas Built Buses, April 2000

6. Furnish a chronology of any modifications or changes in the manufacture, design, or material composition of the subject switches or the switch wiring harness. Include the following for each modification or change.

- a. the approximate date on which the modification or change was incorporated into production;
- b. a description of the modification or change;
- c. the reason for the modification or change;
- d. whether the modified or changed component can be interchanged with earlier production components.

Thomas wiring harness P/N 61201521 was modified in August 1999. The 30 pin connector was being made obsolete by the supplier. It was replaced with one 15 and one 12 pin connector. This modification can not be interchanged with earlier production components. The approximate date the new pin connectors were incorporated into production was September 1999.

Source: Thomas Built Buses, April 2000

7. Furnish Thomas' opinion of the alleged defect in the subject device. Include an assessment of the following:

- a. all causal or contributory factors;
- b. the failure mode(s) or root cause(s);
- c. an analysis of how and why the subject failures could occur, and
- d. the risk to motor vehicle safety that this poses.

Thomas Built Buses believes the design and installation of the headlight switch is satisfactory. The effect of this failure is loss of headlights. However, loss of headlights is immediately discernable by the bus driver and the risks can be quickly mitigated.

COLE HERSEE CO.
SOUTH BOSTON, MA 02107
GEORGE C. GALLO
97-454-570 - EXT 200

COLE HERSEE
COMPANY

To: Thomas Built Buses

FROM GEORGE C. GALLO

ATTN: Mr. Steve Jacobovich

ADMINISTRATIVE MANAGER

Senior Electrical Design Engineer

File

PAGES 16 (INCLUDING COVER SHEET)

Phone

Date 02/28/04

Re: Warranty Letter

CC:

X Report

For Review

☐ Please Comment

Please Reply

☐ Please Reply

● Comment: Steve,

Copies of the documents we talked about follow.

If you need any additional information and/or assistance, please do not hesitate to contact us.

Regards,

COLE HERSEE COMPANY

George C. Gallo

ADMINISTRATIVE MANAGER

Phone (617) - 254-5700 - EXT 200

FAX (617) 344-4125

From: Skouras, Thomas
Sent: Wednesday, May 19, 2004 2:52 PM
To: Moore, James
Cc: [REDACTED]
Subject: PRN 71002-02

Jim

I received a call from Stacey Hanes, Production Planner for Thomas Built Buses Chassis Division. He stated they were having a problem with our PRN 71002-02. He put a Marquez Perkins on the line with both Dick Eby and myself. He explained that they were having a problem in the field with the dimmer control. Specifically, when adjusted to the high position, they are experiencing an arc, possibly due to a gap between the arm and the coil. Dick told him that we would check our stock on hand for any problems and requested to have samples of the failed switch sent back to us. Marquez was going to see Ricky Myers in the Warranty Dept. to have samples sent back to my attention.

[REDACTED]

Thomas Skouras x381

Cole Hersee Co.
18 OLD COLONY AVENUE, SOUTH WESTON, MA, U.S.A. 01887TEL: (977) 200-8100
FAX: (977) 200-8000**CORRECTIVE ACTION FORM**CA Number: **861**

Supplier _____ Factory _____ Customer ☒ Internal Audit _____
PN/BO Element: **71092-02** Date Issued: **5/25/99**
Originator: **DA (THOMAS BUS GRASSIE)** Repeat CA? NY CA# _____
Assigned To: _____ Response Due Date: **6/1/99**
Description of Problem: **SPARKING OUT AT HIGH POSITION ACCORDING TO THE CUSTOMER.**
(CALL SEE ATTACHED LETTER)

Containment Action:

N/A

Assignee: _____

Date: _____

Root Cause: **SAMPLES FROM CUSTOMER INDICATE HIGH LOAD OR DEAD SHORT ON FAILED CIRCUIT. JUNKY CIRCUIT IS RATED AT LESS THAN 3 AMP, EVEN WHEN BATTERY CONNECTION TO HAMP LOAD COULD CAUSE FAILURE. ALSO, HIGH VOLT SURGE ON RESISTIVE CIRCUIT COULD CAUSE INTERMITTENT CIRCUIT. THIS CONDITION ALSO**

Preventive Action (with objective evidence):

IMPROVE POWER RATING TRACKER

Customer Application should be reviewed by Customer
E Mail See if they fit within the Band Range

