# **#930 STARTER**





### (5) Runout of commutator periphery

• If the reading exceeds the specified limit, rectify the commutator of the armature, making sure the outside diameter stays within specification.

### (6) Condition of commutator surface

- If the surface is rough or has stepped wear, rectify it with emery paper (#300 to 500).
- After rectifying the surface, check the extent of commutator runout.

## (7) Undercut depth between segments

- If the measurement is lower than the specified limit, rectify or replace the armature.
- To rectify the armature, grind the illustrated portions.

 If the undercut is worn as illustrated, rectify or replace the armature.
 O: Acceptable
 × : Unacceptable



# ■ Inspection: Yoke

• Inspect the ferrite magnet in the yoke for damages and cracks. If any fault is found, replace the yoke.

54-1



#### Inspection: Overrunning clutch

If the following inspections reveal any abnormality, replace the overrunning clutch.

- While holding the housing, give a turn to the pinion. The pinion should not turn at all in one direction but should turn smoothly in the other direction with some resistance felt.
- Confirm that the pinion teeth are free of chips and not abnormally worn.
- Confirm that the pinion metal is not abnormally worn.

### CAUTION A -

• The overrunning clutch is filled with grease inside. Do not use immersion cleaning.



# Outside diameter of armature shaft Rear bearing Junside diameter of rear bearing Inside diameter of rear bearing P116385E

# see if it meets the standard value.

■ Inspection: Lever

• If the measurement is out of the standard value, replace the lever.

· Measure the overrunning clutch contact surface of the lever to

#### Inspection: Rear bearing

- Confirm that the difference between the inside diameter of the rear bearing and outside diameter of the armature shaft meets the standard value.
- If the measurement is out of the standard value, replace the rear bearing.

# ◆ Assembly procedure ◆



- Assembly: Planetary gear holder, internal gear and overrunning clutch
- Install the internal gear, overrunning clutch and stop ring onto the planetary gear holder.

# **#930 STARTER**



- Set a new snap ring in the groove of the planetary gear holder.
- Using a puller, draw the stop ring toward the snap ring and then fit the snap ring into the stop ring by pressing with a screwdriver.

# Assembly: Lever

• Paying attention to its direction, install the lever onto the overrunning clutch.

## Assembly: Front bracket

• Install the planetary gear holder, internal gear, overrunning clutch and lever on the front bracket.



Overranning clutch

Lever

Internal gear

P116862E

# Assembly: Packing A, B, plate and planetary gear

• Install in this order: plate, packing B, three planetary gears and packing A.

Front bracket

54-





# Yoke Commutator Brush spring Brush Armature P116393E



# Assembly: Front bracket and yoke

• Using the mating marks provided before disassembly for alignment, install the yoke to the front bracket.

# Assembly: Ball and armature

• Insert the ball, and then install the armature on the planetary gear holder side.

## Assembly: Brush holder

- Install the brush holder on the armature.
- Set the brush springs in the regular state.

#### Assembly: Rear bearing and rear bracket

• Install the rear bearing to the rear bracket.

# **#930 STARTER**

Terminal S



Lever

P116396E

- Install the rear bracket on the yoke. Make sure that the parts are fitted at the grommet section of the rear bracket.
- Tighten the through bolts and screws.

# Assembly: Magnetic switch

• Install the magnet switch onto the lever with its terminal S in the illustrated direction.

 Screw
 Magnetic switch

 Screwdriver
 Forestand

Magnetic switch

• Tighten the screws.



• Connect the field coil line to terminal M of the magnet switch, and then tighten the nut.

54-1

# igoplus Inspection after assembly igoplus





#### Inspection: Performance and pinion gap

• After assembling the starter, perform inspections with current supplied to it.

## WARNING A -

- When the starter is energized, the pinion will spring out and rotate. Be careful not to touch it with your hands.
- The magnetic switch may become very hot during inspections. Be careful when touching it.

# CAUTION A -

- Do not energize the pull-in coil P for longer than 10 seconds, and do not energize the holding coil H for longer than 30 seconds. If these periods are exceeded, the coils may overheat and burn out.
- When current is supplied to the starter, a large current (100 A or higher) will flow. For inspection purposes, booster cables or similarly thick cables must therefore be used. It is also important to ensure that all connections are secure.

## (1) Performance test

- Connect the starter as illustrated.
- Set the voltage to 11 volts DC.

# 

- The voltage applied must not exceed 12 V.
- The following operations are performed with current supplied to the starter. Thus, the entire test (consisting of measurement of the current flowing through the starter and measurement of the starter's rotational speed) must be completed within 30 seconds.
  - Turn ON the switch to supply current to the starter. The pinion will spring out and rotate.

# CAUTION A

- When the switch is turned ON, the pull-in coil P and holding coil H are both energized. When the large current from the DC power supply flows from terminal B to terminal M, the supply of current to the pull-in coil P is cut; only the holding coil H remains energized. To prevent the holding coil from burning out, it is essential to complete all operations within 30 seconds.
  - Measure the current, then measure the starter's rotational speed with a digital tachometer.
  - Turn OFF the switch to de-energize the starter.
- If either measurement is out of specification, disassemble and inspect the starter again.

