

Body Electrical System

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GENERAL

SPECIFICATIONS ETOC0050

MULTIFUNCTION SWITCH

Items	Specifications
Rated Voltage	DC 12V
Operating temperature range	-30°C - +80°C (-22 - +176°F)
Rated load Dimmer & passing switch Lighting switch Turn signal & lane change switch Wiper switch Wiper mist switch Washer switch Variable intermittent wiper volume switch Rear wiper & washer switch Horn switch	High : 1A (Relay load) Low : 1A (Relay load) Passing : 1A (Relay load) Lighting : 1A (Relay load) 6.6 ± 0.5A (Lamp load) Low, High : 4.5A (Motor load) Int. : 0.22 ± 0.05A (Relay load) Lock : Max. 28A (Motor load) 4.5A (Motor load) 4A (Motor load) Max. 25mA Rear wiper : 0.2A (Relay load) Rear washer : 4A (Motor load) 1A (Relay load)

INSTRUMENTS AND WARNING SYSTEM

Warning lamps	Bulb wattage (W)	Color
High beam	LED	Blue
Low fuel	LED	Amber
Turn signal (LH, RH)	LED	Green
Battery (charge)	LED	Red
Oil pressure	LED	Red
Air bag	Bulb (1.4W)	Red
Parking brake	LED	Red
Seat belt	LED	Red
Check engine	Bulb (1.4W)	Amber
ABS	LED	Amber
Door ajar	LED	Red
Trunk lid open	LED	Red
Cruise	LED	Green
TCS	LED	Amber
TCS OFF	LED	Amber