Completed By: _____

Target Date: _____

TO BE FILLED OUT BY COLE HERSEE

Verification of Effectiveness of Action (by Originator):

None

Originator Signature: _____

Date: _____

☒ ACCEPTED☐ REJECTED

New Due Date if Rejected: _____

New Follow Up Date: _____

Cole Hersee QA Signature: **[Signature]**Date Closed: **6/1/99**

Distribution: Test Lab (original), J Moore, GAV/Leo Cavalieri

Cole Hersee Co., Boston, MA

LIFE TEST REPORT

DATE: 6/3/97

SWITCH TYPE: push-pull 8 pos headlamp with rheostat dimmer

SWITCH NO.: 71022-02

CUSTOMER/VENDOR: various

CUSTOMER/VENDOR #: various

POSITIONS: 3

VOLTS: 12.8

Two switches tested for QA record. Switches cycled at 24 opm.

CIRCUITS	AMPS	TYPE
1-7 (park)	5	lamp
5-4 (tail)	5	lamp
1-8 (head)	10	lamp

		MVD	MVD	MVD	MVD	MVD	MVD	MVD	MVD	MVD	MVD
CYCLES		0	11K	21K	32K	42K	52K	70K	80K	90K	100K
Sw 1	pos 1: off	ok	ok								
	pos 2: 1-7	21	75	115							
	5-4	17	150	155	failed at 24K						
	pos 3: 1-8	210	175	200							
	5-4	10	125	160							
Sw 2	pos 1: off	ok	ok	ok	ok	ok	ok	ok	ok		
	pos 2: 1-7	21	80	180	80	200	112	180	104	60	100
	5-4	7	15	121	8	20	42	61	20	10	60
	pos 3: 1-8	200	20	208	200	245	199	205	240	75	210
	5-4	9	20	60	41	40	15	40	31	65	21

REMARKS:

Switch 2 successfully completed the life test at 100K cycles.

Switch 1 got very hot and began to burn due to arcing and excessive grease on the terminal insulator.

Requested By: QA

Conducted By: S. Gonçalves

Approved By: G. Auguste

AJI, LAB, JH, GE, L. Cavaliere/GA, LDeG, DRAFTING

Coto Electric Co., Boston, MA

LIFE TEST REPORT

DATE: 04/26/96

REPORT NO. _____

SWITCH TYPE: Push/Pull

SWITCH NO. 71022-02

CUSTOMER/VENDOR: [REDACTED]

CUSTOMER/VENDOR # FS-HS15

POSITIONS: 3

VOLTAGE: 12VDC

Comparative test between CH #71022-02
and a similar switch #FS-HS15 made in
Taiwan by Island Steel Company.

Cycling test at 12 CPM to see if
competitive switch would be durable.

CIRCUITS	AMPS	TYPE
1-7 (Park)	5	Lamp
2-4 (Tail)	5	Lamp
1-6 (Head)	10	Lamp
3-2 (Dash)	5	Lamp

CYCLES	MVD	MVD	MVD	MVD	MVD	MVD	MVD	MVD	MVD	MVD
	0	5K	10K	15K	20K	25K	30K	35K	40K	45K
CH - Pos. 3: Dash: 3-2	OK*	OK	OK	OK	OK	OK	OK	OK	OK	OK
Tail: 2-4	11	11	12	18	36	29	16	33	22	34
Park: 1-7	11	17	21	24	32	50	21	24	38	61
Pos. 3: Tail: 2-4	12	14	16	26	23	33	28	27	27	36
Head: 1-6	9	10	12	24	26	62	47	45	33	22
Dash: 3-2	OK*	OK	OK	OK	OK	OK	OK	OK	OK	OK
IS - Pos. 2: Dash: 3-2	OK*	OK	OK	OK	OK	OK	OK	OK	OK	OK
Tail: 2-4	38	21	17	27	27	47	21	29	41	61
Park: 1-7	11	18	17	23	29	33	24	17	21	26
Pos. 3: Tail: 2-4	27	32	54	33	29	35	44	32	47	58
Head: 1-6	18	19	22	21	35	22	36	21	27	34
Dash: 3-2	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK

REMARKS: OK* Means knob had good rotary action and sw. retained good (Dash) light dimming capability in that position.