# **#930 STARTER**



# DC power supply Switch1 Switch2 FI4260E Pinion Pull out and then lightly push back pinion by hand. P116400E

## (2) Pinion gap

- Connect the starter as illustrated.
- The following operations are performed with current supplied to the starter. Thus, the entire procedure for measurement of the pinion gap must be completed within 30 seconds.
- Turn ON switches 1 and 2 to supply current to the starter. The pinion will spring out and rotate.

• After the pinion starts to rotate, quickly (within five seconds) turn OFF switch 2 to stop the pinion's rotation.

- When switches 1 and 2 are turned ON, the pull-in coil P and holding coil H are both energized. The circuit is connected such that no voltage is applied to starter terminal B, so current flows to the pull-in coil while the pinion rotates. To prevent the pull-in coil from burning out, it is essential to turn OFF switch 2 quickly (within five seconds) after the pinion starts to rotate.
  - Pull out the end of the pinion by hand, and then lightly push it back by hand. Measure the amount of axial movement (pinion gap).
  - Turn OFF switch 1 to de-energize the starter.
- If the measurement is out of specification, replace the lever.

# $M \in M O$

# **#940 ALTERNATOR**



### • Removal sequence

- 1 Belt
- 2 Alternator

# WARNING 🕂 -

- Before removing the alternator, disconnect the (-) battery cable and insulate the cable and the (-) battery terminal with tape.
- It is dangerous to leave the (-) battery cable connected since the battery cable voltage is always present at terminal B.

# • Installation sequence

Follow the removal sequence in reverse.

# Service standards

Location	Maintenance item			Standard value	Limit	Remedy	
2	Alternator output current (*when alternator is hot and producing 13.5 V)At 1800 rpmAt 6000 rpmAt 6000 rpmAt 1800 rpmAt 1800 rpmAt 6000 rpmAt 6000 rpm	1104	At 1800 rpm	55 A or more	-		
		TIUA	At 6000 rpm	110 A or more	-	Correct or	
		1404	At 1800 rpm	75 A or more	-	replace	
		140 A or more	-				
	Adjustment voltage of regulator (at 6000 rpm, 5 A is loaded)			14.5 ± 0.25 V	-	Replace	

\* The hot condition occurs after the alternator has been running at normal ambient temperature at 6000 rpm and maximum output for 30 minutes.

# Inspection procedure





#### ■ Inspection: Alternator

(1) Alternator output current (bench test)

• Connect the alternator as illustrated.

#### 

- Wires with sufficient thickness should be used for wiring and each connection should be securely fastened.
- Increase load resistance to the maximum (condition under which the load current hardly flows).
- Turn switch 1 and 2 ON.
- Run alternator at 6000 rpm for 30 minutes by adjusting load resistance so that electric current can conform to the following standard.

Alternator nominal current

Alternator	Current
110A	Approx. 110A
140A	Approx. 140A

- Measure the current at each specified revolution of alternator.
- If the measured value is lower than the standard value, disassemble and check alternator.

### (2) Adjustment voltage of regulator (bench test)

- Connect the alternator as illustrated.
- Turn switch ON.
- Run alternator at low speeds.
- Increase the speed of alternator to 6000 rpm and measure the voltage (adjustment voltage) at this speed. At the same time, make sure that the current is 5 amperes or less at 6000 rpm.
- If the measured value deviates from the standard value, do as follows:
  - If higher than the standard value: Replace the regulator.
  - If lower than the standard value: Inspect the alternator related parts before replacing the regulator.

# 54-13 ON-VEHICLE INSPECTION AND ADJUSTMENT

# **#950 INSPECTION OF ALTERNATOR**



#### Performance test

- The on-vehicle inspection is only a simplified check. Use a test bench for accurate checking.
  - Connect the meters to the alternator as shown.

## WARNING A -

- To prevent possible injury, be sure to disconnect the negative battery cable and insulate the cable and the negative battery terminal with tape before working on the wiring. With the negative (-) battery cable connected, battery voltage is always applied to terminal B.
- To connect to switch, use a lead wire with the same or larger diameter than that of the chassis harness connected to terminal B.
- Turn on switch and make sure that voltmeter indicates battery voltage.
- Start the engine.
- Immediately turn on the switches for all lamps on the vehicle.
- Immediately accelerate the engine to the speed indicated below and measure the alternator's output current. Approx. 2200 rpm
- The alternator is considered to be good if the measured value is 70% or more of the nominal output current. Alternator nominal output

Voltage	Output current
12 V	110 A
12 V	140 A

# Service standards

Location	Maintenance item	Standard value		Limit	Remedy
_	Adjusting voltage	12V-110A	14.5 ± 0.2 V	Penlace	
		12V-140A	14.5 ± 0.25 V	_	Replace



• Connect the meters to the alternator as shown.

