ETACS

CONTENTS

ETACS

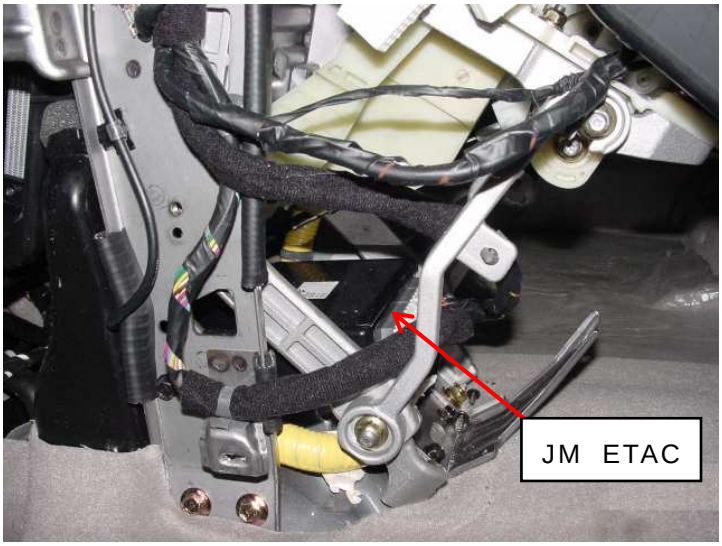
1. General

ETACS was applied for body electrical system control with existent vehicles even if gouge JM Function that control is controlled to approach with a different car

Also, develop into Anti theft function to do control according to specification in ETACS.

1.1 Electric performance

Item	Requirement	Remarks
Rated voltage	DC 12V	
Rang of operating voltage	DC 9 ~ 16V	.
Rang of operating temp.	-30□ ~ +80□	
Conservation range of temperature	-40□ ~ +85□	
Use maximum humidity	95%	
Parasite electric current (Dark electric current)	Less than 4mA (ETACS & Anti theft controller) Less than 3mA(ETACS controller)	IGN1: OFF & IGN2:OFF & All electrical load OFF & 30seconds passes after Tx signal reception & 4seconds passes after door key unlock S/W from OFF to ON & 2seconds passes under the no change of input switch



1.2 Rated load

Item	Load
Room lamp	Dc 12v 12w(lamp load)
IGN. key illumination lamp	Dc 12v 2w(lamp load)
Seat belt indicator	Dc 12v(led load)
Tail lamp relay / DRL	Dc 12v 200ma(induced load)
Rear fog relay	Dc 12v 200ma(induced load)
Door lock relay	Dc 12v 200ma(induced load)
Door unlock relay	Dc 12v 200ma(induced load)
Door unlock relay	DC 12V 200ma(Induced load)
Hazard relay	Dc 12v 200ma(induced load)
Start inhibit relay	Dc 12v 200ma(induced load)
Burglar horn	Dc 12v 200ma(induced load)
Power window relay	Dc 12v 200ma(induced load)
Wiper relay	Dc 12v 200ma(induced load)
Rear defogger relay	Dc 12v 200ma(induced load)
Front deicer relay	Dc 12v 200ma(induced load)
Chime bell	Dc 12v 350ma(induced load)

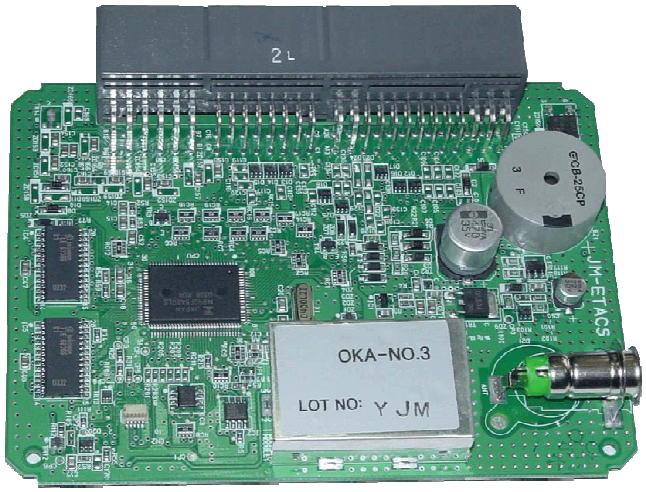
1.3 Input signal characteristic

No	Input signal	Condition	Recognition ON/OFF voltage level	Remarks
1	BAT	ON=BAT	9~16volts	BAT=Battery
2	IGN1	ON = BAT with IGN. KEY ON	ON: Higher than7volts Off: Lower than 4volts	
3	IGN2	ON = BAT with IGN. KEY ON)	ON: Higher than7volts Off: Lower than 4volts	
4	ALT “L”	ON = Charging volt with ENG ON	ENG ON: Higher than7volts ENG Off: Lower than 4volts	
5	Ignition Key Switch	Insert = BAT (KEY insert)	Insert: Higher than7volts Removed: Lower than 4volts	
6	Driver DR S/W	Open = GND	Lower than 1 volt/Open	ON: DR Open
7	Assist DR S/W	Open = GND	Lower than 1 volt/Open	ON: DR Open
8	4 Door S/W	Door Open = GND All DR Closed = Open	Lower than 1 volt/Open	ON:DR Open
9	Driver DR Lock S/W	Lock = Open, Unlock = GND	Lower than 1 volt/Open	ON: Unlock
10	As DR Lock S/W	Lock = Open, Unlock = GND	Lower than 1 volt/Open	ON: Unlock
11	RR RH DR Lock S/W	RR LH, RR RH, T/Gate Unlock = GND RR LH, RR RH, T/Gate Unlock = Open	Lower than 1 volt/Open	ON: Unlock
12	Tail gate S/W	Open = GND	Lower than 1 volt/Open	
13	Tail gate Key Unlock S/W	ON = GND	Lower than 1 volt/Open	ON: Unlock
14	Hood S/W	Open = GND	Lower than 1 volt/Open	
15	Drive Door Key Lock S/W	ON = GND	Lower than 1 volt/Open	ON: Lock
16	Driver Door	ON = GND	Lower than 1 volt/Open	ON: Unlock
17	Assist DR Key Lock S/W	ON = GND	Lower than 1 volt/Open	ON: Lock
18	Assist DR KEY Unlock S/W	ON = GND	Lower than 1 volt/Open	ON: Unlock
19	Washer S/W	ON = BAT	ON: Higher than7volts Off: Lower than 4volts	
20	INT. S/W	ON = BAT	ON: Higher than7volts Off: Lower than 4volts	
21	INT. Volume S/W	0V ~ 2.5volts	-	0Ω~ 50KΩ
22	Front Deicer S/W	ON = GND	Lower than 1 volt/Open	
23	RR. Defogger S/W	ON = GND	Lower than 1 volt/Open	
24	Tail Lamp S/W	ON = GND	Lower than 1 volt/Open	

No	Input signal	Condition	Recognition ON/OFF voltage level	Remarks
25	Front Fog L/P S/W	ON = GND	Lower than 1 volt/Open	
26	RR. Fog lamp S/W	ON = GND	Lower than 1 volt/Open	
27	Head Lamp S/W	ON = GND	Lower than 1 volt/Open	
29	Air bag signal	ON = GND (Deployed)	Lower than 1 volt/Open	
30	Speed Sensor	VSS Pulse (PULSE:0□5V)	Low: Lower than 1 volt Hi: Higher than 4volts	

1.4 ETACS function items

1) Wiper control
   - Washer & Wiper
   - Speed sensing intermittent wiper control
   - Variable intermittent wiper control
2) Seat belt warning timer control
3) Key operated warning control
4) Front windows deicer control
5) Rear windows defogger control
6) Room lamp delay control
7) Rear fogger lamp control
8) Tail lamp auto cut control
9) Ignition keyhole illumination control
10) Door lock/unlock control
    - Central door lock control
    - Auto door lock control
    - Ignition key reminder
    - Crash door unlock
11) Power window timer control



