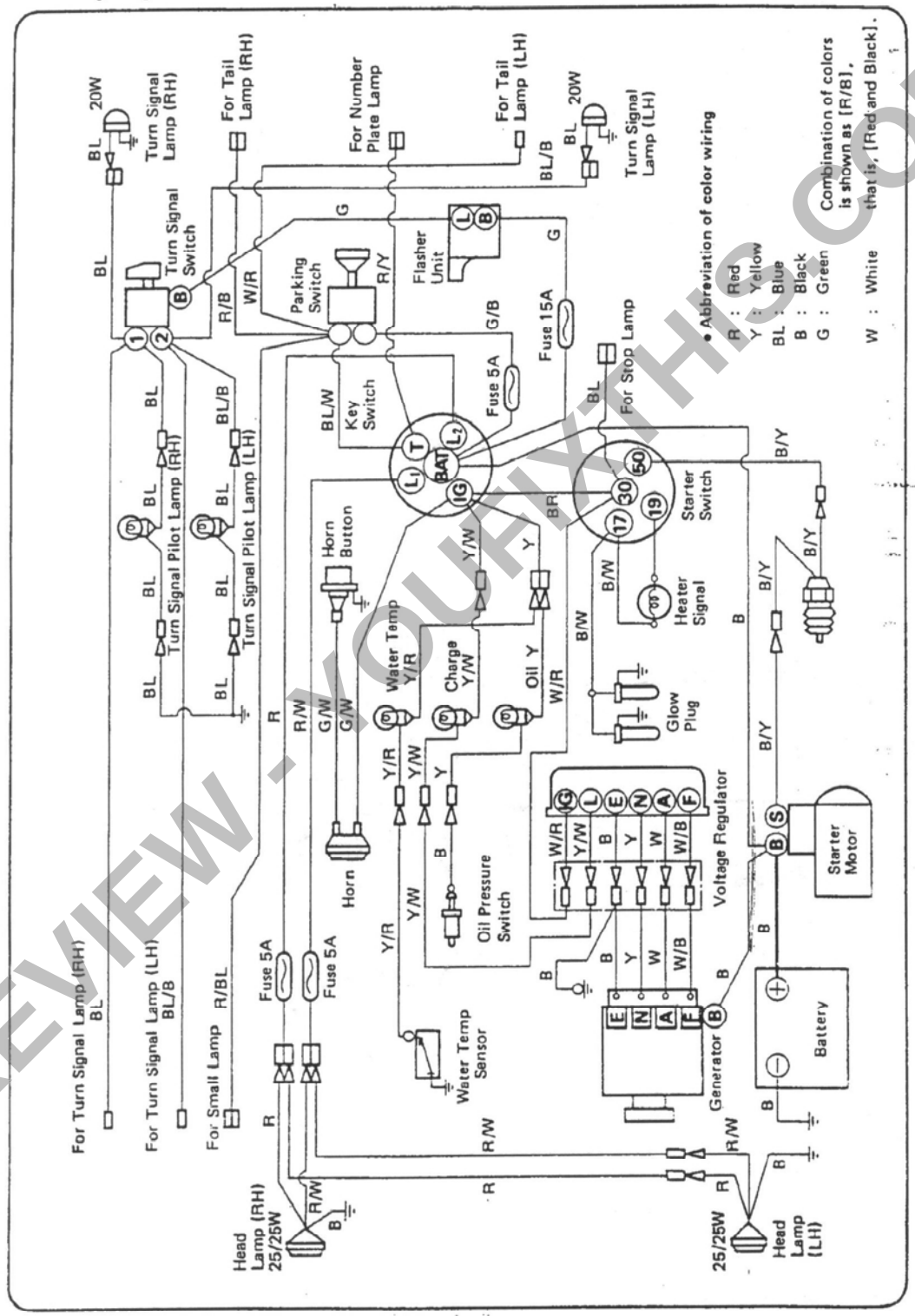
8) Electric Wiring

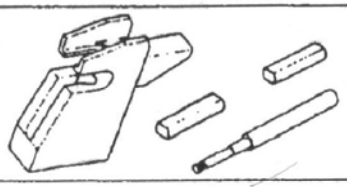
a) Electrical Wiring Diagram



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2. SPECIAL TOOLS

Tool No.	Tool Name	Sketch	Usage
MD998130	Piston pin setting tool		To remove and install the piston pins for KE55 and KE70. (Note) The guide (c) (ST332150) must be ordered separately for KE55.
ST33210-0	Bearing installer		To remove and install the main bearings for KE55, KE70 and KE75.

