

RAIN SENSOR**8610-09****INDEX****RAIN SENSOR****OVERVIEW AND OPERATION
PROCESS**

| | |
|---|----|
| 1. SYSTEM LAYOUT AND OVERVIEW..... | 3 |
| 2. RAIN SENSING OPERATION..... | 5 |
| 3. RAIN SENSOR RELATED CIRCUIT..... | 6 |
| 4. FUNCTIONS AND SPECIFICATIONS OF RAIN SENSING WIPER..... | 7 |
| 5. OPERATION MODE OF RAIN SENSING WIPER SYSTEM..... | 12 |



اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

REMOVAL AND INSTALLATION

| | |
|---|----|
| 8610-09 FUNCTIONS AND CHECKS OF RAIN SENSOR..... | 13 |
| 8610-09 DIAGNOSIS PROCEDURES..... | 15 |
| 8610-09 RAIN SENSOR..... | 17 |

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



RAIN SENSOR


8610-09

OVERVIEW AND OPERATION PROCESS

1. SYSTEM LAYOUT AND OVERVIEW

The rain sensing wiper unit in this vehicle doesn't control the wiper directly. The rain sensing unit detects the amount of rain drops and sends the operating signal to STICS, and STICS drives the wiper directly.

Rain Sensor Unit
(Auto Light Sensor Integrated Type)



A sensor that emits infrared rays through LED and then detects the amount of rain drops by receiving reflected rays against sensing section (rain sensor mounting section on the windshield) with photodiode.

The auto light sensor is Integrated into the rain sensor (refer to the below picture).

Multifunction Wiper Switch:
AUTO and Sensitivity Control

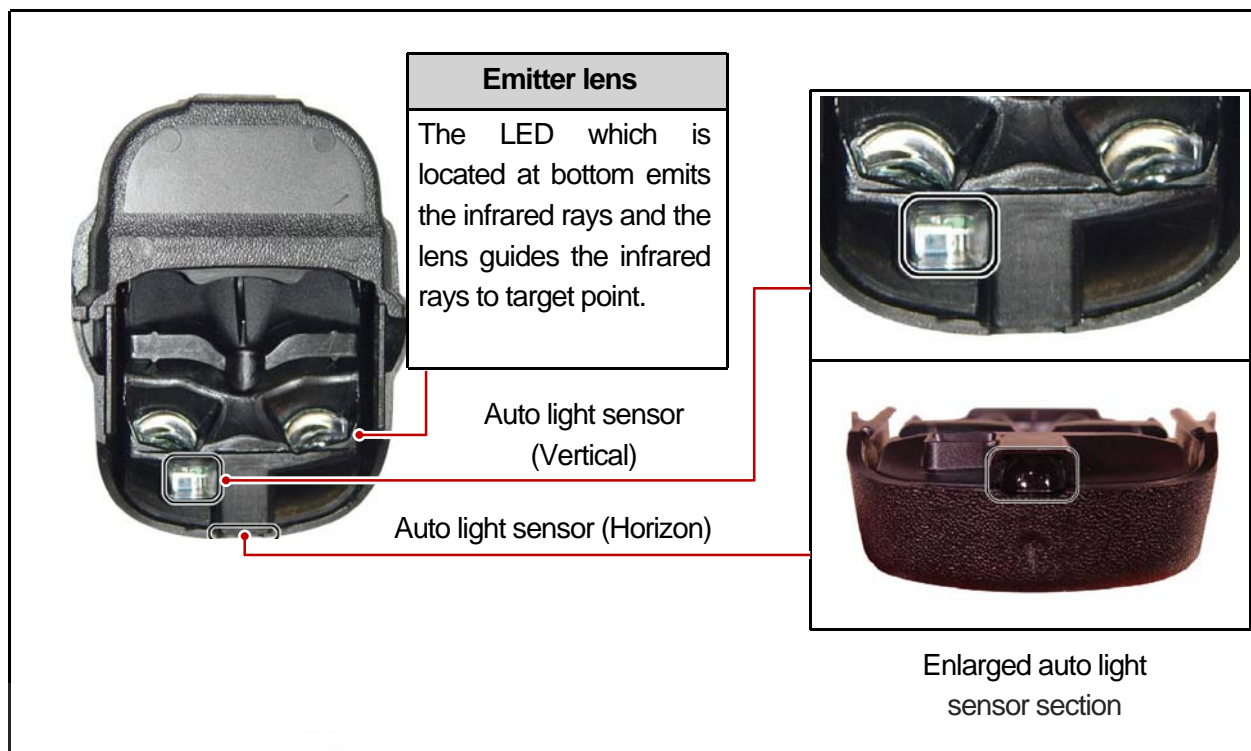


AUTO: Wiper operates automatically by rain sensor

FAST <-----> SLOW: Auto delay/Auto speed control.

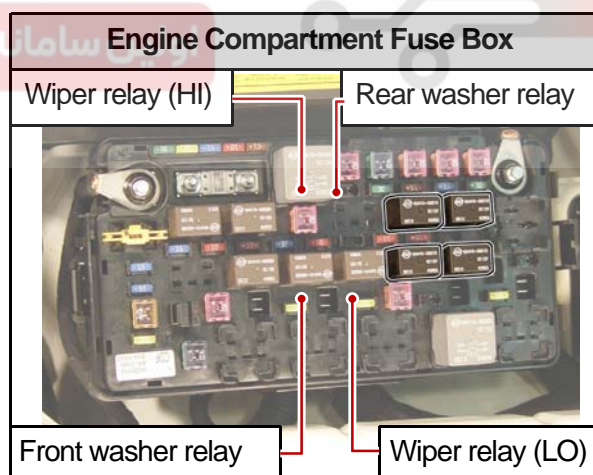
A position that controls sensitivity against rains on the windshield and transmits wiping demand signal accordingly.

| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |



► STICS

The rain sensing unit detects the amount of rain drops and sends the operating signal to STICS, and STICS drives the wiper directly. At this moment, STICS determines the wiper operation mode (washer, MIST, AUTO), then sends the information to the rain sensor.



