ENGINE MECHANICAL



SECTION

ST060

VIE DIV

7 - 1

Base KV10106500

Engine stand (2) ST05012000

cn	MT	EN	2T
UU	14.1		10

(E EV10110330

Spacer

PREPARATION EM- 2

VG30E	
ENGINE COMPONENTS — Outer Parts	EM- 5 001101V>
CHECKING COMPRESSION PRESSURE	
TIMING BELT	EM- 8
TIMING BELT - Removal	EM- 9
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PREPARATION

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Description	
ST0501S000 (—) Engine stand assembly	SECTION LE	Disassembling and assembling
① ST05011000 (-) Engine stand ② ST05012000 (-) Base	2	
KV10106500 (—) Engine stand shaft		PREPARATION
KV10110001 (—) Engine sub- attachment		ENGINE COMPONENTS — Outer Parts CHECKING COMPRESSION PRESSURE TIMING BELT Removal
ST10120000 (J24239-01) Cylinder head bolt wrench	5	Loosening and tightening cylinder head bolt
KV10110600 (J33986) Valve spring compressor		vidmez Disassembling and assembling of valve components vidmez A — QABH ABQMLYO
KV10107501 (—) Valve oil seal drift		Installing valve oil seal A9 110
EM-36 EM-43	S.D.S.) We want to the state of	ENGINE OVERHAUL — Inspection

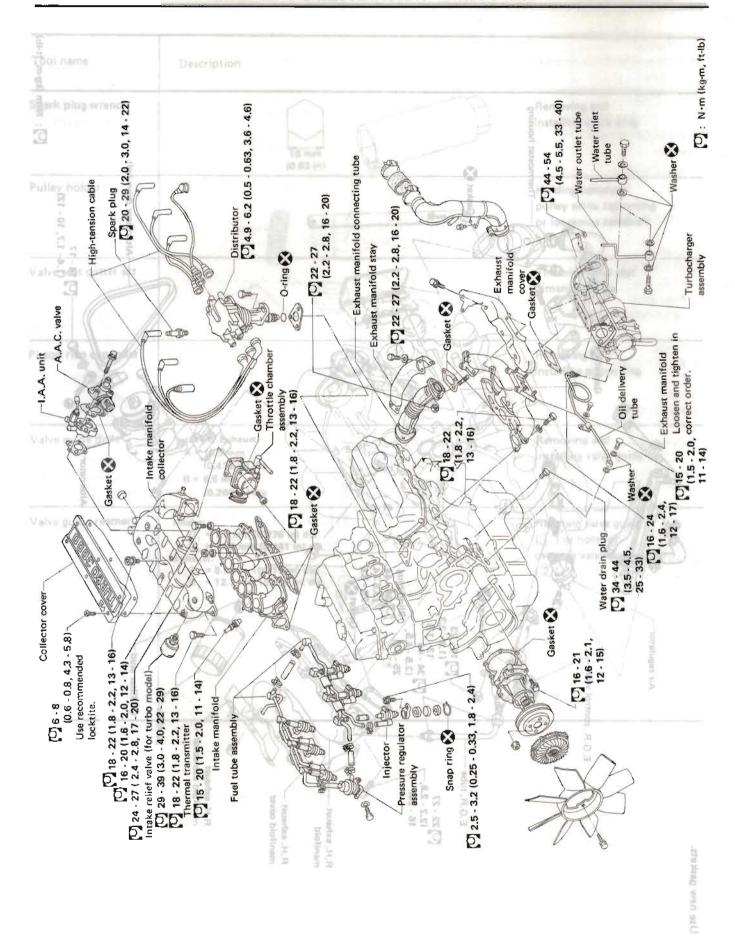
Tool number (Kent-Moore No.) Tool name	Description	Description	Tool name
KV10110300 (—) pure stand Piston pin press stand assembly	Remove	pisto	ssembling and assembling on with connecting rod
1) KV10110310 (-) Harlamas	mibloH	3 3 3 3	in septon Xalln
Cap	or look		7.7 10 12
3) ST13030020 (-) Press stand 4) ST13030030 (-)	Piniana		Tax Tattuo filiagravia
Spring (-) Drift KV10110320	Remov		retinacité par nozal
Center shaft bins pri	Remov	logick® Exhaux:	alve guide drift
EM03470000 (J8037) Piston ring compressor		Inst. cylin	
ST16610001 (J23907) Pilot bushing puller		Rem	noving crankshaft t bushing
KV10111100 (–) Seal cutter		70 49 1	noving oil pan
ws39930000		Pres gask	sing the tube of liquid
Tube presser	A Comment		
d _p	EG.8 (2.2 - 2.7) 16 - 28	H. H. exhaust — mass find and and and and and and and and and a	
erse gask			

DEMHORB

PREPARATION

Tool name	Description	Tool name Tool name
Spark plug wrench ild m	Disasio	Removing and installing spark plug
Pulley holder		Holding camshaft pulley while tightening or loosening camshaft bolt
Valve seat cutter set		Finishing valve seat dimensions
Piston ring expander		Removing and installing piston ring
Valve guide drift		Removing and installing valve guide
Valve guide reamer Valve guide reamer Valve guide reamer Alababi startaknero guide	Intake: D ₁ = 7.0 mm (0.276 in) dia. D ₂ = 11.2 mm (0.441 in) dia. Exhaust: D ₁ = 8.0 mm (0.315 in) dia. D ₃ = 12.2 mm (0.480 in) dia.	Reaming valve guide (①) or hole for oversize valve guide (②)
neq lie gn	vorms R	XV10111100 Int value aniinteni Seal cutter
the tube of liquid	Pressing gasket	0000E9E2W (-) Tuba pressir

SEMBOOR

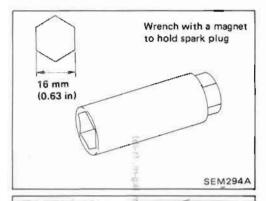


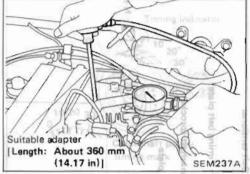
EM-6

REMINDER

SEM8508

CHECKING COMPRESSION PRESSURE





Measurement of Compression Pressure

- 1. Warm up engine.
- 2. Turn ignition switch off.
- 3. Removal all spark plugs.

Itemator drive nec

- 4. Disconnect distributor center cable.
- Release fuel pressure.
 Refer to "Release Fuel Pressure" in section EF & EC.
- 6. Attach a compression tester to No. 1 cylinder.
- Depress accelerator pedal fully to keep throttle valve wide open.

we, suched pipe bracket of coolant and lower hose

- 8. Crank the engine and read the highest gauge indication.
- Always use a fully-charged battery to obtain specified engine revolution.

Compression pressure:

kPa (kg/cm², psi)/rpm

Standard

Non-turbo

1,196 (12.2, 173)/300

Turbo

1,167 (11.9, 169)/300

Minlmum

Non-turbo

883 (9.0, 128)/300

Turbo

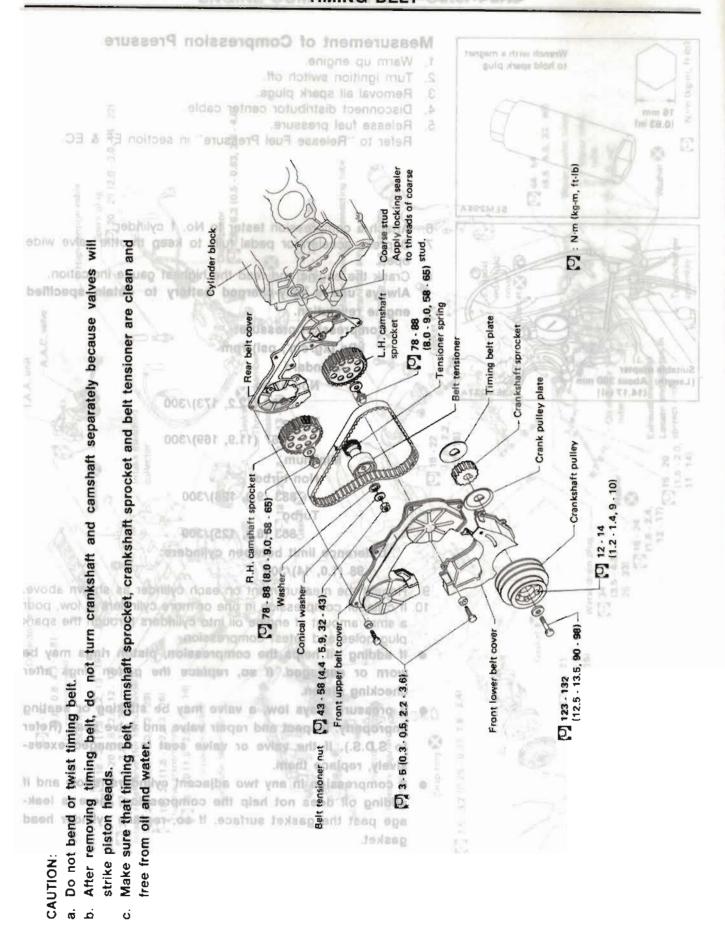
863 (8.8, 125)/300

Difference limit between cylinders:

98 (1.0, 14)/300

- 9. Repeat the measurement on each cylinder as shown above.
- If cylinder compression in one or more cylinders is low, pour a small amount of engine oil into cylinders through the spark plug holes and retest compression.
- If adding oil helps the compression, piston rings may be worn or damaged. If so, replace the piston rings after checking piston.
- If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. (Refer to S.D.S.). If the valve or valve seat is damaged excessively, replace them.
- If compression in any two adjacent cylinders is few and If adding oil does not help the compression, there is leakage past the gasket surface. If so, replace cylinder head gasket.

ERURABER TIMING BELT COMMOBILE



Removal Bodgett Barrier Barrier

- led called an to notife 1.5 Remove engine under cover.
 - 2. Drain engine coolant from radiator.

Be careful not to spill coolant on drive belts.

- 3. Remove radiator shroud and fan.
- Remove the following belts.
- Power steering drive belt
- · Compressor drive belt

Alternator drive belt

5. Remove suction pipe bracket of coolant and lower hose from suction pipe.

I tern to check

Tooth is broken/

Back surface is

Side surfate la worn

tooth root is

- Remove all spark plugs.
- 7. Set No. 1 cylinder at T.D.C. on its compression stroke.
- 8. Remove idler bracket of the compressor drive belt and crankshaft pulley.
- 9. Remove front upper and lower belt covers.



I stud is once removed, apply locking stalant to threads all AREMARore installing



Belt comers are worn and round:

10. Loosen timing belt tensioner nut, turn tensioner, and then Teeth are worn: remove timing belt.



Rotating direction

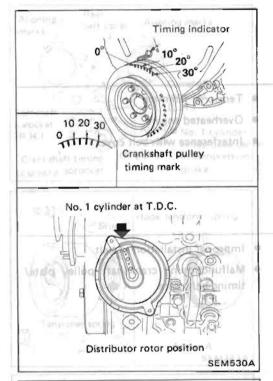
- ff) Align white lines on timing belt with punctimarks on canyshawohunoelekteshirbomaskuhali eptocket
- 2) Relationseau equium naukali de waxio neni balt cover.
- Mumbated testinder testing one nwob mow

worn down and invisible

Oll/Coolent by water is-Butween L.H. and H.H. camshall sprockets

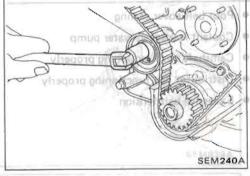
erankshaft timing sprocket

stuck to belt



Cartulate jamming

Damaged camshaft, crankshaft oil seal



Poor oil sealing of each off dial Contempose at visite numbers starting e Poot best cover staling

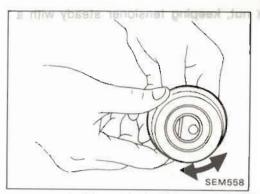
ming puarks

Inspection ome A

Visually check the condition of the timing belt.

Replace if any abnormality is found.

Item to check	4. Remove the (meldor) belts.	Cause
Tooth is broken/	Gompressor drive belt	Camshaft jamming
ooth root is	Alterrator drive belt.	Distributor jamming
cracked, ewol bns instead		
compression Broke	the state of the s	Damaged camshaft/crankshaft oil seal Totalibri primit
	Had Gawal by SEM394A	000 01
Back surface is cracked/worn.	1 /4000 13 11	Tensioner jamming
Jacked/Worth.		Overheated engine
ately bec		Interference with belt cover
and bring bring by	SEM395A	D.O.T is withrilly 0 I oM
Side surface is worn.	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Improper installation of belt
	Belt corners are worn and round.	 Malfunctioning crankshaft pulley plate, timing belt plate
nent one genorales the	Wicks are frayed and coming out. SEM396A	De Sall or
Teeth are worn.	alled grimit avomen	 Poor belt cover sealing
j &	and the second second second	 Coolant leakage at water pump
5 5	TOTAL TOTAL	 Camshaft not functioning properly
是 第二层		 Distributor not functioning properly
8 8 8	FEFER HUNLI	Excessive belt tension
D	- 534	-55.5
belt,	Rotating direction	and the same of th
	9 2	
Ilming ads. Ilming d wate	9	SEM240A
	3 6	
owing on the series	Canvas on tooth face is worn down.	
5000	Canvas on tooth is fluffy, rubber layer is	
A FIGURE	worn down and faded white, or weft is	
No see a see	worn down and invisible. SEM397A	
Dil/Coolant or water is		Poor oil sealing of each oil seal
tuck to belt.		Coolant leakage at water pump
		Poor belt cover sealing



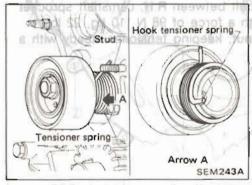
Inspection (Cont'd) BELT TENSIONER AND TENSIONER SPRING

- 1. Check belt tensioner for smooth turning.
- 2. Check condition of tensioner spring.

Aligning Aligning marks belt cover marks Camshaft sprocket (L.H.) Camshaft sprocket Aligning No. 1 cylinder (R.H.) marks at top dead center Oil pump in compression Crankshaft timing SEM241A sprocket stroke

Installation and user participates

Confirm that No. 1 cylinder is set at T.D.C. on its compression stroke.



 Install tensioner and tensioner spring.
 If stud is once removed, apply locking sealant to threads of stud before installing.

