SECTION 10-G

LIGHTING SYSTEM

CONTENTS OF SECTION 10-G

10-47 HEADLIGHTS AND CONTROLS

a. Description of Lighting Switch

The switch uses a multiple push-on type connector. It is a "push-pull" type which also incorporates a manually operated rheostat for controlling the instrument panel lights, and a detent position which completes the dome light circuit. Three "push-pull" positions of the switch knob provide control of the exterior lights as follows:

1. *Off position* (knob all the way in) cuts off all lights controlled by the switch.

2. *Parking position* (knob pulled out to first notch) turns on the parking lights, tail lights, and license light and key light. The instrument panel lights also will be turned on if the rheostat is set for these lights.

3. *Driving position* (knob pulled out to last notch) turns parking lights off and turns headlights on, while the other lights remain as in the parking position. The headlights will be on the upper or lower beams depending on the position of the separate dimmer switch.

In the parking and driving positions, the instrument panel lights are controlled by rotating the light switch knob. With the knob turned counterclockwise, these lights are on maximum brightness. As the knob is turned clockwise, they gradually dim until they are off at the full clockwise position of the knob.

4. *Dome light position* (knob turned fully counterclockwise) turns the dome light on. The dome light can be turned on regardless of the in-or-out position of the switch.

b. Description of Thermo Circuit Breaker

A thermo circuit breaker is incorporated in the lighting switch assembly, to protect wiring from damage due to short circuits in the headlight and front parking light circuits only.

The thermo circuit breaker consists of a bi-metal blade and set of contact points connected in series with the lighting circuits. An abnormal flow of current through the circuit breaker, such as would be caused by a short circuit in a lighting circuit, heats the bi-metal blade sufficiently to separate the points and cause them to vibrate. The vibrating blade alternately opens and closes the circuit, thus reducing the flow of current and protecting the wiring against overheating and burning. The flickering light produced by the vibrating circuit breaker serves as a warning to the operator of vehicle that a short circuit exists.

c. Test of Lighting Switch

If the lighting switch is suspected of being faulty, the contacts can be tested by connecting a low reading voltmeter between the wire supplying current to the contact and the wire conducting current away. This must be done with the switch in a position where the contact under test is closed. See Figures 10-50 and 10-93.

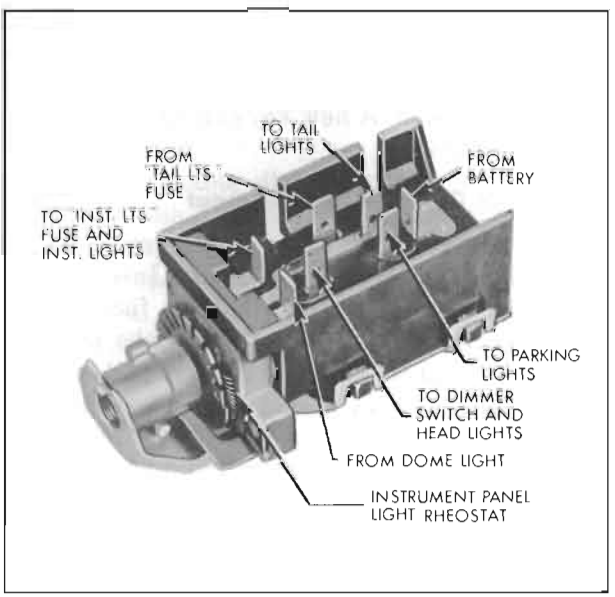


Figure 10-50—Lighting Switch—Bottom Side

1. In order to gain access to the headlight switch, remove lower left instrument panel housing.

2. To check the switch contact for the headlights, pull switch knob out to last notch and also make sure dimmer switch is in upper beam position. Connect voltmeter prods between battery and headlight terminals of switch (between red and yellow wires). If voltage loss through switch contacts is over .2 volt, switch must be replaced.

3. To check the contact for the tail lights, connect voltmeter between tail lights and tail light fuse terminals (between gray and black wires). If voltage loss is over .1 volt, switch must be replaced.

4. To check the contact for the parking lights, put switch knob in first notch position. Connect voltmeter between battery and parking light terminals (between red and white-black stripe wires). If voltage loss is over .1 volt, switch must be replaced.

d. Replacement of Lighting Switch

1. Disconnect battery ground cable to avoid a possible short circuit.

2. Remove lower left instrument panel housing.

3. Unplug multiple connector from lighting switch.

4. Pull switch knob out to last notch, then depress the spring loaded latch button on top of switch, while pulling knob and rod assembly out of switch.

NOTE: *If latch button is depressed before switch knob is pulled out, knob and rod assembly will not release.*

5. Remove switch escutcheon using Wrench J-8563 and remove switch from instrument panel.

6. Install switch in reverse order of above steps, making sure that switch alignment tang engages slot in instrument panel before tightening mounting nut. (Switch terminals will point toward accelerator pedal.)

7. Reconnect battery ground cable in manner to properly wind clock and set clock. See paragraph 10-56.

e. Test of Thermo Circuit Breaker

To test the thermo circuit breaker, remove lighting switch from instrument panel to avoid possible damage to adjacent instruments.

Since the current required to open the circuit breaker contacts depends somewhat on outside temperature, the circuit breaker should be tested at normal temperature (70° to 80°F.).

1. Connect an ammeter and a carbon-pile rheostat in series with the battery terminal of lighting switch and positive terminal of a 12-volt battery, and set rheostat to provide maximum resistance. Rheostat must have capacity for 50 amperes and be adjustable down to .3 ohms. See figure 10-50.

2. With switch on, connect the headlight terminal of lighting switch and the negative post of battery.

3. Adjust rheostat to give 26 amperes. The circuit breaker should open within 60 seconds.

4. Adjust rheostat to give 15 amperes on ammeter. The circuit breaker should remain closed indefinitely at 15 amperes.

5. If circuit breaker does not operate as specified the lighting switch assembly must be replaced since internal repairs cannot be made.

f. Dual Headlamp Assembly

A dual headlamp system is standard equipment on all series and consists of two dual headlamp assemblies, one mounted on each side of the car.

Each dual headlamp includes two 5¾" T-3 sealed beam units mounted in a single housing enclosed by one headlamp door. The inboard unit is used for bright lights only and has a single filament. The outboard unit is used for both bright and dim lights and has two filaments. For identification, the inboard unit is marked "1," the outboard unit is marked "2".

When the dimmer switch is in the dim or lower beam position only, the outboard (type "2") unit of each dual headlamp is on. Both outboard (type "2") and inboard (type "1") units of each dual headlamp are on when the dimmer switch is in the bright or high beam position.

The T-3 sealed beam unit has three projections equally spaced around the perimeter of the lens. These projections are ground off at the factory to provide a mounting surface for aiming devices. These aiming devices are used without switching headlights on as described below (par. 10-48, d).

g. Dimmer Switch

The driver may select the upper or lower

headlight beam as traffic and road conditions demand by operating the dimmer switch mounted on the toe panel in a convenient position for the left foot.

The dimmer switch opens and closes the circuits to the upper and lower lamp filaments in both sealed beam units, thereby alternately raising and lowering the headlight beams with each successive operation of the switch. Depression of switch button turns the rotary contacts one position within the switch. The spring-loaded button automatically returns to the reset position when released.

The wiring connection to the dimmer switch is made by a multiple connector. The dimmer switch is mounted on the inner side of the toe pan, so the switch, connector and wiring are all inside the car.

h. Headlight Beam Indicator

Whenever the upper headlight beams are lighted, a beam indicator bulb on the instrument panel also lights, producing a small spot of red light in front of the driver. *For safety reasons, he should never pass an approaching car with the beam indicator showing red.*

10-48 HEADLAMP SEALED BEAM UNIT REPLACEMENT AND ADJUSTMENT

a. Replacement of Sealed Beam Unit

When a sealed beam unit is burned out or broken it must be replaced as a unit assembly.

1. Remove headlamp door by loosening four captive screws.

2. Unhook the spring from retaining ring, then remove sealed beam unit and retaining ring assembly, being careful not to disturb the two beam adjusting screws.

3. Pull the wiring connector from the sealed beam unit.

4. Remove two screws fastening retaining ring to mounting ring. Remove retaining ring and sealed beam unit.

5. Install new sealed beam unit by reversing removal procedure. Position lens with the "1" or "2" up. The reflector has three lugs which fit into notches in the headlamp mounting ring.

CAUTION: *Make sure that sealed beam unit is marked "1" for an inboard unit or "2" for an outboard unit.*

6. Before installation of headlamp door, adjust headlamp for proper aim as described below.

b. Headlamp Aiming

The headlamps must be properly aimed in order to obtain the maximum road illumination and safety that has been built into the headlighting equipment. With the Guide T-3 type sealed beam units, proper aiming is even more important because the increased range and power of this new lamp make even slight variations from recommended aiming hazardous to approaching motorists. The headlamps must be checked for proper aim whenever a sealed beam unit is replaced and after any adjustment or repairs of the front end sheet metal assembly.

Regardless of method used for checking headlamp aim, car must be at curb weight, that is, with gas, oil, water, and spare tire, but no passengers. Tires must be uniformly inflated to specified pressure (par. 1-1). If car will regularly carry an unusual load in rear compartment, or a trailer, these loads should be on car when headlamps are checked. Some states have special requirements for headlamp aiming adjustment and these requirements should be known and observed.

Horizontal and vertical aiming of the headlamp beam is provided by the two beam adjusting screws which move the mounting ring in the body against the tension of the coil spring. There is no adjustment for focus since the sealed beam unit is set for proper focus during manufacturing assembly.

c. Use of Guide Headlamp Aimer

The Guide T-3 Safety Aimer makes it possible to precision-aim Buick's dual headlamp system in a minimum amount of time and space and to check the aim of the headlamps without removing the headlamp doors.

No screens or other aiming equipment are needed and aiming can be accomplished in daylight or darkness without the headlamps turned on. An average stall is all that is required since only sufficient room is needed for a man to walk around the car. A stall with a level floor is preferred so that aimer can be used just as received from the factory without being recalibrated.