► Auto Light Sensor and Rain Sensor Coupled Control

1. Rain detected headlamp: If it rains heavy which requires the intermediate INT speed, the headlamps are turned on automatically.
2. Night detected wiping: When the auto light control turns on the headlamps and the rain sensor detects the rain, the wiper sensitivity is automatically increased by one level. (For example, the AUTO wiper switch is at the 3rd level, but the wiper operates at the 4th level.)

2. RAIN SENSING OPERATION

The rain sensor is installed on the specific heat treated windshield that has minimum 13% of transmittance rate with specified intensity of radiation. It is installed on the glass with a adhesive of Sorepa. It communicates with STICS and makes the wipers to operate automatically under the rain sensing mode (multifunction switch wiper: AUTO mode). The emitting section of the rain sensor unit emits infrared rays against the windshield and then detects the amount of rain drops by receiving reflected rays with photodiode.

The difference compared with the conventional rain sensor is that the auto light sensor is integrated into the rain sensor. Followings are the components and functions of the rain sensor unit

1) Rain Sensor Unit (Including Cover)



| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

RAIN SENSOR

ACTYON 2012.12

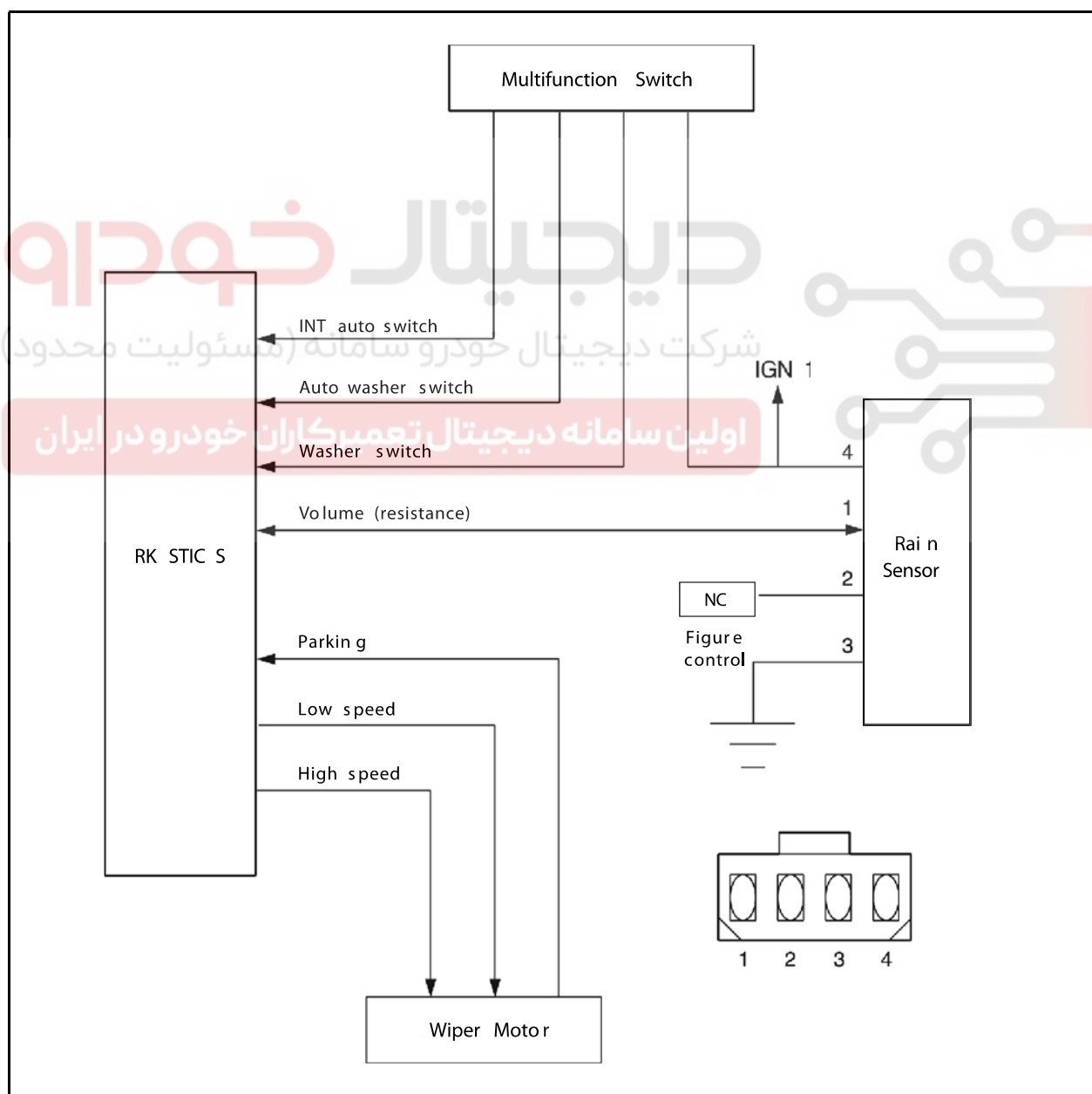
3. RAIN SENSOR RELATED CIRCUIT

The rain sensor has one connector with 4 pins and each pin has following function as shown in the circuit diagram. However, in this vehicle, the terminal No. 1 and No. 2 are for communications between STICS and the rain sensor; the No. 1 terminal sends the detected value from the rain sensor to STICS then the STICS drives wiper motor.

