

DIRECTORATE GENERAL BORDER ROADS
GENERAL REPAIR INSTRUCTION NO 145
ON
MARUTI GYPSY MG 410 4WD : COMMON
DEFECTS AND ITS REMEDY AND TECH.
SPECIFICATIONS

AIM

1. This instruction deals with systematic diagnosing then fault finding on Maruti Gypsy MG 410 4WD when the veh reports on defect to assist the mech to repair/rectify in the shortest time. It also provides the technical specification of the vehicle.

Action By

2. (a) Base /Field Wksp (GREF) – Organise training of technical personnel to follow a correct sequence of diagnose and for evolving techniques to pin point defect by process of elimination. Record correct defects in repair cards and diagnose exact cause for speedy repairs.

(a) Projects/units – SO I /SO II (Project) to organise training of all mechanics Held on unit establishment centrally under the arrangements of project in the Field Wksp (GREF).

DETAILS

3. Trouble shooting and its remedial measure are tabulated in Appx 'A' and technical specification/data are give at Appx 'B' to this instruction.

4. Please ack receipt.

Dated : 31 Jan 91

(AJS Khalsa)
SE (E&M) SG
Dir Tech
or Dir General Border Roads

TROUBLE SHOOTING ON MARUTI GYPSY MG 410 4WD

ENGINE

Complaint	Possible causes	Remedy
1	2	3
Poor starting	<p>Starter will not run</p> <ol style="list-style-type: none"> 1. Main fuse is blown off. 2. Contact is not closing in main switch, or this switch is open-circuited. 3. Run- down battery 4. Defective starting relay. 5. Loose terminal connection on the battery. 6. Defective brushes in starter 7. Loose battery cord connection 8. Open in field or armature circuit of starter. <p>No sparking</p> <ol style="list-style-type: none"> 1. Defective spark plug 2. Short-circuit (grounded) fault in high-tension cords 3. Cracked rotor or cap in distributor 4. Burnt breaker contact points 5. Breaker contact gap out of adjustment 6. Defective condenser 7. Contact is not closing positively in main switch or switch is open circuited 8. Loose or blown fuse 9. Ignition timing out of adjustment 10. Defective ignition coil <p>Faulty intake and exhaust systems</p> <ol style="list-style-type: none"> 1. Carburetor needs readjustment 2. Fuel pump is not discharging adequately 	<p>Replace</p> <p>Repair or replace</p> <p>Recharge</p> <p>Repair or replace</p> <p>Clean & retighten</p> <p>Replace</p> <p>Retighten</p> <p>Repair or replace</p> <p>Adjust the gap, or replace</p> <p>Repair or replace defective cords</p> <p>Replace</p> <p>„</p> <p>Adjust as prescribed</p> <p>Replace</p> <p>Replace</p> <p>Set right, or replace</p> <p>Adjust as prescribed</p> <p>Replace</p> <p>Adjust as prescribed</p> <p>Replace</p>

1	2	3
3	Clogged fuel filter	Clean, or replace
4	Defective choke mechanism	Repair or replace
5	Loose intake manifold	Retighten
6	Carburetor is dirty and clogged	Disassemble and clean
7	Float level out of adjustment	Adjust as prescribed
8	Clogged fuel hose	Clean or replace
9	Not enough fuel in the tank	Refill
10	Clogged exhaust ports	Clean
	Abnormal internal condition in engine	
1	Ruptured cylinder head gasket	Replace
2	Valve clearance out of adjustment	Adjust as prescribed
3	Weakened or broken valve spring	Replace
4	Loose manifold, permitting air to be drawn in	Retighten and as necessary, replace the gasket.
5	Worn piston, rings or cylinders	Replace worn rings and piston and as necessary rebore.
6	Broken valve timing belt	Replace
7	Poor valve seating	Repair or replace
8	Wrong kind of engine oil	Replace
9	Burnt valves	Replace
	Not enough power	Inadequate compression
1	Valve clearance out of adjustment	Adjust as prescribed
2	Valves not seating tight	Repair
3	Valve stems tending to seize	Replace
4	Broken or weakened valve spring	Replace
5	Piston rings seized in grooves or broken	Replace
6	Worn-pistons, rings or cylinders	Replace worn parts & as necessary rebore.

1	2	3
	7 Leaky cylinder head gasket	Replace
	Improperly timed ignition	
	1 Ignition timing out of adjustment	Adjust as prescribed
	2 Defective spark plug	Adjust the gap or replace
	3 Breaker point gap out of adjustment	Adjust or replace
	4 Leaky high-tension cords for some cylinders	Replace
	5 Distributor governor is not working correctly	Repair
	Fuel system out of order	
	1 Clogged carburettor	Disassemble & clean
	2 Defective fuel pump	Repair or replace
	3 Clogged fuel filter	Replace
	4 Choke wire working erratically	Adjust
	5 Float level out of adjustment	Adjust
	6 Clogged fuel pipe	Clean or replace
	7 Clogged fuel tank outlet	Clean
	8 Loose joint in fuel system	Retighten
	Abnormal condition in air intake system	
	1 Air cleaner dirty and clogged	Clean or replace
	2 Poor returning motion of choke valve	Repair, adjust or replace
	Clogged exhaust system	
	1 Muffler is clogged with carbon	Clean
	Overheating tendency or engine	
	1 (Refer to the section entitled "overheating")	
	Others	
	1 Dragging brakes	Adjust as prescribed
	2 Slipping clutch	Adjust or replace

1	2	3
Sudden drop of speed in high speed cruise	<p>Abnormal condition in electrical systems</p> <ol style="list-style-type: none"> 1. Breaker contact point gap too large 2. Spark plug gap too large 3. Cracked rotor or cap in distributor, resulting in leakage 4. Defective condenser 5. Deteriorated ignition coil, or crack resulting in leakage 6. Leaky high-tension cords 7. Ignition timing out of adjustment <p>Abnormal condition in fuel system</p> <ol style="list-style-type: none"> 1. Float level set too low 2. Clogged condition of main jet circuit in carburettor 3. Inadequately discharging fuel Pump <p>Abnormal condition in engine</p> <ol style="list-style-type: none"> 1. Loss of compression pressure due to leaky cylinder head gasket 2. Compression pressure too low because of worn low because of worn pistons, rings, cylinders or burnt valves 	<p>Adjust as prescribed</p> <p>Adjust as prescribed</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Replace</p> <p>Adjust as prescribed</p> <p>Adjust as prescribed</p> <p>Clean</p> <p>Replace</p> <p>replace</p> <p>Replace and as necessary rebore</p>
Engine not responding quickly to pedal control in picking up speed	<p>Abnormal condition in electrical system</p> <ol style="list-style-type: none"> 1. Ignition timing out of adjustment 2. Defective spark plug, or plug gap out of adjustment 3. Leaky high tension cords for some cylinder 4. Breaker contact points out of adjustment or defective 	<p>Adjust as prescribed</p> <p>Replace, or adjust as prescribed</p> <p>Replace</p> <p>Adjust as</p>