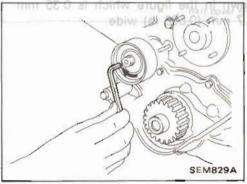
THE PERMIT

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64 58



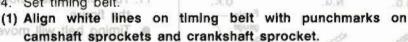
3. Turn tensioner fully clockwise with hexagon wrench, and temporarily tighten lock nut.

ried goirni T

12.7 mm. 10.600 in)

0.35 mm (0.0135 ln)

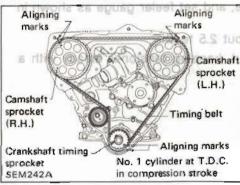
4. Set timing belt.



SIMBURE

(2) Point arrow on timing belt toward front belt cover. Number of teeth (reference):

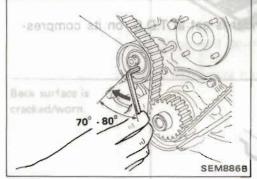
Number of timin	ng belt teeth Na O 1 - yallug sanol	133
Number of	Between L.H. and R.H. camshaft sprockets	40
teeth between timing marks	Between L.H. camshaft sprocket and crankshaft timing sprocket	43



tensioner spring.

Installation (Cont'd)

- риняя явиогрият д.5. Loosen tensioner lock nut, keeping tensioner steady with a hexagon wrench. ner for smooth turning or or or with the condition of the condi



Turn tensioner 70 to 80 degrees clockwise with hexagon wrench, and temporarily tighten lock nut.

Turn crankshaft clockwise 2 or 3 times, then slowly set No. 1 cylinder at T.D.C. on its compression stroke.

> Tension tellographic Par Overheated enging Aligning No. 1 cylinder

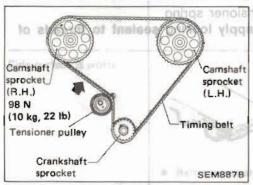
> > stroics.

ned boat on a window

(.H. A)

(B.B)

Cranicalist's siming SEMBATA ROPORTAL



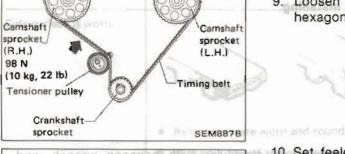
8. Push middle of timing belt between R.H. camshaft sprocket boyo and tensioner pulley with a force of 98 N (10 kg, 22 lb).

noissenamos ni

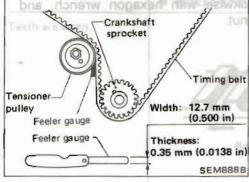
9. Loosen tensioner lock nut, keeping tensioner steady with a

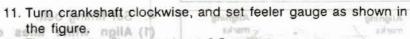
MATURAL PRO

hexagon wrench.



10. Set feeler gauge as shown in the figure which is 0.35 mm Mool (0.0138 in) thick and 12.7 mm (0.500 in) wide.



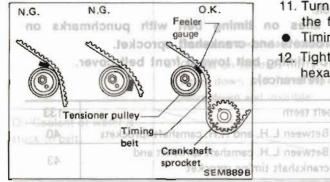


Timing belt will move about 2.5 teeth.

taeth between

timing marks

12. Tighten tensioner lock nut, keeping tensioner steady with a hexagon wrench.



Number of timing belt teem

TIMING BELT

Installation (Cont'd)

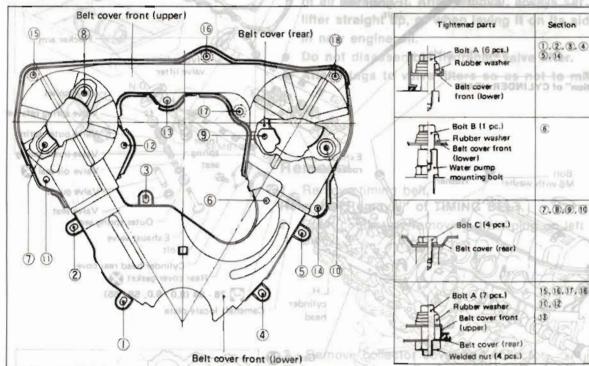
- 13. Turn crankshaft clockwise or counterclockwise, and remove
- feeler gauge.

 14. Turn crankshaft clockwise 2 or 3 times, then slowly set No. 1 cylinder at T.D.C. on its compression stroke.

When lightening pulinder head bolts and rocker shall bolts. the thread portions and sent apply new engine oil to Camenzio securius 118 22 13 161-

R.H. cylinder L.H. cylinder the

15. Install lower and upper belt covers.



Tightened parts	Section	Parts tightened with bolts
Bolt A (6 pcs.) Rubber washer Belt cover front (lower)	①,②,③,④ ⑤,Ĥ	①, ②, ③, ④: Cylinder block ⑤, 14: Compressor bracket
Bolt B (1 pc.) Rubber washer Belt cover front (lower) Water pump mounting bolt	® Boli With With With	Water pump mounting bolt
Bolt C (4 pcs.) Belt cover (resr)	7.8.9.10	Cylinder head
Bolt A (7 pcs.) Rubber washer Belt cover front (upper) Belt cover (rear) Welded nut (4 pcs.)	15,16,17,18 10,12	(19.16.17.16: Welded nuts (1). (2: Cylinder head (1): Water outlet

SEM248A

L.H. cumulture

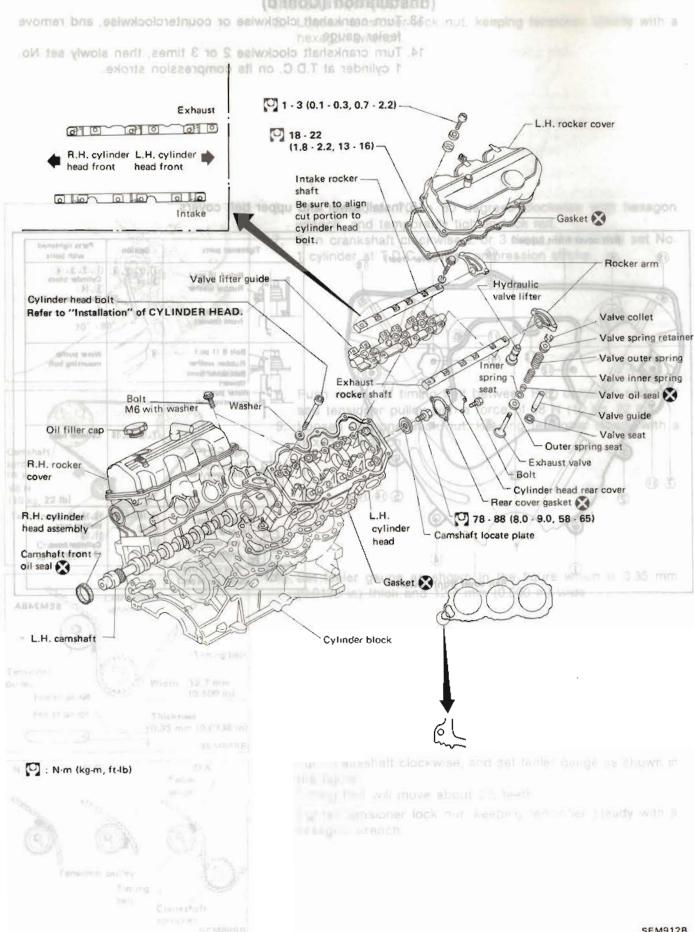
drain plug in cylinder block

Remove intake manifold with fuel tube ananatalyon m.k.

Loosen intake manifold bolts in numerical order

- L. H. racker cover

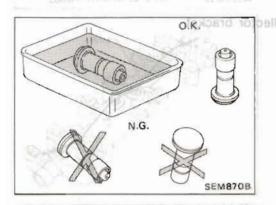
Gastert E.



Removal (Cont'd)

5. Remoder : NOITUAD ring pump bracket.

- When installing sliding parts such as rocker arms, camshaft and oil seal, be sure to apply new engine oil on their sliding surfaces.
- When tightening cylinder head bolts and rocker shaft bolts, apply new engine oil to the thread portions and seat surfaces of bolts.



H.H. exhaust munifold

- If a hydraulic valve lifter is kept on its side, there is a risk of air entering it. After removal, always set hydraulic valve lifter straight up, or when laying it on its side, have it soak in new engine oil.
 - Do not disassemble hydraulic valve lifter.
 - Attach tags to valve lifters so as not to mix them up.

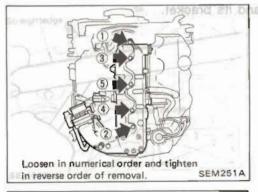
edut eanalad blotinam Removal modern and camerate

blonnam tauarixe mont edut 130 Remove timing belt. Stanta with Tool

never led primit uses one steelool@Refer to "Removal" of TIMING BELT.

2. Drain coolant by removing drain plug on left side of cylinder block

SEM297A



Remove collector cover and collector. Before removing collector, be sure to drain coolant removing drain plug in cylinder block.

twoloasel The resurrecing limit of cylinder head in delarration by the cylinder block resurfacing in an engine to Amount of cylinder head resurfacing by "A" Amount of cylinder black resembling is "B"

freelystero sommoni sistance il 70%

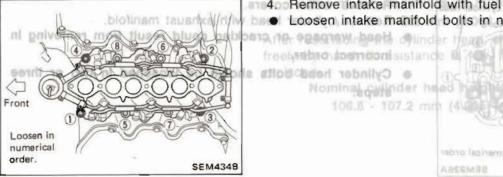
Nominal Gwinder head

106.8 - 107.2 mm (4)

4. Remove intake manifold with fuel tube assembly.

Less than 0.1 mm (0.004 in)

Loosen intake manifold bolts in numerical order.



Locsen in numerical order

THORSE FROMT

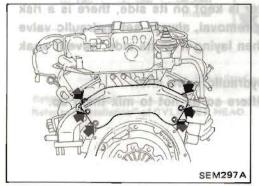
e Cylinder hebdoblotts

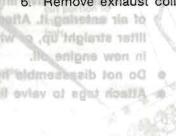
Removal (Cont'd)

(V.II - 2 2 T.3 TH)

- 5. Remove power steering pump bracket.
- e When installing sliding parts such as rocker arms, camshaft and oil seal, be sure to apply new engine oil on their sliding surfaces.
- When tightening cylinder head bolts and rocker shall bolts. apply new engine oil to the thread portions and seat surfaces of selts.
 - A Place Ster III counter to heart from

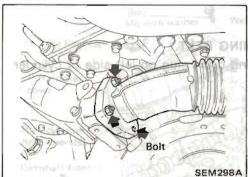
Remove exhaust collector bracket.





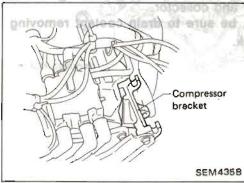
Drain coolant by temo



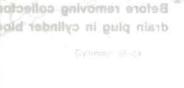


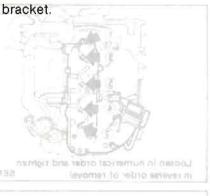
- 8. Disconnect exhaust tube from exhaust manifold.
- 9. Remove camshaft sprockets and rear timing belt cover.

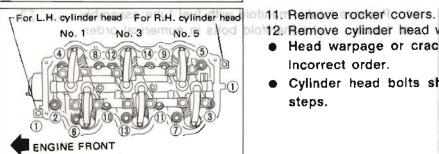
THE RESERVE FOR MALEST



10. Remove compressor and its bracket.







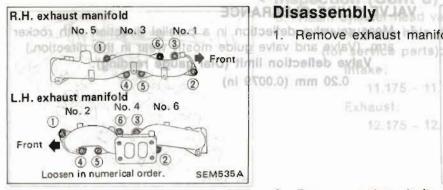
Loosen in numerical order

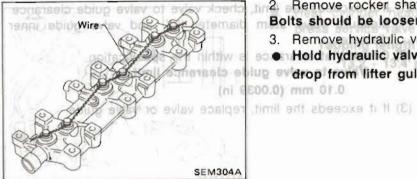
SEM926A

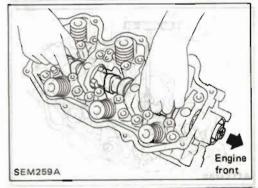
- 12. Remove cylinder head with exhaust manifold.
 - Head warpage or cracking could result from removing In Incorrect order.
 - Cylinder head bolts should be loosened in two or three steps.

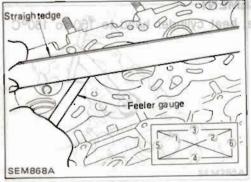
ni nesocu eurmerical -19010

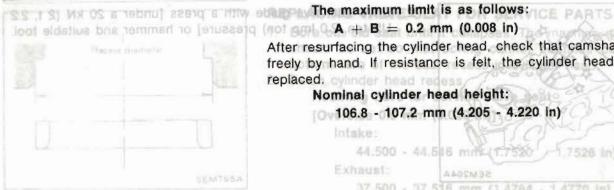
b lospection (Contld)











BOWARDisassembly Y-AVd vive guide (tole, Albert

No. 5 No. 3 No. 1 Remove exhaust manifolds from cylinder head.

- 2. Remove rocker shafts with rocker arms. Bolts should be loosened in two or three steps.
 - 3. Remove hydraulic valve lifters and lifter guide.
- Hold hydraulic valve lifters with wire so that they will not drop from lifter gulde.

000 - 7.018 mm (0.2756; 0.2763

SEMTSIA

12.175 - 12.196 void 40.4783 -04802

- 4. Remove oil seal and camshaft.
- 5. Remove valve components with Tool. Tool: KV10110600 (J33986)
- Remove valve oil seals.

Inspection 3VJAV

CYLINDER HEAD DISTORTION

Head surface flatness:

Less than 0.1 mm (0.004 in)

If beyond the specified limit, replace it or resurface it. Resurfacing limit:

The resurfacing limit of cylinder head is determined by the cylinder block resurfacing in an engine.

Amount of cylinder head resurfacing is "A"

Amount of cylinder block resurfacing is "B"

(not gm \ A + B = 0.2 mm (0.008 in)

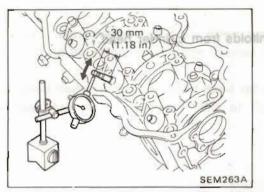
After resurfacing the cylinder head, check that camshaft rotates freely by hand. If resistance is felt, the cylinder head must be replaced, cylinder head redes

44.500 - 44.516 mm (1.75%) - 1.7526 In

Nominal cylinder head height:

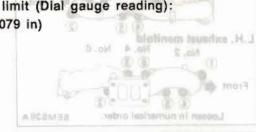
106.8 - 107.2 mm (4.205 - 4.220 in)

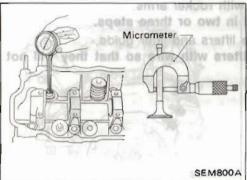
intake:



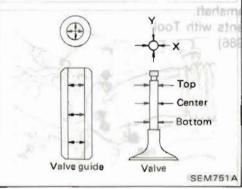
Inspection (Cont'd) VALVE GUIDE CLEARANCE DE BROKE

1. Measure valve deflection in a parallel direction with rocker arm. (Valve and valve guide mostly wear in this direction.) Valve deflection limit (Dial gauge reading): 0.20 mm (0.0079 in)





- 2. If it exceeds the limit, check valve to valve guide clearance.
 - (1) Measure valve stem diameter "d" and valve guide inner diameter.
- (2) Check that clearance is within the specification. Valve to valve guide clearance limit: 0.10 mm (0.0039 in)
 - (3) If it exceeds the limit, replace valve or valve guide.