SERVICE SPECIFICATIONS ETOC0100

INDICATORS AND GAUGES

Items	Specifications																																																																																				
<p>Speedometer</p> <p>Type</p> <p>Input spec.</p> <p>Indication</p> <p>Standard values</p>	<ul style="list-style-type: none"> o Cross-coil type o Hall IC type : 4 pulses/rev. o Km/h : 637rpm x 4 pulses/rev. indicates 60Km/h o MPH : 1026 rpm x 4 pulses/rev. indicates 60MPH <table border="1" data-bbox="432 517 1497 770"> <tr> <td>Velocity (Km/h)</td> <td>20</td> <td>40</td> <td>60</td> <td>80</td> <td>100</td> <td>120</td> <td>140</td> </tr> <tr> <td>Tolerance (Km/h)</td> <td>20-24.4</td> <td>40-43</td> <td>60-64.4</td> <td>80-85.5</td> <td>100-105.5</td> <td>120.5-126</td> <td>140.5-146</td> </tr> <tr> <td>Tolerance (Km/h)</td> <td>20-24.4</td> <td>40-44.4</td> <td>60-65.4</td> <td>81-86.5</td> <td>102-107.5</td> <td>123-128.5</td> <td>144-149.5</td> </tr> <tr> <td>Velocity (Km/h)</td> <td>160</td> <td>180</td> <td>200</td> <td>220</td> <td>240</td> <td colspan="2">Area</td> </tr> <tr> <td>Tolerance (Km/h)</td> <td>160.5-166</td> <td>181-186.5</td> <td>201-206.5</td> <td>221-226.7</td> <td>241-246.7</td> <td colspan="2">Others</td> </tr> <tr> <td>Tolerance (Km/h)</td> <td>165-170.5</td> <td>186-191.5</td> <td>207-212.5</td> <td>227.7-233.5</td> <td>248.5-254.3</td> <td colspan="2">EEC & General</td> </tr> </table> <table border="1" data-bbox="432 797 1497 1046"> <tr> <td>Velocity (MPH)</td> <td>10</td> <td>20</td> <td>40</td> <td>60</td> <td>80</td> </tr> <tr> <td>Tolerance (MPH)</td> <td>10-14.4</td> <td>20-23</td> <td>40-44.4</td> <td>60-65.5</td> <td>80-85.5</td> </tr> <tr> <td>Tolerance (MPH)</td> <td>8.5-11.5</td> <td>18.5-21.5</td> <td>38.5-41.5</td> <td>58.3-61.7</td> <td>78.3-81.7</td> </tr> <tr> <td>Velocity (MPH)</td> <td>100</td> <td>120</td> <td>140</td> <td>160</td> <td>Area</td> </tr> <tr> <td>Tolerance (MPH)</td> <td>100.5-106</td> <td>120.5-126</td> <td>140.5-147</td> <td>160.5-167</td> <td>Except U.S.A</td> </tr> <tr> <td>Tolerance (MPH)</td> <td>98.3-101.7</td> <td>118.3-121.7</td> <td>138.1-141.9</td> <td>158.1-161.9</td> <td>U.S.A</td> </tr> </table>	Velocity (Km/h)	20	40	60	80	100	120	140	Tolerance (Km/h)	20-24.4	40-43	60-64.4	80-85.5	100-105.5	120.5-126	140.5-146	Tolerance (Km/h)	20-24.4	40-44.4	60-65.4	81-86.5	102-107.5	123-128.5	144-149.5	Velocity (Km/h)	160	180	200	220	240	Area		Tolerance (Km/h)	160.5-166	181-186.5	201-206.5	221-226.7	241-246.7	Others		Tolerance (Km/h)	165-170.5	186-191.5	207-212.5	227.7-233.5	248.5-254.3	EEC & General		Velocity (MPH)	10	20	40	60	80	Tolerance (MPH)	10-14.4	20-23	40-44.4	60-65.5	80-85.5	Tolerance (MPH)	8.5-11.5	18.5-21.5	38.5-41.5	58.3-61.7	78.3-81.7	Velocity (MPH)	100	120	140	160	Area	Tolerance (MPH)	100.5-106	120.5-126	140.5-147	160.5-167	Except U.S.A	Tolerance (MPH)	98.3-101.7	118.3-121.7	138.1-141.9	158.1-161.9	U.S.A
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<p>Tachometer</p> <p>Type</p> <p>Standard values</p>	<ul style="list-style-type: none"> o Tap the speedometer to prevent hysteresis effects during inspection. o Cross-coil type (4cyl : 2pulses/rev, 6cyl : 3pulses/rev) <table border="1" data-bbox="432 1171 1497 1254"> <tr> <td>Revolution (RPM)</td> <td>1,000</td> <td>2,000</td> <td>3,000</td> <td>4,000</td> <td>5,000</td> <td>6,000</td> <td>7,000</td> <td>8,000</td> </tr> <tr> <td>Tolerance (RPM)</td> <td>±100</td> <td>±125</td> <td>±150</td> <td>±150</td> <td>±150</td> <td>±180</td> <td>±210</td> <td>±240</td> </tr> </table>	Revolution (RPM)	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	Tolerance (RPM)	±100	±125	±150	±150	±150	±180	±210	±240																																																																		
