

GUIDE-MATIC

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DESCRIPTION AND OPERATION

SYSTEM DESCRIPTION

The Guide-Matic system allows the driver to obtain automatic switching of his vehicle headlight beams in response to light from approaching vehicle headlights. Provision is also made for the driver to obtain manual control or constant low beam if he desires. It is available for all Buicks as a dealer-installed option.

The system consists of a photo-amplifier, power relay, foot switch, sensitivity control (driver control), and interconnecting wire harness.

The photo-amplifier combines a light sensing photocell and transistorized DC amplifier into one unit with sufficient power to operate a power relay for switching the headlight beams. Mounting location is on the left front fender, so the amber-colored lens has an unobstructed view of approaching vehicle headlights. Road signs, back reflection from the vehicle's own headlights, and other miscellaneous light requires the vertical and horizontal "viewing range" of the photocell to be rather narrow. The amber-colored lens picks up light and focuses it through a small opening onto the photocell to form an optical system to accomplish this. Since the "viewing range" is narrow, aim of the photo-amplifier is very important. Proper operation requires that the unit be properly aimed vertically and horizontally, as outlined under "Aiming Adjustment".

The photo-amplifier is adjusted and sealed at the factory. If a failure occurs, the assembly must be replaced. A model-serial number label is attached on the bottom of the assembly for field identification.

The power relay is a sealed, single pole, double throw, 12-volt DC relay which provides the heavy-duty contacts for switching the headlight beams. The high beams are connected to the "normally closed" contacts. It is mounted under the carpet on the toe pan just above the foot switch.

The power relay contains a diode for dampening purposes to protect the photo-amplifier. Observe proper polarity when connecting to prevent burn-out of diode and subsequent ruining of photo-amplifier. Replace relay only with same part number replacement.

The foot switch is the same as the regular foot dimmer switch, except for an added "momentary contact" grounding switch. Operating the switch in the normal manner provides either "Automatic" control of headlight beams or "low beam" only. In "Automatic" position, a slight pressure on top of the switch closes the grounding switch to provide an "overriding" high beam (regardless of light on the photo-amplifier) for signaling purposes, or to determine "Automatic" position.

The sensitivity control (driver control) is located on the lower instrument panel to the left of the steering column. Rotating the control knob provides a range of sensitivity control and is the only means of adjusting sensitivity in the field.

An in-line 4-ampere (SFE-4) fuse is located near the foot switch in the interconnecting wire harness. If this fuse opens, the system will revert to manual control of headlight beams by means of the foot switch. If service cannot be obtained immediately, removing the fuse will enable the driver to manually control the headlight beams.

CIRCUIT DESCRIPTION

Battery operating voltage is supplied through the headlight terminal of the light switch (light blue wire). See Figure 9H-1. The photocell acts as the light sensor by varying its internal resistance according to the amount of light applied. It is connected between positive battery voltage (light switch) and ground through the power relay, driver control and the "Dim, Hold" controls (3 meg. and 15 meg.) to form a circuit for controlling the base of transistor Q1. In darkness the photocell internal resistance is very high (megohm range) and will have no significant effect on Q1 base voltage. Transistor Q3 will be conducting, but Q1, Q2, Q4, and Q5 are turned off and power relay coil is de-energized which keeps the headlights on high beam. Transistor Q6 is turned on, connecting the 3 megohm "Dim" control to ground in parallel with the "Hold" control to reduce photocell sensitivity to "Dim" sensitivity range.

When sufficient light strikes the photocell, Q3 turns off and Q1, Q2, Q4, and Q5 turn on to energize the power relay and switch the headlights to low beam. Q6 turns off, disconnecting the "Dim" control from ground and increasing photocell sensitivity to "Hold" the headlights on low beam when the approaching driver reduces light by switching to low beam.

The 10 K potentiometer (driver control) provides a means of controlling sensitivity by adjustment of battery positive voltage applied to the photocell. Centering the control knob provides approximately normal sensitivity, as adjusted at the factory. Rotating the knob clockwise will increase voltage applied and cause the unit to switch to low beam when cars are farther away. Rotating to extreme counterclockwise "Off" position reduces applied battery voltage sufficiently to desensitize the photocell to the point where it will not respond to light, and the unit will provide only high beams in "Automatic" position of the foot switch. The foot switch will operate conventionally, providing high or low beam.

