Owner's Manual

JNSZ1100SV

READ THIS MANUAL CAREFULLY
IT CONTAINS IMPORTANT SAFETY
INFORMATION.

MINIMUM
RECOMMENDED
OPERATOR AGE: **16**

FOR OFF-ROAD USE ONLY

This vehicle is designed and manufactured for off-road use only.
USA only:
It does not confirm to federal motor vehicle safety standards, and operation on Public streets, roads, or highways is illegal

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Liability Release of Joyner Recreational Vehicles

Warranty Disclosure

Warranty Parts Order Form

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1. **Liability Release** needs to be signed by the dealer and purchaser then faxed back to Joyner at 480-813-6379
2. **Service Record** Form must be filled out and signed off by the dealer and the purchaser and faxed back to Joyner to activate warranty.
3. **Pre Delivery Inspection** is to be completed by a qualified technician. It must be initialed and signed off by the technician. At the same time, the consumer needs to initial off and confirm that each item of the 120 point check is operational.
4. **Customer Sign Off** must be initialed by customer after receiving PDI with dealership and confirming the vehicle is fully operational.
5. **Operator Maintenance** should be conducted by an Individual that has knowledge of vehicle and has completely read and understand the operator's manual.

Effective 3-15-08

All warranty claims must be processed through an authorized Joyner dealer. A copy of all documentation must be on file with Team Joyner USA, Inc.

Protect your vehicle and your safety. Follow the schedule listed within.

WWW.TEAMJOYNERUSA.COM

Toll Free 1-866-441-6363

After completing assembly and PDI Fax to 480-813-6379

•1510 W. Bell De Mar Dr. Tempe, AZ. 85283 • Phone: 480.813.6363 - Fax: 480.813.6379 •

Page

This release covers Joyner vehicles, dealers, and all affiliates of Castle Financial Corporation.

Liability Release of Joyner Recreational Vehicles

Please Initial and Sign

____ 1) Jumping the vehicle can cause serious damage to the drive train (axle, transmission, suspension)

____ 2) Injury or death can result from jumping vehicle. Do not jump.

____ 3) I understand that the roll bars are cosmetic and a roll over could cause death or serious injury. The seller is not liable for death or injury.

____ 4) I have inspected all machines for any cosmetic damage and found it/them to be satisfactory. I further understand that cosmetic damage is NOT covered by any factory warranties and unless noted here are deemed acceptable by me.

____ 5) Off-roading is dangerous. Death or injury could occur. The seller is not liable for injury or death.

____ 6) I understand all sales are final and that there is no right of rescission, no option for return or exchange for any vehicle purchased; and that the titled and registered machines were effectively purchased when I signed the title application.

____ 7) I understand the warranty is 90 days manufacturer defect only. Parts are covered but no labor.

____ 8) I understand that although some leading institutions do not require insurance, state law DOES require liability insurance and a driver's license. I also understand that some of the products offered by the dealer constitutes insurance and a separate policy would have to be purchased from an outside source to protect my purchase and fulfill state requirements.

____ 9) I have also been shown the VIN number for each machine and they match this form and all paperwork received.

____ 10) I understand that I have only 72 hours to notify the seller of any issues to the paperwork of the vehicle. After 72 hours it will be accepted by the purchaser.

____ 11) Off Road use only. Driving on paved roads can cause axle or transmission damage. Both tires turn equally, this is not a limited slip differential. Injury or death can occur from operating a non-DOT vehicle on public roads.

____ 12) Promise to pay - by signing this contract buyer agrees to pay Seller the "Total Due."

____ 13) Time of Essence - Time is the essence of this contract. Seller's acceptance of partial payments shall not in any manner modify the terms of this contract and such acceptance shall not be construed as a waiver of any subsequent defaults on Buyer's part nor shall it waive the "time is of the essence" provision.

____ 14) Notice - Any notice required to be given to Buyer shall be deemed reasonable notification if (1) mailed by ordinary mail, postage prepaid, to Buyer's mailing address as shown on this contract or to Buyer's most recent address as shown by a "notice of change of address" on file with Seller, whether or not such notice is actually received by Buyer, or (2) if given in any other manner which results in Buyer's actual receipt of such notice.

____ 15) Bad Check - If Buyer pays Seller with a check that is dishonored or unpaid for any reason, Seller may, at Seller's sole option, terminate this contract and retake the vehicle, or make claims against Buyer on the check. In addition, Seller will charge a $25 returned check charge plus any actual charges assessed by Seller's financial institution resulting from such returned check.

____ 16) Attorney Fees - If it is necessary for Seller to take legal action to enforce any of Seller's rights under this contract, Buyer agrees to pay to the extent permitted by law, the Seller's reasonable attorneys' fees and court costs.

____ 17) General - This contract is governed by applicable federal law and the laws of the state of Arizona. Any provisions found to be invalid shall not invalidate the remainder hereof. Waiver of any default shall not constitute waiver of any subsequent default. All words used herein shall be construed to be of such gender and number as the circumstances require. The contract shall be binding upon Buyer's heirs, personal representatives, successors and assigns and shall inure to the benefit of Seller's successors and assigns. This contract constitutes the entire agreement between the parties with respect to the subject matter herein, and may not be altered or amended unless made in writing and duly executed by the seller.

____ 18) Cash Deposit - If Buyer fails or refuses to accept delivery of any Vehicle or product or fails to comply with this contract, Seller may keep any cash deposit as liquidated damages, to the extent not prohibited by law. The deposit may also be used to reimburse Seller for any expenses and losses Seller incurs or suffers as a result of Buyer's failure or refusal to accept delivery of the Vehicle or product or to comply with this contract. Such expenses and losses may include Seller's reasonable attorneys' fees.

____ 19) Non-Delivery - Seller is not liable for failure to deliver or for delay in delivering the Vehicle or other product where such failure or delay is due, in whole or in part, to any cause beyond Seller's control or without Seller's fault or negligence.

____ 20) Risk of Loss; Insurance - The risk of loss to the vehicle or any other items covered by this invoice passes to Buyer upon delivery of the vehicle or other goods to the Buyer at the address set forth on this invoice for shipment to Buyer or such other place of receipt designated by the Buyer. Buyer is responsible for maintaining its own theft and liability insurance coverage for the vehicle.

____ 21) Age - Buyer represents and warrants to Seller that buyer is over the age of majority and is fully competent to enter into this contract. Buyer acknowledges that Seller is relying on this representation in entering into and performing this contract.

____ 22) Limitation of Damages. It is understood and agreed that Seller's liability and Buyer's sole remedy, whether in contract, under any warranty, in tort (including negligence), in strict liability or otherwise shall not exceed the return of the amount of the purchase price paid by the Buyer, and under no circumstances shall Seller be liable for any special, incidental, punitive or consequential damages, including, but not limited to, property damage, damage to or loss of equipment, lost profits or revenue, costs of renting replacements and other additional expenses, even if Seller has been advised of the possibility of such damages.

____ 23) No liability for Buyer's negligence. Seller shall not be liable for any damages, losses of expenses as a result of Buyer's negligence, whether deemed active or passive and whether or not any such negligence is the sole cause of any such damage, loss or expense.

____ 24) Conditions of Sale

____ 25) It is the responsibility of the Buyer to insure the safety and safe operation of all items sold to Buyer.

____ 26) The mechanical fitness of the machine is the sole responsibility of the Buyer and operator.

____ 27) Buyer acknowledges that there are dangers and risks inherent in the operation and use of all off-road vehicles, including but not limited to the danger and risk of collision with natural and man-made objects and with other vehicles and recreational users. Buyer understands that personal injury, death, dismemberment, or property damage can occur from any type of operation of an off-road recreational vehicle. Buyer accepts and assumes full responsibility for all such dangers and risks and the possibility of personal injury, death, property damage, or loss resulting therefrom and from unsafe operation.

____ 28) It is highly recommended that the Buyer or operator of this vehicle: (i) wear a helmet and safety belt at all times during operation of the vehicle and (ii) attend a safety course in operating ATV's, Dirt Bikes, UTV's, or Dune Buggies.

Customer Signature_____ Date_____

Address_____ City_____ State_____ Zip_____ Phone_____

Dealer Signature_____ Date_____

Address_____ City_____ State_____ Zip_____ Phone_____

Vehicle_____ VIN #_____ Year_____

• 1510 W. Bell Dr Mar Dr. Tempe, AZ. 85283 • Phone: 480.813.6363 - Fax: 480.813.6379 •

Must be on file to order parts

Team Joyner USA Limited Manufacturer's Defect Warranty

Team Joyner USA herby warrants that new Joyner Off-Road Vehicle purchased from an authorized Joyner dealer worldwide including the United States, Middle East, Europe, Canada, Germany, Spain, or wherever Joyner recreational vehicles are sold by an authorized dealer will be free from defects in material and workmanship for the period of time stated herein, subject to certain stated limitations. Purchasing a Joyner vehicle from a non-authorized Joyner dealer will be without a warranty

The Period of Warranty for Joyner Off-Road Vehicles shall be ninety (90) days from the date of purchase. The warranty can be voided during the 90 days if found that you have violated any of the below requirements.

During the Period of the Warranty any authorized Joyner dealer will evaluate, repair or replace any part adjudged defective by Joyner due to faulty workmanship or material from the factory. Parts used in warranty repairs will be warranted for the balance of the product's warranty period. All parts replaced under warranty become property of Team Joyner USA. Warranty only covers defective parts, no labor is included. Consumer will pay Joyner dealer direct for any labor charges.

General Exclusions from this warranty that will void the entire warranty shall include any failures caused by:

a. Competition or racing use.
b. Installation of parts or accessories that is not qualitatively equivalent to genuine Joyner parts.
c. Abnormal strain, neglect, or abuse.
d. Lack of proper maintenance.
e. Accident or collision damage.
f. Modification to original parts.
g. Damage due to improper transportation.
h. Adjustments from operations.
i. Damage caused by exceeding travel of vehicle.
j. Altering the vehicle in any manner.
k. Placing additional seats.
l. Turbo chargers and super chargers.
m. Adding electrical devices that cause electrical failure.
n. Damage caused by debris; rocks, riverbed, trees, etc.
o. Damage caused by rollovers due to improper operation of vehicle.
p. Climbing beyond the capacity of the vehicle.
q. Operating differential lockers in excess speed of 20 mph.
r. Abuse and improper operations.
s. Increasing size of the tire or wheel from the Joyner standard tire and wheel package.
t. Towing an additional vehicle using a winch for other uses other than pulling the vehicle it is attached to.

Specific Exclusions from this warranty shall include parts replaced due to normal wear or routine maintenance, such as spark plugs, oil, oil filter, air filter, brake shoes, CV Joints, CV Boots, Universal Joints, Cables, water damage to electrical equipment, clutches pressure plates and transmission gear from neglect or miss shifting.

The Customer's Responsibility under this warranty shall be to:

1. Operate and maintain the off road vehicle as specified in the appropriate owner's manual;
2. Give notice to an authorized Joyner dealer of any all apparent defects within ten (10) days after delivery, and make the machine available at that time for inspection and repairs at such dealer's place of business.
3. To operate to the intent of the vehicle use
4. Not to travel in and out of water that is more than twelve (12) inches deep.
5. To not operate at any time in salt water.
6. Not to jump the machine in any manner.
7. To follow all local and state safety regulations.
8. Not to alter the vehicle in any manner.
9. Not to install any additional seating.
10. To check all bolts and nuts prior to any ride.
11. Properly clean and protect the cosmetics of the vehicle.

Additional Warranty Requirements:

1. An authorized Joyner dealer to perform a break in service at ten (10) hours or two hundred and fifty (250) miles which ever comes first. There must be a record that this has been conducted by an authorized dealer in order to obligate Joyner to use the warranty on the vehicles or parts.
2. A record of complete operator maintenance must be kept and at any time a Joyner dealer may request this record to qualify the repair under warranty.
3. All fluid must be changed per the operator's manual. On all transmission or engine failures, this record will be requested.
4. Pre-Delivery Inspection (PDI)
   On each Joyner vehicle a pre delivery inspection form is required. A Joyner dealer is required to perform his procedure with the consumer signing off on all items of the PDI form. It is the Joyner dealer's responsibility to ensure and sign off on the vehicle to its mechanical fitness and make sure all safety equipment is installed

correctly. The dealer, during their pre delivery inspection is required to use Tamper Proof paint in red, orange, or white to ensure all nuts and bolts are tightened to specifications. The form can be downloaded at www.teamjoynerusa.com or request them to be FedExed to you. It is also the consumer's responsibility that the dealer has performed this procedure. Consumers must, within ten (10) days after accepting the vehicle, notify Joyner at 1-866-441-6363 or email PDI@teamjoynerusa.com or fax to 480-813-6379 in writing that the dealer failed to properly deliver the vehicle to you on an authorized pre delivery inspection form. Failure to properly notify Joyner of this can Void the warranty or cause serious injury, death, dismemberment, or damage to the vehicle. Joyner is not responsible for the fitness of the vehicle or the safety of the vehicle if the PDI is not performed by the dealer.

Warranty Notification Procedures-

Joyner will only accept warranty claims on its prescribed form with an authorized dealer signing off that in fact the part should be covered under warranty. This from must be e-mailed or faxed in signed by a dealer. A current PDI form must be on file with Joyner with a dealer's signature and consumer signature accepting delivery of the vehicle order and agreeing to the mandatory liability releases. If dealer determines that the part is not under warranty, you have ten (10) days to dispute this in writing to dealer and Joyner. Consumers can not order warranty parts only authorized Joyner dealerships can.

Safety- You should acknowledge that you are entering a very hazardous sport and you could be injured, dismembered, or even loose your life. This could occur from operation failure to completely conduct operator's maintenance or failure to have your vehicle properly delivered to you on an authorized dealer Joyner PDI form. It is not the responsibility of Joyner or any of its affiliates to ensure your vehicle will not cause you to be injured, dismembered, or even loss of life. You, without any guaranty of warranty, enter into full awareness of the hazards. It is recommended that you wear proper protection to include Helmet, safety belt, safety netting over doorways and even hand and arm restraints to keep your full body inside the vehicle in case of a roll over. Joyner can not be responsible for any losses of life, limbs, or serious injury. It is recommended that you attend an off road safety course prior to operating this vehicle, or you have agreed to take all responsibilities of operator and passengers.

This warranty is not transferable

Emission Control System Warranty – Team Joyner USA also warrants to the ultimate purchaser and each subsequent purchaser of each 2006 and later model Joyner off road vehicles covered by this warranty that the vehicle is designed, built, and equipped so as to conform at the time of sale with all U.S. emissions standards applicable at the time of manufacture and that it is free from defects in materials and workmanship which would cause it not to meet these standards within the period listed immediately below. Failures other than those resulting from defects in material or workmanship which arise solely as a result of owner abuse and/or lack of proper maintenance are not covered by this warranty.

All models-thirty (30) months from the original purchase date.

If at anytime the emission related parts have been altered or removed, or the removal of the certificate that is fixed to the vehicle, the warranty will be null and void. This vehicle must conform to the regulations per EPA and CA Air Resource Board.

Team Joyner USA makes no other warranty of any kind, expressed or implied. All implied warranties of merchantability and fitness for a particular purpose which exceed the obligations and time limits stated in this warranty are hereby disclaimed by Team Joyner USA and excluded from this warranty.

Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. Also excluded from this warranty is any incidental or consequential damages including loss of use. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Authorized Dealership

Team Joyner USA
1510 W. Bell De Mar Dr
Tempe, AZ 85242
1-866-441-6363

Name_____
Address_____
City, State, Zip_____
Phone_____
Signature_____

Parts Order Form
Warranty Claim Form

www.teamjoynerusa.com

90 Day Manufacturer Defects Only
Fax# (480) 813-6379
Email: parts@teamjoynerusa.com

OFFICE USE ONLY

Parts Department
Date Received:_____
Date Processed:_____
Date Shipped:_____
Order Complete
Yes ☐ No ☐
Invoiced to Factory
Yes ☐ No ☐

Dealer:_____
Contact Name:_____
Address:_____
City:_____ **ST:**_____ **Zip:**_____
Phone:_____

Customer Name:_____
Address:_____
City:_____ **ST:**_____ **Zip:**_____
Phone:_____

SALE DATE	DELIVERY DATE	YEAR	MODEL	VIN#	COLOR

SYMPTOMS:_____

QTY	ITEM #	PG. #	PART #	DESCRIPTION	COST	TOTAL	WARRANTY YES OR NO

Payment Method: Cash ☐ Check ☐ Visa ☐ Mastercard ☐ Discover ☐

Drivers License #_____ ST:____ EXP:_____
Card#_____ EXP:_____ ZIP:_____ CVC#_____
I authorize Team Joyner USA to charge my credit card
Signature:_____ Date:_____

SUBTOTAL:_____
TAX:_____
SHIPPING COST:_____
TOTAL:_____

SHIPPING IS NOT INCLUDED ON PARTS ORDERS

Shipping Method: Ground ☐ 2Day ☐ Overnight ☐ Rush Service $25 Fee ☐

Dealers Signature:_____ Date Submitted:_____
Print Name Sign

Exceeding the capability of the machine can cause damage and will not be covered under warranty. Abuse or misuse will not be covered under warranty. The 90 day manufacturers warranty is for defective parts only, not parts that become inoperative from use.

It is the purpose of this form to determine that the customer is qualified for warranty parts. Please note that the following parts are not covered under warranty and are considered as wear parts.

CLUTCH CABLE, THROTTLE CABLE, CLUTCH, BRAKE PADS, MUFFLERS, SHOCKS, LIGHT BULBS, DIRT IN FUEL TANK, DIRT IN CARBURETOR, DAMAGE FROM JUMPING OR EXCEEDING TRAVEL OF MACHINE, THERMOSTAT, TIRE S AND WHEELS, ELECTRICIAL PARTS SUCH AS: ALTERNATOR, VOLTAGE REGULATOR

WE ONLY ACCEPT FAX OR EMAIL ORDERS FOR PARTS-NO PHONE ORDERS!

NO ORDERS WILL BE PROCESSED WITH INCOMPLETE INFORMATION

OFFICE USE ONLY

APPROVED or DECLINED BY:_____ DATE:_____
Yes ☐ No ☐ Yes ☐ No ☐ PRINT NAME SIGN

REMARKS:_____

Operational Failure ☐ Out of Warranty Period ☐ Operational Wear ☐ Pictures Required/Retrieve Part ☐

PDI MUST BE ON FILE TO PROCESS

SERVICE RECORD

Fax to 480-813-6379

No warranty parts can be ordered if not on file

authorized pre-paid service program at a participating dealership near you.

You can purchase the first year service programs that include 10, 40, 80, and 120 hour services. Inquire with your dealer. We recommend that you follow this service schedule to ensure safety and mechanical fitness of your Joyner recreational vehicle. Failure to have your vehicle serviced by an authorized service center or dealership can result in injury, death, or dismemberment.

Customer Name _____

Address _____

City _____ State _____ Zip _____

Email _____ Phone _____

Vehicle Information

Model _____ Year _____

Vin # _____ Color _____

	Date	Sign off	Miles	Remarks
Assembly				
EPA and CARB stickers				
Pre Delivery Inspection				
Customer Sign Off				
10 hour or 250 miles				
40 hour or 250 miles				
40 hour or 500 miles				
80 hour or 750 miles				
120 hour or 1000 miles				

Dealership Information

Name	Phone	Date

Monthly checks

Date	Date	Date	Date	Date	Date
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Selling Dealership

Dealership Name _____

Address _____

City _____ **State** _____ **Zip** _____

Phone _____

This activates Warranty

Date of Purchase _____

Customer Signature _____

By signing you have agreed to all liability releases and understand warranty.

Preventative Maintenance and Service Log

Team joyner USA	Dealership Responsibilities			Recommended Authorized Joyner Dealer or Service Center				Operators Responsibilities Also check prior to each ride			
120 Point Check	Assembly	Pre Delivery Inspection	Customer Initials	10 hour or 250 miles	40 hour or 500 miles	80 hours or 750 miles	120 hours or 1000 miles	Weekly	Monthly	Quarterly	Yearly
Engine											
1)Drive Belt				TA	TA	TA	TA		TA	TA	TA
2)Tighten Bolts On Engine				TA	TA	TA	TA	TA	TA	TA	TA
3)Engine Oil				RC	LF	LF	RC	LF	LF	LF	RC
4)Exhaust				TA	TA	TA	TA	TA	TA	TA	TA
5)Air Filter				RC	LF	LF	RC	LF	LF	LF	RC
6)Manifold Bolts				TA	TA	TA	TA			TA	TA
7)Pulley Bolts				TA	TA	TA	TA			TA	TA
8)Engine Mounts				TA	TA	TA	TA	TA	TA	TA	TA
9)Engine Breather Tube				IC	IC	IC	IC		IC		IC
10) Carburetor				TA	TA	TA	TA	TA	TA	TA	TA
11) All Nuts And Bolts				TA	TA	TA	TA	TA	TA	TA	TA
Transmission											
12) Transmission Fluid				RC	LF	LF	RC	LF	LF	LF	RC
13) Clutch Pedal				LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA
14) Clutch							RC				RC
15) Shifter				LF/TA	LF/TA	LF/TA	LF/TA			LF/TA	LF/TA
16) Transmission Function				IC	IC	IC	IC		IC	IC	IC
17) Clutch Mount				TA	TA	TA	TA		TA	TA	TA
18) Shifter Cables				LF/TA	LF/TA	LF/TA	LF/TA			LF/TA	LF/TA
19) Transmission Mounts				TA	TA	TA	TA		TA	TA	TA
20) All Nuts And Bolts				TA	TA	TA	TA	TA	TA	TA	TA
Ignition											
21) Coil				IC	IC	IC	IC	IC	IC	IC	IC
22) Distributor For Ignition				IC	IC	IC	IC	IC	IC	IC	IC
23) Plug Wires				IC	IC	IC	IC	IC	IC	IC	IC
24) Throttle Choke Cable				LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA
25) Idle				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
26) All Nuts And Bolts				IC	IC	IC	IC	IC	IC	IC	IC

IC= Inspect And Clean, TA: Tighten And Adjust If Needed, LF= Lubricate And Fill, RC= Replace Or Change

After completing make a copy for your records and fax to 480-813-6379

joyner USA	Dealership Responsibilities			Recommended Authorized Joyner Dealer or Service Center				Operators Responsibilities Also check prior to each ride			
	Assembly	Pre Delivery Inspection	Customer Initials	10 hour or 250 miles	40 hour or 500 miles	80 hours or 750 miles	120 hours or 1000 miles	Weekly	Monthly	Quarterly	Yearly
Cooling System				IC/LF	IC/LF	IC/LF	RC	IC/LF	IC/LF	IC/LF	RC
27) Coolant Level											
28) Coolant Hose And Clamps				IC	IC	IC	IC	IC	IC	IC	IC
29) Radiator Mount Bolts				TA	TA	TA	TA	TA	TA	TA	TA
30) Radiator Cap				TA	TA	TA	TA	TA	TA	TA	TA
31) Fan				IC	IC	IC	RC	IC	IC	IC	RC
32) Hose Clamps				TA	TA	TA	TA	TA	TA	TA	TA
Fuel System											
33) Fuel Tank Cover				TA	TA	TA	TA	TA	TA	TA	TA
34) Breathe Hose And Joint				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
35) Fuel Hose				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	RC
36) Fuel Hose Clamps				TA	TA	TA	TA	TA	TA	TA	TA
37) Fuel Tank				IC	IC	IC	IC	IC	IC	IC	IC
38) Fuel Filter				IC	IC	RC	IC			IC	RC
39) Fuel Regulator				TA	TA	TA	TA	TA	TA	TA	TA
40) Fuel Pump				IC	IC	IC	RC		IC	IC	RC
Drive Train											
41) Axles				IC	IC	IC	IC	IC	IC	IC	IC
42) Cv Joint				IC	IC/LF	IC	RC			IC	RC
43) Drive Shaft				LF	LF	LF	LF		LF		LF
44) Cv Bouts				IC	IC	IC	RC	IC	IC	IC	RC
45) Spindle				TA	TA	TA	TA	TA	TA	TA	TA
46) Bearings				IC/LF	IC/LF	IC/LF	RC		IC	IC	RC
47) Castle Nuts				TA	TA	TA	TA	TA	TA	TA	TA
48) Cotter Pins				RC	RC	RC	RC	RC	RC	RC	RC
49) Differential Front				TA	TA	TA	TA	TA	TA	TA	TA
50) Differential Front Cable				TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF
51) Front Gear Oil				RC	LF	RC	LF	LF	LF	RC	RC

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	Dealership Responsibilities			Recommended Authorized Joyner Dealer or Service Center				Operators Responsibilities Also check prior to each ride			
	Assembly	Pre Delivery Inspection	Customer Initials	10 hour or 250 miles	40 hour or 500 miles	80 hours or 750 miles	120 hours or 1000 miles	Weekly	Monthly	Quarterly	Yearly
52) Differential Breather Tub Front				IC	IC	IC	IC	IC	IC	IC	IC
53) Differential Rear				TA	TA	TA	TA	TA	TA	TA	TA
54) Differential Rear Cable				TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF
55) Differential Breather Tub Rear				IC	IC	IC	IC	IC	IC	IC	IC
56) Rear Gear Oil				RC	LF	RC	LF	LF	LF	RC	RC
57) Axle Nuts				TA	TA	TA	TA	TA	TA	TA	TA
58) Wheel Studs Nuts				TA	TA	TA	TA	TA	TA	TA	TA
59) Ball Joint Bolts				TA	TA	TA	TA	TA	TA	TA	TA
60) 4x4 Lockers				IC/TA	IC/TA	IC/TA	IC/TA			IC/TA	IC/TA
Brakes											
61) Brake Pads				IC	IC	IC	RC	IC	IC	IC	RC
62) Brake Fluid Level				LF	LF	LF	RC	LF	LF	LF	RC
63) Rotors				IC	IC	IC	IC	IC	IC	IC	IC
64) Calipers				IC/TA	IC/TA	IC/TA	IC/TA	IC	IC/TA	IC/TA	IC/TA
65) Brake Lines				IC	IC	IC	IC	IC	IC	IC	IC
66) Master Cylinder				IC/TA	IC/TA	IC/TA	IC/TA	IC	IC/TA	IC/TA	IC/TA
67) Brake Pedal				LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA
68) Emergency Brake				IC	IC	IC	IC	IC	IC	IC	IC
69) Emergency Brake Cable				LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA
70) Emergency Brake Pads				IC	IC	IC	RC	IC	IC	IC	RC
71) Emergency Brake Fluid				LF	LF	LF	RC	LF	LF	LF	RC
72) Three Way Brake Valve				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
73) All Nuts And Bolts				TA	TA	TA	TA	TA	TA	TA	TA
74) Wire And Plugs				IC	IC	IC	IC	IC	IC	IC	IC
Electrical											
75) Battery				IC/LF	IC/LF	IC/LF	RC	IC/LF	IC/LF	IC/LF	RC
76) rnator				IC	IC	IC	IC	IC	IC	IC	IC
77) Starter				IC	IC	IC	IC	IC	IC	IC	IC

IC= Inspect And Clean, TA: Tighten And Adjust If Needed, LF= Lubricate And Fill, RC= Replace Or Change

Team joyner USA	Dealership Responsibilities			Recommended Authorized Joyner Dealer or Service Center				Operators Responsibilities Also check prior to each ride			
	Assembly	Pre Delivery Inspection	Customer Initials	10 hour or 250 miles	40 hour or 500 miles	80 hours or 750 miles	120 hours or 1000 miles	Weekly	Monthly	Quarterly	Yearly
78) Connection				IC	IC	IC	IC	IC	IC	IC	IC
79) Voltage Regulator				IC	IC	IC	IC	IC	IC	IC	IC
80) Gauges				IC	IC	IC	IC	IC	IC	IC	IC
81) Lighting				IC	IC	IC	IC	IC	IC	IC	IC
82) All Nuts And Bolts				TA	TA	TA	TA	TA	TA	TA	TA
83) Horn				IC	IC	IC	IC	IC	IC	IC	IC
Suspension											
84) Tires				IC	IC	IC	IC	IC	IC	IC	IC
85) Tire Air Pressure				TA	TA	TA	TA	TA	TA	TA	TA
86) Wheels And Bearing				LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA	LF/TA
87) A-Arms				TA	TA	TA	TA	TA	TA	TA	TA
88) Swing Arms				TA	TA	TA	TA	TA	TA	TA	TA
89) Shocks Rear				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
90) Tighten Nuts On The Hub And Wheel				TA	TA	TA	TA	TA	TA	TA	TA
91) Shock Bolts				TA	TA	TA	TA	TA	TA	TA	TA
92) A-Arm Bolts				TA	TA	TA	TA	TA	TA	TA	TA
93) Tie Rod				TA	TA	TA	TA	TA	TA	TA	TA
94) Ball Joint				TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF
95) Hein Joints				TA	TA	TA	TA	TA	TA	TA	TA
96) Shocks Front				TA	TA	TA	TA	TA	TA	TA	TA
97) Nitrogen				TA	TA	TA	TA	TA	TA	TA	TA
98) All Nuts And Bolts				TA	TA	TA	TA	TA	TA	TA	TA
Steering											
99) Steering Wheel				TA	TA	TA	TA	TA	TA	TA	TA
100) Steering Box				TA/LF	TA/LF	TA/LF	TA/LF		TA/LF	TA/LF	TA/LF
101) Steering Rod Bolts				TA	TA	TA	TA	TA	TA	TA	TA
102) Ball Joints				TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF	TA/LF
103) Rod Ends				TA	TA	TA	TA	TA	TA	TA	TA
104) Hein Joint				TA	TA	TA	TA	TA	TA	TA	TA
105) All Nuts And Bolts				TA	TA	TA	TA	TA	TA	TA	TA

IC= Inspect And Clean, TA: Tighten And Adjust If Needed, LF= Lubricate And Fill, RC= Replace Or Change

	Dealership Responsibilities			Recommended Authorized Joyner Dealer or Service Center				Operators Responsibilities Also check prior to each ride			
	Assembly	Pre Delivery Inspection	Customer Initial	10 hour or 250 miles	40 hour or 500 miles	80 hours or 750 miles	120 hours or 1000 miles	Weekly	Monthly	Quarterly	Yearly
Chassis			[redacted]								
106) Welds				IC	IC	IC	IC	IC	IC	IC	IC
107) Roll Bar Connection				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
108) Floor Panels			[redacted]	TA	TA	TA	TA	TA	TA	TA	TA
109) Skid Plates			[redacted]	TA	TA	TA	TA	TA	TA	TA	TA
110) Winch Function				IC	IC	IC	IC	IC	IC	IC	IC
111) Winch Mount			[redacted]	TA	TA	TA	TA	TA	TA	TA	TA
112) Seat Belts				TA	TA	TA	TA	TA	TA	TA	TA
113) Seat Belt Mounts			[redacted]	TA	TA	TA	TA	TA	TA	TA	TA
Cosmetics			[redacted]								
114) Body Kits				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
115) Hood				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
116) Dump Bed				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
117) Safari Rack				IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA	IC/TA
118) Light Bar Rack				TA	TA	TA	TA	TA	TA	TA	TA
119) Dash Panel				TA	TA	TA	TA	TA	TA	TA	TA
120) Seats				TA	TA	TA	TA	TA	TA	TA	TA

IC= Inspect And Clean, TA: Tighten And Adjust If Needed, LF= Lubricate And Fill, RC= Replace Or Change

Warranty can be voided by Joyner or dealership if the proper maintenance and service has not been conducted

The service record must be faxed in when requesting warranty parts effective 2-15-08. No exceptions!!!!

Fax 480-813-6379

Release of liability required to be on file to order parts.
We reserve the right at any time to not sell or supply parts to the dealer or consumer for any reason.

OWNER’S MANUAL

1. FOREWORD

Thank you for choosing our off high way recreational vehicle. We hope you will have fun with it. Before you drive the off high way recreational vehicle, please read through this Owner’s Manual carefully as it contains important safety and maintenance information. Failure to follow the warnings contained in this manual can result in serious injuries.

Be sure to follow the recommended maintenance schedule and service your kart accordingly. Preventive maintenance is extremely important to the longevity of your off high way recreational vehicle.

We hope you will have a pleasant experience with our products and thanks again for choosing US.

2. A FEW WORDS ABOUT SAFETY

In order to keep everyone safe, you must take responsibility for the safe operation of your Off high way recreational vehicle.

To help you make informed decisions about safety, we have provided operating procedures and other information on labels and in this manual. This information alerts you to potential hazards that could hurt you or others.

It is not practical or possible to warn you about all hazards associated with operating or maintaining an off high way recreational vehicle. You must use your own good judgment.

You will find important safety information in a variety of forms, including:

Safety Labels - On the Off high way recreational vehicle.

Safety Messages – Preceded by a safety alert symbol ⚠ and one of two signals: WARNING, or CAUTION.

These signal words mean:

Physical harm may result from failure to adhere to the instructions that are described within the WARNING labels.

Safety Headings---It means important safety reminders or important safety precautions.

Safety Section --- It means Go- Kart safety.

Instructions --- how to use this Go –Kart correctly and safely.

This entire manual is filled with important safety information----please read it carefully.

3. IMPORTANT SAFETY INFORMATION

Your Off high way recreational vehicle will provide you with many years of service and pleasure. Providing you take responsibility for your own safety and understand the challenges you can meet while driving.

There is much that you can do to protect yourself when you drive. You'll find many helpful recommendations throughout this manual. The following are a few that we consider most important.

Follow the Age Recommendation

It is strongly recommended that no one under the age of 16 be permitted to drive this Off high way recreational vehicle without adult supervision.

Always Wear a Helmet

It's a proven fact: helmets significantly reduce the number and severity of head injuries. Always wear an approved motorcycle helmet. We also recommend that you wear eye protection, sturdy boots, gloves, and other protective gear.

Drive Off-Road Only

Your Off high way recreational vehicle is designed and manufactured for off-road use only. The tires are not made for pavement, and the off high way recreational vehicle does not have some features required for use on public roads.

Take Time to Learn & Practice

Even if you have derived other off high way recreational vehicle, take time to

become familiar with how this off high way recreational vehicle works and handles. Practice in a safe area until you build your skills and get accustomed to this off high way recreational vehicle's size and weight.

Because many accidents involve inexperienced or untrained drives, we urge all drivers to take a training course approved by the Off high way recreational vehicle Safety Institute. Check with your dealer for more information on training courses.

Be Alert for Off-Road Hazards

The terrain can present a variety of challenges when you drive off-road. Continually "read" the terrain for unexpected turns, drop-offs, rocks, ruts, and other hazards. Always keep your speed low enough to allow time to see and react to hazards.

Drive within Your Limits

Pushing limits is another major cause of Off high way recreational vehicle accidents. Never drive beyond your personal abilities or faster than conditions warrant. Remember that alcohol, drugs, fatigue, and inattention can significantly reduce your ability to make good judgments and driver safely.

Don't Drink and drive

Alcohol and driving don't mix. Even one drink can reduce your ability to respond to changing conditions, and your reaction time gets worse with every additional drink. So don't drink and drive, and don't let your friends drink and drive either.

Never run your Go- Kart indoors.

The exhaust from the engine contains a tasteless, odorless and poisonous gas called carbon monoxide.

Keep away from moving parts of the Off high way recreational vehicle

The operator of the Off high way recreational vehicle should never place their hands or other parts of their body near any moving part of the Off high way recreational vehicle. Failure to adhere to this warning will cause physical harm to your body.

Skidding or Sliding

The terrain surface can be a major factor affecting turns, Skidding a turn is more likely to occur on slippery surfaces such as snow, ice, mud and loose gravel. If you skid on ice, you may lose all directional control. To avoid skidding on slippery terrain, keep you speed low and drive carefully.

4. SAFETY LABELS

This section presents some of the most important information and recommendations to help you drive your Off high way recreational vehicle safely. Spend a few moments to read these pages.

The labels are considered permanent parts of the Off high way recreational vehicle. If a label comes off or becomes hard to read, contact your dealer for warning labels replacements.

5. ARE YOU READY TO DRIVE?

Before each drive, you need to make sure you and your Off high way recreational vehicle are both ready to drive. To help get you prepared, this section discusses how to evaluate your driving readiness, what items you should check on your Off high way recreational vehicle, and adjustments to make for your comfort, convenience, or safety.

Before you drive your Off high way recreational vehicle for the first time, we urge you to:

- Read this owner's manual and the labels on your off high way recreational vehicle carefully.

- Make sure you understand all the safety messages.
- Know how to operate all the controls.
- Have adult present if under 16 years old.

Before each drive, be sure:

- You feel well and are in good physical and mental condition.
- You are wearing an approved motorcycle helmet (with chin strap tightened securely), eye protection, and other protective clothing.
- You don't have any alcohol or drugs in your system.

Protective Apparel

For your safety, we strongly recommend that you always wear an approved motorcycle helmet, eye protection, boots, gloves, long pants, and long-sleeved shirt or jacket whenever you drive.

Although complete protection is not possible, wearing proper wear can reduce the chance of injury when you drive.

The following suggestions will help you choose the proper driving wear.

- Helmets and Eyes Protection

Your helmet is your most important piece of driving gear because it offers the best protection against head injuries. A helmet should fit your head comfortably and securely.

- An open-face helmet offers some protection, but a full-face helmet offers more. Regardless of the style, look for a DOT (Department of Transportation) sticker in any helmet you buy. Always wear a face shield or goggles to protect your eyes and help your vision.

Operating this Off high way recreational vehicle without wearing an approved motorcycle helmet, eye protection, and protective clothing could increase your chances of head and/or eye injury, possibly death in the event of severe accident.

Always wear approved motorcycle helmet that fits properly and wear eye protection (goggles or face shield), gloves, boots, long-sleeved shirt or jacket and long pants.

- Additional Driving Wear

In addition to a helmet and eye protection, we also recommend:

1. Sturdy off-road motorcycle boots to help protect your feet, ankles, and lower legs Off-road motorcycle gloves to help protect your hands.
2. Driving pants with knee and hip pads, a driving jersey with padded elbows, and a chest/shoulder protector.

Drive Training

Developing your driving skills is an on-going process. Even if you have derived other Off high way recreational vehicles, take time to become familiar with how this Off high way recreational vehicle works and handles. To build skills, Practice driving the Off high way recreational vehicle in a safe area, do not drive in rough terrain until you get accustomed to the Off high way recreational vehicle's controls, and feel comfortable with its size and weight.

Operating Off high way recreational vehicle without proper instruction could increase your risk of an accident, which could lead to serious injury or death.

Attempt supporting with your hands to the ground when the Vehicle turning over could lead to serious injury or death.
Never support with your hands to ground when the vehicle will turn over.

Age Recommendation

It is strongly recommended that no one under the age of 16 be permitted this Off high way recreational vehicle without adult supervision.

A child driving a Off high way recreational vehicle that is not recommended for his/her age could lose Off high way recreational vehicle control and result in severe injury or death.

A child under 16 should have adult supervision when operate on the Off high way recreational vehicle.

No Alcohol or Drugs

Alcohol, drugs and off high way recreational vehicles don't mix. Even a small amount of alcohol can impair your ability to operate a Off high way recreational vehicle safely. Likewise, drugs-even if prescribed by a physician-can be dangerous while operating a Off high way recreational vehicle. Consult your doctor to be sure it is safe to operate a vehicle after taking medication.

Operating this Off high way recreational vehicle after alcohol or drugs can seriously affect your judgment, because you to react more slowly, affect your balance and perception, and could result in serious injury or death.

Never consume alcohol or drugs before or while operating this Off high way recreational vehicle.

6. IS YOUR VEHICLE READY TO DRIVE?

Before each drive, it is important to inspect your Off high way recreational vehicle and make sure any problems are away. A pre-drive inspection is necessary, not only for safety, but also for comfort. Because any a breakdown, or even a flat tire, can be a major inconvenience.

If your Off high way recreational vehicle has overturned or has been involved in a collision, do not drive it until your dealer has inspected your Off high way recreational vehicle, There may be damages or other problems you cannot see.

Improperly maintaining this Off high way recreational vehicle or failing to correct a problem before driving can cause a crash in which you can be seriously hurt even die.