No. 2 terminal sends the wiper and washer operation information such as

**washer operation mode,
wiper relay, or
multifunction wiper switch is in AUTO wiper position**

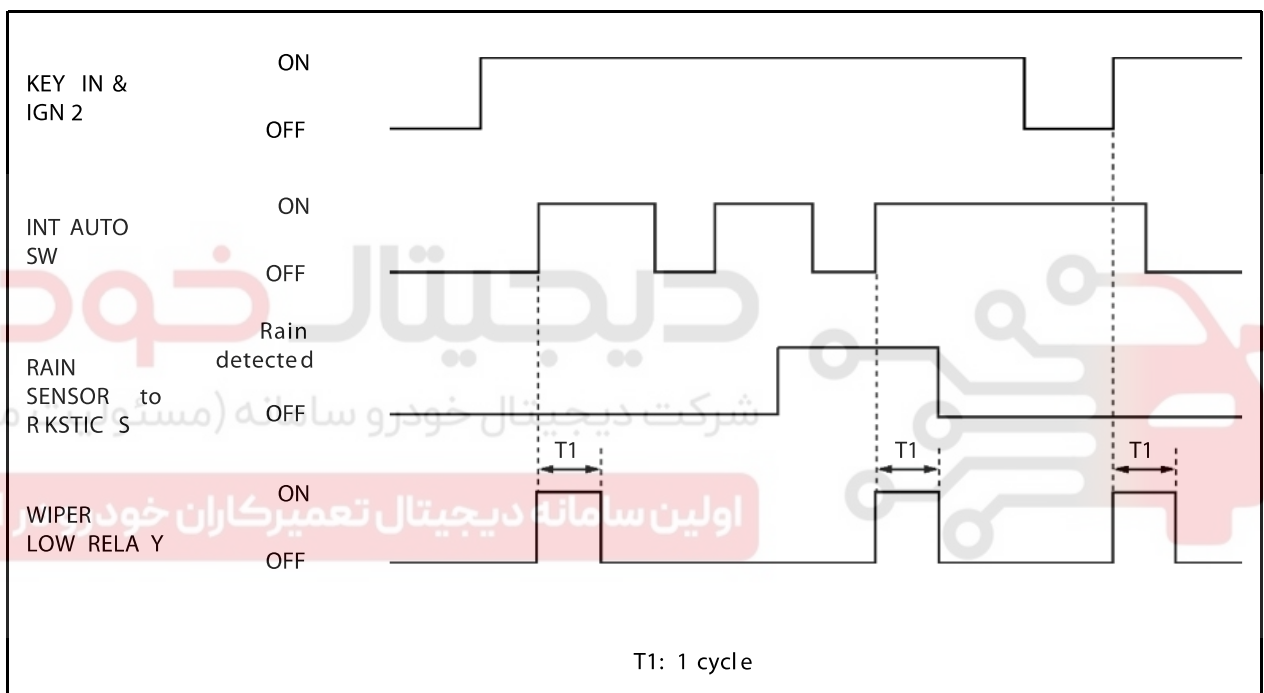
to the rain sensor to recognize whether it is actual rain or it is in rain sensing wiper operation mode.



4. FUNCTIONS AND SPECIFICATIONS OF RAIN SENSING WIPER

1) Power-up Reminder Wiper

1. When turning off and on the INT auto switch, the system drives the wiper motor for one cycle through LOW relay regardless of communication with rain sensor.
2. The wiper relay (LOW) is turned on and the wiper motor runs one cycle when changing the INT auto switch to "ON" position from "OFF" position for the first time(while the ignition key is in "ON" position). When the wiper switch is turned to "ON" position again from "OFF" position, the system drives the wiper motor through LOW relay one cycle only when the rain sensor detects the "Rain Detected" signal.



| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

2) Washer Coupled Wiper in the Rain Sensing Mode

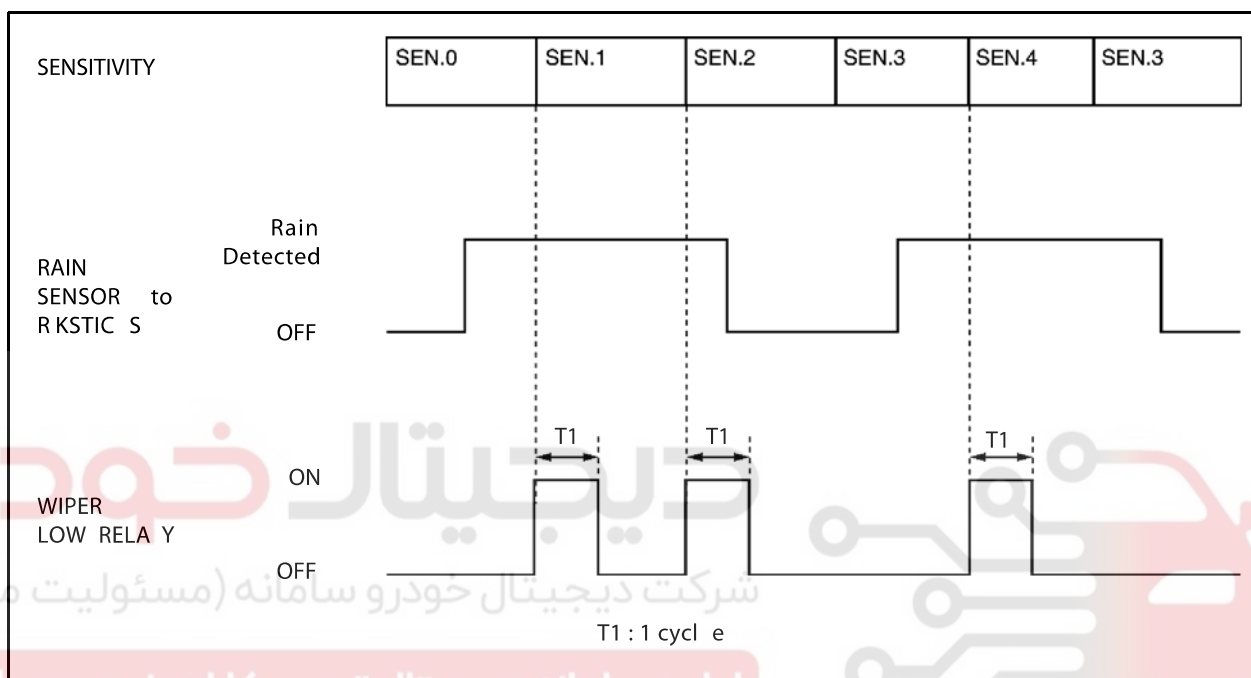
1. The washer coupled wiper is operated when receiving the washer switch input with the ignition switch "ON" and the auto INT switch "ON" in rain sensing mode. At this moment, the communication with the rain sensor is overridden. However, the washer switch input is overridden during continuous operation.
2. The operation data is sent to the rain sensor even during the washer coupled wiper operation.