The IS (FS-HS15) switch failed after 30K cycles. The switch was removed from test after it began to burn and smoke near the 62 BAT terminal. After inspecting the switch it was discovered that the insulator

Cont'd. Pg. 4

AJI, LAB, JN, QC, Lisa Cavalieri/OA, LDas DRAFTING

Sola Center Co., Boston, MA

LIFE TEST REPORT

DATE: 04/26/96

REPORT NO. _____

SWITCH TYPE: Push/Pull

SWITCH NO. 73092-03

CUSTOMER/VENDOR: _____

CUSTOMER/VENDOR: FR-2815

POSITIONS: 3

VOLTS: 12VDC

See Page 1

CIRCUIT	AMP	TYPE
1-7 (Park)	5	Land
5-4 (Tail)	5	Land
1-6 (Head)	10	Land
3-2 (Dash)	5	Land

	MVD	MVD	MVD	MVD	MVD	MVD	MVD
CYCLES	50K	55K	60K	65K	70K	75K	80K
CH - Pos. 2: Dash: 3-2	OK	OK	OK	OK	OK	OK	OK
Tail: 5-4	21	60	28	27	38	39	36
Park: 1-7	50	47	57	56	66	73	45
S1 Pos. 3: Tail: 5-4	54	43	54	33	42	56	73
Head: 1-6	41	38	56	50	54	52	49
Dash: 3-2	OK	OK	OK	OK	OK	OK	OK
IS - Pos. 2: Dash: 3-2	OK	OK	OK	OK	OK	OK	OK
Tail: 5-4	48	35	38	57	42	47	FAILED: SHUTTER AT 50K
Park: 1-7	24	59	55	39	62	71	
Pos. 3: Tail: 5-4	64	75	45	43	57	63	
Head: 1-6	26	30	36	46	34	36	
Dash: 3-2	OK	OK	OK	OK	OK	OK	

ATT, LAB, JN, QC, Lisa Cavalieri/CA, LDes DRAFTING

Life Service Co., Boston, MA

LIFE TEST REPORT

DATE: 04/26/06

REPORT NO. _____

SWITCH TYPE: Dash/Full

SWITCH NO. 71022-02

CUSTOMER/VENDOR: [REDACTED]

CUSTOMER/VENDOR # 72-16515

POSITIONS: 3

VOLTS: 12VDC

See Page 1

CIRCUIT	AMP	TYPE
1-7 (Park)	5	LAMP
5-4 (Tail)	5	LAMP
1-6 (Head)	10	LAMP
3-2 (Dash)	5	LAMP

	MVD	MVD	MVD	MVD	MVD	MVD	MVD
CYCLES	50K	95K	95K	100K			
CH - Pos. 2: Dash: 3-2	OK	OK	OK	OK			
Tail: 5-4	30	50	46	55			
Park: 1-7	51	53	47	51			
Pos. 3: Tail: 5-4	46	47	63	75			
Head: 1-6	61	70	63	69			
Dash: 3-2	OK	OK	OK	OK			
IS - Pos. 2: Dash: 3-2							
Tail: 5-4							
Park: 1-7							
Pos. 3: Tail: 5-4							
Head: 1-6							
Dash: 3-2							

material had developed a conductive carbon track that links to term. #5. This conductive track was caused by a bouncing and arcing moveable contact as it "Made" and "Broke" with terminal #5. It is well known that this insulator material does develop electrically conductive paths when exposed to repeated arcing.

In the F8-muss switch the bouncing and (arcing) was more severe because T.I. has a vacant terminal slot (#11) and the moveable contact bump for terminal #5 rides right over that slot. The CH switch does not have that vacant slot at #11. Contact bouncing in the Taiwan made switch was also severe because T.I. contact #5 does not lay flush with terminal insulator. Contact (with square edge) sticks out about .010" over the insulator. The CH switch takes care of that nicely by having a leveling ramp near terminal #5 so that moveable contact can ride smoothly.

We also know through experience that this insulator material does not react well with grease especially in the presence of arcing. Grease accelerates the formation of conductive tracks on insulator material. The Taiwan made switch had a lot more grease than the CH switch. That amount of grease has to be reduced to a minimum.