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<p>Fuel gauge</p> <p>Type</p> <p>Standard values</p>	<ul style="list-style-type: none"> o Tap the tachometer to prevent hysteresis effects during inspection. o Cross - coil type (Fixed point type : Pointer should not fall into the "E" point but indicate remaining fuel level when the ignition is off) <table border="1" data-bbox="432 1429 1497 1637"> <thead> <tr> <th rowspan="2">Level</th> <th colspan="2">Gauge</th> </tr> <tr> <th>Resistance (Ω)</th> <th>Gauge angle (°)</th> </tr> </thead> <tbody> <tr> <td>E (Empty)</td> <td>97</td> <td>-45 ± 2.5</td> </tr> <tr> <td>1/2</td> <td>32.5</td> <td>0 ± 5.0</td> </tr> <tr> <td>F (Full)</td> <td>6</td> <td>45 ± 2.5</td> </tr> </tbody> </table> <ul style="list-style-type: none"> o Inspection order : E → F → E The level must be reached within 7 minutes after the resistance is set for Full or Empty. o Point stability tolerance : Within ±6° Apply power for 10 minutes. Then turn off the power for an hour and read the position of the pointer. 	Level	Gauge		Resistance (Ω)	Gauge angle (°)	E (Empty)	97	-45 ± 2.5	1/2	32.5	0 ± 5.0	F (Full)	6	45 ± 2.5																																																																						
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Items	Specifications																
Temperature gauge Type Indication standard	<ul style="list-style-type: none"> o Cross - coil type <table border="1"> <thead> <tr> <th>Temperature</th> <th>Angle (°)</th> <th>Assembled tolerance (°)</th> </tr> </thead> <tbody> <tr> <td>60°C</td> <td>0</td> <td>-</td> </tr> <tr> <td>85°C ~ 110°C</td> <td>38</td> <td>+2 -3</td> </tr> <tr> <td>Red zone (over 125°C)</td> <td>90</td> <td>+7 -4</td> </tr> </tbody> </table>	Temperature	Angle (°)	Assembled tolerance (°)	60°C	0	-	85°C ~ 110°C	38	+2 -3	Red zone (over 125°C)	90	+7 -4				
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Resistance of temperature sender (NTC)	<ul style="list-style-type: none"> o Inspection order : OFF → C → H <table border="1"> <thead> <tr> <th>Temperature (°C)</th> <th>60</th> <th>85</th> <th>110</th> <th>125</th> </tr> </thead> <tbody> <tr> <td>Resistance (Ω)</td> <td>143.4±2</td> <td>58.1±2</td> <td>26.9±2</td> <td>17.5±2</td> </tr> </tbody> </table>	Temperature (°C)	60	85	110	125	Resistance (Ω)	143.4±2	58.1±2	26.9±2	17.5±2						
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Torque gauge Type Input spec. Standard values	<ul style="list-style-type: none"> o Stepper motor o ISO CAN 2.0A 500Kbps <table border="1"> <thead> <tr> <th>Indication (N.m)</th> <th>0</th> <th>50</th> <th>100</th> <th>150</th> <th>200</th> <th>~400</th> </tr> </thead> <tbody> <tr> <td>Tolerance (N.m)</td> <td>±5</td> <td>±5</td> <td>±5</td> <td>±5</td> <td>+20 -5</td> <td>±20</td> </tr> </tbody> </table>	Indication (N.m)	0	50	100	150	200	~400	Tolerance (N.m)	±5	±5	±5	±5	+20 -5	±20		
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Tolerance (N.m)	±5	±5	±5	±5	+20 -5	±20											
Instantaneous fuel consumption gauge Type Input spec. Standard values	<ul style="list-style-type: none"> o Stepper motor o Speed input (Hall IC) o Injection input from EMS. <table border="1"> <thead> <tr> <th>Indication (ℓ/100km)</th> <th>0</th> <th>5</th> <th>10</th> <th>15</th> <th>20</th> <th>~Max.</th> <th>At idle</th> </tr> </thead> <tbody> <tr> <td>Tolerance (ℓ/100km)</td> <td>±2</td> <td>±2</td> <td>±2</td> <td>±2</td> <td>+5 -2</td> <td>±10</td> <td>Indicate "0"</td> </tr> </tbody> </table>	Indication (ℓ/100km)	0	5	10	15	20	~Max.	At idle	Tolerance (ℓ/100km)	±2	±2	±2	±2	+5 -2	±10	Indicate "0"
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Voltage gauge Type Input spec. Standard values	<ul style="list-style-type: none"> o Stepper motor o Battery input voltage <table border="1"> <thead> <tr> <th>Indication (V)</th> <th>Below 8.5V</th> <th>10</th> <th>12</th> <th>14</th> <th>16</th> <th>Above 16V</th> </tr> </thead> <tbody> <tr> <td>Tolerance (V)</td> <td>Indicate "Min."</td> <td>±0.5</td> <td>±0.5</td> <td>±0.5</td> <td>±0.5</td> <td>Indicate "Max."</td> </tr> </tbody> </table>	Indication (V)	Below 8.5V	10	12	14	16	Above 16V	Tolerance (V)	Indicate "Min."	±0.5	±0.5	±0.5	±0.5	Indicate "Max."		
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Tolerance (V)	Indicate "Min."	±0.5	±0.5	±0.5	±0.5	Indicate "Max."											