3) Rain Sensing Sensitivity Control

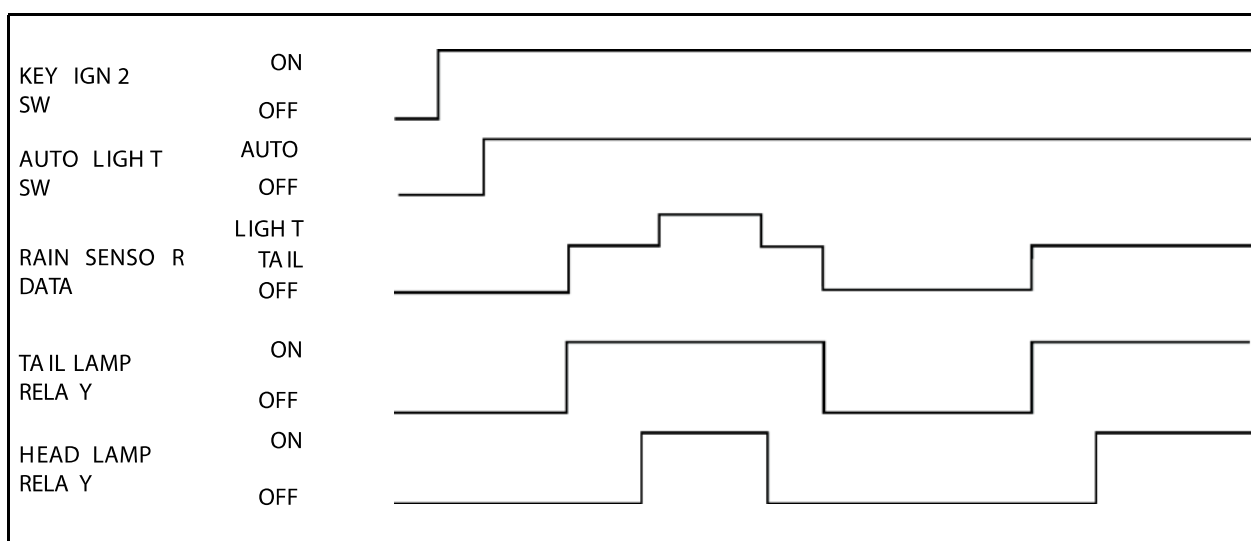
- The wiper relay (LOW) is turned on and the wiper motor runs one cycle when the volume sensitivity is increased (ex: from 0 to 1) (while the ignition key is in "ON" position, the wiper switch is in "AUTO" position, and the wiper motor is in "Parked" position). However, the wiper motor can be operated only when the rain sensor detects the "Rain Detected" signal.

※ If the volume sensitivity is changed more than 1 stage within 2 seconds, the wiper motor runs only one cycle.



4) Auto Light Control

- Only when the auto light switch is in "AUTO" position, it controls the tail lamp and headlamp by communicating with the rain sensor (while the ignition key is in "ON" position).