The T-3 Aimer comes from the factory with level bubbles accurately set and instructions for rechecking the level accuracy after aimer has been in use. It is important that these in-

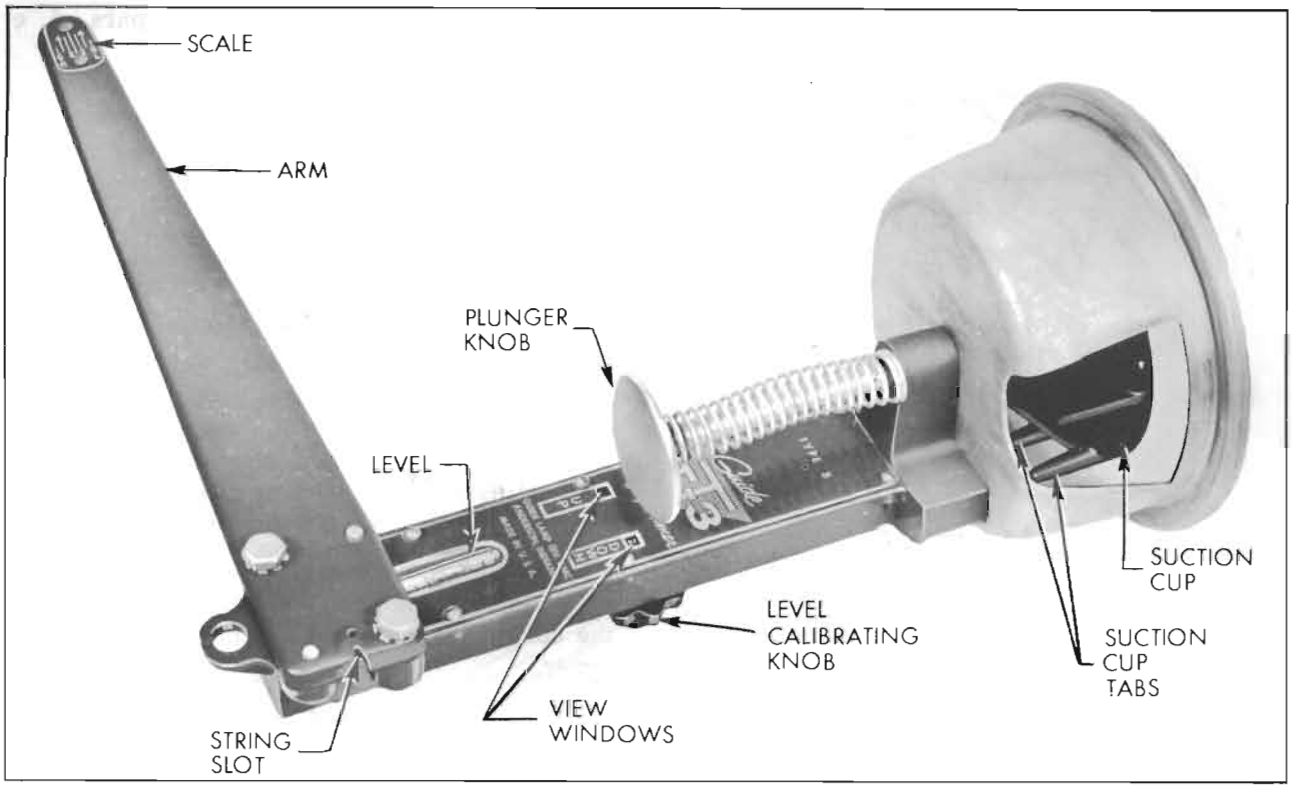


Figure 10-51—Left T-3 Aimer

structions be followed when aimer is received and before it is used, as a precaution in case aimer is dropped or damaged. The aimer can be used in selecting an area for headlamp aiming and can be calibrated to compensate for uneven floors.

The Guide T-3 Safety Aimer for the lefthand dual headlamp is shown in figure 10-51.

d. Mounting Aimer for Checking Aim

NOTE: *It is not necessary to remove headlamp doors to check headlamp aim.*

1. Drive the car onto the selected aiming area.

IMPORTANT: *For an accurate headlamp aim the floor must either be level or else the T-3 Safety Aimer must be calibrated for the selected aiming area in accordance with instructions received with aimer. Once the aimer is calibrated for an unlevel floor, all future aimings MUST be made with cars placed on the same area faced in the same direction.*

2. Mount the T-3 Safety Aimers on each of the inboard units (type "1") so that the lamp guide points engage smooth inner ring of aimer and the arm on each aimer points toward center of car.

3. Secure Safety Aimer to each headlamp unit by pressing plunger knob firmly. Rotate arm to approximately horizontal position. See Figure 10-52.

4. With aimers in place, position the knots on each end of the elastic string in the slots provided on both aimers. Car doors must be closed and car rocked gently sideways to equalize springs, prior to checking and adjusting headlamps. See Figure 10-53.

5. Rotate aimers around headlamp units so that the scale on each aimer just clears the string.

6. For aiming both inboard (type "1") and outboard (type "2") units, loosen level calibrating knob and slide knob rearward or forward until numeral "2" appears in DOWN view window. Tighten knob of the aimer. *All future checking and adjusting of headlamp aim will be done with aimer calibrated with numeral "2" in DOWN view window.*

e. Checking Horizontal Aim

1. The string should cross *between right and left line "2" on scale of aimer.* If the string does not fall within these limits it is necessary

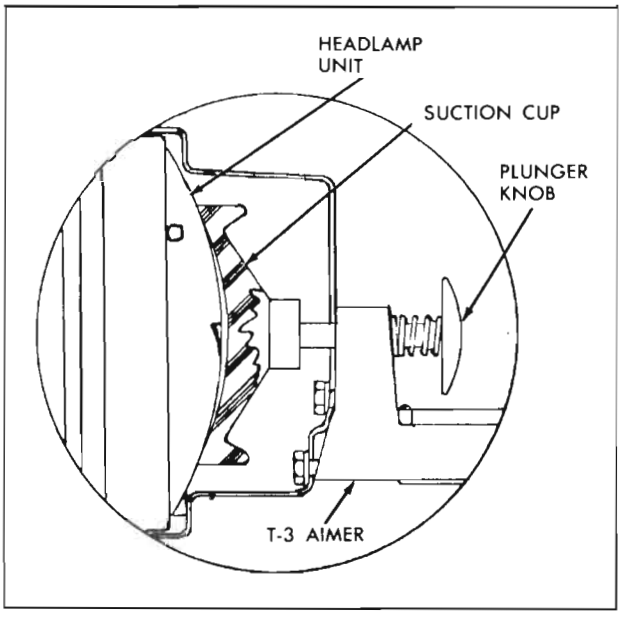


Figure 10-52—Attaching Aimer

to adjust horizontal aim using procedure in subpar. h.

2. Check horizontal aim of other type "1" unit as instructed above.

f. Checking Vertical Aim

1. The bubble should be within the *two outside lines of the level on the aimer.* If bubble in level does not fall within these limits it is necessary to adjust vertical aim using procedure in subpar. i.

2. Check vertical aim of other type "1" unit as instructed above.

3. Remove aimers by pulling on the suction cup tabs through opening in aimer. Mount the aimers on each of the outboard units (type "2") and check headlamp aim of the type "2" units as instructed in above sub. pars. d, e and f.

g. Mounting Aimer for Adjusting Aim

1. Remove the headlamp doors and replace any defective unit.

2. Mount T-3 aimers on Type "1" units as instructed in subpar. c above.

h. Adjusting Horizontal Aim

1. Turn horizontal aiming screw on left-hand unit until the string is positioned directly over the center line of the scale on the left-hand aimer. Turn screw clockwise in making final adjustment to take up play in the headlamp mechanism. See Figure 10-54.

2. Repeat the same operation on the right-hand unit to position the string directly over the center line of the scale on the right-hand aimer.

i. Adjusting Vertical Aim

1. Turn headlamp vertical aiming screw counter-clockwise until the bubble in level is at the end of vial toward headlamp unit. Then turn screw clockwise until bubble is centered in the level. See Figure 10-55.

2. Repeat Step 1 on the other headlamp unit.

3. Recheck the position of the string on the scale of the aimers, and the bubble in the levels.

4. Remove aimers by pulling on the suction cup tags through opening in aimer and mount aimers on the outboard units (type "2") and adjust as instructed in above subpars. d, e, and f to complete headlamp aiming procedure. Install headlamp doors.

