

MANUAL TRANSMISSION AND CLUTCH MSB SERIES

SECTION 00 SERVICE INFORMATION

Contents

TROUBLESHOOTING	00-2
Transmission	00-2
Clutch	00-3
MAIN DATA AND SPECIFICATIONS	00-4
SERVICE STANDARD	00-5
Transmission	00-5
Clutch	00-6
SERVICING	00-7
Transmission Oil Level Check	00-7
Transmission Oil Change	00-7
Gear Control Cable Adjustment.....	00-7
Clutch Pedal Travel and Free Play Adjustment.....	00-8
Clutch Hydraulic Circuits Bleeding	00-11
FIXING TORQUE	00-12
Transmission	00-12
Clutch	00-13
SPECIAL TOOLS	00-14
Transmission	00-14
Power Take Off.....	00-15
Clutch	00-15

TROUBLESHOOTING

Transmission

PROBLEM	POSSIBLE CAUSE	CORRECTION
Abnormal Noise	1. Flywheel pilot bearing worn. 2. Bearing worn or broken (Main shaft or counter shaft). 3. Anti-lash plate malfunction. 4. Gear tooth contact surface worn or scuffed (Main shaft, counter shaft and/or reverse idle gear). 5. Spline worn (Synchronizer clutch hub). 6. Gear, clutch hub or thrust washer thrust face seized. 7. Lack of backlash between mating gears.	1. Replace. 2. Repair or replace. 3. Repair or replace. 4. Repair or replace. 5. Replace. 6. Replace. 7. Replace.
Hard Shifting	1. Improper clutch pedal free play. 2. Wrong oil in use. 3. Gear control linkage misadjust. 4. Change lever sliding portions worn. 5. Shift block, shift rod and/or control box sliding faces worn. 6. Shift arm and/or synchronizer sleeve groove worn. 7. Synchronizer parts worn or weakened. 8. Thrust washer, collar, and/or gear thrust faces worn (Main shaft and/or counter shaft thrust play).	1. Readjust. 2. Replace with recommended oil. 3. Readjust. 4. Repair or replace. 5. Repair or replace. 6. Replace. 7. Replace. 8. Replace.
Walking or Jumping out of Gear	1. Gear control linkage misadjust. 2. Detent spring weakened or broken. 3. Detent ball worn. 4. Change lever sliding portions worn. 5. Shift block, shift rod and/or control box sliding faces worn. 6. Shift arm and/or synchronizer sleeve groove worn. 7. Synchronizer parts worn or weakened. 8. Thrust washer, collar, and/or gear thrust faces worn (Main shaft and/or counter shaft thrust play). 9. Spline worn (Synchronizer hub). 10. Bearings worn or broken.	1. Readjust. 2. Replace. 3. Replace. 4. Repair or replace. 5. Repair or replace. 6. Replace. 7. Replace. 8. Replace. 9. Replace. 10. Replace.

Clutch

PROBLEM	POSSIBLE CAUSE	CORRECTION
Dragging	1. Hydraulic line leakage. 2. Air in line. 3. Master cylinder and/or slave cylinder piston cup worn. 4. Driven plate worn or warped. 5. Diaphragm spring weak or tip of finger worn. 6. Driven plate sticking on spline. 7. Release bearing worn or damaged. 8. Clutch pedal excessive free play.	1. Repair. 2. Bleed and check for damage. 3. Replace. 4. Replace driven plate. 5. Replace pressure plate assembly. 6. Clean and free spline and lubricate with grease. 7. Replace release bearing. 8. Readjust.
Slipping	1. Driven plate facing worn or oil soaked. 2. Diaphragm spring weak. 3. Pressure plate and/or flywheel warped. 4. Clutch pedal lack of free play.	1. Replace driven plate and check for leaks as needed. 2. Replace pressure plate assembly. 3. Repair or replace. 4. Readjust.
Shudder (Chattering)	1. Engine mounting loose or broken. 2. Driven plate facing warped. 3. Driven plate surface of facing hardened. 4. Driven plate facing oil soaked. 5. Driven plate damper spring weakened or broken. 6. Pressure plate and/or flywheel warped.	1. Tighten or replace. 2. Replace driven plate. 3. Replace driven plate. 4. Replace driven plate and check for leaks. 5. Replace driven plate. 6. Repair or replace.
Noisy	1. Release bearing binding. 2. Release bearing worn or broken. 3. Release bearing insufficiently lubricate. 4. Driven plate damper springs weakened or broken. 5. Pilot bearing worn or broken. 6. Driven plate rivet loosen. 7. Ball stud insufficiently lubricate. 8. Clutch pedal lack of free play. 9. Clutch pedal shaft insufficiently lubricate. 10. Pilot bearing loose or broken.	1. Clean or replace if damaged, and lubricate. 2. Replace. 3. Lubricate with grease or replace. 4. Replace driven plate. 5. Replace. 6. Replace driven plate. 7. Lubricate with grease. 8. Readjust. 9. Lubricate with grease. 10. Replace.
Pedal is Hard to Push	1. hydraulic line blocked or crimped. 2. Clutch pedal shaft insufficiently lubricate.	1. Clean out or replace. 2. Lubricate with grease.