ETOC010B

LIGHTING SYSTEM

Items	Bulb wattage(W)
Head lamp	55W / 55W (High / Low beam)
Front turn signal lamp	21W
Front position lamp	5W
Front fog lamp	51W
Rear combination lamps	
Tail/stop lamp	5W / 21W
Back up lamp	21W
Turn signal lamp	21W
Luggage lamp	5W

Items	Bulb wattage(W)
Center high mounted stop lamp	Internal type : 2.4W (LED) External spoiler type : 3.5W (LED)
Overhead console lamp	10W x 2
License plate lamp	5W x 2

AUDIO

Items	H250	H260
Rated output	Max. 20W x 4	Max. 20W x 4
Load impedance	4Ω x 4	4Ω x 4
Band	AM/FM, LW/MW/FM	AM/FM, LW/MW/FM
Tuning type	PLL Synthesized type	PLL Synthesized type
Dark current	Max. 2mA	Max. 3.8mA
Frequency range / Channel	AM : 531~1602KHZ/9KHZ	AM : 531~1602KHZ/9KHZ
	FM : 87.5~108MHZ/100KHZ	FM : 87.5~108MHZ/100KHZ
	LW : 153~279KHZ/1KHZ	LW : 153~279KHZ/1KHZ
	MW : 531~1602KHZ/9KHZ	MW : 531~1602KHZ/9KHZ
	FM : 87.5~108MHZ/50KHZ	FM : 87.5~108MHZ/50KHZ

WINDSHIELD WIPER AND WASHER

Items	Specifications
Wiper motor Rated voltage Operating voltage range Insulation resistance Speed/current at 1Nm load test Speed/current at 4Nm load test Torque/current when parking	DC 12V DC 10-15V Min.1MΩ Low : 44-52rpm/3.5A or less High : 64-78rpm/4.5A or less Low : 39-47rpm/5.5A or less High : 56-68rpm/7.0A or less Low : 28Nm/24A or less High : 23Nm/28A or less
Windshield washer Motor type Pump type Rated voltage Discharge pressure Flow rate Current Overload capacity (Continuous operation) With water Without water (Racing)	DC ferrite magnet Centrifugal 12V 1.8kg/cm ² or more 1,450cc/min. or more 5.0A or less 60sec. or less 20sec. or less
Rear wiper motor Speed/current at no load test Speed/current at 1Nm load test Torque/current when parking Wiping angle at no load	35rpm/2.2A or less 30-40rpm/3.5A or less 8Nm/14A or less 170° ± 3°

TROUBLESHOOTING ETOC0150

INSTRUMENTS AND WARNING SYSTEM

Symptom	Possible cause	Remedy
Tachometer does not operate	No.17 fuse (10A) blown Tachometer faulty Wiring faulty	Check for short and replace fuse Check tachometer Repair if necessary
Fuel gauge does not operate	No.17 fuse (10A) blown Fuel gauge faulty Fuel sender faulty Wiring faulty	Check for short and replace fuse Check gauge Check fuel sender Repair if necessary
Low fuel warning lamp does not light	No.17 fuse (10A) blown Bulb burned out Fuel level sensor faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check sensor Repair if necessary
Water temperature gauge does not operate	No.17 fuse (10A) blown Water temperature gauge faulty Water temperature sender faulty Wiring or ground faulty	Check for short and replace fuse Check gauge Check sender Repair if necessary
Oil pressure warning lamp does not light	No.17 fuse (10A) blown Bulb burned out Oil pressure sender faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check sender Repair if necessary
Low brake fluid warning lamp does not light	No.17 fuse (10A) blown Bulb burned out Brake fluid level warning switch faulty Parking brake switch faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check switch Check switch Repair if necessary
Open door warning lamp does not light	No.18 fuse (10A) blown Bulb burned out Door switch faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check switch Repair if necessary
Seat belt warning lamp does not light	No.17 fuse (10A) blown Bulb burned out Buckle switch faulty Wiring or ground faulty	Check for short and replace fuse Replace bulb Check switch Repair if necessary