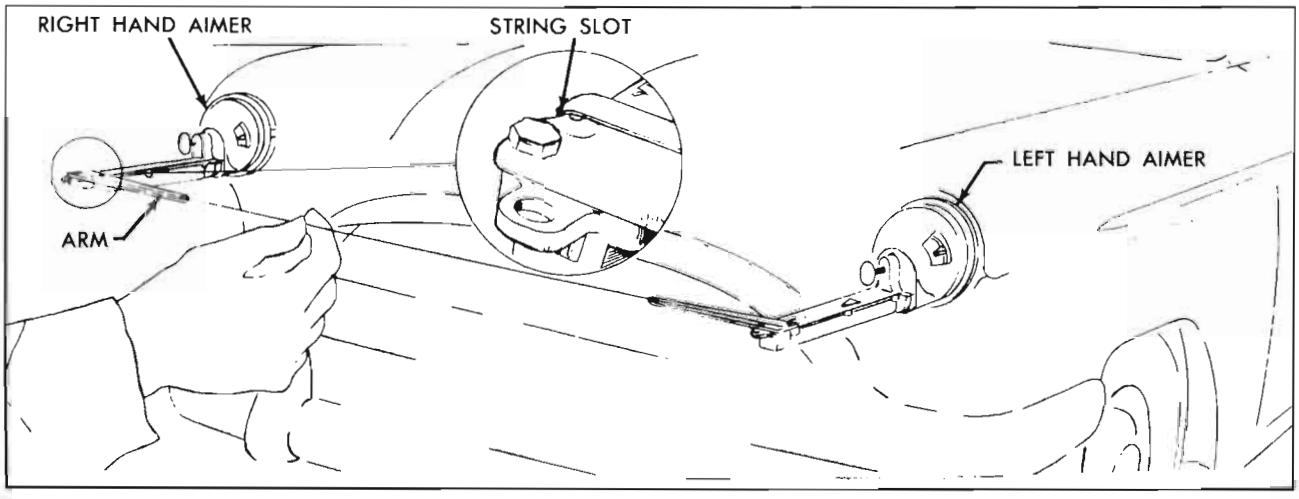


Figure 10-53—Positioning String

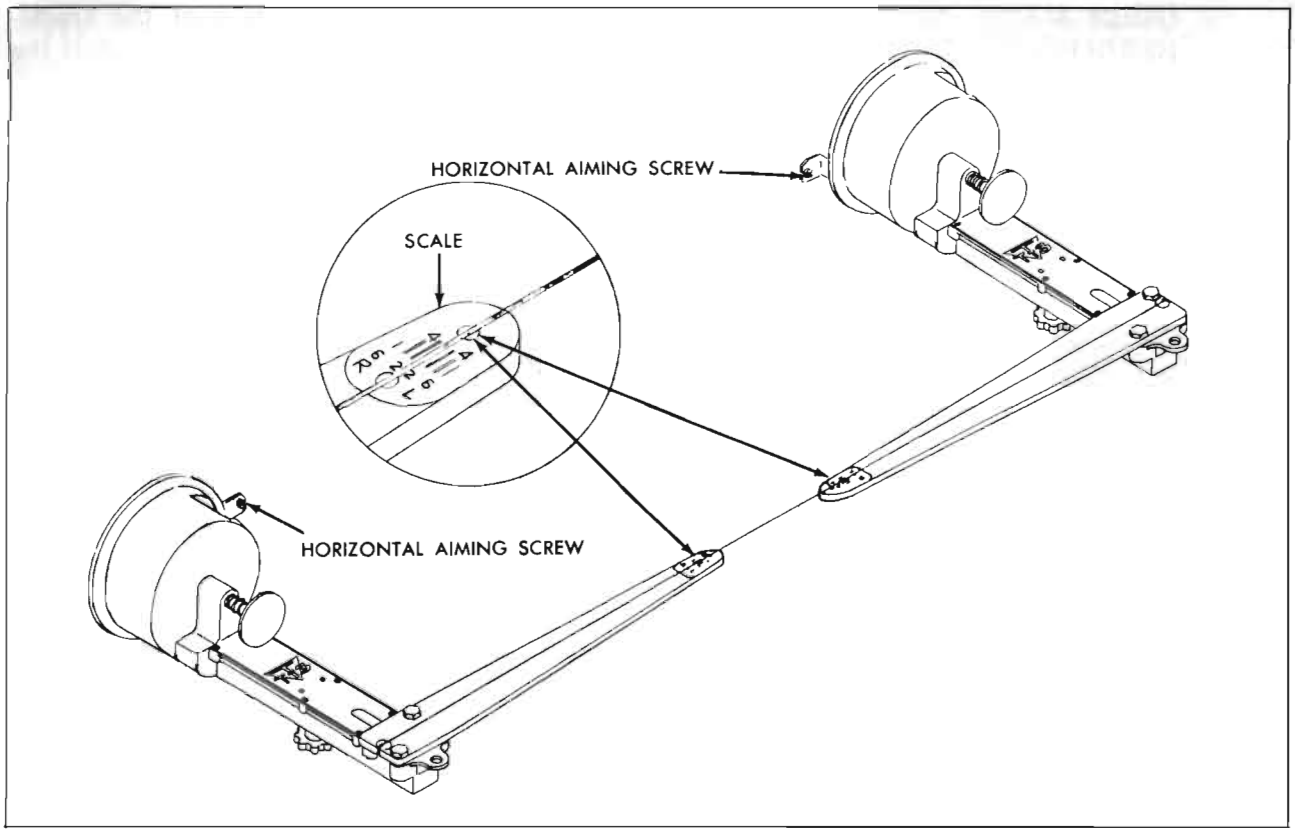


Figure 10-54—Adjusting Horizontal Aim

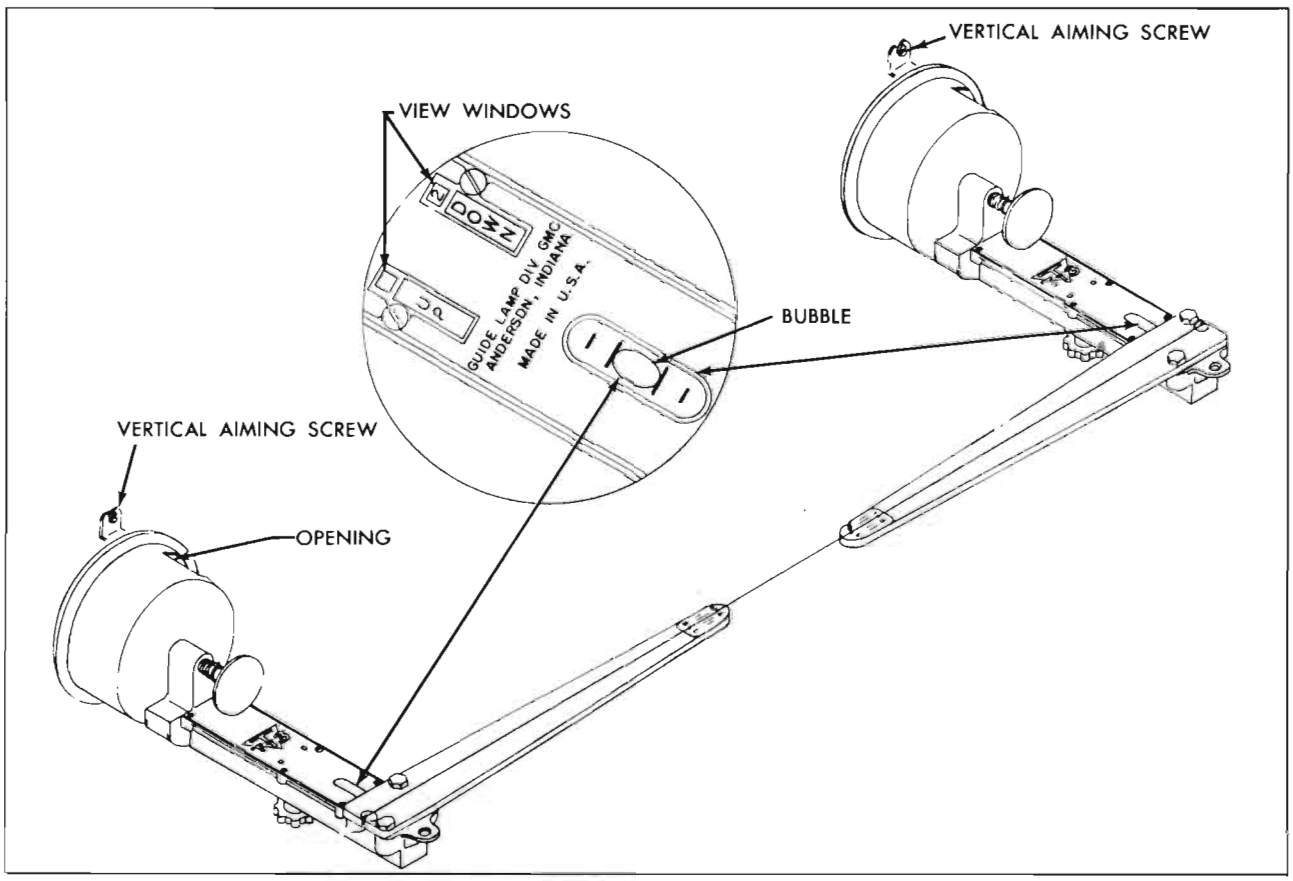


Figure 10-55—Adjusting Vertical Aim

10-49 GUIDE-MATIC POWER HEADLIGHT CONTROL

a. Operation

The Guide-Matic consists of the phototube unit, amplifier unit and a combination override and dimmer switch. See Figure 10-56.

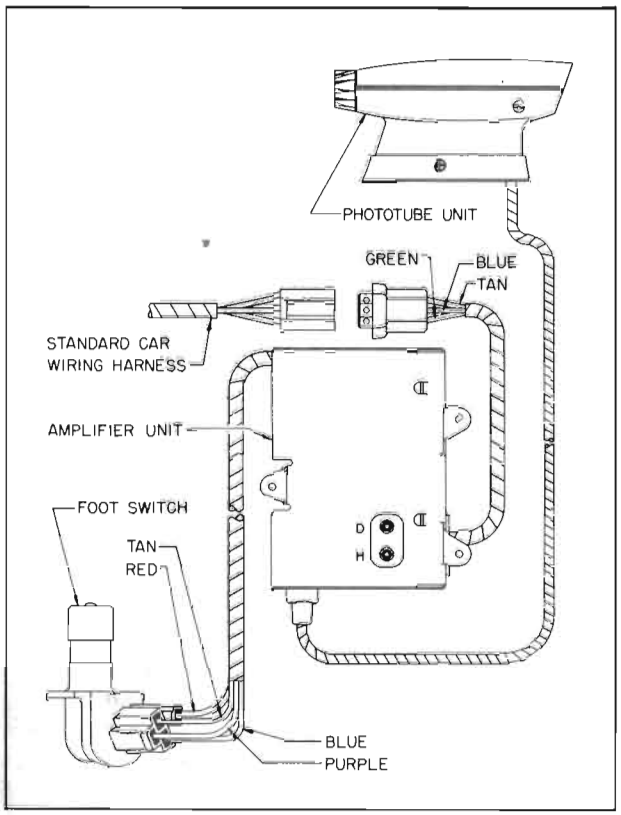


Figure 10-56—Guide-Matic Circuit Diagram

The phototube unit picks up light from an approaching car and sends it to the amplifier unit.

The amplifier unit, in response to a signal from the phototube unit, operates the power relay which switches the headlamps from high to low beam. It also supplies voltage to the phototube unit.

The phototube unit has a sensitivity control knob which allows the driver a limited amount of control of the sensitivity of the phototube unit. The knob has "FAR" and "NEAR" at the extreme ends of the adjustment range and a detent position midway in the range for normal setting. Adjustment toward the "FAR" (clockwise position) increases the sensitivity of the unit. Adjustment toward the "NEAR" position (counter-clockwise) decreases the sensitivity of the unit.

The courtesy salute section of the Guide-Matic is an added feature which switches the headlamps from upper to lower beam in a two-step action. When the headlamps are switched to lower beam, the upper beams will remain on at reduced candlepower for approximately one second, which indicates the car is equipped with a Guide-Matic.

b. Trouble Shooting

1. *Headlamps Stay on Low Beam*

a. Turn on the headlamps and let the Guide-Matic warm up for at least one minute. Cover the phototube unit with a dark cloth.

(1) If headlamps go to upper beam, system is operating but requires sensitivity adjustments.