JM ETACS

1.5 Anti theft function

- Arm function
- Disarm function
- Alarm function
- Panic function

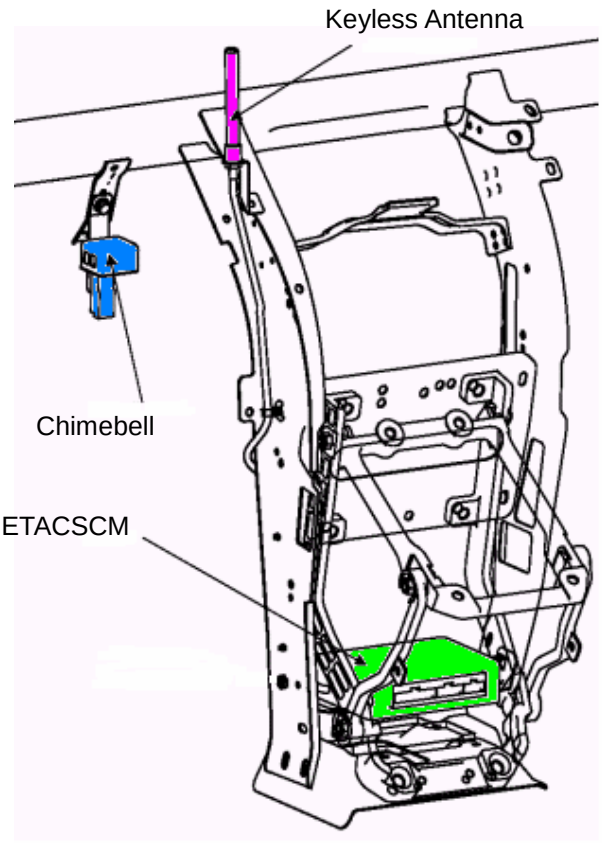
1.6 Input / Output signal

Battery (Back-up Voltage)
Ignition 1 & 2(Power Voltage)
Alternator " L " Terminal
Washer Switch
Wiper INT. Switch
Wiper INT. Volume Resistor
Rear WDW. Defogger Switch
Front deicer switch
Seat Belt Switch
Door Warning Switch
Driver's & Assist DR lock switch
All Door S/W (each door S/W)
Assist DR switch
Driver's door switch
Vehicle Speed Sensor
Air bag crash signal
Tail Lamp Switch
Fog Lamp Switch
Etc

E T A C S C M

Wiper Motor Relay
Defogger Relay
Seat Belt Warning Indicator
Chime Bell
Power Window Relay
Central Door Lock Relay
IGN. Key Hole Illumination
Tail Lamp Relay
Room Lamp
Fog Lamp Relay

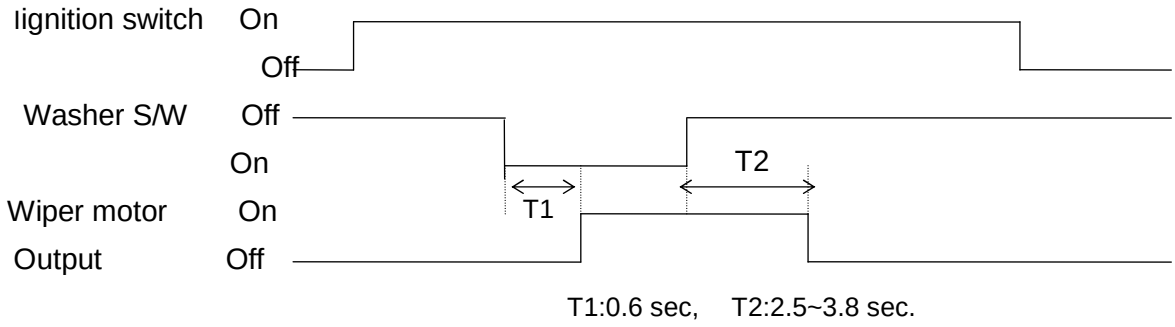
* The antenna location can be changed for better quality without notice.



2. ETACS function

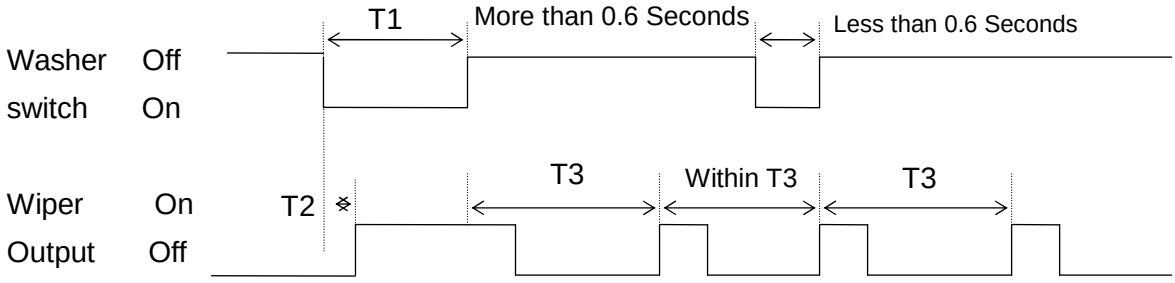
2.1 Washer & intermittent wiper control Description & operating chart

1) When the ignition switch is "on", and if turn the washer switch on, wiper output become "on" after 0.3sec. and turn the washer switch off, wiper output become "off" after 2.5□3.8sec.



T1:0.6 sec, T2:2.5~3.8 sec.

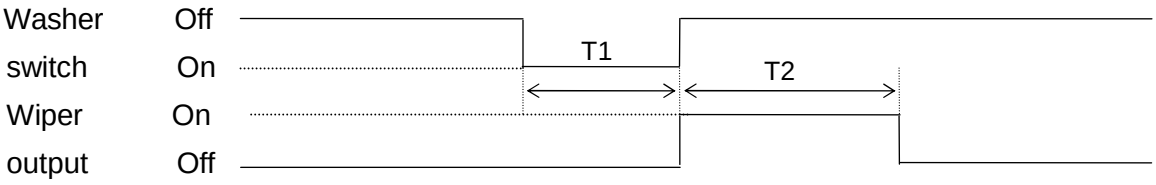
2) The output of wiper related to washer become "on" when the washer switch is turned on for min 0.6sec in operating of INT. wiper and behave as like wiper mist function when the washer switch is turned on for 0.2□0.6sec.



T1:06 Seconds, T2: 0.3Sec. T3:INT. Time

3) Wiper mist

The output of wiper motor become "on" during mist switch ‘on”.



T1: 0.2~0.6 sec, T2: 0.6~0.7 sec

4) Speed sensing wiper control

Speed sensing intermittent wiper

Control the intermittent time of INT. wiper as vehicle speed is changed.

- "On" state of ignition switch.

- "INT" state of wiper switch.

- Set up vehicle speed, intermittent time and input volume value

□ change the wiper speed(with calculating intermittent time form vehicle speed)

1) Vehicle speed input calculates vehicle speed in the form of input pulse per a second.

$$1\ [\text{pulse/sec}] = \frac{60\ [\text{km/h}] \times 60\ [\text{sec}]}{637 \times 4\ \text{pulse}} \square 1.41\ [\text{km/h}]$$

2) Vehicle speed output

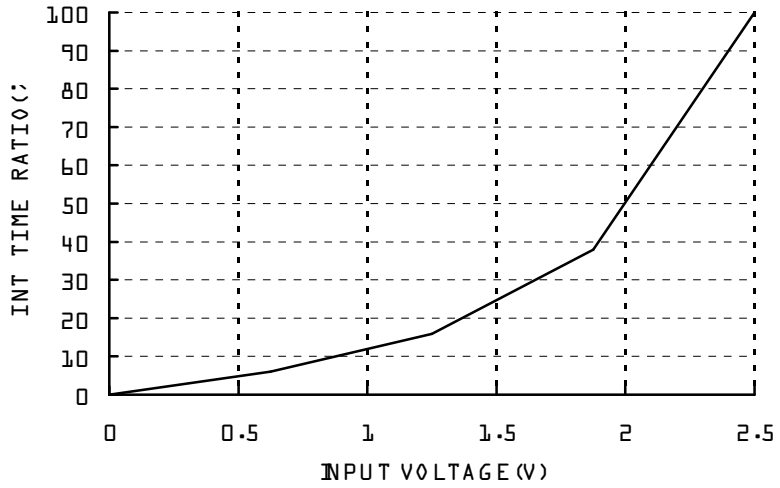
Vehicle speed was counted input pulse per second, and than choose max. value (compare new value with old value).

V = max (v new, v old) V new : new v/speed

V old: old v/speed

3) Intermittent time ratio (vehicle speed: 0km/h)

Calculate intermittent time ratio from set up intermittent time volume (input voltage) intermittent time ratio is corrected by input voltage linearly, according as expressed volume position from slow (100%) to fast (0%) of set up knob.