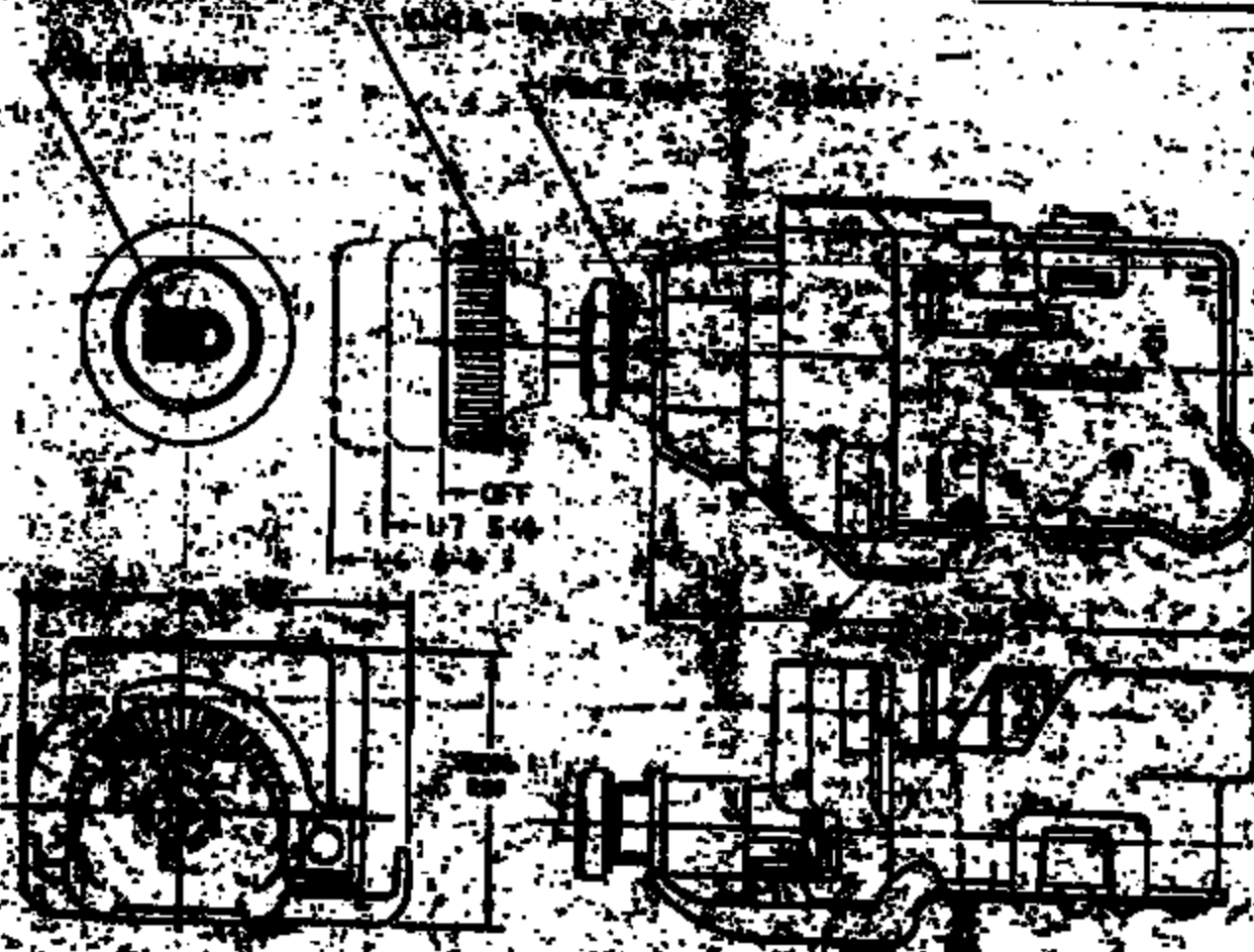
The Cole Hersee/USA made switch lasted 100K cycles and was still in good working condition when the switch was removed from test. A conductive carbon track had begun to form between terminals #4 and #7. But resistance never got to be low enough to cause any failure. The CH switch was otherwise OK.

The CH and the Taiwan made switches are similar in appearance (look alike) and virtually similar in internal design.

Island Steel Co. can be a potential supplier of this switch (71092-02) but the problems discovered through this endurance test and reported above need correction. The corrective actions necessary are: 1) A ramp near T.I. contact #5 to make same flush with insulator and prevent bouncing and arcing. 2) Plugging vacant #11 terminal slot. (Action #1 should take care of that.) 3) Reduce to a minimum the amount of grease on contacts.