WARNING A -

- To prevent possible injury, be sure to disconnect the negative battery cable and insulate the cable and the negative battery terminal with tape before working on the wiring. With the negative (-) battery cable connected, battery voltage is always applied to terminal B.
- To connect to switch, use a lead wire with the same or larger diameter than that of the chassis harness connected to terminal B.
- Turn off the switches for lamps, heater, etc. so that electric loads may not be applied during the inspection.
- Turn on switch and then start the engine.
- If the output current is 5 amperes or less when the engine speed is raised to the appropriate speed indicated below, then measure the voltage at terminal B.
   Approx. 2200 rpm
- If the output current is not less than 5 amperes, the measured value (regulated voltage) will be slightly lower.
- If the output current is 5 amperes or more, do one of the following:
  - Run the engine for a while to charge the battery.
  - Replace the battery with a fully-charged one.
- If the measured value deviates from the standard value, conduct checking again on the test bench.

# **#960 HEADLAMP AIMING**

# 1. Preparation before Adjustment





# 2. Adjustment





- Park the vehicle on a level flat place and apply chocks to the wheels.
- Empty the vehicle.
- Adjust the tire inflation pressure to the specified value.
- Place a mass of 68 kg {150 lb} (corresponding to a mean weight of one man) on the driver's seat.
- On vehicles with headlamp leveling device, set the headlamp leveling switch to 0.
- Start the engine to charge the battery.
- Locate a lamp tester at a place opposite to the vehicle front end face as illustrated.
- Turn on the headlamps and aim the headlamps such that the passing beam lamp center is aligned with the beam convergent lens center of the lamp tester. (Shown here is the left-hand headlamp.)
- Mask other lamps than that next subjected to adjustment in such a way that no light may leak.

- Headlamp lenses are made of plastic. Do not keep the masked headlamps illuminated for longer than 2 minutes.
   Sustained illumination of these lamps can cause heat generation, possibly resulting in deformed headlamp lens.
- Turn on the passing beam.
- Perform the following procedure to adjust the passing beam such that the elbow point of the cut-off line between the lighted and shaded areas is positioned as shown in the figure:
- Adjustment in vertical direction: Turn screws A and B the same amount in this order.
- Adjustment in horizontal direction: Turn screw B.
- The position of the cut-off line between the lighted and shaded areas must correspond to the adjustment value.

	Adjustment value
Cut-off line position	0.57° <fe></fe>
	0.86° <fg></fg>

				Beam adjustr	nent direction			
		Right-hand	headlamp			Left-hand	headlamp	
	Up	Down	Left	Right	Up	Down	Left	Right
Screw A	CCW	CW	-	-	CCW	CW	-	-
Screw B	CCW	CW	CCW	CW	CCW	CW	CW	CCW

CW: Clockwise CCW: Counter-clockwise

# **#961 FOG LAMP AIMING**

# 1. Preparation before Adjustment



- Park the vehicle on a level flat place and apply chocks to the wheels.
- Empty the vehicle.
- Adjust the tire inflation pressure to the specified value.
- Place a mass of 68 kg {150 lb} (corresponding to a mean weight of one man) on the driver's seat.
- Start the engine to charge the battery.
- Locate a lamp tester at a place opposite to the vehicle front end face as illustrated.
- With the fog lamp turned on, align the center of fog lamp bulb and the center of convergent lens of convergent lamp tester. (Shown here is the left-hand fog lamp.)
- Mask other lamps than that next subjected to adjustment in such a way that no light may leak.

# CAUTION A -

• Fog lamp lenses are made of plastic. Do not keep the masked fog lamp illuminated for longer than 2 minutes. Sustained illumination of these lamps can cause heat generation, possibly resulting in deformed fog lamp lens.

# 2. Adjustment



- Turn on fog lamp.
- Make adjustment with the aiming gear to bring for lamp cut-off line into the illustrated position.

Cut-off line position	Standard value		
	1.5% or less		

	Adjusting direction for optical axis			
	Upward	Downward		
Screwdriver rotation direction	Clockwise	Counter-clockwise		

# $M \in M O$

# **#984 INSPECTION OF IMMOBILIZER**

• Since the FUSO diagnostics data are updated from time to time, descriptions or wording may not agree with the workshop manual. The FUSO diagnostics will have the latest data.

# 1. List of Diagnosis Codes

Code	Message	Warning lamp indication	Remarks
521742-12	Immobilizer fault	0	
521742-31	Watchdog reset	0	
521743-2	Missing transponder modulation	0	
521744-2	Invalid secret key	0	
521745-2	Bad ECM authentication	0	
521746-2	No ECM challenge/acknowledge	0	
521747-2	Transponder authentication failed	0	
521748-2	Transponder ID table empty	0	
521749-2	Transponder data format error	0	
521750-19	CAN bus performance	0	
521750-31	Lost communication with SAM	0	

# 2. Details of Diagnosis Codes

# 521742-12: Immobilizer fault

Generation condition	Some abnormality has occurred in immobilizer electronic control unit.
Recoverability	System recovers when relevant diagnosis code is erased.
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	Defective immobilizer electronic control unit

#### 521742-31: Watchdog reset

Generation condition	CPU has been reset.
Recoverability	• System recovers if no abnormal conditions are present when starter switch is placed in ON again.
Control effected by electronic control unit	• None
Possible causes	Defective immobilizer electronic control unit