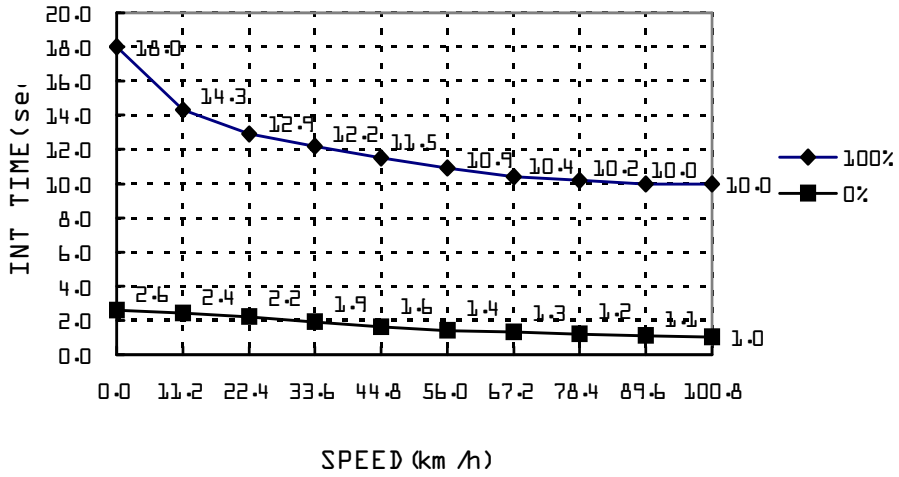


4) Base intermittent time output

Calculate intermittent time at intermittent time ratio 100% and 0% from vehicle speed of No.(2)(by correction of intermittent time linearly). And then calculate base intermittent time with quota allotment method from intermittent time ratio of No (3).

- do not be renewed base intermittent time if variation of intermittent time is max. 0.3sec.
- operate continuously if base intermittent time is max. 2sec.

- operate wiper if start(from 0km/h to 7km/h) vehicle when intermittent time timer (passage time)is more than 10sec.



Volume S/W Input voltage	Intermittent time (sec) ±10%						Remarks
	0Km/h	20Km/h	40Km/h	60Km/h	80Km/h	100Km/h	
0.0V	2.6S	2.2S	1.7S	1.3S	1.2S	1.0S	
1.0V	4.2S	3.3S	2.7S	2.2S	2.1S	1.9S	
1.5V	5.7S	4.8S	3.7S	3.2S	3.0S	2.8S	
2.0V	9.5S	7.1S	6.2S	5.5S	5.2S	5.0S	
2.5V	18.0S	13.0S	11.7S	10.6S	10.1S	9.9S	

2.2 Seat belt warning timer

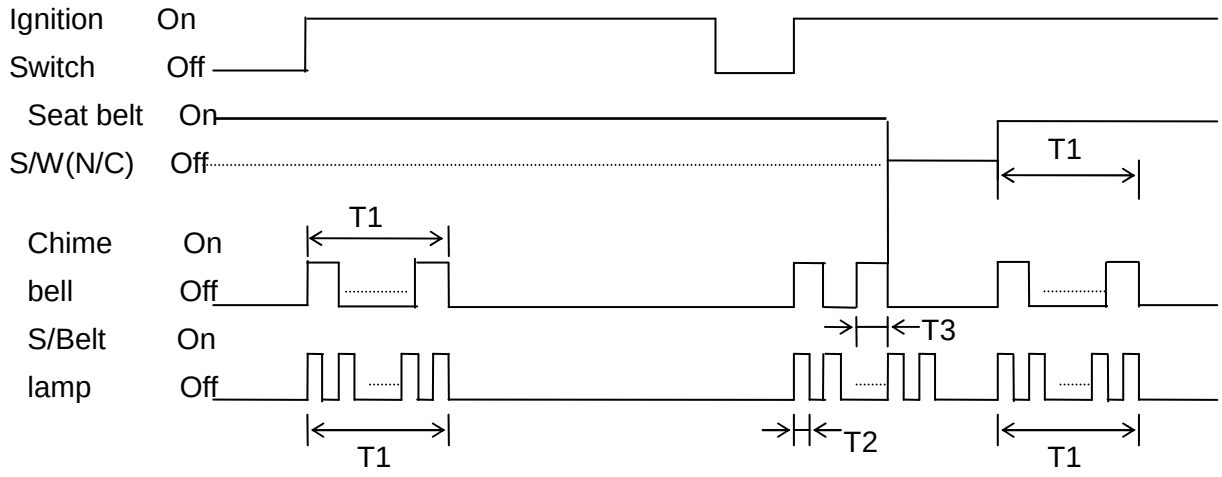
2.2.1 Description

1) The seat belt warning lamp signal (period: 0.6sec) and the seat belt warning lamp signal (period: 0.6sec) output for 6sec with duty (50%) from the ignition is "on".

2) The lamp and the chime bell output are turned off if the ignition is "off" within the time. As soon as the seat belt switch is "on" within the time, chime bell output is "off" immediately but seat belt warning lamp output for rest time.

3) The warning lamp and the chime bell output are always "on" if the seat belt is taken off after putting on the seat belt when the ignition is "on" state.

2.2.2 Operating time chart



T1 : 6 ±1 sec. T2 : 0.3 ±0.1 sec , t3 : 0.45 ±0.1 sec

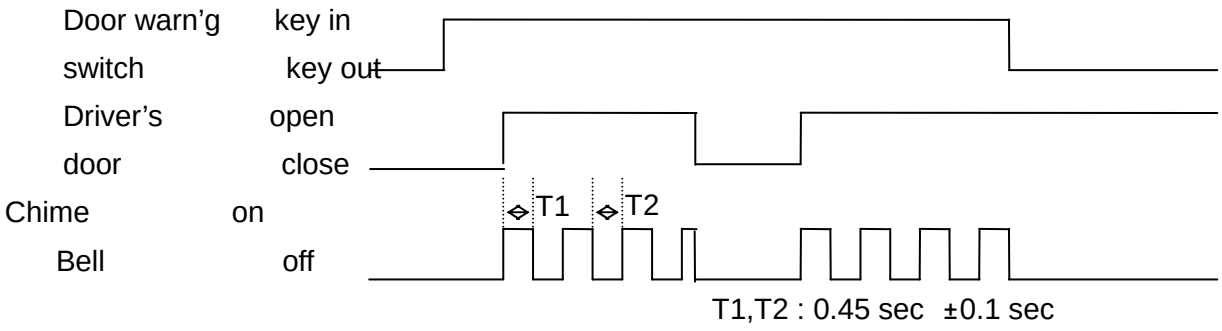
2.3 Key operated warning

2.3.1 Description

1) Chime bell output continuous signal (cycle 0.9sec, duty 50%), when open the door if insert key in the key cylinder.

2) Make sure that the output come to "off" when the door is closed or the key is removed from the key cylinder.

2.3.2 Operating time chart



2.4 Rear windrow Defogger timer & Front deicer (including outside mirror heated)

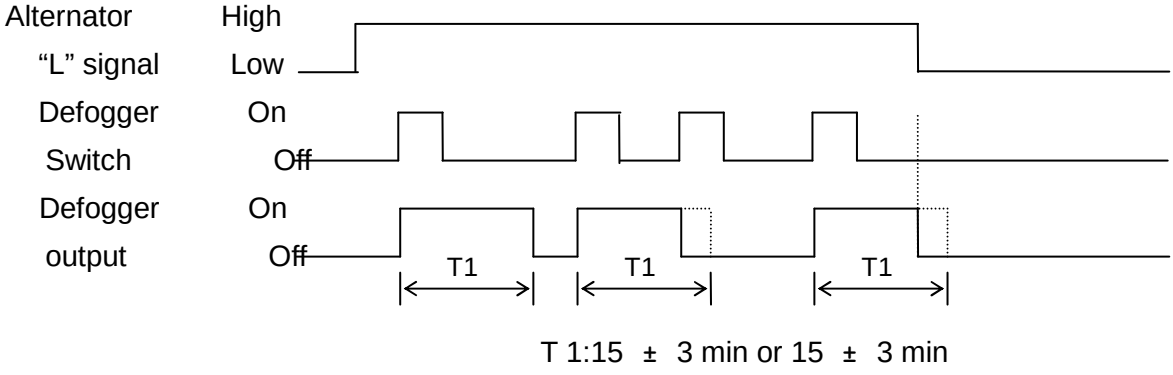
2.4.1 Description

1) The output of defogger is "on" for 15 or 20min when the defogger switch is "on" in case alternator "L" terminal signal is in the "charging voltages high" position.

2) Make sure that defogger's output is "off" if the defogger switch is "on" again when the output is still "on" state.

3) Make sure that defogger's output is "off" if the alt l's changed to "low" when the output is still "on" state.

2.4.2 Operating time chart



2.5 Delay out room lamp

2.5.1 description

1) Lamp is "on" when door is opened (door switch is "on").