Two special tools are prepared to service the engine.

3. TIGHTENING TORQUE CHART

1) ENGINE

Tightening Part	Tightening Torque: ft-lbs (kg-m)
Cylinder head bolt	
KE55	80–87 (11–12)
KE70 and KE75	(11–12)
Nozzle holder mounting bolt	94–101 (13–14)
Nozzle holder body and retaining nut	11–15 (1.5–2)
For swirl chamber	58–72 (8–10)
For precombustion chamber	43–58 (6–8)
Glow plug	11–15 (1.5–2)
Connecting rod cap nut (KE55 and KE70)	23–25 (3.2–3.5)
Connecting rod cap bolt (KE75)	40–43 (5.5–6.0)
Flywheel mounting bolt	83–90 (11.5–12.5)
Oil drain plug	36–43 (5–6)
Oil filter	8 – 9 (1.1–1.3)
Standard Bolts and Nuts	
6mm thread	5 (0.7)
8mm thread	12 (1.7)
10mm thread	25 (3.5)
12mm thread	46 (6.4)
14mm thread	69 (9.5)

2) OTHER STANDARD BOLTS AND NUTS

	Tightening Torque: in-lbs (kg-cm)			
	4T Bolts and Nuts		9T Bolts and Nuts	7T Bolts and Nuts
M 5	26–34	(30–40)	52–60	(60–70)
M 6	52–69	(60–80)	87–113	(100–130)
M 8	113–156	(130–180)	217–303	(250–350)
M10	173–260	(200–300)	477–607	(550–700)
M12	434–520	(500–600)	781–954	(900–1100)
M14	607–694	(700–800)	1128–1302	(1300–1500)
M16	868–1041	(1000–1200)	1388–1562	(1600–1800)
M18	1041–1215	(1200–1400)	1739–2083	(2000–2400)
M20	1302–1475	(1500–1700)	2083–2256	(2400–2600)

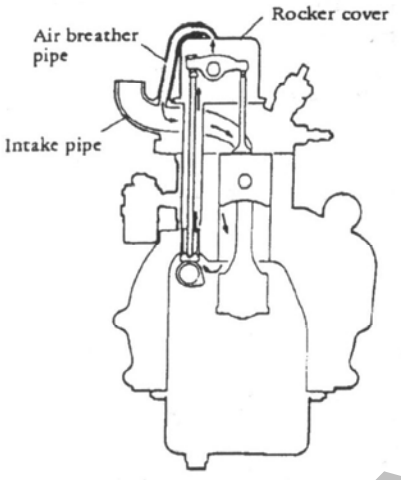
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arm mounting part around its shaft is processed by high frequency hardening.

- **Blow-by gas recirculation device**

The device will not allow the blow-by gas in the crankcase to discharge outside the engine.
The blow-by gas in the crankcase passes through tappet hole and push rod hole, and enters into the rocker cover. Then, it is intaken to the combustion chamber by way of air breather pipe and intake pipe to be burnt again.

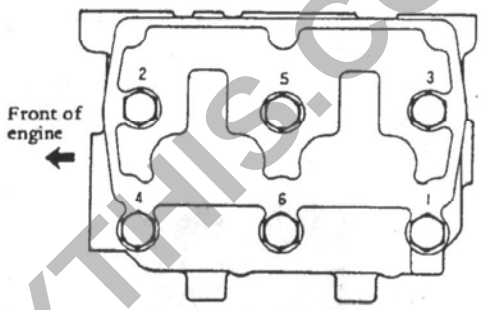


Blow-by Gas Recirculation Device

(2) Disassembly, assembly and adjustment of cylinder head

(a) Disassembly

1. Remove the air breather pipe.
2. Remove the intake pipe and muffler.
3. Remove the oil pipe from the cylinder head.
4. Remove the alternator brace mounting bolt from the cylinder head.
5. Remove the fuel return pipe.
6. Remove the fuel injection pipe from the nozzle holder.
7. Remove the rocker cover.
8. In accordance with the sequence of steps shown in the figure, loosen and take out the cylinder head bolts.
9. Take out the cylinder head assembly. Remove gasket and clean the crankcase top face.
10. Remove the nozzle holder assembly.
11. After removing the glow plug lead wire, take out the glow plug.
12. Loosening the rocker stay mounting bolts, remove the rocker shaft assembly.
13. Compress the valve spring using a valve lifter, take out the retainer, spring and valve.
    Removed parts must be kept separately for each cylinder from which they are removed.