#### 521743-2: Missing transponder modulation

Generation condition	<ul> <li>No communication takes place between transponder key (starter key) and immobilizer electronic control unit.</li> </ul>
Recoverability	System recovers if no abnormal conditions are present when starter switch is placed in ON again.
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	<ul> <li>Defective transponder key (starter key)</li> <li>Defective harness between immobilizer antenna and immobilizer electronic control unit</li> <li>Defective immobilizer antenna</li> <li>Defective immobilizer electronic control unit</li> </ul>

# 521744-2: Invalid secret key

Generation condition	Secret key is not registered in immobilizer electronic control unit.
Recoverability	None
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	Defective immobilizer electronic control unit

### 521745-2: Bad ECM authentication

Generation condition	<ul> <li>Collation between engine electronic control unit and immobilizer electronic control unit is not successfully made.</li> </ul>
Recoverability	<ul> <li>System recovers if collation is made successfully when starter switch is placed in ON again.</li> </ul>
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	<ul> <li>Defective engine electronic control unit</li> <li>Incorrect engine electronic control unit in use</li> <li>Engine electronic control unit transferred from another vehicle</li> </ul>

#### 521746-2: No ECM challenge/acknowledge

Generation condition	<ul> <li>No communication is possible between engine electronic control unit and immobilizer electronic control unit.</li> </ul>
Recoverability	• System recovers if normal communication is established when starter switch is placed in ON again.
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	<ul> <li>Defective engine electronic control unit</li> <li>Controller area network communication line is open or short-circuited to power, ground or another circuit.</li> <li>Incorrect engine electronic control unit in use</li> </ul>

## 521747-2: Transponder authentication failed

Generation condition	Collation between transponder key (starter key) and immobilizer electronic control unit is made unsuccessfully.
Recoverability	<ul> <li>System recovers if collation is made successfully when starter switch is placed in ON again.</li> </ul>
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	<ul> <li>Unauthorized transponder key (starter key) is used.</li> <li>Transponder key (starter key) not registered yet is used.</li> </ul>

## 521748-2: Transponder ID table empty

Generation condition	Transponder key (starter key) ID is not stored in immobilizer electronic con- trol unit.
Recoverability	<ul> <li>System recovers when initial key registration is executed.</li> </ul>
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	Transponder key (starter key) used is not a one registered in immobilizer electronic control unit.

#### 521749-2: Transponder data format error

Generation condition	<ul> <li>Immobilizer electronic control unit has received an implausible data from transponder key (starter key) through communication line.</li> </ul>
Recoverability	• System recovers if a plausible data is obtained when starter switch is placed in ON again.
Control effected by electronic control unit	Engine is disabled from starting.
Possible causes	<ul> <li>Faulty transponder key (starter key)</li> <li>Faulty immobilizer antenna</li> <li>Faulty immobilizer electronic control unit</li> </ul>

# **#984 INSPECTION OF IMMOBILIZER**

### 521750-19: CAN bus performance

Generation condition	<ul> <li>Controller area network error message is received.</li> </ul>
Recoverability	<ul> <li>System recovers if any normal signal is received when starter switch is placed in ON position.</li> </ul>
Control effected by electronic control unit	None
Possible causes	<ul> <li>Controller area network communication line is open or shorted to power, ground or another circuit.</li> <li>Faulty controller area network resistor</li> <li>Faulty signal detect and actuation module</li> <li>Faulty immobilizer electronic control unit</li> </ul>

## 521750-31: Lost communication with SAM

Generation condition	No controller area network message is receivable.
Recoverability	<ul> <li>System recovers if any normal signal is received when starter switch is placed in ON position.</li> </ul>
Control effected by electronic control unit	None
Possible causes	<ul> <li>Controller area network communication line is open or shorted to power, ground or another circuit.</li> <li>Faulty controller area network resistor</li> <li>Faulty signal detect and actuation module</li> <li>Faulty immobilizer electronic control unit</li> </ul>

# 3. FUSO Diagnostics Service Data (Measured Values)

• Since the contents of the FUSO Diagnostics are regularly updated, the descriptions and expressions may differ from those given in the service manuals. Check the latest information with the FUSO Diagnostics.

Current Value Group	Description	Value	Explanation
	Number of regis- tered key	0 to 6	Shows the number of registered starter keys (transponder keys) for the engine immobilizer.
Vehicle key	Transponder key type	Registered/Unregistered	Shows the type of the starter key (transponder key) for the engine immobilizer that is currently inserted in the starter switch.
	Ignition status	ON/OFF	Shows the ignition status.
Immobilizer status	Immobilizer mode	Normal mode/ Transponder key ID initial registration mode/ Transponder key ID additional registra- tion mode/ Transponder key deletion mode/ Secret key registration mode	Shows the current state of the immobilizer ECU.
	Immobilizer indicator	ON/OFF	Shows the immobilizer indicator lamp state.
	Immobilizer status	ACTIVE/NOT ACTIVE	Shows the immobilizer system state.