In "Automatic" position, the foot switch connects the photo-amplifier output to the power relay coil. In this position, a slight downward pressure on top of the switch will connect the driver control armature to ground, effectively removing operating voltage from the photocell to provide an "override high beam" in the presence of light. A fixed 500 ohm stop in the driver control prevents control burn-out. In

"low beam" position, the foot switch connects battery voltage directly to the power relay coil. The headlights will remain on low beam until the foot switch is changed to "Automatic" position. The "override" is not effective in this position, since the photo-amplifier output is disconnected from the power relay.

AUTOMATIC OPERATION

Turn headlights on, rotate driver control knob to approximately center of rotation, and place foot switch in "Automatic" position. If there is no light ahead, the headlights will be on high beam. No warm-up time is required.

When light from an approaching vehicle's headlights reaches a predetermined level at the photocell's sensing surface, the amplifier will trigger (pull on) the power relay, causing it to switch (dim) the headlights from high to low beam. At the same time, the photocell sensitivity is increased to "hold" sensitivity to keep headlights on low beam when the approaching driver reduces light by switching to low beam.

If the driver desires his lights to switch when the approaching vehicle is farther away or nearer, he may adjust the driver control. If the approaching driver fails to dim, he may signal him by momentarily putting a slight pressure on top of the foot switch to "override" his headlights to high beam. When he removes the pressure, his headlights will revert to low beam if there is still sufficient light ahead.

When the approaching car passes and light is removed from the photocell, the amplifier removes the signal voltage from the power relay coil, causing it to "drop out" and switch back to high beam.

If the road surface is highly reflective (snow, gravel, etc.), the unit may be held on low beam by reflections of its own headlights. If this occurs, slowly rotate driver control counterclockwise until lights return to high beam. This is maximum usable sensitivity for the particular road surface.

MANUAL OPERATION

Rotate driver control knob to extreme counterclockwise position (Off). The foot switch will now operate conventionally, switching headlights from high to low beam. High beam position will represent "Automatic" position of the foot switch.

LOW BEAM OPERATION

Place foot switch in "low beam" position. Headlights will remain on low beam until foot switch is changed

to "Automatic" position. Overriding action is not available, since power relay is disconnected from the photo-amplifier.

DIAGNOSIS

ELECTRICAL DIAGNOSIS GUIDE

PERFORM FOLLOWING CHECKS IN SEQUENCE TO DETERMINE CAUSE AND CORRECTION, AND PREVENT UNNECESSARY SERVICE WORK

Check position of driver control knob.

ROTATED TO "OFF" POSITION

Check with owner for understanding of proper operation.

NOT IN "OFF" POSITION

Place car where light strikes photo-amplifier.

Set driver control knob to approximately center position. Operate engine at fast idle and turn on headlights (no warm-up required).

HEADLIGHTS NOT ON LOW BEAM IN BOTH POSITIONS OF FOOT SWITCH

Check for loose connections or blown fuse (near driver control).

Disconnect dark green wire at foot switch.

LOW BEAM IN BOTH POSITIONS OF FOOT SWITCH

Replace shorted foot switch.

HIGH BEAM IN ONE POSITION OF FOOT SWITCH

Disconnect photo-amplifier and connect 12-volt test bulb between ground and left blue wire in 5 way interconnecting harness connector.

BULB DOES NOT LIGHT

Check continuity of blue wire through power relay and light switch (possible loose connection).

BULB LIGHTS

Connect 12-volt test bulb between battery positive terminal and dark green wire in 5 way interconnecting harness connector.

Rotating Driver Control Knob Does Not Turn Bulb On and Off

Check for loose connection at driver control two (2) way connector or defective driver control.

Rotating Driver Control Knob Turns Bulb On and Off

Connect jumper between battery positive terminal and gray wire in 5 way interconnecting harness connector.

Headlights on Low Beam In Both Positions of Foot Switch

Replace defective photo-amplifier.

Headlights Still Not On Low Beam In Both Positions of Foot Switch

Check for defective power relay; replace if defective

Check for defective foot switch; replace if defective

HEADLIGHTS ON LOW BEAM IN BOTH POSITIONS OF FOOT SWITCH

Place foot switch in "Automatic" position (use override procedure to find "Automatic" position).

"AUTOMATIC" POSITION CANNOT BE FOUND

Check for disconnected dark green wire at foot switch (override).

Ground dark green wire at foot switch.

If "Automatic" position of foot switch (high beam) can now be found, replace defective foot switch.