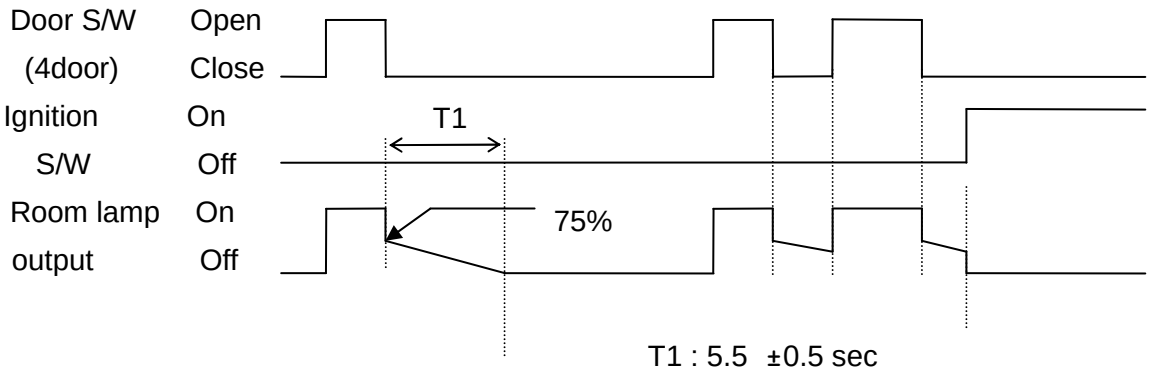
As soon as door is closed (door switch is "off") 75% of light disappear and the rest decay slowly come to the light off after 5□6 sec.

2) Make sure that no operation when time of door switch "on" is under 0.1 sec.

3) Make sure that analysis capacity is more than 32 step when light was decayed.

4) Make sure that the output is off as soon as the ignition switch is turned on during delaying and decaying operation.

2.5.2 operating time chart



2.5.3 Room Lamp Delay Out after receive “Keyless Unlock” signal.

1 The room lamp lights “OFF” after lighting “ON” about 30 sec on condition that door is closed.

2 The room lamp prolongs light “ON” about 30 sec. Again, If the TX button unlocks during this condition.

3 The room lamp keeps lighting “ON” in light “ON” when opening the door, the room lamp is back to the delay function.

4 The room lamp lights “OFF” immediately and signals alarm if the keyless lock is.

2.6 Lamp auto cut (tail lamp only)

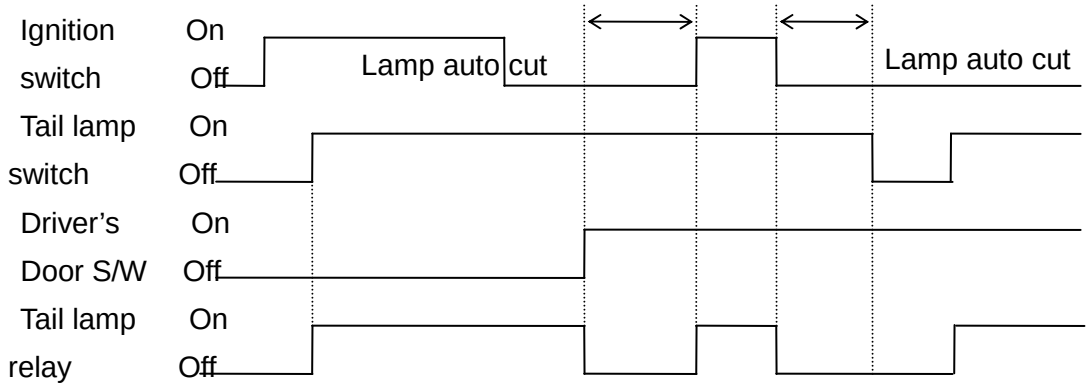
2.6.1 Description 1

1. In case of the tail lamp switch is turned ON after IG. SW ON or the driver door is opened after IG. SW OFF, the tail lamp is extinguished automatically.

2. In addition, the IG. SW is turned OFF after driver door is opened with IG. SW is ON condition, the tail lamp will be extinguished automatically too.

3 After automatic extinguish, if the tail lamp switch is turned ON again, then, the tail lamp will be ON (illuminating) and the auto cut function will be released.

2.6.1 Operating time chart



2.7 Ignition keyhole illumination

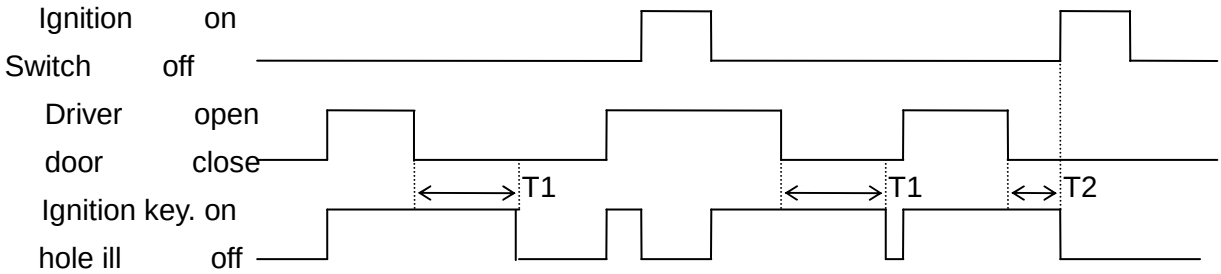
2.7.1 Description

1) Ignition keyhole illumination is turned on when driver door is opened (at Ignition switch "off").

2) Make sure that the output is "off' after delaying "on" state of ignition key hole illumination for 10sec when the driver door is closed in case of No (1) state.

3) Make sure that the ignition key hole illumination is turned off if the ignition input is accepted in case of No. (1),(2) state.

2.7.2 Operating time chart



T1 : 10 ±1 sec , T2 : 0 ~ 10 sec

2.8 Auto door lock control

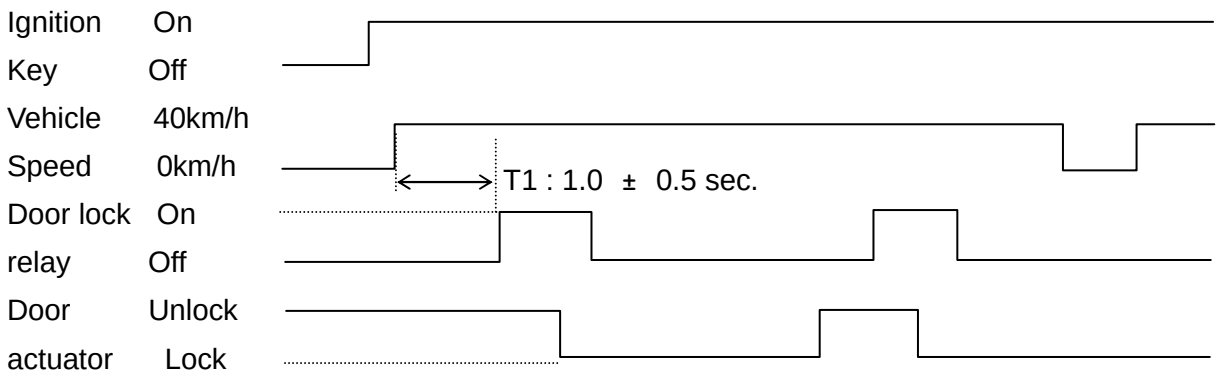
2.8.1 Description

Door lock function is operated automatically in bellow condition, when vehicle speed is more than 40 Km/h while the engine is running.

1). IG. Switch is ON.

2.) Vehicle speed is more than 40 Km/h.

The signal of vehicle speed 40 Km/h is receive in ETACSCM.



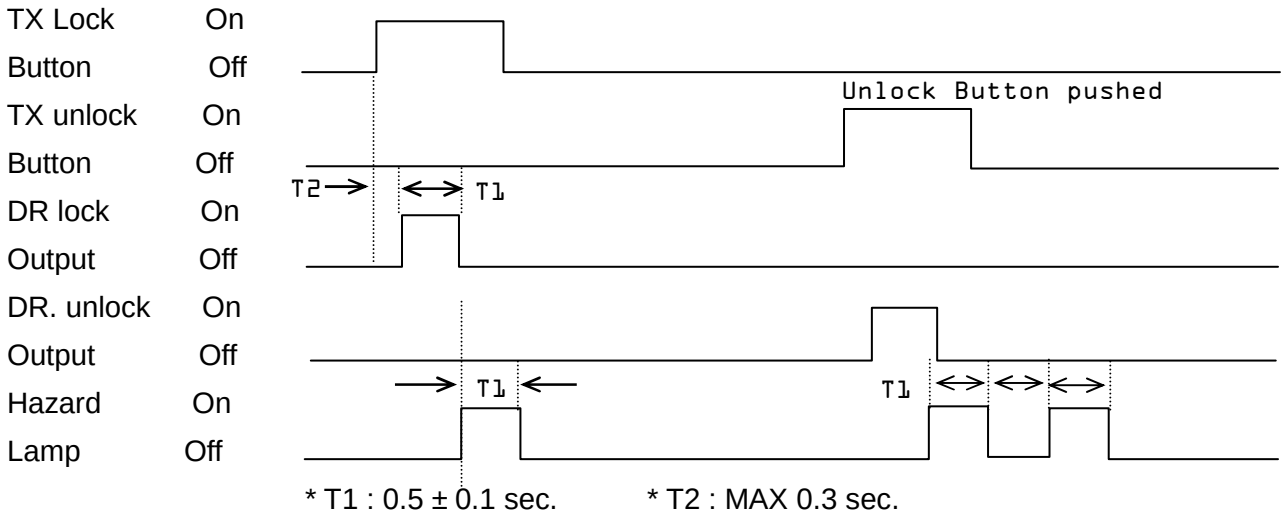
2.9 Central Door Lock Control by Remote Controller 2.9.1 Description

The ETACS module receives “Lock/Unlock” signal from the transmitter, and outputs door “Lock or Unlock.