# 4. Initial Settings of Immobilizer

# 4.1 Connecting the FUSO Diagnostics

# CAUTION A ---

- The immobilizer can be set with FUSO Diagnostics Ver. FDS-R10-1 or higher.
- Display images will be applied to FUSO Diagnostics Ver. FDS-R12-1 or higher. Display images might look different according to the version of FUSO Diagnostics.
- Connect FUSO Diagnostics. (See Gr54-00A.)

#### 4.2 Selection of the setting of immobilizer

	11111111111111111111111111111111111111	A PROPERTY AND A PROPERTY
Diagnosis		11.6V 19160n 0FF @ 22 1
Canter		
Constant along Special Special		
Central units view: There	is no current quick test result available.	
	ben	
ARS - Antilock brake out	tem Control unit (A1)	
EZGO - Hill Start Assist	Control unit (A2)	
CUC - Instrument name	(411)	
SSAM - Signal & Actual	Mloduje (A20)	
HVAC - Control and one	rating unit "Automatic air conditioning" (AT)	
ISS - Automatic engine s	tartistop Control unit (A13)	
EEC - Combustion engin	e Control unit (A4)	
TCM - DUONIC Central	unit (A20)	
HLAL - Centrol unit 'Auto	matic headiamp adjustment (A6)	
AMO - Instabilizer-Con	trol unit (A17)	
SRS - Supplemental rest	Indirit systemControl unit (A25)	
Bar gata wer	Care	
		12461
AFUSO Diagno	stics	ITSUBISHI FUSO TRUCK & BUS CORPORATION
Diamonia > Castrol unit		C11154 meteriolat 63 173 1
ang and a second line		
MMO - Immobilizer - C	control unit (A12)	0
Varian Gror patter Attended	Artestan	
Providence	and the second se	
TRUCK OWN	Transponder key teached process	
Transponder key	Transponder key teach-to process	
Transponder key Teach-is process	Explanation	
Transponder Key Treath-In process	* Explanation Make the following settings	
Transponder key Transponder key Trasth-in process	Explanation Make the following settings:	nal vey
Transponder key Transponder key Teast-in process	Explanation Make the following settings: - Teach in transpander keys. - Programming and teach-is of addite - Key Detelle	nal key
Searcool Transporter Kay Teath-in process	Explanation     Make the tofowing settings         Track in transponder keys         • Programming and teach-in of addition         • Key Detele         Space ( land uses	nal tey
Transporter Key Teast-in process	Explanation Make the tolowing setting:	nal key
Transponder key Textil-in process	Explanation tase the totowing setting: • Teach in transporter keys: • tray below • tray below • Special features • The function * depends on the state • The function * depends on the state	nal key s of the component 'A12 (
Transporter key Teast-is process	Explanation Usas the tolevery settings: - Teach in transponder lays; - Programmerg and sechis of addets - Key Deteils Special features - The function "depinds on the statu Immositizer: Central unit 7.	nall say a of the component 'A12 (
Transorder key Teast-is process	Explanation Make the following settings - Tracels in temperature - Tracels in temperature - Tracels in temperature - Tracels in temperature - The function "depends on the statu - The function" depends on the statu - The function "depends on the statu	nal key s of the component 'W12 ( values
Tressorder key Texath-Ispicens	Explanation Mase to topong settings A seach to topong settings - Programming and teachs of addet - King Deter Special Fedfures - The Section Section as the status - Interview (Central unit) / Status of associated actual New	nativey a of the companient 3412 ( values Actual value Specified
Instances Testander Say Testander Say	Explanation Hase the following lettings: • Teach through the type: • regularizing and statch in deaders • regularizing and statch in teacher • regularizing and statch • regelarin	nal vey s of the component A12 ( values Actual values Specified value
Transorder Ley Teast-try pocons	Explanation Explanation Explanation Explanation Exactly the explanation Explanation Exactly the explanation Explanation Explanation Explanation Explanation Exactly Explanation Explanatio	nat vey s of the component 'A12 ( values Actual value Therapondar
Instances Testander Key Testander Sey	Explanation Was the following settings • Teach through the type, • regularized to the status • regularized to the status modular. Centre 4 section are the status modular. Centre 4 section and 1. Status of associated actual Nerve Type of say used Notice for stars the status Notice for the status of the sta	ndi key sof the component 'A12 ( values Antari value Transpador of
Transporter Lay Teach-typicous	Explanation Explan	nativey s of the component 'A12 ( values Actual value Throgondar of of 0
	Explanation Uses the tolerapy settings  • Teach the threshold type, • regenering and teach is dealers • regressioning and teach is dealers • regressions and teach is the state monoblest. Centre and J. Status of descolated actual News Type of teay used News States of function framebilitier States of function framebilitier	ndil key soff the component' A12 ( values Antoni value Transporter of of of o
Transporter key Transporter ke	Explanation Uses the tolevary setting: - A set to the setting of t	nativy s of the component 'A12 ( values Actual value Transponder valiet valiet value of of of of of of of of of of
Tradorder Ley Tradorder Ley	Explanation Uses the toleways setting: 	nd lay soft a component /h12 ( values Actual value Specified Transponder of o 0 0 10.4.6.1
Trading years	Explanation Has the toleways settings: A set the toleways settings: A setting the toleways settings: A setting the toleways setting to A setting to the toleways setting to B setting to the toleways setting to the toleways setting to B setting to the toleways setting to the toleways setting to B setting to the toleways setting to the toleways setting to B setting to the toleways setting to to the toleways setting to totting to to the toleways s	nat vy soft he component 'A12 ( values Transponder of of of of transponder table 1246 1
Transporce by Transporce by TeachingScott	Explanation     Explanatin     Explanatin     Explanatin     Explanatin     Explanatin	nativey a of the component A12 ( values Actual value Treagondar value or or or or 1246 f
	Explanation Explanation Inserts to tolowing settings: - and the tompspreder type. - registering and tabels in datase - registering and tabels in the state - monostruct register and it. - Status of cassion lated actual - Name - Type of last used - Name - Type of last used - Name - Type of last used - Name - Nam	nal key soff the component 'A12 ( values Actual value Transporter og og og unerer 12246 1
	Explanation Uses the tolevary setting:	nativy a of the component 'A12 ( values Actual value Specified value 00 01 00 01 02 02 02 02 02 02 02 02 02 02
Trading productory Trading process	Explanation Explanation Was the tolevary setting: • regularized to the status • regularized to the	nell key and the component A12 ( values Actual values Transporter egy op 12461 1157 · graden OF
Interconductory     Tradicipacean     Tradi	Explanation Explan	nat vey s of the component A12 ( values Actual value Transponder value 00 00 00 00 00 00 00 00 00 0
Technic by Technic by Technic process	Explanation Explanation Instantion Special features Special features Special features Instantion features Type of sevues and state Name Type of sevues Status of associated actual Name Type of sevues Status of sevues Status of function firmebilier Comments States of function firmebilier	nell key and the component A12 ( values Antain rahaw Transporter en op 0 12460 1157 generation (Component) 1260 1157 generation (Component) 1260 1157 generation (Component) 1157 generation (Component) 115
International and a second secon	Explanation Explanation Uses to: tolowing setting: - in operating and teachs of addite - in operating and teachs of addite - in operating and teachs of addite - in the operating and teach of a dite - in the operating and the operating and teach of a dite - in the operating and the operating and teach of a dite - in	nat vy s of the component A12 ( values Actual value Transponde Values 00 01 00 01 01 01 01 01 01 01