Loosening Sequence of Cylinder Head Bolts

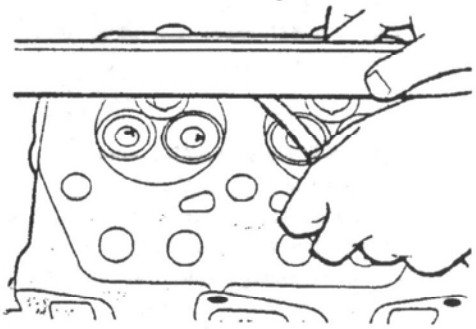
(b) Inspection

NOTES:

- *Before cleaning the cylinder head, check it for water leaks and damage.*
- *Before checking and servicing, thoroughly clean the parts to remove oil, water scale, carbon, dust and others.*
- *Using compressed air, clean the oil holes. Confirm that the hole is not clogged.*

- Cylinder head

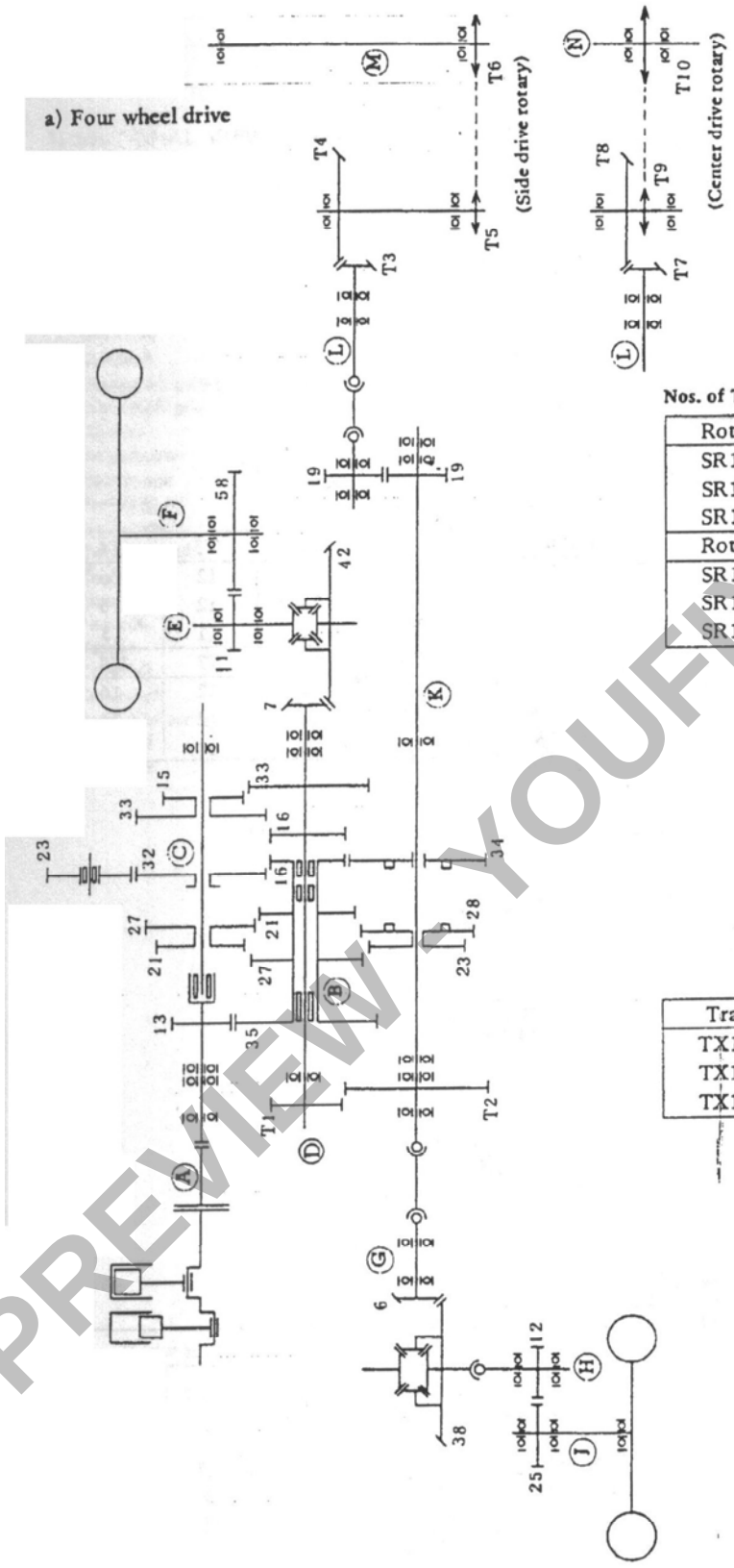
Before cleaning the cylinder head, check it for cracks, damage and water leaks.
Check the oil passages for clogging.
Distortion of cylinder head bottom face:
Using a straight edge and thickness gauge, check the distortion as shown in the figure.