■ Operating Condition □ When the IG. Key is removed from key cylinder.

□ When the SET/OFF switch on keyless entry system receiver is put on the “OFF” (Operation mode)

2.9.2 Operating time chart



* T1 : 0.5 ± 0.1 sec. * T2 : MAX 0.3 sec.

2.10Ignition Key Reminder Control

2.10.1 Description

This function is to prevent vehicle from Lock if IG. Key is inserted into key cylinder.

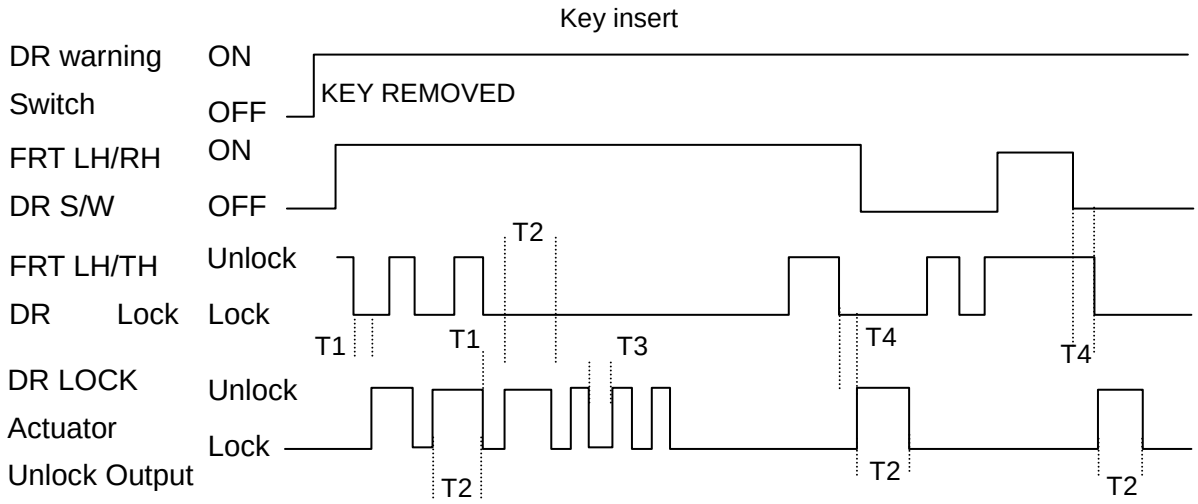
1) IG. Key is inserted into key cylinder.

2) The signal of IG. Key insert condition is perception in ETACSCM.

3) At this time if pushed door lock knob of front LH or RH door, door unlock signal output for 1 sec.

4) So, that during insert key into the key-cylinder to prevent door lock.

2.10.2 Operating time chart



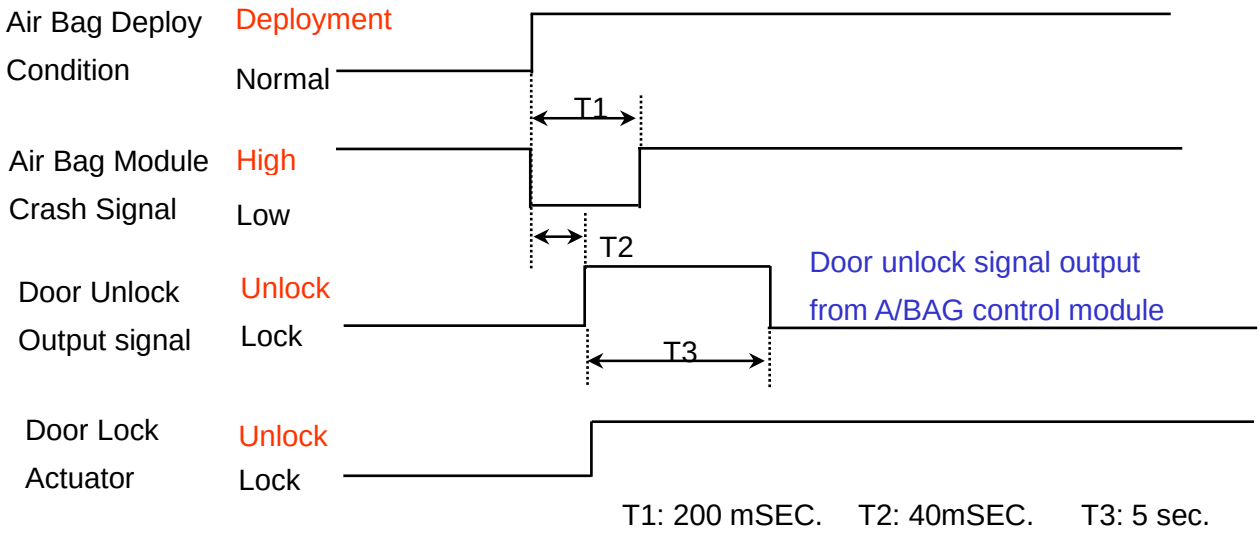
* T1 : 0.5 ± 0.1 sec. * T2 : 1 ± 0.1 sec. * T3 : 0.5 ±0.1 sec. * T4 : MAX 0.5 sec

2.11 Crash door unlock

2.11.1 Description 1) If the airbag signal is inputted to the ETACS when the door is locked, the unlock signal is executed immediately for safety.

2) At this time, all doors should be locked for operating above “unlock execution”.2.11.2

Operating time chart



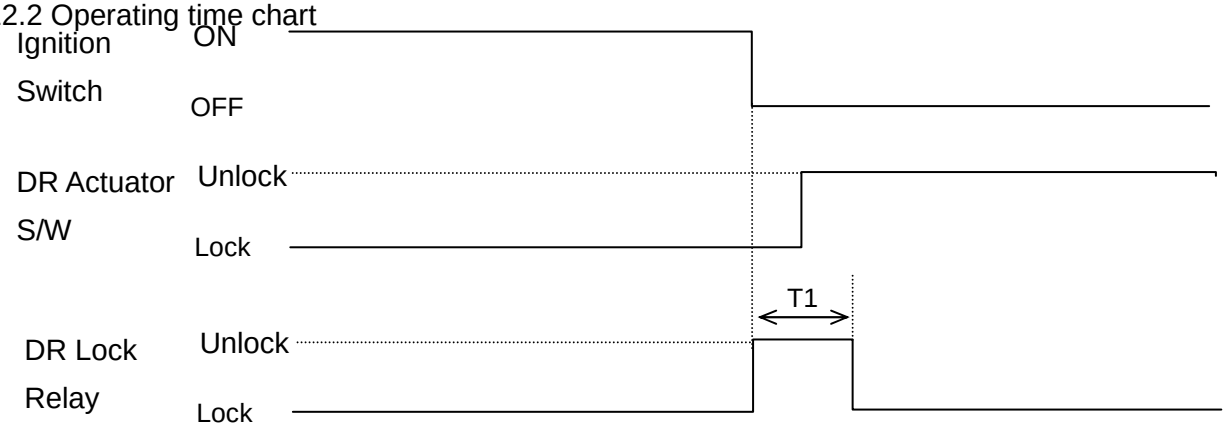
2.12 Auto Door Unlock Control“1” after IG. Off

2.12.1Description

1). When IG. S/W is turned OFF, the door lock is controlled to UNLOCK from ETACSCM.

2) If IG. SW is turned OFF, unlock signal is output control door unlock relay in ETACSCM.

2.12.2 Operating time chart



* T1 : 0.5 ± 0.1 sec.

2.13 Ignition keyhole illumination

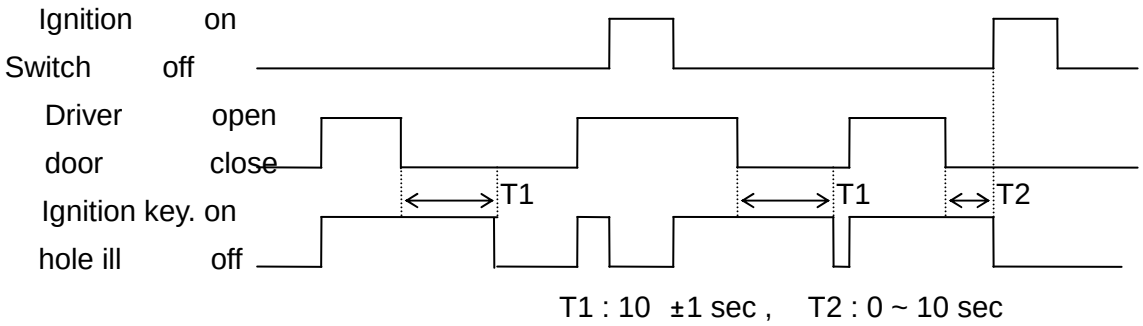
2.13.1 Description

1) Ignition keyhole illumination is turned on when driver door is opened (at Ignition switch "off").