Always perform a pre-drive inspection before every drive and correct each problem.

Pre-drive Inspection

Check the following items before you get on the Off high way recreational vehicle:

- Engine Oil

  Check the oil level and add oil if needed. Check for leaks.

- Fuel

  Check the fuel level and add fuel if needed. Also make sure the fuel fill cap is securely fastened. Check for leaks.

- Tires

  Use a gauge to check the air pressure. Adjust if needed. Also look for signs of damages or excessive wear.

- Nuts & Bolts

  Check the wheels to see that the axle nuts are tightened, Use a wrench to make sure all accessible nuts; bolts, and fasteners are tight.

- Under body & Exhaust System

  Check for and remove any dirt, vegetation or other debris that could be fire hazard or interfere with the proper operation of the Off high way recreational vehicle.

- Air Cleaner Housing Drain Tube

  Check for deposits in the drain tube. If necessary, clean the tube and check the air cleaner housing.

- Leaks, Loose Parts

Walk around you Off high way recreational vehicle and look for anything that appears unusual, such as a leak or loose cable.

- Lights

  Make sure the headlight; brake light and taillight are working properly.

- Throttle

  Check the free play and adjust if needed. Press the throttle to make sure it moves smoothly without sticking, and snaps back automatically when it is released.

- Brakes

  Press the brake pedal several times, check for proper brake pedal free play. Make sure there is no brake fluid leakage.

- Steering Wheel

  Check that the wheels turn properly as you turn the steering wheel.

- Cable

  Check the cable housing for wear. Check the fittings for looseness. Replace or tighten as needed.

- Tie rod

  Check the tie rod housing for wear. Check the fittings for looseness. Replace or tighten as needed.

7.SAFE DRIVING PRECAUTIONS

Off-Road Use Only

You Off high way recreational vehicle and its tires are designed and manufactured for off-road use only, not for pavement. Driving on pavement can affect handling and control. You should not drive your off high way recreational vehicle on pavement.

⚠ WARNING

Operating this Off high way recreational vehicle on paved surfaces may seriously affect handling and control of the Off high way recreational vehicle, and may cause the vehicle to go out of control.

Never operate the Off high way recreational vehicle on any paved surfaces, including sidewalks, driveways, parking lots and streets.

When driving off-road, also remember to always obey local off-road driving laws and regulations. Obtain permission to drive on private property. Avoid posted areas and obey “no trespassing” signs.

You should never drive your Off high way recreational vehicle on public streets, roads or highways, even if they are not paved. Drivers of street vehicles may have difficulty seeing and avoiding you, which could lead to a collision. In many states it is illegal to operate off high way recreational vehicles on public streets, roads and highways.

⚠ WARNING

Operating this Off high way recreational vehicle on public streets, roads or highways can cause collision with other vehicle.

Never operate this Off high way recreational vehicle on any public streets, roads or highways, even dirt or gravel one.

Keep Hands and Feet on Controls

Always keep both hands on the steering wheel and both feet on the foot controls. When driving your Off high way recreational vehicle. It is important to maintain your balance and to control of the Off high way recreational vehicle. Removing hands or foot away from the controls can reduce your ability to react control of the kart.

⚠ WARNING

Removing hand from Steering wheel or feet from foot controls during operation can reduce your ability to control the Off high way recreational vehicle or could cause you to lose your balance and fall off the Off high way recreational vehicle.

Always keep both hand on the steering wheel and both feet on the foot controls of you’re Off high way recreational vehicle during operation.

Control Speed

Driving at excessive speed increases the chance of an accident. In choosing a proper speed, you need to consider the capability of your Off high way recreational

vehicle, the terrain, visibility and other operating conditions, plus your own skills and experience.

⚠ WARNING

Operating this Off high way recreational vehicle at excessive speeds increases your changes of losing control of the Off high way recreational vehicle, which can result in an accident.

Always drive at a speed that is proper for your Off high way recreational vehicle, the terrain, visibility and other operating conditions, and your experience.

Use Care on Unfamiliar or Rough Terrain

Before driving in a new area, always check the terrain thoroughly. Don't drive fast on unfamiliar terrain or when visibility is limited. (It's sometimes difficult to see obstructions like hidden rocks, bumps, or holes in time to react).

⚠ WARNING

Failure to use extra care when Operating this Off high way recreational vehicle on unfamiliar terrain could result in the Off high way recreational vehicle overturning or going out of control.

Go slowly and be extra careful when operating on unfamiliar terrain. Always be alert to changing terrain conditions when operating the Off high way recreational vehicle.

Never drive past the limit of visibility. Maintain a safe distance between your Off high way recreational vehicle and other off-road vehicles. Always exercise caution and use extra care on rough, slippery and loose terrain.

⚠ WARNING

Failure to use extra care when operating on excessively rough, slippery or loose terrain could cause loss of traction or vehicle control, which could result in an accident, including an overturn.

Do not operate on excessively rough, slippery or loose terrain until you have learned and practiced the skills necessary to control the Off high way recreational vehicle on such terrain. Always be especially cautious on these kinds of terrain.

Do Not Perform Stunts

You should always operate your Off high way recreational vehicle in a safe and reasonable manner. When driving, always keep all four wheels on the ground.

⚠ WARNING

Attempting wheelies and other stunts increases the chance of an accident, including an overturn.

Never attempt stunts, such as wheelies or jumps. Don't try to show off.

8. SPECIFICATIONS

DIMENSIONS

Overall Length----------123 in. (3130mm)
Overall Width ---------- 75 in. (1910mm)
Overall Height ---------- 69 in. (1745mm)
Wheelbase ---------- 89 in. (2270mm)
Front Track ---------- 66.5 in. (1690mm)
Rear Track ----------65 in. (1650mm)
Ground Clearance ---------- 12.5 in. (320mm)

ENGINE

Type ---------- 4-Bore, 4-Stroke, Liquid-cooled
Bore x Stroke ---------- 72mm×66.5mm
Displacement ---------- 1080cc
Corrected compression ratio ---------- 9.5:1
Carburetor ---------- Electric Fuel Injection
Output Power ----------50KW
Maximum Torque ---------- 90N.M
Starting ---------- Electric
Ignition ---------- C.D.I
Lubrication ---------- Force & Splash
Transmission ---------- manual clutch, 4 shift/Reverse
Fuel type ---------- RQ93 (unleaded)
Engine oil---------- SAE-10W/30
Gear oil---------- GL-4 75W/90

CAPACITIES

Maximum load ---------- 250kg
Fuel tank ---------- 42L
Engine oil ----------3500ml
Gear oil ----------2000ml
Coolant ----------6000ml
Starting ---------- <5s
Climbing ---------- 20°-25°
Battery ---------- 12V45Ah
Head Light ---------- 12V 55/55W/Both
Tail Light ----------12V10W/5W/21W/Both
Spot light ----------12V35W/Four
Main Fuse ----------50A
Brake Track ---------- < 7m @ 20miles/h
Top speed ---------- 62 miles/h (or limited as customers require)

CHASSIS

Front, Rear brake ---------- Hydraulic disc, right foot control
Front tire ---------- 25×8-12
Front tire ---------- 27×8-12（option）
Rear tire ---------- 25×10-12
Rear tire ---------- 27×11-12（option）
Front Suspension ---------- Independent Dual A-Arm
Rear Suspension ---------- Longitudinal Control Arm
Final Drive ---------- shaft driven

TIRE PRESSURE

Front ---------- 103kpa,1.05kg/c ㎡ 15psi
Rear ----------103kpa,1.05kg/c ㎡ 15psi

WEIGHT

Net Weight ----------570kg

Warranty (factory limited scope) ---------- 90 Days

9. OPERATION INSTRUCTION

WARNING-Do not attempts to start or operate the engine until completely familiar with the location and use of each control necessary to operate this vehicle. Operator must know how to stop this machine before starting and driving it.

Control pedal

1) **Accelerator Pedal:** Changes engine rpm and vehicle ground speed. Press down on the accelerator pedal with your foot to increase speed and let up on the pedal to decrease speed. (See figure 1)

⚠ WARNING

Each time prior to starting the engine, check the throttle assembly to ensure that when pedal is pushed all the way forward the assembly is working smoothly and returns to idle when released. Do not operate if pedal or engine throttles linkage fail to return to idle. If unable to correct the problem through lubrication, adjustment or replacement of worn parts, contact your dealer for assistance.

2) **Brake Pedal:** Applying pressure to the brake pedal instead of the accelerator pedal with your foot will slow down and/or stop the vehicle. Riding or resting your foot on the pedal unnecessary will wear the brakes out prematurely. (See figure 1)

3) Clutch Pedal: Applying pressure to the clutch pedal with your left foot will make gearbox to declutch and let up the pedal to clutch. (See figure 1)

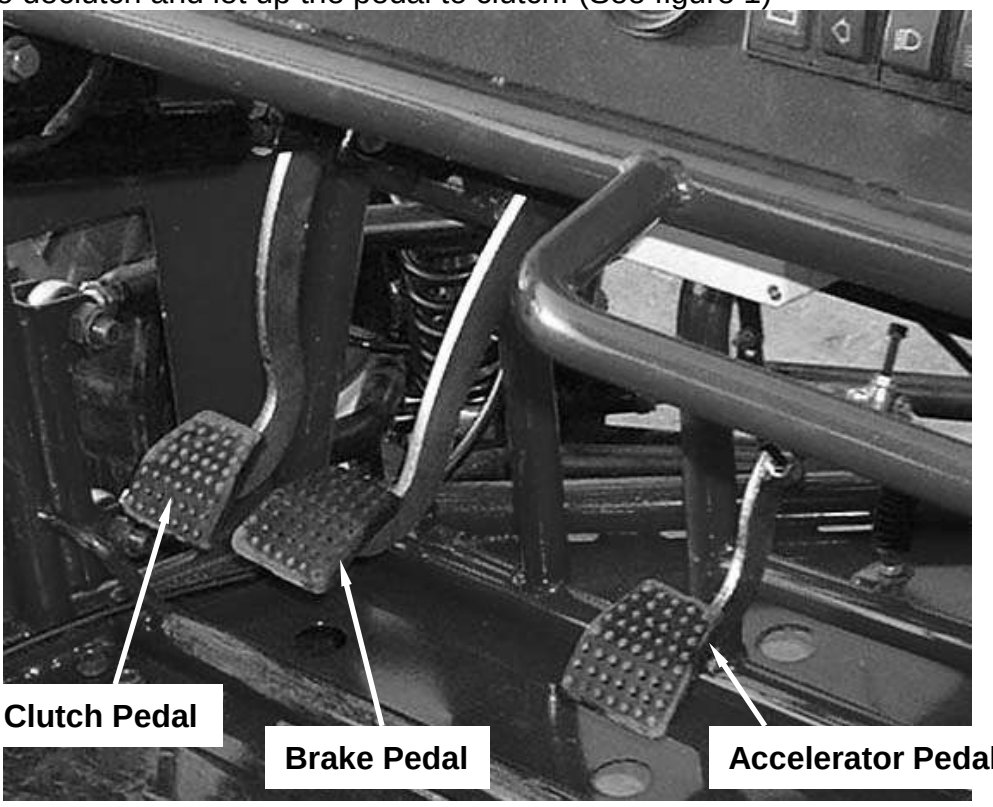


FIGURE 1

Park brake lever and shift selector

4) **Park Brake Lever**: Sets and releases the park brakes. Do not drive vehicle with park brake lever set. Indicator light will illuminate indicating park brake is engaged. (See

figure 2)

• Set park brakes: pull-up on the park brake lever until the lever is tight.

• Release park brakes: Pull-up on the park brake lever, depress the release button and push the lever

5) **Shift Selector**: Changes trans-axle gears from neutral to forward or reverse. Always start engine in neutral. (See figure 3)

• Pull up on shift selector collar and move lever to position “1” “2” “3” “4”, the vehicle will move forwards at different speed.

• Pull up on shift selector collar and move lever to center position to place trans-axle in neutral.

• Pull up on shift selector collar and move lever to position “R”, the vehicle will move backwards.

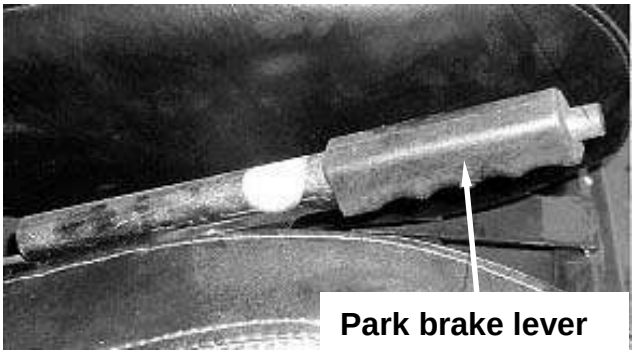


FIGURE 2

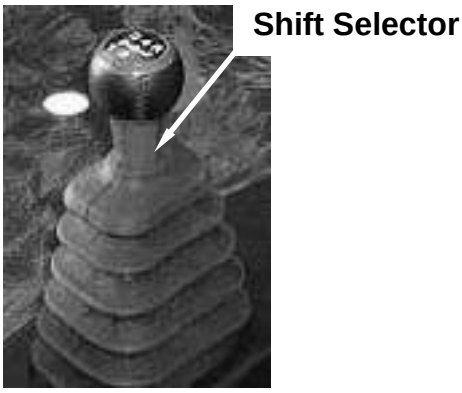


FIGURE 3

Switch

6) Ignition Switch: Pull firmly up on the park brake lever with your hand until the lever is tight. Set shift selector in neutral. Insert the key into key-switch, turn the key clockwise, and release the key when the engine starts. (Warning: Don’t crank starter more than 5 seconds at one time). (See figure 4)

7) **Turning-light switch:** control the turning- light. Press the top of button down and the right turning light work; Press the bottom of button down and the left turning light work; Set the button in neutral while moving in line. (See figure 5)

8) **Head light switch:** control the headlight far beam or lower beam. Press the lower-beam button down and the head light work as lower beam, the far-beam button and work as far beam. (See figure 5)

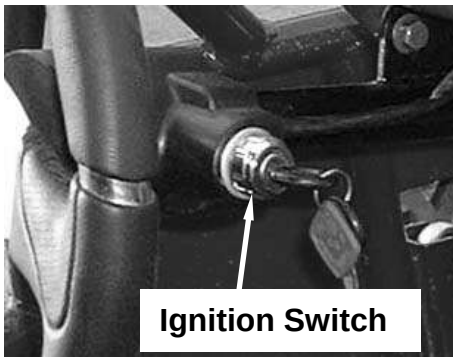


FIGURE 4

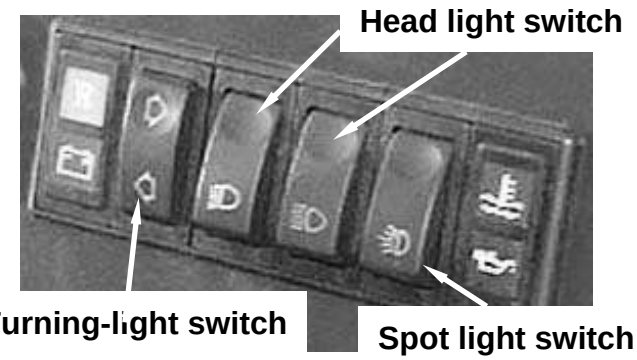


FIGURE 5

9) **Park Brake Light switch:** control the 4 turning lights on or off. Pull the park-brake-light switch out and the 4 turning lights illuminate together. (See figure 6)
10) **Horn Switch:** control the horn. Press the horn button down and hold, the horn buzz. (See figure 7)
11) **Spot light switch:** control the 4 spot- lights on or off.

FIGURE 7

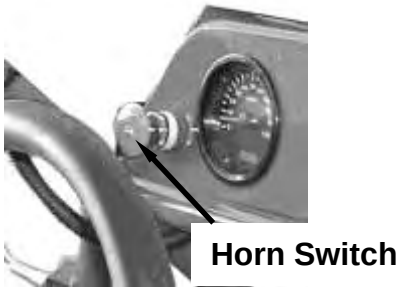


FIGURE 6

Indicating and gauges

12)**Speedometer:** Indicates the speed vehicle is moving at. It warns you to drive at proper speed. (See figure 8)
13)**Tachometer:** Indicates the RPM of engine. (See figure 8)
14)**Coolant temperature indicator:** indicate the temperature of coolant, if the temperature is above 102^0C/215^0 F. and the Stop engine immediately. Check coolant lever and add if low, see authorized JOYNER dealer if temperature indicator stay on and overflow tank is full of coolant. (See figure 8)
15)**Voltmeter**: Indicates battery is charging. Check battery if voltmeter registers a charge that is lowers than normal. See your authorized JOYNER dealer if battery is good and voltmeter still register low charge (See figure 8)
16)**Fuel level gauge:** The fuel gauge displays approximately how much fuel you have in the fuel tank. Always park the vehicle on level ground to get an accurate reading. The fuel tank is empty when the fuel gauge-needle points to 0 and full when the needle points to 1. (See figure 8)
17) **Oil pressure gauge**: Indicates oil pressure. If the needle point to red area, stop engine immediately. Check oil level and add if low. See authorized Joyner dealer if needle stays on and engine is full of oil. (See figure 8)
18)**Reverse gear light:** indicate reverse gear engaged if illuminated. (See figure 9)
19)**Battery charge light:** if it is off, battery charging, if on, check battery connection. (See figure 9)
20)**Coolant temperature light:** indicate coolant temperature is above 102^0C. (See figure 9)
21)**Oil pressure light:** Indicates low/high oil pressure when illuminated, see authorized JOYNER dealer if necessary. (See figure 9)

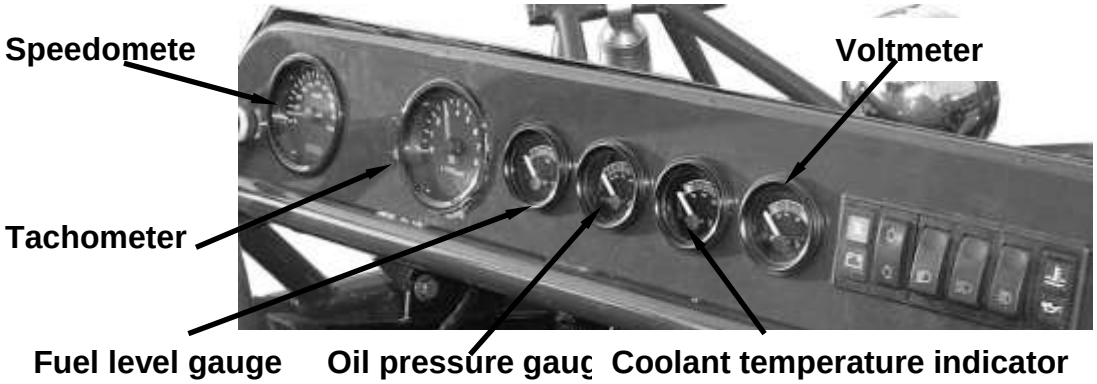


FIGURE 8

FIGURE 9

Passengers

The vehicle allows for two riders only.

Make sure you brief your passenger on proper safety procedures like keeping hands, arms, feet and other body appendages inside the vehicle. Passengers should only be transported in factory-supplied seating.

Operator and passenger are responsible for deciding if their situation warrants using Seat Belts.

Seat

The seats must always be securely fastened in the position which best affords the operator control of the foot pedals, steering wheel, and the remote stop button. (See figure 10)

a. Pull seat adjustment handle upward to disengage seat slide.
b. Move seat to desired position.
c. Be sure seat adjustment handle snaps back into place and that seat is locked into position.
d.

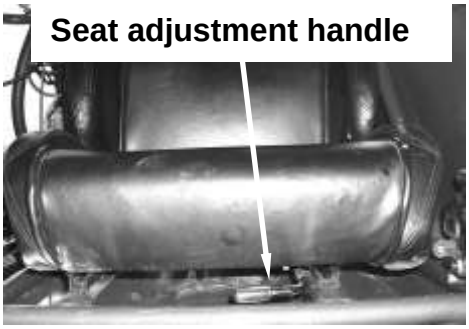


FIGURE 10

⚠ WARNING

Before attempting to adjust the seat ensure that engine of the Off high way recreational vehicle is stopped.

⚠ WARNING

Never operate this Off high way recreational vehicle when the provided seat is not securely fastened, to do so could result in a strong possibility of severe personal injury or loss of life. Before attempting to adjust the seat ensure that engine of Off high way recreational vehicle is stopped.

10. MAINTENANCE

Chassis Maintenance

1. Tire Maintenance

Use only tires recommended by Joyner. It is important for your safety and the safety of others that the tires have correct air pressure. Check air pressure in four tires before each use. Visually inspect tires for loss of air throughout each day of operation. See Tire inflation Chart below for correct tire pressure.

Tire Inflation Chart	
Tire	Inflation PSI
Front Tires	15
Rear Tires	15

2. Shift Adjustment

After a long time of use, it is necessary to adjust the shift cable to make shift clear, screw the thin nut show in the following figure clockwise or count clockwise to move the shift cable at a proper position where you can shift clearly and smoothly, and then tighten the shin nut. (See figure 11, 12)

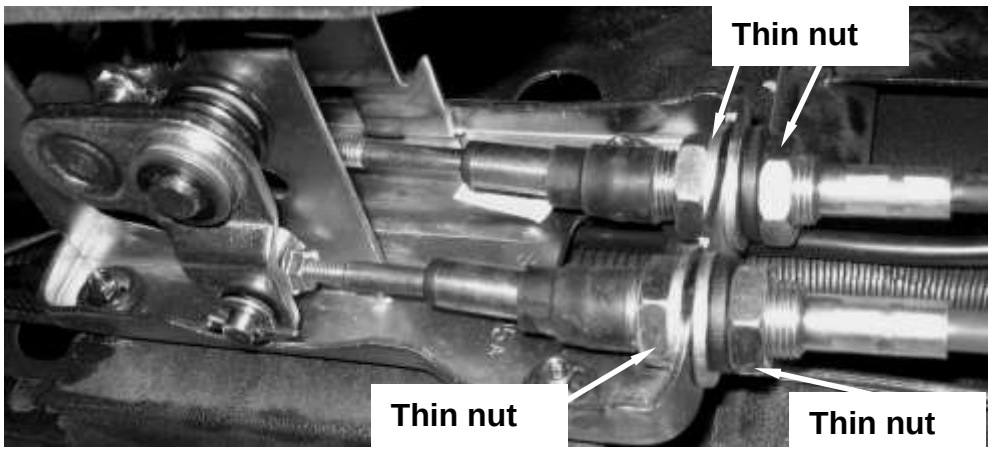


FIGURE 11

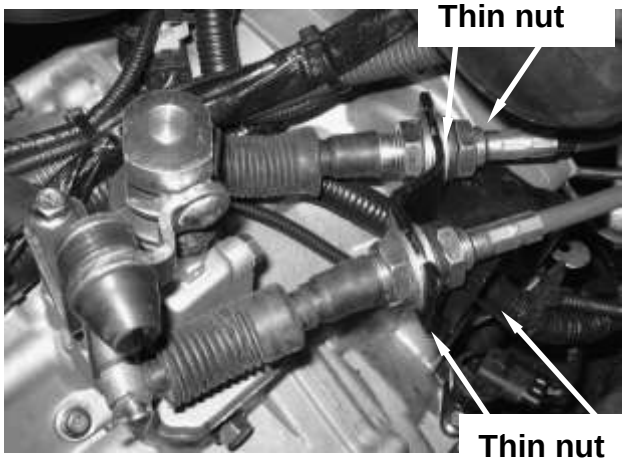


FIGURE 12

3. Parking Adjustment

Pull the park brake lever up so that the unit can engage park brake, To release the unit, press button on front end of parking lever then push the parking lever to the bottom. Adjust the parking cable if necessary. (See figure 13, 14)

FIGURE 14

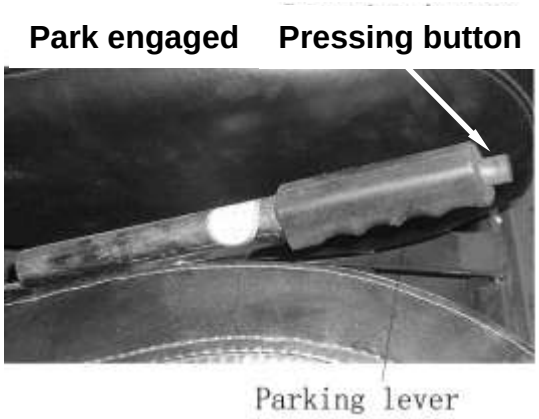


FIGURE 13

4. Break-in

The first month is most important in the life of your vehicle. Proper operation during this break-in period will help assure maximum life and performance from your new vehicle. The following guidelines explain proper break-in procedures.

4.1. After the engine starts, the engine is not allowed in high speed in the neutral gearshift.

4.2. Drive vehicle from stop to low speed slowly.

4.3. Avoid braking strongly.

4.4. Do not exceed the vehicle speed on the below schedule

The speed of vehicle	The first 1000 km		
Max speed in each gear	1st	Gear	25km/h
	2nd	Gear	45km/h
	3rd	Gear	70 km/h
	4th	Gear	100km/h

5. Shock Absorber Adjustment

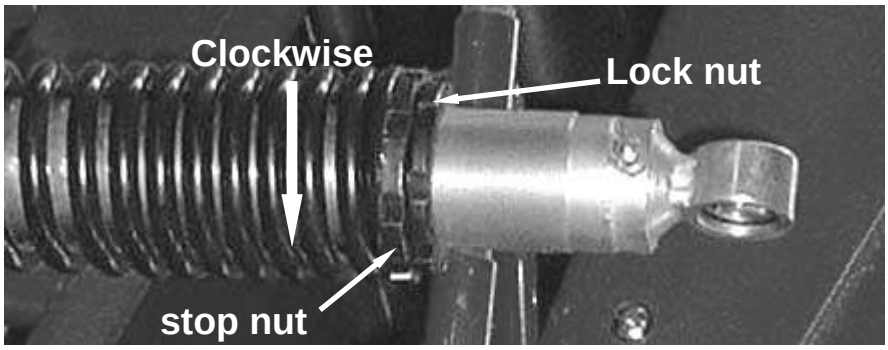
After a long time of use, it is necessary to adjust the spring as following: **(See figure 15)**

5.1. Loosen the lock nut with a shock absorber wrench (by Joyner);

5.2. Screw the stop-nut clockwise, and the tension of shock spring will increase; decrease as screw to left.

5.3. If necessary, inflate with nitrogen, control the pressure lower than **0.8MP.**

FIGURE 15



6. Front Wheel Replacement

Do not disassemble the center castle nuts when you replace the front wheels. (See Fig. 16) Tighten the nuts after replacing the wheels.

Castle nuts
Torque:180±5 N.M
Wheel nuts
Torque:70±5 N.M

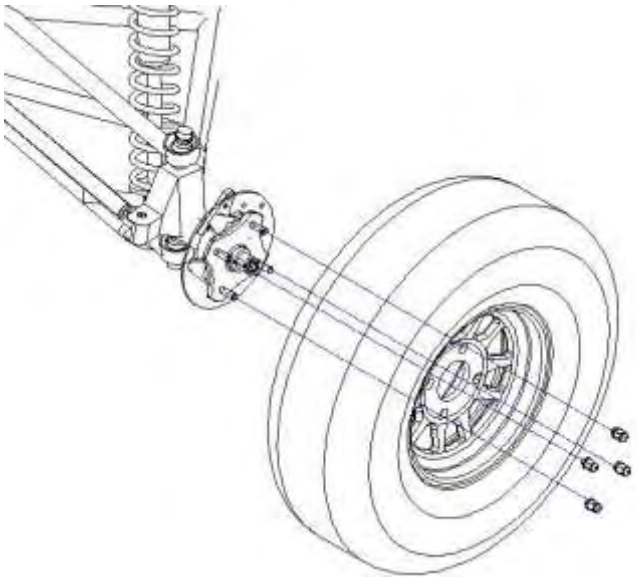


FIGURE 16

7. Rear Wheel Replacement

Do not disassemble the center castle nuts when you replace the front wheels. (See Fig. 17) Tighten the nuts after replacing the wheels.

Castle nuts
Torque:180±5 N.M
Wheel nuts
Torque:70±5 N.M

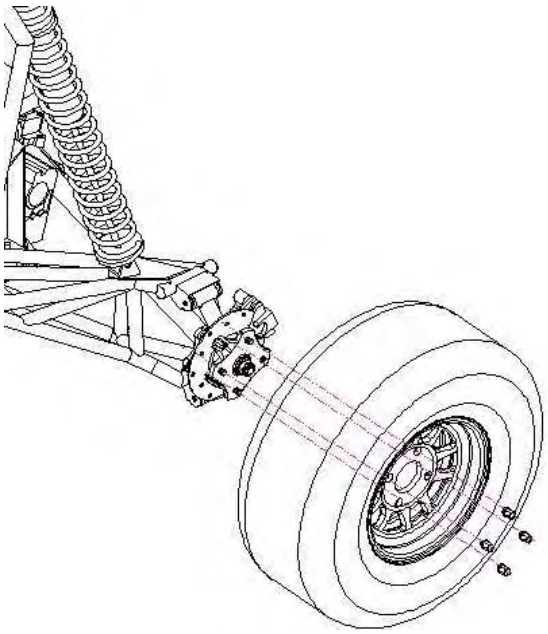


FIGURE 17

8. Clutch replacement

Remove two bolts, and demount Starter-assembly carefully. (See Fig. 18-21)

FIGURE 18

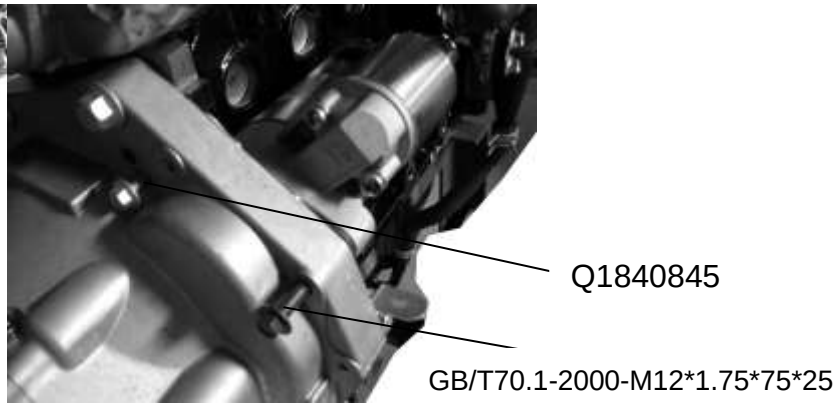


FIGURE 19

FIGURE 21

FIGURE 20

2. Remove four bolts on the transmission case, lay down these carefully. **Caution:** When fix the four bolts in the transmission case; you must tighten them according to the prescribed **torque 45-55N.M**. (See Fig. 22-25)

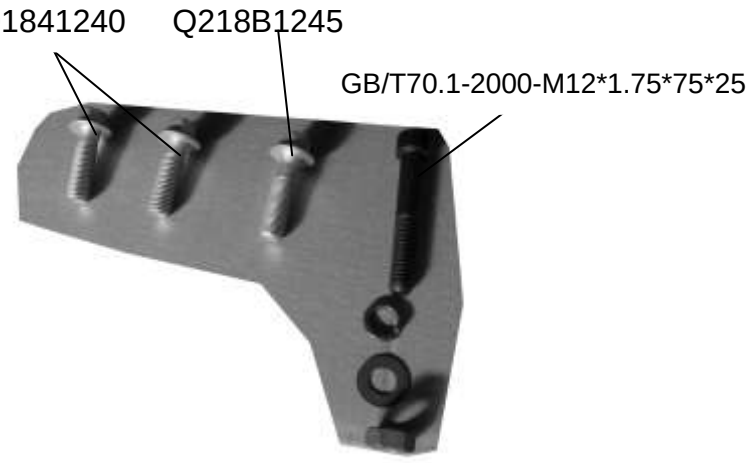
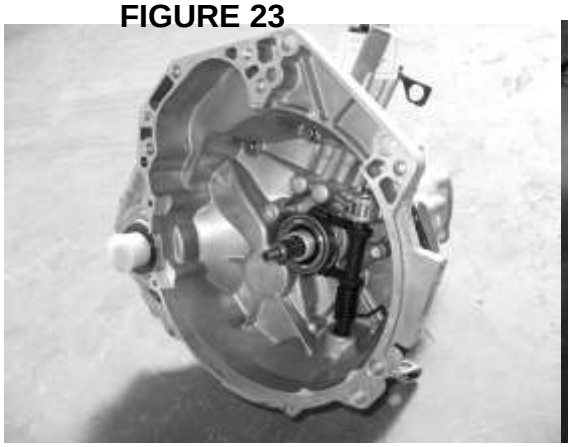


FIGURE 23 **FIGURE 22**



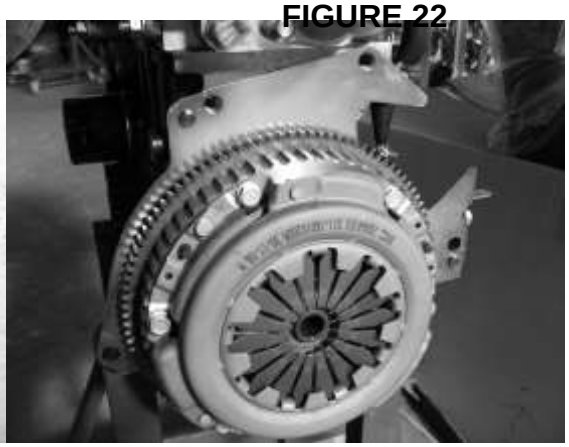
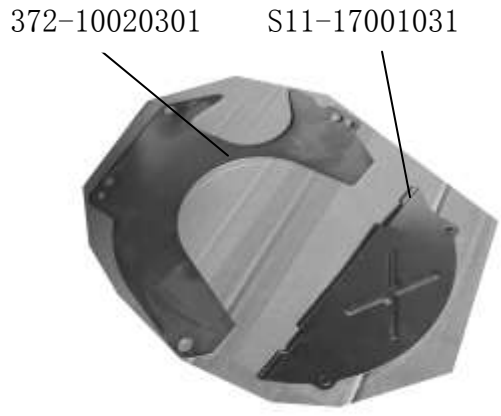


FIGURE 24 **FIGURE 25**

3. Remove upper steel cushions and lower steel cushion. (See Fig. 26-27)



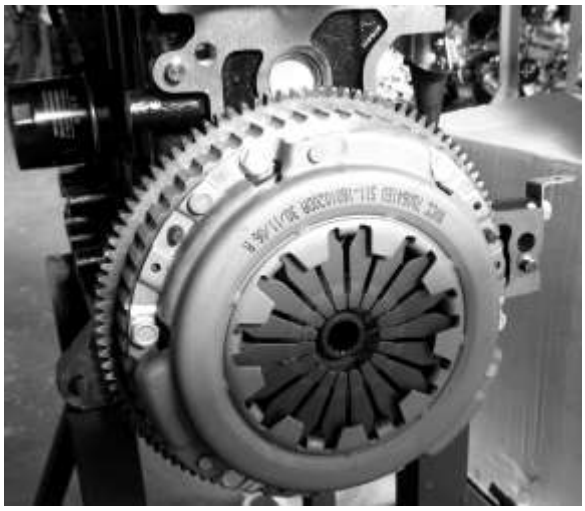


FIGURE 26 **FIGURE 27**

4. Insert a spine-shaft into the hole of the Clutch assy , remove the six bolts on the Clutch pressure plate, now It's clear. **Caution**: When fix the six bolts in the Clutch pressure plate; you must tighten them according to the prescribed **torque 28 N.M**. (**See Fig. 28-32**)

FIGURE 28

FIGURE 29

FIGURE 30

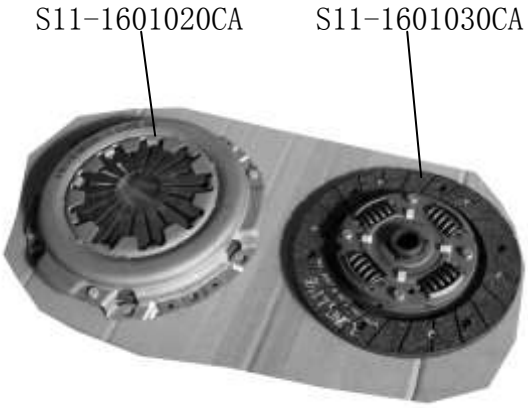


FIGURE 31

FIGURE 32

5. Insert a spline-shaft into the hole of the Clutch assy , fix the six bolts on the Clutch pressure plate , tighten them according to the prescribed **torque 28 N.M** . (**See Fig. 33-34)**

FIGURE 33

FIGURE 34

6. Fix parts according to reverse operation to the disassembly.

9. Front Wheel Alignment

9.1. Put the vehicle on level ground.

9.2. The “toe-in” of the front wheels should be 0.63 inches. To check alignment, measure distance A and B between the centerline (CL) of the wheels. The proper toe-in dimension A should be 0.63 inches greater than dimension B.

9.3. To adjust the alignments, loose the lock nuts on both sides of Front Tie Rods. To make Dimension B smaller, turn the rod to the left. Turn the rod to the right to make Dimension B larger. After adjusted to desired length, tighten the lock nut against the rod end. Recheck the dimensions for proper alignment.

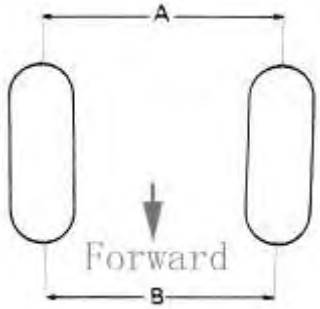


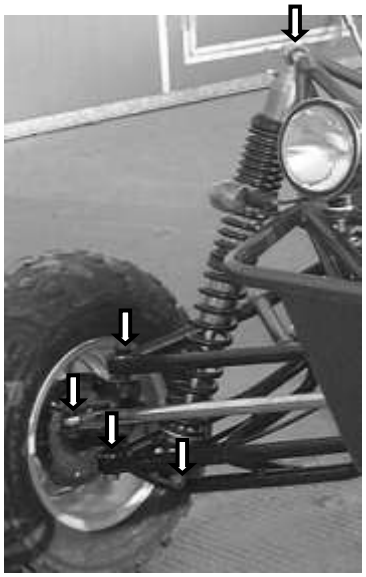
FIGURE 35

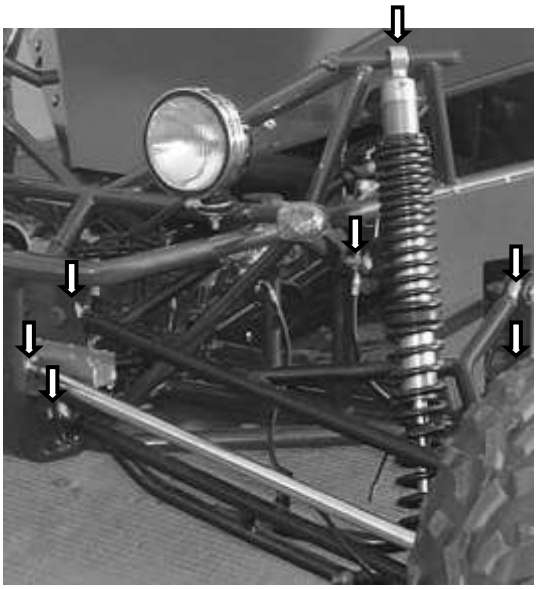
10. Cleaning Instructions

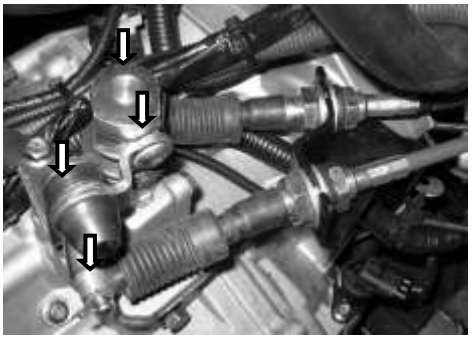
Keep your kart clean. With a clean rag, wipe off any dirt and oil from around controls. Wipe off any spilled fuel and oil. Keep the engine clean of foreign object and be sure to check that air intake fan is free of debris for proper cooling.