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1	2	3
	5. Defective condenser	Replace
	Abnormal condition in fuel system	
	1. Float level too low or too high	Adjust as prescribed
	2. Clogged jets in carburettor	Clean
	3. Air cleaner is dirty and clogged	Clean or replace
	Abnormal condition in engine	
	1. Exhaust ports dirty with carbon	Clean
	2. Muffler clogged with carbon	Clean
	3. Compression pressure too low	Replace worn running parts, or rebore
	4. Poorly seating valves	Repair
	5. Valve clearance out of adjustment	Adjust as prescribed
	6. Pistons tending to seize	Replace and as necessary rebor
	7. Bearings tending to seize	Replace
Erratic idling	Abnormal condition in ignition system	
	1. Ignition timing out of adjustment	Adjust as prescribed
	2. Defective spark plug or plug gap too large	Replace or adjust
	3. Cracked cap in distributor, there being leaking inside	
	4. Leaky high-tension cords	Replace
	5. Cracked rotor in distributor, there being leakage inside	replace
	Abnormal condition in fuel system	
	1. carburettor idling adjustment is disturbed	Adjust as prescribed
	2. Clogged pilot jet in carburettor	Clean
	3. Float level out of adjustment	Adjust as prescribed
	4. Air cleaner is dirty and clogged	Clean or replace.

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1	2	3
5	Air is being sucked in due to loose joints or broken parts	Retighten or replace
6	Broken carburetor packings	
Abnormal condition in engine.		
1	Exhaust ports clogged with carbon.	Clean
2	Valve clearance out of adjustment	Adjust as prescribed
3	Poorly seating valves	Repair
4	Blown cylinder head gasket	Replace
Abnormal detonation	Abnormal condition in ignition system	
1	Spark plugs are tending to overheat.	Change plug heat valve.
2	Ignition timing out of adjustment.	Adjust as prescribed
3	Defective breaker contact point.	Replace
4	Loose connection in high-tension or low-tension circuit.	Retighten
Abnormal condition in fuel system		
1	Air-fuel mixture too lean.	Clean and adjust
2	Carburetor is dirty inside.	Clean
3	Float level out of adjustment.	Adjust as prescribed
4	Water inside carburettor.	Clean
5	Air is leaking in through inlet manifold joint.	Retighten
Abnormal condition in engine		
1	Excessive carbon deposit on piston crowns or sylinder head.	Clean
2	Blown cylinder head gasket, resulting in low compression pressure.	Replace
3	Valve clearance out of adjustment.	Adjust as prescribed
4	Valves tending to seize.	Replace
5	Weakened valve springs.	Replace

1	2	3
Overheating	Abnormal condition in ignition system	
	1	Lenition timing out of adjustment. Adjust as prescribe
	2	Wrong heat valve of spark plugs. Change heat value
	3	Breaker point gap out of adjustment in distributor Adjust as prescribe
	Abnormal condition in fuel and exhaust systems.	
	1	Float level set too low. Adjust as prescribe
	2	Clogged jets in carburettor. Clean
	3	Loose inlet manifold. Retighten
	4	Clogged exhaust ports. Clean
	Abnormal condition in cooling system.	
	1	Not enough coolant. Refill
	2	Loose or broken fan belt. Adjust or replace
	3	Erratically working thermostat. Replace
	4	Poor water pump performance. Replace
	5	Leaky mediator cores. Repair or replace
	Abnormal condition in lubrication system.	
	1	Clogged oil filter. Replace
	2	Clogged oil strainer Clean
	3	Deteriorated oil pump performance Replace
	4	Oil leakage from oil pan or pump. Repair
	5	Wrong kind of lubrication oil. Change
	6	Not enough oil in oil pan Replenish
	Others	
	1	Dragging brakes Adjust
	2	Slipping clutch Adjust or replace
	3	Blown cylinder head gasket Replace
Abnormal Engine noise	Crankshaft noise	
	1	Worn-down bearings resulting in excessively large running clearances Replace
	2	Worn connecting rod boarding Replace

1	2	3
3	Distorted connecting rods	Repair or replace
4	Worn crankshaft journals.	Repair by grinding, or replace crankshaft
5	Worn crankpins.	- do -
Noise due to pistons, rings, pins or cylinders.		
1	Abnormally worn bores of cylinders	Rebore to next oversize or replace.
2	Worn pistons, rings or pins.	Replace and as necessary reboare to next oversize.
3	Pistons tending to seize.	Replace
4	Broken piston rings	Replace
Others		
1	Excessively large camshaft thrust play.	Replace
2	Excessively large crank shaft thrust clearance.	Adjust as prescribed
3	Valve clearance too large.	- do -
4	Not enough engine oil	Replenish.
High fuel consumption	Abnormal condition in ignition system.	
1	Ignition timing out of adjustment.	Adjust as prescribed
2	Leaky high-tension cords.	Replace
3	Breaker point gap maladjusted	Adjust or replace
4	Wrong heat value of spark plugs.	Change heat value
5	Cracked distributor cap or rotor.	Replace
Abnormal condition in fuel system.		
1	Float level set too high.	Adjust as prescribed
2	Fuel leakage from tank, pipe or carburettor.	Repair or replace
3	Erratic returning action of choke valve.	Repair or adjusted
4	Pilot screw set incorrectly.	Adjust as prescribed
5	Clogged breather in carburettor	Clean
6	Air cleaner is dirty and clogged.	