ssociated actual

Number of keys taught in Status of function immobili  From the control unit list screen, select [IMMO - Immobilizer Control Unit (A12)].

- Select "Actuations" tab.
- Select [Transponder key Teach-in process].

Press the "S" button of "Start teach-in process".

# **#984 INSPECTION OF IMMOBILIZER**

# 4.3 Various operations (initial key registration, additional key registration, secret key registration, key information deletion)

• Details of each function are as follows.

Function	FUSO Diagnostics display	Outline
Initial key registration	Button "R": Register Initial Key	Used to allow the immobilizer electronic control unit to identify starter key data or to load new data to the memory after replacement of the electronic control unit. (See "(1) Initial key registration".)
Additional key registration	Button "R": Register Additional Key	Used to allow the immobilizer electronic control unit to identify starter key data or to load new data to the memory at re-registration of starter key or addition of a new key. (See "(2) Additional key registration".)
Secret key registration	Button "R": Perform teach-in process "security code".	Used to allow the system to collate immobilizer electronic control unit ID with engine electronic control unit ID. (See "(3) Secret key registration".)
Key information deletion	Button "N": Delete key.	Used to delete starter key data registered in the immobilizer electronic con- trol unit memory. (See "(4) Key information deletion".)

# 

 The secret key data can be registered in the memory only after the initial key has been previously registered.

# (1) Initial key registration

 After replacement of the immobilizer electronic control unit, this function should be executed to allow the electronic control unit to identify the starter key data in the memory or load new data to the memory. (The procedure of initial key registration is identical with the procedure of additional key registration after pressing the button "R" for "Register Initial Key" See "(2) Additional key registration".)

### (2) Additional key registration

- At re-registration of starter key or addition of a new key, additional key registration function should be executed to allow the electronic control unit to identify the starter key data in the memory or load new data to the memory.
- Up to 6 sets of the key data can be registered in the immobilizer electronic control unit memory.

#### (2.1) Registration procedure



- Insert the starter key registered in the immobilizer electronic control unit memory.
- Check the actual value of "Type of key used" is "Transponder key".

• Press the "R" (red) button of "Register additional key".

54-13-12

- <complex-block>
- Press the "Continue" button.

If an error occurs, or when work was interrupted in the middle, and then press the "Continue" button after the ON again to OFF once the starter switch.

- Insert a new starter key to be registered in the immobilizer electronic control unit memory into the starter key switch.
- Press the "Continue" button.

- A message appears to show registration of additional starter key data in the immobilizer electronic control unit has been successfully completed.
- Make sure that the number of the value of "Numbers of keys taught in" is increased.