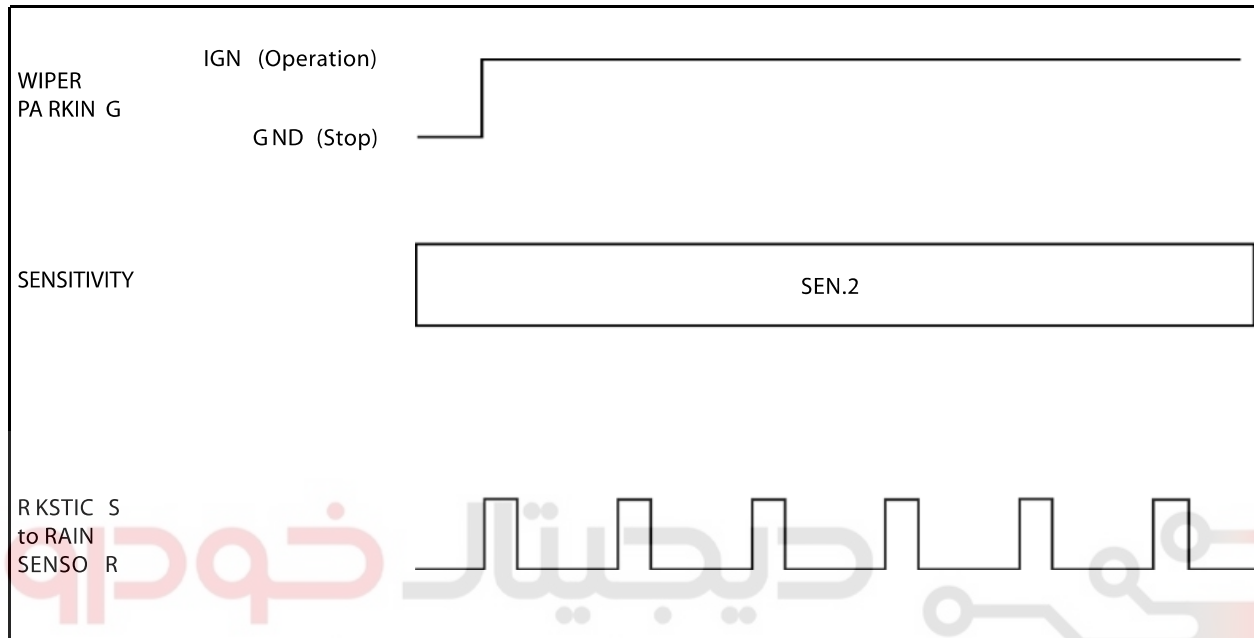


| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

5) Wiper Operation When the Wiper Parking Terminal Is Grounded

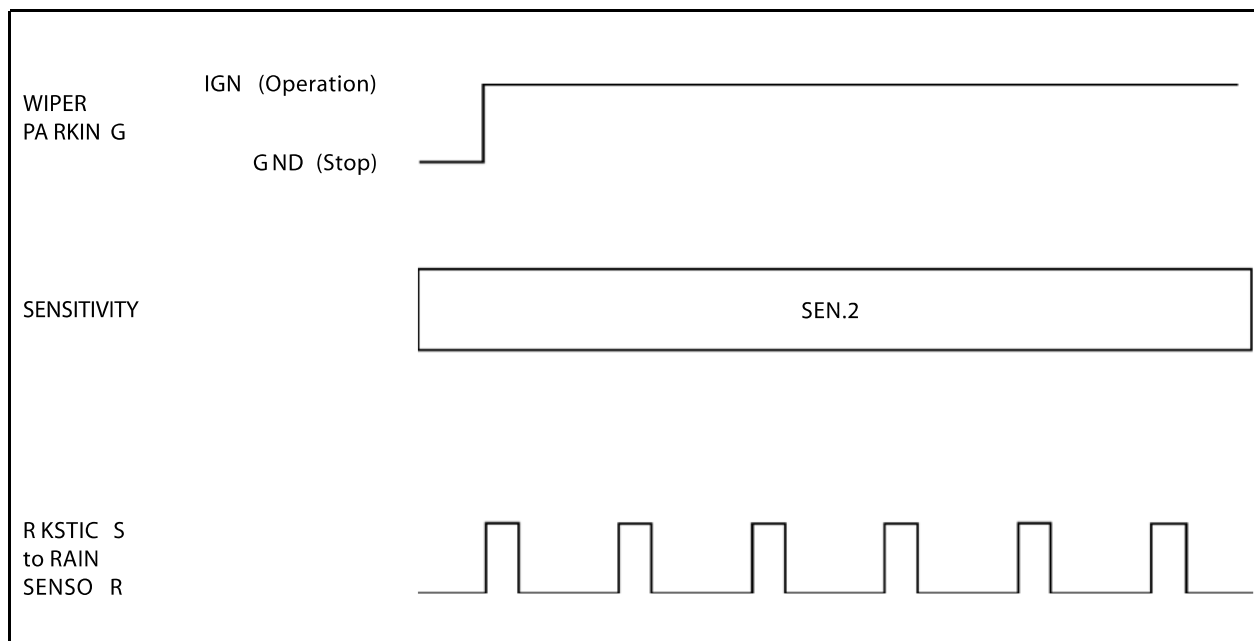
1. The wiper system continuously outputs the parking signal of current sensitivity when the parking terminal is grounded (while the ignition key is in "ON" position and the INT switch is in "ON" position).

※ The wiper motor runs only when the rain sensor requires.



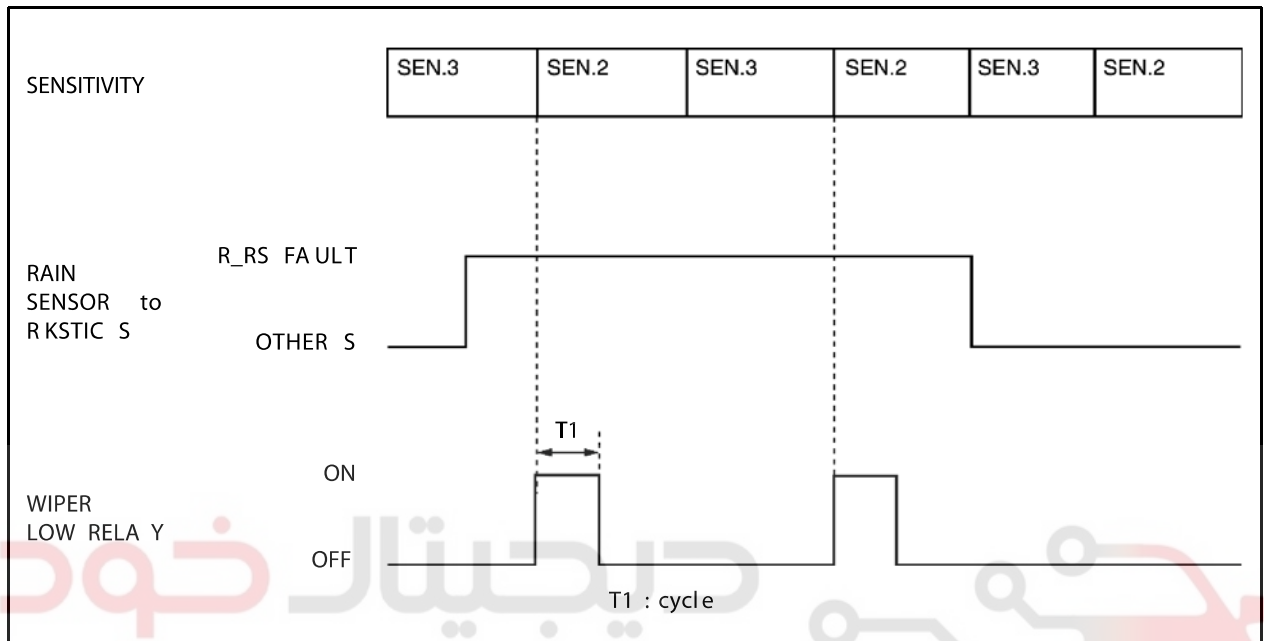
2. When the parking terminal is fixed to IGN, the wiper system outputs the operating signal of current sensitivity for 2 seconds, then continuously outputs the parking signal of current sensitivity (while the ignition key is in "ON" position and the INT switch is in "ON" position).