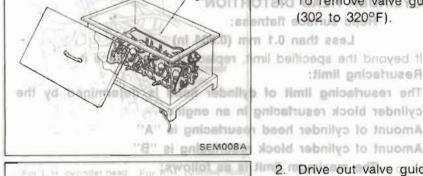




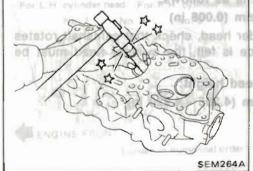
VALVE GUIDE REPLACEMENT (302 to 320°F). Less than 0.1 mm If beyond the specified lim Resurfacing limit: The resurfacing limit of c cylinder block resurfacing in an eng

Oil To remove valve guide, heat cylinder head to 150 to 160°C

SEMBABA

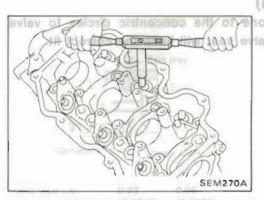


2. Drive out valve guide with a press [under a 20 kN (2 t, 2.2 US ton, 2.0 Imp ton) pressure] or hammer and suitable tool. basin rebniles simpliniourness rengracking could result from removing in



freely: the change its fell e Cylinder helispeight should be inviseded in two or three Nominal cylinder to 106.8 - 107.2 mm (4

Amount of cylinder bleck



Inspection (Cont'd)

Ream cylinder head valve guide hole, sales inckness of

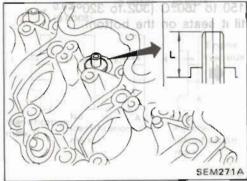
Valve guide hole diameter the standard specified and

Examp Intake:

11.175 - 11.196 mm (0.4400 - 0.4408 in)

Exhaust:

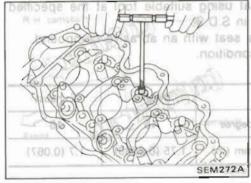
12.175 - 12.196 mm (0.4793 - 0.4802 in)



4. Heat cylinder head to 150 to 160°C (302 to 320°F) and press service valve guide onto cylinder head.

Tapping length "L":

13.2 - 13.4 mm (0.520 - 0.528 in)



pglau II aa 5. Ream valve guide. AL CLEARANCE

1.2 m nworks an Finished size:

eviev gal .gniffintake:A

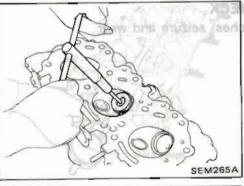
7.000 - 7.018 mm (0.2756 - 0.2763 in)

Exhaust:

Seat face angle "g"

Contacting width "W"

8.000 - 8.018 mm (0.3150 - 0.3157 in)

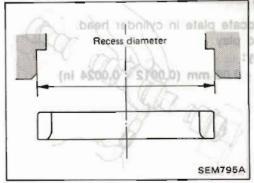


SVALVE SEATS amond diameter of samunall bearing

Check valve seats for any evidence of pitting at valve contact surface, and reseat or replace if it has worn out excessively.

пемвиза

- Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat.
- Cut with both hands to uniform the cutting surface.



REPLACING VALVE SEAT FOR SERVICE PARTS

- Bore out old seat until it collapses. The machine depth stop should be set so that boring cannot continue beyond the bottom face of the seat recess in cylinder head.
 - Ream cylinder head recess.

Reaming bore for service valve seat

[Oversize 0.5 mm (0.020 in)]:

Inta

ake: 44.500 - 44.516 mm (1.7520 - 1.7526 in)

Exhaust:

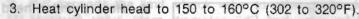
37.500 - 37.516 mm (1.4764 - 1.4770 in)

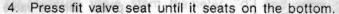
Inspection (Cont'd)

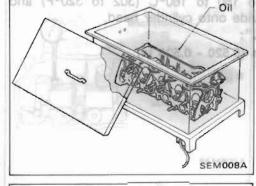
Reaming should be done to the concentric circles to valve guide center so that valve seat will have the correct fit.

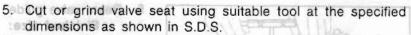


tim WET





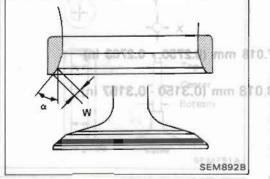




- 6. After cutting, lap valve seat with an abrasive compound.
- 7. Check valve seating condition.

Exhaust:

(3) If it exceeds the limit



8 - 000,8	1	Intake	Exhaust
Seat face angle "\alpha"	degree	45	45
Contacting width "W"	mm (in)	1.75 (0.0689)	1.7 (0.067)

CAMSHAFT VISUAL CHECK

Dallings evilar is selling to appealing you Check camshaft for scratches, seizure and wear.

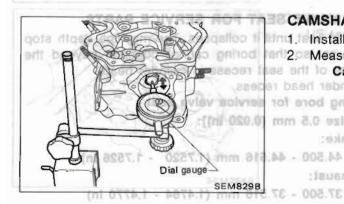
surface, and resear or replace if it has worn out excessively

e Before repairing valve seats check valve and valve guide
for wear. If they have worn, replace their. Then correct
valve seat.

e. Cut with both hands to uniform the cutting surface.



Recess dismeter



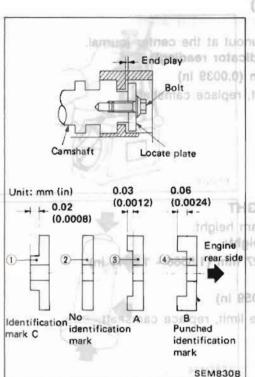
CAMSHAFT END PLAY

- 1. Install camshaft and locate plate in cylinder head.
- 2. Measure camshaft end play.

as and lo Camshaft end play:

Standard 0.03 - 0.06 mm (0.0012 - 0.0024 ln)

Reaming bore for [Oversize 0.5 mm Intake: 44.500 - 44



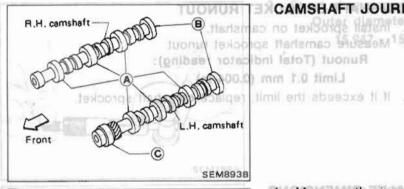
Inspection (Cont'd)

3. If it is out of the specified range, select thickness of almed ent to judgme camshaft locate plate to obtain the standard specified end . End play not sores but let play: could height: mm/N (mm/kg.

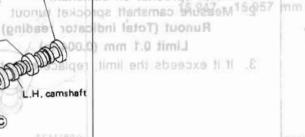
Example:

When camshaft end play is 0.08 mm (0.0031 in) with shim 2, replace shim (2) with shim (3) to set the end play at 0.05 mm (0.0020 in). 25 0/255,0 (25.0/28.0. 0 984/57.3)

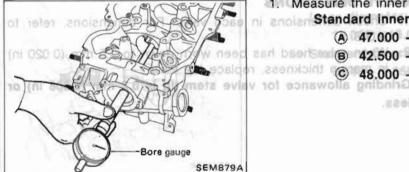




CAMSHAFT JOURNAL CLEARANCE







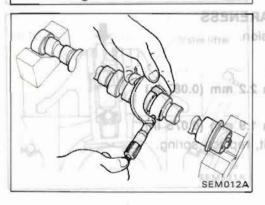
- 1. Measure the inner diameter of camshaft bearing.
- Standard inner diameter:
 - (A) 47.000 47.025 mm (1.8504 1.8514 in)
- B 42,500 42,525 mm (1.6732 1.6742 in)
- © 48,000 48,025 mm (1.8898 1.8907 in)

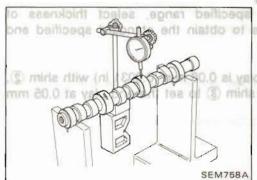
2. Measure the outer diameter of camshaft journal. Standard outer diameter:

- A 46.920 46.940 mm (1.8472 1.8480 in)
 - B 42.420 42.440 mm (1.6701 1.6709 in)
- © 47.920 47.940 mm (1.8866 1.8874 in)
- 3. If the clearance exceeds the limit, replace camshaft and/or cylinder head.

SEMPREA

Camshaft journal clearance limit: olege 0.15 mm (0.0059 in) mg manner as in step (3)





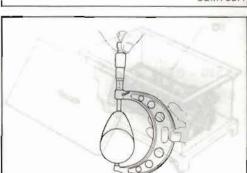
Inspection (Cont'd)

CAMSHAFT RUNOUT

and made of his 1. Measure camshaft runout at the center journal. Runout (Total indicator reading):

Limit 0.10 mm (0.0039 in)

2. If it exceeds the limit, replace camshaft.



SEM549A

CAMSHAFT CAM HEIGHT

1. Measure camshaft cam height.

Standard cam height:

39.537 - 39.727 mm (1.5566 - 1.5641 in)

BUDEWARE

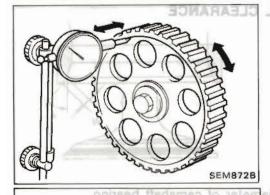
Mherm

(0.0012)

Cam wear limit:

0.15 mm (0.0059 in)

If wear is beyond the limit, replace camshaft.



CAMSHAFT SPROCKET RUNOUT

Install sprocket on camshaft.

Measure camshaft sprocket runout. Runout (Total indicator reading):

Limit 0.1 mm (0.004 in)

3. If it exceeds the limit, replace camshaft sprocket.

T (Margin thickness) 025 mm (1,8504 - 1,8514 in) 525 mm (1.6732 - 1.6742 J SEM188A

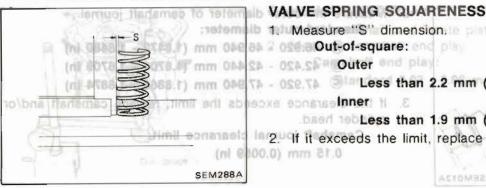
VALVE DIMENSIONS

1. Check dimensions in each valve. For dimensions, refer to S.D.S. A

- Nationes . H.J

2. When valve head has been worn down to 0.5 mm (0.020 in) in margin thickness, replace the valve.

Grinding allowance for valve stem tip is 0.2 mm (0.008 in) or less.



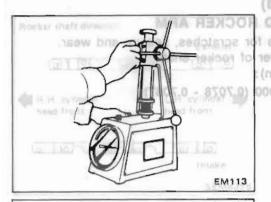
1. Measure "S" dimension.

88.1) mm 048 TA - 052 TA State Less than 2.2 mm (0.087 in)

Less than 1.9 mm (0.075 in)

2. If it exceeds the limit, replace spring.

0.15 mm (0.0059 in)



Inspection (Cont'd)

VALVE SPRING PRESSURE HEIGHT

Check valve spring pressure height.

Pressure height: mm/N (mm/kg, in/lb)

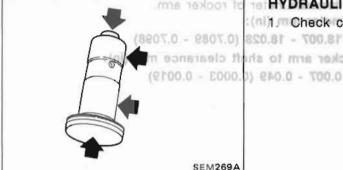
tighten rocker shaft boils for No 1 No

(ni) mm delecouterre labe (s not lifted.

40.0/250.1 (40.0/25.5, 1.575/56.2) non stroke and

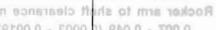
lighten Innerer shaft bolts for No. 2, No.

25.0/255.0 (25.0/26.0, 0.984/57.3)



Install exhaust manifold 18 Millioder head at reverse order of HYDRAULIC VALVE LIFTER

1. Check contact and sliding surfaces for wear or scratches.





Check diameter of a valve lifter.

THE AUTHORNIEGIA IN SPROCKET HISTORICAL TO STATE OF THE S

Outer diameter:

Confirm that knock pin on camshat is not a



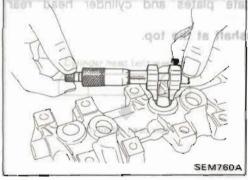
narrow pitch side toward cylin

пасамае Cylinder head side 3. Check valve lifter guide inner diameter. e Be Inner-diameter: washers between heliganand cylinder

18 /1844 mso 10 mia dio 16.000 - 16.013 mm (0.6299 - 0.6304 in)

Standard clearance between valve lifter and lifter guide: 0.043 - 0.066 mm (0.0017 - 0.0026 ln)

Narrow pitch

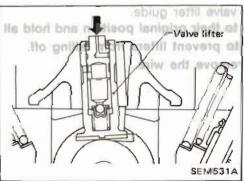




(1) Push plunger forcefully with your finger.

- Be sure to check it with rocker arm in its free position (not on the lobe).
 - (2) If valve lifter moves more than 1 mm (0.04 in), air may be inside of it.
 - (3) Bleed air off by running engine at 1,000 rpm under no load for about 10 minutes.
 - (4) If hydraulic valve lifters are still noisy, replace them and bleed air off again in the same manner as in step (3).

SEMPROA



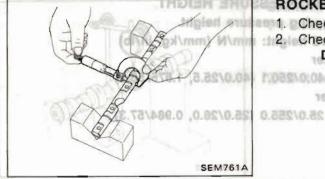


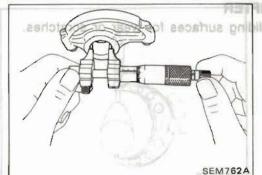
Inspection (Cont'd)

- ROCKER SHAFT AND ROCKER ARM
- 1. Check rocker shafts for scratches, seizure and wear.
- 2. Check outer diameter of rocker shaft.

Diameter mm (in):

17.979 - 18.000 (0.7078 - 0.7087)





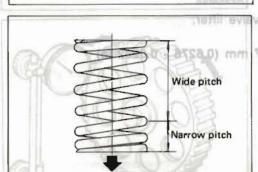
3. Check inner diameter of rocker arm.