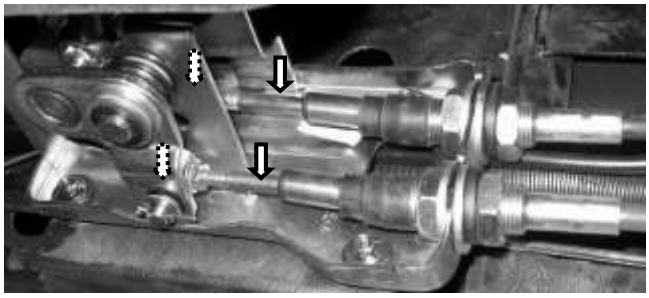
11. Vehicle Lubrication

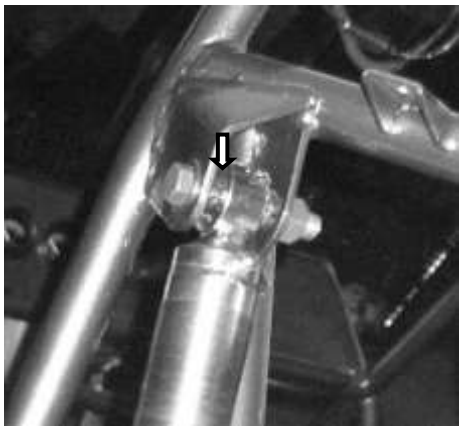
Lubricate vehicle every 90 days of use, Apply several drops of oil in specific points pointed by arrows as following pictures.

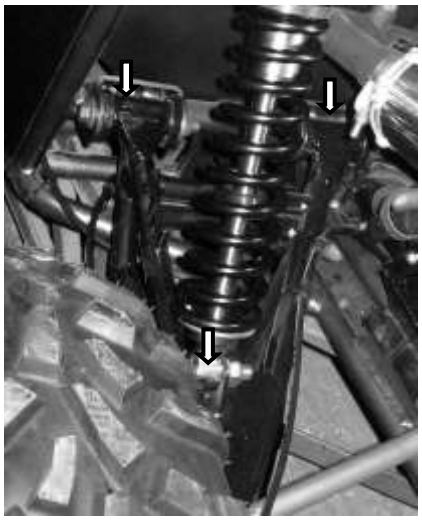


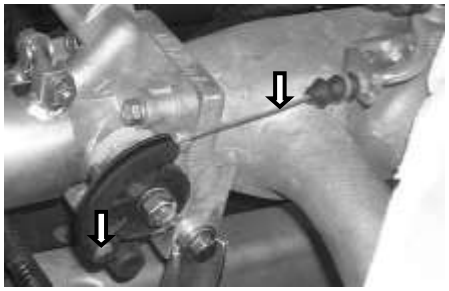












12. Storage Instruction

In the event your kart is not to be operated for periods in excess of 30 days or at the end of each driving season prepare for storage as follows:

12.1. Drain fuel tank by allowing engine to run out of fuel, or use a fuel stabilizer.

12.2. Lubricate engine cylinder by removing the spark plug and pour one ounce of clean lubricating oil through the spark plug hole into the cylinder. Crank the engine slowly to spread oil and replace spark plug.

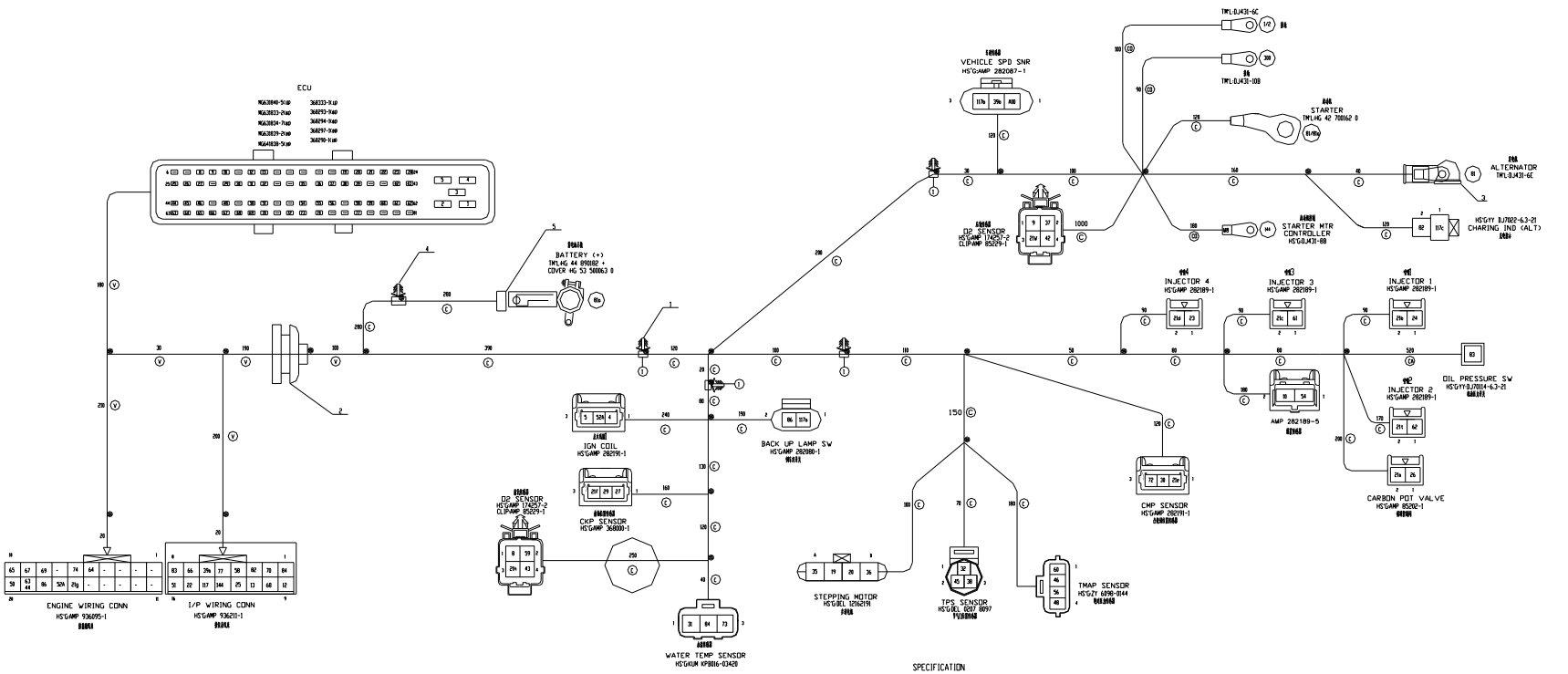
12.3. Do not save or store gasoline over winter. Using old gasoline, which has deteriorated from storage, will cause hard starting and affect engine performance.

⚠ WARNING

Do not drain fuel while engine is hot. Be sure to move Off high way recreational vehicle outside before draining fuel.

13.ENGINE WIRING DIAGRAM

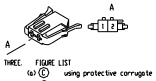
S11-3724180CS



SPECIFICATION

ONE. Dimensions in the diagram are actual dimension of wiring harness and have nothing to do with wiring angle in the diagram;

TWO. View Brection: Connector view direction schematic diagram.



THREE. FIGURE LIST
(a) C using protective corrugate tube bind up
(b) CB use cotton tube completely wind
(b) V use PVC tape completely wind

FOUR. COLOUR OF LEAD : R - RED ; O - ORANGE ; W - WHITE ; B - BLACK ; Y - YELLOW ; V - PURPLE ; G - GREEN ; L - BLUE ; Br - BROWN ; Gr - GRAY ; P - PINK ; Lg - LAUREL-GREEN

TECHNIQUE REQUIREMENTS

ONE. WIRING HARNESS
1.The number of the wires should be corresponded to the number of the terminals in the housings.
2.Dacing rate of the wire harness must be reached 100%.
3.The wire we used must all-resistent,heat-resistnet and inflaming retarding,the AVSS wire should be conformed to the standard JASO D611 ;
4.The compressed terminals and the jointed wires should be conformed to the standard QCn 29009. QCn 29000 ;
5.The connectors should be conformed to the standard QC/T 417.1-417.5;
6.The engdage of the wires should be conformed to the standard Q/SQRB4.030 4.25;
7.The other characteristics should be conformed to the standard Q/SQRB4.030;
8.The wires must be warped with the corrugated protective tube fully,and the radius inside of corrugated protective tube must longer than the 3/4 radius of the wire(s) at least.

TWO. INSULATING TAPE
1.The material of the insulting tapes should be thermoplastic plastic.
2.The characteristics of the acidproof and oil-resistent should be conformed to the standard JG/T 3001;

THREE. CORRUGATED PROTECTIVE TUBE.
1.The protective corrugate tube should adopt the type of inflaming retarding,oil-resistent and hyper-light's 90/-25 protective corrugate tube;
2.The temperature characteristics:-40h-120?in the rage,the surface of corrugate tube should not crack and variant.
3.The technique characteristics should be conformed to the standard JG/T3001;
4.The characteristics of oil-rristent and antifriction should be conformed to the standard JG/T 3001;

FOUR. THE AIRPROOF OF THE CONNECTORS
1.The connectors with the waterproof plugs and seals should be assembled securitly.Missing or falling off was not allowed.
2.After the conntor with waterproof plugs connected, the water leakage and air leakage was not allowed in the test of airproof with 2.5 atmospheric pressure.

FIVE. JERSY CLOTH TAPE
1.The jersy cloth tape should be use "tesa" brand.
2.The tapes' characteristics should be conformed to the production requirments of tesa's.

SIX. MARK Should be conformed to the standard Q/SQR.04.057 Q/SQR.04.058

NUM	DIA	COL	START POINT	HOL POS	END POINT	HOL POS	REMARK
39	0.5	RW	ECU	39	39JIONT		
38	0.5	B	ECU	38	TPS SENSOR	3	
36	0.5	LR	ECU	36	STEPPING MOTOR	4	
35	0.5	G	ECU	35	STEPPING MOTOR	3	
32	0.5	RW	ECU	32	TPS SENSOR	1	
31	0.5	L	ECU	31	WATER TEMP SENSOR	1	
30	0.5	GO	ECU	30	CMP SENSOR	2	
29	0.5	LG	ECU	29	CKP SENSOR	2	
27	0.5	BrB	ECU	27	CKP SENSOR	1	
26	0.5	LB	ECU	26	CARBON POT VALVE	1	
25	0.5	Lg	ECU	25	I/P WIRING CONN	12	
24	0.5	BrG	ECU	24	INJECTOR 1	1	
23	0.5	BrW	ECU	23	INJECTOR 3	1	
22	0.5	RY	I/P WIRING CONN	15	ECU	22	
21	0.85	R	ECU	21	21JIONT		
21a	0.85	R	CARBON POT VALVE	2	21JIONT		
21b	0.85	R	INJECTOR 1	2	21JIONT		
21c	0.85	R	INJECTOR 2	2	21JIONT		
21d	0.85	R	INJECTOR 3	2	21JIONT		
21e	0.85	R	CMP SENSOR	1	21JIONT		
21f	0.85	R	CKP SENSOR	1	21JIONT		
21h	0.85	R	O2 SENSOR	3	21JIONT		
21g	1.25	R	ENGINE WIRING CONN	16	21JIONT		
20	0.5	W	ECU	20	STEPPING MOTOR	2	
19	0.5	L	ECU	19	STEPPING MOTOR	1	
13	0.5	L	ECU	13	I/P WIRING CONN	11	
12	0.5	GrR	ECU	12	I/P WIRING CONN	9	
10	0.5	GR	ECU	10	EXPLODE VIBRATION SNR	2	TWIST 54
8	0.5	G	ECU	8	O2 SENSOR	1	
5	0.5	P	ECU	5	IGN COIL	1	
4	0.5	L	ECU	4	IGN COIL	1	
21W	0.85	R	O2 SENSOR	3	21JIONT	1	
2	2.0	B	ECU	2	GND		
1	2.0	B	ECU	1	GND		

NUM	DIA	COL	START POINT	HOL POS	END POINT	HOL POS	REMARK
74	0.5	OB	ECU	74	ENGINE WIRING CONN	6	
73	0.5	Br	ECU	73	WATER TEMP SENSOR	3	
72	0.5	P	ECU	72	CMP SENSOR	3	
70	0.5	LY	ECU	70	I/P WIRING CONN	2	
69	0.5	GrB	ECU	69	ENGINE WIRING CONN	8	
68	0.5	GW	ECU	68	I/P WIRING CONN	10	
67	0.5	G	ECU	67	ENGINE WIRING CONN	9	
66	0.5	Y	ECU	66	I/P WIRING CONN	7	
65	0.5	BrG	ECU	65	ENGINE WIRING CONN	10	
64	0.5	LgB	ECU	64	ENGINE WIRING CONN	5	
63	0.5	GrB	ENGINE WIRING CONN	19	ECU	63	
61	0.5	BrL	ECU	61	INJECTOR 2	1	
60	0.5	RB	ECU	60	TMAP SENSOR	1	
59	0.5	B	ECU	59	O2 SENSOR	2	
58	0.5	R	ECU	58	I/P WIRING CONN	4	
56	0.5	Y	ECU	56	TMAP SENSOR	3	
55	0.5	B	ECU	55	IGN COIL 1 2 3 SHIELD		
54	0.5	VW	ECU	54	EXPLODE VIBRATION SNR	1	TWIST 10
51	0.5	RG	ECU	51	I/P WIRING CONN	16	
50	0.5	RB	ECU	50	ENGINE WIRING CONN	20	
48	0.5	BW	ECU	48	TMAP SENSOR	4	
46	0.5	LY	ECU	46	TMAP SENSOR	2	
9	0.5	WR	ECU	9	O2 SENSOR	1	
37	0.5	BrY	ECU	37	O2 SENSOR	2	
62	0.5	YR	ECU	62	INJECTOR 2	2	
42	0.5	BrW	ECU	42	O2 SENSOR	4	
45	0.5	GB	ECU	45	TPS SENSOR	2	
44	0.5	GrB	ENGINE WIRING CONN	19	ECU	44	
43	0.5	VB	ECU	43	O2 SENSOR	4	
39a	0.5	RW	I/P WIRING CONN	6	39JIONT		
39b	0.5	RW	VEHICLE SPD SNR	2	39JIONT		

NUM	DIA	COL	START POINT	HOL POS	END POINT	HOL POS	REMARK
300	1.25	B	GND		?GAMP	2	
A00	0.85	B	VEHICLE SPD SNR	1	GND		
117c	0.85	RW	CHARING IND (ALT)	1	117JIONT		
117a	0.85	RW	B/UP LAMP SW	1	117JIONT		
117b	0.85	RW	VEHICLE SPD SNR	3	117JIONT		
117	0.85	RW	I/P WIRING CONN	15	117JIONT		
144	1.25	YB	STARTER MTR CONTRLLER		I/P WIRING CONN	13	
52Aa	1.25	O	IGN COIL 3	2	87JIONT		
87b	1.25	O	IGN COIL 1	2	87JIONT		
87c	1.25	O	IGN COIL 2	2	87JIONT		
87d	1.25	O	?GAMP	1	87JIONT		
87	1.25	O	ENGINE WIRING CONN	7	87JIONT		
86	0.85	WG	B/UP LAMP SW	2	ENGINE WIRING CONN	18	
84	0.5	BY	WATER TEMP SENSOR	2	I/P WIRING CONN	1	
83	0.5	GB	OIL PRESSURE SW		I/P WIRING CONN	8	
82	0.5	W	CHARING IND (ALT)	2	I/P WIRING CONN	3	
81	8.0	R	ALTERNATOR		STARTER		
81a	16.0	R	STARTER		BATTERY (+)		
77	0.5	WG	ECU	77	I/P WIRING CONN	5	

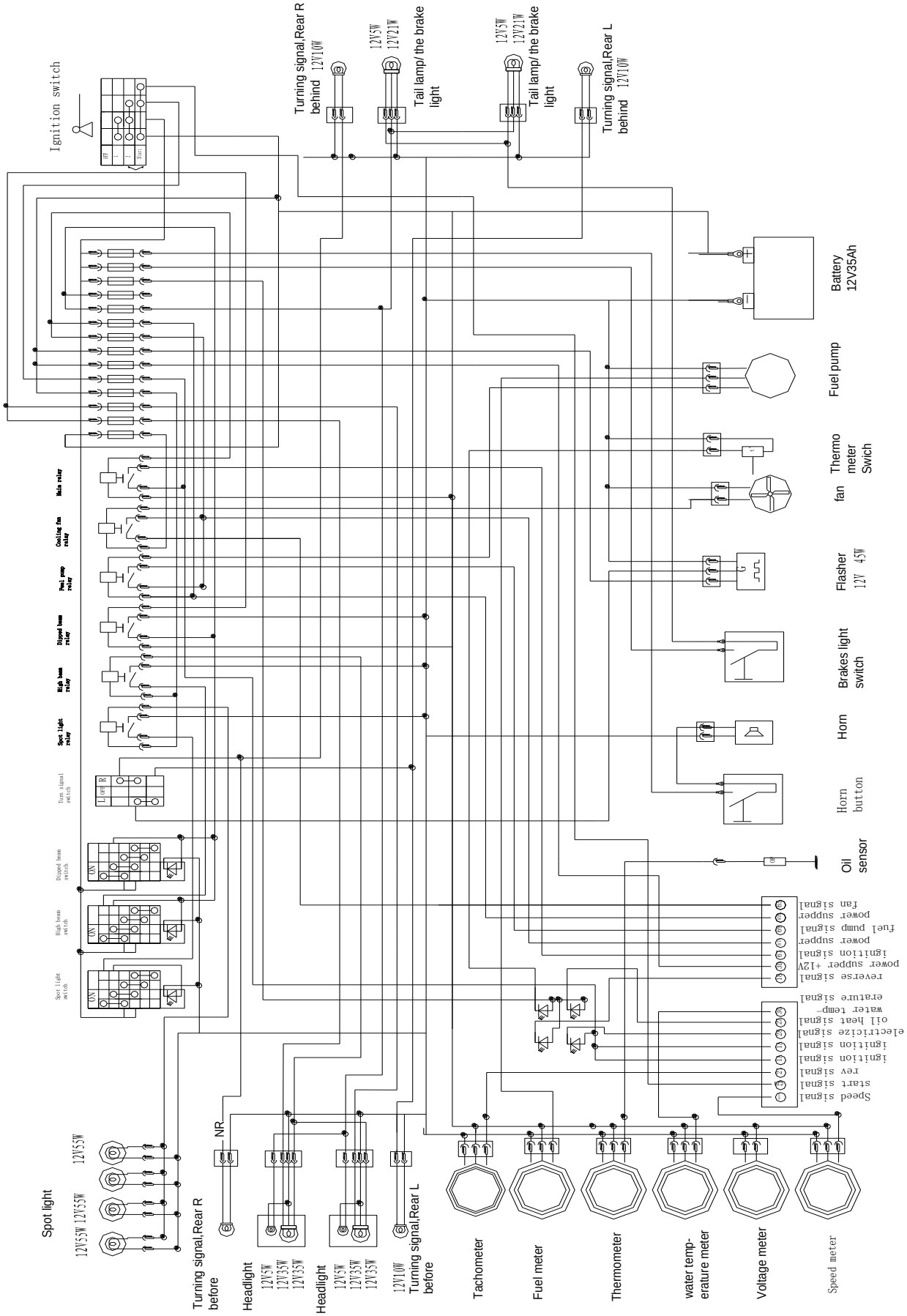
N	PART NUMBER	PART NAME	QTY	METERIAL
5	53 500063 0	GROMMET	1	
4	019060000	B/CABLE	1	
3	B.645.120	GROMMET - ALT	1	
2	S11-3724181	GROMMET	1	
1	KPP011-99020	B/CABLE	4	

JOYNER

V/H A - ENGINE MANAGEMENT

S11-3724180CS

14. MAIN WIRING DIAGRAM



Engine maintenance

1. Service Air Filter

Service air filter refer to preventative log.

NOTE: Service more often under dusty conditions.

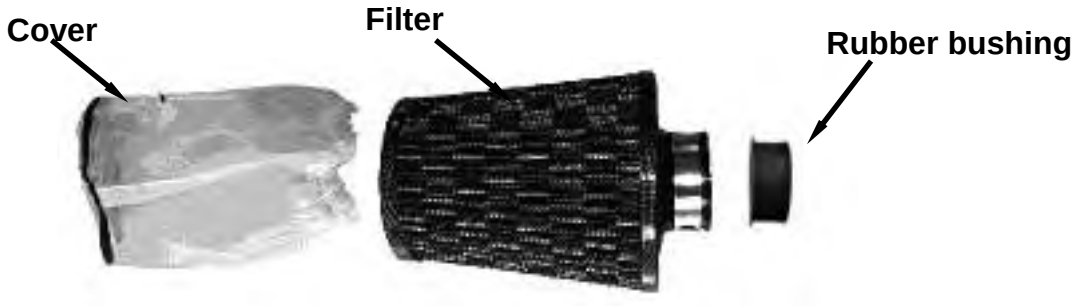


FIGURE 36

Remove filter cover (**See Fig. 36**) Check the filter cover and the air filter, if the filter cover and the air filter are dusty, please clear the filter cover and replace with a new air filter.

2. Engine Lubrication

Engine oil replacement

You must change the oil in the crankcase after the first 5 hours of operating of your new engine and after 10 hours of use thereafter. That will insure proper lubrication of internal parts and prevent costly repairs due to excessive wear. (See Fig. 37-39)

FIGURE 37

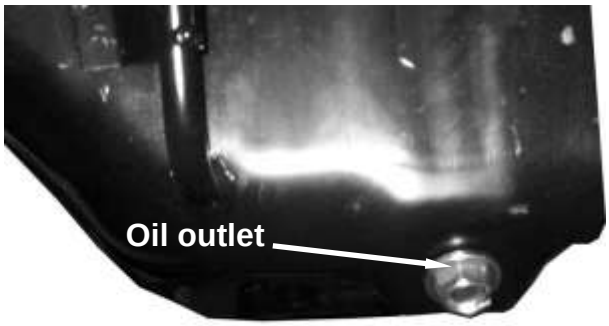


FIGURE 39

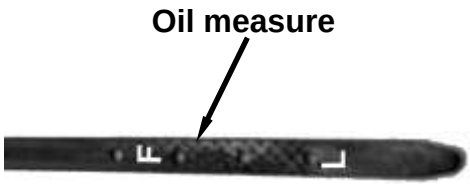


FIGURE 38

2.1.1. With the engine warm, put the vehicle on the level ground.
2.1.2. Shut down the engine, put a collecting oil plate under the engine oil outlet. Loosen the oil outlet plug in the warm engine. Let the engine oil out fully **(see Fig. 9).**
2.1.3. Tighten the engine oil outlet plug.
2.1.4. Remove the oil filler cap (see Fig. 10), fill oil (SAE 10W/30-50) about 3.86 liters to the engine.
2.1.5. Pull out the engine oil dip stick **(see Fig. 11),** confirm the corrective oil level in the crankcase **(see Fig. 12).**

2.2. Check engine oil and recharge

2.2.1. If the color of engine oil changes, you need to replace the engine oil as above.
2.2.2. Check the engine oil level; charge from 2.1.4 as above if the oil level is lower than "L",

3. Transmission lubrication

Oil replacement

You must change the oil in the transmission after the first 5 hours of operating of your new engine and after 10 hours of use thereafter. That will insure proper lubrication of internal parts and prevent costly repairs due to excessive wear. (See Fig. 40)

FIGURE 40

3.1.1. Put the vehicle on the level ground.
3.1.2. Shut down the engine, put a collecting oil plate under the transmission oil outlet. Loosen the oil outlet plug in the warm engine. Let the transmission oil out fully **(see Fig. 14、15).**
3.1.3. Remove the iron dust plug, this plug has a magnet on it. Iron dust caused by moving parts will stick to the plug. Clean the iron dust from this dust plug **(see Fig. 16)**.
3.1.4. Tighten the transmission oil outlet plug and the iron dust plug**(see Fig. 16)**.
3.1.5. Remove the plug **(see Fig. 13),** fill oil (API 80(75) W-90 GL-3 Gear Oil **)** about 2.0 liters.

Check transmission oil

If the color of transmission oil changes, you need to replace oil. Replace transmission oil as above.

4. Engine Coolant

Add Coolant

You must check the coolant for level and leaks. If it is low, you need to refill coolant into the radiator (approximately 6000 ml). The lack of coolant will cause the engine to overheat. This can cause engine damage. (See Fig. 41)
The coolant should always be topped up, since the coolant can evaporate.

FIGURE 41

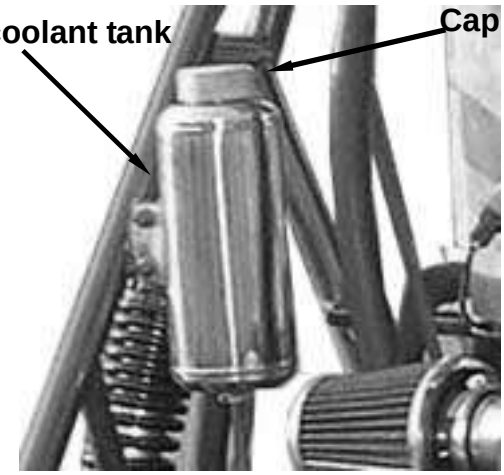


FIGURE 42

4.1.1. Put the vehicle on level ground.
4.1.2. Turn the coolant cap counterclockwise and open the cap **(see Fig. 16)**.
4.1.3. Pour fresh coolant to filler neck, Start the engine at idle.
4.1.4. Increase the engine rev's a few times
4.1.5. Repeat 2,3,4 till the coolant is at neck and no bubbles come up.
4.1.6. Refit the coolant cap, turn it clockwise and tighten it
4.1.7. Turn the reserve coolant case cap counterclockwise and open the cap **(see Fig. 17)**.
4.1.8. Pour fresh coolant of the specified type into the reserve coolant tank till the coolant reaches 2/5 to 3/5 of the reserve coolant tank volume.
4.1.9. Close the reserve coolant case cap, turn it clockwise and tighten it

5. Top up the reserve coolant (See Fig. 42)

If the coolant in the reserve tank is less than 2/5, it needs to be topped up.

⚠ WARNING

Opening the radiator cap while the engine is hot can be hazardous. Opening the radiator cap can spray the high temperature coolant in your eyes, face and any parts of your body. This can result in severe injury.
Never open the radiator cap while the engine is hot.

⚠ WARNING

New and used coolant can be hazardous.
Children and pets may be harmed by new or used coolant.
Continuous or brief contact with coolant may be dangerous for your health.
Keep new and used coolant away from the children and pets. To minimize your exposure to new and used coolant, wear a long sleeve shirt and moisture-proof gloves (such as dishwashing gloves) when you change coolant. If coolant contacts your skin, wash thoroughly with soap and water. Wash any clothing or rags if wet with coolant. Recycle or properly dispose of used coolant.

⚠ WARNING

Harm or damage may occur if use coolant that don't meet the specification 50% standard green coolant and 50% distill water

6. Idle Speed Adjustment

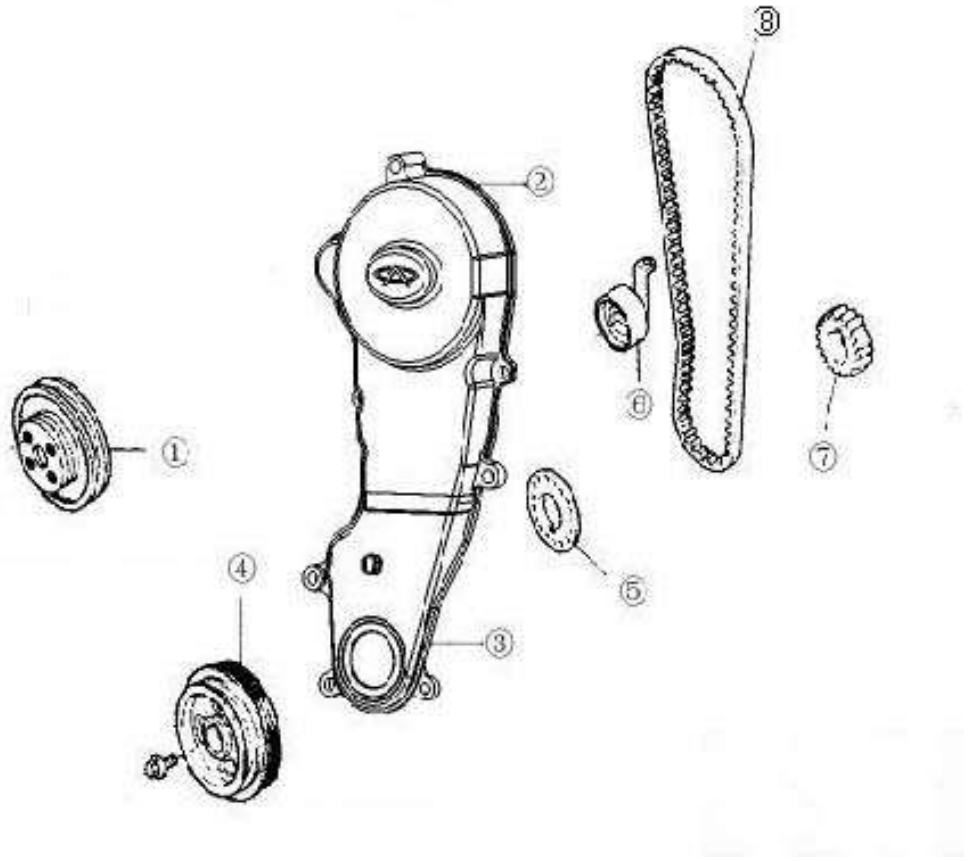
Never make unnecessary adjustments. The factory recommended settings are correct for most applications. It's not necessary to disassemble the screw unless the idle speed needs to adjustment. (See Fig. 43)
Warm up the engine (5~10min)

6.1. Connect the tachometer; adjust the throttle to limit the idle speed. The standard value is (800-900RPM).
6.2. Adjust the screw and adjust the idle speed to an ideal value.
6.3. Repeat step **6.2** until the RPM of engine stables.

FIGURE 43

7. Timing Belt

1. Configuration diagram

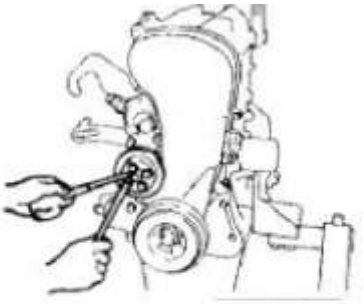


1 Water pump pulley 2 Timing belt cover. upper 3 Timing belt cover. Lower 4 Torsion shock absorber 5 Timing pulley damper 6 Tensioner 7 Crankshaft timing pulley .8 Timing belt

2. Disassembly

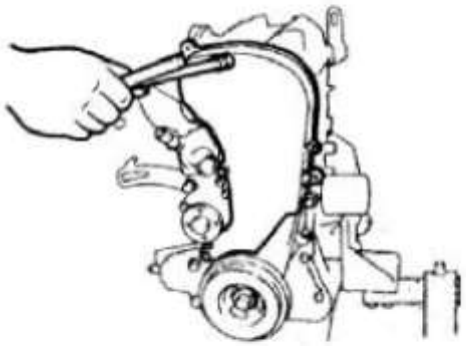
2.1. According the right picture, remove water pump pulley

Torque: 25±1.5 N.m



2.2. Removing timing belt cover

Torque: 6±1N.m

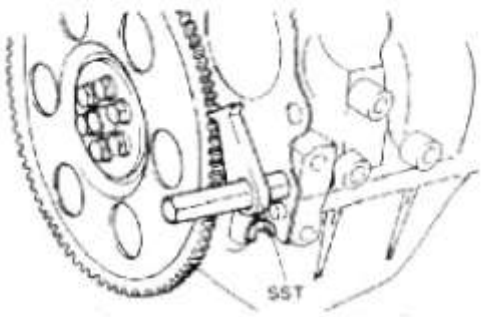


2.3. Remove tensional vibration damper

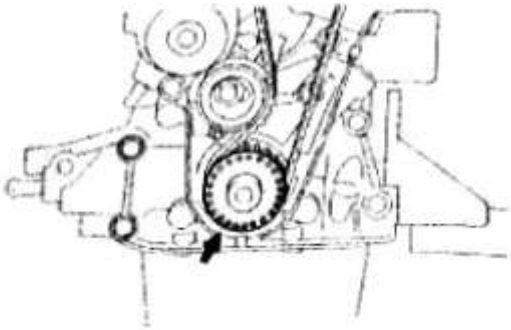
2.3.1. Fix the flywheel and prevent the gear ring from rotating,

2.3.2. Remove bolt of tensional vibration damper.

2.3.3. Ensure the mark on the timing belt match the mark on the oil pump

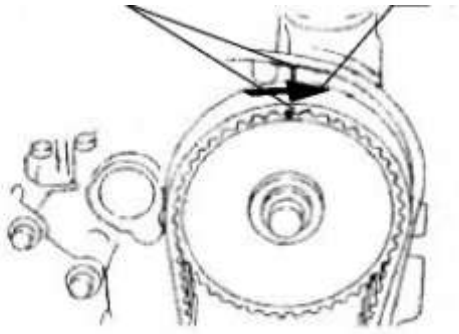


2.4. Remove timing belt covers



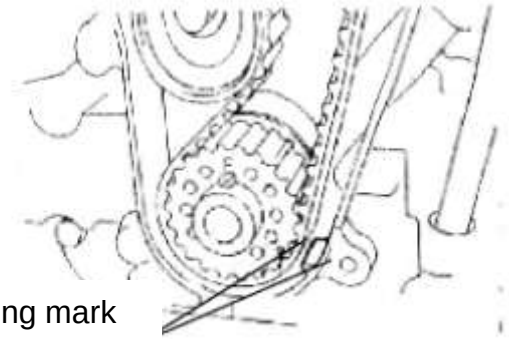
2.5. Remove the tensioner

2.5.1. Carry out the operation at the upper thrust point of compression of the first cylinder piston



2.5.2. After removing the timing cover cap, turn the bolt and rotate the timing gear clockwise with wrench, align timing mark of camshaft timing gear with the cam mark of camshaft cover cap;

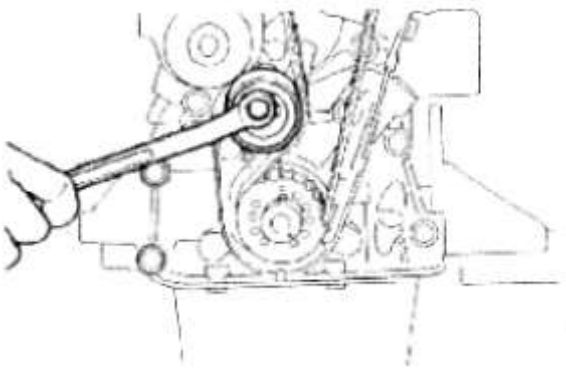
Attention: You can rotate the engine clockwise only, after installing the pulley; before removal, make a arrow mark on the position of timing mark, assemble according to original state.



Timing mark

2.5.3. Make sure that the crankshaft timing pulley wheel mark is aligned with the mark of the oil pump.

2.5.4. Remove the tensioner bolt, and take off the tensioner



2.6. Remove the timing belt.

[Caution] It is absolutely not allowed to use screw driver or some other sharp-edged tools to remove the belt.

Attention: Pay attention to the following points while using timing belt:

- Don’t bend the belt even at a small angle, otherwise it will result in rope fracture inside the belt.
- - Service life of belt is short, don’t pollute the belt with grease and water.
- You have no choice but rotate

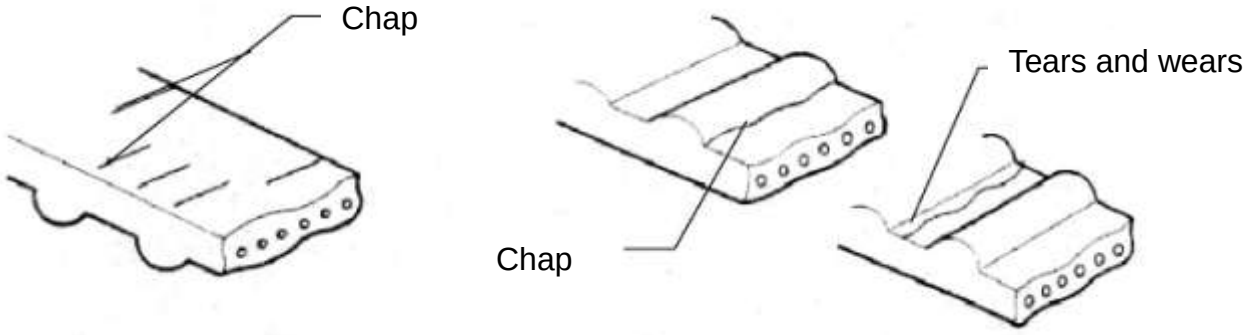
2.7. Remove the crankshaft timing gear

2.8. Make careful and detailed checks on the timing belt. Replace with new parts if any of the conditions shown in the figure occurs.

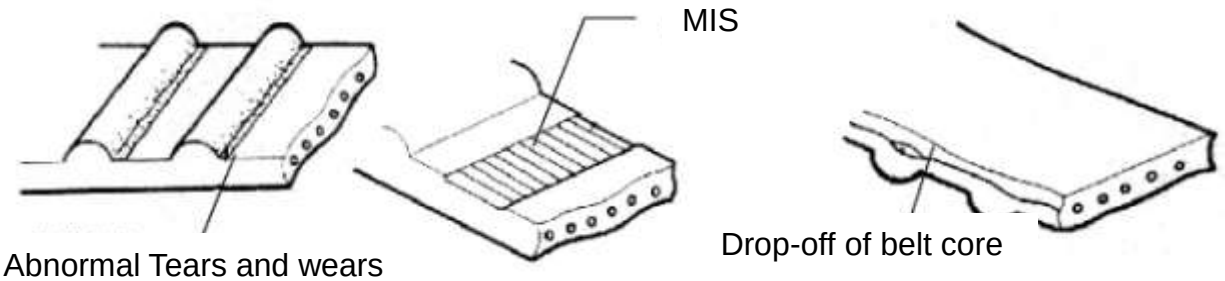
2.8.1. Cracks on the backside rubber;

2.8.2. Cracks of teeth roots, cracks clearing off the fabric lining layer;

2.8.3. Tears and wears of fabric lining layer, missing rear teeth, broken teeth, etc.



2.8.4. Abnormal tears and wears on belt sides



2.8.5. Even if the damages on the outer appearance can not be confirmed, the belt should be replaced under any of the following circumstances:

2.8.5.1. If the water in the water pump is leaked, which makes it necessary to refill the water continuously;

2.8.5.2. There are much oil stains on the belt, the belt should be replaced for the rubber will be damaged when it is expanded;

Specifications and model of the timing belt

Part number	372-1007030
Belt wide	２７．０mm

Timing belt tensioner

Turn the belt tensioner supporting stand bolts to see if there is any abnormal sound.

Check to see if there are any damages on the contacting surface of the belt.