(2) If headlamps stay on lower beam, position amplifier hold control in approximately the center of its travel. This will eliminate the possibility of locking the headlamps on low beam due to complete misadjustment. If headlamps remain on low beam when phototube is again covered, go to Step (b).

(b) Remove left front kick pad and disconnect phototube unit harness from the amplifier unit.

(1) If headlamps go to upper beam, trouble is in the phototube unit.

(2) If headlamps remain on lower beam, trouble is in amplifier unit or foot switch. Go to Step (c).

(c) Remove foot switch from floor of car and disconnect foot switch harness. Disconnect amplifier harness from original car wiring harness. Place original car wiring harness onto foot switch. Operate foot switch.

(1) If headlamps switch from upper to lower beam, trouble is in the amplifier unit.

(2) If not, trouble is in foot switch.

2. *Headlamps Stay on Upper Beam*

(a) Remove cover of phototube unit and ground the white wire. NOTE: *Remove knob and C-ring first.*

(1) If headlamps switch to lower beam, trouble is in phototube unit.

(2) If headlamps do not switch to lower beam, trouble is in the amplifier unit or foot switch. Go to Step (b).

(b) Remove red wire from foot switch.

(1) If headlamps go to lower beam, trouble is in foot switch.

(2) If headlamps do not go to lower beam, go to Step (c).

(c) Remove foot switch from floor of car and disconnect foot switch harness. Disconnect amplifier harness from original car wiring harness. Place original car wiring harness onto foot switch. Operate foot switch.

(1) If headlamps switch from upper to lower beam, trouble is in amplifier unit.

(2) If not, trouble is in foot switch.

c. Removal and Installation

If diagnosis indicates that the phototube unit must be removed for repair by an authorized warranty repair dealer, the amplifier unit should also be removed and sent with the phototube unit. If the amplifier unit must be removed for repair, the phototube unit need not be sent with it if diagnosis indicates it was operating satisfactorily.

1. *Phototube Unit*

(a) Remove the left front kick pad and disconnect the phototube unit harness from the bottom of the amplifier. See Figure 10-57.

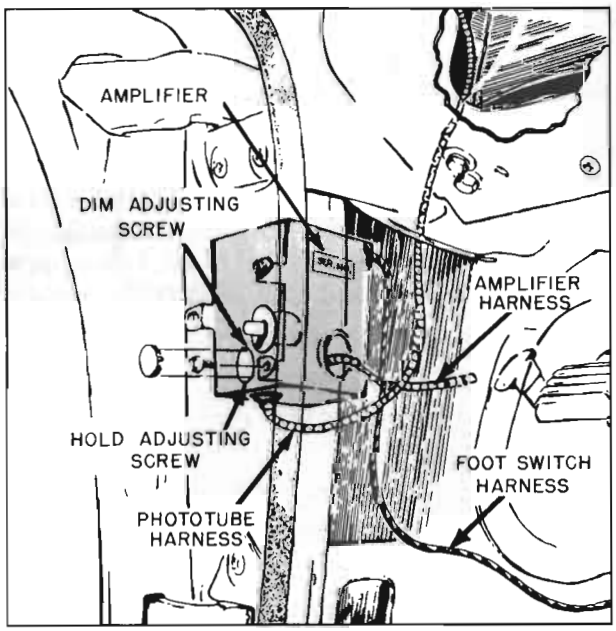


Figure 10-57—Amplifier and Wiring

(b) Remove the Phillips head pivot pin from right side of phototube unit base, then lift the unit off the base and remove phototube unit and harness.

(c) To install, reverse the procedure. Check vertical aim and dim and hold sensitivity adjustments. See subparagraph d.

2. *Amplifier Unit*

(a) Disconnect foot switch harness from foot switch.

(b) Remove left front kick pad. Disconnect phototube and amplifier harness. See Figure 10-57.

(c) Remove the amplifier attaching screws at the door post and remove amplifier.

(d) To install, reverse the procedure. After installing the amplifier unit, check the dim and hold sensitivity adjustments. See subparagraph d.

d. Adjustments and Tests

A new Tester J-8465, made by Kent-Moore, is required for installing, checking or adjusting the Guide-Matic. The tester includes a vertical aiming device No. 6 and a sensitivity test lamp. See Figure 10-58.

1. *Phototube Unit Vertical Aiming Procedure*

Proper performance of the Guide-Matic power headlight control requires that the phototube unit be accurately aimed vertically. If the unit is aimed too low, back reflections from the headlamps which are being controlled will lock the amplifier on lower beam. However, the unit must be aimed as low as possible to provide maximum tolerance for car loading.

(a) Phototube unit vertical aiming should be done with car unloaded, trunk empty except for spare tire, gas tank at least half full, and with tires at correct pressure.

(b) Locate car on a level floor (level within ¼" fore and aft of car).

(c) Rock car sideways to equalize springs.

(d) Set Aiming Device No. 6 on top of phototube unit as shown in Figure 10-58.

(1) The three points on aiming device *must* be resting on top of phototube unit.

(2) The aiming device *must* be touching front of phototube unit.

(e) Observe number stamped on driver control knob. See Figure 10-59. Adjust aiming dial until corresponding number is under pointer.

(f) Adjust vertical aim screw until bubble is centered in level.

2. *Dim and Hold Sensitivity Tests*

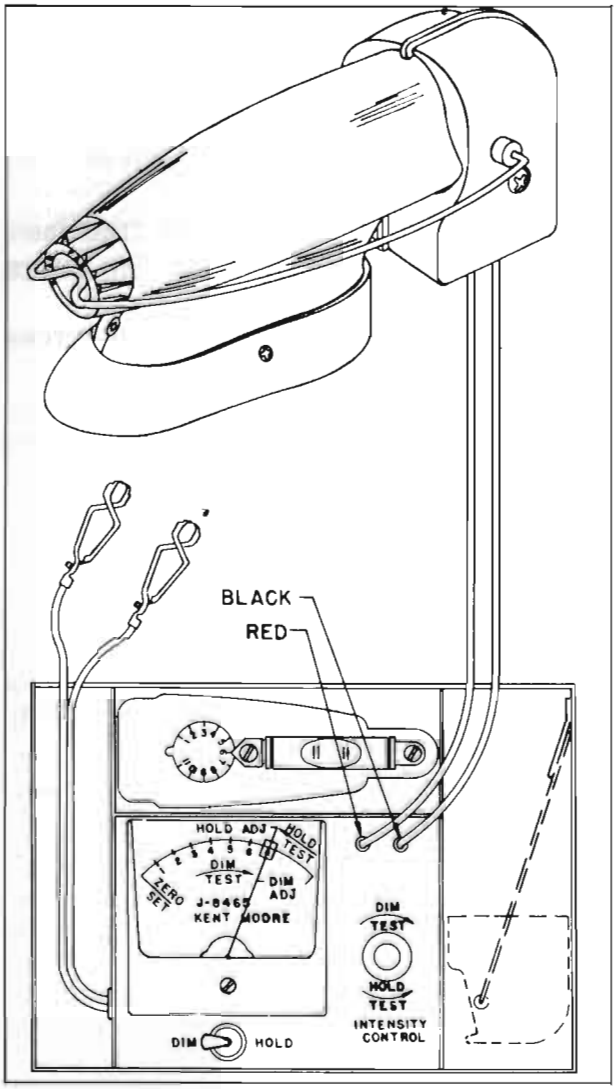


Figure 10-58—Tester J-8465

CAUTION: *Phototube unit must be covered with a black cloth during test. Tests or adjustments on the Guide-Matic should be made with the phototube unit below 100°F. If car has been in the sun immediately prior to checking, allow it to cool in a covered place for approximately one hour before the check is actually made.*

(a) *Preparation for Tests*

(1) Set driver control to detent position.

(2) Install tester lamp. (Use Kent-Moore Model J-8465.) See Figure 10-58.

(3) Start engine and operate at fast idle while making adjustments.

(4) Turn headlamps on and wait at least 5 minutes for amplifier unit to stabilize. Place foot switch in automatic position.

(5) Turn zero corrector on face of meter until meter pointer is on "ZERO SET" line. See Figure 10-58.

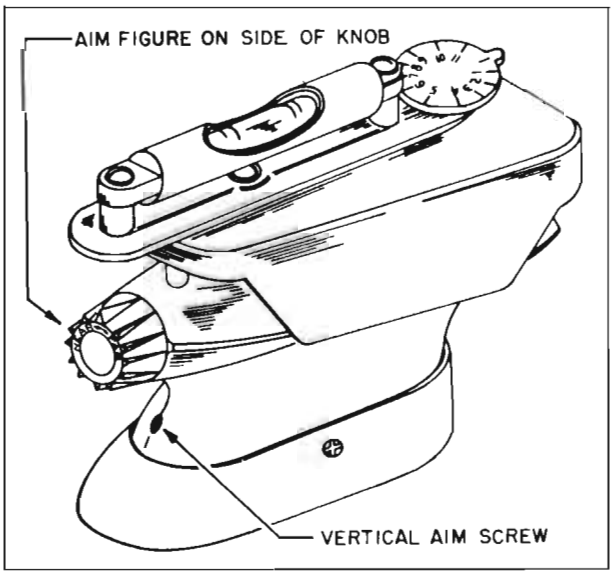


Figure 10-59—Aiming Device Installed

(6) Turn tester "INTENSITY CONTROL" counter-clockwise.

(7) Connect battery leads of Guide-Matic tester to battery terminals.

(b) *Dim Sensitivity Test*

(1) Rotate tester "INTENSITY CONTROL" completely counter-clockwise.

(2) Turn "DIM-HOLD" switch to "HOLD" position and then back to "DIM" position. Headlamp should be on upper beam.

(3) Turn tester "INTENSITY CONTROL" clockwise slowly just to point where headlamps switch to lower beam. The meter pointer should now read in the black "DIM ADJ." range on the meter scale. See Figure 10-58. If not, proceed to the hold and dim sensitivity adjustments.