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a) Four wheel drive



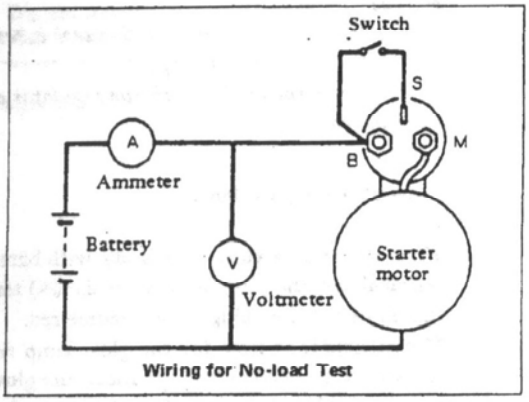
Nos. of Teeth on Rotary Gear

Rotary hoe	T3	T4	T5	T6
SR1000CD	13	29	12	16
SR1100CD	13	29	12	16
SR1200CD	13	29	11	15
Rotary hoe	T7	T8	T9	T10
SR1000N	14	32	12	16
SR1100N	14	32	12	16
SR1200N	14	31	11	15

Tractor	T1	T2
TX1000F	18	32
TX1300F	19	31
TX1500F	20	31

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Wiring for No-load Test

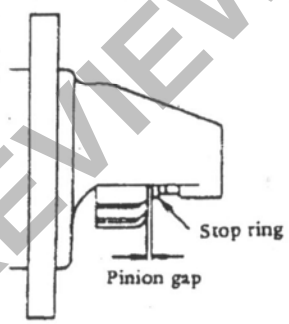
fied correct the cause of the problem following to the chart below.
When the brush is excessively worn, replace it with a new one.

Measure the pinion gap:

When connecting the magnetic switch S terminal and starter motor body with a battery, the pinion pops out and remains in that position. At this time,lightly push back the pinion to the side of the armature, and measure the clearance between the pinion and stop ring, as shown in the figure.

SYMPTOM	PROBABLE CAUSE
Excessive current and low speed	• No oil on bushing, or damagged bushing • Armature contacts with the pole piece • Armature coil grounds with the field coil • Short-circuit in armature coil
Excessive current and starter motor does not run	• Magnetic switch is grounded • Grounding of armature coil, field coil • Seizured bushing
No current, starter motor does not run	• Broken armature coil or field coil • Broken brush • Poor contact of brush with commutator
Low current	• Poor connection of field coil
Excessive current and high motor speed	• Short-circuit in field coil

Measuring Pinion Gap



NOTES:

- *When measuring the pinion gap, remove the connector on the M terminal.*
- *Assembly is the reverse order of disassembly. Pay attention to the following.*

Throughly clean the front bracket flange of the starter motor and the starter motor mounting face of the crankcase, to remove paint, oil and rust.

- Alternator

Connect ammeter, voltmeter, switches variable resistor and the battery. Then run the alternator with the motor to carry out preformance test of the alternator.

No-load test:
Run the alternator, and put on the switch (S_1). Then, electrical current flows to the field coil of the alternator from the battery.
Increase the alternator speed gradually until no inverse current remains in the field coil of the