1	2	3
Abnormal condition in engine.		
1	Leakage of combustion gases from cylinder head.	Retighten or replace head gasket
2	Valve seating poorly	Repair
3	Valve clearance out of adjustment	Adjust as prescribed
Others		
1	Dragging brakes	Adjust as prescribed
2	Slipping clutch	Adjust or replace
Excessive engine oil consumption	Oil leakage	
1	Oil drain plugs loose.	Retighten
2	Loose oil pan securing bolts.	Retighten
3	Broken oil pan gasket.	Replace
4	Leaky oil seals.	Replace
5	Brown cylinder head gasket.	Replace
6	Oil filteralpositioned or loose.	Set the pump right or retighten mounting bolts
"Oil punping"(Oil finding its way into combustion chambers.)		
1	Oil ring are worn or broken.	Replace
2	Piston ring end gaps are not staggered as prescribed.	Reposition rings
3	Badly worn ring grooves.	Replace piston
4	Worn piston or cylinders.	Replace pistons and as necessary rebore
Oil leakage along valve stems.		
1	Defective valve from stem oil seals.	Replace
2	Badly worn valves or valve guide bushes.	Replace
Carburettor		
Fuel overflow from carburettor	1	Float valve is worn or dirty with foreign matter.
	2	Float is ruptured and contains some fuel.

1	2	3	
	3	Broken or otherwise defective gasket	Replace
	4	Loose float chamber securing screws	Retighten
	5	Fuel pump discharge pressure too high	Repair, eliminating any contact
Exhaust and Muffler			
Poor muffling performance	1	Loose exhaust pipe connection.	Retighten
	2	Broken muffler gasket.	Replace
	3	Broken manifold, pipe or muffler	Repair or replace
	4	Exhaust manifold loose in place	Retighten
	5	Interface between body and muffler	Repair, eliminating any contact.
Clutch			
Slipping clutch	1	Lose of clearance at the tip or release fork	Adjust as prescribed.
	2	Clutch facings dirty with oil.	- do -
	3	Clutch facings excessively worn.	- do -
	4	Weakened diaphragm spring	- do -
	5	Distorted pressure plate or flywheel surface.	- do -
	6	Not enough play or clutch pedal	Adjust and as necessary replace clutch facings.
Dragging clutch	1	Excessive clutch pedal play.	Replace
	2	Weakened diaphragm spring on worn spring tip.	- do -
	3	Damaged or worn splines of transmission input shaft.	- do -
	4	Front input shaft bearing worn or broken	- do -
	5	Excessively wobbly clutch disc.	- do -
	6	Clutch facings broken or dirty with oil	- do -

1	2	3	
Clutch vibration	1	Glazed (glass like) clutch facings	Repair or replace
	2	Clutch facings dirty with oil	Replace
	3	Wobbly clutch disc, or poor facing contact	Replace
	4	Weakened torsion springs (In clutch disc)	Replace
	5	Clutch disc rivets loose.	Replace the disc
	6	Distorted pressure plate or flywheel surface.	Replace
	7	Weakened engine mounts (cushion pads)	Replace Retighten or replace
Noisy clutch	1	Worn or broken release (throw-out bearing).	Replace
	2	Front input shaft bearing worn down	- do -
	3	Excessive rattle of clutch disc hub.	- do -
	4	Cracked clutch disc.	- do -
	5	Pressure plate ⁴ and diaphragm spring are rattling.	- do -
Grabbing clutch	1	Clutch facings are soaked with oil	- do -
	2	Clutch facings are excessively worn.	- do -
	3	Rivet heads are showing out the facing.	- do -
	4	Torsion springs are weakened	- do -
<u>Transmission</u>			
Gears slipping out of mesh	1	Distorted shift rod.	Repair or replace
	2	Worn shift fork shaft.	Replace
	3	Worn locating steel balls.	- do -
	4	Weakened springs for locating stool balls.	- do -
	5	Worn shift fork.	- do -
	6	Excessive rattle in thrust direction of gears	- do -

1	2	3
	7 Worn ring or hub in synchronizers	Replace
	8 Worn bearings of input shaft, main shaft or countershaft	- do -
	1 Weakened or broken synchronizer springs	- do -
	2 Worn inner groove of synchronizer ring.	- do -
	3 Synchronizer ring is seized on the cone.	Replace the ring
	4 Distorted shift fork shaft or shift fork.	Replace
	5 Worn shift fork	- do -
Excessive gear noise	1 Not enough oil in transmission.	Replenish
	2 Defective synchronizer.	Replace
	3 Gears ratting in thrust direction.	- do -
	4 Broken or worn bearings.	- do -
	1 Clutch pedal play to large resulting in "dragging clutch".	Adjust as prescribed
	2 Clutch disc facings are worn.	Replace
	3 Clutch disc facings are dirty with oil.	- do -
	4 Distorted or unevenly worn shift fork shaft.	- do -
	5 Broken locating balls	- do -
	6 Worn synchronizer sleeve	- do -
	7 Worn synchronizer hub	- do -
Differentials		
Breakage (case, gears bearings, etc.)	1 Insufficient or wrong kind of gear oil.	Replenish or change oil.
	2 Improperly shimmed side bearings or pinion bearings.	Adjust as prescribed
	3 Improper mesh of drive pinion with ring gear.	Adjust or replace
	4 Excessive backlash due to worn side gear thrust washer and pinion thrust washer.	- do -
	5 Distorted rear axle housing.	Replace
	6 Loose bolts securing ring gear.	- do -

1	2	3	
Gear noise	1	Maladjusted backlash between drive pinion and ring gear.	Adjust as prescribed
	2	Damaged gear tooth or improper mesh of drive pinion and ring gear	Replace or adjust.
	3	Improper tooth contact in the mesh between drive pinion and ring gear.	Adjust as prescribed
	4	Insufficient or wrong kind or gear oil.	Replenish or replace.
	5	Ring gear wobbles when truning or ring gear securing bolts are loose.	Replace or retighten
	6	Broken or otherwise damaged teeth of side gears or deferential pinion gears	Replace
Bearing noise	1	(Constant noise) insufficient or wrong kind of gear oil.	Replenish or change
	2	(Constant noise) Damaged or worn bearings or borne parts.	Replace
	3	(Noise during coasting) Damaged bearings of rear drive pinion.	Replace
	4	(Noise during turning) Broken bearings on axle shafts.	Replace
Propeller shafts			
Vibration and noise	1	Broken or worn bearings of universal joint spider.	Replace
	2	Distorted propeller shaft.	Replace
	3	Unbalanced propeller shaft.	Replace
	4	Loose propeller shaft	Retighten
Noise occurring at standing start or during coasting	1	Worn or damaged universal joint.	Replace
	2	Worn propeller shaft splines, due to lack of lubrication	Replace
	3	Loose propeller shaft.	Retighten
	4	Loose flanged yoke universal joint	Retighten