LIGHTING SYSTEM

Symptom	Possible cause	Remedy
One lamp does not light (all exterior)	Bulb burned out Socket, wiring or ground faulty	Replace bulb Repair if necessary
Head lamps do not light	Bulb burned out Head lamp fuse (15A) blown No.21 fuse (10A) blown Head lamp relay faulty Lighting switch faulty Wiring or ground faulty	Replace bulb Replace fuse and check for short Check for short and replace fuse Check relay Check switch Repair if necessary
Tail lamps and license plate lamps do not light	No.9, No.14 fuse (10A) blown Battery fusible link (50A) blown Tail lamp relay faulty Lighting switch faulty Wiring or ground faulty	Replace fuse and check for short Replace the fusible link Check relay Check switch Repair if necessary
Stop lamps do not light	No.13 fuse (15A) blown Stop lamp switch faulty Wiring or ground faulty	Replace fuse and check for short Adjust or replace switch Repair if necessary
Stop lamps stay on	Stop lamp switch faulty	Adjust or replace switch
Instrument lamps do not light (Tail lamps light)	Rheostat faulty Wiring or ground faulty	Check rheostat Repair if necessary
Turn signal lamp does not flash on one side	Bulb burned out Turn signal switch faulty Wiring or ground faulty	Replace bulb Check switch Repair if necessary
Turn signal lamps do not operate	No.7 fuse (10A) blown Body control module faulty Hazard relay faulty Turn signal switch faulty Wiring or ground faulty	Replace fuse and check for short Check body control module Replace relay Check switch Repair if necessary
Hazard warning lamps do not operate	No.7 fuse (10A) blown Body control module faulty Hazard switch faulty Hazard relay faulty Wiring or ground faulty	Replace fuse and check for short Check body control module Check switch Replace relay Repair if necessary
Flasher rate too slow or too fast	Lamps' wattages are smaller or larger than specified Defective body control module	Replace lamps Check body control module
Back up lamps do not light up	No.3 fuse (10A) blown Back up lamp switch faulty Wiring or ground faulty	Replace fuse and check for short Check switch Repair if necessary
Overhead console lamp does not light up	No.18 fuse (10A) blown Wiring or ground faulty	Replace fuse and check for short Repair if necessary

AUDIO

There are six areas where a problem can occur: wiring harness, the radio, the cassette tape deck, the CD player, the speaker, and antenna. Troubleshooting enables you to confine the problem to a particular area.