- (3) Secret key registration
- Secret key registration function should be executed whenever the following operations have been done. Without secret key registration, the engine cannot be started because engine cannot find the same key ID in the memory.
  - The immobilizer electronic control unit is replaced with new one.

126837E

- The engine electronic control unit is replaced with new one.
- The engine electronic control unit is replaced with one derived from other vehicles.

- The immobilizer electronic control unit should never be replaced with one derived from other vehicles.
- The secret key registration function need not be executed after the starter key data is once deleted and registered again.

# **#984 INSPECTION OF IMMOBILIZER**

# (3.1) Registration procedure

FUSO Diagnost Diagnosis > Centrol unit			
	nds Mil	SUBISHI FUSO TRUCK & BUS CO	RPORATION
MMO - Immobilizer - Con	ntrol unit (A12)	Carrier generation	0
Version Error paties Adverture	Artestary		
Selectors Transporter tex	Transponder key Teach-to process	Actual value Specif	led
Teach-in process	Type of key used	value Transponder	
	Number of keys taught in	01	
	Status of function 'immobilizer'	00	_
<b>11</b>	S		
	Register additional key		
	R		
	Perform teach-in process 'Security code'.		
	R		
_	S Start leach-in process.		
*•	8		Centruet
*	Cere	4.	0401
		E	2461
	tion MIT	SUBISHE FUSO TRUCK & BUS CO	OPOEATION
Diegnosis > Centrol unit	19-0-57 (1975	El 11.5V syntan OFF	6 2 ?
🖬 MMO - Immobilizer - Car	ntrol unit (A12)		0
Version Error paties Autorit relate	Artestany		_
Transporder key Teath-is pointes	Explanation		1
	Make the following settings		
	Teach in transponder keys.     Programming and teach-in of additional	i key	
	• Key Delete		
	The function ' depends on the status of	f the component 'A12 (	
	Immobilizer: Control unit ).	dara a	
	Status of associated actual vi	Actual value Specifi	we we
	Type of key used	value Transponder	
	Number of keys laucht in	key 02	
	Status of function 'Immobilizer'	00	
	2		Carthart
-		1.	2462
🙏 FUSO Diagnost	ios Mili	SUBISHI FUSO TRUCK & BUS CO	RPORATION
Diagnosis > Centrol unit		El 11.5V Ignition OFF	8 2 ?
MintO - minobelzer-Cor	troi unit (A12)		u
Version Gran patien Actual values			
Weaks Drocesta Attainate Enfection	Transponder key Teach-in process		
Selection Befection Transporder key Teach-in process	Explanation		
Refection Selection Transporder Key Teach-in process	Explanation The control unit is checking the access au	Ihergation.	
Extension Concerning Astronomy Enforcement Transporter Key Teast-Int process	Transponder key Teach-to process Explanation The control unit is checking the access au Step by step	Therization.	
Received Groupening Research and Enterchara Transporter Key Transf-Hispircess	Transponder Avy Teratibele process Explanation The control unit is checking the access au Step by step - Ocetime with submit Continuer Extense	Iherization.	
Reference in the second	Transponder Avy Tirat bein process Explanation The control unit is checking the access and Step by step • Certificies with subon "Certificer" Status of associated actual vol-	thergation. Sector 4 and 5	
Sector Concerning Concerning Enforcement Transporter Ray Teach-Hippicess	Transponder key Trashele process Explanation The correst will be checking the access au Step by step - corring with Judo's Continue' Status of associated actual via Name Name	ihergaton. Alues Actual value Spect Toronander	ed
Series (2014) Series (2014) Intrastorie say Textori pocas	Explanation Explanation Step by step - carine was whore to be Status of associated actual vir Name Type of key used Name of the summary of the states of the Name of the summary of the states of the	Inergation.	ed
Vene (2010) Another Selections Terratorian Key Teratorian process	Explanation Explanation Step by step - cerna with suther Conserv Status of associated actual vol Number of keys taggin in Dates of frequency Number of keys taggin in Dates of frequencies	Actual Value Transponder U2 02 03	•
Versel (2010)	Exploration Explanation Explanation Explanation Explanation Explanation Step by step - cernise with sution Coresor Status of associated actual vit Read Type of key used Number of keys taugit in Guides of function Temobilizer	Nerrasion Actual Value Specifi Transpinder Value 02 00	8
Versel (the close) And close the Safetyber Transported to the Transported to Transported to T	Transponder key Teaching process Explanation Explanation Step by step Community the subor Control Status of associated actual va Read Type of key used Number of keys target in Satus of function Temobility	Nercesion Actual Value Temponde Toyogram Do Do Do	ed Lossue
Versel (Internet) Antonio (Antonio) Selection Terrational Version Terrational process	Control Reg Teaches process     Control Reg Teaches process     Control Reg Teaches process and     Control Reg Teaches	Intersition.	ed Crewe
Verent (Stratent) Andreas Enfortune Terratorite Key Terratori process	Encounter key Teachen process     Explanation     Explanation     Explanation     Explanation     Step by step     . cermus with subsory Consear     Step by step     . cermus with subsory Consear     Marker     Type of keys tasget     Nucleor disps taget     Nucleor disps taget     Marker disps taget	nerzeson Actual yabe Bpeci Transponder Key 00	2462