0.15 mm (8.0059 in) 2. If wear is beyond the limit, leplace of

Diameter mm (in):

18.007 - 18.028 (0.7089 - 0.7098)

Rocker arm to shaft clearance mm (in): 0.007 - 0.049 (0.0003 - 0.0019)



Cylinder head side

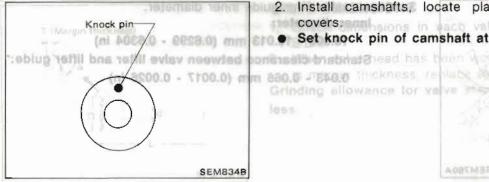
SEM638B

Assembly were CRET RUNOUT

- 1. Install valve component parts.
- o' Always use new valve oil seal. Refer to OIL SEAL RE-PLACEMENT tel indicator reading):

SEMZOBA

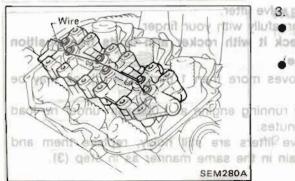
- Before installing valve oil seal, Install inner valve spring seat xceeds the limit, replace of
- Install outer valve spring (uneven pitch type) with its narrow pitch side toward cylinder head side.



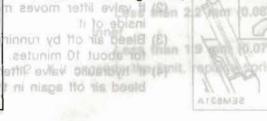
2. Install camshafts, locate plates and cylinder head rear covers.

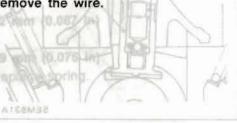
SEM780A

Set knock pin of camshaft at the top.



- 3. Install valve lifters into valve lifter guide.
- Assemble valve lifters to their original position and hold all valve lifters with wire to prevent lifters from falling off.
 - After installing them, remove the wire.





Assembly (Cont'd)

- Rocker shaft direction Exhaust 0 R.H. cylinder L.H. cylinder head front (4) Tighte endings to 25 N·m (3.0 kg·m, 22 h-lb). ang skiplench, turn, ell bolts, 60 to 65 SEM835B
- 4. Install rocker shafts with rocker arms.

(2) 18 - 22 N·m

- Tighten bolts gradually in two or three stages.
- Before tightening, be sure to set camshaft lobe at the position where lobe is not lifted.

ebic H.Fl

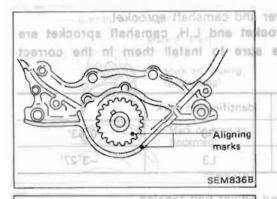
flod baen

- (1) Set No. 1 piston at T.D.C. on its compression stroke and head from tighten rocker shaft bolts for No. 2, No. 4 and No. 6
- (2) Set No. 4 piston at T.D.C. on its compression stroke and tighten rocker shaft bolts for No. 1, No. 3 and No. 5 cylinders.
 - 5. Install exhaust manifold to cylinder head in reverse order of edomination (seven) is and it are longer than the others.

No 6

No.4

(0.9 - 1.1 kg-m, 6.50 8.0 (100b)



Installation

TE TO 101 (at 00.6) Imm 50 to bids in two stages mail (1 - E: 1006 inm (4.17 in) for others

- 1. Set No. 1 cylinder at T.D.C. on its compression stroke as follows:
- (1) Align crankshaft sprocket aligning mark with mark on oil pump body.

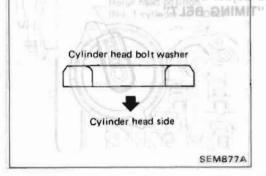
BNGINE FRONT

(2) Confirm that knock pin on camshaft is set at the top.

R.H. camshaft sprocket L.H. camshaft sprocket

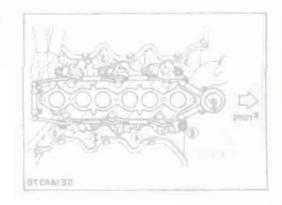
19d 72010] b-2. Install cylinder head with new gasket.

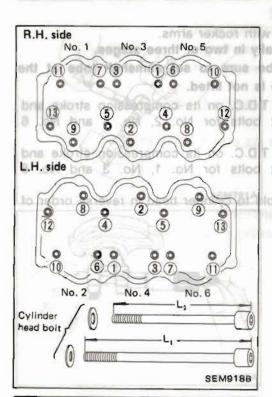
- Be sure to install washers between bolts and cylinder head.
- Do not rotate crankshaft and camshaft separately, or valves will hit piston heads.

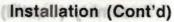


Install intake manifold.

Tighten manifold bolts and nuts in two or three stages in reverse order of removal.





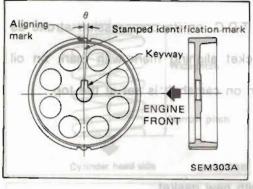


- 3. Tighten cylinder head bolts in numerical order using ST10120000 (J24239-01).
- Tightening procedure.
- (1) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
 - (2) Tighten all bolts to 59 N·m (6.0 kg-m, 43 ft-lb).
- (3) Loosen all bolts completely.
 - (4) Tighten all bolts to 29 N·m (3.0 kg-m, 22 ft-lb).
 - (5) Tighten all bolts to 54 to 64 N-m (5.5 to 6.5 kg-m, 40 to 47 ft-lb) or if you have an angle wrench, turn all bolts 60 to 65 degrees clockwise.
 - Bolts for 4, 5, 12 and 13 are longer than the others.

Rocker arm to shaft clearance may (in): --

L₁: 127 mm (5.00 in) for 4, 5, 12 and 13

L2: 106 mm (4.17 in) for others

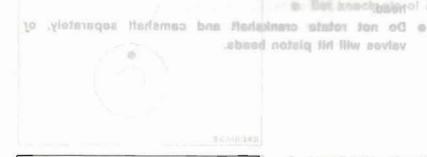


- 4. Install rear belt cover and camshaft sprocket.
- R.H. camshaft sprocket and L.H. camshaft sprocket are different parts. Be sure to install them in the correct positions.

2) Confirm thet Wock	Identification mark	θ	
R.H. camshaft sprocket	e spring R3	0°53′	
L.H. camshaft sprocket	L3	-3°27	

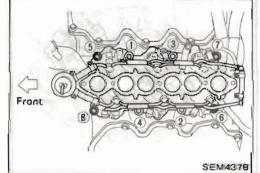
5. Install timing belt and adjust belt tension.

Refer to Installation in "TIMING BELT".

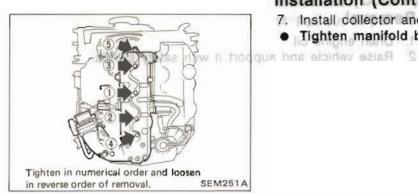




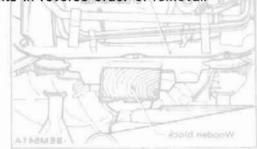
- 6. Install intake manifold, valve litter stude
- Tighten manifold bolts and nuts in two or three stages in reverse order of removal.

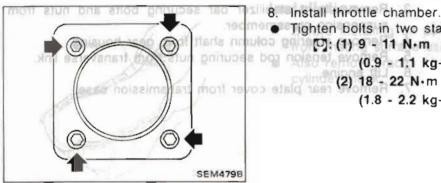


Installation (Cont'd)



- 7. Install collector and collector cover.
- Tighten manifold bolts in reverse order of removal.



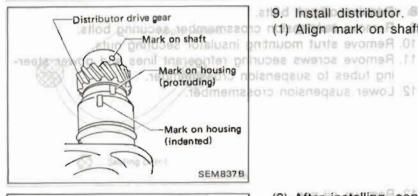


- 8. Install throttle chamber.
- Tighten bolts in two stages.

Harls newloo palle (7): (1) 919 11 N·m and a secrepti

prinus a box notes (0.9 - 1.1 kg-m, 6.5 - 8.0 ft-lb)

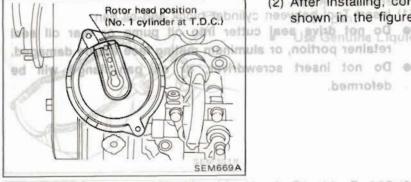
(1.8 - 2.2 kg-m, 13 - 16 ft-lb)



at 9.4 Install distributor. 41 pump gasket and fear oil seal retained

(1) Align mark on shaft with protrusive mark on housing.





Curt here:

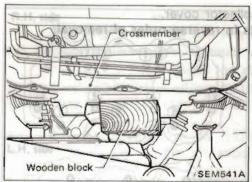
(2) After installing, confirm that distributor rotor head is set as shown in the figure.







deformed.



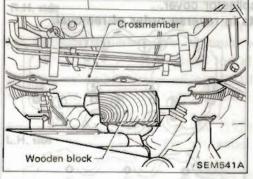
(b toetellations/(Cont/d) Removal lighteder head boilts to be the service using

- 1. Drain engine oil.
 - 2. Raise vehicle and support it with safety stands.

(1) Tighten all bolts to 29 N·m (3.0 m) (2) Tighten all bolts to 59 N-m (6.0 kg/s

(3) Loosen all bolts completely. (4) Tighten all bolts to 29 N·m (3.63) (5) Tighten all boits to 54 to 64 N-miles

degrees clockwise.



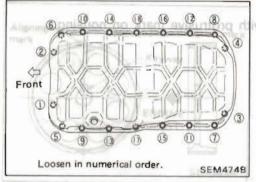
3. Remove front stabilizer bar securing bolts and nuts from suspension crossmember.

SEM251A

ft-lb) or if you have an angle wages to the standard the 85

Javares ha subto enever ni

- 4. Remove steering column shaft from gear housing.
- 5. Remove tension rod securing nuts from transverse link.
 - 6. Lift engine.
 - 7. Remove rear plate cover from transmission case.

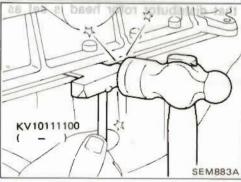


- 8. Remove oil pan bolts. Ind campharters and
- 9. Remove suspension crossmember securing bolts.
- 10. Remove strut mounting insulator securing nuts.
- 11. Remove screws securing refrigerant lines and power steering tubes to suspension crossmember.

Mark on housing (bid nebril)

SEMA798

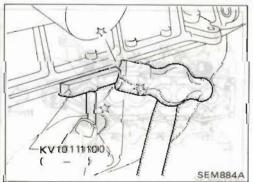
12. Lower suspension crossmember.



- 13. Remove oil pan.
 - (1) Insert Tool between cylinder block and oil pan.
 - Do not drive seal cutter into oil pump or rear oil seal retainer portion, or aluminum mating face will be damaged.

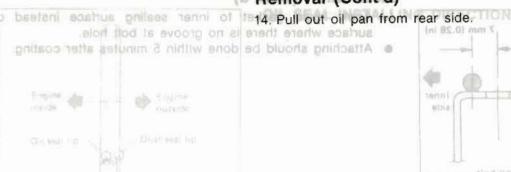
BYEBWEE

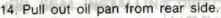
Do not insert screwdriver, or oil pan flange will be deformed.

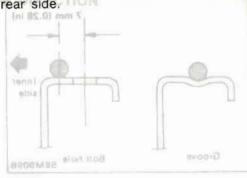


(2) Slide Tool by tapping its side with a hammer, and remove oil paniten manifold boits and nuts in two or three stages in

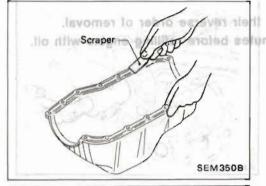
Removal (Cont'd)



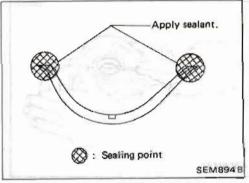




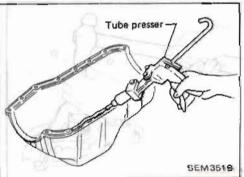
Installation



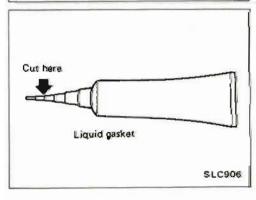
- 1. Before installing oil pan, remove all traces of liquid gasket from mating surface using a scraper.
 - Also remove traces of liquid gasket from mating surface of cylinder block. 4. Apply engine oil to camshaft oil seal and install it using



- 2. Apply sealant to oil pump gasket and rear oil seal retainer gasket, a ming bell and crankshaft sprocket

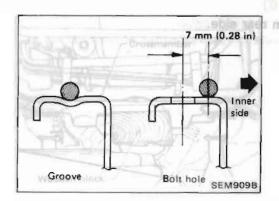


- Apply a continuous bead of liquid gasket to mating surface of oil pan.
- Use Genuine Liquid Gasket or equivalent.



- Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) wide nove flywheel/drive plate,





Installation (Cont'd)

- 4. Apply liquid gasket to inner sealing surface instead of surface where there is no groove at bolt hole.
- Attaching should be done within 5 minutes after coating.

pan, remove all traces of liquid gasket e using a acraper principle boy noted remove traces of liquid gasket from mating surface of

- 5. Install oil pan.
- Install bolts/nuts in their reverse order of removal.
- Wait at least 30 minutes before refilling engine with oil.



: Applyosealments to dil pump gasket and rear oil seal retainer Loose in numerical order

- Remove testespsion orbanishment for the balls
- 11. Remove screws securing refraecapt lines and pr ing lubes to suspension crosses

(5) Sealing point SEMB940

3. Apply a commodus bead of liquid gasket to mating surface KW 101/11/100

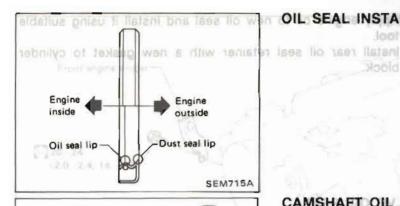
11 Insert Appligativeen cylinde block and out an is a see to rear of grand lib got rest of seel Seeline Liquid Gasket or equivalent retainer portion, or aluminum metho lace whose damaged

> Do not insert screwbriver. all pan fland will be

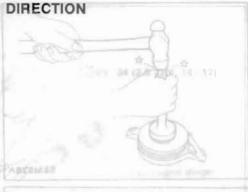
Cut here

SEMBETE





Ilstent one less to with OIL SEAL INSTALLING DIRECTION



KV10110800

SEM284A

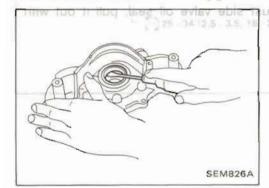
CAMSHAFT OIL SEAL

- 1. Remove timing belt.
- 2. Remove camshaft sprocket.
 - 3. Remove camshaft oil seal.

Be careful not to scratch camshaft.

4. Apply engine oil to camshaft oil seal and install it using suitable tool.

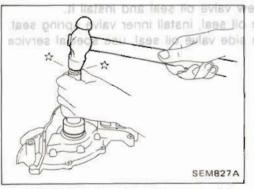
BEM287A



FRONT OIL SEAL

When removing intake

- 1. Remove timing belt and crankshaft sprocket.
- 2. Remove oil pump assembly.
- 3. Remove front oil seal from oil pump body.