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Items \ Models		TX 1000	TX 1000F	TX 1300	TX 1300F	TX 1500	TX 1500F
Dimensions and Specifications							
Overall length	in (mm)	71.65 (1820)		74.80 (1900)	75.59 (1920)	77.95 (1980)	78.74 (2000)
Overall width	in (mm)	35.63 (910)		38.58 (980)		40.16 (1020)	
Overall height	in (mm)	45.28 (1150)		47.24 (1200)		48.43 (1230)	
Wheelbase	in (mm)	46.46 (1180)		48.02 (1220)		50.39 (1280)	
Min. turning radius	in (mm)	69.29 (1760)	72.83 (1850)	69.69 (1770)	77.95 (1980)	73.62 (1870)	78.74 (2000)
Ground clearance	in (mm)	12.20 (310)	10.04 (255)	12.99 (330)	10.63 (270)	13.78 (350)	10.63 (270)
Front wheel tread	in (mm)	27.56 (700)	30.12 (765)	27.56 (700)	30.12 (765)	27.56 (700)	30.12 (765)
Rear wheel tread	in (mm)	27.56 · 31.50 (700 · 800)		29.13 · 33.07 (740 · 840)		30.71 · 34.65 (780 · 880)	
Total weight	lbs (kg)	992 (450)	1,058 (480)	1,058 (480)	1,124 (510)	1,124 (510)	1,190 (540)
Front wheel weight		471 (214)	531 (241)	502 (228)	568 (258)	515 (234)	477 (262)
Rear wheel weight		520 (236)	527 (239)	555 (252)	555 (252)	608 (276)	613 (278)
Engine							
Model name		KE55		KE70		KE75	
Type		Water Cooled Four Cycle Diesel Engine					
Output	PS	11		13		14.8	
Maximum torque	kg-m/rpm	2.9/2300		3.5/2300		4.0/2300	
Combustion chamber		Swirl Chamber					
No. of cylinders		2		2		2	
Bore x stroke	in (mm)	2.68 x 2.95 (68 x 75)		2.87 x 3.15 (73 x 80)		3.07 x 3.15 (78 x 80)	
Total displacement	cu-in (cc)	33.20 (544)		40.82 (669)		46.62 (764)	
Fuel		Diesel Light Oil					
Fuel tank capacity	Gallon (lit.)	2.64 (12)					
Starting method		Starter Motor					
Battery		NS60 (12V x 45A)					
Air cleaner type		Dry Type					

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2) ENGINE

Items	Standards	Correction Limit	Usable Limit
Compression pressure	455 psi (32kg/cm²) at 2800 rpm		313.0 psi(22kg/cm²)
Compression pressure difference between cylinders		35 psi (2.5kg/cm²)	
Fuel injection order	1–2		
Fuel injection timing	25 degrees BTDC		
Cylinder Head			
Flatness (distortion) of lower face	Less than 0.002in (0.05mm)	0.004in (0.1mm)	
Inside diameter of valve guides (Intake & exhaust)			
KE55	0.2598–0.2604in (6.6–6.615mm)		
KE70 & KE75	0.3149–0.3155in (8–8.015mm)		
Valve seat angle (Intake & exhaust)	45 degrees		
Valve seat width (Intake & exhaust)	0.039–0.059in (1–1.5mm)	0.079in (2mm)	
Valve seat sinkage (Intake & exhaust)			0.039in (1mm)
Valve Timing			
Intake open	18 degrees BTDC		
Intake close	46 degrees ABDC		
Exhaust open	46 degrees BBDC		
Exhaust close	18 degrees ATDC		
Valve clearance (Intake & exhaust)	0.014in (0.35mm) at cold engine		
Intake Valve			
Valve dia. x total length			
KE55	1.103x4.196in (28x106.5mm)		
KE70 and KE75	1.181x4.57in (30x116mm)		
Stem outside diameter			
KE55	0.258–0.259in (6.565–6.580mm)		0.004in (0.1mm)
KE70 & 75	0.313–0.314in (7.96–7.975mm)		0.004in (0.1mm)
Clearance between stem and guide			
KE55	0.0008–0.0019 (0.020–0.050mm)	0.004in (0.1mm)	
KE70 & KE75	0.0009–0.0021 (0.025–0.055mm)	0.004in (0.1mm)	
Seat face angle	45 degrees		
Thickness of valve head			
KE55	0.039in (1mm)		0.0196in (0.5mm)
KE70 & KE75	0.059in (1.5mm)		0.0196in (0.5mm)

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ENGINE

○ Check, add & adjust △ Clean
● Change ★ Repair at service station

ITEM	DAILY	SERVICE AT 50	100	150	200	250	300	350	400	450	500	550	600	INSPECTION THERAFTER	CHECK STANDARDS ON DAILY INSPECTION
Engine oil	○	●		●		●		●		●		●		Change every 100 hours.	Must be in specified range on level gauge.
Air cleaner			△		△		△		●		△		△	Clean every 100 hours. Change every 400 hours.	
Radiator coolant	○													Change once a year.	Filled to the mouth.
Fuel	○														
Fuel filter			○	△	○	△	●	○	△	○	△	○	●	Clean every 100 hours. Change every 300 hours.	
Cleaning inside fuel tank														Clean once a year.	
Fan belt		○				○				○				Check every 200 hours.	10 mm (approx. 3/8") deflection when pushed by finger
Battery electrolyte level			○		○		○		○		○		○	Check every 100 hours.	
Oil filter		●		●		●		●		●		●		Change every 100 hours.	
Damages & leaks	○													Change broken parts.	Cracks and leaks should be repaired
Looseness of bolt and nut	○														Should not be loose.
Valve clearance		★								★				Adjust every 400 hours	0.35 mm (.014 in) for both valves (when cooled)
Engine idle speed		★													
Starting pressure of nozzle injection		★													Starting pressure 120 kg/cm² (1707 psi)
Injection nozzle				★					★				★	Check every 200 hours	
Startor motor, alternator & regulator									★					Adjust every 400 hours	
Glow plug									★					Check every 400 hours	Check for broken wire
Compression pressure														Check every 800 hours	