1	2	3	
<u>Brakes</u>			
Not enough braking force	1	Brake oil leakage from brake lines.	Locate the leaking point & repair.
	2	Drum-to-shoe clearance out of adjustment.	Adjust as prescribed
	3	Overheated brakes	Determine the cause of overheating and repair.
	4	Poor contact of shoes on brake drum.	Adjust for proper contact.
	5	Brake shoes stained with oil or wet with water.	Replace
	6	Badly worn brake shoe lining	Replace
Uneven braking (Brakes not working in unison)	1	Shoe linings are wet with waster or stained with oil in some brakes.	Clean or replace
	2	Drum-to-shoe clearance out of adjustment in some brakes	Adjust as Prescribed
	3	Drum is not of round in some brakes.	Replace
	4	Wheel tires are inflated unequally.	Inflate equally
	5	Defective wheel cylinders	Repair or replace
	6	Disturbed front wheel alignment.	Adjust as prescribed
Pedal stroke too large	1	Drum-to-shoe clearance out of adjustment	Adjust as prescribed.
	2	Air trapped in the brake circuit.	Blood air out as prescribed.
	3	Brake pedal improperly adjusted	Adjust as prescribed
	4	Brake oil leakage.	Locate the leaking point & repair.
	5	Not enough oil in the brake fluid reservoir.	Replenish
	6	Excessively worn brake drums.	Replace
	7	Distorted or poorly contacting brake shoes.	Repair or replace
	8	Defective cup in master cylinder	Replace
	9	Worn brake shoes.	Replace

1	2	3	
Dragging brake	1	Clogged return port in master cylinder,	Clear
	2	Brake shoes improperly mounted on backing plate.	Repair
	3	Weakened or broken return springs in the brake.	Replace
	4	Defective wheel cylinders.	Repair or replace
	5	Sluggish parking-brake cables or linkage.	Repair or replace
	6	Brake shoes improperly adjusted.	Adjust as prescribed
Pedal Pulsation	1	Damaged or out of round brake drums.	Replace
	2	Damaged wheel bearings.	Replace
	3	Distorted steering knuckle or rear axle shafts.	Replace
Braking noise	1	Glazed shoe linings or foreign matters stuck to linings.	Repair or replace
	2	Worn or loose shoe linings.	Replace
	3	Broken front wheel bearings.	Replace
	4	Distorted or loose backing plates	Replace or retighten securing bolts.
<u>Front suspension & steering system</u>			
Hard steering	1	Wheel tyres not adequately inflated.	Adjust the pressure
	2	The rod ends tending to seize.	Replace
	3	Linkage connections tending to seize.	Repair or replace
	4	Steering gearbox out of adjustment.	Adjust as prescribed
	5	Unevenly worn steering shaft bush.	Replace
	6	Poorly lubricated or worn joints in linkage.	Lubricate or replace
	7	Disturbed front wheel alignment.	Adjust as prescribed

1	2	3
Wobbly steering wheel	1 Wheel tyres inflated unequally.	Adjust the pressure.
	2 Wobbly wheels	Repair or replace
	3 Large difference in tire diameter between right and left wheels.	Replace
	4 Loose hub nuts.	Retighten
	5 Damaged or worn wheel bearings.	Replace
	6 Worn or loose tie rod ends.	Replace or retighten
	7 Steering gear box out of adjustment.	Adjust as proscribed
	8 Steering gearbox mounted loose.	Retighten
	9 Worn steering center lever.	Replace
	10 Worn steering knuckle oil seal.	Replace
Steering wheel pulling to one side	1 Unevenly worn wheel tyres	Replace
	2 Brake dragging in one road wheel	Repair
	3 Wheel/tyres unequally inflated	Adjust the pressure
	4 Worn or distorted link roads.	Replace
	5 Disturbed front wheel alignment.	Adjust as prescribed
Shocks coming to steering wheel	1 Tire inflating pressure too high.	Reduce the specification
	2 Poor shock absorber performance.	Replace
	3 Differences in diameter of tyres among the four road wheels.	Adjust
	4 Worn steering linkage connections.	Replace
	5 Worn or broken front wheel bearings.	Replace
	6 Loose front wheel.	Retighten
	7 Steering wheel loose in place	Retighten the nut

1	2	3
Rapid wear or uneven wear of wheels tyres	1 Wheel tyres improperly inflated.	Adjust the prossure.
	2 Differences in diameter among the four tyres.	Adjust or replace.
	3 Worn or loose road wheel bearings.	Replace.
	4 Wobbly wheel tyres.	Repair or replace
	5 Wheel tyre improperly "rotated" to result in un balance.	Adjust
	6 Disturbed front wheel alignment.	Adjust as prescribed
Steering noise	1 Loose bolts and nuts.	Retighten
	2 Loose loaf spring seats.	Retighten
	3 Broken or otherwise damaged wheel bearings.	Replace
	4 Worn or sticky tie rod ends.	Replace
	5 Linkage joints needing grease.	Lubricate or replace.
<u>Starting Motor</u>		
Starter runs but pinion will not mesh into ring gear.	1 Magnetic Switch not working.	
	2 Worn pinion of starter clutch.	
	3 Defective splines resulting in sticky pinion plugging motion.	
	4 Worn bush.	
	5 Wrong pinion plunging position.	
	6 Worn teeth of ring gear.	
Starter will not run at all, or run but runs slow to crank with full force.	Battery trouble.	
	1 Poor contact in battery terminal connection.	Repair or retighten
	2 Loose grounding cable connection.	Retighten
	3 Battery run down.	Recharge.
4 Battery voltage too low due to battery deterioration.	Replace	