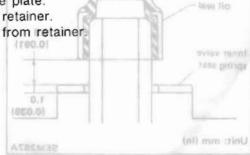
4. Apply engine oil to new oil seal and install it using suitable Before inst,loot; valve

· When installing intake

KV10107501 If or intake valve (abla SEMBERA

brief vd ti tes less lio eviev ebis tsueREAR OIL SEALV

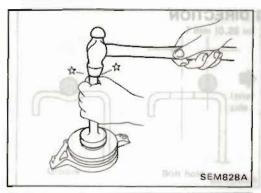
- 1. Remove flywheel/drive plate.
- 2. Remove rear oil seal retainer.
- 3. Remove rear oil seal from retainer.

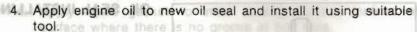


PylaV

OIL SEAL REPLACEMENT

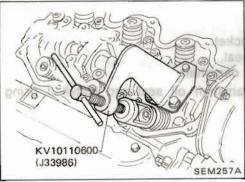
Installation (Cont'd)





5. Install rear oil seal retainer with a new gasket to cylinder block.



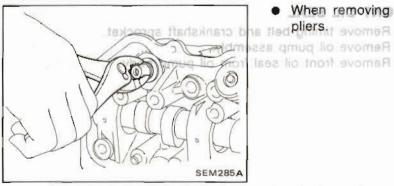


VALVE OIL SEAL

3. Remove front oil seal

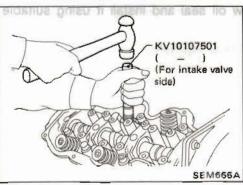
Remove rocker cover.

- 2. Remove rocker shaft assembly and valve lifters with valve lifter guide.
- 3. Remove valve springs and valve oil seal.
- Piston concerned should be set at T.D.C. to prevent valve from falling off.
- When removing intake side valve oil seal, use Tool.



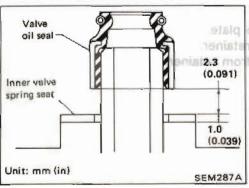
When removing exhaust side valve oil seal, pull it out with



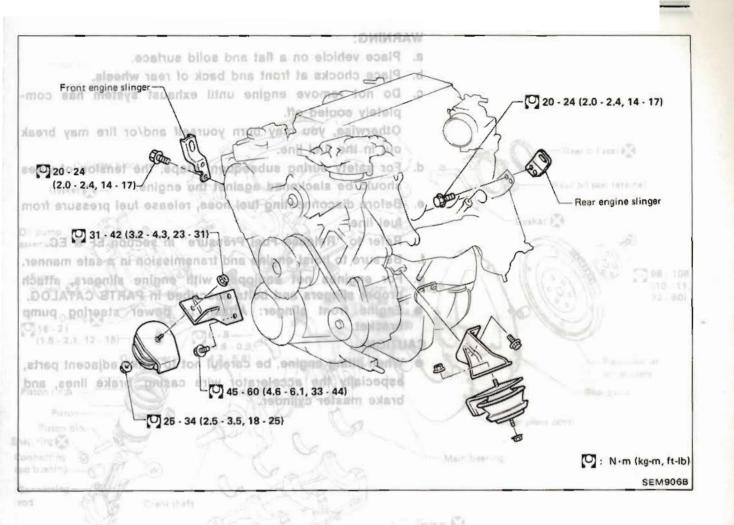


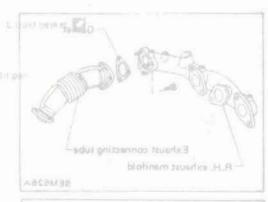
- 4. Apply engine oil to new valve oil seal and install it.
 - Before installing valve oil seal, install inner valve spring seat.

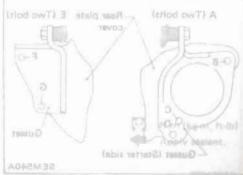
When installing intake side valve oil seal, use special service tool.



When installing exhaust side valve oil seal, set it by hand.







Remove R.H. exhaust manifold and exhaust connecting tube.

then separate engine and transmission

(Hen separate engine and transmission

(Hen separate engine and transmission)

Gard 19 7 - II 19.7 - 0.6, 5 | 0.81 - 1 Oracle (1) - 0 29 - 19 (3.0 - 4.0, 72 - 29) Washer 3

 When installing engine gussets tighten bolts in 6 stages as shown below

				160	Tightsening on
766	ma	44%	D)E	2nd	net
A*2 and 6*2	329	P*2 und G*2	STA.	2.0	FA

- 1: Tighten temporarily
- *2: Tighten completely

[4]: 29 - 39 N-m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)



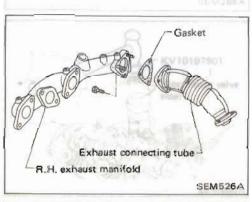
WARNING: WAR

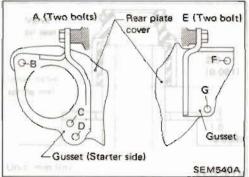
- a. Place vehicle on a flat and solid surface.
- b. Place chocks at front and back of rear wheels.
- c. Do not remove engine until exhaust system has completely cooled off.
 - Otherwise, you may burn yourself and/or fire may break out in the fuel line.
- d. For safety during subsequent steps, the tension of wires should be slackened against the engine.
- e. Before disconnecting fuel hose, release fuel pressure from fuel line.
 - Refer to "Release Fuel Pressure" in section EF & EC.
- Be sure to hoist engine and transmission in a safe manner.
- g. For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.
- Engine front slinger: Attach to power steering pump bracket. ine interest side valve oil seal

CAUTION:

 When lifting engine, be careful not to strike adjacent parts, especially the accelerator wire casing, brake lines, and brake master cylinder.

D 26 - 34 [2.5 - 3.8, 18 - 28]





Remove R.H. exhaust manifold and exhaust connecting tube, then separate engine and transmission.

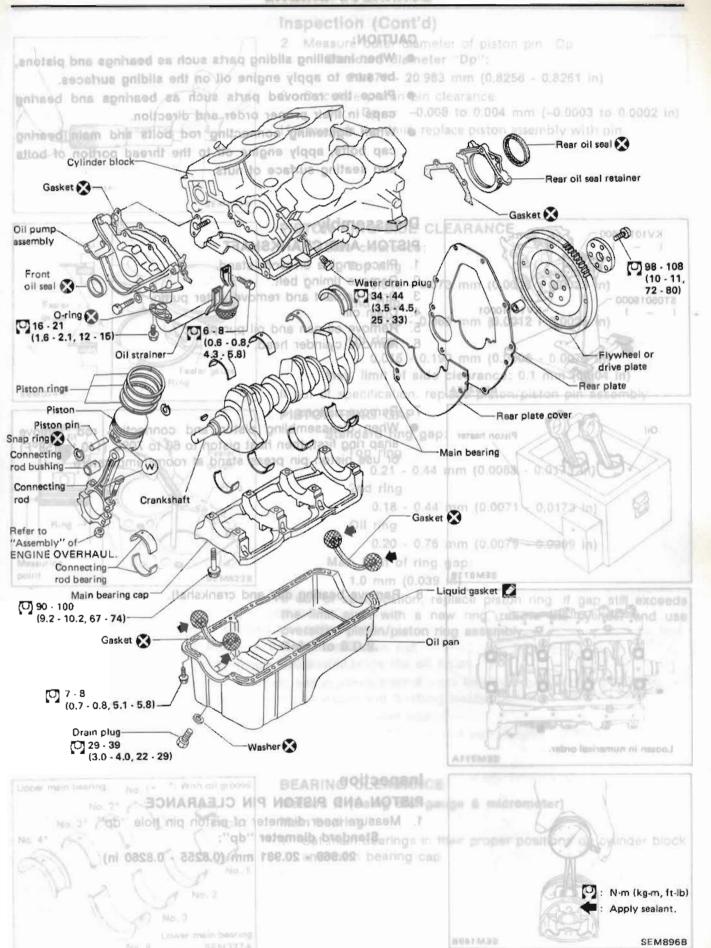
When installing engine gussets, tighten bolts in 6 stages as shown below.

Tightening order

1st	2nd	3rd	4th	5th	6th
A*1	D*2	A*2	F*2 and G*2	E*2	A*2 and E*2

- 1: Tighten temporarily.
- *2: Tighten completely.

☼: 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)



CAUTION:

- When installing sliding parts such as bearings and pistons, be sure to apply engine oil on the sliding surfaces.
- Place the removed parts such as bearings and bearing caps in their proper order and direction.
- When tightening connecting rod bolts and main bearing cap bolts, apply engine oil to the thread portion of bolts and seating surface of nuts.

gressure from

001-06[1]

(9.2-10.2, 87-74)

Gosten W. W.

(0.7 - 0.8, 6.7 - 6.8)

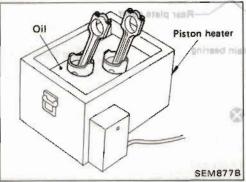
(3.0 - 4.0, 22 - 29)

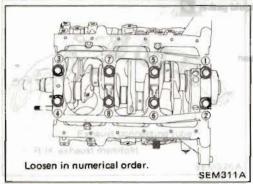
77.29 - 30

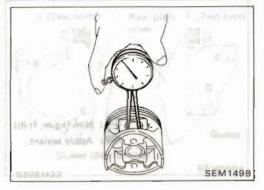


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SEM308A







Disassembly

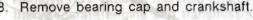
PISTON AND CRANKSHAFT

- Place engine on work stand.
- 2. Remove timing belt.
- 3. Drain coolant and remove water pump.
- 4. Drain oil.
- Remove oil pan and oil pump. 5.
- Remove cylinder head.
- Remove pistons.
- When disassembling piston and connecting rod, remove snap ring first, then heat piston to 60 to 70°C (140 to 158°F) or use piston pin press stand at room temperature.

Sterator wire carlot

one, be cheek not to allike adjacent perts.

Crammination



Inspection

PISTON AND PISTON PIN CLEARANCE

* Swiggly

Measure inner diameter of piston pin hole "dp". Standard diameter "dp":

20.969 - 20.981 mm (0.8255 - 0.8260 in)

order in two or three stages Micrometer SEM821B

Inspection (Cont'd)

2. Measure outer diameter of piston pin "Dp".

Standard diameter "Dp":

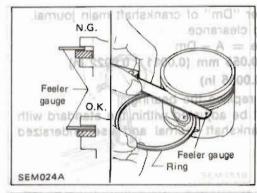
20.971 - 20.983 mm (0.8256 - 0.8261 in)

3. Calculate piston pin clearance.

dp - Dp = -0.008 to 0.004 mm (-0.0003 to 0.0002 in)

If it exceeds the limit, replace piston assembly with pin.

0.014 - 0.054 mm (0.000g3 (35.5)



PISTON RING SIDE CLEARANCE

Side clearance:

Top ring ndard: 0.028

0.040 - 0.073 mm (0.0016 - 0.0029 in)

2nd ring

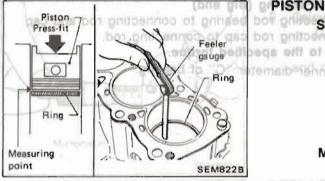
0.030 - 0.063 mm (0.0012 - 0.0025 in)

Oil ring

0.015 - 0.190 mm (0.0006 - 0.0075 in)

Max. limit of side clearance: 0.1 mm (0.004 in)

If out of specification, replace piston/piston pin assembly.



PISTON RING GAP

ing, grind or

Standard ring gap: spoting rod

Top ring

0.21 - 0.44 mm (0.0083 - 0.0173 in)

2nd ring

0.18 - 0.44 mm (0.0071 - 0.0173 in)

Oil ring

0.20 - 0.76 mm (0.0079 - 0.0299 in)

Max. limit of ring gap:

1.0 mm (0.039 in)

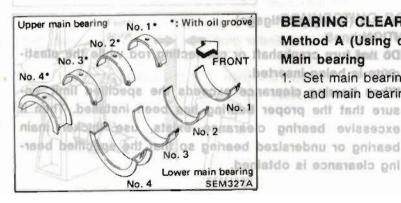
lamuo nig madainma lo "qQ" apper If out of specification, replace piston ring. If gap still exceeds sometissis princed bot of the limit even with a new ring, rebore the cylinder and use qu - 0 = least policy published oversized piston/piston ring assembly.

ni 1200.0 - 8000.0) mm 480.0 - 10. Refer to S.D.S. e rod (n) 3500.0) mm 100000000000 lalign the oil holes

setsment object the designee cannot be adjusted within the standard, with

esia anyiabatang, grind crankshaft journal and use undersized

Refer to step 7 of "MAIN BEARING CLEARANCE".



BEARING CLEARANCE

used southerd lights better the control of the control of the control

Method A (Using dial gauge & micrometer) Main bearing

1. Set main bearings in their proper positions on cylinder block and main bearing cap.

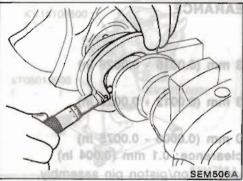
EMY42

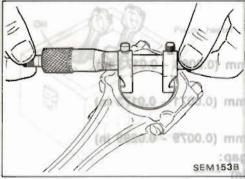
prinsage - 20.994 mm (0.8261 - 0.8265 in)

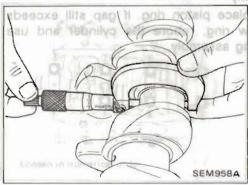
ARREMITE

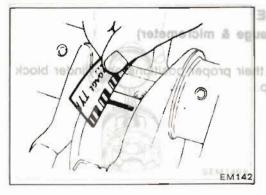
excessive bearing











Inspection (Cont'd)

2. Install main bearing cap to cylinder block. Tighten all bolts in correct order in two or three stages.

and bearing

3. Measure inner diameter "A" of main journal.

ungillin fileir proper order at

and seeting surface of nuts.



4. Measure outer diameter "Dm" of crankshaft main journal.

STERNIST B

Calculate main bearing clearance. Main bearing clearance = A - Dm Standard: 0.028 - 0.055 mm (0.0011 - 0.0022 in) Limit: 0.090 mm (0.0035 in)

cap bolts, apply engine oil to the thread per

If it exceeds the limit, replace the bearing.

If the clearance cannot be adjusted within the standard with any bearing, grind crankshaft journal and use undersized bearing. Fairler guoge Max. limit of side

Connecting rod bearing (Big end)

If out of specification,

1. Install connecting rod bearing to connecting rod and cap.

Install connecting rod cap to connecting rod. Tighten bolts to the specified torque.

Measure inner diameter "C" of bearing.