2) Make sure that the output is "off' after delaying "on" state of ignition key hole illumination for 10sec when the driver door is closed in case of No (1) state.

3) Make sure that the ignition key hole illumination is turned off if the ignition input is accepted in case of No. (1), (2) state.

2.13.2 Operating time chart



T1 : 10 ±1 sec , T2 : 0 ~ 10 sec

2.14 Power window timer

2.14.1 Description

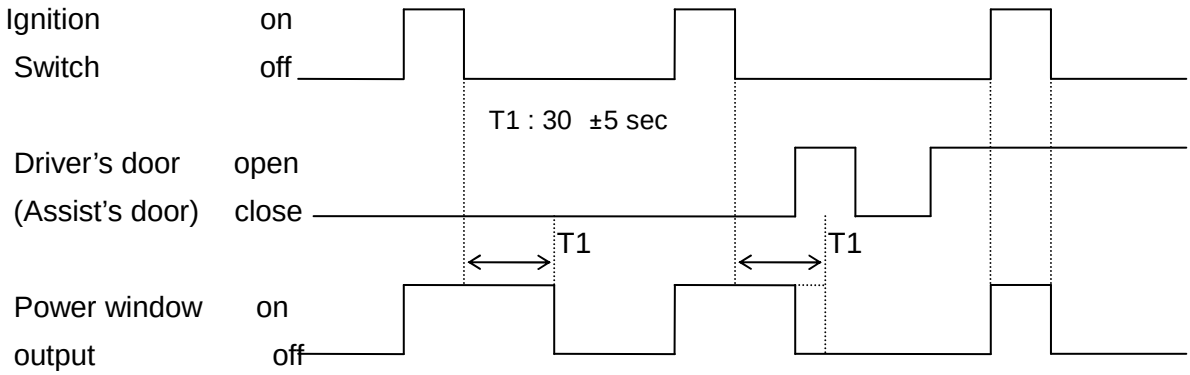
1) Turn the output of power window on when the ignition switch is "on".

2) Stop outputting "off" after maintaining for 30sec when the ignition switch is "off",

3) As soon as driver or assistance door is opened, the output comes to "off" in No (2) state.

4) Make sure to remain "on" the power windows main relay for 30sec. in the power windows up/down operation by keyless.

2.14.2 Operating time chart



3. Anti theft function (Keyless entry)

3.1 General

- Door lock/unlock control by remote control (Keyless entry)
- Thief alarm device (Burglar alarm)

3.2 Anti theft operation prohibition condition.

- In case of ignition key was inserted in height cylinder

- When receive ignition's signal in ETACSCM

3.3 Transmitter

☐ Frequency

EU, AUS, GEN: 433.9 MHz

NAS, JPN: 313.85 MHz

☐ Transmission distance : 10 m

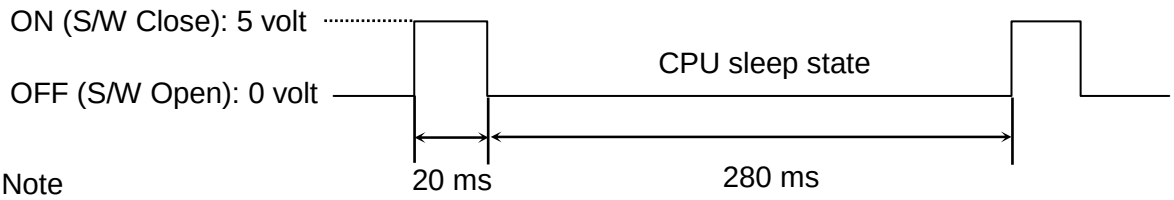
Coding: Rolling code

3.4 Input signal for anti theft system

3.4.1 Strobe control

In order that the parasitic current of ETACSCM reduces, all of input signal into ETACS module is monitored and detected by the method of strobe.

Strobe intermittent control to reduce the parasitic current in ETACS



□ Note

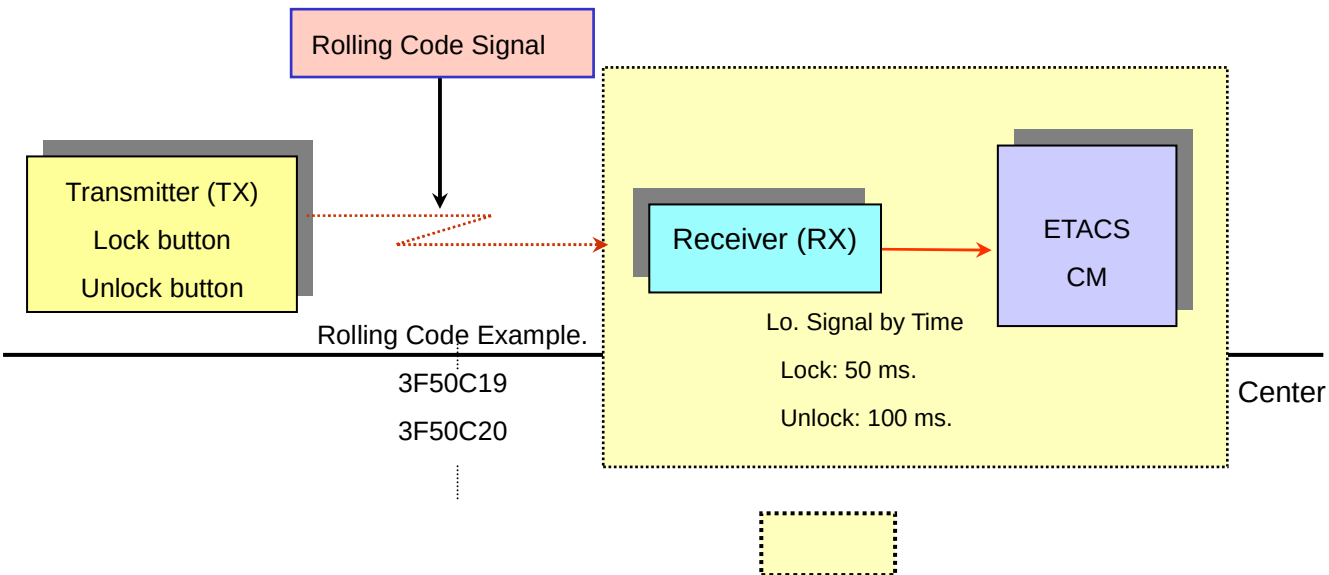
When measuring the input signal voltage of strobe type by using general multi-meter, be careful and don't make confuse that the measuring voltage checks 1-2 volt due to fast speed in 300ms a 1cycle.

Strobe Control Inputs signal Item (Signals related with Anti theft system)

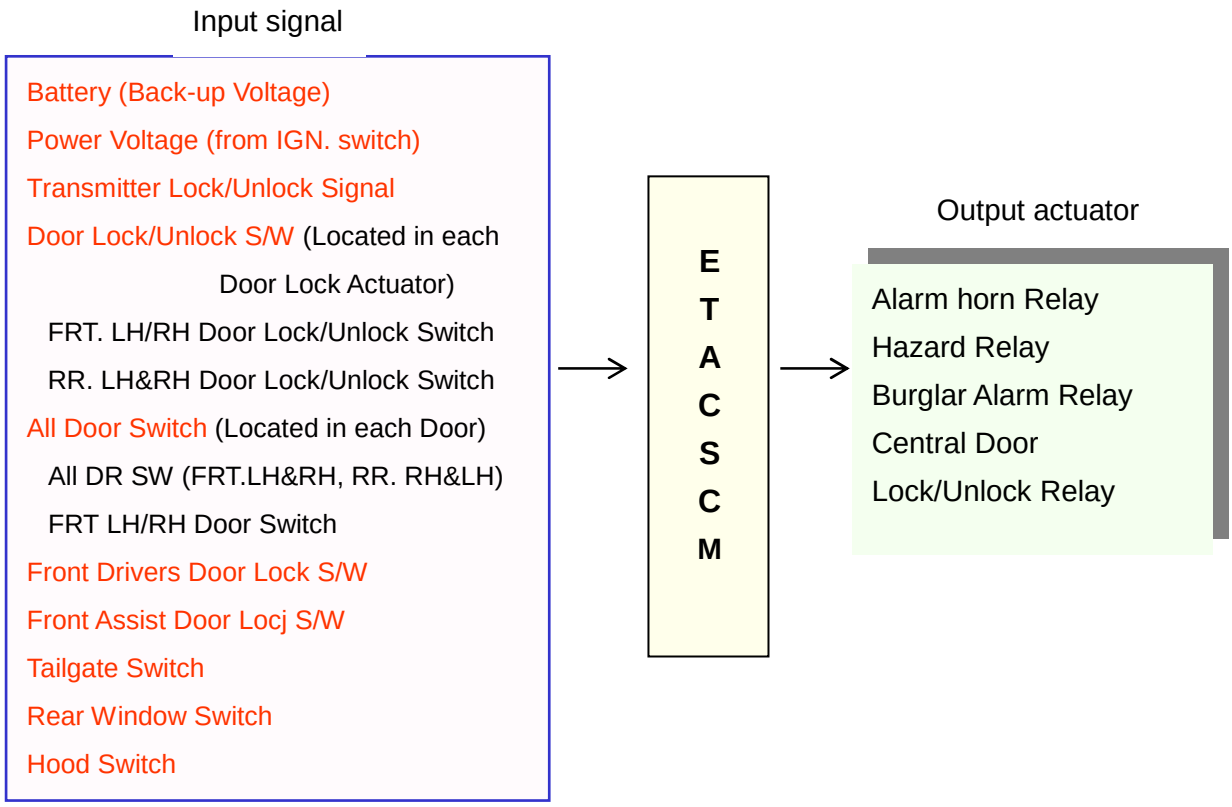
□ Driver's Door Switch □ Door Unlock Switch □ Tail gate Switch