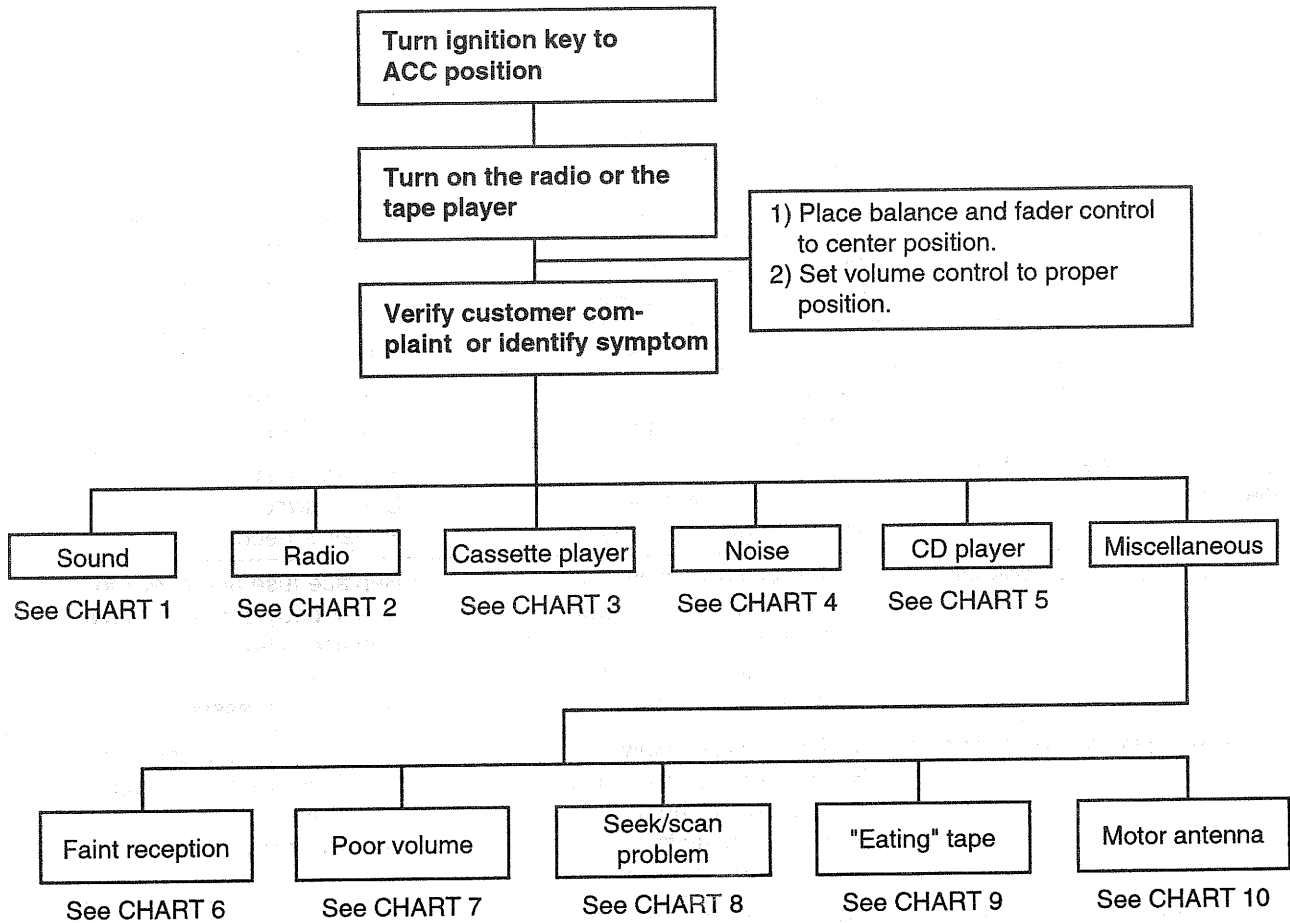
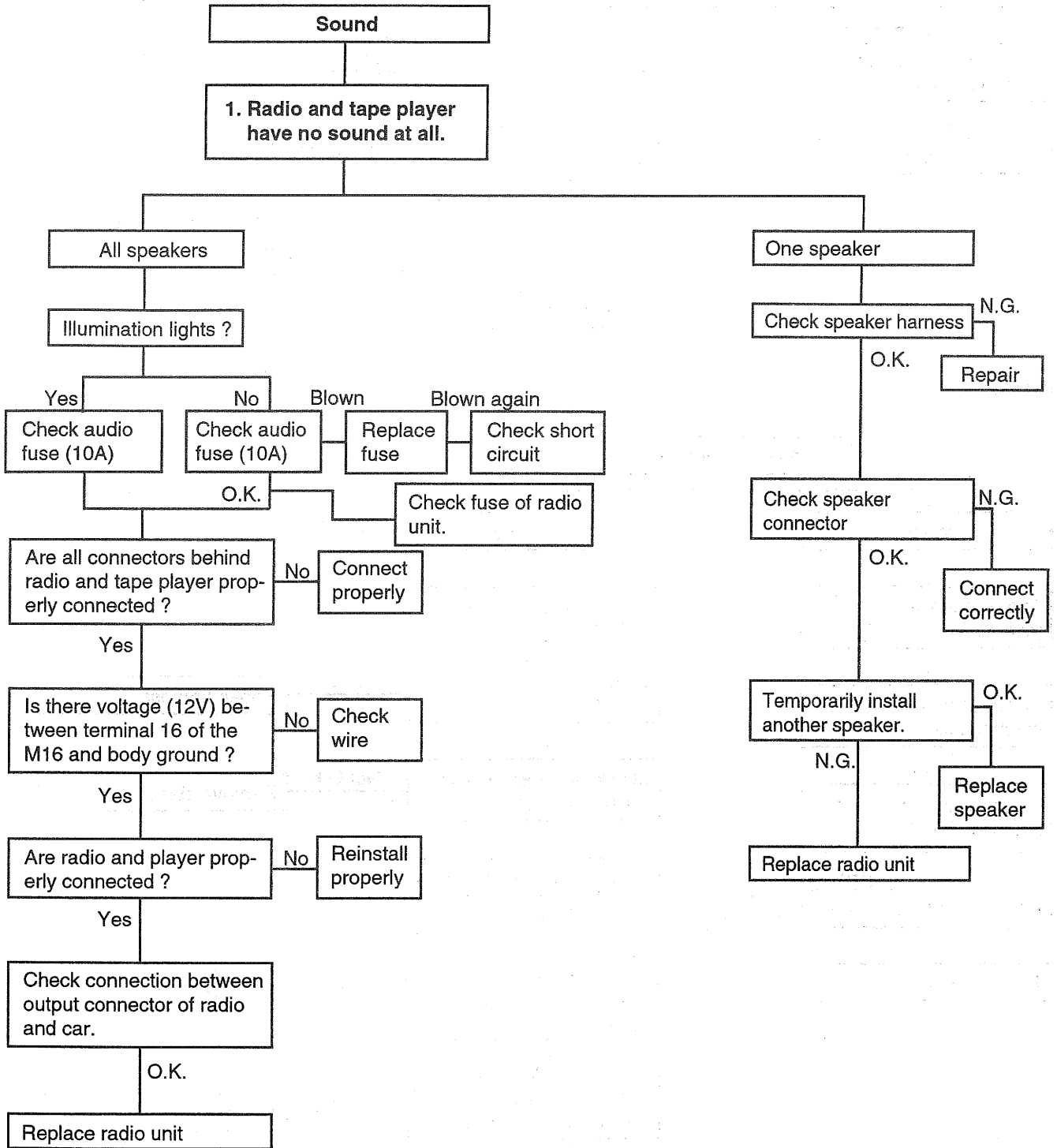