1	2	3
	Ignition switch trouble	
	1 Poor contacting action.	Replace
	2 Lead wire socket loose in place	Retighten
	3 Open-circuit between ignition switch and magnet switch.	Repair
	Magnet switch trouble.	
	1 Lead wire socket loose in place.	Retighten
	2 Burnt contact, plate or poor contacting action.	Replace
	3 Open-circuit in pull-in coil.	Replace
	4 Open circuit in holding coil.	Replace
	Starter proper trouble.	
	1 Brushes are seating poorly or worn down.	Repair or replace
	2 Burnt commutator.	Repair or Replace
	3 Open-circuit in armature winding.	Replace
	4. Worn-down starter.	Replace
Starter does not stop running.	1 Fused contact points of magnet-switch contact plate.	Repair or replace
	2 Short-circuit between coil (layer short-circuit)	Replace
	3 Failure of returning action in ignition switch.	Replace
Alternator		
Battery quickly becomes over-discharged	1 Loose or broken "V" belt.	Adjust or replace
	2 Open-circuit in stator winding.	Repair or replace
	3 Open-circuit in rotor winding.	Repair or replace
	4 Excessively worn slip ring brushes.	Replace
	5 Weakened brush springs.	Replace

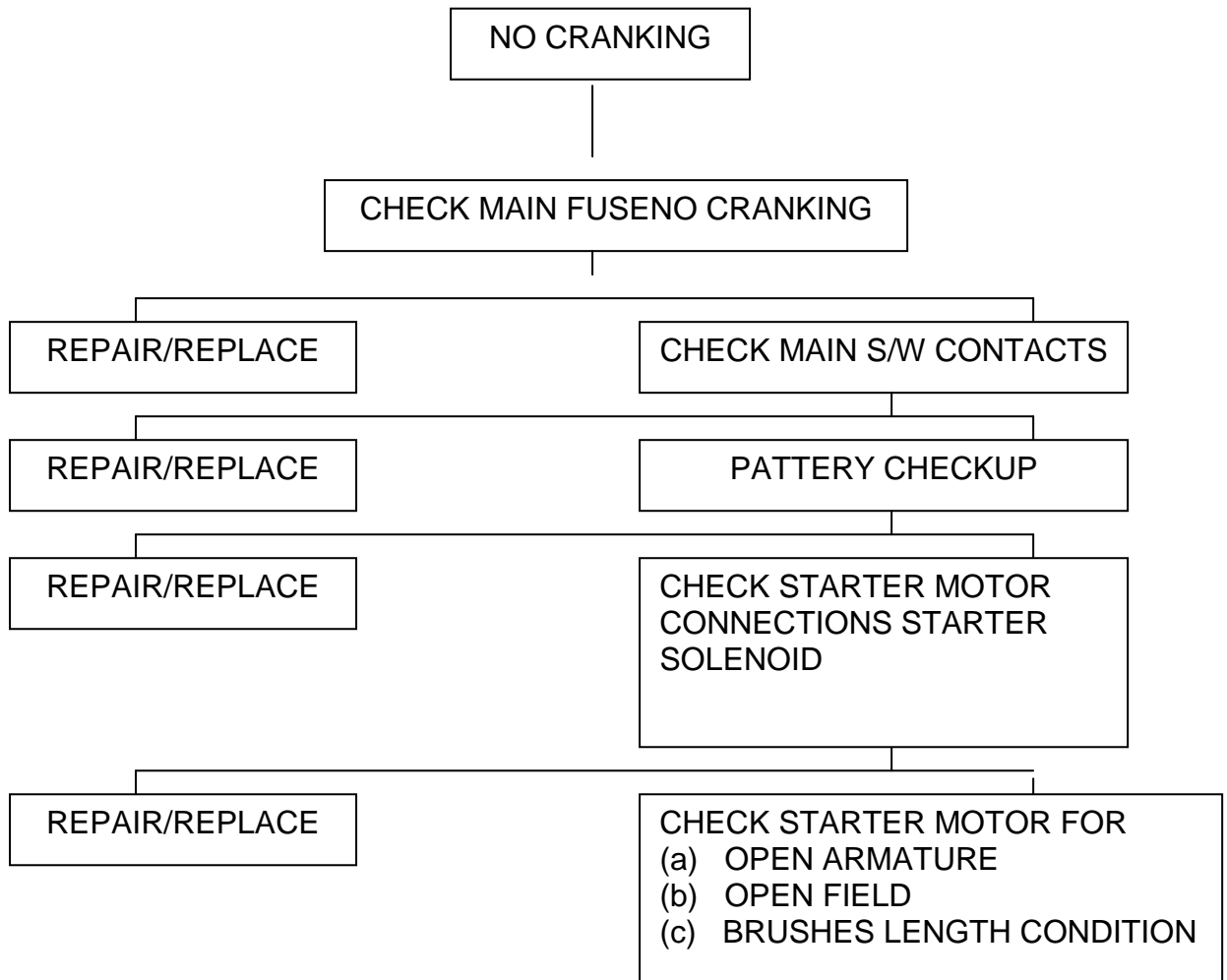
1	2	3
	6 Regulator setting too low (Regulated voltage too low)	Adjust as prescribed
	7 Poor contacting action of low speed point in regulator.	Adjust as prescribed
	8 Fused high-speed contact point in regulator.	Repair pr replace
	9 Improper acid concentration or low level of battery electrolyte.	Replace or replenish
	10 Defective battery cell plates	Replace the battery
	11 Insufficient contact in battery terminal connection	Clean and retighten
	12 Open-circuit between two "F" terminals(one of regulator and the other one alternator or high resistance	Repair
	13 Excessive electrical load	Advise the user to economise
Battery tends to become overcharged	1 Regulated voltage set too high	Adjust as prescribed
	2 Poorly grounded "E" terminal of regulator	Repair
	3 Open-circuit in voltage-regulator pressure coil	Replace
	4 Fused low-speed point of regulator	Repair or replace
	5 Poor contacting action of high-speed point of regulator	Repair or replace
	6 Open-circuit or high resistance between twp "N" terminals (one on alternator and the other on regulator)	Repair
Alternator noise	1 Worn, loose or otherwise defective bearings	Replace
Wiper Motor		
Wiper will not run	1 Fuse is set loose or blown off	Tighten or replace
	2 Incomplete metal-to-metal contact in connector	Repair
	3 Worm or floating brushes	Replace or repair