※ The wiper motor runs only when the rain sensor requires.

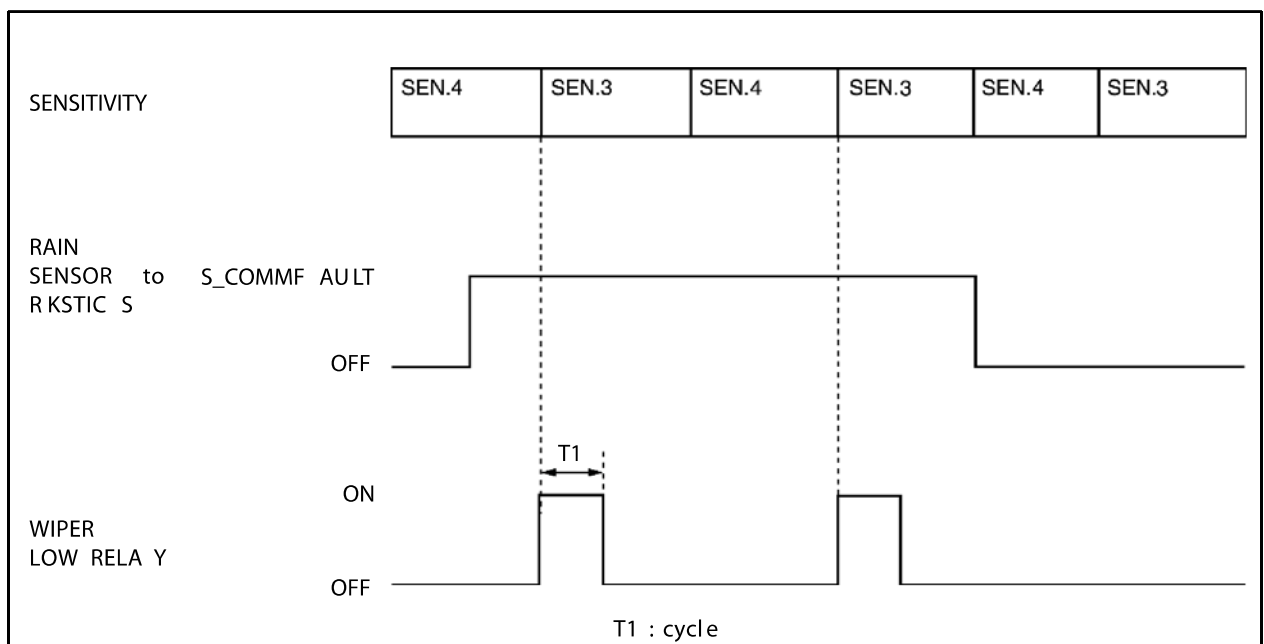


6) Defective Rain Sensor

1. The wiper relay (LOW) is turned on and the wiper motor runs one cycle when the wiper sensitivity is changed to 2 from 3 during receiving the malfunction signal from the rain sensor (while the ignition key is in 'ON' position and the INT switch is in "ON" position).



2. The wiper relay (LO) is turned on and the wiper motor runs one cycle when the wiper sensitivity is changed to 3 from 4 during receiving the malfunction signal from the rain sensor (while the ignition key is in "ON" position and the INT switch is in "ON" position).



| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

5. OPERATION MODE OF RAIN SENSING WIPER SYSTEM

| Driver Switch Positions | | Operation Mode |
|--|---|---|
| MIST (transmits the manual operation mode signal to sensor) | | As long as the switch is in MIST position, the wiper motor operates in low speed. The wiper blade returns to parking position if the switch returns to the original position. The rain sensor ignores inputs during parking signal periods. |
| OFF (transmits the manual operation mode signal to sensor) | | The wiper motor rotates in low speed until it returns to parking position. When the system is in manual mode, the sensitivity of sensor will be set to 2 (AUTO 2) internally. By doing so, immediate wiping with proper intervals is possible when a driver sets the system from OFF to AUTO. |
| AUTO 1 (low sensitivity) | <div>SLOW</div> <div>▲</div> <div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>■</div> <div>▼</div> <div>FAST</div> | Auto delay/auto speed control. Low sensitivity against rains on windshield. When the switch is in AUTO position, the sensor transmits the wiping request signal to STICS. |
| AUTO 2 (low/med sensitivity) | | Auto delay/auto speed control. Low/medium sensitivity against rains on windshield. |
| AUTO 3 (medium sensitivity) | | Auto delay/auto speed control. Medium sensitivity against rains on windshield. |
| AUTO 4 (med/hi sensitivity) | | Auto delay/auto speed control. Medium/high sensitivity against rains on windshield. |
| AUTO 5 (high sensitivity) | | Auto delay/auto speed control. High sensitivity against rains on windshield. |
| LOW SPEED (transmits the manual operation mode signal to sensor) | | The wiper motor rotates continuously in low speed of approx. 45 rev./minute (in the normal battery voltage). The rain sensor operations are same as in MIST . |
| HI SPEED (transmits the manual operation mode signal to sensor) | | The wiper motor rotates continuously in high speed of approx. 70 rev./minute at (in the normal battery voltage). The rain sensor operations are same as in MIST . |