Specifications and model of the timing belt tensioner

Part number	372-1007030
Wide	２７．０mm
Outside diameter	φ50mm

Check to see if there are any damages on the outer appearance

Specifications and model of clockwise pulley

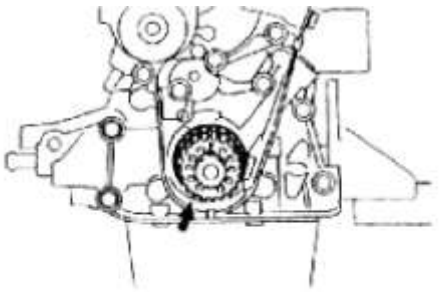
Model / Item	E F
	G L、Z L、G S、Z S
Diameter of camshaft timing gear （mm）	$\varphi 110.7^{+0.1}_{-0.2}$
Diameter of crankshaft timing gear（mm）	$\varphi 54.65^{+0.7}_{-0.13}$

Baffle of crankshaft timing gear

Check to see if there is any deformation

Standard size of crankshaft timing gear：

Wide	28.6mm



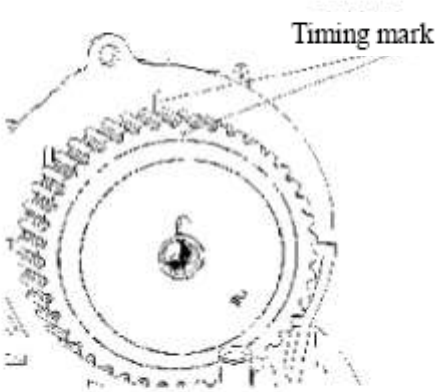
3. Installation

3.1. Installation of crankshaft timing gear

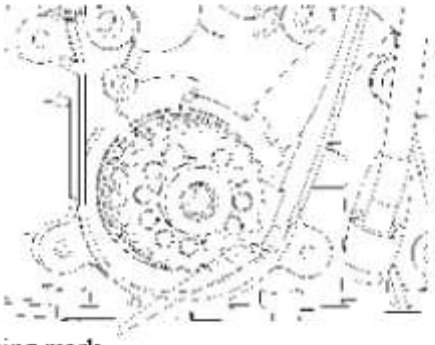
3.2. Installation of timing belt

3.2.1. On the upper thrust point of the first cylinder Compression Place the camshaft timing gear around the front end of the air exhaust camshaft so as to make the positioning groove on the gear be aligned with the positioning pin on the end surface of the camshaft. Then use screws to fix the clockwise gear, with the torque of

100 ± 5N.m.



3.2.2. Make sure that the punched mark on the crankshaft clockwise pulley is aligned with the mark of the oil pump.

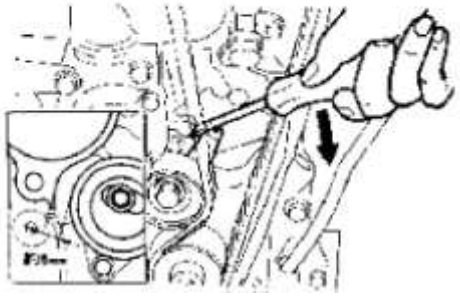


3.3. Install the tensioner

3.3.1. Adjust the tension of the timing belt As shown in the figure, make the space between the edge of the stretching wheel and the water pump case arc to be about 8mm;Tighten the bolt of the stretching wheel with a torque of

25 ± 3N.m. Use a screwdriver to

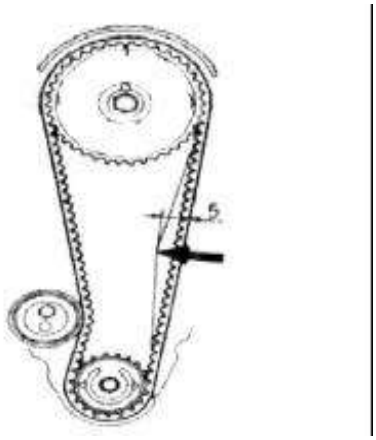
swing the stretcher toward the right..



3.3.2. Turn the crankshaft for two circles

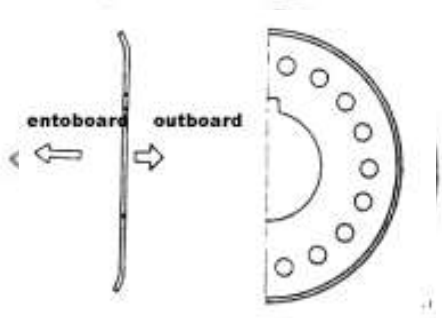
towards the engine rotating direction, so that the camshaft pulley and the crankshaft pulley match the clockwise marks respectively.

3.3.3. Use hands to press down for about 5mm. The force for pressing the clockwise belt is about:

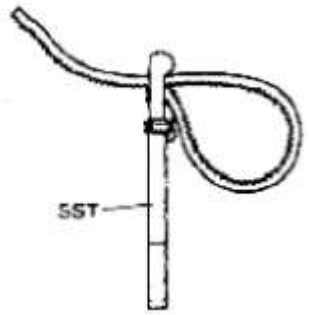


［Reference］ 20～30 N

Notice: When the deflection of the timing belt fails to meet the specifications, the key is to adjus the above-mentioned stretcher fastening bolt by widening he spacing. tighten the S/A fixing bolt of the stretcher with the specified torque of 25 ± 3N.m



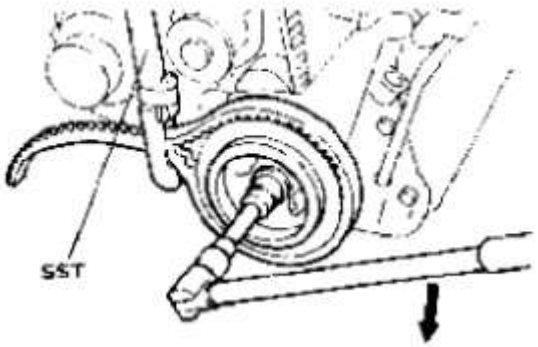
3.4. Install the baffle of the crankshaft-timing pulley
[Attention] Install the baffle towards the direction shown in the right figure.



3.5. Install the tensional vibration damper (use SST)

3.5.1. When there is not a flying wheel,

3.5.1.1. Fix a part of the crankshaft pulley.



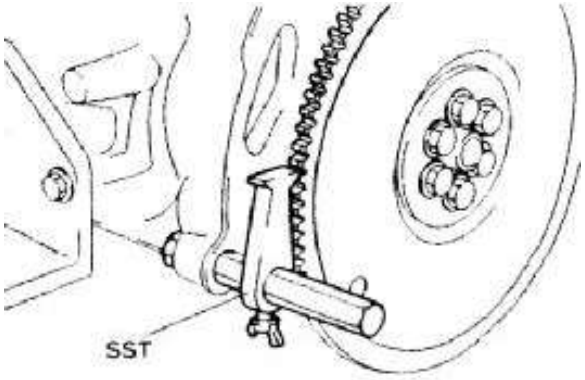
3.5.1.2. Pay attention not to make the gear belt moving, tighten the bolt according to the specified

torque :98.0±10N.m{10±1kgm}

3.5.2. When there is a flying wheel,

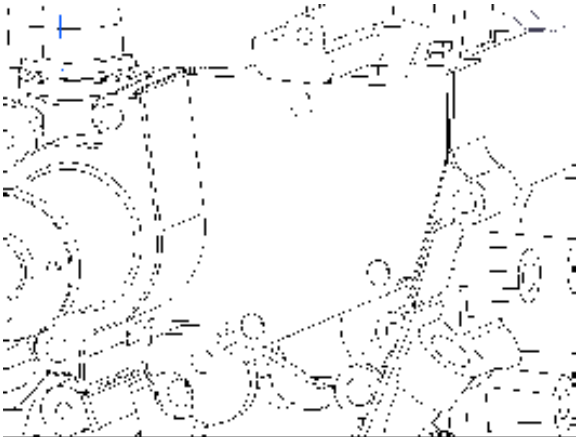
3.5.2.1. Fix the flywheel to prevent the tooth ring from turning

3.5.2.2. Then tighten bolt of tensional vibration damper.

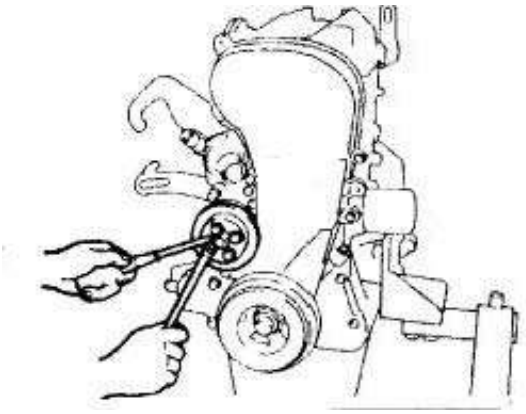


3.6. Install timing belt cover

Install seal strip in the position shown as right figure. Install the position 1 and position 2 before cylinder head assembly; install position 3 before tighten water pump.



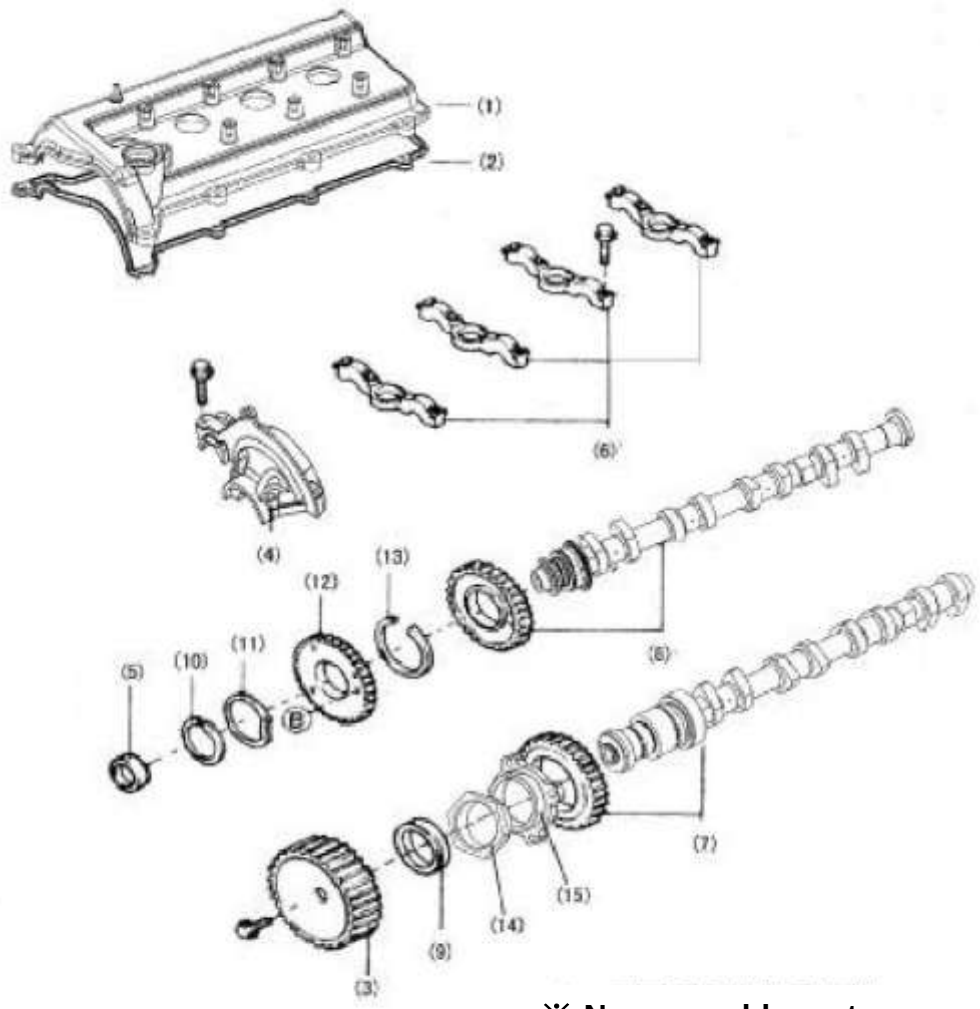
Install the timing belt cover, screw the bolt manually, and then tighten them with a tool.
Torque: 6±1N.m



3.7 Install water pump pulley
Torque: 6±1N.m

8. Camshaft

1. Configuration diagram



※:Non-reusable part

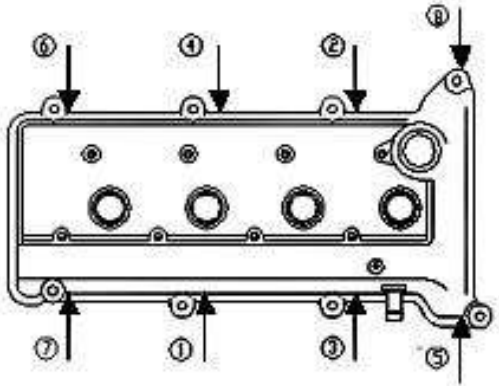
Unit: N*m (kg*cm)

(1) Valve cage cover (2) Valve cage cover gasket (3) Camshaft timing pulley (4) Camshaft cover (5) Circular plug (6) Camshaft bearing cap (7) Exhaust camshaft,(8) Intake camshaft,(9) Oil seal(10) Spring retainer(11) Wave washer(12) Intake camshaft sub-gear(13) Snap ring(14) Lock nut(15) Flange

2. Removal

2.1. 1) Cover-valve chamber

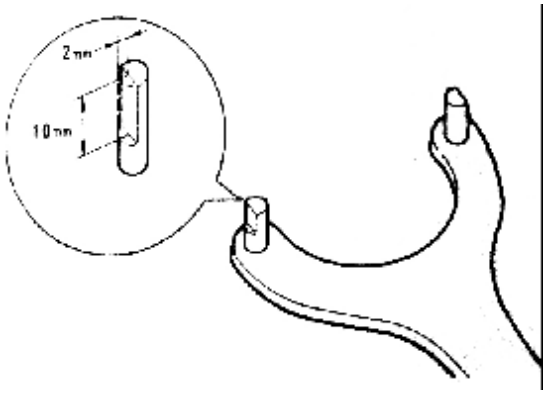
2) Disassembly order of Cover-valve chamber



2.2. Dismount the timing belt sprocket with a special tool.

Attention: Manufacture a special tool according the right figure

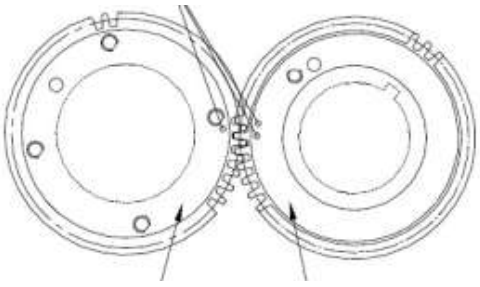
The special is necessary to prevent the camshaft to rotate



Timing mark

2.3. Removal of camshaft bearing cover

2.3.1. Align the marks on the camshaft gears as shown in the right figure.

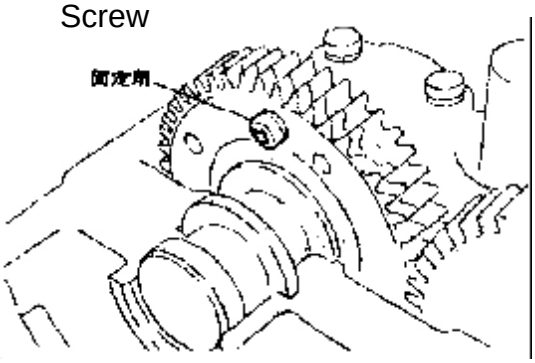


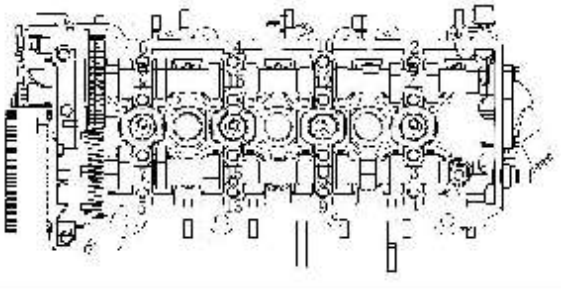
Air outlet camshaft gear Air inlet camshaft gear

2.3.2. Use bolt to position the master and slave gears on the air inlet camshaft, as shown in the right figure.

Attention In order to eliminate the radial force, keep the camshaft in the leveled position before dismounting it (to avoid possible damages caused by excessive radial forces)

Screw





2.4. Remove bolts according the right figure, remove camshaft bearing cover

2.5. Remove the spark plug

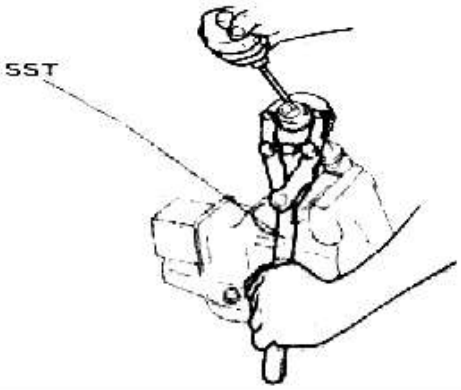
2.6. Remove the camshaft slave gear.

2.6.1. Use the special tool as shown in the right figure.

Clip the camshaft tightly, and turn the gear, to keep the bite state of master and slave gear; remove the fixing bolts of slave gear.

Attention: Do not damage the surface of the camshaft.

SST



2.6.2. Don't Use the special tool

(1). Screw bolt M6 on the camshaft slave gear as the right figure show

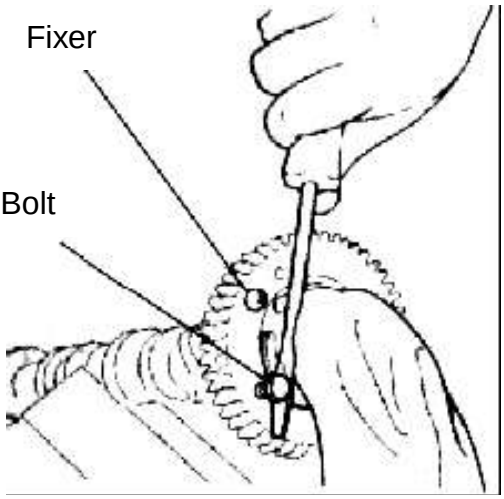
(2). Rotate the gear with a screwdriver; remove the bolt fixing slave gear

Attention: Do not damage the surface of the camshaft.

(3). Remove retainer for shaft with tensionor, remove waveform washer, driver ring and saddle flip washer.

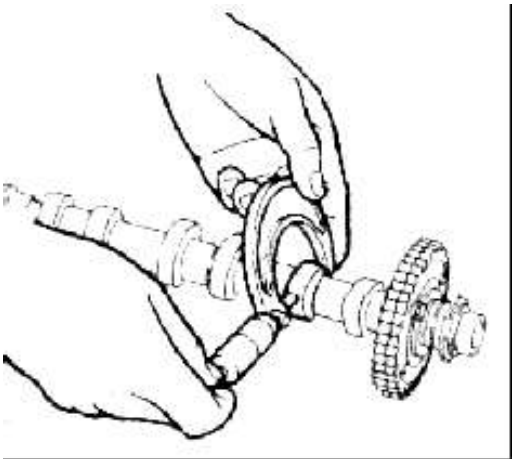
Fixer

Bolt



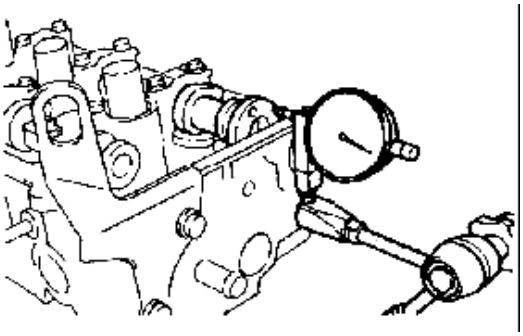
2.7. Camshaft

2.7.1. Use the caliper to measure the height of the camshaft. If it is below the specified limits, make roper replacement.



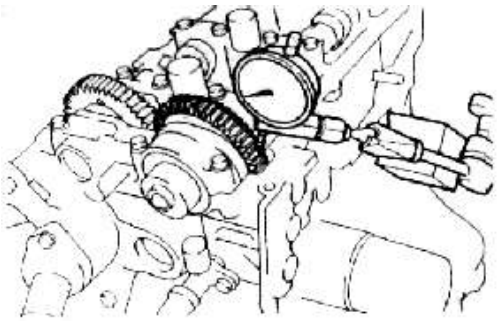
Camshaft Unit：mm

Item	Model	EF	
		ZL、RL	**GL、GS、ZS**
Standard	**IN**	φ23.0-0.02 -0.033	
	EX	φ23.0-0.02 -0.033	
Limit	**IN**	**φ22.9**	
	EX	**φ22.9**	



2.7.2. Checks on camshaft axial clearance

(1)、When the axial spacing is measured with a clipper to be larger than the benchmark value, the camshaft is to be replaced. The air inlet camshaft axial clearance is 0.1～0.170mm。The air exhaust camshaft axial spacing is 0.1 ～ 0.173mm。Limits for operation：0.18mm



2.7.3. Checks on camshaft meshing clearance

(1). Put camshaft into cylinder head

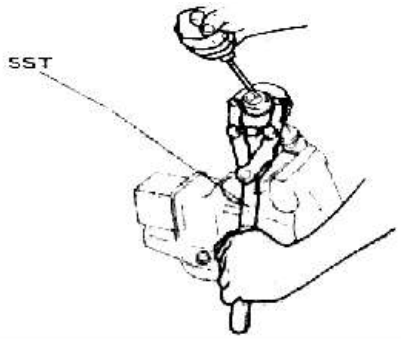
(2). Make sure the front mark on bearing cover and shaft number is ok, and then tighten bolt.

(3). Fix air inlet camshaft, and then measure the clearance with dial indicator.

Attention: measure 4 points around gear

• use a special tool to rotate air inlet camshaft.

• under the condition that the mark on drive-gear match the mark on driven-gear



3. Installations

3.1. When using a special tool

3.1.1. Fix the two φ6 holes of the camshaft gear S/A.

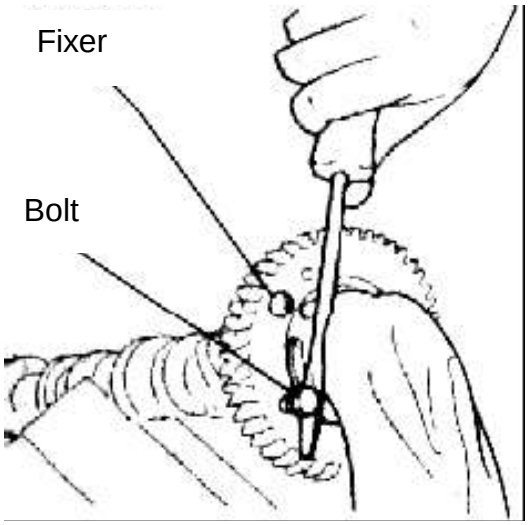
3.1.2. Turn the slave gear to the right, match the mark hole on the slave gear with the mark on the master gear, or align the marks on the slave

gear with the mark on the master gear; then fix the slave gear with bolt.(Thread: M5; pitch: 0.8)

3.2. When no using a special tool

Screw bolt m6 as the right figure, and then insert a screwdriver between the bolt m6 and camshaft, and rotate driven-gear right to match the mark on both of gears, or keep the gear-top of 2 gears consistent, and then fix driven-gear with bolt(M5 × 0.8).

Attention: Do not damage the surface of the camshaft.



3.3. Installation of the camshaft

Attention: Size of the axial clearance of the camshaft

3.3.1. Smear lubricating oil at the camshaft gear section and the cylinder cover axial diameter section.

3.3.2. Fix the camshaft slave gear by roughly adjusting on the cylinder cover.

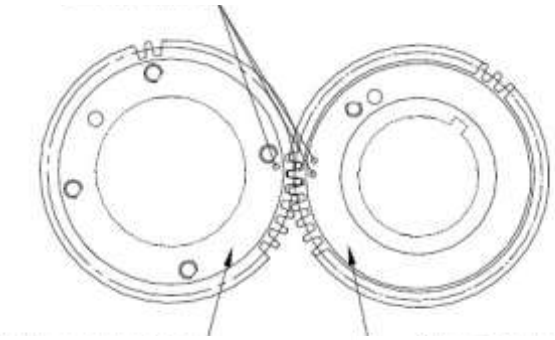
3.3.3. Install camshaft, the timing mark must be aligned shown as the right figure.

3.3.4. Smear lubricating oil on the camshaft assembly, the gears and the cylinder head axial diameter section.

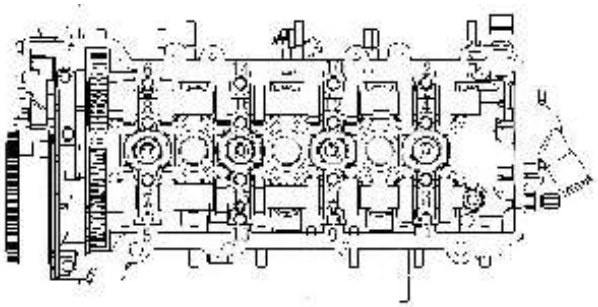
3.4. Tighten the camshaft-bearing cap shown as right figure.

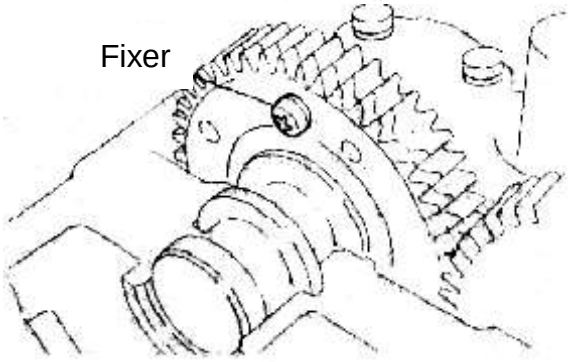
3.5. Remove the bolt for fixing the slave gear of the camshaft assembly.

Timing mark



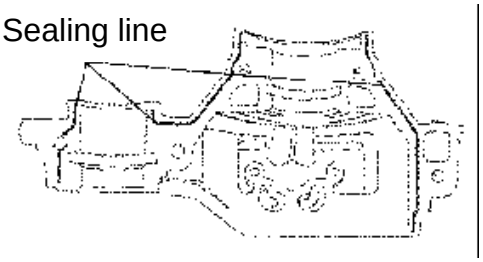
Air outlet camshaft gear Air inlet camshaft gear



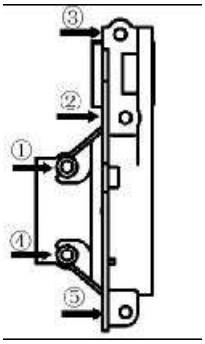


3.6. Installation of camshaft head cap Smear the fluid sealant on the camshaft head cap section (With oil groove) shown as the right figure.

Sealing line



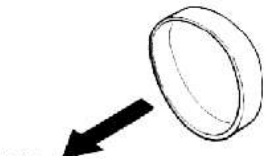
3.6.1. Tighten the bolts according to the sequences shown as the right figure with the specified torques.



3.6.2. After smearing oil in the plug cap hole and assembling surface of the plug, use SST to press the plug lid

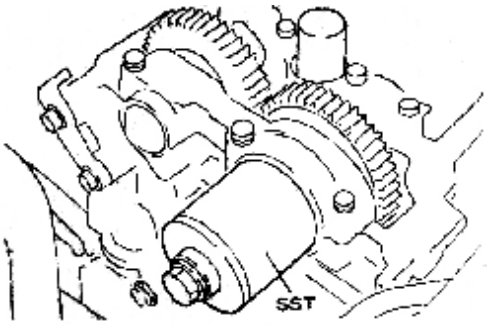
Attention: Install the plug lid shown as the right Illustration. Keep unbiased with cylinder head end surface after pressing.1 ±1mm。

3.7. Smear engine oil on the oil seal installation port of cylinder head, camshaft oil seal edge of blade and outside ring, use M10 bolt (length 50-60 mm) and SST press the cylinder, lower 1mm than the end surface of the cylinder4 head.



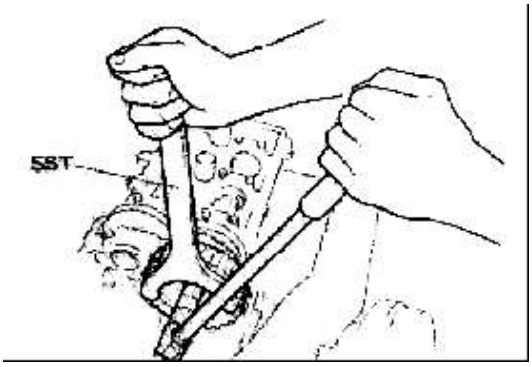
Outside

Attention ·Under the condition of use the oil seal repeatedly, press here with engine oil adhesive agent - The oil seal should not be pressed inclining to one side.

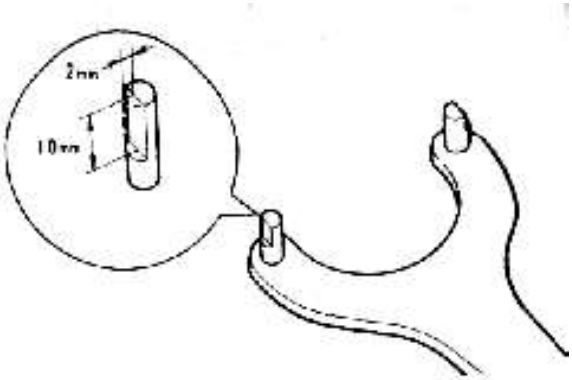


3.8. Installation of the timing gear of camshaft After smearing the fluid sealant, use SST to prevent rotating, tighten the timing gear bolt of camshaft according to regulated

torque of 100±5N.M.



Attention: process the special tool according the right figure.



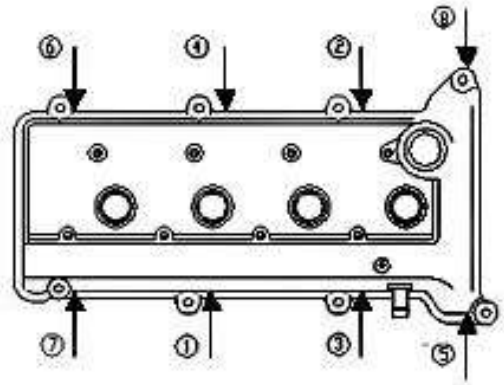
3.9. Installation of cylinder head gasket

3.9.1. Clean the the used cylinder head gasket

3.9.2. Put new one into the groove on the timing-belt cover accurately

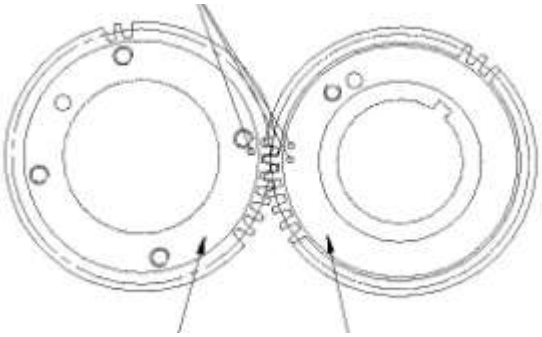
3.9.3. Cover the cylinder head with cylinder head cover; tighten the bolts according the right figure.

Torque: 6±1N.m.



4. Routine check

Timing mark



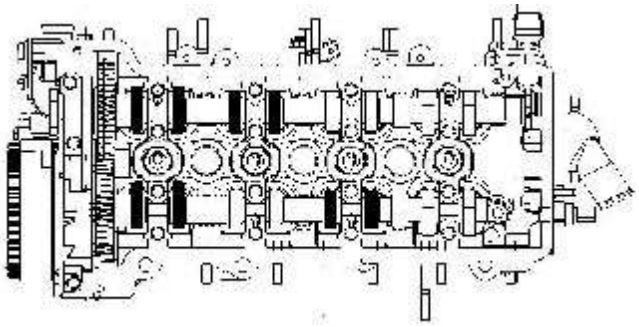
Air outlet camshaft gear Air inlet camshaft gear

4.1. Standard of valve clearance:

valve clearance	IN	0.18±0.05
	EX	0.25±0.05

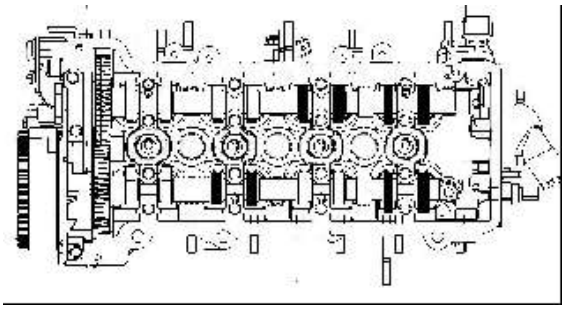
4.2. Align the timing marks on the drive-gear and driven-gear.

4.3. Use a plug gauge to measure the clearance according the right figure



一缸		二缸		三缸		四缸	
IN	EX	IN	EX	IN	EX	IN	EX
O	O	O	—	—	O	—	—

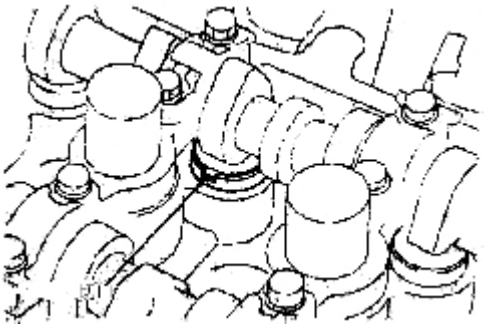
4.4. Rotate camshaft a round, keep the position as the right figure, measure the clearance again.



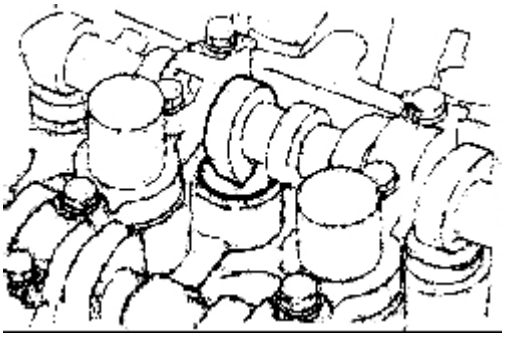
First cylinder		Second cylinder		Third cylinder		Fourth cylinder	
IN	EX	IN	EX	IN	EX	IN	EX
—	—	—	O	O	—	O	O

If exceed the standard of valve clearance, replace a adjusting washer to get a proper clearance

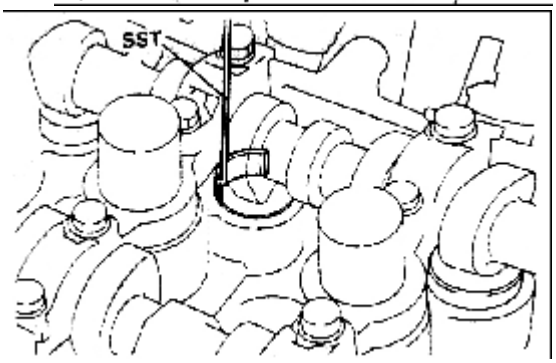
Attention: record the position where valve clearance exceed the standard and the result



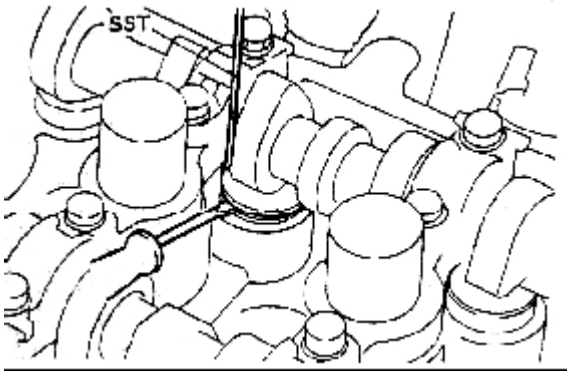
4.4.1. Rotate camshaft to make the cam-top (valve clearance exceed the standard) upwards, and gap of valve lifter towards inside.



4.4.2. Rotate camshaft and the cam press valve lifter down.

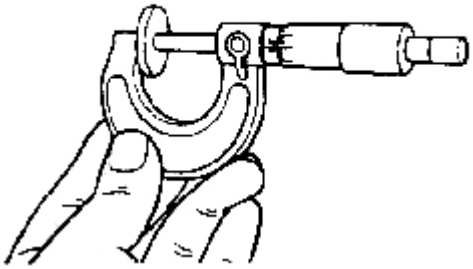


4.4.3. Load the special tool at the top of the valve lifter around the valve lifter, and then rotate camshaft to make the cam-top upwards, press valve lifter down with a special tool, and hold it.



4.4.3.1. Move the adjusting washer out with a screwdriver, and then remove the washer with a magnet iron wire from inside.

4.4.3.2. Use a caliper to measure and adjust the thickness of the separation cushion.



4.4.3.3. Select proper separation cushion on the basis of the throttle thrusting rod benchmark values.

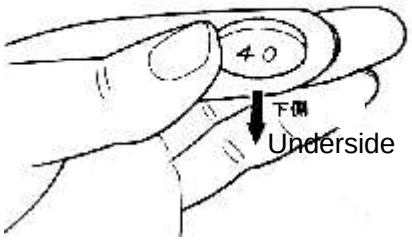
(1). IN

Selected cushion thickness = removed cushion thickness + (measured throttle spacing – 0.18mm)

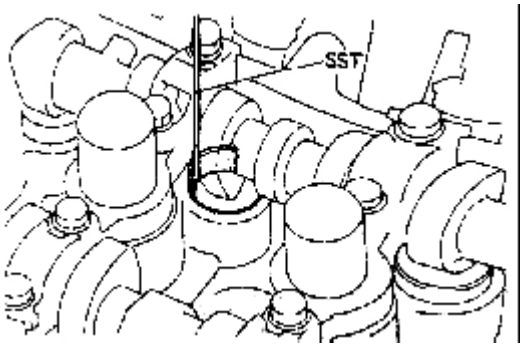
(2). EX

Selected cushion thickness = removed cushion thickness +(measured throttle spacing –0.25mm)

[Reference] there are 32 kinds of shim's thickness Shown as the illustration



2.18	2.40	2.62
2.20	2.42	2.64
2.22	2.44	2.66
2.24	2.46	2.68
2.26	2.48	2.70
2.28	2.50	2.72
2.30	2.52	2.74
2.36	2.58	2.80
2.32	2.54	2.76
2.38	2.6	



4.4.3.4. Use the selected adjusting gasket to adjust the throttle clearance.

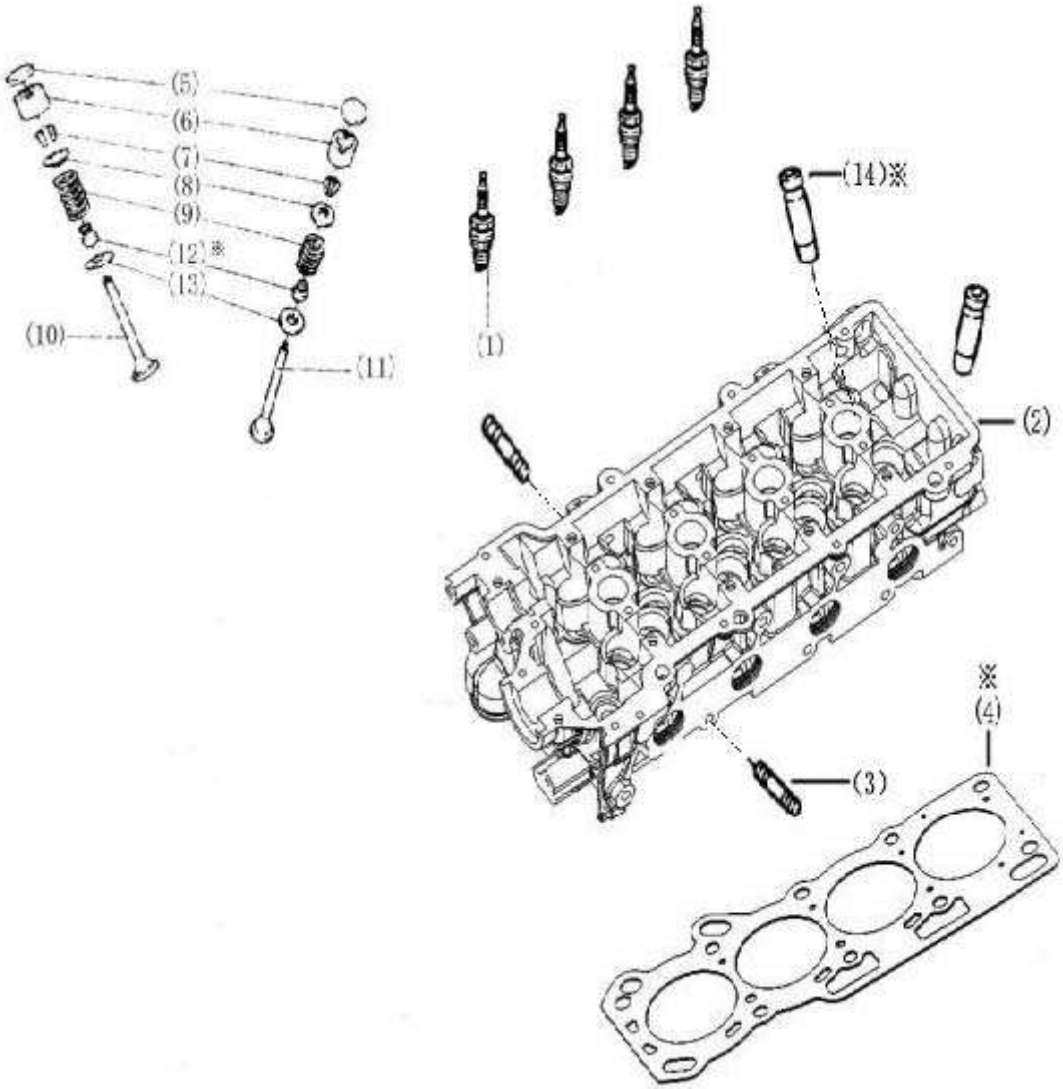
Attention Install the feeler with the identification mark facing downwards.