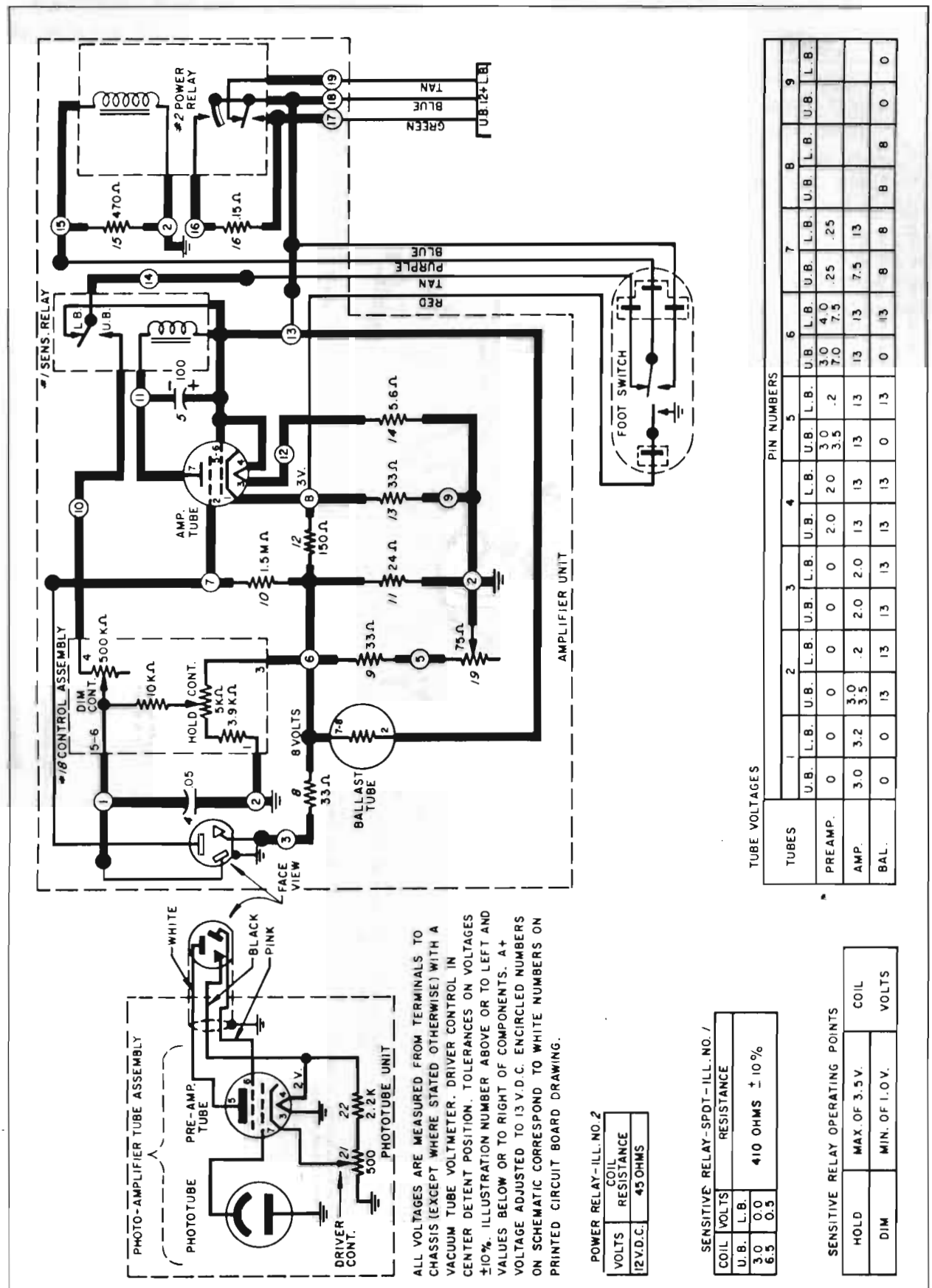
(c) *Hold Sensitivity Test*

(1) Turn "INTENSITY CONTROL" all the way clockwise.

(2) Turn "DIM-HOLD" switch to "DIM" position and back to "HOLD" position to obtain a lower beam.

(3) Slowly turn "INTENSITY CONTROL" counter-clockwise just to the point where headlamps switch to upper beam. The meter pointer should now read in the green "HOLD ADJ." range on the meter scale. See Figure 10-58. If not, proceed to the hold and dim sensitivity adjustments.

3. *Hold and Dim Sensitivity Adjustments*



ALL VOLTAGES ARE MEASURED FROM TERMINALS TO CHASSIS (EXCEPT WHERE STATED OTHERWISE) WITH A VACUUM TUBE VOLTMETER. DRIVER CONTROL IN CENTER DETENT POSITION. TOLERANCES ON VOLTAGES ±10%. ILLUSTRATION NUMBER ABOVE OR TO LEFT AND VALUES BELOW OR TO RIGHT OF COMPONENTS. A+ VOLTAGE ADJUSTED TO 13 V.D.C. ENCIRCLED NUMBERS ON SCHEMATIC CORRESPOND TO WHITE NUMBERS ON PRINTED CIRCUIT BOARD DRAWING.

POWER RELAY-ILL. NO. 2

VOLTS	COIL RESISTANCE
12 V.D.C.	45 OHMS

SENSITIVE RELAY-SPOT-ILL. NO. 1

COIL VOLTS		RESISTANCE
U.B.	L.B.	410 OHMS ± 10%
3.0	0.0	
6.5	0.5	

SENSITIVE RELAY OPERATING POINTS

HOLD	MAX. OF 3.5 V.	COIL
DIM	MIN. OF 1.0 V.	VOLTS

TUBE VOLTAGES

TUBES	PIN NUMBERS																			
	1		2		3		4		5		6		7		8		9			
	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.	U.B.	L.B.		
PREAMP.	0	0	0	0	0	0	2.0	2.0	3.0 3.5	.2	3.0 7.0	4.0 7.5	.25	.25						
AMP.	3.0	3.2	3.0 3.5	.2	2.0	2.0	13	13	13	13	13	13	7.5	13						
BAL.	0	0	13	13	13	13	13	13	0	13	0	13	8	8	8	8	0	0		

Figure 10-60—Guide-Matic Schematic Diagram

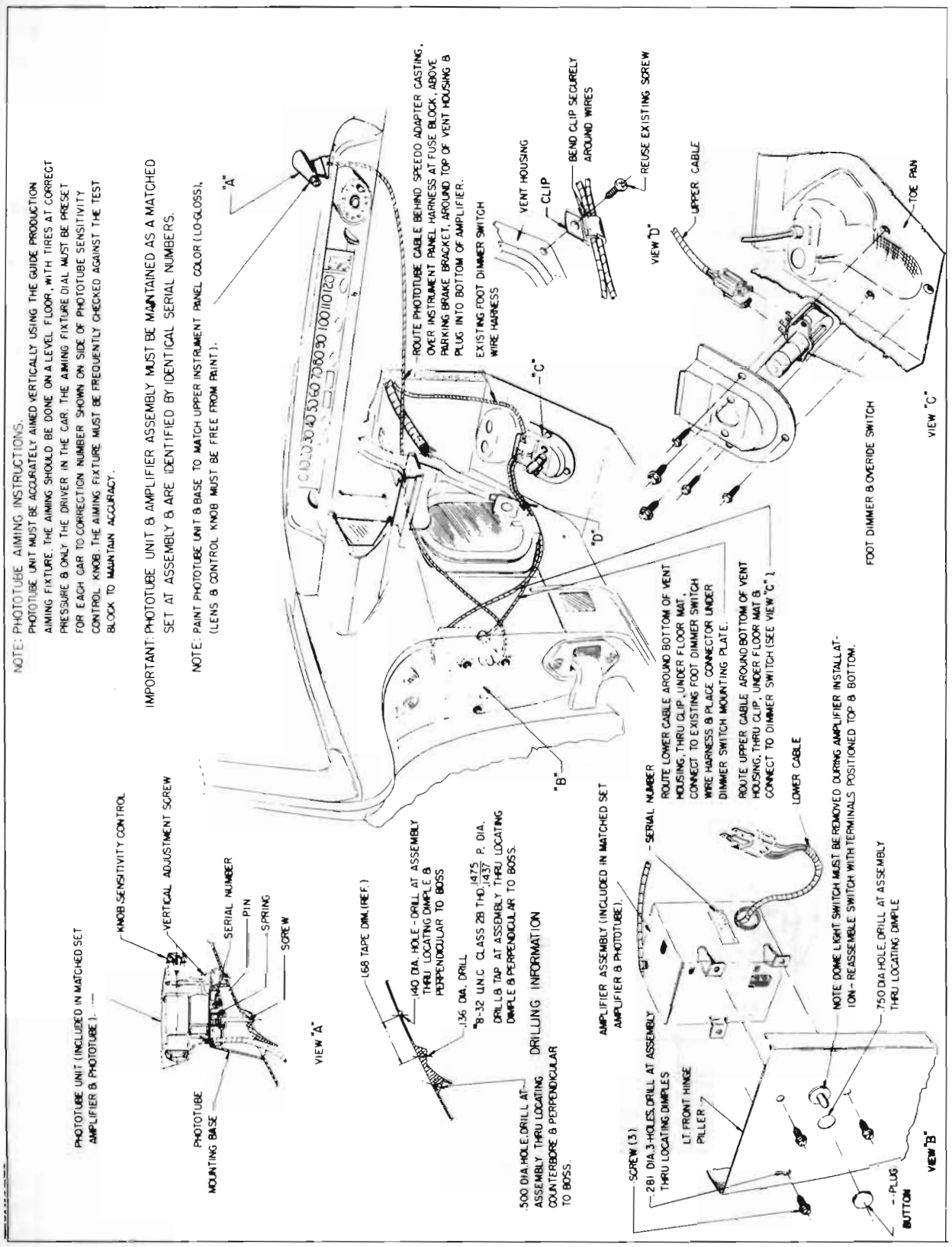


Figure 10-61—Guide-Matic Installation

CAUTION: *Hold sensitivity must be properly adjusted before adjusting dim sensitivity. Phototube unit must be covered with a black cloth during adjustments.*

(a) *Preparation for Adjustments.* Same as preparation for tests above.

(b) *Hold Sensitivity Adjustment*

(1) Hold and dim sensitivity controls are slotted for screwdriver adjustment and are located at the side of the amplifier unit. They are available for adjustment through the left front door post. See Figure 10-57.

(2) Rotate the amplifier hold control completely clockwise. See Figure 10-57.

(3) Rotate tester "INTENSITY CONTROL" all the way clockwise.

(4) Turn "DIM-HOLD" switch momentarily to "DIM" position to switch lights to lower beam, then switch back to "HOLD" position.