1. Rain detected headlamp: If it rains heavy which requires the highest INT speed, the headlamps are turned on automatically.
2. Night detected wiping: When the auto light control turns on the headlamps and the rain sensor detects the rain, the wiper sensitivity is automatically increased by one level. (i.e. the AUTO wiper switch is at the 3rd level, but the wiper operates at the 4th level.)

REMOVAL AND INSTALLATION

8610-09 FUNCTIONS AND CHECKS OF RAIN SENSOR

1) Front Windshield Glass and Coupler Attachment

Check the outer windshield surface of sensing area for wear, damage and scratch. The sensor is able to compensate the wear up to a specific level. Check the coupler attached surface of windshield for porosity. If the porosity exists, the sensor cannot function properly.

CAUTION

- If the installed wiper brushes are out of specification (size and length), the rain sensing area cannot be fully wiped.
- In this case, the rain sensor's sensitivity could be decreased and the wipers are not properly operated.

2) Recognition of AUTO Mode

1. When the engine is started with the multifunction wiper switch in "AUTO" position, the wiper operates one cycle to remind a driver that the wiper switch is in "AUTO" position.
2. When the wiper switch is turned to "AUTO" from "OFF", the wiper operates one cycle. It always operates one cycle for the initial operation, however, the wiper does not operate afterwards to prevent the wiper blade wear if not raining when turning the wiper switch to "AUTO" from "OFF". However, the wiper operates up to 5 minutes after rain stops.
3. If this function does not occur, check No. 2 terminal on the rain sensor. If any defective cannot be found, check the wiper relay (LOW) for defective.

CAUTION

- As described, the STICS recognizes if the wiper switch is in "AUTO" position. If there is no problem, go to diagnosis mode in STICS and check the terminal that receives signal from wiper and communication lines between rain sensor unit and STICS.

3) Instant Wipe Function

When the variable resistance knob on the multifunction wiper switch is turned by each 1 stage from low sensitivity (S mark) to high sensitivity (F mark), the wiper operates one cycle.

CAUTION

- When the variable resistance knob is rotated by 4 stage from 0 stage without stoping, the wiper operates one cycle. The wiper operates one cycle when changing the wiping stage (0 → 1, 1 → 2, 2 → 3).

| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

4) Washer Coupled Wiper Function

Check the washer coupled wiper operation by pressing the washer switch.

5) Irregular Operations (Abrupt Operations)

1. Check the sensor for coming off.
2. Check the rain sensor cover's installation status.
3. Check that the customer is familiar to how to control the wiper sensitivity.
Check that the customer can select the sensitivity by selecting the variable resistance value (stage 1 to stage 5), that is, the wiper sensitivity control value. And, also check whether the sensitivity is selected to the highest value of FAST (stage 5).
4. Check the wiper blade for wear.
If the wiper blade cannot wipe the glass uniformly and clearly, the irregular operations could be occurred. And, the wiper blade should be replaced with new one with same specifications.

6) Self Diagnosis

(1) Poor Sensing

Position the wiper switch to "AUTO" position and rotate the variable resistance knob from "FAST" toward "SLOW" by one step. At this moment, check if the wiper operates one cycle.

The wiper operates when the windshield glass is excessively worn or scratched, the windshield glass is not cleared wiped due to using worn wiper blade or different wiper blade, or the rain sensor is not improperly installed.