1	2	3
	4 Dirty or burnt commutator	Repair or replace
	5 Short-circuited or fused field coil	Repair or replace
	6 Loose terminal connection on wiper switch	Repair or replace
Wiper will not stop running	1 Defective wiper switch	Repair or replace
Wiper stops at wrong position	1 Improper wiper arm setting.	Repair
	2 Cover plate incorrectly positioned in place	Repair
Poor wiping action	1 Insufficient pressure or wiper arm.	Replace
	2 Deteriorated or hardened blade	Replace
	3 Blade improperly set	Repair or replace
	4 Windshield dirty with oil.	Clean
Fuel Meter		
Faulty meter indication	1 Incomplete metal-to-metal contact in terminal connections	Retighten
	2 Defective receiver gauge due to burnt point or deformed bimetal element	Replace
	3 Erratic float movement.	Repair or replace
	4 Defective grounding (for float and gauge)	Repair
No indication	1 Open-circuit	Repair
	2 Open-circuit heat wire	Replace
	3 Burnt point	Replace
	4 Deformed bimetal element.	Replace
	5 Open-circuited resistor	Replace
<u>Turn signal</u>		
<u>Lamps</u>		
Flashing frequency is higher on one side, or flashing occurs only on one side right or left	1. Lamps are imperfectly grounded.	Repair
	2 Lamps of wrong watt ratings are used.	Replace
	3. One of the lamp bulbs is blown on right or left side or on front or rear side.	Replace

1	2	3
	4 Defective turn signal relay.	Replace
	5 Open-circuit or high resistance between switch and lamps	Repair
No flashing on occurs on both sides, right & left	1 Blown fuse in turn signal circuit.	Replace
	2 Open-circuit or high resistance between battery and switch.	Repair
	3 Defective turn signal replay.	Replace
Flashing frequency is too low, or no flashing occurs on both sides	1 Lamps of a smaller watt rating than the specification rating are used.	Replace
	2 One of the lamps on right or left side or on front or rear side is poorly grounded.	Repair
	3 Supply voltage is too low.	Recharge the battery.
	4 Fuse set loose in place resulting in connector.	Repair
	5 Incomplete metal-to metal contact in connector.	Replace
	6 Defective turn signal relay	Replace
Flashing frequency is too high.	1. Lamps of a larger wattage than the specification are used.	Replace
	2 Defective flasher	Replace
<u>Speedometer</u>		
Faulty indication	1 Damaged speedometer drive or driven gear.	Replace
	2. Defective drive cable.	Replace
	3 Drive cable incompletely or improperly attached into the meter.	Set right
	4 Defective speedometer	Replace
Speedometer noise	1 Inadequately lubricated or defective cable	Lubricate or replace.
	2 Not enough oil in transfer	Replenish.

1	2	3	
<u>Water Temperature Meter</u>			
Faulty indication	1	Incomplete metal-to-metal contact in terminal connections,	Repair & tighten
	2	Receiver gauge defective (due to burnt point or deformed bimetal element)	Replace
	3	Defective temperature gauge	Replace
No indication	1	Open-circuit.	Repair
	2	Defective receiver gauge (Open-circuited heat wire deformed bimetal element or pointer)	Replace
	3	Defective temperature gauge	Replace
Oil pressure warning lamp			
Turning ignition switch (for engine starting) does not light this lamp.	1.	Lamp bulb is blown.	Replace
	2	Blown-off fuse.	Replace
	3	Defective oil pressure switch.	Replace
	4	Open-circuit between lamp and ignition switch.	Repair
	5	Open-circuit between lamp and pressure switch	Repair
Lamp remains burning even after engine starts up	1	Not enough oil in engine oil pan.	Replenish
	2	Oil pressure too low.	Repair or replace the pump.
	3	Defective oil pressure switch.	Replace.

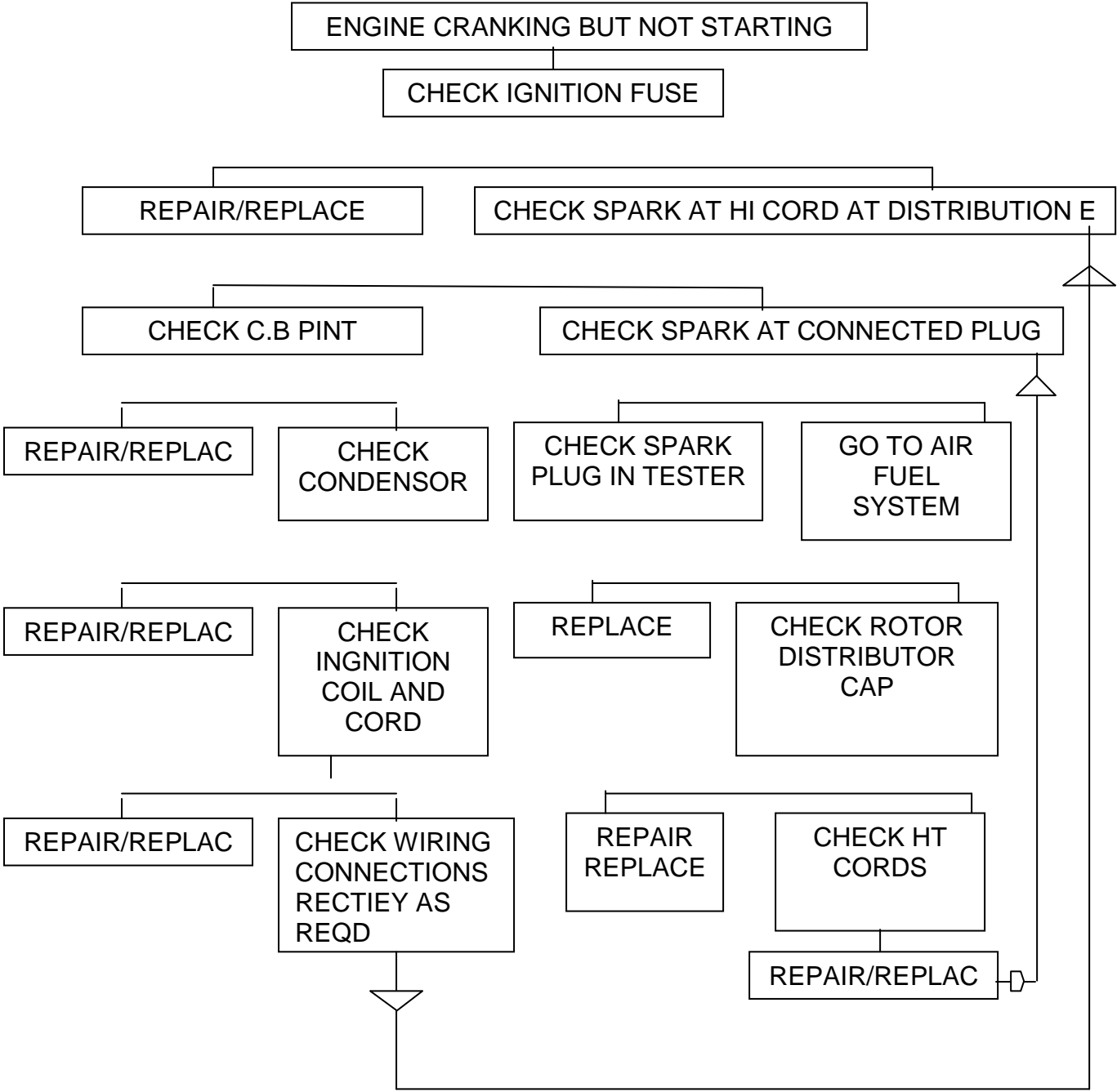
STARTER SYSTEM (TROUBLE SHOOTING)
GYPSY 410 4WD