4.4.3.5. Rotate camshaft to make cam-top downwards, and the throttle to be pressed down, and then take special tool out

4.4.3.6. Rotate camshaft 2-3 round, and then recheck the valve clearance, if valve clearance can't get to the standard, repeat4.1-4.4 to adjust the valve clearance.

9. Cylinder head

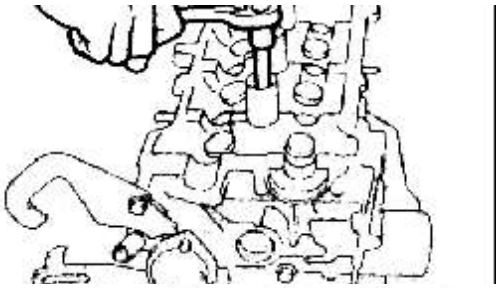
1. Configuration diagram



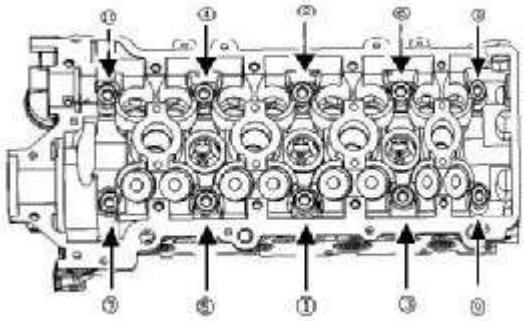
（1） Spark plug20±1Nm（2） Cylinder head（3） Weather seal I（4） Cylinder head gasket
（5） Adjust shim（6） Valve lifter（7） Keeper（8） Valve spring seat（9） Valve spring （10） Intake valve（11） Exhaust valve（12） Valve oil seal（13） Valve seat（14） Valve guide

2. Dismounting

2.1. Removal of spark plug



2.2. There are 8 cylinder cover bolts. In the process of removing the cylinder, please follow the sequences shown as the right illustration, loosen the bolts one by one evenly and gently.。

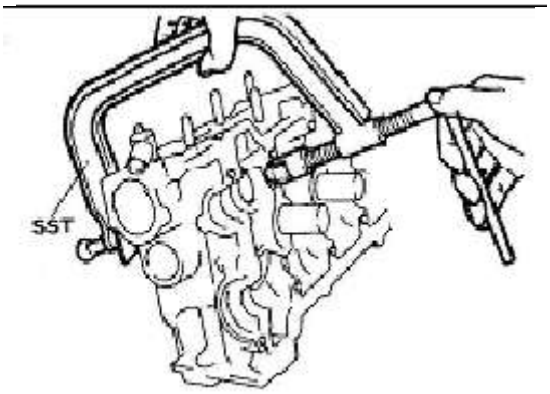


2.3. Removal of the cylinder dustproof sealing and cylinder cover base.

Attention The cylinder cushion cannot be used repeatedly.

2.4. Removal of throttle adjusting separation cushion and valve thrusting rod

2.5. Use special tools to remove the valve spring locking block, throttle spring stand, valve spring, IN valve and EX valve

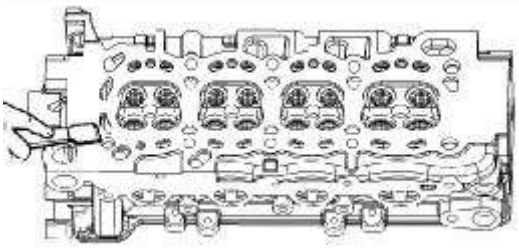


2.6. Removal of valve oil seal and valve spring washer

2.7. Clearing

(1). The accumulated carbon residue covered on the valve must be cleared.

(1). Use scraper to clear the cylinder cover, the air inlet and exhaust branching pipe surfaces and bottoms

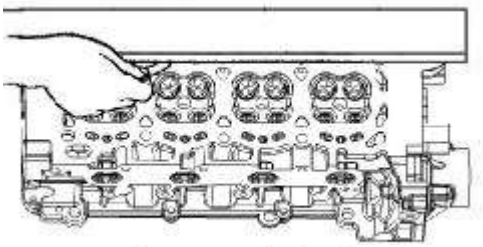


Attention

Do not damage the cylinder cover surface by scraping

during the process of clearing.

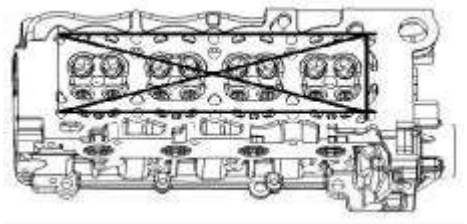
Do not drop filth into the air inlet and the water channel.



3. Routine checks

3.1. Cylinder cover

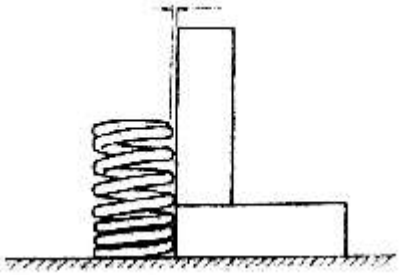
Use the straight knife sharp edge ruler to measure the levelness at various points as shown in the figure. Cylinder cover 0.10mm Air inlet branching pipe surface 0.10 mm



3.2. Valve spring

3.2.1. Use a square ruler to measure the right angle of the valve spring. Replace the spring if it fails to meet the specifications.

[Limit] 1.2mm

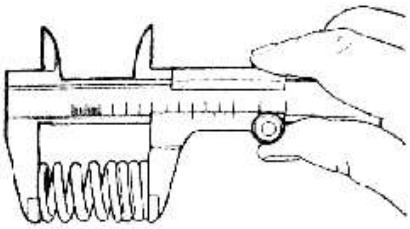


3.2.2. Measure the free state of spring

[Benchmark value] 37mm

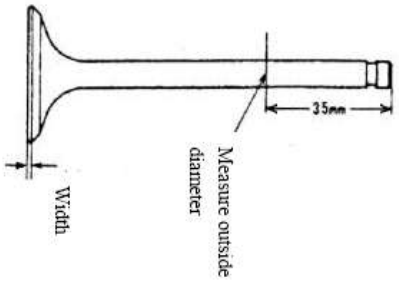
3.3. Routine checks on throttles

3.3.1. Check to see if there are some deformations, obvious tears and wears



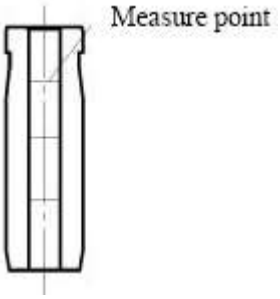
Check list on valve Unit: mm

item		standard	limit
wide	IN	0.85～1.41	—
	EX	1.07～1.36	—
Width of valve top	IN	1.0±0.2	0.75
	EX	1.0±0.2	0.75



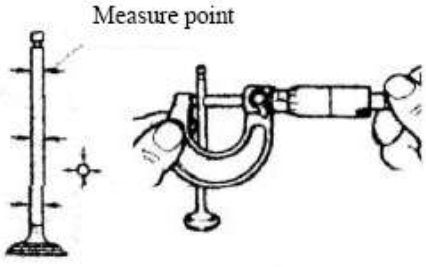
3.3.2. Checks on the clearance between the throttle guiding pipe and throttle thrusting rod

3.3.2.1. Use a dial gauge to measure the inner diameter of the throttle-guiding pipe, and use a caliper to measure the outer diameter.



3.3.2.2. Work out the differences of the measured values. If it is above the specified limits, the throttle or the guiding pipe must be replaced.

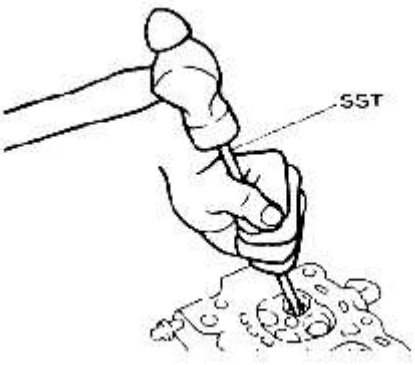
Attention The measurement points are shown as the figure. Work out the clearance of the final torn and worn section



item		standard	limit
Valve guide Inside diameter(mm)		Φ5.0	—
Valve stem outside diameter (mm)		Φ5.0	—
Spacing (mm)	IN	0.056 ～ 0.020mm	0.07
	EX	0.066 ～ 0.030mm	0.08

3.3.3. Replacement of valve guide

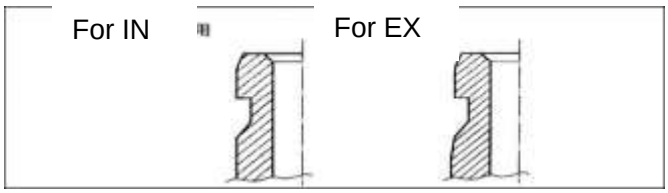
3.3.3.1. Heat the cylinder cover to 80—100 degrees C with hot water



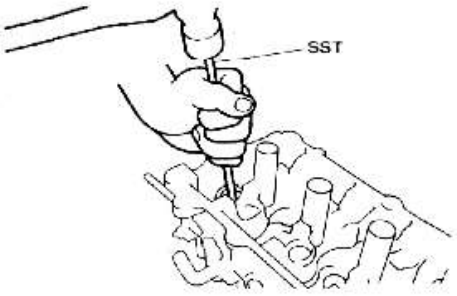
3.3.3.2. Use special tools to drive in the valve-guiding pipe to the position as shown in the right figure from the side of the combustion chamber.

Attention The removed guiding pipe cannot be used repeatedly. The air intake and exhaust valve guiding pipes should not be mixed up in installation.

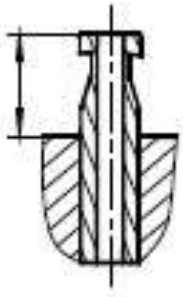
3.3.3.3. Use special tools to drive in the new valve-guiding pipe to the position as shown in the right figure.



Attention In the process of driving in the guiding pipe into the cylinder cover, the operation should be carried out slowly until the pipe gets to the proper position. No excessive driving should be exerted. Pay attention to the specifications in the operation. Driving in depth of throttle guiding pipe



model	EF	
item	GL,ZL,RL,GS,ZS	
Height(mm)	IN	13.71±0.25
	EX	12.11±0.25

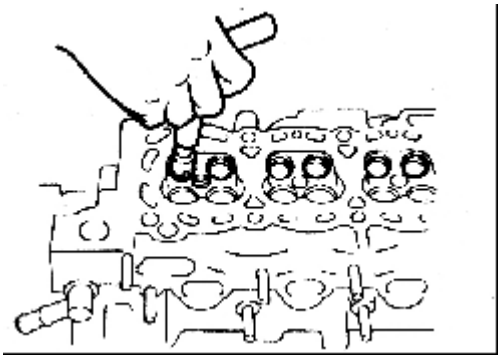


3.3.3.4. Use reamer to grind the inner diameter to achieve the standard value of the clearing.

3.3.4. Valve mating surface

3.3.4.1. Smear thin layer of red lead powder on the valve-mating surface. Do not turn the valve, and gently drive it in. Check the mating condition and the width of mating line.

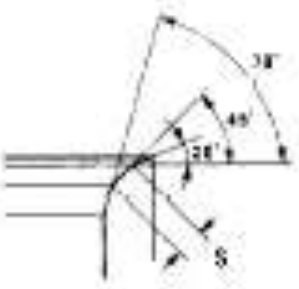
3.3.4.2. Correction of valve base stand ring
Attention Signs of breaking or cracking should not appear on the correction surface. Take it out slowly after the correction is completed.



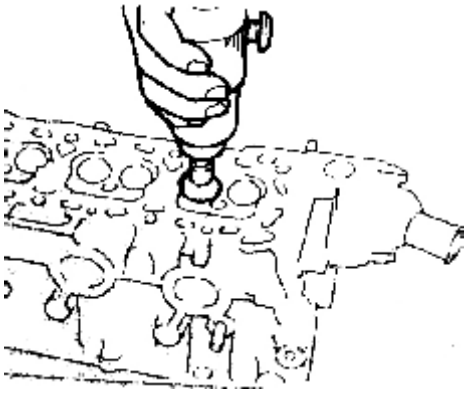
3.3.4.3. Use a 45 degree cone as the mating benchmark value.

3.3.4.4. Check the mating position of the throttle. If it is in the center of the valve, the position is the best one. If not, proper corrections have to be made.

3.3.4.5. Make conic cutting at the center of the mating position with 70 degrees toward inwards and 30 degrees outwards.



3.3.4.6. Use polishing agent to grind and polish the throttle sealing.



3.4. Assemble of cylinder head

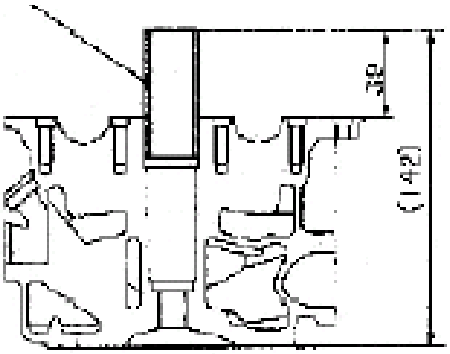
3.4.1. Cylinder head

Pay attention to the following instructions in the process of assembling for the other accessories on the cylinder cover.

3.4.2. Spark plug insulator 1 Put the spark plug insulator in the corresponding hole

Spark plug insulator

on the cylinder head with special use auxiliary tools, smear fluid sealant before pressing, pressing height is shown as the illustration:



Attention· Pay attention that the vertical

degree of its pressing depth and the cylinder head top surface;

· The insulator should not be deformed

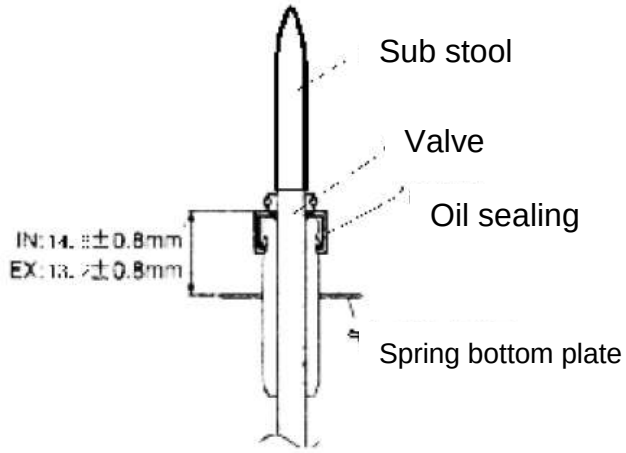
while being pressed; Otherwise, it is easy for the valve chamber cover cap to lea

3.4.3. Installation

3.4.3.1. Installation of valve spring washer and valve oil sealing

3.4.3.1.1. Cover auxiliary tools on the valve rod head, smear oil on the outer circle of the auxiliary roundness and inside of new valve oil seal, install it on the illustrated position, pull out the auxiliary tools of valve oil seal.

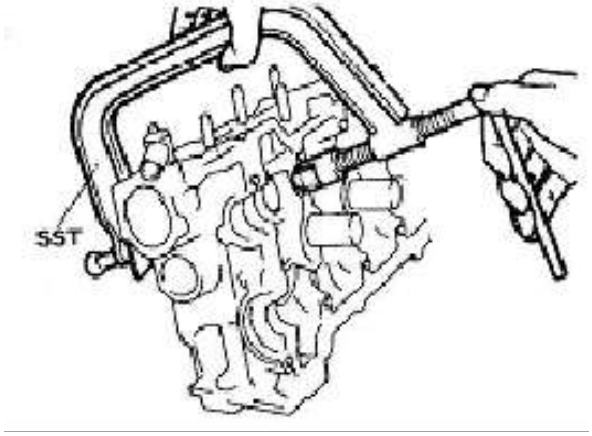
[Reference] Insert the oil sealing up to the dimension as shown in the right figure.



3.4.3.2. Installation of IN and EX

3.4.3.2.1. Assembling of valve springs

Attention It is for you to distinguish the different suppliers by means of paintings on the valve spring, valve spring of same engine should have the same identification paint marking.



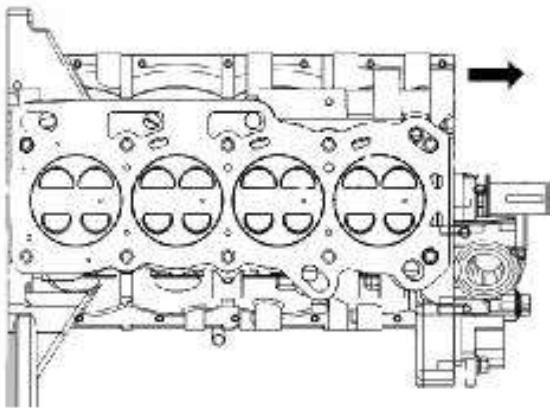
3.4.3.3. Install the locking blocks for the valve spring stands.

Warning

·Protective eye glasses must be worn in the process of this operation to protect the eyes.

·Beware of the flying spring and other objects

Upon completion of the installation of the throttle springs and throttle spring stands, use special tools to install the locking blocks for the throttle spring stands.

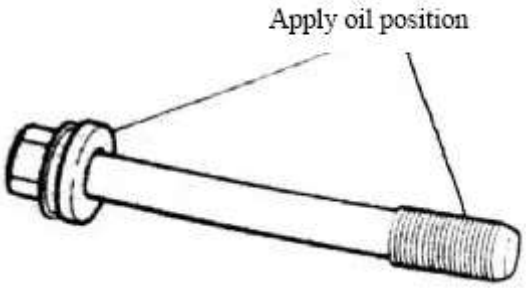


3.4.3.4. Installation of the throttle thrusting rod and throttle spacing by adjusting the separation cushions

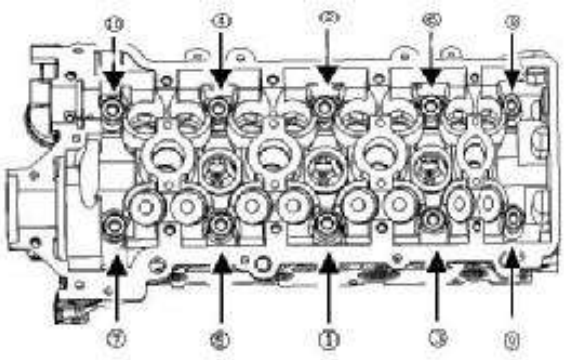
3.4.3.5. Install the cylinder cover base, make identification of the marks for the front and rear directions.

3.4.4. Assembling of dustproof sealing strip and cylinder cover

3.4.4.1. Apply lubricating oil at the threads and grooves of the bolts.



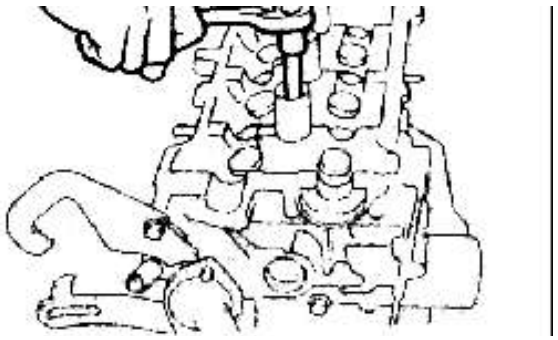
3.4.4.2. The tightening of the cylinder bolts should follow the sequence as shown in the right figure. The tightening is to be carried out in 2—3 operations till the torque meets the specifications. The torque for the first tightening operation is 30±2N.m; the torque for the second tightening operation is 50±3N.m; and the torque for the third tightening operation is 70±3.5 Nm.



3.4.4.3. Installation of the spark plug

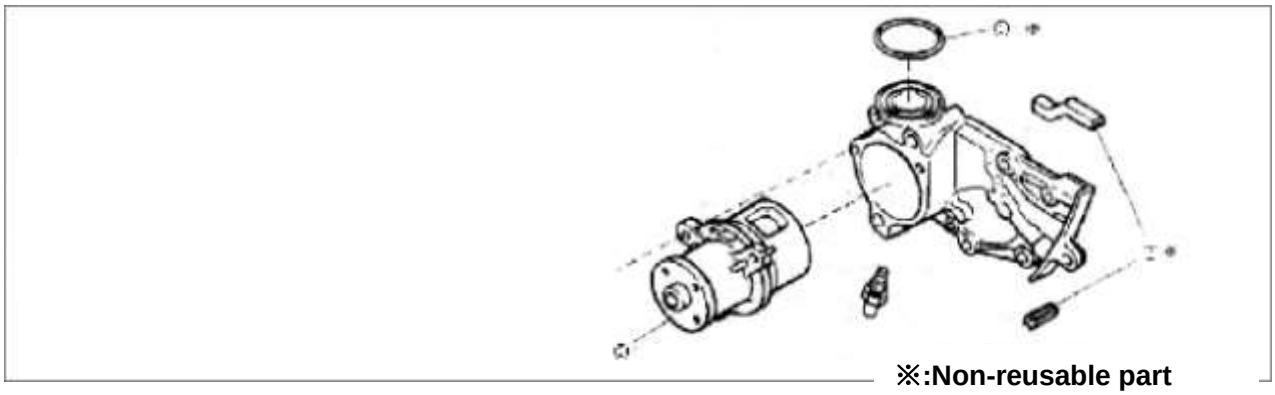
[Torque] 20±1Nm

Attention: The tools should be placed vertically, so as not to make the spark plug insulator become deformed, otherwise it is easy to leak oil.



10. Water pump

1. **Configuration diagram** (the dismounting and assembling of the cylinder body should be done in the following procedures)



※:Non-reusable part

Unit: N*m (kg*cm)

1 “O” ring, non-reusable2 Oil pump body3 Weather seal

2. Dismounting

11.

12.

2.1. Dismounting and removal of O-shaped ring

Attention: These rings are not reusable.

2.2. Removing the three bolts and dismount the water pump principal body.

2.3. Removal of the dustproof sealing stripe

3. Clearing

3.1. Clearing of the mating surface of the water pump

4. Routine checks

4.1. Check to see if there are any deformation or damages

4.2. Use a hand wrench to see if the turning is OK, and if it is smoothly lubricated?

5. Installation

5.1. Install the dustproof sealing stripes

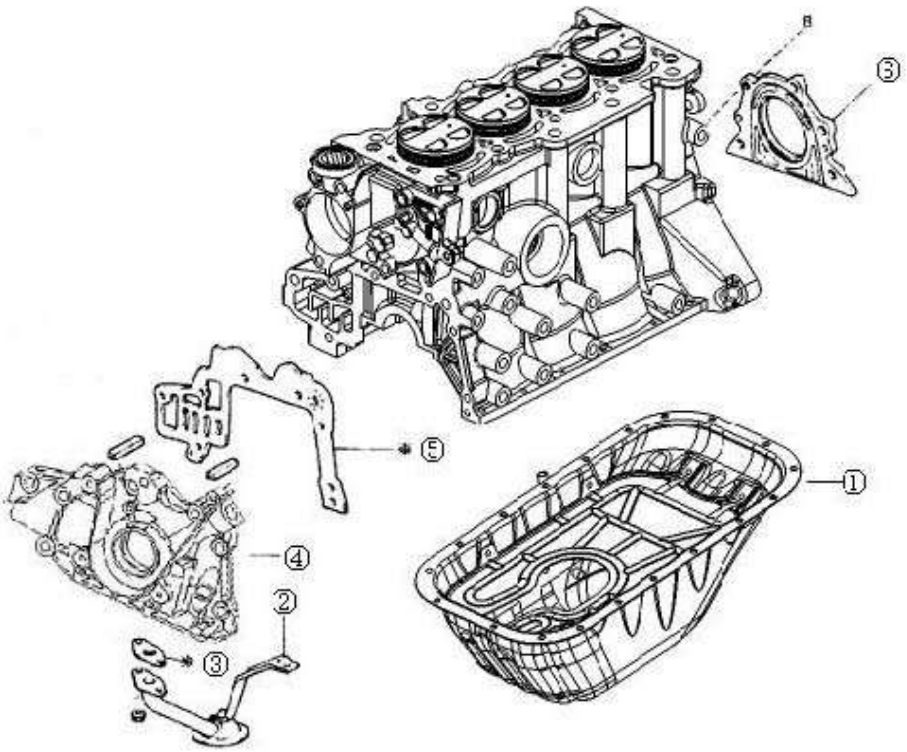
5.2. Install the water pump principal body

Tighten with a torque of 25±1.5N.m

5.3. Install the new O-rings

13. Oil pump

1. Configuration diagram (The dismounting and installation of the lubricating oil pump should be carried out according to the following procedures).



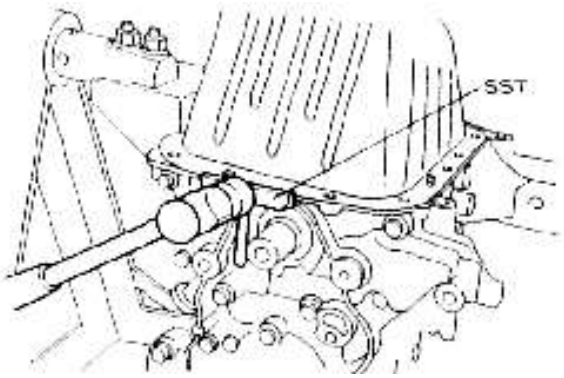
※ : Non-reusable part

① Oil pan，tighten bolt：8±2 Nm② Oil strainer③ Oil collector gasket④ Oil pump⑤ Oil pump gasket⑥ Rear oil seal bracket

2. Dismounting

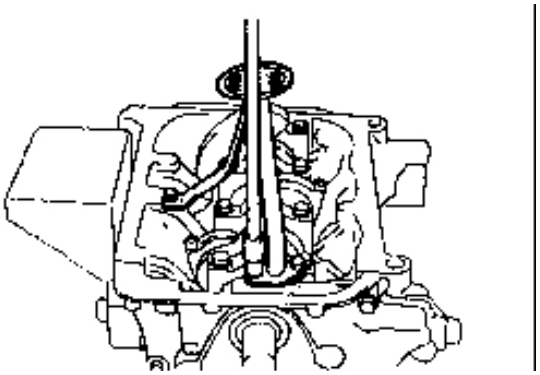
2.1. The engine being turned upside down on the dismounting frame, take off the bolts. Remove the oil pan from the cylinder body.

Attention: Do not make the oil pan flange section to be deformed.



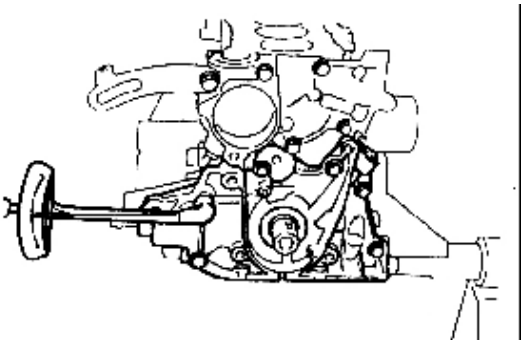
2.2. Remove the oil collecting filter and its flange

Attention The filter flange is not reusable.



2.3. Dismount the oil pump assembly and oil pump cushion

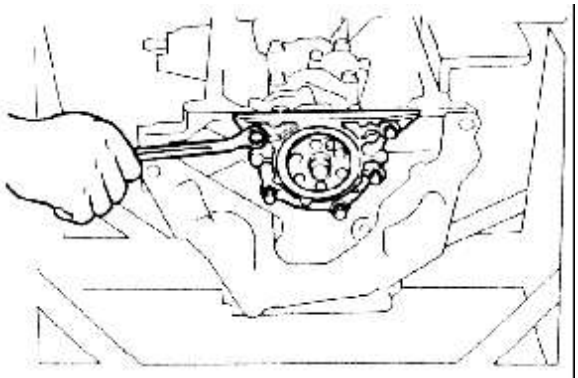
2.4. Dismounting of oil seal stand

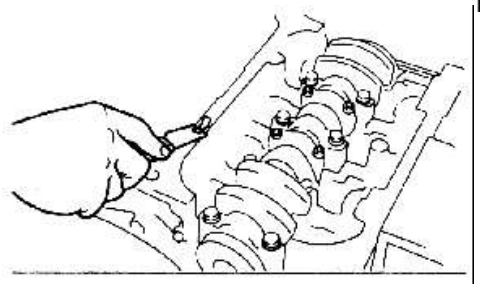


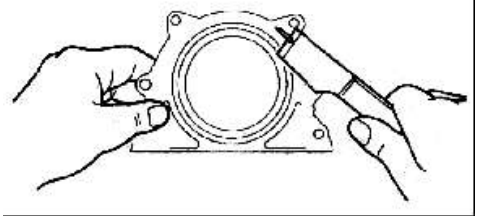
3. Clearing

3.1. For the mating surfaces of the oil bottom case, oil pump and oil seal stands, For the mating surfaces of the rear oil seal stand and oil pump scraper and chipping chisel or some other tools may be used to clear the used ones.

Attention Do not drop the residues into the cylinder body.

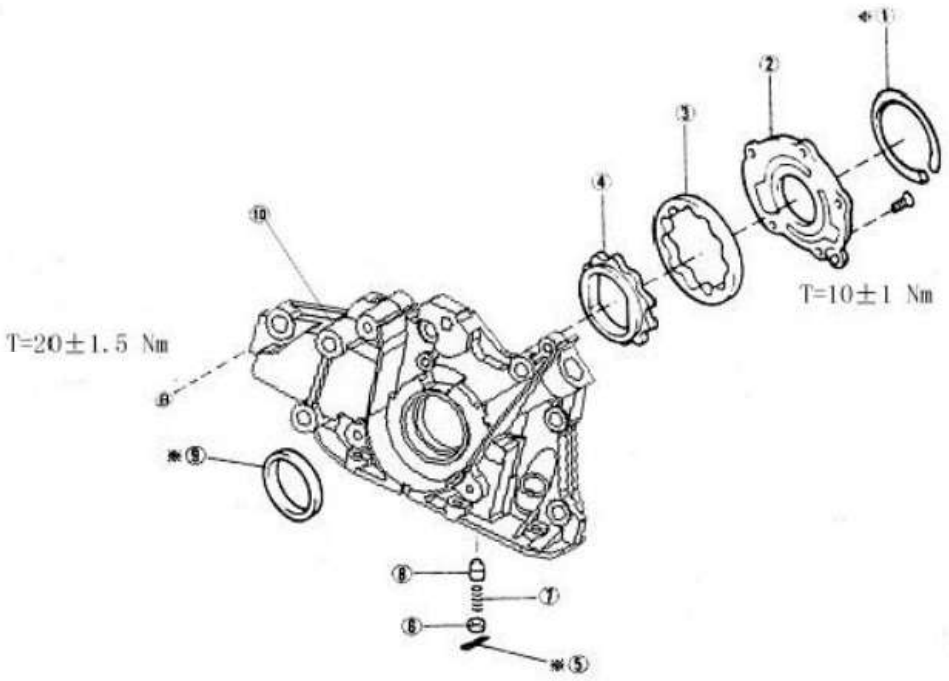






4. Disintegration and assembling of oil pump

4.1. Configuration diagram



※:Non-reusable part

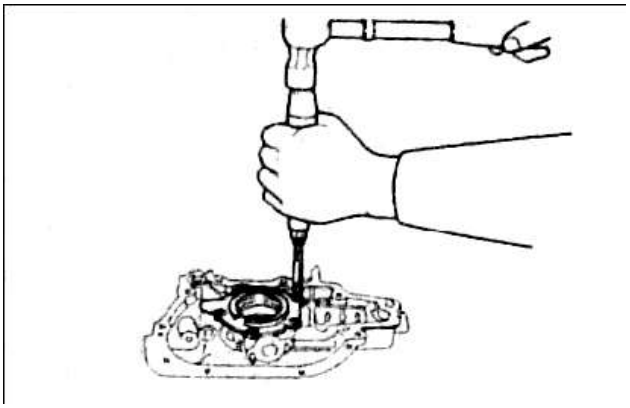
Unit: N*m (kg*cm)

1 Weather seal2 Oil pump cover plate3 Driven rotor4 Drive rotor5 Split pin6 Relief valve spring seat7 Relief valve spring8 Relief valve9 Crankshaft front oil sealing10 Oil pump body

4.2. Disintegration

4.2.1. Weather seal

Attention The weather seal are not reusable.



4.2.2. Remove the oil pump cover

Attention: The bolt is assembled with glue, loosen it with screw driver according to the illustrations

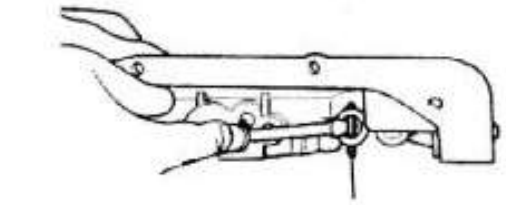
4.2.3. Remove the driven and drive rotor of the oil pump

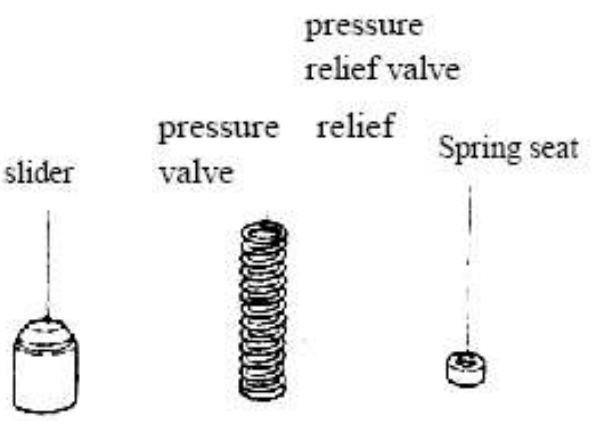
4.2.4. Take off the split pin

Attention The split pins are not reusable.

Attention: Pay attention not to make the spring and spring seat sending forth and ropping suddenly, while taking off the open pins.

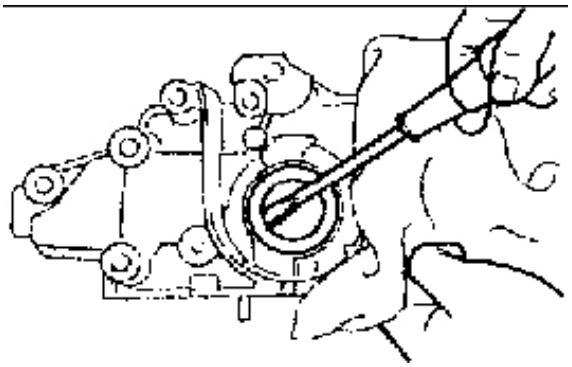
4.2.5. Removal of the oil pump pressure relief valve spring stand, spiral spring, oil pump pressure relief valve





4.2.6. Removal of the front oil seal of the crankshaft

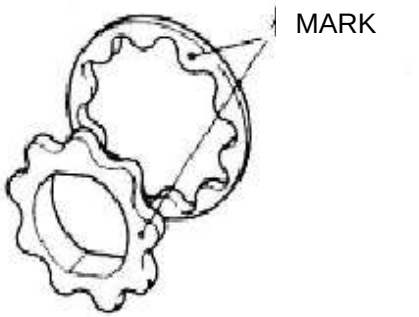
Attention The removed oil seals are not reusable.



4.3. Routine checks

4.3.1. Checks on lubricating oil pump spacing

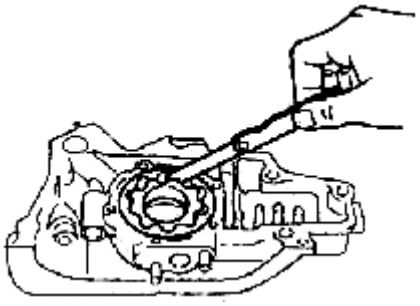
4.3.1.1. Follow the mark on the interior and exterior gears of the oil pump to place it into the lubricating oil pump body on the cylinder body.



4.3.1.2. Use a feeler to measure the clearance between the interior gear and the exterior gear

[Benchmark] 0.05-0.18mm(average of 9 points)

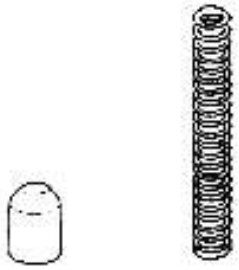
[Limit] 0.35 mm



4.3.1.3. Use a feeler to measure the clearance between the rotator and the pump body

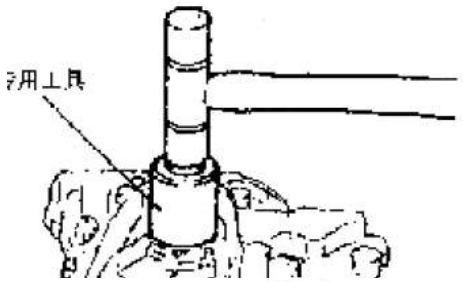
[Benchmark] 0.10-0.181mm

[Limit] 0.25mm



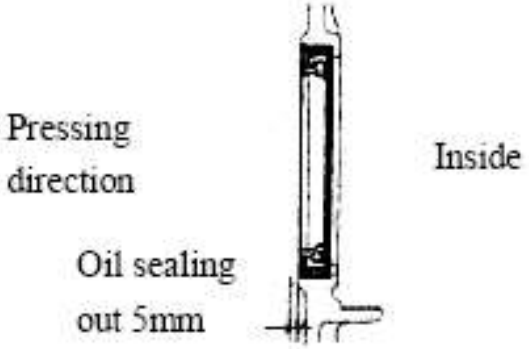
4.3.2. Routine checks on the pressure relief valve

4.3.2.1. Remove the pressure relief valve, there should be no visible tears, wears and scrapes on the pressure relief valve



4.4. Installation

4.4.1. After smearing lubricating oil on the lips of the new T-shaped oil seals, use SST to make the assembly.



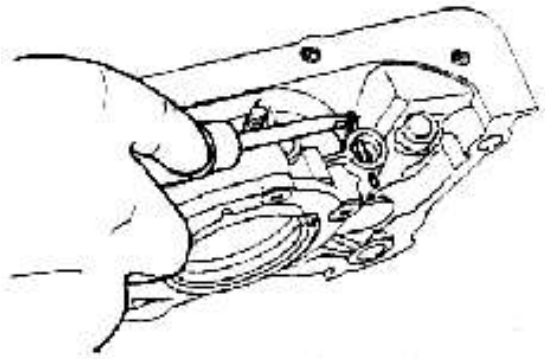
Attention

·Use new oil seal..

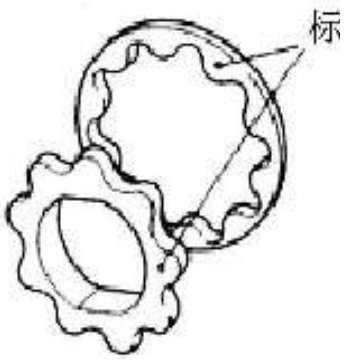
·The exposed part of the outer edge of the oil seal after being pressed in should be less than 0.5mm.