If "Automatic" position cannot be found, replace defective photo-amplifier assembly.

"AUTOMATIC" POSITION CAN BE FOUND

Leave in "Automatic" position and cover photo-amplifier with black cloth.

HEADLIGHTS DO NOT SWITCH TO HIGH BEAM

Disconnect photo-amplifier at 5 way connector.

If headlights switch to high beam, replace defective photo-amplifier.

HEADLIGHTS SWITCH TO UPPER BEAM

Uncover photo-amplifier. Let headlights switch to low beam.

Rotate driver control ring to "Off" position. Headlights should switch to high beam.

Headlights Do Not Switch to High Beam

Check driver control for defective connection to ground or defective control. Replace control assembly if defective.

Headlights Switch to High Beam

Check vertical aim adjustment and dim and hold sensitivity as final check, as outlined in notes.

MAINTENANCE AND ADJUSTMENTS**AIMING ADJUSTMENT**

The unit must be aimed straight ahead in the horizontal plane. If necessary to readjust horizontal aim, unit must be removed and mounting holes reoperated to allow repositioning.

Accurate vertical aim is essential to proper performance of the Guide-Matic. If the photo-amplifier is aimed too low, reflected road light from the vehicle's own headlights can cause the Guide-Matic to be slow in returning headlights to upper beam or hold them on low beam. The unit must be aimed as low as possible, however, to provide maximum tolerance for car loading. The aiming procedure outlined here should be rechecked on new cars that have been driven at least 2,000 miles.

1. Photo-amplifier vertical aiming should be performed with vehicle unloaded, trunk empty, except for spare tire, gas tank at least half full, and tires at correct pressure.
2. Locate vehicle on level floor (level within 1/4 inch fore and aft).
3. Rock car sideways to equalize springs.

Install leveling device J-22837 available from Kent-Moore Corporation. Be sure the two notches

are seated over top front edge of casting, and the lower extrusion is seated on extruded platform on lower part of lens.

5. Adjust aiming screw with an allen wrench until level bubble is centered. Always make final adjustment while turning screw clockwise.

TESTING "DIM" AND "HOLD" SENSITIVITY ON CAR

The individual controls for "Dim" and "Hold" are located in the photo-amplifier and are adjusted and sealed at the factory so they are not accessible in the field. However, a sensitivity check can be made to determine if sensitivity is within the limits of the driver control to provide the driver with at least a minimum acceptable "Dim" and "Hold" sensitivity. This will prevent unnecessary replacement and give the serviceman a more positive assurance the unit is working properly. Sensitivity Tester No. J-22630 has been developed by Kent-Moore Corporation, 28635 Mound Road, Warren, Michigan, for this purpose.

1. Preparation for Test

- a. Sensitivity Tester No. J-22630 consists of a test bulb (53), an adapter tube with filter and bail for securing test bulb to photo-amplifier, and a means of controlling and regulating battery voltage applied to the test bulb.

b. Install tester.

Be sure notch on front edge of adapter tube is located at bottom of photo-amplifier lens (to clear aiming pad on lens). Also, push rubber sleeve surrounding bulb all the way into rear opening in adapter tube.

- c. Connect long leads from tester to battery. Observe polarity - red to positive and black to negative.

- d. Cover photo-amplifier and test bulb with black cloth.

- e. Rotate driver control knob completely counter-clockwise.

- f. Turn on headlights and operate engine at fast idle. Headlights should be on upper beam.

2. Test Procedure

- a. Adjust sensitivity tester voltage control knob until pointer reads 7.0 volts.

- b. Slowly rotate driver control knob clockwise just to point where headlights switch to lower beam.

- c. Check accuracy of driver control adjustment by rotating sensitivity tester voltage control knob coun-

terclockwise until headlights switch to upper beam. Then slowly rotate sensitivity tester control knob clockwise just to point where headlights switch to lower beam. Control knob pointer should be registering between 6.5 and 7.0 volts.

d. If reading does not agree, repeat steps a, b, and c.

e. Slowly rotate sensitivity tester voltage control knob counterclockwise just to point where headlights switch to upper beam. Control knob pointer should register from 1.5 to 2.5 volts less than reading obtained for switching to lower beam in step c.

f. If this minimum "Dim" and "Hold" sensitivity can be obtained at any position of the driver control knob rotation range, the unit is acceptable for sensitivity and you may proceed to step g. If "Dim" (switching to lower beam) cannot be adjusted (step b), check for open ground circuit to driver control or defective driver control. If okay, replace defective photo-amplifier. If "Dim" and "Hold" sensitivity readings are close together (approximately 1/2 to 3/4 volt apart), replace defective photo-amplifier.

g. Turn off engine, disconnect sensitivity tester, and reconnect any wires previously disconnected.