NOTE: *If lights do not switch to lower beam, the amplifier dim control must be turned completely clockwise and then readjusted after hold adjustment is correct.*

(5) Adjust "INTENSITY CONTROL" slowly counter-clockwise until meter pointer is on "HOLD ADJ." line. See Figure 10-58.

(6) Turn amplifier hold control slowly counter-clockwise just to the point where headlamps switch to upper beam. Do not go beyond this setting.

(7) Recheck sensitivity as shown in Steps (1) through (3) under *Hold Sensitivity Test.*

(8) Reinstall dust and moisture protective button plugs.

(c) *Dim Sensitivity Adjustment*

NOTE: *Dim sensitivity should not be adjusted until after hold sensitivity is properly adjusted.*

(1) Rotate amplifier dim control completely counter-clockwise. See Figure 10-57.

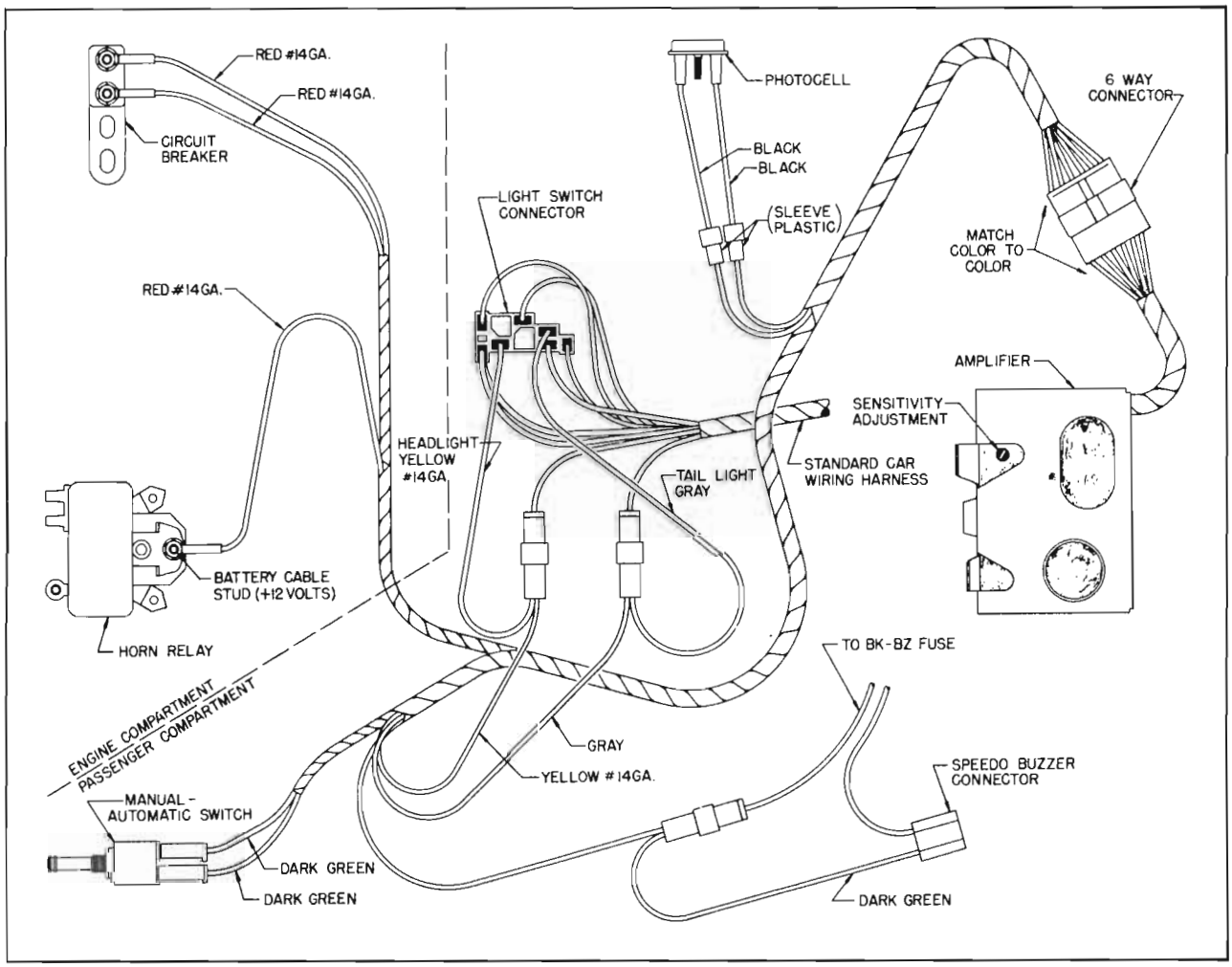


Figure 10-62—Twilight Sentinel Wiring Diagram

(2) Momentarily turn "DIM-HOLD" switch to "HOLD" then back to "DIM" position to obtain upper beam. See Figure 10-58.

(3) Adjust tester "INTENSITY CONTROL" until meter pointer is at "DIM ADJ." line. See Figure 10-58.

(4) Slowly rotate amplifier dim control clockwise just to point where headlamps switch to lower beam. Do not go beyond this setting.

(5) Recheck sensitivity as shown in Steps (1) through (3) under *Dim Sensitivity Test.* If sensitivity is not correct, repeat adjustment procedure.

(6) If adjustment is correct, turn off headlamps and disconnect Kent-Moore tester.

(7) Remove tester lamp from the phototube unit.

(8) Reinstall dust and moisture protective buttons.

10-50 TWILIGHT SENTINEL

a. Description

The Twilight Sentinel is an electronic device which automatically controls the on-off operation of the headlights, tail lights, and instrument lights of the car on which it is installed. This operation is in response to the amount of light striking a light sensitive cell. The complete system consists of three units—photocell, amplifier and manual-automatic switch. See Figure 10-62.

The photocell is a photo-conductive type and is mounted face up, behind the windshield, so it is exposed to direct sky light which is converted into an electrical signal which is used by the amplifier unit.

The amplifier unit applies voltage to the photocell and switches the car lights on or off in response to a signal from the photocell. The amplifier unit consists of a transistor amplifier, sensitive relay, and power relay. It is mounted on the right front door hinge pillar behind the kick pad. See Figure 10-63.

The manual-automatic switch is a push-pull type switch and is mounted above and to the left of the manual light switch.

b. Operation

With the manual-automatic switch in automatic (pushed in) position, the Twilight Sentinel provides completely automatic operation which turns the car lights on or off according to the light level. As evening approaches and daylight is reduced to the point where lights are needed for safe driving, the Twilight Sentinel will turn the car lights on.

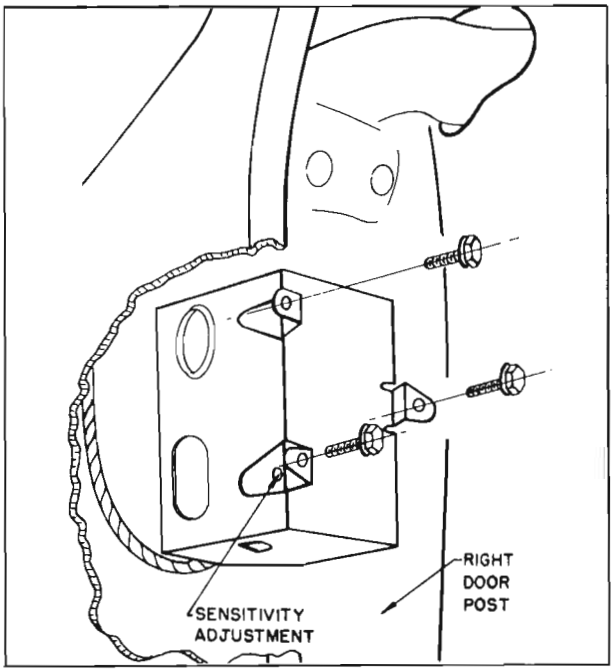


Figure 10-63—Amplifier Location

A built-in ratio prevents the lights turning off when passing under bright street lighting. During daylight hours while car lights are not required the Twilight Sentinel will keep the lights turned off. A time-delay feature is incorporated to prevent the car lights turning on immediately if the light level is reduced suddenly while the car is passing under trees, shadows, overpass, etc. When the ignition is turned off, the Twilight Sentinel is inoperative and the lights will turn off.

When the car is in a garage, the lights may turn on because of the low light level. However, as soon as the car is driven into the direct daylight, the lights will be turned off by the Twilight Sentinel.

If the driver desires to turn his lights on during the daylight hours, he may do so by operating the standard light switch in the normal manner. This by-passes the Twilight Sentinel and the lights must be turned off at the standard switch before the Twilight Sentinel can again control the lights.

In manual (pulled out) position of the manual-automatic switch, the Twilight Sentinel does not function. While switch is in this position, the car lights must be manually operated by the standard light switch. In some states, the law requires that the car lights remain off in certain tunnels. If the light level is low enough

so that the Twilight Sentinel turns the lights on, the manual-automatic switch must be placed in manual position in order to comply with the law.

The Twilight Sentinel needs no warm-up time and it will provide immediate automatic control whenever the switch is turned to automatic position.

c. Trouble Shooting

The Twilight Sentinel is adjusted at the factory and should maintain its adjustment. Of course, there may be occasions when the adjustment is questioned. Like any other electrical device, a misunderstanding of the operation of the unit may lead to the belief that an adjustment is necessary. The following troubles may be reported:

1. *Normal Complaints*

(a) Lights turn on too late in evening.

(b) Lights turn on too soon in evening.

(c) Lights remain on during the day.

(d) Lights fail to come on.

While the above complaints may be corrected by simple sensitivity adjustments in most cases, a few on-car checks should be made to determine if the difficulty is more serious than can be corrected by adjustment.

2. *Checking Operation*

Because of the high light levels needed to operate the Twilight Sentinel, a flashlight or field tester should be held close to the photocell whenever light is needed.

Place manual-automatic switch in automatic (pushed in) position. Place manual light switch in off position. Start engine and hold a black cloth over photocell. Lights should be on. Remove cloth. Lights may or may not turn off. If not, shine flashlight into cell. Lights should now turn off.

If the Twilight Sentinel performs as stated above, it will perform satisfactorily after the proper adjustments are made.