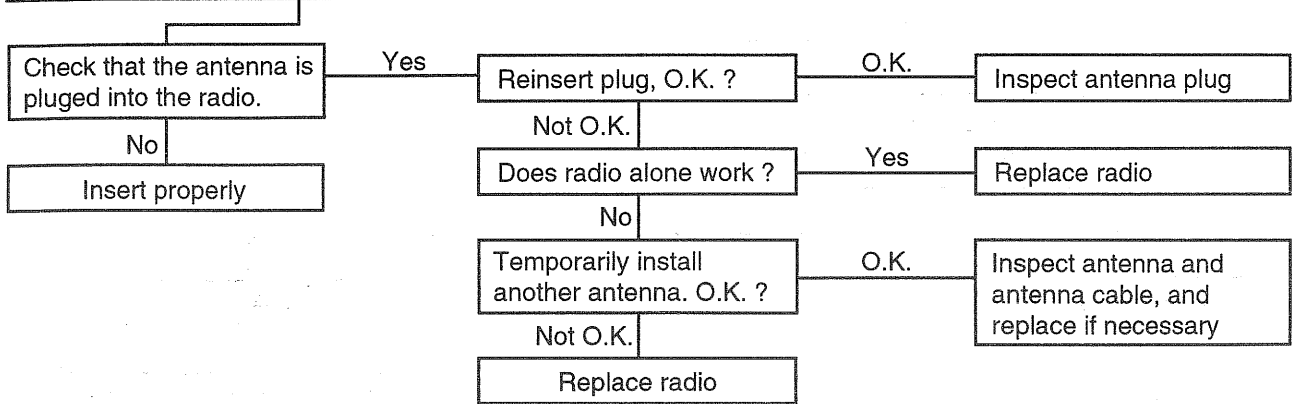