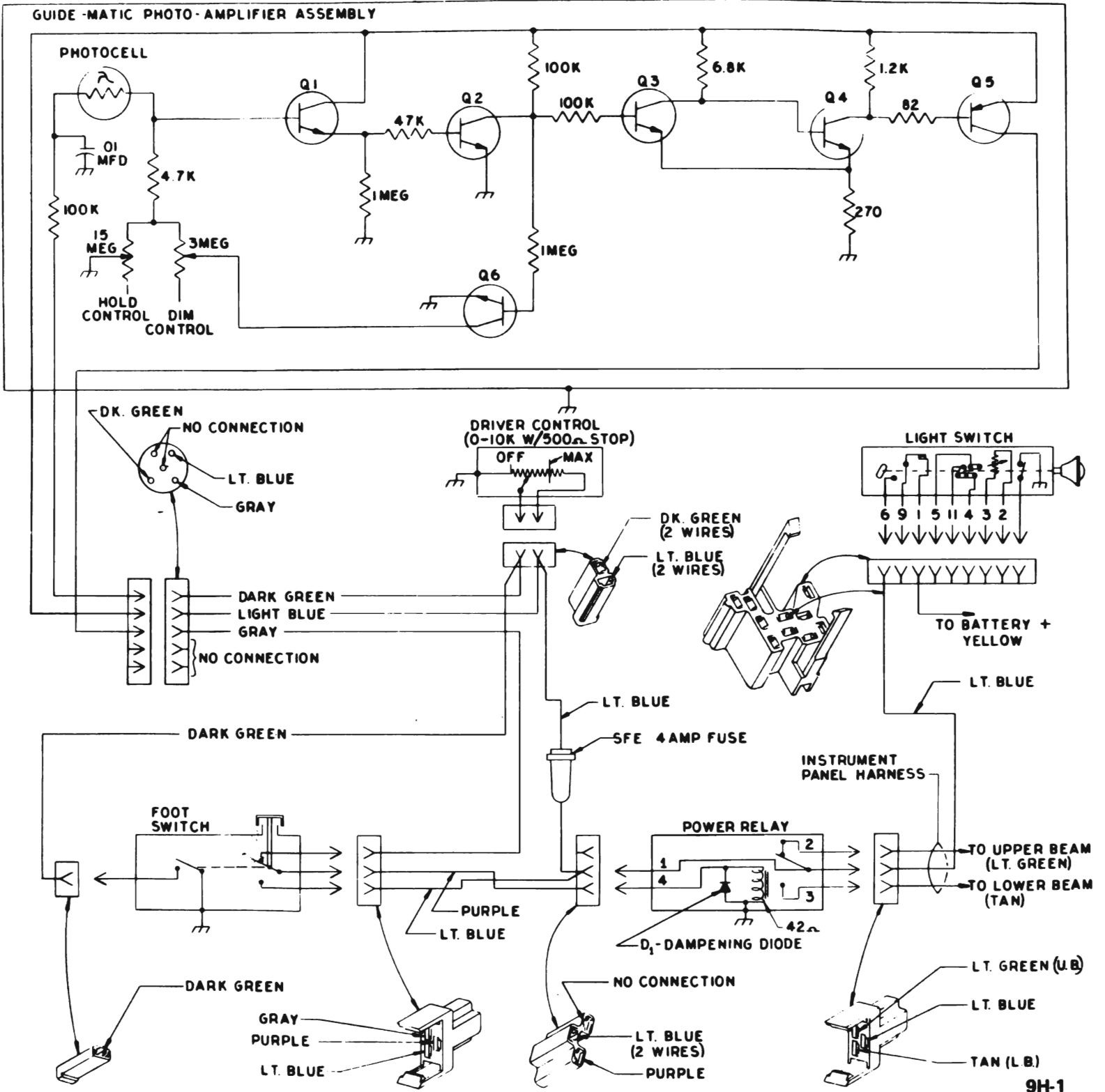


Figure 9H-1 Guide-Matic Schematic