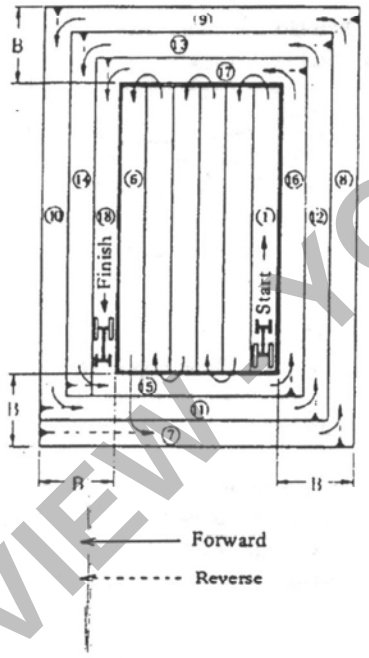
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1. TILLING

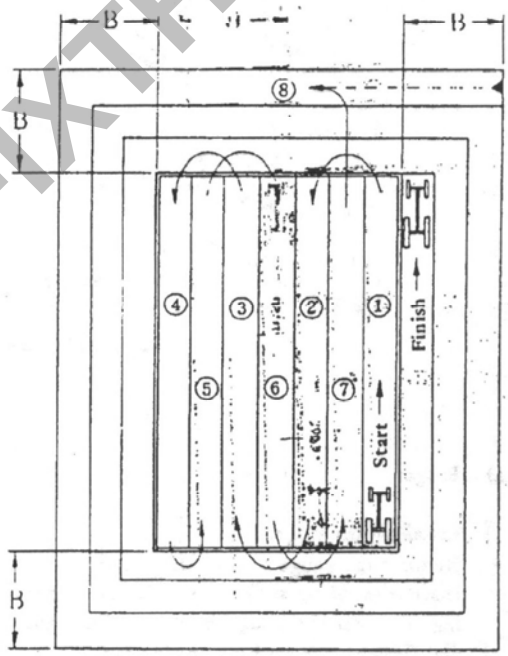
a) Adjacent Path Tilling

- There are many tilling methods. This method is recommended for most efficient results.
- The starting point will be decided by the point where the tractor gets out from the field.
- When turning or reversing the tractor, the rotary must be raised.
- In using the side drive rotary, move the tractor so that the levee is located at the right side of the tractor. This enables close tilling by the levee.
- The width of B should be a little narrower than the width of 3-times the rotary tilling width.



b) Every-other-path Tilling

- This is recommended for ridging and ridge breaking in small fields where turning the machine is difficult.
- Tilling a head land should be done in the same manner as described above.



PRECUATIONS DURING WORK

1) Getting in and out of the fields.
When the levee of the field is high, use a bridge plate for easy movement on and off the field.
2) Confirm the machine speed selected.
Before starting tillage, confirm that the auxiliary speed shift lever is in the 'Low' position.
When lowering the rotary with the auxiliary speed shift lever at 'High', the machine could start suddenly and cause an accident.
3) Never allow persons to ride on the rotary during operation.
4) When tilling is not being performed, turn off rotation of the tilling shaft.
5) When sharp turning or reversing the machine with the rotary raised, confirm that the area is clear in the direction of movement.
6) Only the operator should adjust the tilling depth. No other persons in the work area should be allowed to adjust the tilling depth.
7) When reversing the machine during work, raise the rotary to prevent damage to the rotary.
8) Never turn the machine sharply during work.