OK

NOT OK I

Ignition system (trouble shooting)



APPENDIX 'B' TO GRI NO 145

GYPSY 410 4WD

SPECIFICATION

<u>DIMENSIONS</u>		<u>TRANSMISSION</u>	
Overall length	401 Omm	Clutch type	Dry single disc
Overall width	146 Omm	Transmission type	4 forward all Synchromesh, 1-reverse
Overall height	191 Omm		
Wheel base	2375 mm	Transfer gear box	2-speed constantmesh
Tread, front	121 Omm	Final reduction ration	4,111
Rear	122 Omm	Gear ratios	
Load deck size		First	3.138
Length	145 Omm	2 nd	1.947
Width	81 Omm	3 rd	1.423
Height	122 Omm	Fourth	1.000
Ground clearance	220 mm	Reverse	3.4666
Weight		Transfer gear ratios	
Curb weight	915 Kg	Low range	2.511
Weight distribution		High range	1.580
Front	470 Kg	Wheel and Suspension Tyre size, front & rear tyre pressure	F78-15
Rear	445 Kg	Front	1.40 kg/cm ²
Gross veh weight	1350 Kg	Rear	1.40 kg/cm ² unloaded 1.80 kg/cm (loaded)
Engine Type	Four-stroke cycle water- cooled OHC	Suspension type front & rear	Leaf spring
Number of cylinders	4		
Lubrication system	Wet sump		
Bore	65.5 mm	Steering	
Stroke	72. Omm	Turning radius	5.7m
Piston displacement	970om	Steering gear box	Ball & nut type
Compression ratio	8.8:1	Toe in	2-6mm
Carburetor	Single-barrel type	Camber angle	1 ⁰⁰ '
Air cleaner	Dry type with non- woven fabric element	Caster angle	2 ⁰³⁰ '
		King pin angle	9 ⁰⁰⁰ '
		Trail	13mm

DIMENSIONS		TRANSMISSION	
ELECTRICAL		BRAKE SYSTEM	
Lenition timing	10 B.T.D.C. at 850 RPM	Type	4 wheel hydraulic
		Wheel brake front	Disc brake rear
			Drum brake (leading & trailing)
Standard spark Plug	MICO W8DC		
Starter	Solenoid shift type		
Generator	Alternator	Parking brake	Internal expanding on propeller shaft
Battery	12V 30AH/ 20HR		
Main fuse	Fusible Link (0.5mm)		
Fuse box	10/10/10/15/ 15/ 15/ 15/15/10	CAPACITIES	
Headlight	12V, 50/40W	Cooling solution	4.0L
Tum signal light	12V,21W	Fuel tank	40L
Side turn signal	12V,5W	Engine oil	3.2L
Clearing light	12V,5W	Transmission oil	1.3L
Tail/brake light	12V,5W	Transfer gear box oil	0.8L
Idcence plate light	12V,5W	Differential gear oil	
Back-up light	12V,21W	Front	1.5L
Interior light	12V,5W	Rear	1.3L
Metor pilot light	12V,3.4W		

TECHNICAL DATA

Item	Standard	Service limit
1	2	3
ENGINE		
Compression pressure	13.5kg/cm ² at 300 RMP	12.0kg/cm ² at 300 RMP.
C.P. differences between 2 cyls		1.0KG/CM ² at 300 RPH
Valve clearance (Inlet & Exhaust) :-		
- do - Cold	0.13 – 018mm	
- do - Hot	0.23 – 0.28mm	
Flatness of gasketed surface	-	0.85mm
Flatness of manifold seat (Inlet)		0.1mm
- do - (outlet)		0.1mm

1	2	3
Valve seat seating width (inlet)	1.3-1.5mm	
- do (exhaust)	1.3-1.5mm	
Seating angle	45 ⁰	
Valve guide hole diameter (index) (Oversized)	12'030-12.048mm	
Camshaft/Journal clearance	0.050-0.091mm	0.15mm
Chamshaft thrust clearance	0.50-0.150mm	0.30mm
Valve stem diameter inlet	6.965-6.980mm	
- do - exhaust	6.955-6.970mm	
Valve guide inlet	7.000-7.015mm	
Exhaust	7.000-7.015mm	
Valve guide to valve stem Clearances (Inlet)	0.020-0.050mm	0.07mm
- do - Exhaust	0.030-0.060mm	0.09mm
Valve stem defection inlet		0.12mm
- do - Exhaust		0.16mm
Stook allowance of valve Stem and face		0.05
Valve head radial run out		0.03
Valve spring squareness		2.0
Valve guide protrusion (Index)		16.5mm
Thickness of valve head periphery Inlet	0.800-1.20mm	0.6mm
- do - exhaust	0.80-1.20mm	0.7mm
Contact width of valve and valve seat inlet	1.3-1.5mm	
- do - exhaust	1.3-1.5mm	
Valve spring free length inlet	48.9mm	47.6mm
- do - exhaust	48.9mm	47.6mm
Valve spring preload inlet	23.6-27.6kg for fitting length 40mm	
- do - exhaust	- do -	
Rocker shaft O.D	14.965-14.980mm	
Rocker azm I.D	14.985-15.005mm	
Rocker shaft defection/runout		0.06mm
Flatness of gaskeved surface		0.05mm
Cylinder bore (STD)	65.50-65.520mm	
Difference in bore between cyl		0.05mm
Wear limit in bore		0.05mm