4.4.2. Assembling of the oil pump pressure relief valve and split pins

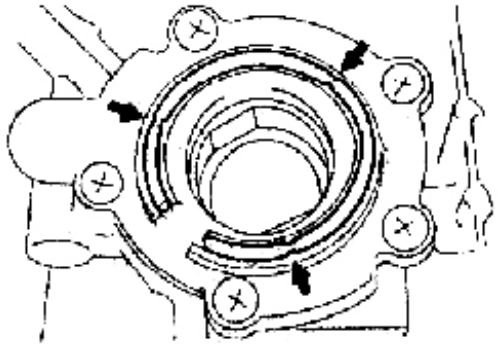
Attention The split pins are not reusable.



4.4.3. The marks of the exterior and interior gears of the lubricating oil pump should be on the visible side when being assembled into the pump body.

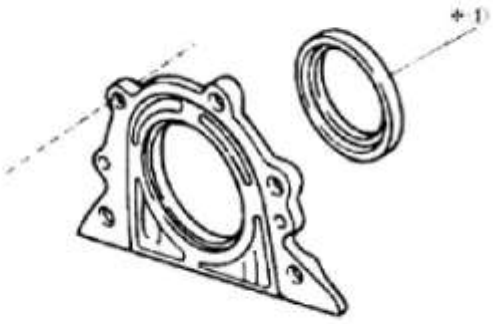


4.4.4. The new weather seal should be put inside the oil pump cover groove.



5. Disintegrating and assembling of oil seal

5.1. Configuration diagram



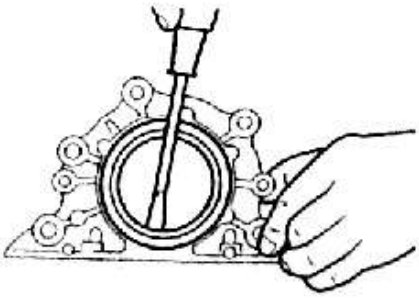
※:Non-reusable part

Unit: N*m (kg*cm)

5.2. Disintegration

5.2.1. Use a flat screwdriver to remove the rear oil seal.

Attention The oil seals are not reusable.



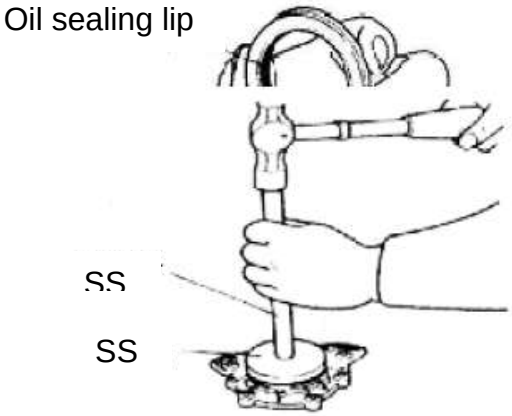
5.3. Checks

Check to see if the tears and wears of the lip section of the oil seals are within the normal conditions, and if there are any damages in outer appearance.

5.4. Assembling

5.4.1. Smear lubricating oil on the new oil seal lip section.

5.4.2. Install the oil seal shown as the right figure.

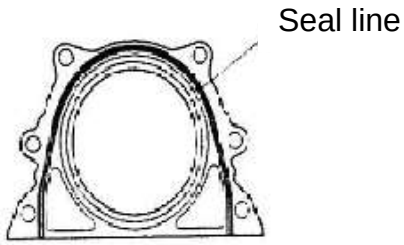


6. Assembling

6.1. Assembling of the oil sealing stands

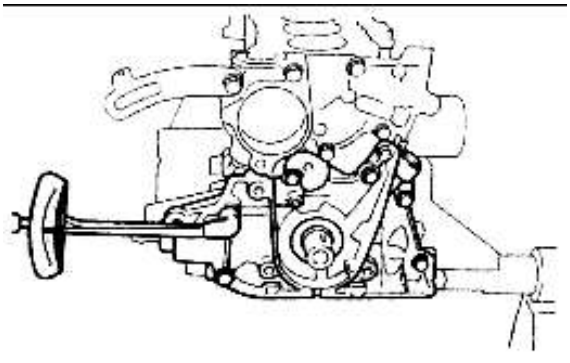
Smear oil sealing silica on the oil sealing stands shown as the right figure.

[Grease] Letai 5699



Attention The liquid sealing silica is to be smeared to the mating section of the oil seal stands and cylinder body surface, with a width of 3—4mm.

[Torque] 25±1.5N.m

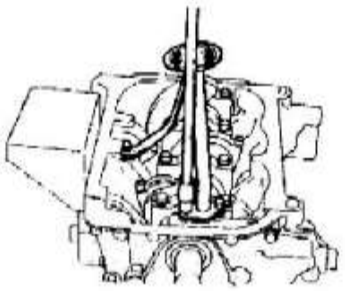


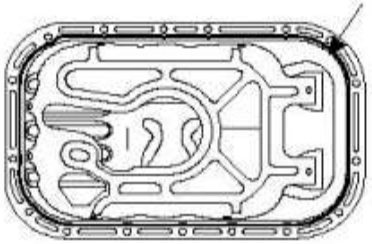
6.2. Assembling of new oil pump washer, oil pump assembly

[Torque] 20±1.5N.m

6.3. Installation of new lubricating oil collecting and filtering device, oil pump collecting and filtering device

[Torque] 6±1N.m





6.4. Assembling of oil pan

6.4.1. Clear the mating surface with the cylinder body

6.4.2. Apply sealing silica before assembling

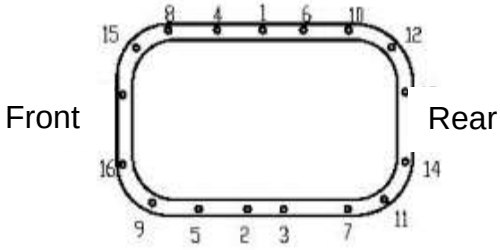
[Grease] Letai 5699

Attention

·The liquid cushion with silica line diameter of

ф3-4mm, without any broken section

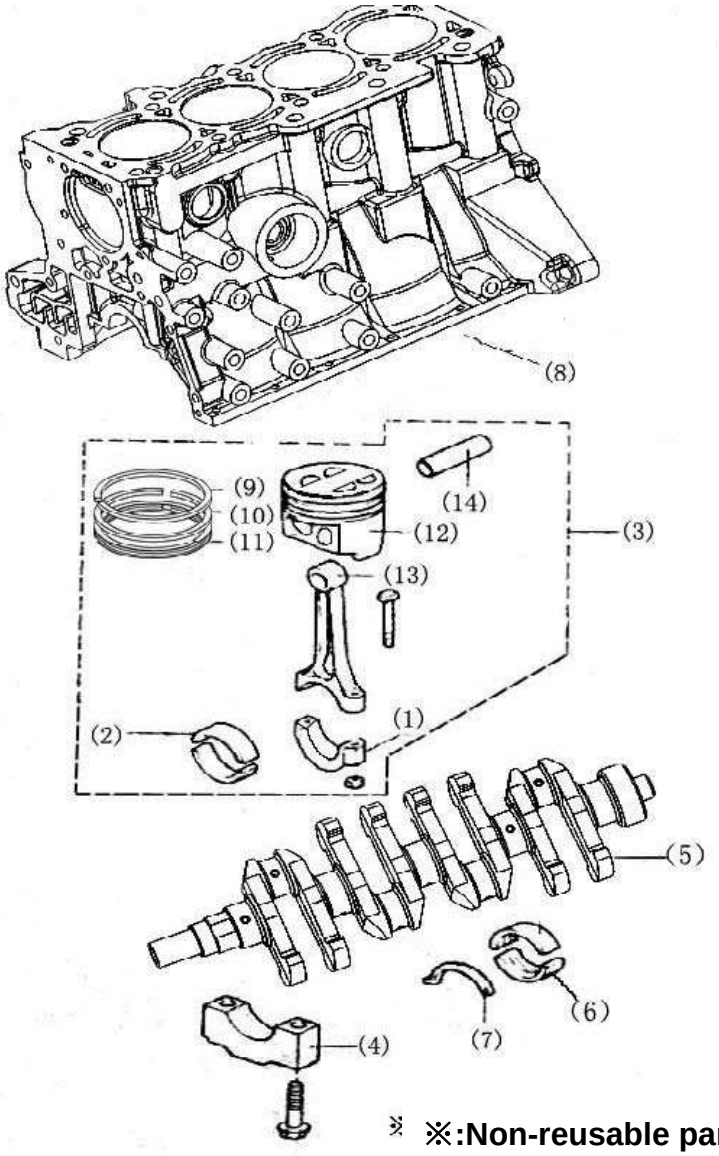
·Make the assembly in 15 minutes after the application of silica



6.4.3. Tighten in the sequence shown in the right figure with the torque of 6±1N.m from the center to the two sides

14. Crankshaft connecting rod mechanism

1. Configuration diagram (Dismount and assemble the oil pump in the follow sequence)



※:**Non-reusable part**

Unit: N*m (kg*cm)

(1) Connecting rod cover(2) Connecting rod bearing bush(3) Piston and connecting rod assembly(4) Main bearing cover(5) Crankshaft(6) Crankshaft bush(7) Thrust washer(8) Cylinder block(9) No.1 compression ring(10) No.2 compression ring(11) Oil ring(12) Piston(13) Connecting rod(14) Piston pin

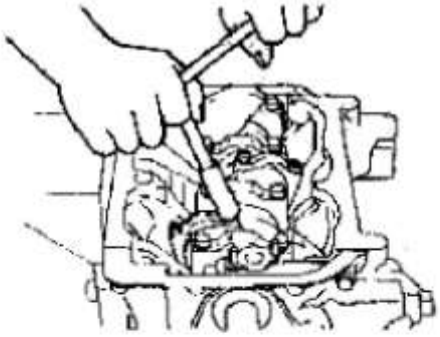
2. Disintegration of crankshaft connecting rod mechanism

2.1. Check the connecting rod axial clearance

2.1.1. Use centimeter or feeler to measure axial spacing

[Benchmark]:0.15-0.24mm

[Limit]:0.30mm

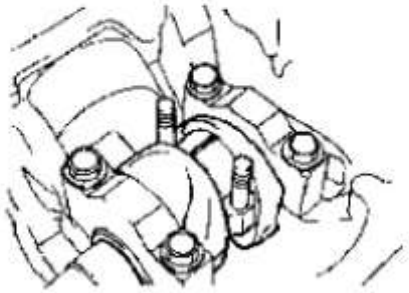


2.2. Check the connecting rod bush vertical clearance

2.2.1. Remove the bush cover

Attention: Parts and components of various cylinders should be placed in good order.

2.2.2. Clean the bush and axle diameter

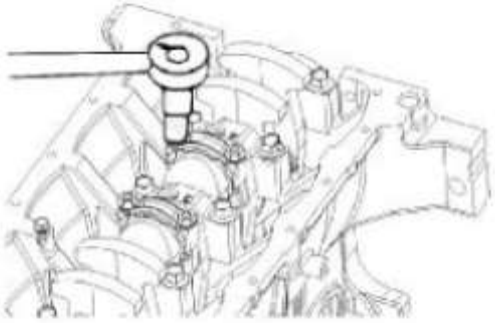


2.2.3. Place clearance gauge on the connecting

bearing diameter.

Tighten bush cover according to regulated torque

torque: 40±2N.m

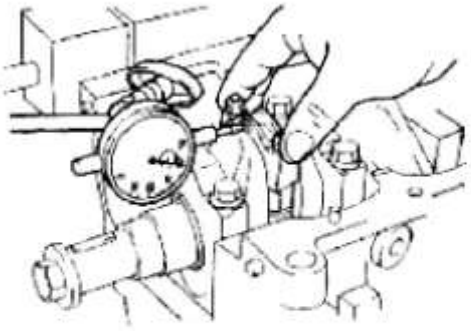


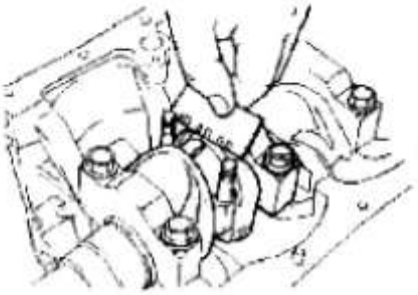
Attention Do not turn the crankshaft

2.2.4. Remove the bush cover, measure the maximum width of the spacing ruler

[Benchmark]: 0.020-0.044 mm

[Limit]: 0.07 mm

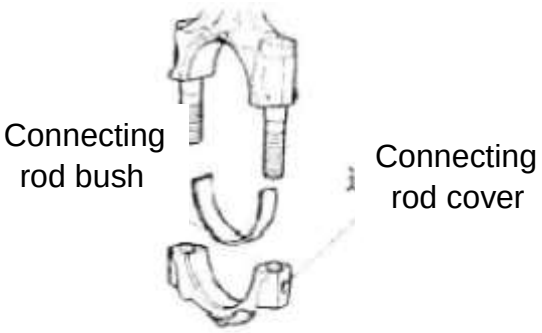




2.2.5. Replace the bush if width is beyond the limit.

Attention:

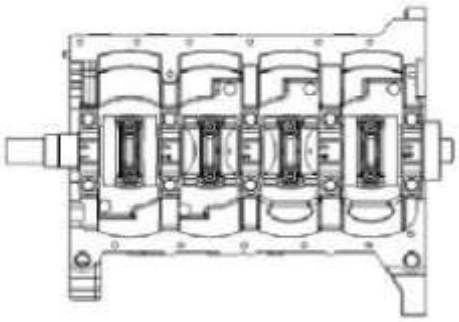
·In replacing the bushes, you should use the products
of same brand and from the same manufacturer, which
can accord with the request of clearings.

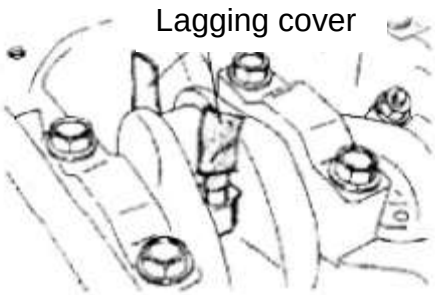


2.2.6. Removal of connecting rod bearing cover and
connecting rod bush

2.2.7. The threaded section of the connecting rod bolt is
to be equipped with protective sleeve to prevent from
scraping the cylinder hoe and crankshaft connecting
rod axle diameter. Then knock the piston connecting
rod out with the handle of a hammer.

Attention Put the parts and components of various
cylinders in good order.



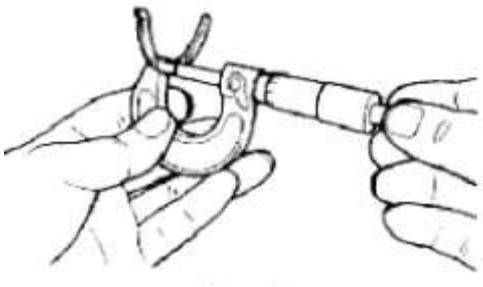


2.3. Use a caliper to measure the crankshaft axial
clearance. If the axial clearance is above the limits, it
is needed to replace the axial thrust washer or the crankshaft.

[Benchmark]:0.089-0.211mm

[Limit]:0.30mm

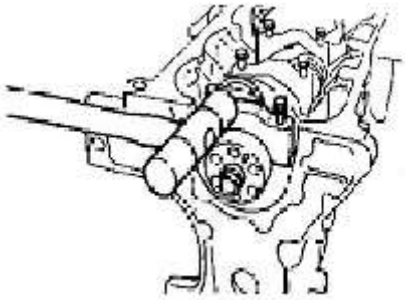
item	**Benchmark value**
Thickness of thrust face	1.9-0.11 -0.03



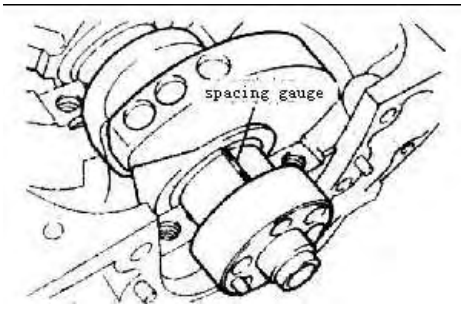
2.4. Check the radial clearance of the crankshaft

2.4.1. Remove the crankshaft bearing cover; use a resin hammer to knock the bearing cover off gently.

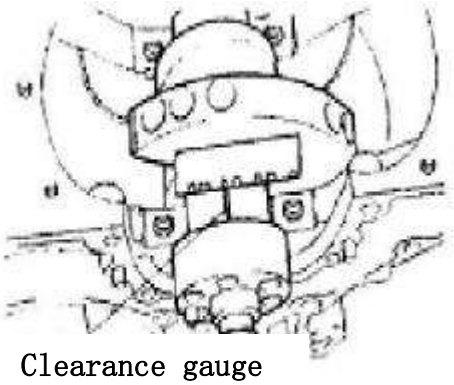
2.4.2. Clean the inside of the bushes, the inside of the bearing cover, the cylinder walls, the axle diameter, etc. Make thorough checks for any tears and wears as well as other damages.



2.4.3. Use a clearance+6 gauge to adjust the radial clearance of the crankshaft; tighten the bolts of bearing bush cover with specified torque. **[Torque]** 70±3.5N.m



Attention Tighten the bolts of the crankshaft bearing cover in three times to the regulated value, in the sequence as shown in the right figure. Attention: Don't turn the crankshaft after tightening ,because of the clearance gauge.

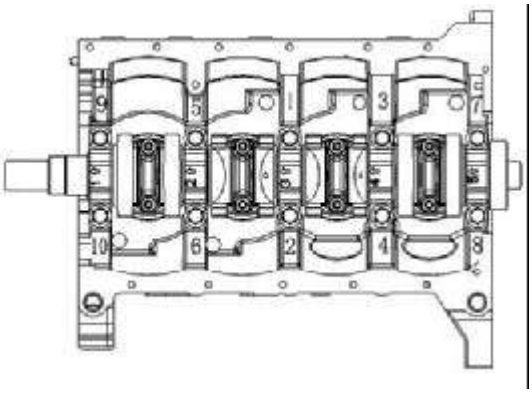


Clearance gauge

2.4.4. Remove the bearing cover and measure the maximum width of the spacing. If it goes beyond the limit, replace the bush.

[Benchmark]:0.025-0.069mm

[Limit]:0.10mm



2.4.5. Remove Main bearing cover, Crankshaft, Crankshaft bush, Thru

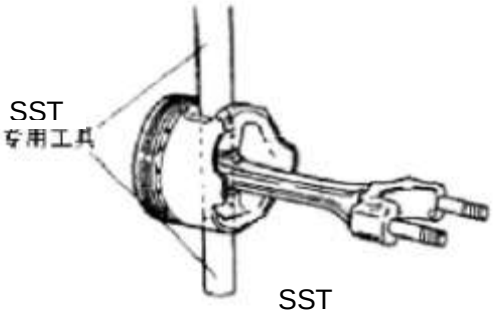
st washer

Attention: tighten the bolts fixing bearing cover according the order show as right figure

2.5. Disassembling of connecting rod assembly of the piston

2.5.1. Use the piston ring pliers to remove the primary ring, the secondary ring and the oil ring

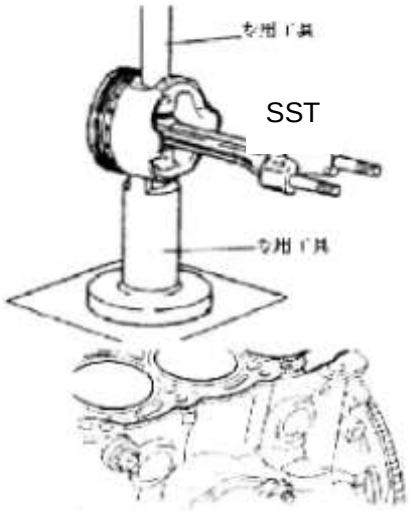
Attention Do not mix up the pistons and piston rings for each unit of assembly.



2.5.2. Use SST to remove the piston, connecting rod and piston pin

SST

① Remove the piston pin to take off the piston and the connecting rod by using SST.



3. Clearing

15.

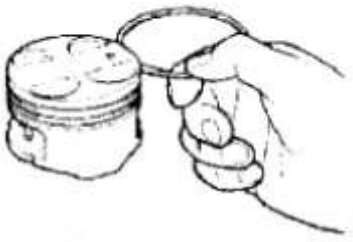
3.1. Cylinder body

Warning Wear eyeglasses during the clearing operation to protect your eyes.

3.1.1. Use flat chisel to clear the cylinder body, the cylinder cover, the oil bottom casing, the oil pump and the oil seal.

3.2. Piston

Warning Wear eye glassed in the process of cleaning to protect your eyes.



3.2.1. Use the old ring to clean the accumulated carbon in the ring groove.

3.2.2. Clean the accumulated carbon at various parts with detergents.

Attention Do not use metal brush or some other hard substance to do the cleaning.

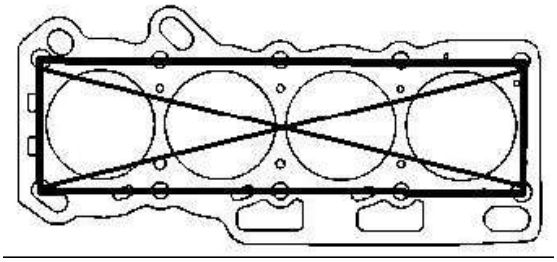
4. Routine checks

4.1. Cylinder block

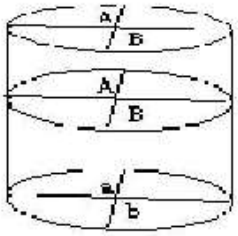
4.1.1. Checks on the levelness of cylinder top surface

(1). Use a ruler and feeler to do the measurements of the six parts as shown in the right figure.

[Limit] 0.08mm



4.1.2. The use of cylinder meter: Measure the values at the parts as shown in the right figure and work out the maximum value and the minimum value. Replace the cylinder body or do the boring of the cylinder if the values exceed the limits.



Top dead center

Bottom dead center

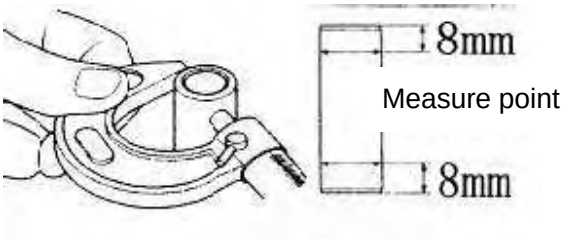
[Limit] 0.03mm

[Reference] Circularity：A-B or a-b

Cylindricity：A-a or B-b

[Reference] Cylinder standard diameter:

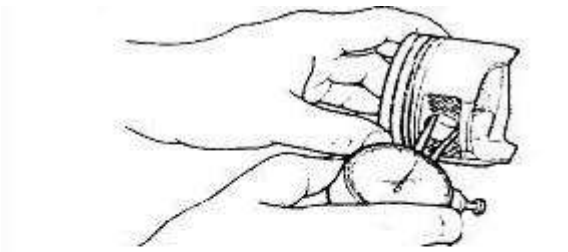
φ72.00-72.01mm



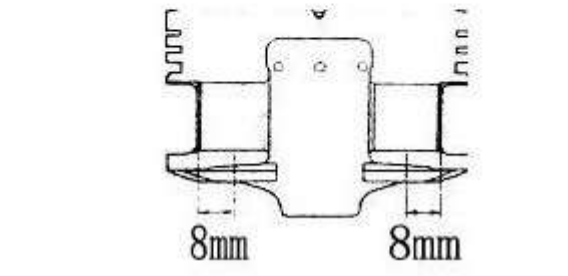
4.2. Piston

4.2.1. Check the clearance between the piston pinholes.

Use a caliper to measure the positions of the piston shown in the following figure, with the maximum value as the size of the piston pin diameter.



4.2.2. Use the inner diameter centimeter to measure the positions of the piston hole diameter shown as the following figure, take the minimum value as the size of the pinhole diameter.



4.2.3. Work out the clearance on the basis of the size difference between the hole diameter and the pin diameter. Replace the piston pin or the piston if the result exceeds the benchmark value.

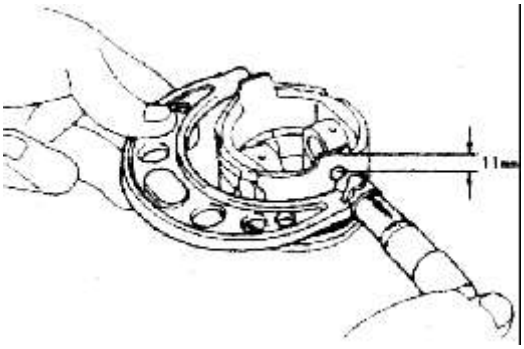
[Benchmark] 0.004-0.009mm

[Limit] 0.015mm

4.2.4. Measurement of the piston diameter

4.2.4.1. Make the measurement at the position 11mm below the piston skirt and along the vertical direction of the piston pin.

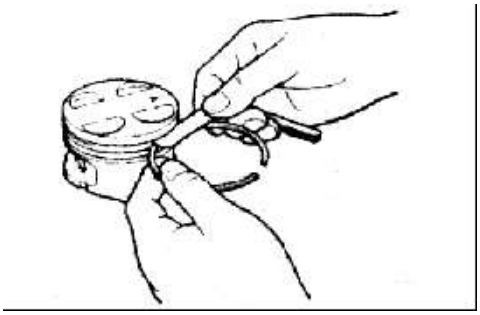
[Benchmark] □ 72 –0.013–0.025



4.2.5. Check the clearance between the piston ring and the ring groove

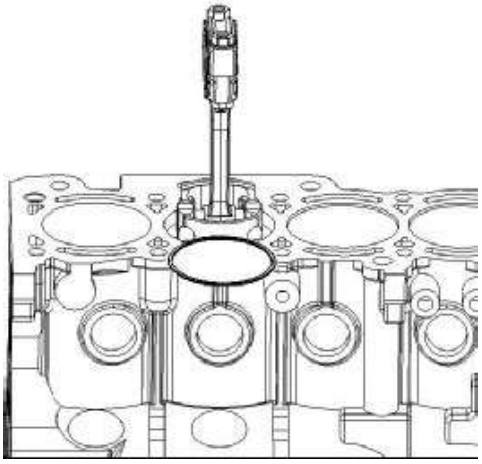
4.2.5.1. Use a feeler to measure the rings

	Benchmark(mm)	Limit (mm)
Primary ring	0.03~0.06	0.12
Secondary ring	0.03~0.06	0.11

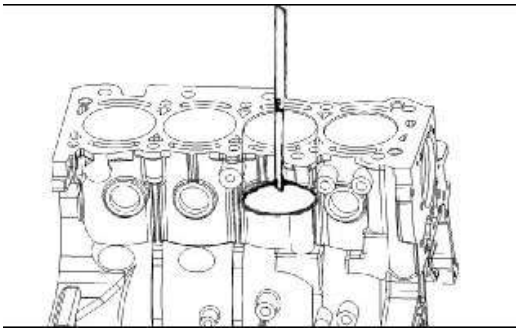


4.2.6. Check the clearance of piston ring ends

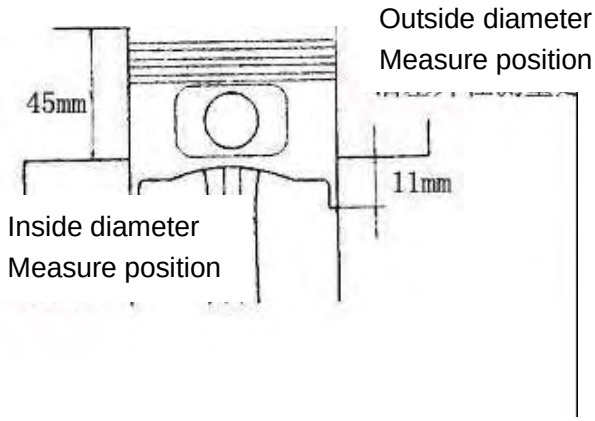
4.2.6.1. Put the piston ring i n the position which is 45 mm under the cylinder hole top surface, in order to make the piston ring keep flattened, you can press the piston ring with piston top surface, then use a piston gauge to measure the open clearance.



	Benchmark(mm)	Limit (mm)
Primary ring	0.25-0.40	0.65
Secondary ring	0.35~0.50	0.65
Oil ring	0.20~0.70	1.00



4.2.7. Check the clearance between the piston and the cylinder wall The positions for measuring the inner diameter of the cylinder and the piston skirt are as shown in the right figure. Replace and repair the piston or the cylinder body, or bore the cylinder if the measured results exceed the limits

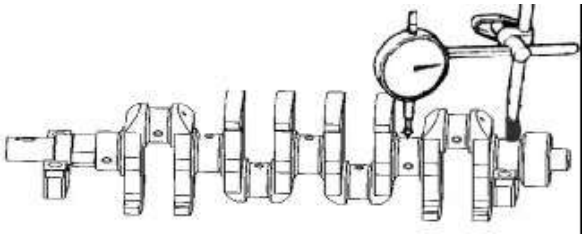


[Benchmark] 0.018～0.03

[Limit] 0.10

[Reference] The clearance between the piston and the cylinder hole is subject to the innermost diameter of cylinder in vertical direction minus the maximum outer diameter of the piston.

4.2.7.1. After the replacement of the piston or the cylinder body, it is needed to confirm the clearance of the replaced cylinder once again.

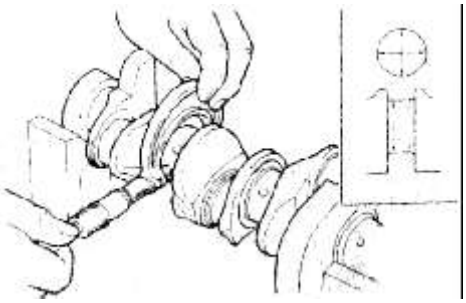


Datum: 0.018～0.030

4.3. Crankshaft

4.3.1. Check the coaxiality of the main shaft diameter

4.3.1.1. Use the centimeter to measure the coaxiality.



Replace the crankshaft if the measurement result exceeds t he limit.

[Limit] 0.03mm

Attention: The bending value should be 1/2 of the fluctuation for one circle of turning the crankshaft.

4.3.2. Check the tears and wears of the crankshaft

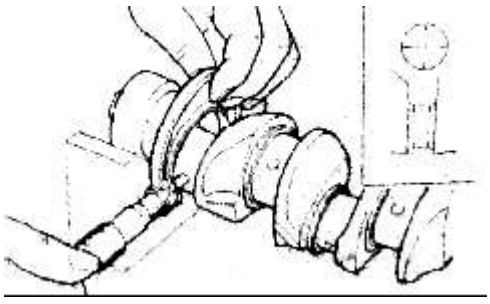
4.3.2.1. Use a caliper to measure the shaft diameter, and work out the circularity and cylindricity.

[Limit] 0.005mm

4.3.2.2. Use a caliper to measure the connecting rod diameter, and work out the circularity and cylindricity.

[Limit] 0.004mm

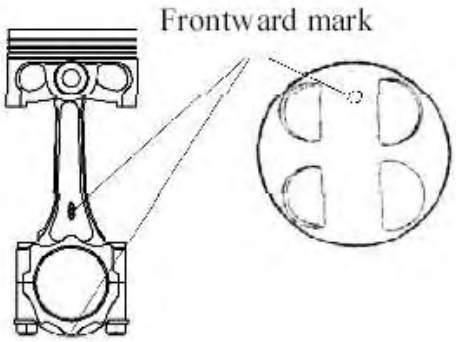
the measuring position is shown as the figure,



5. Assmbling of the crankshaft connecting rod mechanism

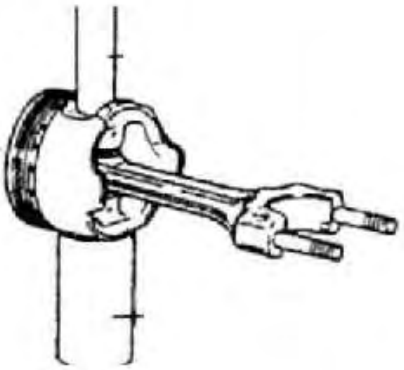
5.1. Assembly of the piston and connecting rod

5.1.1. Use special tools to assemble the piston, connecting rod and piston pin in the following specified procedures.



5.1.1.1. Smear lubricating oil to the connecting rod pin hole, and make the assembly according to the marks for the same unit and in the indicated direction.

5.1.1.2. Make the installation shown as the right figure.



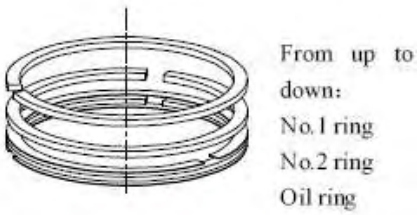
5.1.1.3. Make adjustments and installation of the piston and the connecting rod shown as the right figure. After smearing lubricating oil to the piston pin, use pressurizing device to assemble the piston and the connecting rod.

Attention

· Pay attention to the assembling direction when pressing in the piston pin;

˜ The small bit of connecting rod should be heated to 300℃ while pressing the piston pin in the piston. Exert pressure in the process of pressing to assure the alignment of the pin.

5.2. Install Primary ring, the secondary ring and the oil ring in the following specified procedures.



5.2.1. Install gas ring

Side face with marks should be upright, install primary ring with piston ring tool.

5.2.2. Install oil ring (gasket ring, down scraper and upper scraper) firstly, then install the secondary ring, then install the primary ring, Open degree of every ring is shown as the illustration:

5.3. Assemble the crankshaft main bearing cover, the crankshaft, shaft bush, shaft body and thruster according to the following instructions.

5.3.1. The protruding thrust block on the bush should match the groove on the cylinder body for installation..

Attention Use the bush made by the same manufacturer. Outward

5.3.2. Smear lubricating oil on this side (upper side) of the crankshaft before installing it.

5.3.3. The side thrust chip with oil sink should face outward (crankshaft handle) for installation on the cylinder body-bearing stand.

Attention Smear lubricating oil on the side of the oil sink.

The bush (lower) installed in bearing cover must match thruster groove.

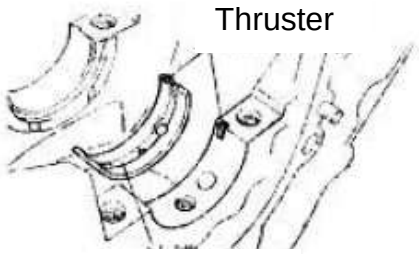
5.3.4. Smear lubricating oil on the friction side opposite to the contact of the bush lower parts. Install the parts according to the forward induction mark on the crankshaft bearing cover.

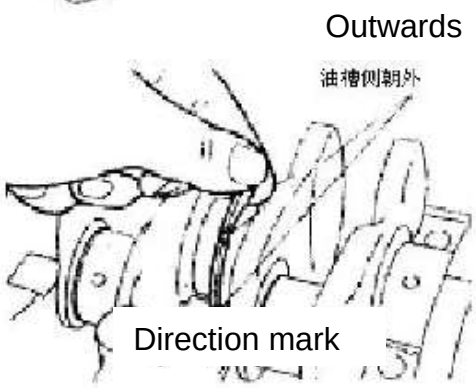
5.3.5. After applying the lubricating oil, tighten the bolts in the sequence shown as the right figure for 2—3 cycles with the specified torque.

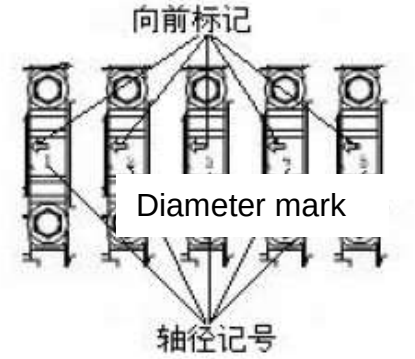
[Torque] 70±3.5N.m

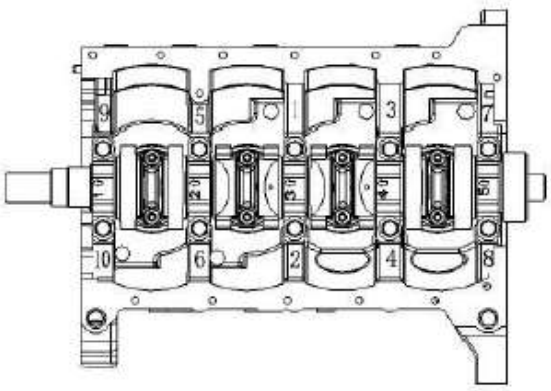
5.3.6. Rotate the crankshaft after assembling, you should rotate it with ease, the torque should be less than 1Nm

Attention:· The torque of crankshaft rotating should be less than 1Nm;(The torque is for installing the crankshaft only, not for installing the piston connecting rod)

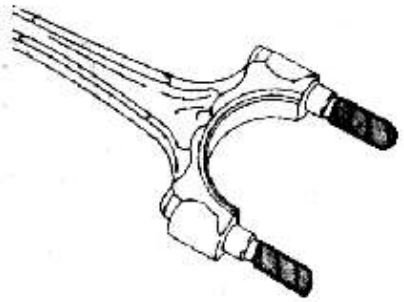








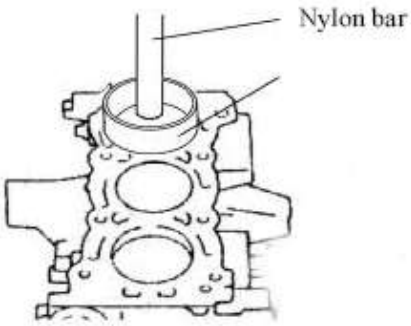
5.4. Assemble the piston connecting rod Ay, connecting rod bush and connecting rod bearing cover according to the following instructions.



5.4.1. The openings of the air ring and oil ring should match the specified direction.

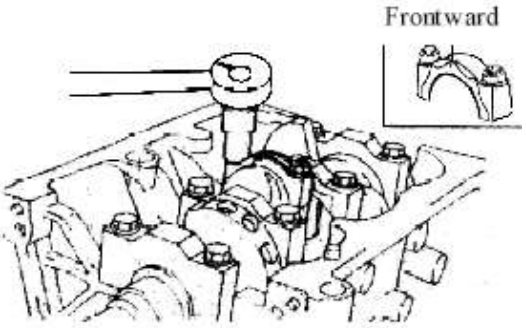
5.4.2. Use nylon sleeves for the bolts of the connecting rod to prevent from scraping the cylinder hole and axial diameter

5.4.3. Apply lubricating oil to the piston, the connecting rod and the surfaces of the other related moving parts.



5.4.4. Make sure the frontward indication mark on the piston. Should be frontward and assemble the piston connecting rod Ay with SST.

Attention The cylinder number on the piston connecting rod should be identical to the cylinder number.



5.4.5. Assemble the connecting rod bearing cover and bush according to the following instructions.

5.4.5.1. Smear a little lubricating oil on the bolt and screw nut stand before they are mounted according to the indication mark.

5.4.5.2. Tighten the left and right screw nuts alternately for a couple of times with the specified torque.

[Torque]： 40±2N.m

Attention The connecting rod and the rod bush should be bought from the same supplier

Chapter 1 the principle for EFI and actuator

1.Intake air pressure and intake Temperature sensor

Usage: Measure0.1～0.2bar pressure in manifold and intake air temperature to supply load information for engine.

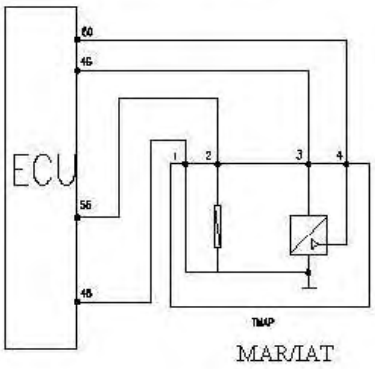
Constitution and principle: The sensor consists of two sensors, MAP and IAT, which mounted on steady pressure well.

MAP: consists of one silicon chip that etched a film on the chip. There are 4 piezoelectric resistances that consist of a Wheatstone bridge. The information processing circuit is also on the chip. The chip consists of closed reference space with a metal shell. The air absolute pressure in the space is nearly to zero. In this way, a micro electric-mechnic system is formed. The active face of the chip is endured a pressure nearly to zero, and MAP pressure applies on the back of the chip through a connecting pipe. The thickness of the chip is only several microns（um）,so the change of MAP pressure will result the mechanical deformation for the chip together with 4 resistances to change their resistance. The voltage signal that is linearity with pressure is formed after processing by information processing circuit in the chip.