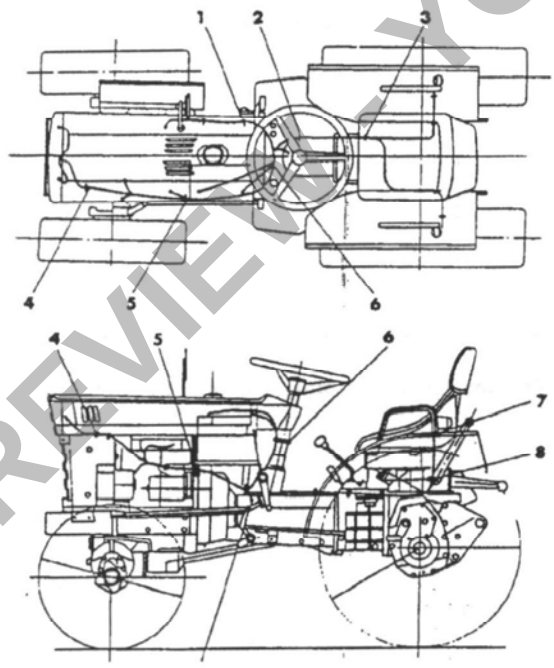
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- **List of Grounding Positions**

Meter panel	Reverse side of horn button mounting portion Mount to the steering wheel (1)
Steering	Meter panel mounting face (1) Clutch housing mounting face (1) Upper face of left and front bolt (battery grounding)
Clutch housing	Steering comp. mounting face (1)
Front frame	Engine mounting face (1) Bonnet support mounting part (1)
Bonnet support	Front frame mounting part (1) Light plate mounting part (1)
Light plate	Head light mounting part (1)
Rear axle housing	Fender mounting parts (1 each left and right side)
Fenders	Rear axle housing mounting face (1 each for left and right side) Arm support mounting part (1 each for left and right sides)
Arm support	Fender mounting part Turn indicator light mounting part

b) **Electrical wiring location**



1. Clamp at clutch housing side face
2. Clamp at upper face of clutch housing
3. Clamp at change metal upper face
4. Clamp at air cleaner retainer
5. Retain the wire harness, battery cable and grounding cable with a clamp.
6. Gather wire harness, battery cable and grounding cable, and fix them with wire retaining rubber band.
7. Clamp at fender upper face
8. Clamp at lower side of fender side face
9. Pass through the lead wire for the safety switch through the clutch housing hole by inserting the grommet.

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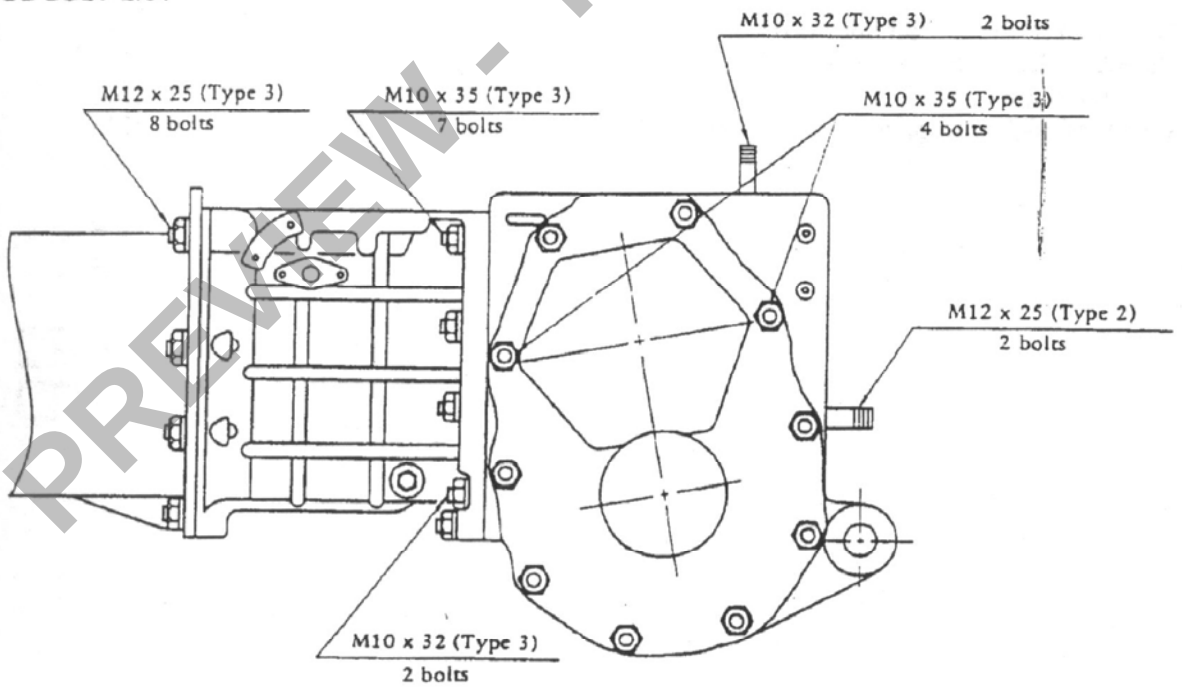
3) BEARING NUT