3. *Isolating Trouble*

(a) Failure of Lights to Turn On

(1) Place manual-automatic switch in automatic position. Place manual light switch in off position. Turn on ignition and place a black cloth over photocell. Lights should turn on. If not, remove one of black wires to photocell. If lights go on, trouble is in photocell and it should be replaced. If lights remain off, proceed with Step 2.

(2) Disconnect six-way connector near amplifier. Place a jumper between fourteen gage red wire and the fourteen gage yellow wire of car harness. If headlights turn on, trouble is in amplifier and it should be removed from car for further testing. If not, trouble is in wiring harness.

(b) Failure of Lights to Turn Off

(1) Place manual-automatic switch in automatic position. Place manual light switch in off position and turn on ignition. Shine flashlight into cell—lights should be off. If not, remove the two black wires from photocell and short them together. If lights go off, trouble is in photocell and it should be replaced. If not, proceed with Step 2.

(2) Disconnect the six-way plug near the amplifier. If lights go off, trouble is in amplifier and it should be removed for further testing. If lights remain on, trouble is in car harness.

d. Sensitivity Test and Adjustment on Car

The sensitivity test and sensitivity adjustment are made using the Guide-Matic Tester J-8465 in conjunction with the Twilight Sentinel Test Head J-8627. See Figure 10-64.

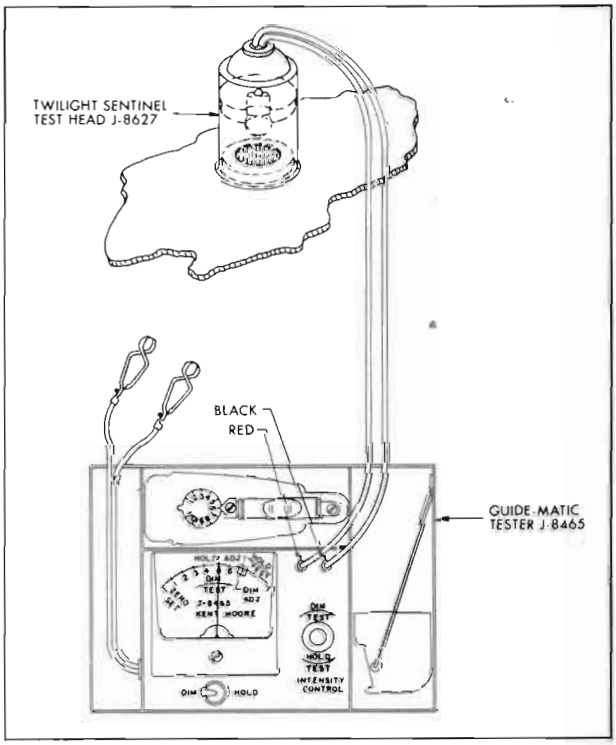
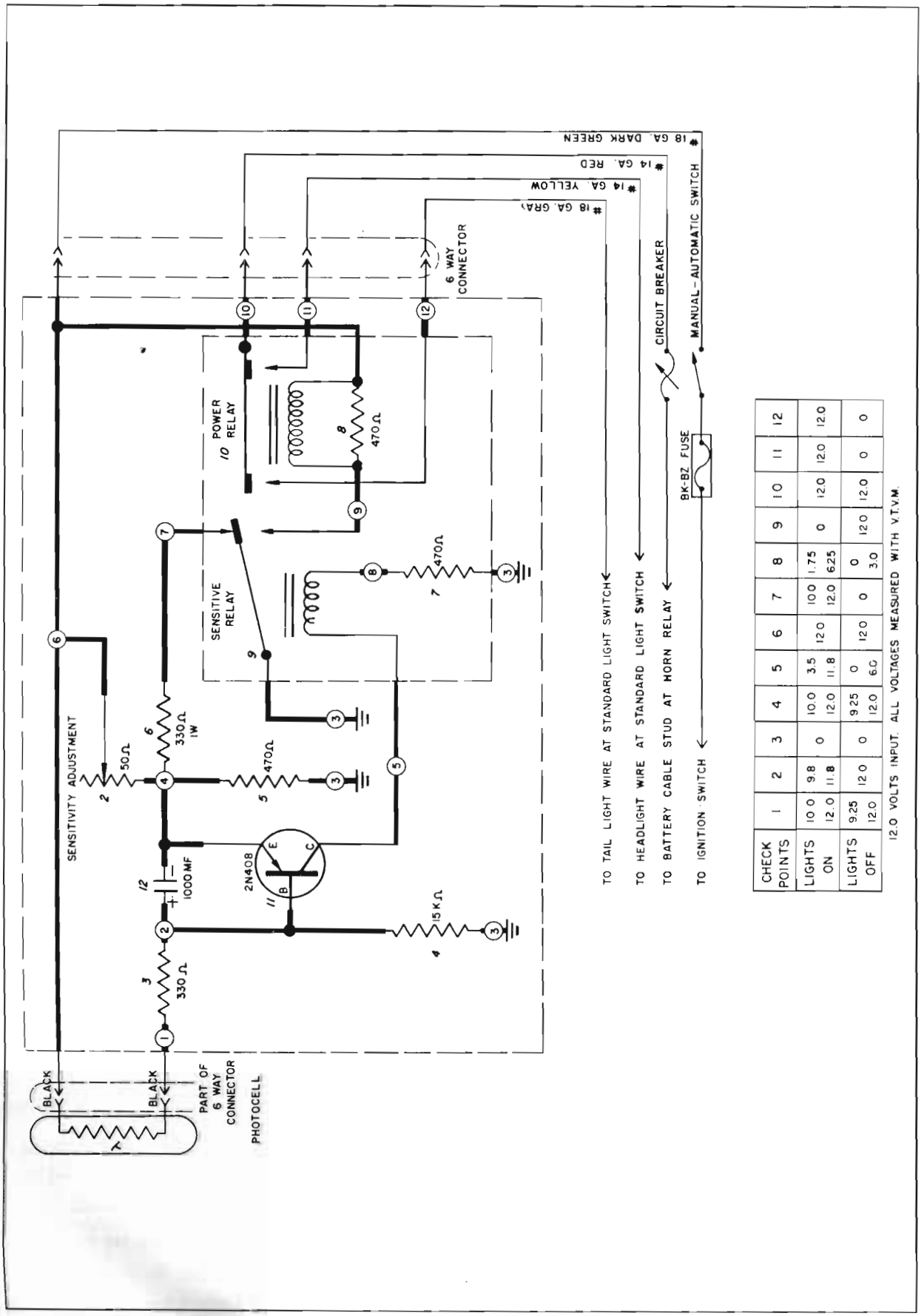


Figure 10-64—Guide-Matic Tester J-8465 with Test Head J-8627

1. *Preliminary Set-up*

(a) Insert red and black plugs of Test Head



CHECK POINTS	1	2	3	4	5	6	7	8	9	10	11	12
LIGHTS ON	10.0 12.0	9.8 11.8	0	10.0 12.0	3.5 11.8	12.0	100 12.0	1.75 6.25	0	12.0	12.0	12.0
LIGHTS OFF	9.25 12.0	12.0	0	9.25 12.0	0 6.0	12.0	0	0 3.0	12.0	12.0	0	0

12.0 VOLTS INPUT. ALL VOLTAGES MEASURED WITH V.T.V.M.

Figure 10-65—Twilight Sentinel Schematic Diagram

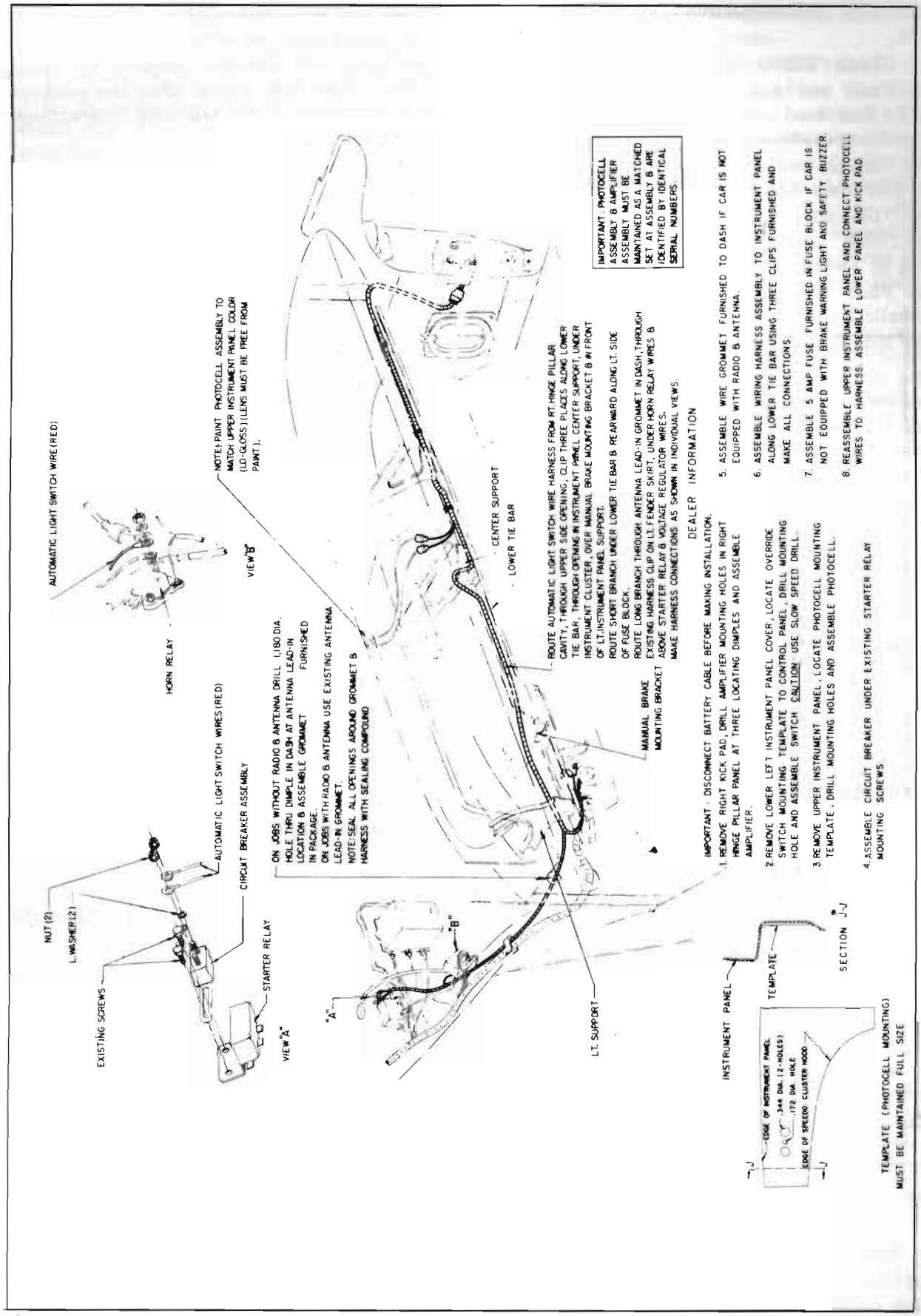


Figure 10-66—Twilight Sentinel Installation

J-8627 into the respective jacks of Tester J-8465.