Intake air temperature sensor: IAT is a resistor with NTC. Like coolant temperature sensor, the resistance decreased with the temperature increasing. ECU in engine monitors the change of intake air temperature (corresponding in series circuit).

Diagnosis: The open, short or wear of sensor could be judged by the rear electronic unit of MAP. ECU will judge the malfunction of sensor if the output signal exceeds the signal outside the output response. For examle, if the intake air pressure is higher or lower than the limit, ECU will judge the sensor is malfunction (The intake air pressure is below lower limit in starting, but ECU can judge sarting condition), "CHECK ENGINE" light will be on at the same time and engine will run at malfunction mode. (The light will on not for all malfunctions).

MAP/ IAT



MAR/IAT

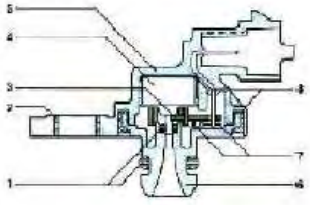
The circuit for MAR/IAT

Pins: No.1 Ground

No.2 Output temperature signal

No.3 To 5V

No.4 Output pressure signal



The section plane of MAP/IAT

1.Seal 2.Stainless steel bush 3.PCB plate 4.Sensor 5.Shell 6.Support 7.Welding conncetion 8.Felt connection

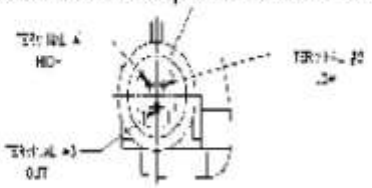
2. TPS

Usage: TPS is used to supply Throttle angle signal. According to this signal, ECU will receive enging load signal and working condition signal such as starting, idle, back up, partial load, and full load) as well as acceleration and deceleration signal.

Constitution and principle: TPS is an angle sensor with linear output. It consists of 2 arc slide resistors and 2 slide arms. The shaft of arm and throttle shaft connect to one axes. When running throttle, arm run together and slides on resistor. Output UP as output voltage. So it is an angle potentiometer. ECU use UP/US as ratio to avoid the fluctuate of sensor value caused by engine voltage fluctuate.

Diagnosis: ECU check if throttle angle exceeds the up limit or lower Limit of output signal. If so, ECU will judge TPS malfunction, engine will run at malfunction mode, MIL will on (Impinge sensor or dirty will cause engine malfunction).

Install: Screw torque for bolts: 1.5Nm-2.5Nm



Out view of TPS

Pins:1. Volt output 2. Signal ground 3. Signal output

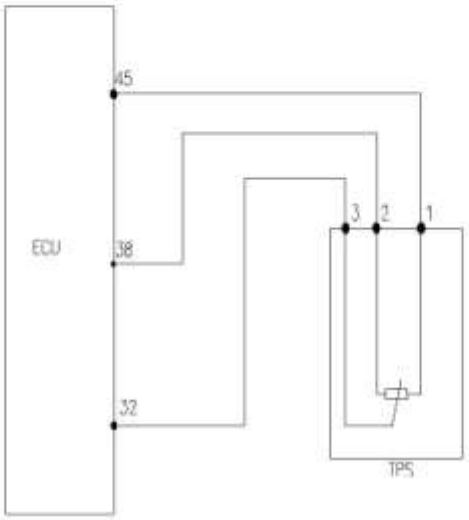


Diagram of TPS

3. CTS TF-W

Usage: CTS is used to supply Coolant temerature information for the ignition timing and fuel inject pulse width control on engine start, idle, normal running.

Constitution and pricinple: CTS is a temperature sensitive resister with NTC. The resistance decreases with coolant temperature increase, but it is not linear relationship. The resistor is enclosed in copper bush. The change of resistance is transformed into changing voltage to ECU by a voltage distribute circuit to monitor the change of coolant temperature.

Diagnosis: When coolant temperature is over up limit, or below lower limit, MIL is on, engine run at malfunction mode. ECU control ignition and fuel inject according to set temperature. Fan runs at high speed.

Limit data: 2.5±5%K Ω

Hint: Screw torque: 15±2Nm

Hint: There are 2 sensors in vehicle. One is single pin water temperature and supply coolant temperature signal for coolant temperature meter; The other is double pins and supply the temp signal to ECU.

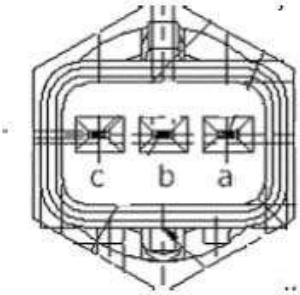
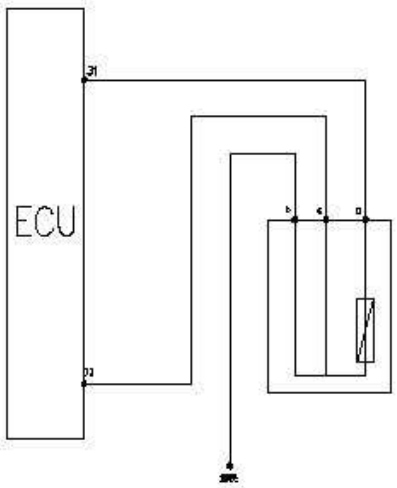


Diagram of CTS

Pins: There are 3 pins that could be interconverted.

a. EFI coolant temperature signal pin, resistance is 2.45KΩ at 20℃.
b. Instrument water temperature signal pin, resistance is 0.05KΩ at 80℃.
c. Signal ground



Circuit diagram of CTS

Hint: There are 1 coolant temperature sensor with 3 lines on it. One is power line, two are signal lines which one to ECU and the other to instrument.

4. KS

Usage: Supply knock signal to ECU for knock control.

Constitution and principle:

KS is vibration accelaration sensor mounted on engine. The sense element is a piezoelectricity element. The vibration of cylinder is transformed to piezoelectrical crystal through mass block in sensor. The pressure of crystal produce voltage on two polar faces and change vibration signal into output AC voltage signal.

Because the frequency of vibration caused by engine knock is much higher than normal frequency of engine vibration signal, so ECU can distinguish knock and unknock signals after filtering the signal of KS. When engine load, speed and coolant temperature exceed sill value, and not set KS malfunction information record, the signal of KS will be used to close loop control for knocking. When the control is actuated, the signal of KS will input to ECU for integral after amplify and filter.

When certain integral value in crank angle exceeds sill value, ECU will consider the knock happens, and reduce 1 degree of ignitionadvanced-angle. If knock happens on next cycle, ECU will reduce 1 degree of ignitionadvanced-angle again; If no knocks happen in next cycles, ECU will resume the angle to normal value.

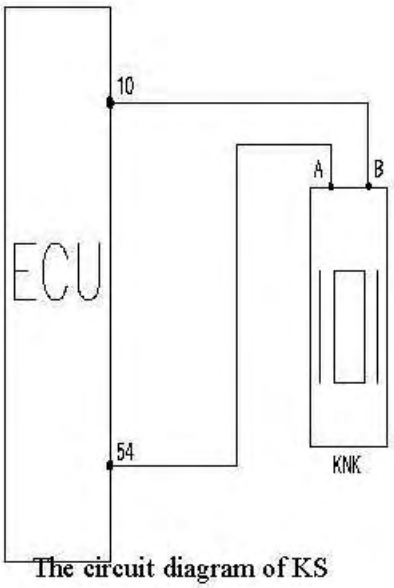
Diagnosis: ECU monitors each sensor, actuator, power amplifier and check circuit. KS will mark malfunction position once following situations happen:

KS malfunction
KS control data process circuit malfunction
Cylinder identification signal is untrustable
After KS marks the malfunction position, knock

close loop control will shut off and reduce a commutation angle for ignition advanced-angle stored in ECU. When wrong frequency is below set value, malfunction position will resume.

Hint: Screw torque 20±5Nm

KS with cable



The circuit diagram of KS

Pins: pin 1 and pin 2 connect ECU
The shield wire of sensor is folded on outside of signal wire.

5. Oxygen sensor

Usage: The sensor is used to supply the information that if oxygen is superfluous after the fuel in cylinder burnt completely in intake air.ECU uses the information to close-loop control for quantitative fuel and transforms or purifies three venomousnee ingredients such as HC, CO and NO_X in catalyzer.

Constitution and principle: The sense element is a ceramic pipe with bores. The outside of pipe is surrounded by exhaust of engine, and inside is touched with atmosphere. The pipe wall is one kind of solid electrolyte with electric heating pipe in it to heat ceramic body to 300 C^0 for ceramic body to work.The oxygen ion can pass pipe freely.

The concentration difference is transformed into electric differencial with this feature to form electric signal. If mix air is richer, electric differencial and output voltage are higher; if mix air is leaner, electric difference and output voltage are lower.

The working voltage of sensor fluctuates between 0.1-0.9V with 5-8 times per 10 seconds. Sensor is aging if the frequency is below this value and needs replacing. The sensor cannot be repaired.

Trouble diagnosis: ECU monitors each sensor, actuator, power amplifier and check circuit. ECU will mark the malfunction position for oxygen sensor once one of following situations happen:

Battery voltage is not trustable.

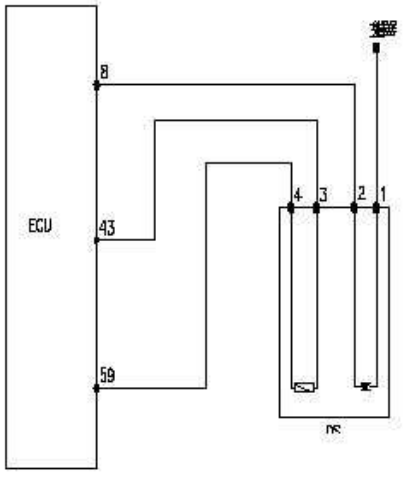
MAP signal is not trustable.

Injector driver is fault.

After marking malfunction position for oxygen sensor, fuel ration close-loop control will shut off and will carry on according to basic inject time stored in ECU.

Install hint: The screw torque of sensor is
50-60Nm. Smear anticorrosive oil on sensor after replacing.

Oxygen sensor



The diagram of oxygen sensor

Oxygen sensor connects with cable. The other end os cable is electric connector. There is asbestos Cover on outside.

Pins on connector:

No.1: Connect heat source (+)/white

No.2: Connect heat source (-)/white

No.3: Connect signal (-)/gray

No.4: Connect signal (+)/black

The heat coil of sensor is controlled by ECU. When sensor is heated to certain temperature, ECU will cut current to the coil and stop heating. (when open or short heating coil, ECU will find malfunction information and MIL will on. Engine will run under malfunction mode in some working conditions).

6. ECU

Usage: ECU is central part of electronic control system. Sensors supply every signal for ECU. After calculation, ECU will control the action of actuator such as injector and ignition coil to control engine operation.

Constitution: There are shield shell and PC board in ECU. Many electronic control units are interated on the board to control EFI system.

Install: ECU is double connector type and is fixed under instrument panel by screws. Series 372 only use one connector with 81pins.

ECU pins:

1. Battery ground	29. CKP input	57. Not used
2. Battery ground	30. CMP ground	58. A/C apply
3. Ignition coil 3	31. Coolant temperature signal	59. O_2 ground
4. Ignition coil 1	32.TPS input	60. IAT ground
5. Ignition coil2	33. Not used	61. Injector of cylinder 2
6. Can-bus low	34. Not used	62. Not used
7. Can-bus high	35. Step motor B+	63. ECU power (+12V BAT)
8. O_2 sensor signal output	36. Step motor B-	64.High speed fan relay control
9. Not used	37. Not used	
10. KS signal output	38. TPS ground	65. High Speed fan relay control output
11. Not used	39 Speed signal	66. Engine speed input signal
12. Evaporator temperature sensor input	40. Not used	67. Main relay control output
13. Evaporator temperature sensor ground	41. Not used	68. A/C relay control output
14. Not used	42. Not used	69. Fuel pump relay output
15. Not used	43. O_2 sensor	70. Trouble lamp
16. Not used	44. ECU power (+12V BAT)	71. Not used
17. Not used	45.TPS power supply (+5V)	
18. Not used	46. IAT power supply (+5V)	
19. Step motor A+	47. Not used	72. CKP input
20. Step motor A-	48 IAT ground	73. Coolant temperature sensor ground
21. Main relay power supply	49. Not used	74. Power steering pressure switch signal
22. Ignition switch power supply	50.	75. Not used
23. No.3 injection nozzle	51. Not used	76. Not used
24. No.1 injection nozzle	52 Not used	77. Diagnostic (K wire)
25. Not used	53. Not used	78. Not used
26. Canistor relay	54. KS ground	79. Not used
27. CKP ground	55. Ignition coil ground	80. Not used
28. Not used	56. IAT signal	81. Not used

7. Fuel pump

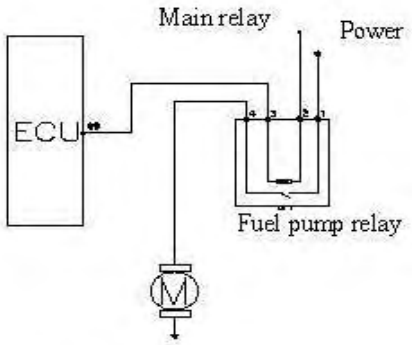
Usage: Fuel pump feeds fuel with certain pressure and quantity to engine. The temperature and voltage have great influence on pump.

Constitution and principle: The pump consistsof DC motro, vane motor and cover(together with stop return valve, leak valve and anti-electromagnetism interference elements). The pump and motor are mounted on same shaft and sealed in same shell. Pump and motor in shell are surouned by fuel for radiation and lubrication. Battery supplies voltage to pump through pump relay. The relay only switches on pump circuit during engine starting and running. When engine stops for malfunction, pump will stop automatically. The maximum pressure on outlet of pump is desided by leak valve. Series 372 use non-return fuel system and fuel pressure

regulator is mounted on pump assembly. The regulator adjusts pump pressure to 380kPa to adapt the requirment for system operation.

Note: The temperature of fuel has great influence on pump function. When working under high temperature for a long time, the pump pressure will drop rapidly if fuel temperature is over certain value. If engine cannot be heat started, please check carefully whether the high temperature working function is good.

Fuel pump



The diagram of fuel pump

Pins: There are 2 pins on pump to connect pump relay. Marks "+" and "-" are cut on the shell of pump.

8. Injector

Usage: Injector injects atomized fuel to engine in specified time according to instruction of ECU.

Constitution and principle: ECU sends pulses to injector coil to form magnetic field force. When the force increased enough to overcome the resultant force of spring pressure, weight of needle valve and friction, needle valve begins to lift and inject process starts. The maximum lift height of needle valve does not exceed 0.1mm. When inject pulses stop, needle valve closes again by the pressure of return spring.

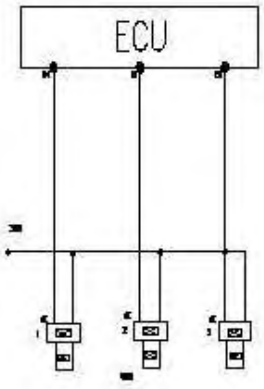
Install hint: The injector must use suitable connector.

Note: For long stopped vehicle, please check carefully if the fuel cohered blocks injector.

In order to mounting easily, recommend to smear non-silicon clear oil on the surface of O-ring connected with fuel distribution pipe. Pay attention to not pollute internal injector and injector hole by oil. Install injector to the seat vertically to injector seat, and then clamp injector on the seat by clip.

Diagnosis: S11 EFI system does not diagnose the injector itself, but diagnoses for injector driver. When injector driver is short to battery voltage or overload, short to ground or open, ECU will mark malfunction position. Oxygen sensor close-loop control and self-study pre-control will shut off. The last self-study data is effective. After troubleshooting, malfunction position resumes.

Injector



The diagram of injector

Pins: There are 2 pins on each injector. One of pins marked (+) on side of shell connects pin 87 on pump relay, and another connects pin 23,24 or 61 on ECU.

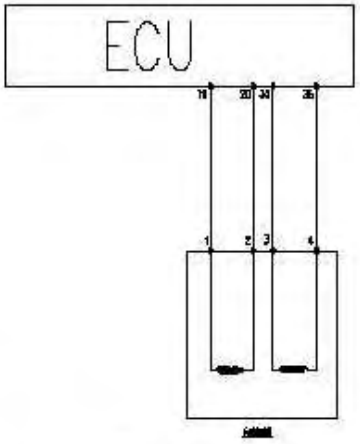
9. Step motor DLA

Function: Step motor with idle actuator offers by-pass intake air channel. When throttle closes, air will enter engine through the channel. ECU can regulate the section of chennel to adjust mass airflow and adjust inject fuel amount. When engine works, ECU will control step motor according to different working conditions to change the operation of engine.

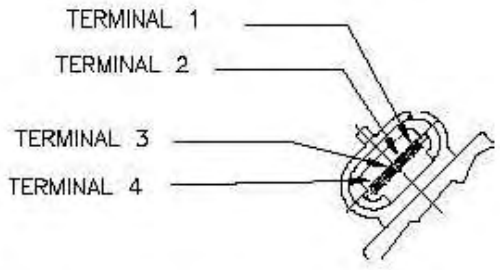
Constitution and principle: Step motor is a micro motor that consists of several steel stators and one rotor. A coil is reeled on each stator. Rotor is a permanent magnet with a nut on the center. All stator coils is always connected with electricity. If changing current direction in one coil, rotor will turn a degree. When current direction in each stator coil is changed in suitable order, revolving field is formed to run rotor in certain direction.

Disgnosis: ECU can monitor the short or open of two coils for step motor and lights MIL. Engine runs at malfunction mode. Some time use test can find the steps changing, but engine still does not work normally. Please check if intake air pressure changes to confirm is the piston of step motor works.

Step motor



The diagram of step motor



Pins:
Pin1: Connect pin 19 on ECU.
Pin2: Connect pin 20 on ECU.
Pin3: Connect pin 35 on ECU.
Pin4: Connect pin 36 on ECU.
Pin 1 and pin 2 are on one coil and pin 3 and

pin 4 are on the other. The resistances in both coils are same. Please confirm if the resistance is in standard values.

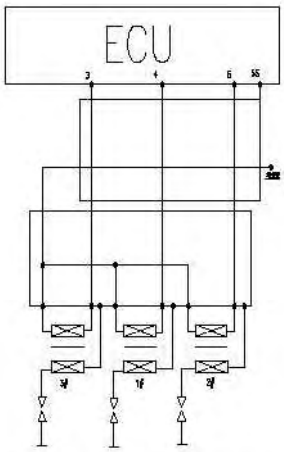
The out view of ignition coil(for 372, there 3 such coils)

10. Ignition coil ZSK-ROV Function:
Ignition coil transforms low voltage on primary coil into high voltage on secondary coil and produces spark through spark plug to light fuel-air mix in cylinder. Independent ignition: There are 3 ignition coils on vehicle. ECU will control the ground of these coils according to the signal of crank position and cam position to control ignition of engine.

Constitution and principle: Ignition coil consists of primary coil, secondary coil, iron core and shell. When battery voltage supplies on primary coil, the coil is charged. Once ECU cuts off the return loop of primary coil, charging stops. The high voltage is induced in secondary coil at same time.

Diagnosis: ECU does not have diagnosis function for ignition coil. So if ignition coil is fault, malfunction code does not exist. It can judge if the coil works normally only by checking resistance of ignition coil. Usually, ignition coil produces more heat during the working, but over heat of coil will result in increasing for coil resistance. It will cause unstable running and automatically stopping work for engine.

Primary coil: 0.47 ohms.
Secondary coil: 8 ohms.



The diagram of ignition coil(without distributor)

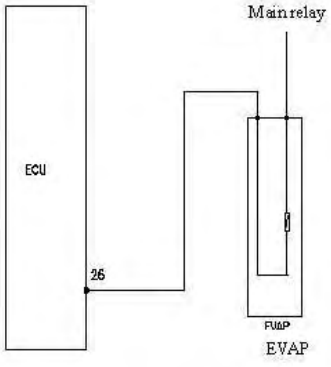
Pins: There are 2 pins on low voltage side of coil. Pin marked (+) connects battery and the other connects ECU.

11. Canister control valve
Usage: The valve is used to control flux to clean canister. The valve is controlled by ECU according to engine load, lasting time and frequency of pulses. The fuel vapor in canister will accumulate to leak fuel for environmental pollution. The function of canister solenoid is to open the solenoid to pass superfluous vapor into intake air pipe to be in combustioned.

Constitution and principle: The valve consists of magnetic coil, iron core and vlave body. There is filter on inlet. Mass flow through the valve is related with the frequency of electric pulses that put out to control valve by ECU and with the pressure differencial between inlet and outlet. If no pulses, canister control valve will close. ECU controls the electrify time for canister solenoid to indirectly control the mass flow of clearing air.

Diagnosis: ECU does not have diagnosis function for canister control valve, but can diagnoses canister control valve driver. When canister control valve driver is short to battery voltage or over load, short to ground and open, the basic self-study of fuel metering close-loop control is shut off. If canister solenoid is fault, engine will be unstable idle or over high idle.

Out view of canister control valve



The diagram of canister control valve

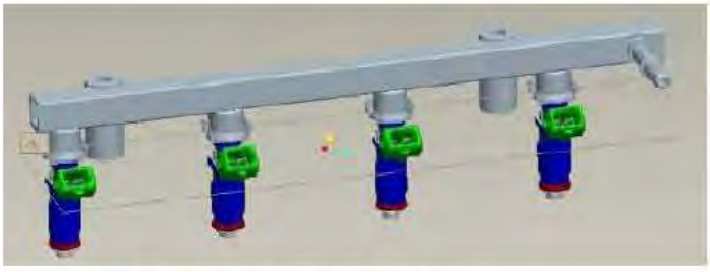
TEV-2
Pins: There 2 pins on canister control valve. One connects pin 87 on main relay and the other connects pin 26 on ECU.

12. Steel fuel distribution pipe assembly
Usage: To store and distribute fuel and return superfluous fuel into fuel tank. Injector and fuel pressure regulator are mounted on the tank to offer stable pressure circumstance to balance the fuel pressure and amount of fuel for smooth running of engine.

Constitution: Series 372 fuel distribution pipe assembly consists of injector and fuel supply pipe aeembly. Since system does not use return fuel control, there is no fuel pressure regulator.

Install request: Clamp in/out fuel pipe and rubber hose with clip. The type of clip should be matched with rubber hose to insure the seal between in/out fuel pipe and the hose.

Diagnosis: Usually, fuel supply pipe assembly is seldom to be fault. Mostly bad installing causes the fuel leakage. Pay more attention during installation. Don' t install the seal or o-ring that are used.



Fuel distribution pipe assembly

Chapter 2 Basic principle for diagnosis of EFI

(1) Fault information record

ECU continually detect the sensors, actuator, related circuit, MIL and battery voltage as well as ECU itself, and carry on reliability test for sensor output signal, actuator drive signal and internal signal such as oxygen close loop control, knock control, idle control and battery voltage control. Once the malfunction in one point is found, or one signal is not true, ECU will set the malfunction information record on RAM memory. The record exists as malfunction code form and displays as the order of malfunction code appearing. Malfunction can de divided as stable malfunction or temporary malfunction such as the fault caused by short-lived, harness open or bad contact for inserters according to the frequency

(2) Malfunction statues

If the lasting time for one malfunction detected exceeds stable time settled, ECU will consider it as a stable fault and stores it as "stable malfunction". If it disappears, ECU will store it as "temporary malfunction" or "not existing". If it is detected again, it will be "temporary malfunction", but the existing history malfunction does not influence the normal use of engine.

(3) Malfunction types

Short to positive pole of battery.

Short to ground.

Open (In the case of up or down resistors, ECU will identify the open fault in input terminal as short between input terminal and battery positive pole or short to ground).

(4) Limp drive home

For some important faults detected, if their lasting time exceeds the setting stable time, ECU will apply some software methods, for example, to close some control function of oxygen sensor close loop control and set substitute value for some unbelievable value. At the moment, through the working condition of engine is not so good, but the vehicle can be drive home. In this way, vehicle can drive home or service station for repairing to void stop on road. Once the fault is detected disappears, the normal values will be used again.

(5) Warning

All 372 of MS200 system vehicles equip MIL. When some important parts such as ECU, MAP, TPS, ECT, KS, O_2, phase sensor, injector, idle actuator, 2 drive poles of step motor, canister control valve, fan repay are fault, ECU will turn MIL on and warning until the faults disappear.

(6) Fault read out

The malfunction information records can be read out from ECU by tester, or be read by flashing malfunction codes. If the faults relate the function of fuel/air mix ratio regulator,

engine will read malfunction information records after running at least 5 minutes.

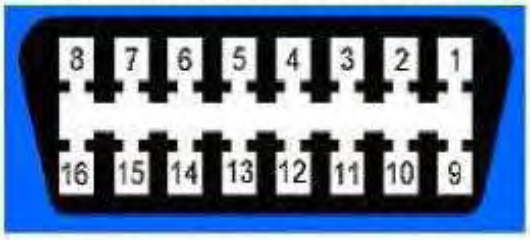


Fig. 3-1 ISO 9141-2 Standard diagnosis connector
The diagnosis connector install under glove box of assistant driving side

(7) Clear malfunction code

When eliminate the faults, DTC should be cleared. There are 2 methods:

Clear DTC by using tester with the order of "clear DTC".

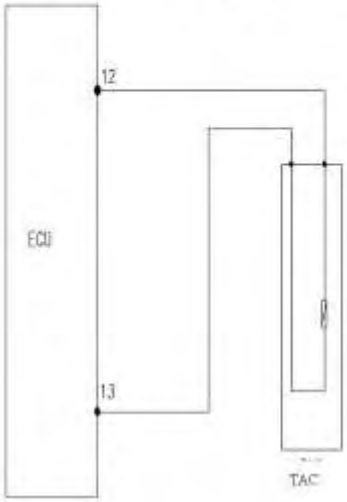
Remove ECU terminals or battery terminals to clear DTC outside of RAM.

(8) Finding faults

Getting above DTC means only to know the faults position, but not the real fault because the reason for one fault may be the electric or mechanical one such as sensor, ECU or actuator damage, or open circuit or short circuit or even mechanical damage.

Fault is internal, but the appearances are various. Firstly use tester or flashing light to check if existing any DTC, and trouble clearing accord to DTC, then find the reason of fault according to engine symptom.

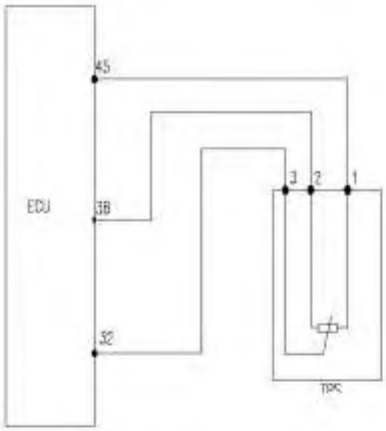
A/C evaporator outlet temperature sensor



The diagram for A/C evaporator temperature sensor

No.	Operation steps	Test results	Next step
1	Turn on ignition key.		Next
2	Pull out connector of A/C evaporator temperature sensor, measure if the volt between 2 pins is 5V with multimeter.	Yes	Next
		No	4
3	Check any open or short between 2 pins with multimeter.	Yes	Replace sensor
		No	Replace ECU
4	ECU and harness, check any open or short between pin 12 and 13 of ECU and pin (1) and (2) of sensor with multimeter.	Yes	Repair or replace harness
		No	Replace ECU

TPS



The diagram of TPS

No.	Operation steps	Test results	Next step
1	Turn on ignition key.		Next
2	Pull out connector of TPS, measure if the volt between pin (1) and (2) of sensor is 5V with multimeter.	Yes	Next
		No	5
3	Measure the resistance between pin (1) and (2) of sensor if in 1.6 to 2.4k with multimeter.	Yes	Next
		No	Replace sensor
4	Run slowly TPS from one end to another and check any open or short between pin (1) and (3), or check if the resistance jump.	Yes	Replace sensor
		No	Replace ECU
5	Connect commutator between ECU and harness, check any open or short between pin 45,38,32 of ECU and pin (1) ,(2)and (3) of sensor with multimeter.	Yes	Repair or replace harness
		No	Replace ECU

KS

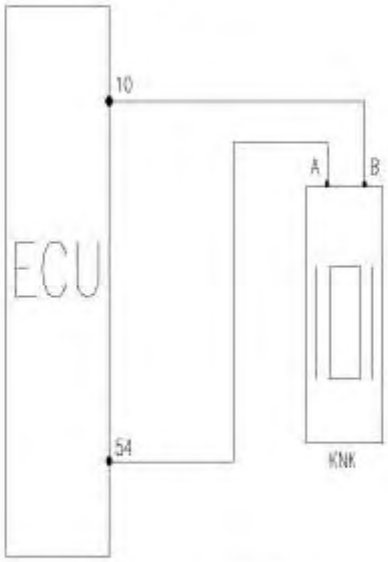


Diagram for KS

No.	Operation steps	Test results	Next step
1	Turn off ignition key, engine nor run.		Next
2	Pull out connector of KS sensor, measure if the resistance between pin 1, pin 2 of sensor is over 1M with multimeter.	Yes	Next
		No	Replace sensor
3	Slightly knock around sensor with small hammer and check if any AC signals putout between pin1 and pin2 of sensor.	Yes	Next
		No	Replace sensor
4	Turn on ignition key but engine not run		Next
	Connect adaptor between ECU and harness and check any open or short between pin 10,54 of ECU and pin A and pin B of sensor with multimeter.	Yes	Repair or replace harness
		No	Replace ECU

MAP/IAT

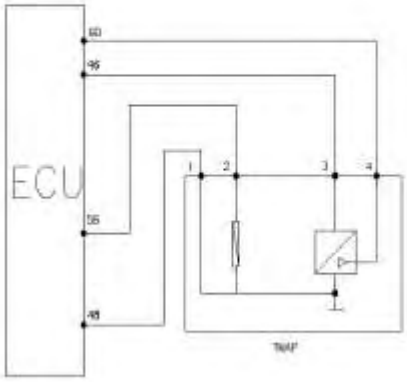
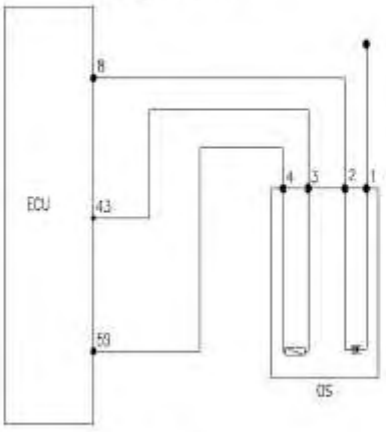


Diagram of MAP and IAT

No.	Operation steps	Test results	Next step
1	Turn on ignition key.		Next
2	Pull out the connectors on harness of MAP and IAT and check if the voltage between pin1 and pin 3 of sensor is 5V with multimeter.	Yes	4
		No	Next
3	Connect the commutator between ECU and harness, check if open or short between pin 48, pin 46, pin 60 of ECU and pin 1, pin 3, pin 4 of sensor separately with multimeter.	Yes	Repair or replace harness
		No	Next
4	Turn on ignition key but engine not run		Next
5	Put on N shaft and run engine in idle. Step down accelarate pedal to fully open. Check if the voltage between pin 4 and pin 1 of sensor (pin 6, pin 48 of ECU) is incrasing to 4V with multimeter.	Yes	Replace ECU
		No	Replace ECU or sensor

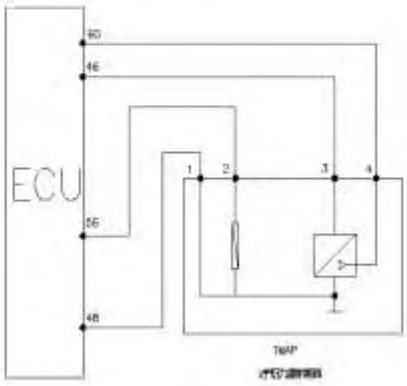
Oxygen sensor



The diagram of oxygen sensor

No.	Operation steps	Test result	Next step
1	Turn on ignition key.		Next
2	Put out the connector on oxygen sensor and check if the voltage between pin 1 and pin 2 is 12 V.	Yes	Next
		No	4
3	Check if the resistance between pin 1 and pin 2 on oxygen sensor is from 6 to 25.	Yes	Replace ECU
		No	Replace sensor
4	Check if the fuse in oxygen sensor heating circuit is burn out.	Yes	Replace fuse
		No	Next
5	Check if open or short between pin 1 on sensor and pin 87 on fuel pump relay, check open or short between pin 2 and pin 59.	Yes	Repair or replace harness
		No	Next
6	Insert the connector of oxygen sensor harness. Put N shaft and run engine in idle to normal coolant temperature.		Next
7	Put out the connectors of oxygen sensor from harness. Check if output 0.1-0.9V voltage between pin 4（+） and pin 3（-）	Yes	Next
		Yes	Repalce sensor
8	Connect the adaptor between ECU and harness. Check if open or short between pin 43, pin 59 on ECU and pin 3, pin 4 separately	Yes	Repair or replace harness
		No	更换 Replace ECU

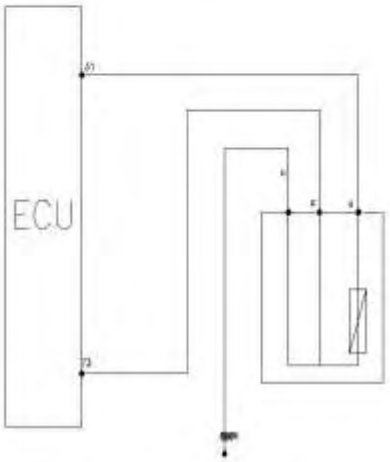
DTC 18 IAT



The diagram of MAP and IAT

No.	Operation Steps	Test result	Next step
1	Turn on ignition key.		Next
2	Put out the connectors on MAP and IAT harness. Check if the voltage between pin 1 and pin 2 is 5 V.	Yes	Next
		No	4
3	Check if the resistance between pin 1 and pin 2 is suit to the temperature (see related parts in this manual).	Yes	Replace ECU
		No	Replace sensor
4	Connect the adaptor between ECU and harness. Check if open or short between pin 48, pin 46, pin 56 on ECU and pin 1, pin 3, pin 2 separately.	Yes	Repair or replace harness
		No	Replace ECU

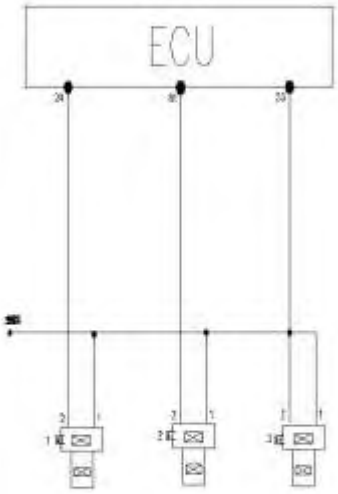
Coolant temperature sensor



The diagram of CTS

No.	Operation steps	Test result	Next step
1	Turn on ignition key.		Next
2	Put out the connector on CTS harness, check if the voltage between pin a and pin c is 5V.	Yes	Next
		No	4
3	Check if the resistance between pin a and pin c is suit to the temperature (see related parts in this manual).	Yes	Replace ECU
		No	Replace sensor
4	Connect the adaptor between ECU and harness. Check if open or short between pin 73, pin 31 on ECU and pin a, pin c separately.	Yes	Repair or replace harness
		No	Replace ECU

Injector



The diagram of injector

No.	Operation steps	Test result	Next step
1	Turn on ignition key without engine run.		Next
2	Put out al connectors on injector harness; connect two probes of multimeter on pin 1 and engine ground.		Next
3	Turn on ignition key. See if the display on multimeter is 12 V for 1 second once turning on the key.	Yes	Repeat step 2
		Yes	6
		No	Next
4	Use multimeter to check if open or short between pin 87 on pump relay output and pin 1 on each injector.	Yes	Repair or replace harness
		No	Next
5	Repair or replace pump replay, main repalay and circuit.	Yes	Repair or replace harness
6	Connect the commutator between ECU and harness. Check if open or short between pin 24, pin 61, pin 23 on ECU and pin 2 on each injector separately.	No	Next
7	Use multimeter to check if resistance between pin 1 and pin 2 on injector is 12—16V in 20℃.	Yes	Repeat step 7
		Yes	Next
		No	Replace injector
8	Reinsert all injector connector. Put N shaft and run engine in idle. Put out each injector connector in turn and check if the vibration of engine pricks up hereby.	Yes	Repeat step 8
		No	Replace ECU

Canistor control driver

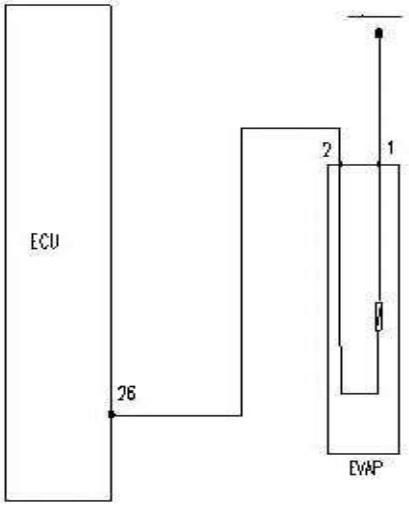


Diagram of canister control valve

No.	Operation steps	Test result	Next step
1	Run engine in idle to normal coolant temperature.		Next
2	Put out the connector on canister valve and check if the voltage between two pins is 12 V.	Yes	Next
		No	5(Check live wire)
3	Reinsert conncetor of canister valve harness. Run engine to 1500 RPM. Touch valve with hand and check if any slightly viabration or impact on valve.	Yes	Next
		No	7(Check ground wire)
4	Use multimeter to check if resistance between pin 1 and pin 2 is 22—30.	Yes	ReplaceECU
		No	Replace canister control valve
5	Use multimeter to check if open or short between pin 87 on main relay and pin 1 on valve.	Yes	Repair or replace harness
		No	Next
6	Repair or replace main relay and circuit.		
7	Shut off engine. Connect commutator between ECU and harness. Use multimeter to check if open or short between pin 26 on ECU and pin 2 on valve.	Yes	Repair or replace harness
		No	Replace ECU

Canistor control driver

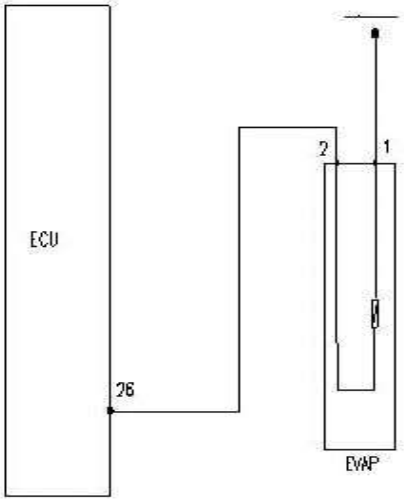
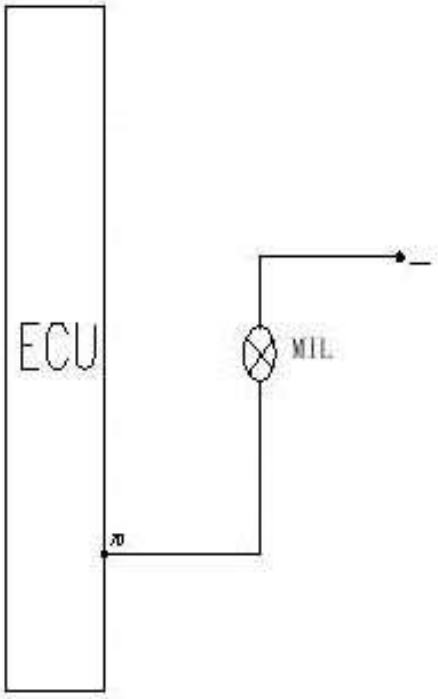


Diagram of canister control valve

No.	Operation steps	Test result	Next step
1	Run engine in idle to normal coolant temperature.		Next
2	Put out the connector on canister valve and check if the voltage between two pins is 12 V.	Yes	Next
		No	5(Check live wire)
3	Reinsert conncetor of canister valve harness. Run engine to 1500 RPM. Touch valve with hand and check if any slightly viabration or impact on valve.	Yes	Next
		No	7(Check ground wire)
4	Use multimeter to check if resistance between pin 1 and pin 2 is 22—30.	Yes	ReplaceECU
		No	Replace canister control valve
5	Use multimeter to check if open or short between pin 87 on main relay and pin 1 on valve.	Yes	Repair or replace harness
		No	Next
6	Repair or replace main relay and circuit.		
7	Shut off engine. Connect commutator between ECU and harness. Use multimeter to check if open or short between pin 26 on ECU and pin 2 on valve.	Yes	Repair or replace harness
		No	Replace ECU

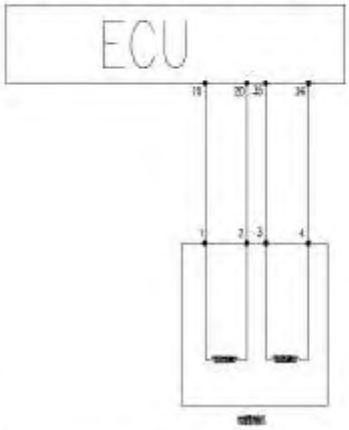
MIL driver



The diagram of MIL

NO.	Operation steps	Test result	Next step
1	Turn on ignition key		Next
2	Remove instrument panel. Put out MIL bulb. Use multimeter to check if the voltage in MIL socket is 12 V.	Yes	Next
		No	5 (Check live wire)
3	Use multimeter to check if MIL bulb is good.	Yes	Next
		No	Replace bulb.
4	Connect the commutator between ECU and harness. Check if open or short between pin 70 on ECU and input connector of MIL.	Yes	Repair or replace harness
		No	Replace ECU
5	Check if the fuse in oxygen heating circuit is burn out.	Yes	Replace fuse
		No	Next
6	Use multimeter to check if open or short between pin 87 on main relay and pin 1 on MIL socket.	Yes	Repair or replace harness
		No	Next
7	Repair or replace main relay and circuit.		