Nut		Tightening Torque: in-lbs (kg-cm)
Code	Nominal Thread	
AN 02	M15	173–347 (200–400)
03	M17	173–347 (200–400)
04	M20	260–434 (300–500)
05	M25	260–434 (300–500)
06	M30	260–434 (300–500)
07	M35	347–520 (400–600)
08	M40	520–694 (600–800)
09	M45	520–694 (600–800)
10	M50	694–868 (800–1000)
11	M55	694–868 (800–1000)
12	M60	694–868 (800–1000)

4) LIST OF PARTS WHERE LOCK WASHERS AND LOCK WIRE ARE USED

Part	Quantity
Mating part of front and rear transmissions (Upper rear part)	1
Differential case metal tightening part	2 for each side
Change guide tightening bolt at speed change metal (3 bolts)	Iron wire
Tightening part of ring gear (42) with differential case (At rear differential case)	2
Tightening part of ring gear with front differential case (At front differential case)	2

5. STUD BOLT LIST



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screw with a new one.
Measure the inside diameter of the rocker arm bushing and outside diameter (rocker arm mounting part) of the rocker shaft. If the clearance is found excessive, replace the part as a rocker arm assembly.

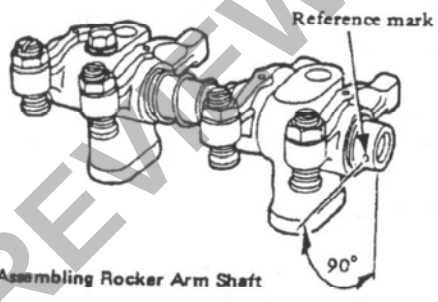
(c) Assembly and adjustment

NOTES:
- *Before reassembling, thoroughly clean all the parts*
- *When assembling sliding and rotating parts, coat them with clean oil.*

1. Securely mount the valve stem seal to the valve guide.

   NOTE: *It is not possible to use the valve stem seal again.*

2. After coating the valve stem with clean engine oil, insert the stem in the valve guide.
   Install the valve spring and retainer, and compress them with a valve lifter to mount the retainer lock.
3. Install the rocker arm, rocker shaft and rocker stay as shown in the figure.
   Pay attention to the mounting direction of the rocker shaft.
   The reference mark at the front end of the shaft must face to the left when viewed from the front.
   Coat bore of the rocker arm bushing with clean engine oil.

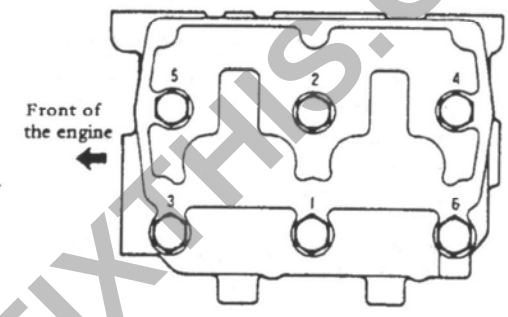


Assembling Rocker Arm Shaft

4. Install the rocker arm and shaft assembly on the top face of the cylinder head. Tighten the bolts securely.

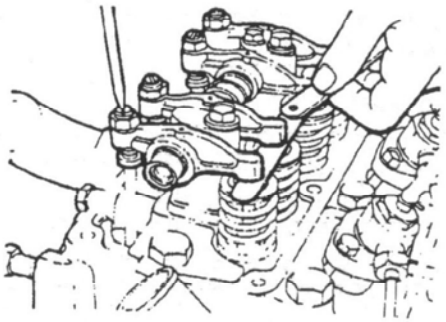
   NOTE: *Never use the nozzle holder gasket again.*

5. Install the glow plug with specified torque.
6. Mount the nozzle holder assembly, and tighten the mounting bolts with specified torque.
7. Install glow plug lead wire.
8. Since sealing compound is already coated on the cylinder head gasket, never apply sealing compound on the gasket.
9. Tighten cylinder head bolts with specified torque, according to the sequence of steps shown in the figure.



Tightening Sequence of Cylinder Head Bolt

10. Ensure new gaskets and packings are used. Coat them with sealing compound as specified.
11. Adjustment of valve clearance:
    At the top dead center on the compression stroke in each cylinder, adjust the valve clearance. Inserting the thickness gauge between the valve stem and rocker arm, adjust the clearance by turning the adjusting screw to obtain specified limits.


Adjusting Valve Clearance

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