0.18 - 0.44 Oil ring 0.20 - 0.76 Max. limit of ring

1.0 mm (0.039

4. Measure outer diameter "Dp" of crankshaft pin journal. 5. Calculate connecting rod bearing clearance.

BEMB22B

noteig Connecting rod bearing clearance = C - Dp Standard: 0.014 - 0.054 mm (0.0006 - 0.0021 in) Limit: 0.090 mm (0.0035 in)

6. If it exceeds the limit, replace the bearing.

7. If the clearance cannot be adjusted within the standard with any bearing, grind crankshaft journal and use undersized bearing.

Refer to step 7 of "MAIN BEARING CLEARANCE".

Method B (Using plastigage) CAUTION: SIE BARRON PIN CLEAR ANCE

Do not turn crankshaft or connecting rod while the plastigage is being inserted.

 When bearing clearance exceeds the specified limit, ensure that the proper bearing has been installed. Then if excessive bearing clearance exists, use thicker main bearing or undersized bearing so that the specified bearing clearance is obtained.

SEMBRIA

Inspection (Cont'd)

Main bearing clearance:

out to soone, bias, wear or crecks

10-fuo bhe 19gel 101 glamuoj enuasem neterno 0.028 - 0.055 mm (0.0011 - 0.0022 in)

Eimitdaguchner dienst

(Y-X) bruot-10,090 mm (0,0035 in)

(al coop.0) mm 200.0 n Connecting rod bearing clearance:

Standard

(ml \$000.0) mm 200.0 nertt see 0.014 - 0.054 mm (0.0006 - 0.0021 in)

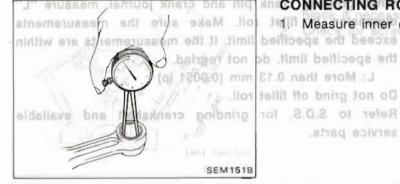
Limit: (A-B-C):

0.090 mm (0.0035 in)

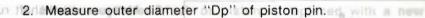
CONNECTING ROD BUSHING CLEARANCE (Small end)

Our-of-round: X -

1. Measure inner diameter "C" of bushing.



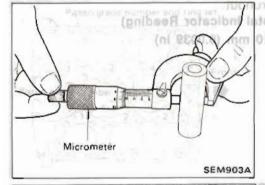




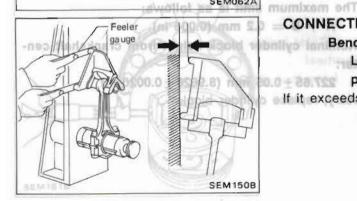
3. Calculate connecting rod bushing clearance.

Or 0 Dp = 0.005 - 0.017 mm (0.0002 - 0.0007 ln)

If it exceeds the limit, replace connecting rod assembly and/or piston set with pin.



asize the distor-Amount of cylinde SEM062A



REPLACEMENT OF CONNECTING ROD SMALL END BUSHING

1. Drive in the small end bushing until it is flush with the end surface of the rod.

Be sure to align the oil holes.

2. After driving in the small end bushing, ream the bushing. Small end bushing inside diameter:

enigne of the Finished size: Transa "B

ebnilyo to thus 20.982 - 20.994 mm (0.8261 - 0.8265 in)

Less than 0.1 mm 10.004 int

CONNECTING ROD BEND AND TORSION

Bend and torsion:

Limit 0.1 mm (0.004 ln)

per 100 mm (3.94 in) length

If it exceeds the limit, replace connecting rod assembly.

mm (0.0035 its) Taper: A - B Out-of-round: X - Y SEM316A 000 mm 020.0

Inspection (Cont'd) CRANKSHAFT Wing cap to cylinder ble

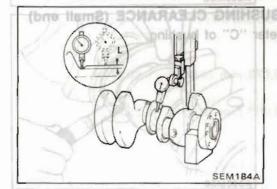
- 1. Check crankshaft journals for score, bias, wear or cracks.
- 2. With a micrometer, measure journals for taper and out-ofround.

Out-of-round (X-Y):

had princed boy pal Less than 0.005 mm (0.0002 in)

Taper (A-B):

00.0) mm 430.0 - aro Less than 0.005 mm (0.0002 in)

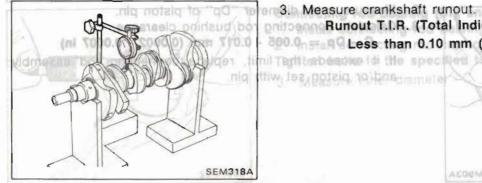


a. When grinding crank pln and crank journal, measure "L" dimension in fillet roll. Make sure the measurements exceed the specified limit. If the measurements are within the specified limit, do not regrind.

L: More than 0.13 mm (0.0051 in)

- b. Do not grind off fillet roll.
- Refer to S.D.S. for grinding crankshaft and available service parts.

BENISTE



3. Measure crankshaft runout. midsud bot prifteene Runout T.I.R. (Total Indicator Reading) and car 300.0 Less than 0.10 mm (0.0039 in)



1. Clean upper face of cylinder block and measure the distorone liation, ar recting roof bearing clearance C - Do

bot ar Limit indiget: 0.014 - 0.054 mm (0.0008, - 0.0021 in)

lio edi nolle 0.10 mm (0.0039 in) assis

2. If out of specification, resurface it. The resurfacing limit is determined by the cylinder head resurfacing in engine.

Amount of cylinder head resurfacing is "A" Amount of cylinder block resurfacing is "B"

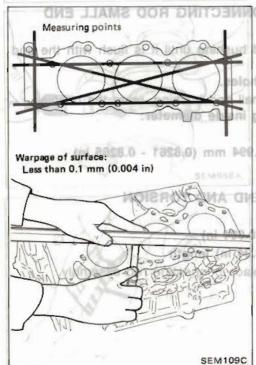
The maximum limit is as follows:

A GI 38 GOS ONIT A + B = 0.2 mm (0.008 in)

Nominal cylinder block height from crankshaft cen-) men 1:0 timiliterin crankshall or connet

227.65 ± 0.05 mm (8.9626 ± 0.0020 in)

3. If necessary, replace cylinder block.





(blnspection (Cont'd) PISTON-TO-BORE CLEARANCE

1. Using a bore gauge, measure cylinder bore for wear, yd benimeteb ei e Standard inner diameter: side of the pister air note

A ne email noteig 87.00 87.05 mm (3.4252 - 3.4272 in)

noitalubles exis beto Refer to S.D.S.

- 8 + A Out-of-round (X-Y):

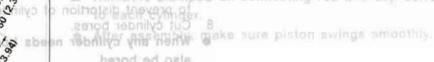
Limit 0.015 mm (0.0006 in)

Taper (A-B-C):

Limit 0.015 mm (0.0006 in)

If it exceeds the limit, rebore all cylinders. Replace cylinder neels end-of-riblock if necessary, paneeting roa and new sn

sonavolle 2. Check for scratches or seizure. If seizure is found, hone it. so princed wise later bed on connecting rod and cap correspond



(0.0002 to 0.0016)

SEM320A

out of

permeeers

also be bored. Do not cut too much

Cut only 0.05 mm (0.0 (ini) mm: rinUe

Piston grade number and ring set Front Piston grade number SEM557A

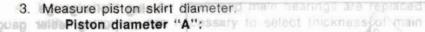
exe ext et

bcylinder be

2.0

clear clear

If either cylinder block or piston is replaced with a new one, select piston of the same grade number punched on cylinder block upper surface.



nwob.

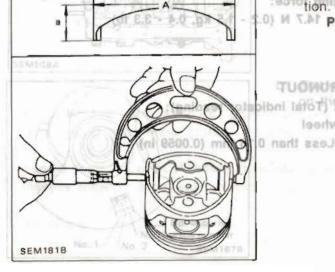
Refer to S.D.S.

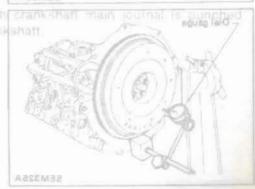
Measuring point "a" (Distance from the bottom): 20 mm (0.79 in)

Check that piston-to-bore clearance is within the specifica-: sorotion.

0) M T.AT Piston-to-bore clearance "B": 0.025 - 0.045 mm (0.0010 - 0.0018 in)







Flywheel

Inspection (Cont'd)

30/AAA3 5. Determine piston oversize according to amount of cylinder wear.

Oversize pistons are available for service. Refer to S.D.S.

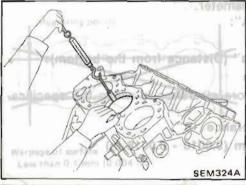
6. Cylinder size is determined by adding piston-to-bore clear-

Rebored size calculation:

$$(A - X)$$
 brown $D = A + B - C = A + [0.005 \text{ to } 0.025 \text{ mm}]$

where,

- (nt account and ato,o time D: Bored diameter
 - A: Piston diameter as measured
 - B: Piston-to-bore clearance
 - C: Honing allowance 0.02 mm (0.0008 in)
 - Install main bearing caps, and tighten to the specified torque to prevent distortion of cylinder bores in final assembly.
 - Cut cylinder bores.
 - When any cylinder needs boring, all other cylinders must also be bored.
 - Do not cut too much out of the cylinder bore at a time.
 Cut only 0.05 mm (0.0020 in) or so in diameter at a time.
- 9. Hone the cylinders to obtain specified piston-to-bore clear-
- 10. Measure the finished cylinder bore for out-of-round and taper.
 - Measurement should be done after cylinder bore cools down.



enthe limit repore all cylinders. Replace cylinder

miches or seizure, if seizure is found, hone it

Dial gauge SEM325A

Using feeler gauge

When pulling feeler gauge straight upward, measure the extracting force. It is recommended that piston and cylinder be heated to 20°C (68°F).

Feeler gauge thickness:

0.04 mm (0.0016 in)

Extracting force:

Amount of cylinder

2.0 - 14.7 N (0.2 - 1.5 kg, 0.4 - 3.3 lb)

FLYWHEEL RUNOUT

Runout (Total indicator reading):

the et galactrover band reput of cylinder band resurracing is a

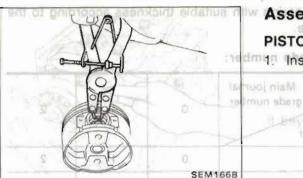
The maximum limit is an toillow

Flywheel

Less than 0.15 mm (0.0059 in)

(Massonblyd(Contild)

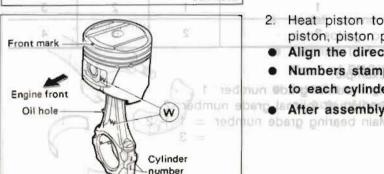
journal grade number



Assembly looked and part

PISTON

1. Install a new snap ring on one side of the piston pin hole.

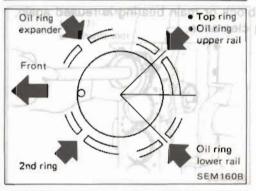


SEM897B

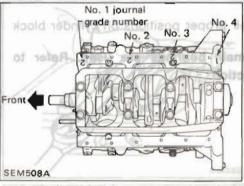
- 2. Heat piston to 60 to 70°C (140 to 158°F) and assemble piston, piston pin, connecting rod and new snap ring.
- Align the direction of piston and connecting rod.

I serving the the the the the transfer bearing with a new ...

- Numbers stamped on connecting rod and cap correspond red nun so to each cylinder; a that oil hole in connecting rod aligns with
- After assembly, make sure piston swings smoothly.



- 3. Set piston rings as shown.
- political elaminative semi corresponding cylinders will! Too!
 - Arrange so that front mark on pustor have faces lowers



- 4. If crankshaft, cylinder block and main bearings are replaced with new ones, it is necessary to select thickness of main bearings as follows:
- a. Grade number of each cylinder block main journal is punched on the respective cylinder block.

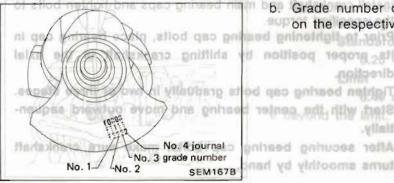
(3.9 to 4.5 kg-m. 28 to 36 tight



(2) Tighten to 38 to APW-nt

b. Grade number of each crankshaft main journal is punched on the respective crankshaft.

\$5 degrees



on thing position is notified position in shifting ora William or per partie of the graduality of the graduality Lidly theis replace connecting red and or crankanall. After securing bearing turns smoothly by han SEMBIOA

Assembly (Cont'd)

c. Select main bearing with suitable thickness according to the following table.

slort nig notsig ant to able and no pri Main bearing grade number:

	Main journal grade number kshaft nal grade number		<u> </u>	2
IĮQ.	whore,	0	(AME	2
Marian Marian Marian Marian Marian	A: Piston diame	ter as messu	2	3
60° to 70°C (140 to 158°F) and assemble in connecting rod and new snap ring.	the second secon	e clearance	3	4
ion of piston and connecting rad.	TOTAL SELECTION THE CHEEK	BIRGH U.UZ IIII	Summer	7

bnogeemoo gao bas bor galloeanoo ao For example: data

Main journal grade number: 1 windooma apniws noteig erus sales Crankshaft journal grade number: 2 Main bearing grade number = 1 + 2

Cut only 0.05 mm (0.0020 in) predmuke

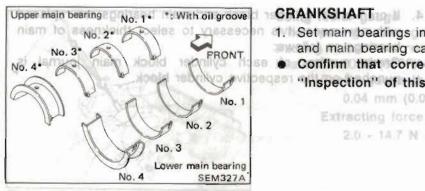
s Do not cut too much out of thenical

nworld 5. If crankshaft, cylinder block or main bearing is reused again, measure main bearing clearance.

Measurement should be done attended.



SEMBORA

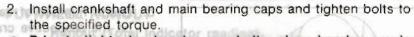


- No. 1 journal 1. Set main bearings in their proper positions on cylinder block and main bearing cap.
- Confirm that correct main bearings are used. Refer to "Inspection" of this section.

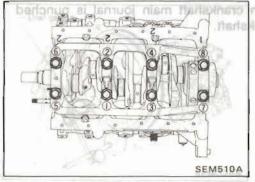


Extracting force:

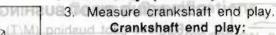
0.04 mm (0.0016) i



- Prior to tightening bearing cap bolts, place bearing cap in its proper position by shifting crankshaft in the axial
- Tighten bearing cap bolts gradually in two or three stages. Start with the center bearing and move outward sequen-
- After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.