(b) Check "ZERO SET" of meter.

(c) Place test head on photocell. IMPORTANT: *Test head must be properly seated on photocell or sensitivity readings will be in error.*

(d) Connect red power lead of tester to 12 volts and black lead to ground.

(e) "DIM-HOLD" switch of tester should be in "DIM" position for all tests and adjustments of Twilight Sentinel.

(f) Place the manual-automatic switch in automatic position.

(g) Set engine on fast idle and proceed with test.

2. *Sensitivity Test on Car*

(a) Rotate "INTENSITY CONTROL" completely clockwise. Lights should be off. If not, proceed to *Sensitivity Adjustment.*

(b) Turn "INTENSITY CONTROL" slowly counterclockwise until lights turn on. IMPORTANT: *Because of the time delay feature the* "INTENSITY CONTROL" *must be rotated slowly to give the correct sensitivity reading.* The meter pointer must be on "5". If reading is incorrect, proceed to *Sensitivity Adjustment on Car.*

(c) Turn control clockwise until lights turn off. Meter reading should be between "6" and "DIM ADJ." line. If the Twilight Sentinel is out of adjustment, proceed to *Sensitivity Adjustment on Car.*

3. *Sensitivity Adjustment on Car*

Follow steps in *Preliminary Set-Up* and remove right kick pad to allow access to sensitivity adjustment. See Figure 10-63.

(a) Turn sensitivity adjustment clockwise and "INTENSITY CONTROL" clockwise. Lights should be off.

(b) Rotate "INTENSITY CONTROL" counterclockwise until meter pointer is on "5".

(c) Rotate sensitivity adjustment slowly counterclockwise until lights turn on. IMPORTANT: *Because of the time delay feature, the sensitivity adjustment must be rotated slowly to obtain correct adjustment.*

(d) Recheck sensitivity as shown in Steps a through c under *Sensitivity Tests on Car.*

e. Removal of Units from Car

IMPORTANT: *Place manual-automatic switch in manual position before proceeding with removal procedures. Also, remove battery ground strap from battery.*

Car lights will function properly by using the regular car light switch after the removal of any component if the following instructions are observed:

1. *Amplifier Removal*

(a) Remove the right-hand kick pad and disconnect the six-way connector.

(b) Remove three screws from door post and remove amplifier.

2. *Photocell Removal*

(a) Disconnect the two black leads of photocell from harness.

(b) Remove seven screws from upper instrument panel and remove panel.

(c) Remove photocell and replace upper instrument panel.

3. *Manual-Automatic Switch Removal*

(a) Remove knob and disconnect two wires from rear of switch.

(b) Remove switch.

4. *Circuit Breaker Removal*

(a) Remove #14 red wire from battery cable stud of horn relay.

(b) Remove two #14 red wires from circuit breaker and remove circuit breaker from starter relay mounting bolts.

(c) Replace nuts on starter relay mounting bolts.

(d) Do not replace #14 red wire on horn relay battery stud until circuit breaker is replaced.

10-51 PARKING, TAIL, STOP, LICENSE AND BACK-UP LIGHTS

NOTE: *See paragraph 10-5 for lamp bulb and fuse specifications.*

a. Front Parking and Signal Lights

Each front parking and signal lamp contains one 32-4 CP lamp bulb which provides a 4 CP parking light and a separate 32 CP direction signal light. The pins on lamp bulb and slots in socket are offset to prevent improper installation of bulb in socket. The parking light is controlled by the lighting switch and the circuit is protected by the switch thermo circuit breaker. The direction signal light is separately controlled by the signal switch and the circuit is protected by the "DIR. SIG." fuse on the fuse

block under the cowl. The lamp bulb is serviced from underneath the bumper by raising the rubber mud flap and removing the snap-out socket from the rear of the lamp assembly. After replacing the bulb, insert the socket and rotate slightly to seat the boot, then replace the mud flap.

b. Tail, Stop, and Signal Lights

Each rear lamp assembly contains a 32-4 CP bulb which is used as a combination tail, stop, and direction signal light. The tail lights are controlled by the lighting switch and the circuit is protected by the 10 ampere "TAIL LTS." fuse on the fuse block.

The stop lights are controlled by a hydraulic switch mounted on the left frame side rail. The switch is closed by hydraulic pressure when the brakes are applied. The direction signal switch is in the circuit, so the stop lights may be flashing or constant depending on the position of the switch. The direction signal and stop light circuit is protected by the 10 ampere "DIR. SIG." fuse mounted on the fuse block under the cowl.

The combination tail, stop, and directional signal lamp bulb sockets can be snapped out from inside the trunk compartment. Since the position of the bulb filaments is important in the rear lamps, these sockets have been provided with a tongue and groove index to insure correct positioning.

c. Replacement of Stop Light Switch

When replacing stop light switch have new switch ready to install as soon as old switch is removed from master cylinder to keep brake fluid loss to a minimum. Always fill master cylinder reservoir after new switch is installed.

d. Rear License Lights

Two rear license lamps are mounted in the bumper beside the license plate to provide adequate lighting of the plate. Each lamp contains one 3 CP lamp bulb which operates in conjunction with the tail lights, and its circuit is also protected by the 10 ampere "TAIL LTS." fuse on the fuse block.

A lamp bulb may be replaced by removing the lens from the license lamp housing.

e. Back-up Lamps and Switch

Back-up lamps are standard equipment on Series 4800 cars and are optional on all other series. They are located in the lower bumper panel on all series. They contain 32 CP bulbs behind clear plastic lenses.

On *synchromesh transmission* cars, the back-up light switch is mounted on the steering column jacket. This switch is actuated by a pin on the switch itself which projects through a slot into the jacket. A spring on the transmission control shaft actuates this switch pin while in the reverse position only. Slotted mounting screw holes permit movement of the switch up and down the steering column jacket for proper locating. See paragraph 10-31 (b) for adjusting procedure.

On *automatic transmission* cars, the back-up light switch is combined with the neutral safety switch. It is mounted on the steering column jacket under the instrument panel. The switch is actuated by a lever on the transmission control shaft which projects through a slot in the jacket. When the neutral safety portion of the switch is correctly timed, the back-up portion is properly timed automatically. Slotted mounting screw holes permit sidewise movement of the switch for proper timing. See paragraph 10-31 (a) for the adjusting procedure for the neutral safety and back-up light switch. The back-up light circuit is protected by the 10 ampere "BACK-UP" fuse on the fuse block.

10-52 INTERIOR LIGHTS AND CIGAR LIGHTERS

NOTE: *See paragraph 10-5 for lamp bulb and fuse specifications.*

a. Instrument Panel Lights

The speedometer, ignition switch, heater-defroster controls, ventilation or air conditioner controls, transmission control dial, and clock are illuminated by lamp bulbs mounted to provide indirect lighting.

The instrument panel lights are controlled by the lighting switch as described in paragraph 10-47 and the circuits are protected by the 5 ampere "INST. LTS." fuse on the fuse block.

The nearest instrument panel lower housing must be removed to replace any of the following light bulbs: ignition switch, transmission control dial, or any of the 14 instrument cluster light bulbs. Remove the socket and bulb assembly from the instrument cluster by rotating counter-clockwise. Replace the bulb and reinstall the assembly by rotating it clockwise. See Figure 10-77 for the location of any instrument cluster bulb.

b. Instrument Panel Compartment Light

The instrument panel compartment (glove box) is lighted by a lamp bulb mounted in a socket in the upper corner of the glove box. The switch is mounted separately in the door opening. This spring-loaded switch makes contact when the compartment door is opened. As the door is closed it depresses the switch button to break contact and turn the light off. This circuit is protected along with the map light circuit by the 5 ampere "MAP-GLV." fuse on the fuse block.

c. Parking Brake Warning Light

The parking brake warning light, when installed, will show a red warning signal light on the instrument panel whenever the ignition switch is turned on while the parking brake is applied. The signal lamp is controlled by a switch mounted in position to be operated by the parking brake lever. The circuit is protected by the 5 ampere "BK. & BZ." fuse on the fuse block under cowl.

When brake lever is in fully released position, the signal switch plunger must be depressed $\frac{3}{16}$" to open the circuit. Adjustment is made by loosening the mounting screws and shifting the switch as permitted by the slotted screw holes.

d. Direction Signal Indicator Lights

The direction signal indicator consists of a 2 CP bulb mounted at each end of the instrument cluster. To get the bulb out of the instrument cluster, the instrument panel lower housing under the bulb must be removed. See Figure 10-77 for the location of any indicator bulb socket.

e. Automatic Transmission Control Dial Light

The control dial is illuminated by a 2 CP lamp bulb mounted in the control dial housing to provide indirect lighting. The light intensity is controlled by the lighting switch in the same manner as all instrument panel lights. To replace the lamp bulb, drop the lower left in-instrument panel housing by removing the five mounting screws. Remove the snap-out socket which is located in the upper left side of the control dial housing.

f. Cigar Lighter

The cigar lighter is heated by pressing the knob in until it latches; the knob will automatically unlatch and return to "off" position when heated to proper temperature.

The lighter is equipped with an ash guard, to prevent ashes and loose tobacco from falling on the user's clothing and to permit the lighter to be passed around without danger of burning the fingers.

In the Casco lighter a replaceable thermal fuse is screwed into the lighter base to protect the lighter element against over heating.

In the Rochester Products lighter a thermal operated circuit breaker is used to protect the element. The circuit breaker is re-set manually simply by removing the plastic covered cup on the back of the lighter base and depressing the spring plunger until it indexes in position.