1	2	3
Cylinder to piston clearance	0.045-0.055mm	
Piston diameter standard	65.460-65.475mm	
Over size .50mm	65.960-65.975mm	
Piston ring groove width topring	1.52-1.54mm	
2 nd ring	1.52-1.53mm	
Oil ring	2.81-2.83mm	
Piston pin diameter	15.995-16.000mm	
Piston pin clearance in con.rod	.003-.016mm	0.05mm
Piston ring thickness top ring	1.47-1.49mm	
2 nd ring	1.47-1.49mm	
Oil ring	0.45mm	
Ring clearance in groove top	0.03-0.07mm	0.12mm
2 nd	0.02-0.06mm	0.10mm
Piston ring end gap top ring	0.15-0.35mm	0.7mm
2 nd ring	0.10-0.30mm	0.7mm
Oil ring	0.30-0.90mm	0.8mm
Crank shaft runout/deflection middle		0.06mm
Crank Pin diameter	37.985-38.000mm	
Crank pin clearance in con.rod	0.020-0.040mm	0.08mm
Connecting rod small end bore	16.003-16.011m	
Crank journal diameter	49.985-50.000mm	
Bearing to journal clearance	0.20-0.040mm	0.08mm
Crank pin out of round & taper		0.01mm
Crank journal out of round & tapper		0.01mm
Fly wheel run out		0.2mm
Crank shaft thrust play	0.13-0.28mm	0.3mm
Connecting rod big end side clearance	0.10-0.20mm	0.30mm
Connecting rod twist		0.10mm
-do- Bow		0.054mm
Oil pump side clearance (flatness)	0.17mm	
Radial clearance outer gear and case	0.30mm	

1	2	3
<u>IGNITION SYSTEM</u>		
Ignition order	1-3-4-2	
Breaker point gap ND,PMP	0.4-0.5mm	
Cam dwell angle ND PMP	52 ⁰ ±3 ⁰	
Condenser capacitance	0.25 microfarad	
Ballast resistance	1.4±ohma at 25 ⁰ C	
High tension cord resistance	16±0.32k ohms/m	
Ignition coil, primary coil winding resistance (80 ⁰ C)	ANU 1.33±13 ohms at 20 ⁰ C LUCAS 1.21±.15 ohms at 30 ⁰ C	
Secondary coil winding Resistance	ANU 8.91k ohms at 17 ⁰ C LUCAS 8.45k ohms at 17 ⁰ C	
Spark plug gap	0.7-0.8bb	
<u>STARTER MOTOR</u>		
Voltage	12 volts	
Output	0.7KW	
Brush length SRF	10mm	6mm
Number of penion teeth	8	
Mica depth/undercut	0.4-0.6mm	0.2mm
Commutator diameter SRF	28mm	27mm
Commutator out of round SRF	0.5mm	0.3mm
	LUCAS 0.5mm or less	0.4mm
Brush Spring tension	1.0kg	1.0kg
<u>CLUTCH</u>		
Facing wear rivet head depth	1.2mm	0.5mm
Facing input shaft serration backlash		0.5mm
Clutch release arm play	2-4mm	
<u>TRANSMISSION</u>		
Key slot width of synchronizer king		
	Low 10.1mm	10.4mm
	2 nd 10.1mm	10.4mm
	3 rd & top 10.1mm	10.4mm

1	2	3
Clearance between gear & rings	1.0-1.4mm	0.7mm
Gear shift fork shaft spring free length	25.5mm	21.0mm
Gear back lash low & 2 nd	0.1mm	0.3mm
3 rd & top	0.1mm	0.3mm
reverse	0.1mm	0.3mm

TRANSFER

Rattle of sliding yoke in extension on case bush	0.025-0.89mm
Output shaft high gear back lash	0.1mm
Output shaft low gear back lash	0.1mm
Free length of locating spring	23.7mm
Side clearance of output Low gear and high gear	0.175-0.325mm

DIFFERENTIAL

Side gear back lash	0.05-0.10mm
Betel gear back lash	0.10-0.15mm
Steering system	
Camber	$1^{\circ} \pm 1^{\circ}$
Caster	$2^{\circ} 3' \pm 1^{\circ}$
King pin inclination	$9^{\circ} \pm 1^{\circ}$
Turning angle OUT	26°
IN	29°
	$\pm 3^{\circ}$

TORQUE ENGINE

Cylinder head bolt	:	45kg-cm
Breather plate bolt	:	100kg-cm
Rocker arm bolt	:	100kg-cm
Rocker shaft bolt	:	180kg-cm
Spark plug	:	250kg-cm
Distributor case bolt	:	180kg-cm
Cam shaft thrust plate bolt	:	100kg-cm
Distributor mounting bolt	:	200kg-cm

1	2	3
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ENGINE (contd)

Fuel Pump mounting bolt : 230kg-cm

Main fold rear cover bolt : 70kg-cm

Engine hanger mounting bolt : 230kg-cm

Thermostatic cap bolt : 150kg-cm

Water temp gauge : 120kg-cm

TRANSMISSION/GEAR BOX

Transmission case bolt : 230kg-cm

Transmission case assy mtg bolt : 550kg-cm

Input shaft bearing retainer bolt : 230kg-cm

Engine rear mounting : 230kg-cm

Extension case bolt : 230kg-cm

Shifting lever case bolt : 230kg-cm

Lever locating bolt : 170kg-cm

Reverse guide pin screw : 300kg-cm

Low speed guide pin screw : 55kg-cm