□ All Door Switch □ Door Lock/Unlock Switch(4 or 5 switch) □ Hood Switch

3.5 Transmitter signal reception process



3.6 Anti- theft system input & output signal



3.7 Anti theft function detail

- Arm function
- Disarm function
- Alarm function

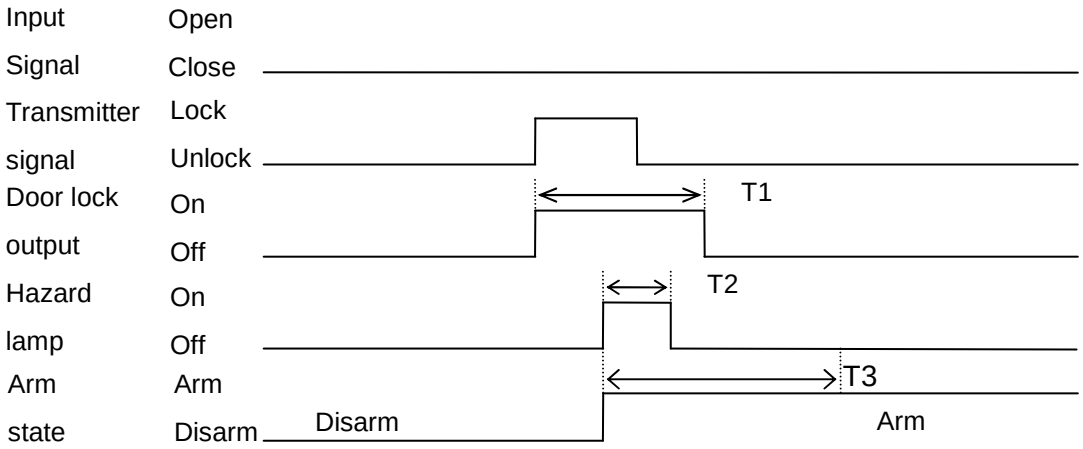
3.7.1 Arm function

1. If the ETACS receives the “Lock” signal from transmitter. (When IG key removed from key cylinder and all switches are closed) ETACS outputs “ON” the “Lock” outputs and vehicle becomes “Armed condition” with turn on the Hazard lamp for 1 sec. after confirming lock signal of door lock actuator.

2. If the ETACS receives the “Lock “ signal from transmitter when any one switch of all door switches is open, it outputs “ON” the “Lock” output only, In this case, ETACS does not output Hazard lamp “ON” and the vehicle does not “Armed”
3. The door is closed in the above “2” condition, ETACS output “ON” the Hazard lamp for 1sec. And the vehicle is armed.
4. If lock button on the transmitter is pushed again under “Armed” condition, only Hazard lamp is “ON” for 1sec. With maintaining armed condition.

□ **Only the transmitter can make the “Armed” condition for the vehicle.**

Function time chart



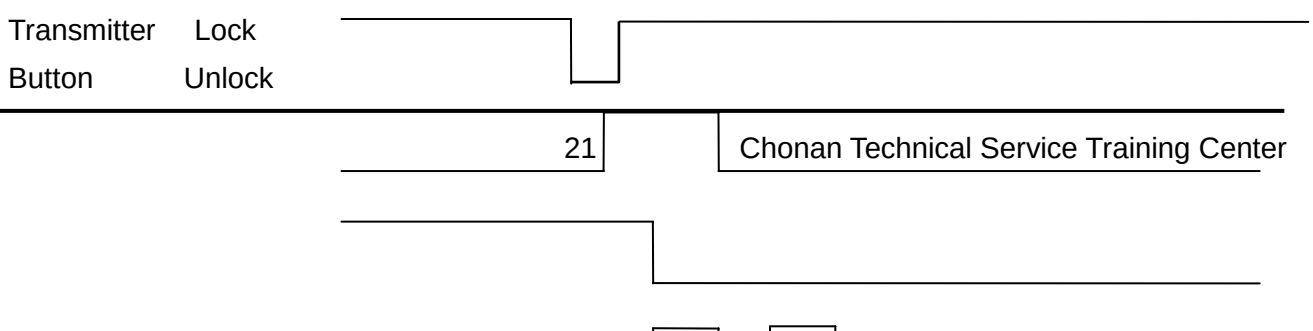
T1 : 0.5 sec, T2 : 0.5±0.1 sec. , T3 : 2 sec. , T4 : Within 2 sec.

3.8 Disarm function

1. When TX unlock button pushed, door unlock output and the vehicle is “Disarmed”. At this time, Hazard lamp output “ON” twice.
2. If unlock (TX) button is pushed again under “Unlocked” condition, only Hazard lamp output “ON” twice. In this case, door unlock is not output again

□ **To disarm impassible using by IGN. Key**

Function time chart



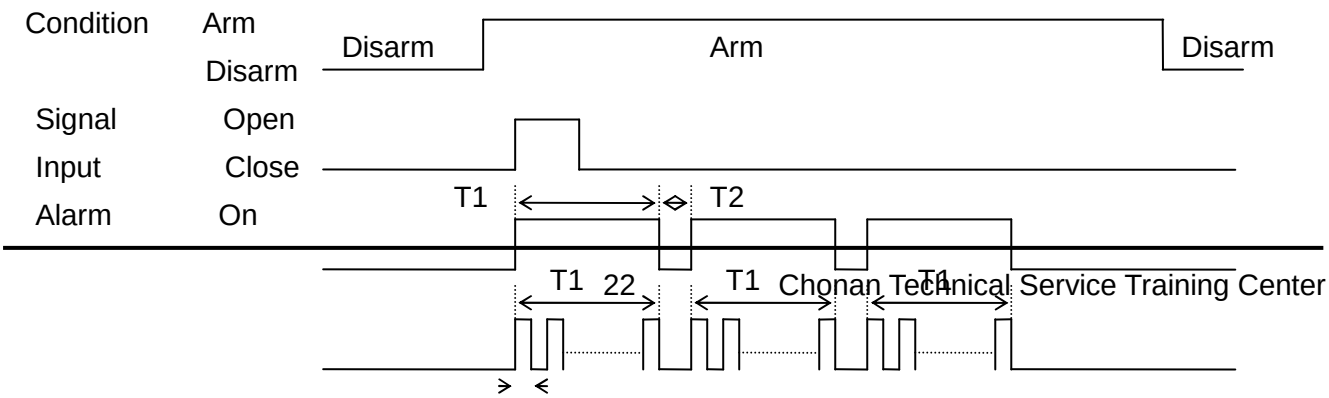
Unlock	On
Output	Off
Arm	Arm
State	Disarm
Hazard	On
Lamp	Off

Others disarming condition

- When input unlock signal from transmitter
- When ignition key “ON”
- When driver’ & assist door key switch off to on. (NAS only)
- When tail gate switch off to on. (NAS only) at this time operate hazard twice when cancel by tail gate unlock switch

3.9 Alarm function (General area)

When receive more than one of entrance signal at arm mode, start inhibit is turned on and keep the alarm on for 27sec(±0.3sec), off for 10sec±0.3sec) and then repeat this 3 times. (The output of hazard lamp is also on)