Verent (star-ten) Antonio Antonio Salestate Terratorial Rey Terratoria process	Exampleide key Teachée process     Explanation     Explanation     Explanation     Step by step     - cermus with suture Conseer     Status of associated actual vis     Name     Nam     Name     N	nerzeton. Actual Value System Transponde tery 50	2462
Territoria Cara Lina Jean Cara Cara San Cara Cara Cara Cara Cara Cara Cara Ca	Transponder key Teachén process Familie Step and Step Carlon Control unit is chicking the access au Step by step - centinue with lution Control Status of associated actual vel Number of keys taogit in Status of function Temobilitier" Type of Keys Lead Number of keys taogit in Status of function Temobilitier" Control	Invession.	2462
President Constant of Antonia Section 1977	Tempender kay Teache process Emponentia unt a Chucking the access and Step by step - Cammar with subtory Constant Status of associated actual vir Marke Type of key used - Cammar Market days taget in Galaxies of function Termobiliser - Cammar - Ca	Interestion.	ed 2462
Vestel Concerned National Selections Transported toy Transported toy Transported toy Transported toy Transported to Transported Disports > Cateford tor Chapters > Cateford tor	Emposede kay Teache process     Explanation     Explanati	Interestion alues Actual vasue specifi Trappyone 00 00 00 11 11 11 11 11 11 11	2462
Period Transformer Antonio Antonio Transformer Antonio Transformer Antonio Transformer Antonio Transformer Antonio Transformer Antonio An	Emposede kay Teachine process     Explanation     Explana	Huesson. Alues Actual VAKa tog 60 60 1120 gebon 077 1120 gebon 077	ercentices 2462
Constant for and Advantage     Textbody process      Textbody process      Constant for any other advantage      Constant for advantage	Case     Control National State State     Control Nation     Control Nation     Control Nation     Control Nation     Control Nation     Control Nation     Control     Contro     Contro     Control     Control     Control     Control     Con	Interzeton.	ed 2462
Terral-Source Internet  Terral-Sources  Terra	Encounter key Tasahob process     Explanation     Explana	Interestion.	ed 2462
Period Constant Annual Annual Sectors  Terrasonary Ray Terrasonary Ray Terrasonary Ray Terrasonary Ray  FUISIO Diagnost  Constant Annual Sectors  Terrasonary Ray  Terrasonary	Emposeder key Teachele process      Explanation     Explanatin     Explanatin     Explana	Interestion.	ee 2462 0044404
Venes (traces) Another     Venes (traces)     Venes (traces)     Venes (traces)	Explorated key Teachele process     Exploration     Exploration     Contrast the building the access and     Step by step     e comma wise building the access and     Status of associated actual vi     Neme     Type of key clean     Type of key associated     Case	Interzeton.	ed 22462: ******
Control (Internet) Advanced Terresorder Ray Terresorder Ray Terresorder Ray Terresorder Ray Control (Internet) Control (Interne) Contr	Explorated key Teachele process     Exploration     Exploration     Control with Structure Control on     Control with     Control     Control with     Control      Contro      Control      Control      Control      Contro      Control	Interzeton.	eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
Terratorder Styreens	Exceptionation key Teachen process     Explanation     Explanatin     Explanatin     Expl	Interestion.	enter 22462: Creating of the second s
FUISO Diagnoss     Control of the second secon	Explanation     Explanatin     Explanatin     Explanatin     Explanatin     Explanatin	Interzation.	ee 2462 70
Control (Internet) - Activation     Territorio (Internet)	Intersonation key Takaholo process Explanation Step by step - Carmer with the future of the constant Status of the societated actual vir Nerview Type of key clean Type of key clean Type of key clean Type of key clean Case to a clean transport of the clean Type of key clean transport of the clean Case	Interzeton.	ed Tender 22462 Press/Jock
Periodi Carana Antonio Periodi Period	Exploration key Teacher process     Exploration     Exploration     Exploration     Exploration     Contrast tea totolog the access at     Status of teacher accusation     Type of they used     Type of they used     Contrast teacher they teacher     Contrast	Interestion.	ed 22462
Periodic Standards  Perio	Exceeded key Teachele process     Explanation     Explanatin     Explanatin     Explanati	Interzeton.	2462
Veste Concerns Amount Rescuese Terraporter say Terraporter say Terraporter say Terraporter say Compositive Control and Compositive Control and Control and	Intersection key Teachele process  Explanation Explanation Step by step  • carma with subsrivitor' Conteau Step by step  • carma with subsrivitor' Conteau Status of associated actual vi Neme Type of key caed Neme Cae  Inter of and (A12)  Component Transponder key Teachele process	Innezator.	900 ATC: 224622 2007 TC: 2007

124625E

• Press the "R" (black) button of "Perform teach-in process 'Security code".

• Press the "Continue" button.

• Press the "Continue" button.

• A message appears to show that registration of the secret key in the engine electronic control unit memory has been successfully completed.