Assembly (Cont'd)



Standard

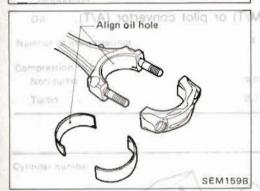
0.05 - 0.17 mm (0.0020 - 0.0067 in)

Limit

0.30 mm (0.0118 in)

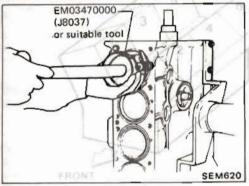
If beyond the limit, replace bearing with a new one.

SEMBland Introduction



SEM511A

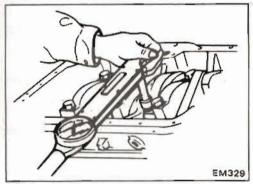
- dig to 1 4. Install connecting rod bearings in connecting rods and connecting rod caps.
 - Confirm that correct bearings are used. Refer to "Inspection" of ENGINE OVERHAUL.
 - Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.



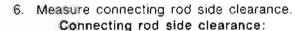
- 5. Install pistons with connecting rods.
- (1) Install them into corresponding cylinders with Tool.
- Be careful not to scratch cylinder wall by connecting rod.

всагиза

 Arrange so that front mark on piston head faces toward front of engine.



- (2) Install connecting rod bearing caps.
- Tighten connecting rod bearing cap nuts to the specified torque.
 - (1) Tighten to 14 to 16 N·m (1.4 to 1.6 kg-m, 10 to 12 ft-lb).
 - (2) Tighten to 38 to 44 N·m
 (3.9 to 4.5 kg-m, 28 to 33 ft-lb) or if you have an angle wrench, tighten bolts 60 to 65 degrees clockwise.



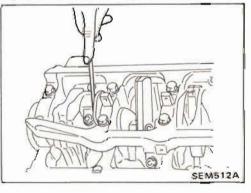
Standard

0.20 - 0.35 mm (0.0079 - 0.0138 in)

Limit

0.40 mm (0.0157 in)

If beyond the limit, replace connecting rod and/or crankshaft.



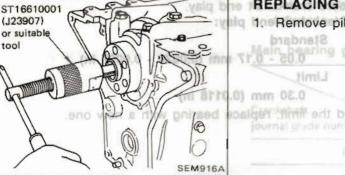
Assembly (Cont'd)

REPLACING PILOT BUSHING

- 1. Remove pilot bushing (M/T) or pilot convertor (A/T).
 - Stendard in bearing grade number



If beyond the "limit" replace bea



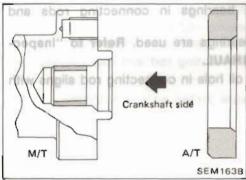
2. Install pilot bushing (M/T) or pilot convertor (A/T).

AFTEMBE

- confecting rod caps. Ocniera that cornect ties

 - primed to elogational grade numb

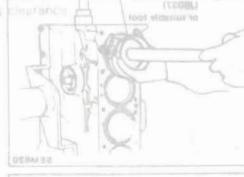
h nedmon opinetalhoestragerso that di hole in or



risgs. Emissionegacy and examine the properties with connecting rods. concrued profit that all theorem anto corresponding cylinders with Tool

 Be careful not to scratch cylinder wall by connecting rod. · Arrange so that front mark on piston head faces toward

front of engine.



(2) Install beringtind bearing cape. amousce regard tent . It is a lighter connecting rod bearing cap note to the specified

rankt and main exprets cap Inerroo [49] TIERRIEN TO 94 to 16 N-m

holloes sint to "notice and to me 10 to 12 mile. (2) Tighten to 38 to 44 W-m

(3.9 to 4.5 kg-ml, 28 to 38 flelb) or if you have an angle wrench, tighten bolts 60 to 65 degrees clockwise. EMIZZO

s) slied aptroptybra was consed and bea Messors convecting rod side clearance Support Connecting rod side elegrance:

(mi varo.o) mm when bearing cap bolts graph

a After securing boaring cap though turns smoothly by handasramae

· biebning ightening bearing cap holes place Sparing cap in this setted - 2700.0) mm as 0. Hos Broper position by shifting washahat of the axial

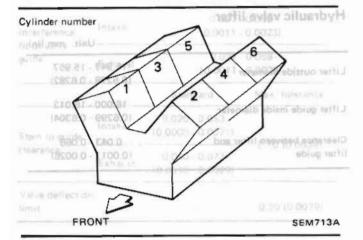
princed refreseworld the will replace connecting rod and/or crankshaft. The second second

EM-46

Inspection and Adjustment (Cont'd) member | General Specifications

Cylinder arrangement	V-6
Displacement cm3 (cu i	n) 2,960 (180.62)
Bore and Stroke mm (in)	87 x 83 (3,43 x 3.27)
Valve arrangement	# 1 034 O.H.C. () 2 423)
Firing order	1-2-3-4-5-6
Number of piston rings	474ban0.4738) (0.4812 0.4817)
Compression	2
40 0/250,1 (40.0/28/6, 1 575/86/2)	1980 7 000 7 188 (0.0756 0.0756)ed beldmass
Number of main bearings	lettimi "gal 4 mi) Mirmin
Compression ratio	10 0150 0 31571
Non-turbo	9.0
	AUCH MINE 8.3 PRINCE TO THE

Valve guide



	Des member
Record shall	
Outsi digmetar	
Redder pres	
Iroar digmeter	
Displance netween locks: and	

COMPRESSION PRESSURE GASH ASSUMENTS

between cylinders

3 m 1 mm - 3298/87/39/39/3		
(0.0989) 6/2 /	Non-turbo	Turbo
Compression pressure Standard	1,196 (12.2, 173)/300	1,167
Minimum	883 (9.0, 128)/300	863 (8.8, 125)/300
Differential limit	09 (1.0. 14)/200	98 /1.0. 141/200

98 (1.0, 14)/300

Unit: kPa (kg/cm², psi)/rpm

98 (1.0, 14)/300

401-05		Harlan
0.0207	10 500 14415	1 = 5761 viva
Listumon) segrets	Cylinder head	
0188-02-016 [18]		
(m 800.038752M		
SEMON28	46	
7		
Ind. mm. naU	41.6. 41.8 (1.638 - 1.646) due	ALVE
steri mini tojy	hickness)	r nigraM) T
Exhaust valve sea Standary	6	2
rimpen .	7	
6871688	1-1	
	-0-1	etemeto bearl svid
Fraa 1 48841.		white
(2 (1,378 · 1,386)	at 0 at 32 5 37 7	Exhibiti
	- (1.7m) 1.2m/1.du	
5,9 (4,933 - 4,957)	8 M 1 1 1 28.3 - 12	erletni.
4.8 (4.890 - 4.913) (1000.01 0.01 mm	124.2 - 12	Exhjust
RQ 3 - 0 5		alve stern Giamete
10 (0,2195); (0.2248b)	9580 00 3 16 11 4764 1	6761-1 8X61n1

Exhlust 7.948 - 7.980 (0.3134) "o" alone their ovisV. intake 45,18, 18,29 Extractr "T" nigram avlaV postni... Exhaust 34 6 | 1 364 | 1 100 | 5 in migram evist Maps thin 0.5 (0.020) Valve stem and surface Less than 0.2 10,908 hom prott grinding tents

> Valve clearance (0) 0 Intake Extractoral 1010

Inspection and Adjustment

CYLINDER HEAD SANSSER MOISSERGMOD Valve spring

ing: yes (ug/cm², pilltepm	2	Unit: mm (in)
Louis A	Standard	Limit
Head surface distortion	Less than 0.05 (0.0020)	0.1 (0.004)
Height (July muminim Market Comment of the C
		Height (nominal) 107±0.2 mm (4.213±0.008 in)
Valential or	on their piets	SEM082B

VALVE

T (Margin thickness) SEM188

Unit: mm (in)

Valve head diameter "D"

Intake 420 - 42.2 (1.654 - 1.661)

Exhaust 35.0 - 35.2 (1 378 - 1.386)

Valve length "L"

Intake 125.3 - 125.9 (4,933 - 4,957)

Exhaust 124.2 - 124.8 (4.890 - 4.913)

Valve stem diameter "d"

Intake 6.965 - 6.980 (0.2742 - 0.2748) Exhaust 7.945 - 7.960 (0.3128 - 0.3134)

Valve seat angle "o"

Intake 45° 15' - 45° 45' Exhaust

Valve margin "T"

Intake 1.3 (0.051) Exhaust 1.5 (0.059)

Valve margin "T" limit More than 0.5 (0.020)

Valve stem end surface Less than 0.2 (0,008) granding limit

Valve clearance

Intake 0 (0) Exhaust 0 (0)

			and the second s
	2,960 [180	Outer	51.2 (2.016)
Free height mm (in)		Inner	(ni) min 44.1 (1.736) ne snoë
Pressure height	0.H.C	Outer	30.0/523.7 (30.0/53.4, 1.181/117.7)
mm/N (mm/kg, in/lb)		Inner	25.0/255.0 (25.0/26.0, 0.984/57.3)
Assembled heig	(M/T) or p	Outer	40.0/250.1 (40.0/25.5, 1.575/56.2)
mm/N (mm/kg, in/lb)		Inner	35.0/107.9 (35.0/11.0, 1.378/24.3)
	0.0	Outer	2.2 (0.087)
Out of square	t of square E. 8 mm (in)	Inner	1.9 (0.075)

Cylinder arran

Cylinder number

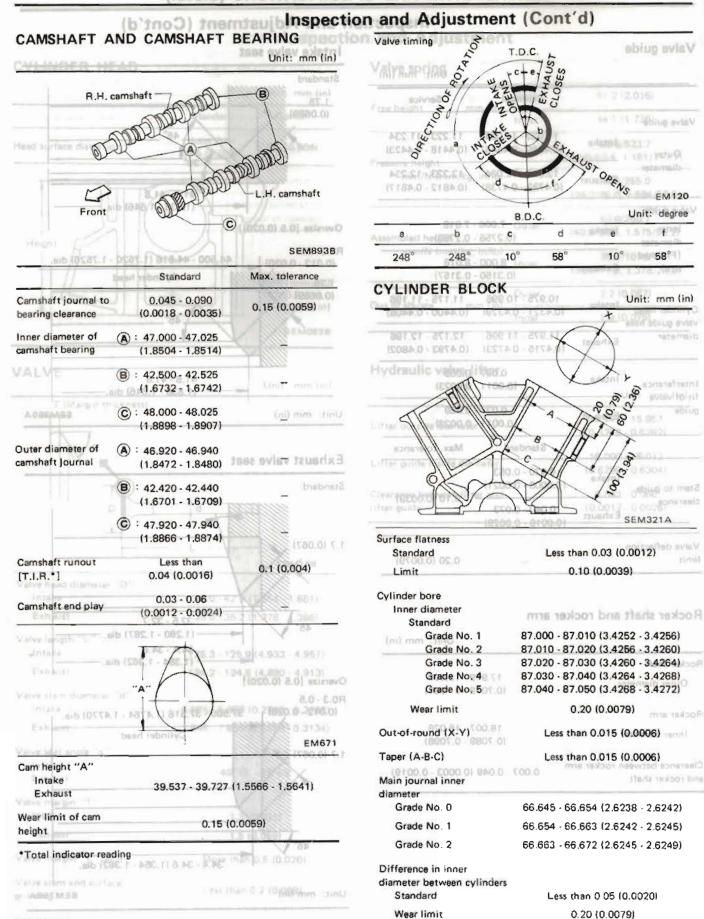
FRONT

Hydraulic valve lifter

SEMPTEA

Unit: mm (in) 15.947 - 15.957 Lifter outside diameter (0.6278 - 0.6282) 16.000 - 16.013 Lifter guide inside diameter (0.6299 - 0.6304) 0.043 - 0.066 Clearance between lifter and lifter guide (0.0017 - 0.0026)

(b'thoo) themtaulbInspection and Adjustment (Cont'd) CAMSHAFT AND CAM Valve guide ISTON RIMO AND Intake valve seat PISTON PIN Unit: mm (in) Standard Standard Service 1.75 (0.0689)Valve guide 45° 11.023 - 11.034 11.223 - 11.234 Intake (0.4340 - 0.4344) (0.4418 - 0.4423) Outer diameter 12.223 - 12.234 12.023 - 12.034 Exhaust (0.4733 - 0.4738) (0.4812 - 0.4817)41.6 - 41.8 (1.638 · 1.646) dia. Valve guide 7.000 - 7.018 Oversize [0.5 (0.020)] Inner Intake (0.2756 - 0.2763) diameter R0.3 - 0.5 Finished 44.500 - 44.516 (1.7520 - 1.7526) dia. (0.012 - 0.020) 8.000 - 8.018 Exhaust sizel Cylinder head (0.3150 - 0.3157) 1.75 (0.0689)or ismure! FlammeD 10.975 - 10.996 11.175 - 11.196 Intake Cylinder head (0.4321 - 0.4329)(0.4400 - 0.4408)valve guide hole b nimiri 12.175 - 12.196 11.975 - 11.996 diameter Exhaust (0.4715 - 0.4723) (0.4793 - 0.4802) $0.027 \cdot 0.059$ 41.6 - 41.8 Intake Interference (0.0011 - 0.0023) (1.638 - 1.646) dia. fit of valve C1: 48,000 - 48,025 0.027 - 0.059 guide Unit: mm (in) SEM755A Exhaust (0.0011 - 0.0023) Outer diameter of Standard Max, tolerance A 45,920 45,940 Exhaust valve seat emperal Libraria (1,8472-1.8480) $0.020 \cdot 0.053$ Intake 11 558.0 - 6503.0 (Bee 62.420a 62.440 Standard (0.0008 - 0.0021)Stem to guide 0.10 (0.0039) 16° (a.1 - 10 (a.1) clearance 0.040 - 0.073 Exhaust 0 or 2000 0-19 00 19 92003 to 0 I DALEEMER (0.0016 - 0.0029) 1.7 (0.067) 22 969 20.081 (0.65 Valve deflection Cemetra 0.20 (0.0079) limit TOTAL T toner diameter Rocker shaft and rocker arm 32.5 - 32.7 (1.280 - 1.287) dia. 87 000 - 87 010 (3.4252 - 3.4256) Unit: mm (in) 34.4 - 34.6 (1.354 - 1.362) dia.-87 020 - 87 030 (3 4260 - 184 020 TR Grade No. 3 87 030 - 87 040 (3 42) 17,979 - 18,000 Oversize [0.5 (0.020)] Outer diameter (3.6) 080 78 - 040.78 (0.7078 - 0.7087) R03-05 Weer limit (0.012 - 0.020)37.500 - 37.516 (1.4764 - 1.4770) dia. Rocker arm 18.007 - 18.028 Cylinder head Inner diameter at 0.0 nerty am.1 PYFNRAS (0.7089 - 0.7098)1.7 (0.067) Clearance between rocker arm 0.007 - 0.049 (0.0003 - 0.0019) and rocker shaft Grade No. 0 66.645 - 66 654 (2.8238 - 2.6242) Mear 1 66.654 · 66 663 (2.6242 · 2.6245) Grade No. 1 rrigisri Grade No. 2 66,683 - 66,672 (2,6245 - 2,6249) 34.4 - 34.6 (1.354 - 1.362) dia. Difference in Inner diameter between cylinders Unit: mm (in) SEM756A Less than 0.05 (0.000) West Urnit