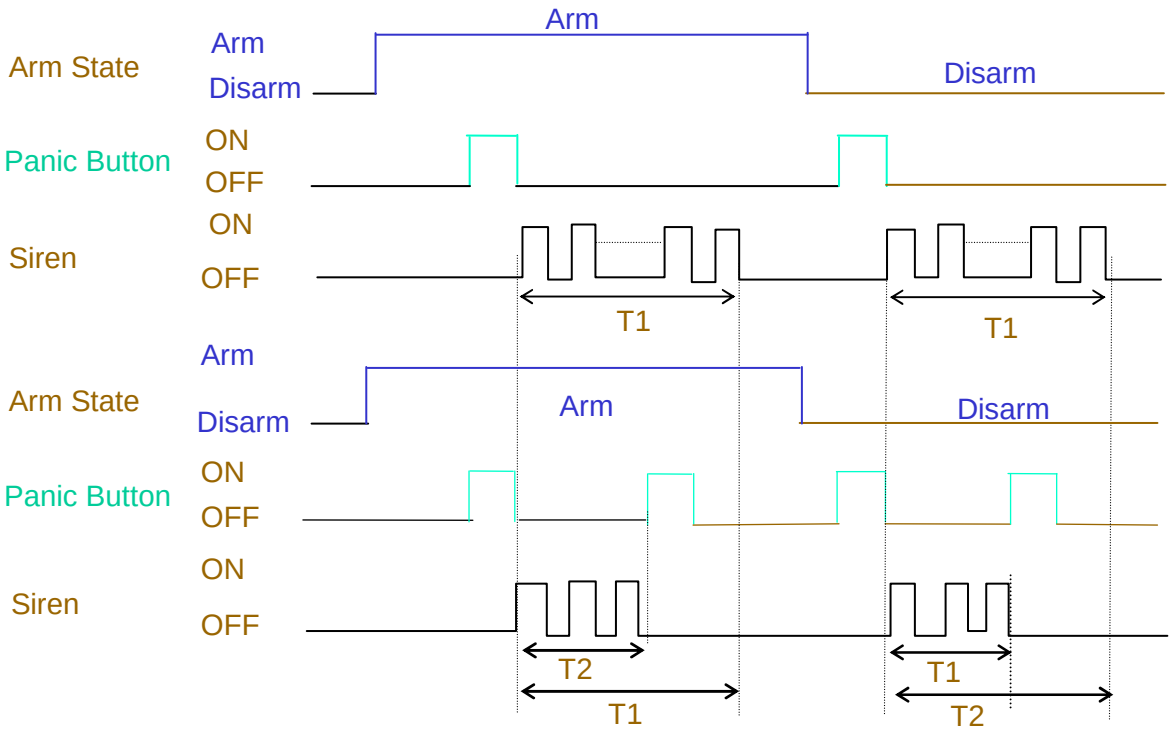


Horn	Off
Hazard	On
Lamp	Off

T1 : 27 ±0.3sec, T2 : 10±0.3sec , T3 : 0.5±0.3sec

3.10 Panic function

If the panic button of transmitter is pushed whether the system is Arm or Disarm, hazard lamp and siren is on for about 30sec. And the panic button reselected, siren and lamp come off.



T1 : 27± 2 sec. T2: Panic button pressed from 1st to 2nd.

During Panic operation, if is below condition, panic is release

- When pushed lock or unlock button of transmitter
- It ignition key inserted to key cylinder. (Key operated warning switch)
- When front RH/LH door switch signal ON to off or off to ON.
- When tail gate unlock switch off to on

4. Diagnosis

4.1 Current data

It is available to diagnose the JM ETACS by communicating with Hi-scan.

Items	EC, Aust.		General (Except M/East)		M/East (Except Brazil)	
	Keyless	Non-Keyless	Keyless	Non-Keyless	Keyless	Non-Keyless
IGN1	O	O	O	O	O	O
IGN2	O	O	O	O	O	O
ALT L	O	O	O	O	O	O
Key IN Sw	O	O	O	O	O	O
Sarter Inhibit relay	O	X	O	X	O	X
Power window relay	O	O	O	O	O	O
Tail Lamp Sw	O	O	O	O	O	O
Rear Fog Sw	O	O	X	X	X	X
Head Lamp Sw	O	O	X	X	X	X
Front Fog Sw	O	O	X	X	X	X
Tail Lamp Relay	O	O	O	O	O	O
Rear Fog Relay	O	O	X	X	X	X
Hazard Lamp Relay	O	X	O	X	O	X
Driver Seat Belt indicator	O	O	O	O	O	O
Room Lamp Output	O	O	O	O	O	O
IGN Key hole illumination	O	O	O	O	O	O
Driver Door Open Sw	O	O	O	O	O	O
Assist Door Open Sw	O	O	O	O	O	O
4 Door Open Sw	O	O	O	O	O	O
Hood Open Sw	O	X	O	X	O	X
Tail Gate Sw	O	O	O	O	O	O
Driver Door Actuator Position Sw	O	O	O	O	O	O
Assist Door Actuator Position Sw	O	O	O	O	O	O
Driver Door Key Lock Sw (US only)	X	X	X	X	X	X
Driver Door Key Unlock Sw (US only)	X	X	X	X	X	X
Assist Door Key Unlock Sw (US only)	X	X	X	X	X	X
Clash Unlock Signal (DOM, JPN only)	X	X	X	X	X	X
MTS Door Unlock Signal (DOM only)	X	X	X	X	X	X
MTS B/alarm Signal (DOM only)	X	X	X	X	X	X
Door Lock Relay	O	O	O	O	O	O
Door Unlock Relay	O	O	O	O	O	O

2-Turn Unlock (D/Lock) Relay (US only)	X	X	X	X	X	X
Rear Door Actuator Position Sw	O	O	O	O	O	O
Assist Door Key Lock Sw (US only)	X	X	X	X	X	X
Tail Gate Key Unlock Sw (US only)	X	X	X	X	X	X
Washer Sw	O	O	O	O	O	O
INT Sw	O	O	O	O	O	O
Defogger Sw	O	O	O	O	O	O
Wiper Relay	O	O	O	O	O	O
Defogger Relay	O	O	O	O	O	O
Front Deicer Sw	O	O	O	O	O	O
Front Deicer Relay	O	O	O	O	O	O
Driver Seat Belt Sw	X	X	O	O	O	O
Burglar Horn Relay	O	X	O	X	O	X
Chime Buzzer (DOM, US, JPN only)	X	X	X	X	X	X
Chime Bell	X	X	O	O	O	O
INT volume	O	O	O	O	O	O
Speed signal	O	O	O	O	O	O
Tx Data Record	O	X	O	X	O	X

** This current data can be changed without notice while developing the vehicle.

4.2 Actuator driving

Items	EC, Aust.		General (Except M/East)		M/East (Except Brazil)	
	Keyless	Non-Keyless	Keyless	Non-Keyless	Keyless	Non-Keyless
Lock Relay	O	O	O	O	O	O
Unlock Relay	O	O	O	O	O	O
Dr Unlock Relay (US only)	X	X	X	X	X	X
Power Window Relay	O	O	O	O	O	O
Wiper Relay	O	O	O	O	O	O

Hazard Relay	O	X	O	X	O	X
Burglar Horn Relay	O	X	O	X	O	X
Starter Inhibit Relay	O	X	O	X	O	X
Tail Lamp Relay / DRL Unit	O	O	O	O	O	O
Rr Fog Relay	O	O	X	X	X	X
Fr Deicer Relay	O	O	O	O	O	O
Rr Defogger Relay	O	O	O	O	O	O
Dr Seat Belt Indicator	O	O	O	O	O	O
IGN Key Illumination	O	O	O	O	O	O
Chime Bell	X	X	O	O	O	O
Chime Buzzer (DOM, US, JPN only)	X	X	X	X	X	X
Room Lamp	O	O	O	O	O	O

4.3 DTC List

DTC	Items	EC, Aust.		General (Except M/East)		M/East (Except Brazil)	
		Keyless	Non-Keyless	Keyless	Non-Keyless	Keyless	Non-Keyless
B1900	INT volume	O	O	O	O	O	O
B1902	IGN Key Illumination	O	O	O	O	O	O
B1903	Burglar Horn Relay	O	X	O	X	O	X
B2106	Power Window Relay	O	O	O	O	O	O
B2107	Hazard Relay	O	X	O	X	O	X
B2108	Wiper Relay	O	O	O	O	O	O
B2110	Lock Relay	O	O	O	O	O	O
B2111	Unlock Relay	O	O	O	O	O	O
B2112	Dr Unlock Relay (US only)	X	X	X	X	X	X
B2114	Tail Lamp Relay / DRL Unit	O	O	O	O	O	O
B2115	Rr Defogger Relay	O	O	O	O	O	O
B2116	Rr Fog Relay	O	O	X	X	X	X
B2119	Fr Deicer Relay	O	O	O	O	O	O
B2120	Dr Seat Belt Indicator	O	O	O	O	O	O