No. 1 and No.2 coil driver in step motor



The diagram of idle actuator/step motor

No.	Operation steps	Test results	Next step
1	Turn on ignition key but engine not run.		Next
2	Put out the connector on step motor and check if the resistance between pin 1 and pin 2 as well as pin 3 and pin 4 is 40—80.	Yes	Next
		No	Replace idle actuator
3	Use multimeter to check if the resistance between pin 1 and pin 2 as well as Pin 3 and pin 4 are infinite.	Yes	Next
		No	Replace bulb or actuator
4	Use multimeter to check if voltages between pin 1 and pin 2 as well as pin 3 and pin 4 are 12V.	Yes	Replace actuator
		No	Next
5	Connect commutator between ECU and harness. Use multimeter to check if open or short between pin 19,pin 20, pin 35, pin 36 on ECU and pin1,2,3,4 on step motor.	Yes	Repair or replace harness
		No	Replace ECU

6. The diagnosis steps according to engine symptoms

Before beginning diagnosis steps according to engine symptoms, the primary checking should be carried out:

(1) Make any abnormal situation for ECU and MIL (except vehicle without MIL).

(2) Use diagnoses instrument or flashlight to check to insure no any malfunction information records.

(3) Use diagnoses instrument to check the idle data on heated engine of EFI system to insure everything is OK.

(4) Make sure the symptoms that driver told exist and check the exact position of symptom. Then begin appearance check:

Check if clear or firm on harness ground.

Check if any rupture, twist in bulb or if connect correctly.

Check if any bottleneck in bulb.

Check if any stave or damage on intake air pipe.

Check if the seal between throttle body and manifold is good.

Check if any rupture, aging on secondary wire in ignition system or connect correctly.

Check if the connection of wires is correct or any loose/bad contact on connector.

1) Engine does not run or run slowly on start

No.	Operation steps	Test step	Next step
1	Check if the voltage between two poles on battery is 10—12.5 V.	Yes	Next
		No	Repair or replace battery
2	Turn on ignition key. Check if the voltage on positive poles of battery connected with the key is 10—12.5 V.	Yes	Next
		No	Repair poles or replace wires
3	Keep ignition key on start position. Check if the voltage on positive pole of starter connected with ignition key is 8V.	Yes	Next
		No	Replace bulb, replace actuator, repair or replace ignition key
4	Keep ignition key on start position. Check if the voltage on positive pole of starter is 8V.	Yes	Next
		No	Repair poles or replace wires
5	Use multimeter to check if open or short for starter.	Yes	Repair or replace start motor
		No	Next
6	Check if engine blocks for bad lubrication.	Yes	Trouble shooting
		No	Next
7	If in winter, check if the resistance of starter is too big that resulted by wrong lubricant or gear oil.	Yes	Replace suitable oil
		No	Repair or replace timing belt

2）Engine can run but cannot start successfully (without distributor)

No.	Operation steps	Check step	Next step
1	Turn on ignition key. Use tester to check if malfunction information record exists.	Yes	Eliminate trouble
		No	Next
2	Pull out cylinder wire and connect ignition plug with the electrode 5—10mm from engine body. Run engine with starter and check if high voltage ignition in blue and white appears.	Yes	8
		No	Next
3	Check if the resistance of high voltage wire is normal (about 16k/ m. For exact data, please touch manufacture).	Yes	Next
		No	Repair or replace high voltage wire
4	Check if any ignition coil damage or crack.	Yes	Replace
		No	Next
5	Check if any loose or damage for identification ring in ignition coil.	Yes	Replace
		No	Next
6	Check if ignition coil is normal.	Yes	Next
		No	Replace
7	Check if ignition coil connector is good.	Yes	Next
		No	Connect plug
8	Turn on ignition key. Check if fuel pump relay and fuel pump can work for 3 seconds.	Yes	Next
		No	Repair fuel pump circuit
9	Connect fuel pressure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 300 kPa.	Yes	Next
		No	13
10	Pull out fuel distribution pipe together with injector. Pull out injector connector on harness. Supply 12V voltage directly from battery to injector. Check if injector can inject fuel.	Yes	12
		No	Next
11	Re-check if injector can inject fuel after cleaning.	Yes	Next
		No	Replace injector
12	Check If fuel deterioration or containing water.	Yes	Replace fuel oil
		No	18
13	Check if fuel pressure below 300kPa.	Yes	Next
		No	17

14	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	16
15	Check if fuel pipe is leaked or blocked.	Yes	Repair or replace fuel inlet
		No	Replace fuel pump
16	Check returning fuel pipe is blocked or curving.	Yes	Repair or replace oil return pipe
		No	Replace fuel pressure regulator
17	Connect commutator between ECU and harness. Check if voltage exists on pin 1,2. Check if the positive source on above pins and ground wires of pin 22,44,63 on ECU are normal.	Yes	Next
		No	Repair or replace harness
18	Check if intake air system parts are leakage.	Yes	Repair
		No	Next
19	Check if MAP or IAT are blocked.	Yes	Repair or replace
		No	Next
20	Check if CTS is normal.	Yes	Next
		No	Repair or replace
21	Check if engine cannot start because mechanical reason such as cylinder head spacing and cylinder leakage.	Yes	Eliminate mechanical malfunction
		No	Replace ECU

3) Heat start difficult

No.	Operation steps	Test results	Next step
1	Turn on ignition key. Use tester to check if malfunction information record exists.	Yes	Eliminate trouble
		No	Next
2	Connect fuel pessure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 250—300 kPa.	Yes	Next
		No	9
3	Disconnect fuel pipe. Shut off ignition key. After 1 hour, check if pressure in fuel system can keep 150—200 kPa.	Yes	Next
		No	Repair fuel system leak

4	Connect fuel pipe. Use returning fuel blocker to block returning fuel pipe and shut off fuel pressure gauge valve. Shut off ignition key. After 1 hour, check if pressure in fuel system can keep 150—200 kPa.	Yes	Replace fuel pressure regulator
		No	Next
5	Check if injector and fuel pipe leaks fuel.	Yes	Replace injector and oilpipe
		No	Next
6	Pull out coolant temperature sensor connector and run engine. Check if engine can start.	Yes	Check coolant temperature and circuit
		No	Next
7	Connect adaptor between ECU and harness. Check if voltage exists on pin 1,2. Check if the positive source on above pins and ground wires of pin 22,44,63 on ECU are normal.	Yes	Next
		No	Repair or replace harness
8	Replace fuel and heat start engine again. Check if engine can start.	Yes	Harness
		No	Replace ECU
9	Check if fuel pipe is blocked or curving, or if fuel pump regulator can work normally.	Yes	Next
		No	Repair or replace
10	Use multimeter to check if voltages between two ends of fuel pump connector exists.	Yes	Next
		No	Repair or replace fuel pump relay and leading line
11	Check if fuel pump resistance is correct.	Yes	Next
		No	Replace fuel pump
12	Check if fuel pump is blocked.	Yes	Replace fuel pump
		No	Replace ECU

4）RPM is normal but difficult in starting

No.	Operation steps	Test results	Next step
1	Turn on ignition key. Use tester to check if malfunction information record exists.	Yes	Eliminate malfunction
		No	Next
2	Check if air filter is through.	Yes	Next
		No	Replace
3	Check if MAP pressure is 35—65 kPa in idle after start.	Yes	Next
		No	Eliminate intake system leak

4	Step down throttle slightly and check engine can start easily.	Yes	Replace or check throttle valve and idle pass
5	Connect fuel pressure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 250—300 kPa.	Yes	Next
		No	9
6	Use special connector to supply 12 V voltage from battery to injector and check if injector works normally.	Yes	8
		No	Next
7	Re-check if injector can inject fuel after cleaning.	Yes	Next
		No	Replace injector
8	Replace fuel. Check If fuel deteriorates or containings water.	Yes	Replace fuel
		No	14
9	Check if fuel pressure below 250kPa.	Yes	Next
		No	13
10	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	12
11	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon.	Yes	Replace fuel pressure regulator
		No	Repair and replace injector or fuel pipe
12	Connect fuel pessure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 250—300 kPa	Yes	Repair and replace fuel pipe
		No	Replace fuel pump
13	Check returning fuel pipe is blocked or curving.	Yes	Repair or replace returning fuel pipe
		No	Replace fuel prassure regulator
14	Pull out idle actuator connector before coolant temperature reaches 35℃ and check if engine speed is degressive.	Yes	Next
		No	Repair or replace idle actuator
15	Turn on ignition key. Check voltages on following pins are normal: 12 V for pin 27 and zreo for pin 14 and 19.	Yes	Next
		No	Check harness or connector
16	Run engine in idle. When coolant temperature reaches normal, ground pin 51 and check if ignition advance angle is 6.75 crank angle.	Yes	Next
		No	Adjust ignition advance angle

17	Check if cylinder compressed pressure is normal.	Yes	Next
		No	Trouble shooting
18	Check if MAP and IAT blocks.	Yes	Repair or replace
		No	Next
19	Check if coolant temperature sensor is normal.	Yes	Replace ECU
		No	Repair or replace

5) Cold start difficult

No.	Operation steps	Check results	Next step
1	Turn on ignition key. Use tester to check if malfunction information record exists.	Yes	Eliminate malfunction
		No	Next
2	Use multimeter to check if coolant temperature sensor is normal. Or link 1.5k resistors between pin 45 and pin 30 on ECU to replace coolant temperature sensor for starting engine. If engine can start, coolant temperature sensor is normal.	Yes	Next
		No	Replace sensor
3	Turn on ignition key. Check if voltages on following pins are normal: 12 V for pin 27 and zreo for pin 14 and 19.	Yes	Next
		No	Check harness
4	Check if air filter is through.	Yes	and connector Next
5	Check if MAP pressure is 35—65 kPa in idle after start.	No Yes	Replace Next
		No	Eliminate intake system malfunction
6	Step down throttle slightly and check engine can start easily.	Yes	Check throttle and idle pass
		No	Next
7	Pull out idle actuator connector before coolant temperature reaches 35℃ and check if engine speed is degressive.	Yes	Next
		No	Repair or replace idle actuator
8	Connect fuel pressure gauge valve. Ground pin 86 on fuel pump relay. Turn on ignition key to run fuel pump relay anfd fuel pump to check if fuel pressure is 250—300kPa.	Yes	Next
		No	12
9	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	11
		No	Next
10	Re-check if injector can inject fuel after cleaning.	Yes	Next
		No	Replace injector

11	Check If fuel deteriorates or containings water.	Yes	Replace fuel
		No	17
12	Check if fuel pressure below 250kPa.	Yes	Next
		No	16
13	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	15
14	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon.	Yes	Replace fuel pressure regulator
		No	Repair or replace injector and fuel pipe
15	Check if fuel pipe is leaked or blocked.	Yes	Repair or replace intake fuel pipe
		No	Replace fuel pump
16	Check returning fuel pipe is blocked or curving.	Yes	Repair or replace returning fuel pipe
		No	Replace fuel pressure regulator
17	Check if cylinder compressed pressure is normal.	Yes	Next
		No	Troble shooting
18	Check if intake air system is leak.	Yes	Repair
		No	Next
19	Check if MAP and IAT blocks.	Yes	Repair or replace
		No	Replace ECU

6) Unstable idle at any situation

1	Turn on ignition key. Use diagnostic equipment to check if malfunction information record exists.	Yes	Eliminate malfunction
		No	Next
2	Check if EWD3 idle actuator or step motor actuator blocked.	Yes	Repair or replace idle actuator
		No	Next
3	Turn on ignition key. Connect adaptor between ECU and harness. Check if voltages on pin 31,56 (output signal for IAT and ECT), pin 19,20,35,36 (output signal for stepmotor) and pin19, 35 (for EWD3) are normal.	Yes	Check harness and connector
		No	Next

3	Shout off engine. Check if air filter is through	Yes	Next
		No	Replace
4	Check if MAP pressure is 35—65 kPa at idle	Yes	Next
		No	Eliminate intake system leak
5	Connect fuel pressure gauge valve. Short pin 30 and pin 87 of fuel pump relay to start fuel pump. Check if fuel pressure is 300 kPa.	Yes	Next
		No	9
6	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	8
		No	Next
7	Re-check if injector can inject fuel after cleaning.	Yes	Replace
		No	Replace injector
8	Check if fuel is degenerative or containing water	Yes	Replace fuel
		No	14
9	Check if fuel pressure blowe 250kpa	Yes	Next
		No	13
10	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	12
11	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon.	Yes	Replace fuel pressure regulator
		No	Repair and replace injector or fuel pipe
12	Check if fuel inlet is leak or block	Yes	Repair or replace fuel inlet
		No	Replace fuel pump
13	Check if return fuel pipe is block or curving.	Yes	Repair or replace return fuel pipe
		No	Replace fuel pressure regulator
14	Pull out coolant temperature sensor and check if engine is normal	Yes	Replace coolant temperature sensor
		No	Next
15	Check if cylinder compression pressure of engine is normal	Yes	Next
		No	Trouble shooting
16	Check if the resistance of secondary wire is normal (about 16k/ m. For exact data, please touch manufacture).	Yes	Next
		No	Replace

18	Check if sensor holes on MAP and IAT block.	Yes	Cleaning
		No	Next
19	Run engine in idle. After coolant temperature reaches actuating temperature for closed loop control, check if oxygen sensor works normally.	Yes	Next
		No	Check oxygen sensor and harness
20	Chec if intake air system leaks.	Yes	Eliminate leak
		No	Next
21	Check if cylinder pressure is normal.	Yes	Next
		No	Trouble shooting

7） Unstable idle at heat engine

1	Turn on ignition key. Use diagnostic equipment to check if malfunction information record exists.	Yes	Eliminate malfunction
		No	Next
2	Check if air filter is through.	Yes	Next
		No	Replace
3	Check if MAP pressure is 35—65 kPa at idle in heating engine process.	Yes	Next
		No	Eliminate intake system malfunction
4	Shut off engine, turn on ignition key. Connect commutator between ECU and harness. Check if voltages on pin 31, 56 (output signal for IAT and ECT) is normal.	Yes	Next
		No	Check
5	Pull out idle actuator connector before heat engine finish and check if engine speed is normal	Yes	Next
		No	Replace idle actuator
6	Check if coolant temperatuer sensor is normal	Yes	Next
		No	Replace

8） Unstable idel after heat engine

1	Turn on ignition key. Use diagnostic equipment to check if malfunction information record exists	Yes	Eliminate malfunction
		No	Next
2	Turn on ignition key. Connect adaptor between ECU and harness. Check if voltages on pin 60,56,31,43(output signal for MAP, IAT, CTS and oxygen sensor) and pin 19,20,35,36 (output to idle actuator) are normal	Yes	Next
		No	Repair or replace harness

3	Shout off engine. Check if air filter is through	Yes	Next
		No	Replace
4	Check if MAP pressure is 35—65 kPa at idle	Yes	Next
		No	Eliminate intake system leak
5	Connect fuel pressure gauge valve. Short pin 30 and pin 87 of fuel pump relay to start fuel pump. Check if fuel pressure is 300 kPa.	Yes	Next
		No	9
6	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	8
		No	Next
7	Re-check if injector can inject fuel after cleaning.	Yes	Replace
		No	Replace injector
8	Check if fuel is degenerative or containing water	Yes	Replace fuel
		No	14
9	Check if fuel pressure blowe 250kpa	Yes	Next
		No	13
10	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	12
11	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon.	Yes	Replace fuel pressure regulator
		No	Repair and replace injector or fuel pipe
12	Check if fuel inlet is leak or block	Yes	Repair or replace fuel inlet
		No	Replace fuel pump
13	Check if return fuel pipe is block or curving.	Yes	Repair or replace return fuel pipe
		No	Replace fuel pressure regulator
14	Pull out coolant temperature sensor and check if engine is normal	Yes	Replace coolant temperature sensor
		No	Next
15	Check if cylinder compression pressure of engine is normal	Yes	Next
		No	Trouble shooting
16	Check if the resistance of secondary wire is normal (about 16k/ m. For exact data, please touch manufacture).	Yes	Next
		No	Replace

17	Check if any ablation damage or crack on ignition coil.	Yes	Replace
		No	Next
18	Check if spark plug is normal	Yes	Replace ECU
		No	Replace spark plug

9）Unstable idel or switch off

1	Turn on ignition key.Use diagnostic equipment to check if malfunction information record exists	Yes	Eliminate malfunction
		No	Next
2	Turn on A/C switch. Turn on ignition key.Connect commutator between ECU and harness. Check if pin 50 and 58(A/C switch) have signal input	Yes	Next
		No	Repair A/C circuit
3	Check if A/C system pressure, magnetic clutch of compressor and A/C pump are normal	Yes	Next
		No	Repair or replace
4	Turn on ignition key. Check if voltage on pin19, 20,35,36(output to idle actuator) are normal	Yes	Next
		No	Check control circuit
5	Remove stepmotor and check if stepmotor is jamming or does not work flexibly	Yes	Repair or replace stepmotor
		No	Next
6	Turn engine and open A/C .Check if idle actuator is normal	Yes	Replace ECU
		No	Replace idle actuator

10）Periodicity unstable(ECU needs self-study again)

1	Turn on ignition key. Use diagnostic equipment to check if malfunction information record exists	Yes	Eliminate malfunction
		No	Next
2	Check if air filter is through。	Yes	Next
		No	Replace
3	Check if intake pressure is 35—65 kPa in idle	Yes	Next
		No	Repair
4	Run engine in idle. Shut off each cylinder one by one and check if engine speed is dropping or fluctuates.	Yes	7
		No	Next

5	Turn on ignition key. Connect commutator between ECU and harness. Check if voltages on pin 48,60,45,28(output signal for MAP, IAT, CTS and oxygen sensor), 1, 2(ground), 22 (ignition switch) and pin 19,20,35,36(output to idle actuator) are normal	Yes	Next
		No	Rpair or replace harness
6	Run engine in idle. After coolant temperature reaches normal, check if ignition advance angle is normal	Yes	Next
		No	Adjust ignition advance angle
7	Check if sensor holes on MAP and IAT block.	Yes	Cleaning
		No	Next
8	Check if fuel is degenerative or containing water	Yes	Replace fuel
		No	Next
9	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	Next
		No	Repair harness and injector
10	Check if the resistance of secondary wire is normal	Yes	Next
		No	Replace
11	Check if any ablation damage or crack on ignition coil	Yes	Replace
		No	Next
12	Check if spark plug is normal	Yes	Replace ECU
		No	Replace spark plug

11）Idle is too high (ECU needs self-study again)

1	Turn on ignition key.Use diagnostic equipment to check if malfunction information record exists。	Yes	Eliminate malfunction
		No	Next
2	Check if throttle pedal bracing wire is blocked or too tight	Yes	Adjust or replace
		No	Next
3	Check if canister control valve, fuel pressure regulator, PCV vacuum pipe and vacuum power-assisted hose of braking system are good	Yes	Repair or replace
		No	Next
4	Step down brake pedal and check if idle is too high while engine idle running and in neutral.	Yes	Next
		No	6
5	Clamp vacuum power-assisted hose and check if idle is normal	Yes	Repair or replace vacuum actuator

		No	Next
6	Clamp PCV vacuum hose and check if idle is normal	Yes	Replace PVC
		No	Next
7	Clamp canister control valve hose and check if idle is normal	Yes	Replace canistor control valve
		No	Next
8	Check if idle actuator is not flexibly or blocked	Yes	Repair or replace
		No	Next
9	Check if intake pipe have leak	Yes	Repair or replace
		No	Next
10	Check if sealed washer of injector is good	Yes	Next
		No	Replace sealing washer
11	Check if MAP and IAT are good	Yes	Replace ECU
		No	Replace sensor

12）Speed of engine is low or switch off while speeding up

1	Turn on ignition key.Use diagnostic equipment to check if malfunction information record exists。	Yes	Eliminate malfunction
		No	Next
z2	Check if air filter is through	Yes	Next
		No	Replace
3	Check if speed is normal at idle	Yes	Next
		No	Next
4	Check if intake pressure is 35—65 kPa in idle	Yes	Next
		No	Repair
5	Run engine in idle. After coolant temperature reaches normal, check if ignition advance angle is normal	Yes	Next
		No	Adjust ignition advance angle
6	Connect fuel pessure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 300 kPa	Yes	Next
		No	10
7	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	9
		No	Next
8	Re-check if injector can inject fuel after cleaning.	Yes	Next
		No	Replace injector
9	Check if fuel is deterirate or containing water	Yes	Replace fuel

		No	15
10	Check if fuel pressure below 250kPa.	Yes	Next
		No	14
11	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	13
12	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon	Yes	Replace fuel pressure regulator
		No	Replace and repair injector or fuel pipe
13	Check if fuel pipe is leaked or blocked.	Yes	Repair or replace fuel inlet
		No	Replace fuel pump
14	Check returning fuel pipe is blocked or curving.	Yes	Repair or replace returning fuel pipe
		No	Replace fuel pressure regulator
15	Turn on ignition key. Connect commutator between ECU and harness. Check if voltages on pin 32(output signal for TPS) ,pin 38 (ground connection)and pin 45(for 4.5-5V power of sensor) are normal.	Yes	Next
		No	Repair or replace harness
16	Check if ignition coil, distributor, secondary wire and spark plug are normal	Yes	Replace ECU
		No	Repair or replace relate unit

13）Speeding up is slow

1	Turn on ignition key. Use diagnostic equipment to check if malfunction information record exists	Yes	Eliminate malfunction
		No	Next
2	Shout off engine. Check if air filter is through	Yes	Next
		No	Replace
3	Check if speed is narmal in idle	Yes	Next
		No	Refer to trouble shooting of idle system
4	Check if intake pressure is 35—65 kPa in idle	Yes	Next
		No	Repair
5	Turn on ignition key. Connect commutator between ECU and harness. Check if voltages on	Yes	Next

	between ECU and harness. Check if voltages on pin 32(output signal for TPS), pin38 (ground connection) and pin 45(4.5-5V power for sensor) are normal.	No	Repair or replace
6	Run engine in idle. After coolant temperature reaches normal, check if ignition advance angle is normal	Yes	Next
		No	Adjust ignition advance angle
7	Connect fuel pressure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 300 kPa	Yes	Next
		No	11
8	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	10
		No	Next
9	Re-check if injector can inject fuel after cleaning.	Yes	Next
		No	Replace injector
10	Check if fuel is degenerative or containing water	Yes	Replace fuel
		No	16
11	Check if fuel pressure below 250kPa.	Yes	Next
		No	15
12	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	14
13	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon	Yes	Replace pressure regulator
		No	Repair and replace injector or fuel pipe
14	Check if fuel pipe is leaked or blocked.	Yes	Repair or replace fuel pipe
		No	Replace fuel pump
15	Check returning fuel pipe is blocked or curving.	Yes	Repair or replace fuel pipe
		No	Replace pressure regulator
16	Check if exhaust system and TWC is blocked	Yes	Replace or cleaning
		No	Replace ECU

14）Poor performance of acceleration and power lessness

1	Check if exist malfunction as following: clutch	Yes	Repair

	slipping,air pressure of tire is low,braking drag,size of tire and four-wheeled alignment are wrong	No	Next
2	Check if throttle can full-open	Yes	Next
		No	Rpair or replace throttle
3	Turn on ignition key. Use diagnostic equipment to check if malfunction information record exists.	Yes	Eliminate malfunction
		No	Next
4	Run engine in idle. After coolant temperature reaches normal, check if ignition advance angle is normal.	Yes	Next
		No	Adjust ignition advance angle
5	Turn on ignition key. Connect commutator between ECU and harness. Check if voltages on pin 48,60,45,28(output signal for MAP,IAT, CTS and oxygen sensor),1,2(ground),22(ignition switch)and pin 19,20,35,36(output to idle actuator)are normal	Yes	Next
		No	Repair or replace harness
6	Check if intake pressure is 35—65 kPa in idle after start	Yes	Next
		No	Repair
7	Connect fuel pessure gauge valve. Short pin 30 on fuel pump relay and pin 87 to start fuel pump. Check if fuel pressure is 300 kPa	Yes	Next
		No	11
8	Use special connector to supply 12 V voltages from battery to injector and check if injector works normally.	Yes	10
		No	Next
9	Re-check if injector can inject fuel after cleaning.	Yes	Next
		No	Replace injector
10	Check if fuel is degenerative or containing water	Yes	Replace fuel
		No	16
11	Check if fuel pressure below 250kPa.	Yes	Next
		No	15
12	Shut off fuel gauge valve. Connect ignition key again to run fuel pump for 3 seconds. Check if fuel pressure can be set up.	Yes	Next
		No	14
13	Open fuel gauge valve, use return fuel blocker to clamp fuel pipe for no returning fuel. Check if fuel pressure can be set up soon。	Yes	Replace pressure regulator
		No	Repair and replace injector or fuel pipe
14	Check if fuel pipe is leaked or blocked.	Yes	Repair or replace fuel inlet
		No	Replace fuel pump

15	Check returning fuel pipe is blocked or curving.	Yes	Repair or replace returning fuel pipe
		No	Replace pressure regulator
16	Check if the date of MAP or IAT are normal。	Yes	Next
		No	Replace sensor
17	Check if ignition coil, distributor, high voltage wire and spark plug are normal	Yes	Next
		No	Replace or adjust
18	Check if A/C system has malfunction.	Yes	Check A/C system
		No	Replace ECU

15） A/C system malfunction

1	Check if there is full refrigerant and check if A/C belt, A/C clutch, pressure switch are normal	Yes	Next
		No	Eliminate malfunction
2	Turn on A/C switch in engine idle. Check if A/C thermistor is malfunction	Yes	Eliminate malfunction
		No	Next
3	Turn on A/C switch. Connect commutator between ECU and harness. Check if output signal for ECU pin 50 and 58(A/C switch) is normal	Yes	Next
		No	Check harness
4	If the vehicle is low-level control, check if A/C can working when turn off A/C.	Yes	Replace bulb or repair harness
		No	Next
5	Check if output low-level for ECU pin 68(connect earthing terminal of A/C relay pullin coil)	Yes	Repair A/C relay and harness
		No	Replace ECU

8. Precaution for service

1) Precaution for service EFI

(1) Controller removal request

Remove controller before welding or painting

Turn off ignition switch when removing controller to avoid

Don' t remove power wires from battery when engine running or electric appliance is in using

Don' t start engine with high current

Note that the ambient temperature of controller could not exceed 80℃

(2) Clean request: Please observe following regulations:

Put removed parts on clean place and cover them with suitable cloth

Only allowed to pull out or insert each harness or tester harness after ignition switch turns off

Make sure the correction for connecting wires when measuring voltage or ground for electronic control system

Removing power wires from battery or pulling out controller connector will cause losing the information for diagnosis and self-study stored in memory

(3) Precaution for fuel system service

When removing or installing fuel pump in fully or partial fully fuel tank, pay attention to:

Mounting equipment that could absorb leaked fuel on tank outlet before operation

Avoid skin touch with fuel directly

Completely clean the connecting part and around before loose it

To prevent fuel spray, put a piece of dishcloth on the connecting part

Cover or block out the opened part if it is not be used at once

Take out parts only before installing. Don' t use the parts witout package

Don' t damage O-ring during installing injector. Smear a little lubricant on o-ring for beteer fitting

Don' t use compressed air or move vehicle when opening system.

2) Safety precaution

In order to avoid personal hurt or damage injector and ignition unit, pay attention to:

Don' t touch or pull out ignition harness if engine is running or starting

Pull out harness connector if engine is starting by starter motor (for example in the situation of checking compressed air).

DEALER PRE-DELIVERY INSPECTION

TEAM JOYNER USA

www.teamjoynerusa.com

DEALER PRE-DELIVERY INSPECTION

1245 N. Mondel Dr. • Gilbert, AZ 85233
Ph: 480-813-6363 • Fax: 480-813-6379

This form registers warranty

This form registers warranty

SOLD TO:

We have determined that your vehicle is safe to operate ☐ YES ☐ NO

Customer Name _____

Address _____

City _____ State _____ Zip _____

Email _____ Contact Person _____ Phone _____

Phone _____ Name _____ Fax _____ Cell _____

Technician _____ Supervisor _____

SALE DATE:	DELIVERY DATE:	YEAR:	MAKE:	VIN #:	COLOR:

ITEM	OPERATIONAL	ITEM	OPERATIONAL	ITEM	OPERATIONAL	ITEM	OPERATIONAL
Paint	Yes No	Carburetor	Yes No	Mirror	Yes No	Rear Diff	Yes No
Lug Nuts	Yes No	Throttle Cable	Yes No	Battery	Yes No	Wheel Bearings	Yes No
Axle Nuts	Yes No	Choke Cable	Yes No	Ignition	Yes No	Blinkers	Yes No
Tie Rods	Yes No	Emergency Brake	Yes No	Gauges	Yes No	Fuel Lines	Yes No
Axles	Yes No	Charging System	Yes No	Switches	Yes No	Steering Wheel	Yes No
CV Joint	Yes No	Tires/Wheels	Yes No	Fluids	Yes No	Clutch	Yes No
Seats	Yes No	Cooling System	Yes No	Gas	Yes No	Belts	Yes No
Seat Belts	Yes No	Winches	Yes No	Engine Oil	Yes No	Brake Pedal	Yes No
Wiring Harness	Yes No	A Arms	Yes No	Transmission Fluid	Yes No	EPA Sticker	Yes No
Brakes	Yes No	Swing Arms	Yes No	Gear Oil	Yes No	Carb Sticker	Yes No
Brake Lines	Yes No	Shocks	Yes No	Shock Oil	Yes No	Oil Vent System	Yes No
Brake Pads	Yes No	Steering Boy	Yes No	Coolant Fluid	Yes No		
Shifter	Yes No	Lights	Yes No	Brake Fluid	Yes No		
Throttle Pedal	Yes No	Horn	Yes No	Front Diff	Yes No		

REMARKS:

_____

_____

_____

Dealer Name _____

Address _____

City _____ State _____ Zip _____

Email _____ Contact Person _____ Phone _____

Phone _____ Name _____ Fax _____ Cell _____

Dealers Signature _____ **Date** _____

I agree to terms and conditions _____

Customer Signature **Date**

This form registers warranty

_____Jumping the vehicle can cause serious damage to the drive train (axle, transmission, suspension).

_____Injury or death can result from jumping vehicle. Do Not Jump.

_____I understand that the roll bars are cosmetic and a roll over could cause death or serious injury. The seller is not liable for death or injury.

_____I have inspected all machines for any cosmetic damage and found it/them to be satisfactory. I further understand that cosmetic damage is NOT covered by any factory warranties and unless noted here are deemed accepted by me.

_____Sand dunning or desert riding is dangerous. Death or injury could occur. The seller is not liable for injury or death.

_____I understand all sales are final and that there is no right of rescission, no option for return or exchange for any vehicle purchased, and that the titled and registered machines were effectively purchased when I signed the title application.

_____I understand the warranty is 90 day manufacture defect only with the following not covered: axles, electrical batteries, light bulbs, clutches, turbo cartridges, carburetor cleaning, piston rings that are scorched from one revving, rims/tires, bearings.

_____I understand that although some lending institutions do not require insurance, state law DOES require liability insurance and a driver's license. I also understand that none of the products offered by the dealer constitutes insurance and a separate policy would have to be purchases from an outside source to protect my purchase and fulfill state requirements.

_____I have been shown the VIN number for each machine and they match this form and all paperwork received.

_____I understand that I have only 72 hours to notify the seller of any issues to the paperwork or the vehicle.

_____Off Road use only. Driving on paved roads can cause axle or transmission damage. Both tires turn equally, this is not a limited slip differential. Injury or death can occur form operating a non DOT vehicle on public roads.

_____Turbo systems, system lessen life of engine, over revving the engine to increase boost of turbo can cause engine damage. This will not be covered under warranty.

ADDITIONAL TERMS AND CONDITIONS OF SALE

1. PROMISE TO PAY. By signing this contract, Buyer agrees to pay Seller the "TOTAL DUE".
2. TIME OF ESSENCE. Time is of the essence of this contract. Sellers acceptance of partial payments shall not in any manner modify the terms of this contract and such acceptance shall not be construed as a waiver of any subsequent defaults on Buyer's part nor shall it waive the "time is of the essence" provision.
3. NOTICE. Any notice required to be given to Buyer shall be deemed reasonable notification if (Ⅰ)mailed by ordinary mail, postage prepaid, to Buyer's mailing address as shown on this contract or to Buyer's most recent address as shown by a "notice of change of address" on file with Seller, whether or not such notice is actually received by buyer, or(Ⅱ) if given in any other manner which results in Buyer's actual receipt of such notice.
4. BAD CHECK. If Buyer pays Seller with a check that is dishonored or unpaid for any reason, Seller may at Seller's sole option, terminate this contract and retake the vehicle, or make claims against Buyer on the check. In addition, Seller will charge Buyer a $25 returned check charge plus any actual charges assessed by Seller's financial institution resulting from such returned check.
5. ATTORNEYS FEES. If it is necessary for Seller to take legal action to enforce any of seller's rights under this contract, Buyer agrees to pay to the extent permitted by law, the seller's reasonable attorneys fees and court costs.
6. GENERAL. This contract is governed by applicable federal law and the laws of the State of Arizona. Any provisions found to be invalidate the remainder hereof, Waiver of any default shall not constitute waiver of any subsequent default. All words used herein shall be construed to be of such gender and number as the circumstances require. The contract shall be binding upon Buyer's heirs, personal representatives, successors and assigns and shall inure to the benefit of Seller's successors and assigns. This contract constitutes the entire agreement between the parties with respect to the subject matter herein, and may not be altered or amended unless made in writing and duty executed by Seller.
7. CASH DEPOSIT. If Buyer fails or refuses to accept delivery of any Vehicle or product or fails to comply with this contract, Seller may keep any cash deposit as liquidated damages, to the extent

not prohibited by law. The deposit may also be used reimburse Seller for any expenses and losses Seller incurs or suffers as a result of Buyer's failure or refusal to accept deliver of the Vehicle or product or to comply with this contract. Such expenses and losses may include Seller s reasonable attorney's fees.

8. NON-DELIVERY. Seller is not liable for failure to deliver or for delay in delivering the Vehicle or other product where such failure or delay is due, in whole or in part, to any cause beyond Seller's control or without Seller's fault or negligence,
9. RISK OF LOSS, INSURANCE. The risk of loss to the Vehicle or any other items covered by this invoice passes to Buyer upon delivery of the Vehicle or other goods to Buyer at the address set forth on this invoice for shipment to Buyer or such other place of receipt designated by Buyer. Buyer is responsible for maintaining its own theft and liability insurance coverage for the Vehicle.
10. AGE. Buyer represents and warrants to Seller that Buyer is over the age of majority and is fully competent to enter into this contract. Buyer acknowledges that Seller is relying on this representation in entering into and performing this contract.

ADDITIONAL TERMS AND CONDITIONS OF SALE

1. PROMISE TO PAY. By signing this contract, Buyer agrees to pay Seller the "TOTAL DUE".
2. TIME OF ESSENCE. Time is of the essence of this contract, Seller's acceptance of partial payments shall not in any manner modify the terms of this contract and such acceptance shall not be construed as a waiver of any subsequent defaults on Buyer's part nor shall it waive the "time is of the essence" provision.
3. NOTICE. Any notice required to be given to Buyer shall be deemed reasonable notification if(Ⅰ)mailed by ordinary mail, postage prepaid, to Buyer's mailing address as shown on this contract or to Buyer's most recent address as shown by a "notice of change of address" on file with Seller, whether or not such notice is actually received by Buyer, or (Ⅱ) if given in any other manner which results in Buyer's actual receipt of such notice.
4. BAD CHECK. If Buyer pays Seller with a check that is dishonored or unpaid for any reason, Seller may at Seller's sole option, terminate this contract and retake the vehicle, or make claims against Buyer on the check. In addition, Seller will charge Buyer a $25 returned check charge plus any actual charges assessed by Seller's financial institution resulting from such returned check.
5. ATTORNEYS FEES. If it is necessary for Seller to take legal action to enforce any of Seller's rights under this contract. Buyer agrees to pay to the extent permitted by law, the seller's reasonable attorney's fees and court costs.
6. GENERAL. This contract is governed by applicable federal law and the laws of the State of Arizona. Any provisions found to be invalid shall not invalidate the remainder hereof. Waiver of any default shall not constitute waiver of any subsequent default. All words used herein shall be construed to be of such gender and number as the circumstances require. The contract shall be binding upon Buyer's heirs, personal representatives, successors and assigns and shall inure to the benefit of Seller's successors and assigns. This contract constitutes the entire agreement between the parties with respect to the subject matter herein, and may not be altered or amended unless made in writing and duly executed by Seller.
7. CASH DEPOSIT. If Buyer fails or refuses to accept delivery of any Vehicle or product or fails to comply with this contract, Seller may keep any cash deposit as liquidated damages, to the extent not prohibited by law. The deposit may also be used to reimburse Seller for any expenses and losses Seller incurs or suffers as a result of Buyer's failure or refusal to accept delivery of the Vehicle or product or to comply with this contract. Such expenses and losses may include Seller's reasonable and loses Seller incurs or suffers as a result of Buyer's failure or refusal to accept delivery of the Vehicle or product or to comply with this contract .Such expenses and losses may include Seller's reasonable attorney's fees.
8. NON-DELIVERY. Seller is not liable for failure to deliver or for delay in delivering the vehicle or other product where such failure or delay is due. In whole or in part, to any cause beyond Seller's control or without Seller's fault or negligence.
9. RISK OF LOSS: INSURANCE. The risk of loss to the vehicle or any other items covered by this invoice passes to Buyer upon delivery of the vehicle or other goods to Buyer at the address set forth on this invoice for shipment to Buyer or such other place of receipt designated by Buyer. Buyer is responsible for maintaining its own theft and liability insurance coverage for the vehicle.

AGE. Buyer represents and warrants to Seller that Buyer is over the age of majority and is fully competent to enter into contact. Buyer acknowledges that Seller is relying on this representation in

entering into performing this contract.