Requested By: A.J. Introvigne Conducted By: J. Shroza Approved By: G. Augusta
J. Moore

Push/Pull71092-02Testtryts



LESS THAN 4000 Miles

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2. ALL OTHERS ARE 2. 501071
3. TERMINALS ARE 2. 501071
4. 501071

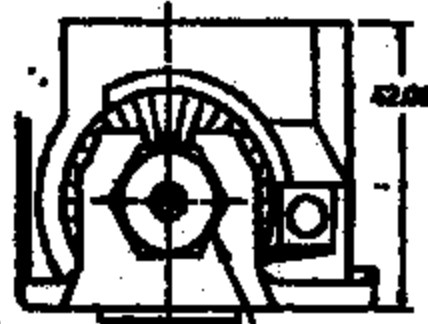
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74092-02



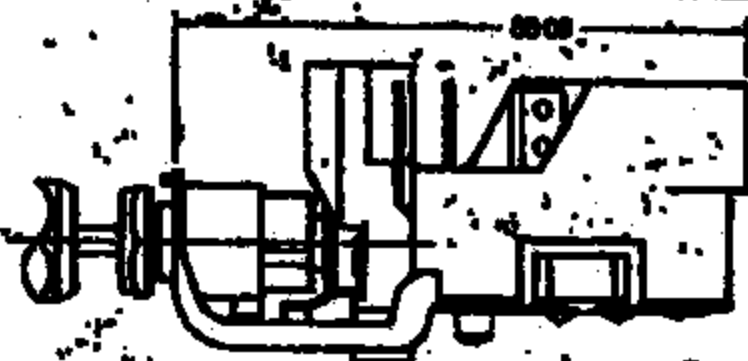
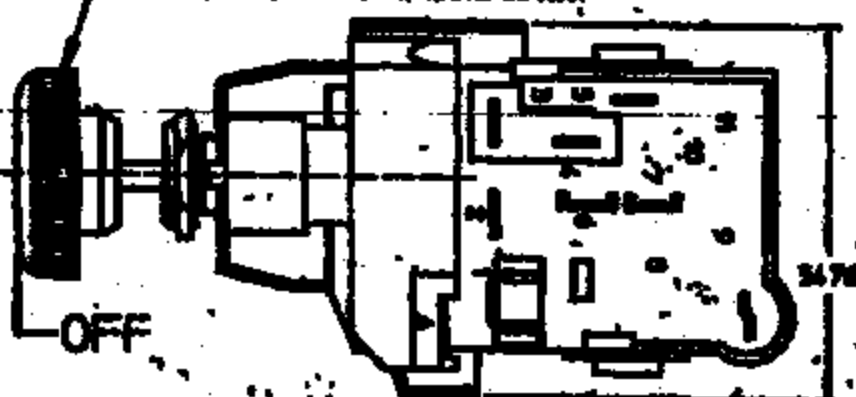
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PAGE NUS 2/16-28