CHART 1

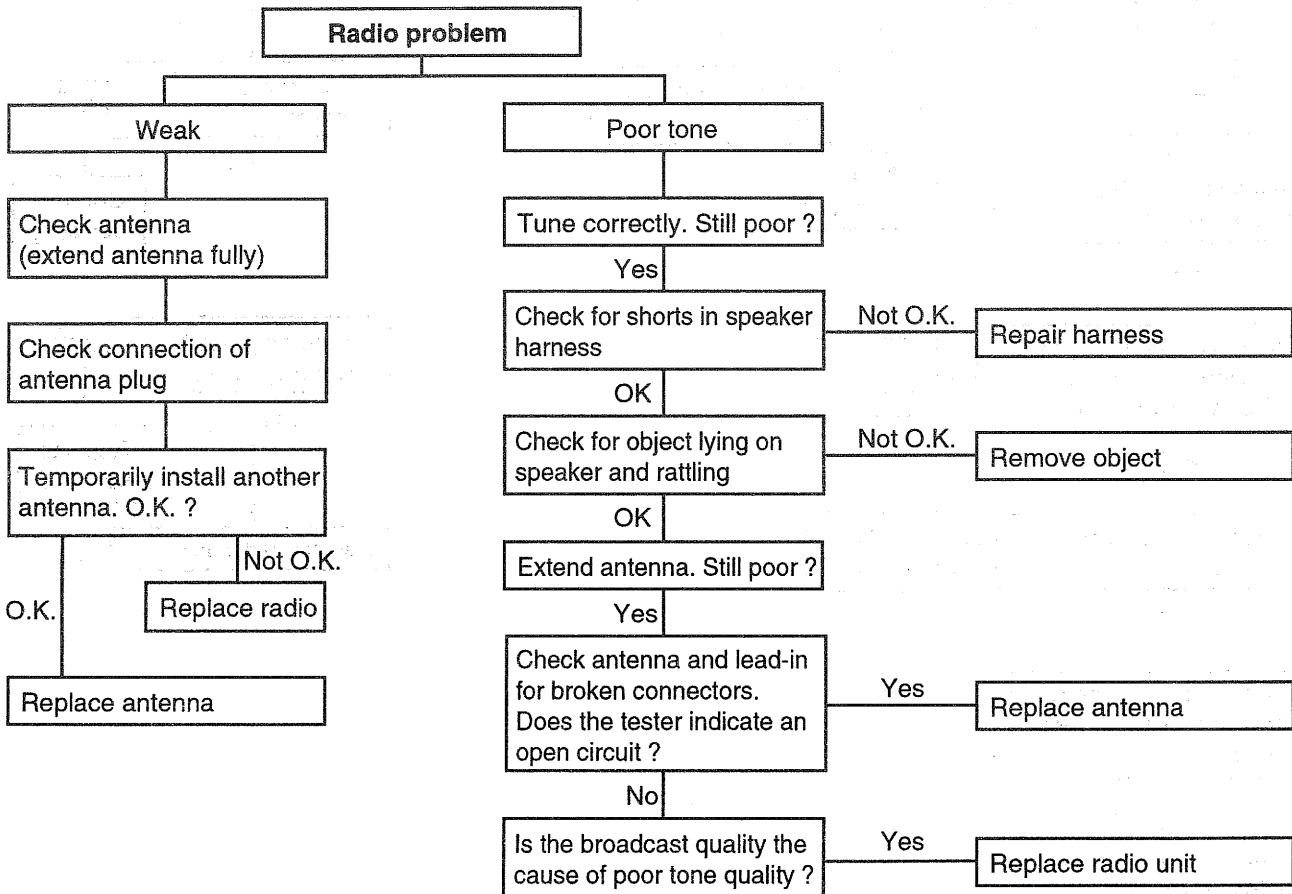


2. Tape player OK but no sound from radio



ETA9010C

CHART 2



ETA9010D