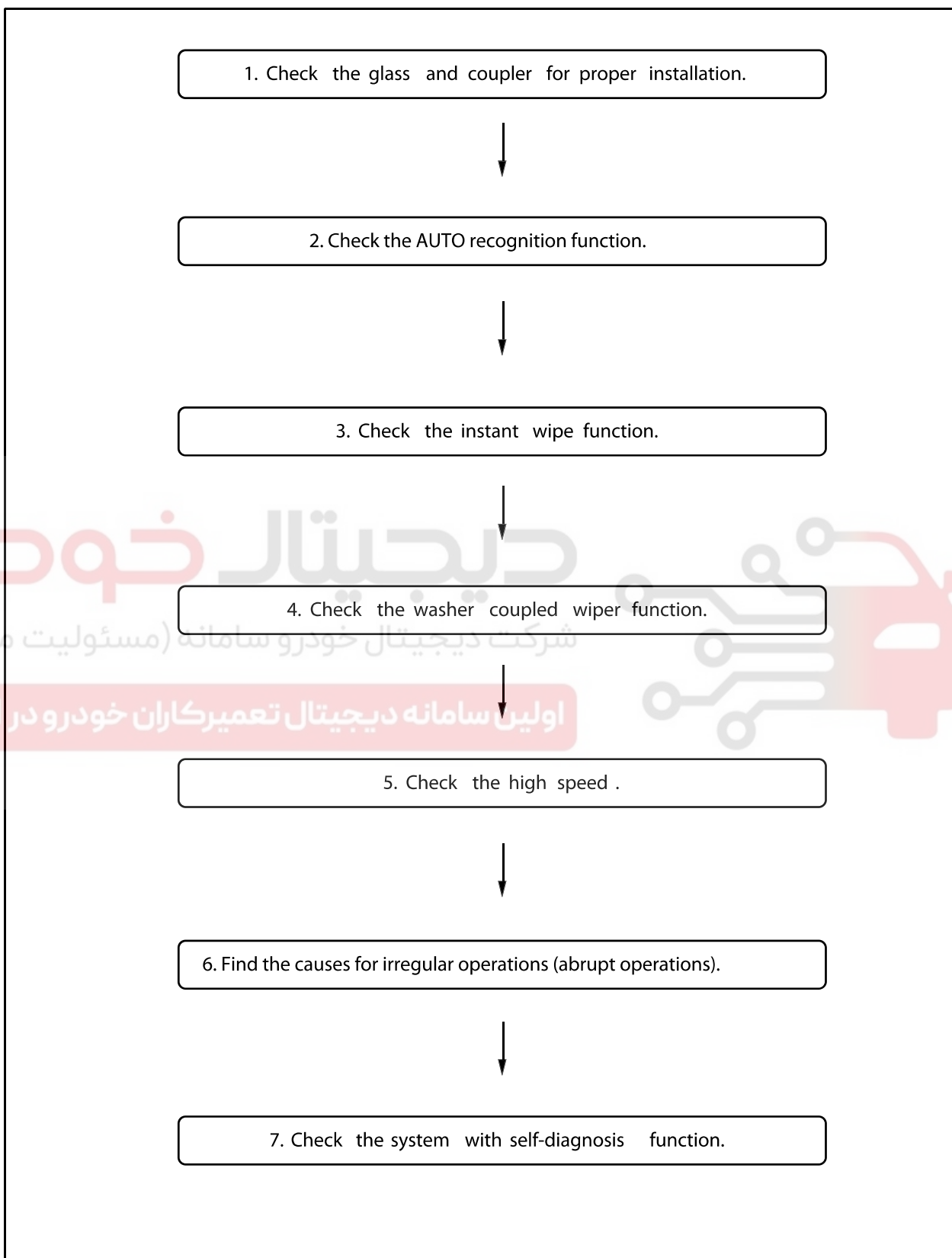
(2) Poor Sensor

Rotate the variable resistance knob toward "SLOW" by 1 more step. At this moment, check if the wiper operates one cycle.

If the wiper operates, this is caused when the sensor is defective or the sensor has the communication problem with STICS.

S.G.N.

8610-09 DIAGNOSIS PROCEDURES



| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

RAIN SENSOR

ACTYON 2012.12

1) Trouble Shooting

Symptom 1. The wiper does not operate one cycle when turning the multifunction wiper switch to the "AUTO" from the "OFF" position or starting the engine while the wiper switch is in the "AUTO" position.

1. When starting the engine with the multifunction wiper switch in the "AUTO" position, the wiper operates one cycle to remind a driver that the wiper switch is in the "AUTO" position.
2. When the wiper switch is turned to "AUTO" from "OFF", the wiper operates one cycle. It always operates one cycle for the initial operation, however, the wiper does not operate afterwards to prevent the wiper blade wear if not raining when turning the wiper switch to "AUTO" from "OFF". However, the wiper operates up to 5 minutes after rain stops. If this function does not occur, check No. 8 pin. If the pin is normal, check the wiper relay related terminals.

Symptom 2. It rains but the system does not work in "AUTO" position.

1. Check whether the multifunction wiper switch is in the "AUTO" position.
2. Check the power to the sensor. Check the conditions of the pin 3 (Ground) and the pin 4 (IGN).
Check the wiper relay for defective.
- 3.

Symptom 3. The wiper operates 3 or 4 times at high speed abruptly.

Check whether the variable resistance knob on the multifunction wiper switch is set in "FAST". The "FAST" is the highest stage of the sensitivity and very sensitive to small amount of rain drops. Therefore, change the knob to the low sensitivity.

Symptom 4. The wiper operates continuously even on the dry glass.

1. Check the wiper blade for wear. If the wiper blade cannot wipe the glass uniformly and clearly, this problem could be occurred. In this case, replace the wiper blade with a new one.
Check whether the variable resistance knob on the multifunction wiper switch is set in "FAST". The "FAST" is the highest stage of the sensitivity and very sensitive to small amount of rain drops. Therefore, change the knob to the low sensitivity.
- 2.

Symptom 5. The wiper does not operate at high speed even in heavy rain.

Check if the wiper operates at high speed when grounding pin 1 and pin 2.

Symptom 6. The wiper responses are too fast or too slow.

Check whether the variable resistance knob on the wiper switch is set in "FAST" or "SLOW".

Notify that the customer can select the sensitivity by selecting the variable resistance value. And, select a proper stage.

S.G.N.

8610-09 RAIN SENSOR**Preceding work**

1. Disconnected the negative battery cable

1. Pry off the rain sensor cover by inserting a small screwdriver into service holes at both sides.

**CAUTION**

- Otherwise, the cover or rain sensor components could be damaged.



2. Disconnect the connector from the rain sensor unit located at the front windshield glass and then lift up the rain sensor unit to separate from the glass.



| | |
|--------------------|--|
| Modification basis | |
| Application basis | |
| Affected VIN | |

RAIN SENSOR

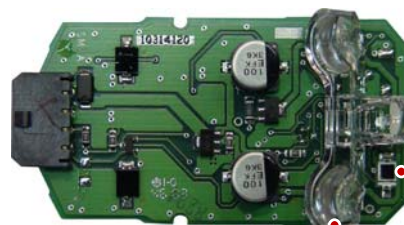
ACTYON 2012.12

Components of the Rain Sensor Unit



PCB Assembly and Emitter Lens

Auto light sensor



Emitter lens



Housing and Receiver Lens



Receiver lens