**VIEW SHOWN
LESS KNOB**

-M003, BLACK PLASTIC, WHITE SPONT

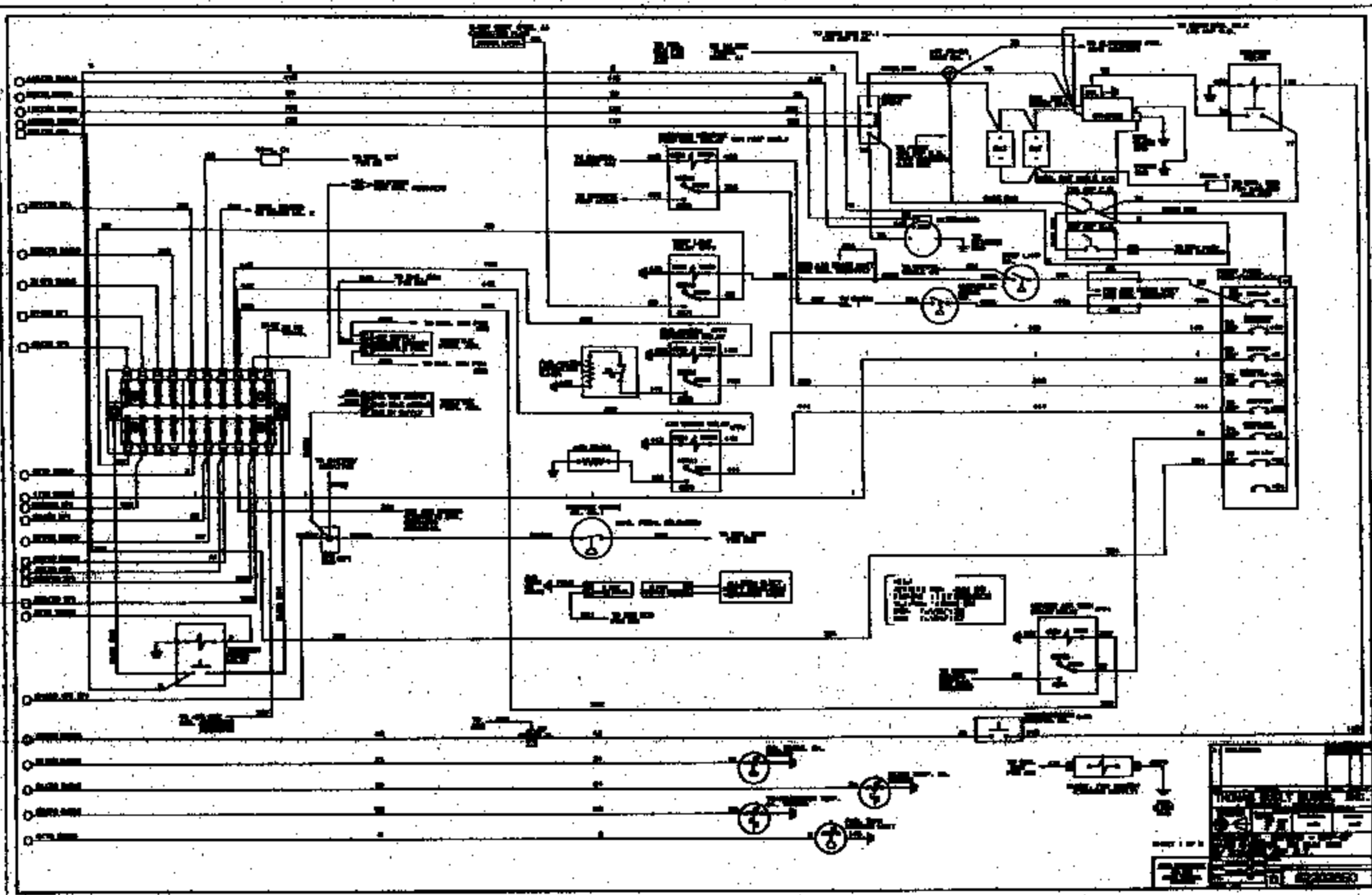


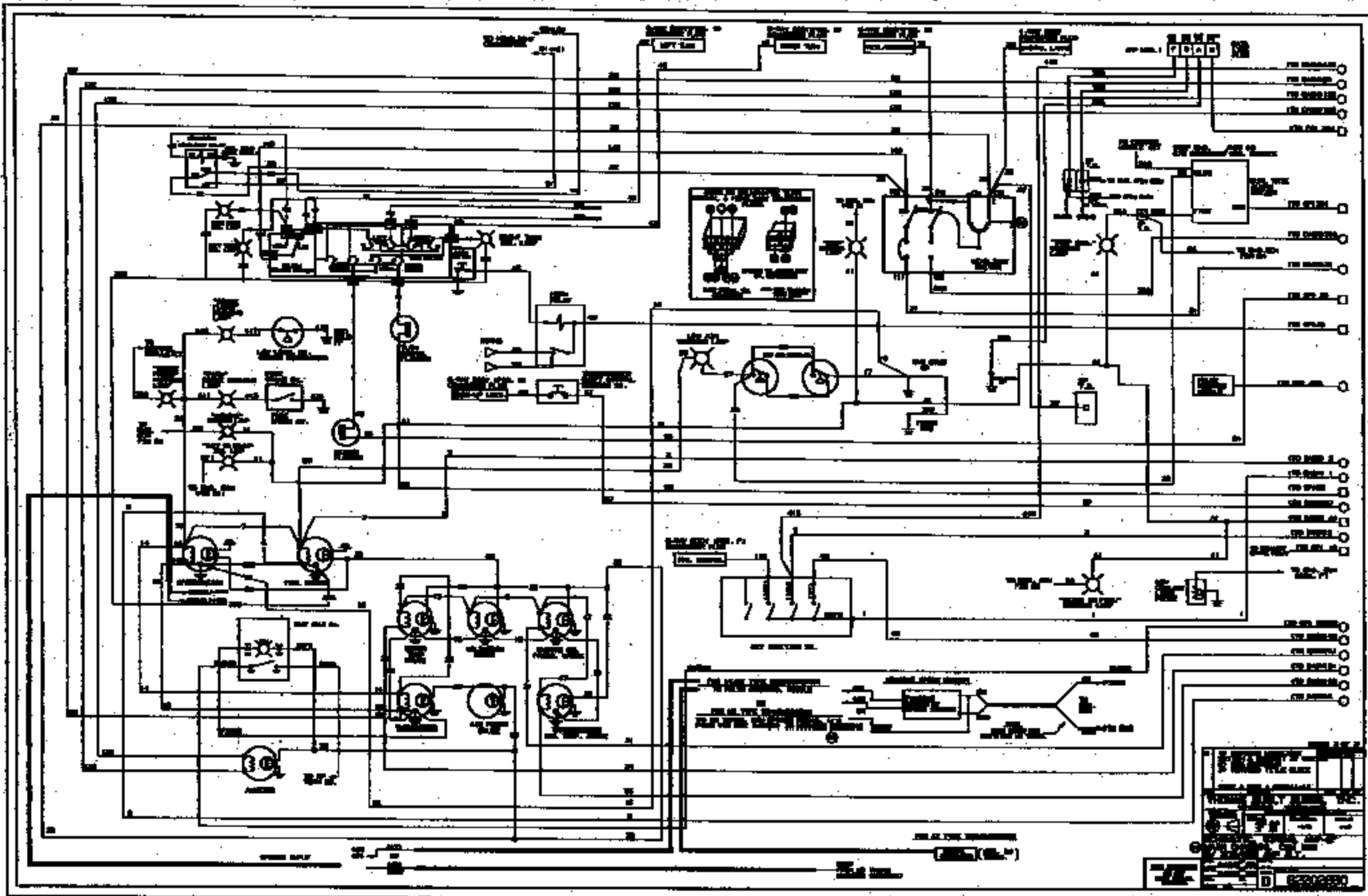
- NOTES:
1. ALL STEEL PARTS PLATED
2. ALL DIMENSIONS ARE REFERENCE ONLY
3. CRUIT DIMENSIONS
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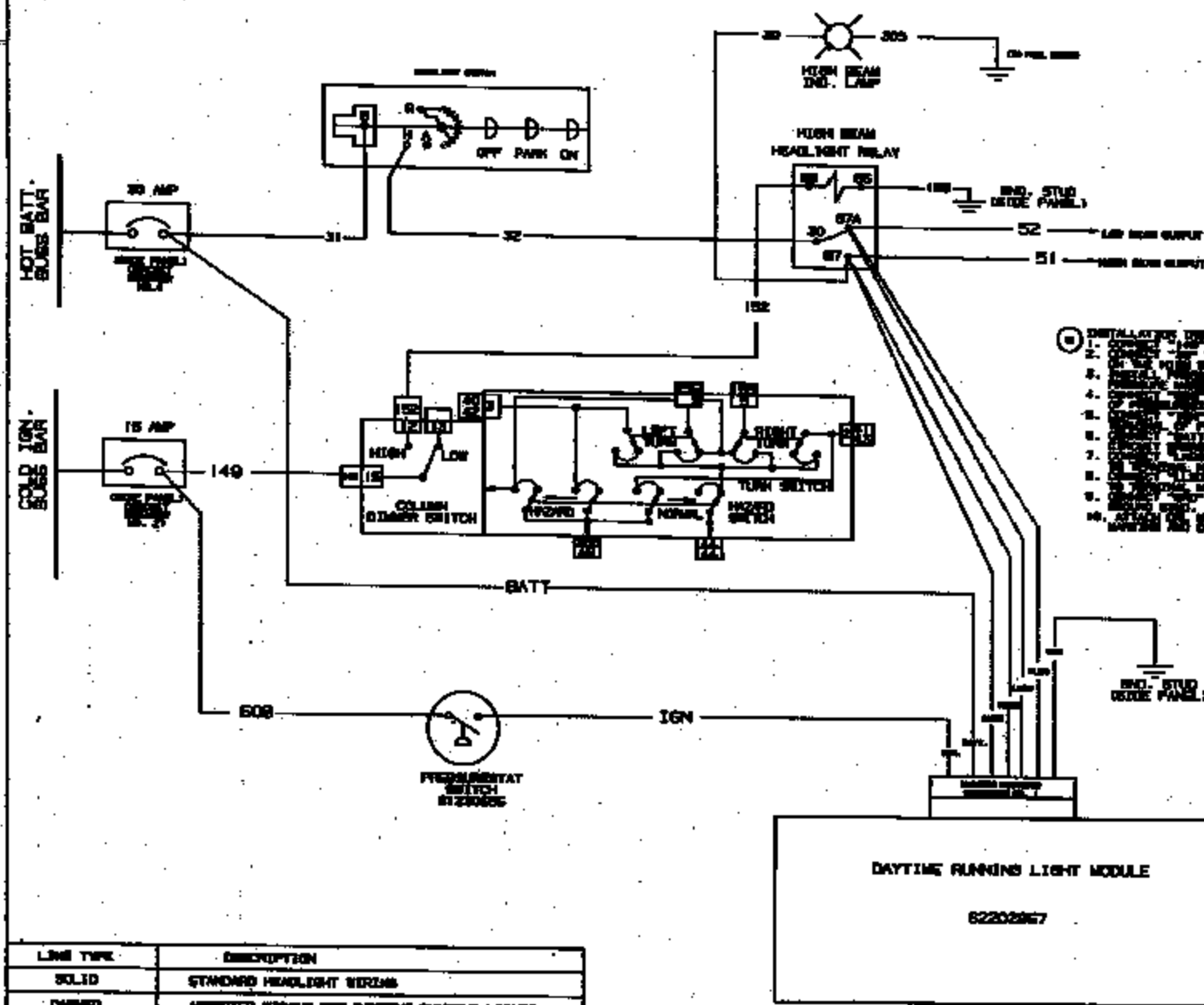
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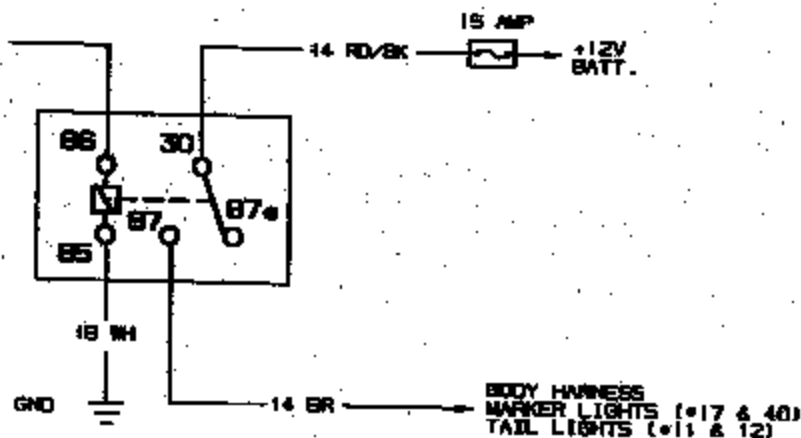
- ① INSTALLATION INSTRUCTIONS:
1. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO COLUMN DOWNHOLD SWITCH.
 2. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO TURN SIGNAL SWITCH.
 3. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "LEFT" TERMINAL.
 4. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "RIGHT" TERMINAL.
 5. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "HAZARD" TERMINAL.
 6. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "LEFT" TERMINAL.
 7. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "RIGHT" TERMINAL.
 8. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "HAZARD" TERMINAL.
 9. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "LEFT" TERMINAL.
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 19. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "RIGHT" TERMINAL.
 20. CONNECT 15 AMP FUSE FROM SIDE PANEL, C.B. NO. 27 TO "HAZARD" TERMINAL.



COMPUTER ORIGINAL — DO NOT MAKE MANUAL CHANGES

CHASSIS INTERFACE HARNESS
TAIL AND MARKER LIGHT

40 AMP
RELAY
52003303



REVISED, AND WIRE COLOR CHANGED			
REV A ON BPN 5122517-1			
THOMAS BUILT BUSES, INC.			
WIRING SCHEMATIC, TAIL AND MARKER LIGHT, RELAY			
B		52004601	

COMPUTER ORIGINAL — DO NOT MAKE MANUAL CHANGES

COMPUTER ORIGINAL — DO NOT MAKE MANUAL CHANGES