(b'tno2) tnemtaujb/Inspection and Adjustment (Cont'd)

PISTON, PISTON RING AND PISTON PIN VA

Available piston Unit: mm (in) a: 20 mm (0.79 in)

SEM8911

0.50 (0.0197) oversize (Service)	87.465 - 87.515 (3.4435 - 3.4455)
0.25 (0.0098) - oversize (Service)	87.215 - 87.265 (3.4337 - 3.4356)
Grade No. 5	87.005 - 87.015 (3.4254 - 3.4258)
Grade No. 4	86.995 - 87.005 (3.4250 - 3.4254)
	86.975 - 86.985 (3.4242 - 3.4246) 86.985 - 86.995 (3.4246 - 3.4250)
Grade No. 1	86.965 - 86.975 (3.4238 - 3.4242)
	Grade No. 2 Grade No. 3 Grade No. 4 Grade No. 5 0.25 (0.0098) oversize (Service) 0.50 (0.0197)

SEMBERA

8010

No. 2 and 3 main bearing

Identification color	"w" misw (nil) mm	Thickness 'T' mm (in)	Grade
Black		1,817 - 1,821 (0.0715 - 0.0717)	0
Brown		1.821 - 1.825	ì
Crawn	19.0	1.825 - 1.829 (0.0710 - 0.0720)	2
wolley		1 829 - 1.833 (0.0720 - 0.0722)	ε
BUIS		1,833 1,837 (0.0723)	

Piston ring VEOUS COMPONENTRAMEDIMARO Unit: mm (in)

(in) mm sileU Unit: mm (in)		
Frywhael	Standard	C" albLimit of mate
Side clearance Top	0.040 - 0.073	1 .ol/ ebenD 5 .ol/ ebenD 0.1 (0.004)
2nd 92.1 - 1386.1) A18.	0.030 - 0.063 (0.0012 - 0.0025)	Pin journal dia, "Dp
M Oil bearing clearance	0.015 - 0.190 (0.0006 - 0.0075)	Out-property (X-X)
Contract 2000 of 800 0 no	Non-turbo 0.21 - 0.44 (0.0083 - 0.0173) Turbo 0.21 - 0.31 (0.0083 - 0.0122)	(8 A) near T brobnat 2 coc(cr. a. D) troenu A (00 (0.04)
2nd 800.0 - 0000.01 T	1 (0.0071 - 0.0173)	Standard
Oil (rail ring)	0.20 - 0.76 (0.0079 - 0.0299)	

Piston pin

	Unit: mm (in)
Piston pin outer diameter	20.971 - 20.983 (0.8256 - 0.8261)
Interference fit of piston pin to piston	-0.008 to 0.004 (-0.0003 to 0.0002)
Piston pin to connecting rod bush clearance	0.005 - 0.017 (0.0002 - 0.0007)

^{*}Values measured at ambient temperature of 20°C (68°F)

CONNECTING ROD

	Onit: mm (in)		
Center distance	154.10 - 154.20 (6.0669 - 6.0709)		
Bend, torsion (per 100 (3.94)]			
Limit	0.10 (0.0039)		
Piston pin bushing inner diameter*	20.982 - 20.994 (0.8261 - 0.8265)		
Connecting rod big end inner diameter	53.000 - 53.013 (2.0866 - 2.0871)		
Şide clearance Standard Limit	0.20 - 0.35 (0.0079 - 0.0138) 0.40 (0.0157)		

^{*}After installing in connecting rod

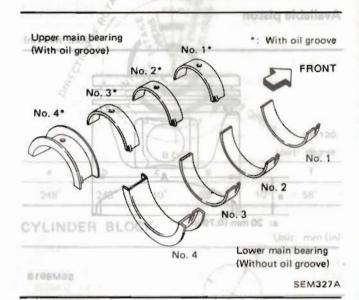
Piston ring

member in Inspection and Adjustment (Cont'd)

CRANKSHAFT

Unit: mm: (in)	Unit: mm (in)
Main journal dia. "Dr	The state of the s
Grade No. 0	62.967 - 62.975 (2.4790 - 2.4793)
Grade No. 1	62.959 - 62.967 (2.4787 - 2.4790)
Grade No. 2	62.951 - 62.959 (2.4784 - 2.4787)
Pin journal dia. "Dp"	49.955 - 49.974 (1.9667 - 1.9675)
Center distance "r"	001.0 - 9(0.0) 41.5 (1.634)
Out-of-round (X-Y) Standard	Less than 0,005 (0,0002)
Taper (A-B)	ochus-naM
Standard	Less than 0.005 (0.0002)
Runout (T.I.R.) Standard	Less then 0.10 (0.0039)
1,0 (0,047	(0.0083 - 0.0122)
Free end play Standard	0.05 - 0.17 (0.0020 - 0.0067)
Limit	0.30 (0,0118)
	(100 - 9700 0) (100 110 110 110 110 110 110 110 110 11
Carrie (5000,0.500Ta	Dm Dp SEM645
(m) mm (in)	CONNECTING ROD.
0.0709 - 8.07081	Center distance
00391	A 001 veg3 n EM716 ne8
	rest, districted 20,982 - 20,984 in the contract of the contra
	Connecting red big and normal distributed Bases of the page page page page page page page pag
Centrepris A (* PY80, 2 - 8880.2 Exhaust Wear tens of Lam	"service disense di service di se

AVAILABLE MAIN BEARING TEST MOTES



No. 1 main bearing

Grade number	Thickness "T" mm (in)	Width "W" mm (in)	Identification color
4356,0	1.817 - 1.821 (0.0715 - 0.0717)	(8) 87.2 ervice) 87.2	Black
14884	1.821 - 1.825 (0.0717 - 0.0719)	STA STAN	(0.0) oa.o Brown
3000SB	1.825 - 1.829 (0.0719 - 0.0720)	22.5 (0.886)	Green
3.1810	1.829 - 1.833 (0.0720 - 0.0722)	0.0 2.10 15.0	Naturwöller block
4nner c	1.833 - 1.837 (0.0722 - 0.0723)		Blue

Grilde Nort

Bleeda No. 2

87 000 - 57 010 13 4263 (3 4756)

Cirade No. 1 No. 2 and 3 main bearing

Grade number	man and	Width "W" mm (in)	Identification color
0 Out-stree	1.817 - 1.821 (0.0715 - 0.0717)	Last John G.O.	Black
Tago (A	(0.0717 - 0.0719)	Cess than 2.27	Brown
2 Grada	1.825 - 1.829 (0.0719 - 0.0720)	19.0 (0.748)	Green
Grade Grade	1.025 - 1.033		Yellow
Dittarance diameter	1.833 - 1.837 (0.0722 - 0.0723)		Blue

*After installing in connecting rod

A AND SPECIFICATIONS (S.D.S.)

Inspection and Adjustment (Cont'd)

No. 4 main bearing

SUPTOT PRINCELLANEOUS COMPONENTS

Grade			ess "T"	2TRAIdentification 3			ARTS	9 P3TUCUnit: mm (in)
- Humber		d .	-m-1A		Flywheel	m-gal	m.M	
0,7022	0.0 - (0	1.817	1.821 0.0717)	Black	Runout (T.I.R.]	Les	s than 0.15 (0.0059)
32 - 43	4.58	1.821 -	1.825	run manaleneT	SPC	TION		Collector
2.2 3,6			0.0719)	Brown Tiels	Bearing cl	earance	o "Installatio	Throrris chamber Here:
ar - cr as - sa		1.825	1.829	Green	22 - 29 10 69 HEAD	3.0 - 4.0	29 - 39 o ''Intrallatio	Unit; mm (in)
INDER HEAT			1.833	Yellow	Main bearing Standard	clearance	0.028 -	0.055 (0.0011 - 0.0022)
ad 8a			0.0722)		Limit	0.25 - 0.33	2.5 - 3.2	0.090 (0.0035)
4 25 1		1.833	· 1.837 · 0.0723)	Water pump Blue Drein plug (Oll pen)	Connecting re	od bearing	12-16	Cylinder head temperature sensor
JUST I	- Eol s	Q);	7 - 8	neg IIO	Standard	1.5 - 2.0	0.014 -	0.054 (0.0006 - 0.0021)
29 36	0.6-0	S.Tir	RA-BE	Oil pump regulator valve	Limit	1.8 - 2.2	18 - 22	0.090 (0.0035) 5877 208762
Main bearing	UBRIS	m (0.0	098 in) un	dersize house gmus ND EM - For Turbocher Unit: mm (in)	13.17 13.17	20 30 18-23 35:45	18 - 29	LC 6 eviav lottnop .R.D.3
Thickness "T"	h-Pelo:	WG S	1.948 - 1.9	956 (0.0767 - 0.0770)	Modelsos at	2.2 - 2.8	22 - 27	Exhaust conventing tube
AVAILAB	LE CO	ONNE	CTING	ROD BEARING	30 - 37	4.1 · 5.1	40 - 50 18 - 24	Exhaust gas abhach B
Connecting	a rod h	agrino	HREVO	•	88 - 08	12.5 - 13.6	123 - 132	Cronkshaft pulley
Comecung	2 10.2	Gaining	001 - 08	Main bearing cap	12 - 15	1.6 - 2.1	16-21	Water inlet
25 - 33	5-4.5	3.5	34 - 44	Unit: mm (in)	18 - 25	2.5 - 3.5	25 - 34	Detanation sensor
14 - 22	0.8-0	2.0	Crank pin j	ournal diameter "Op"	22 - 29	3.0 - 4.0	29 - 39	F.C.V. valve
Standard			49.955 - 49	.974 (1.9667 - 1.9675)	3,6 - 4,6	E8.0 - 08.0	4.9 - 6.2	Distributor bolt
Undersize					10 - 12	1,4+1,7	14-17	Alternator adjusting ber bolt
0.08 (0.003				894 (1.9638 - 1.9643) 854 (1.9622 - 1.9628)	3.6 - 4.6	D.B0 - 0.63	6.8 - 8.2	Air regulator
0.12 (0.00				724 (1.9571 - 1.9576)	22 - 27	3,1 - 3,7	30 - 36	Starter motor

(Cont'd) InemtsujbAragaqtiquagaqAdjustment (Cont'd)

Tightening Torque

ENGINE OUTER PARTS

ANEOUS COMPONENTSTANKINARD

Main journal die. "Dm"	N-m	kg-m	ft-lbullery13
Collector cover	6-8	0.6 - 0.8	4.3 - 5.8
Collector	18 - 22	1.8 - 2.2	13 - 16
Throttle chamber Refer	to "Installat	ion" of CYLIN	DER HEAD
Intake relief valve	29 - 39	3.0 - 4.0	22 - 29
Intake manifold Refer	to "Installat	ion" of CYLIN	DER HEAD
bolt Intake manifold	0.028 - 1	sonemalo	Main bearing Standard
Injector holder 00.01 000.0	2.5 - 3.2	0.25 - 0.33	1.8 - 2.4
Cylinder head temperature sensor	12 - 16	1.2 - 1.6	9 - 12
Thermal transmitter	15 - 20	1.5 - 2.0	11 - 14
Exhaust manifold	18 - 22	1.8 - 2.2	13 - 16
Exhaust outlet	25 - 29	2.5 - 3.0	18 - 22
E.G.R. control valve	18 - 23	1.8 - 2.3	13-17
E.G.R. tube	34 - 44	3.5 - 4.5	25 - 33
Exhaust connecting tube	22 - 27	2.2 - 2.8	16 - 20
Exhaust gas sensor			
Non-turbo	40 - 50	4.1 - 5.1	30 - 37
Turbo	18 - 24	1.8 - 2.4	13 - 17
Crankshaft pulley	123 - 132	12.5 - 13.5	90 - 98
Water inlet	16 - 21	1.6 - 2.1	12 - 15
Detonation sensor	25 - 34	2.5 - 3.5	18 - 25
P.C.V. valve	29 - 39	3.0 - 4.0	22 - 29
Distributor bolt	4.9 - 6.2	0.50 - 0.63	3.6 - 4.6
Alternator adjusting bar bolt	14 - 17	1.4 - 1.7	10 - 12
Air regulator	4.9 - 6.2	0.50 - 0.63	3,6 - 4.6
Starter motor	30 - 36	3.1 - 3.7	22 - 27

ENGINE PARTS

Coper make beering	N·m	kg-m	ft-lb
Rocker cover	(1)-(3),0 - 2	0.1 - 0.3	0.7 - 2.2
Tensioner nut	43 - 58	4.4 - 5.9	32 - 43
Belt cover	3 - 5	0.3 - 0.5	2.2 - 3.6
Rocker shaft	18 - 22	1.8 - 2.2	13 - 16
Camshaft pulley	78 - 88	8.0 - 9.0	58 - 65
Cylinder head Ref	fer to "Install	ation" of CYL	INDER HEA
Camshaft locate plate	78 - 88	8.0 - 9.0	58 - 65
Water pump	16 - 21	1.6 - 2,1	12 - 15
Drain plug (Oil pan)	29 - 39	3.0 - 4.0	22 - 29
Oil pan	7 - 8	0.7 - 0.8	5.1 - 5.8
Oil pump regulator valve	39 - 49	4.0 - 5.0	29 - 36
Oil pump securing bolts	6 - 7 12 - 16	0.6 - 0.7 1.2 - 1.6	4.3 - 5.1 9 - 12
Oil strainer	16 - 21	1.6 - 2.1	12 - 15
Oil strainer bracket	6-8	0.6 - 0.8	4.3 - 5.8
Flywheel	98 - 108	10 - 11	72 - 80
Rear oil seal retainer	6-7	0.6 - 0.7	4.3 - 5.1
Connecting rod	Refer to "Installation" of ENGINE OVERHAUL.		
Main bearing cap	90 - 100	9.2 - 10.2	67 - 74
Water drain plug	34 - 44	3.5 - 4.5	25 - 33
Spark plug	20 - 29	2.0 - 3.0	14 - 22

No. 4 main bearing a man a MAM 3

No. 2 and 3 main bearing

49.881 49.894 (1.9643)_C

49.841 (1938) (1962) 1.96281 49.711 - 48.724 (1.967) 1.96761 Underston

0.08 (0.0001)

9342:15