MAIN DATA AND SPECIFICATIONS

Transmission

Type	MSB-5 5 Speed	
Gear Mesh Type	1st to 5th:	Synchro-mesh
Control Type	Reverse:	Constant-mesh
	Floor remote control	
Gear Ratio	MSB-5S	MSB-5M
1st:	5.016	5.594
2nd:	2.672	2.814
3rd:	1.585	1.660
4th:	1.000	1.000
5th:	0.770	0.794
Reverse:	4.783	5.334
Lubricating Oil	Engine Oil SAE 5W-30	
Oil Capacity L (US qt/Imp qt)	Approx. 2.7 (2.9/2.4)	

Power Take Off

Allowable Maximum Torque	N·m (kg·m / lb·ft)	147 (15/108.4) / at output shaft 1000 RPM
Gear Ratio (to Engine)		1.8214
Revolution Direction		Clockwise (viewed from rear)

Clutch

Pressure Plate		NKR55	NHR55 / NKR55 / NHR69
Spring Type		Diaphragm	Diaphragm
Outside Diameter	mm (in)	240 (9.4)	250 (9.8)
Clamping Force	N (kg/lb)	4,119 (420/926)	6,276 (640/1,411)
Spring Finger Height	mm (in)	40.7 — 42.7 (1.60 — 1.68)	39.0 — 41.0 (1.54 — 1.61)
Driven Plate			
Inside × Outside Diameter	mm (in)	240 × 160 (9.4 × 6.3)	250 × 160 (9.8 × 6.3)
Free Thickness	mm (in)	7.5 — 8.1 (0.295 — 0.319)	8.1 — 8.7 (0.319 — 0.343)
Clamping Thickness	mm (in)	7.1 — 7.7 (0.280 — 0.303)	7.7 — 8.3 (0.303 — 0.327)
Clutch Pedal			
Height	mm (in)	160 — 170 (6.3 — 6.7)	
Stroke	mm (in)	159 — 169 (6.3 — 6.7)	
Free Play	mm (in)	15 — 25 (0.6 — 1.0)	
Master Cylinder			
Bore Diameter	mm (in)	φ 19.050 — 19.102 (0.7500 — 0.7520)	
Slave Cylinder			
Bore Diameter	mm (in)	φ 26.990 — 27.042 (1.0626 — 1.0646)	

SERVICE STANDARD

Transmission

Items		Service Standard	Service Limit
Gear Shift Position between Center of Shift Lever Play and Instrument Center Cluster	mm (in)	Standard Cab: 247±15 (9.7±0.6)	
		Wide Cab: 283±15 (11.1±0.6)	
Ball Bearing Run-out	mm (in)		0.2 (0.01)
Gear Inside Diameter	mm (in)	1st Gear: 61 (2.402)	61.1 (2.406)
		2nd Gear: 54 (2.126)	54.1 (2.130)
		3rd Gear: 42 (1.654)	42.1 (1.657)
		Reverse Gear: 54 (2.126)	54.1 (2.130)
Clearance between 5th Gear and Main Shaft	mm (in)	0.05 — 0.09 (0.002 — 0.004)	0.2 (0.01)
Clearance between Reverse Idle Gear and Idle Gear Shaft	mm (in)	0.04 — 0.08 (0.002 — 0.003)	0.2 (0.01)
Spline Play between 5th Counter Gear and Counter Shaft at 5th Counter Gear Outer Circumference	mm (in)	0.18 — 0.43 (0.007 — 0.017)	0.45 (0.018)
Thrust Washer Thickness	mm (in)	2nd: 3.0 (0.12)	2.8 (0.11)
		5th: 3.8 (0.15)	3.6 (0.14)
Main Shaft Run-out	mm (in)	Less than 0.025 (0.0010)	0.1 (0.004)
Clearance between Block Ring and Dog Gear	mm (in)	3rd/4th: 1.0 (0.04)	0.5 (0.02)
		1st/2nd: 1.5 (0.06)	0.5 (0.02)
		5th: 1.5 (0.06)	0.5 (0.02)
Spline Play between Clutch Hub and Main Shaft at Clutch Hub Outer Circumference	mm (in)	Less than 0.05 (0.002)	0.3 (0.01)
Clearance between Block Ring and Insert	mm (in)	3.59 — 3.91 (0.141 — 0.154)	4.1 (0.16)
Clearance between Clutch Hub and Insert	mm (in)	0.09 — 0.31 (0.004 — 0.012)	0.4 (0.02)
Shift Arm Thickness	mm (in)	10.0 (0.39)	9.0 (0.35)
Detent Spring Free Length	mm (in)	31.6 (1.24)	30.1 (1.19)

00-6 SERVICE INFORMATION

Clutch

Items		Service Standard	Service Limit
Pressure Plate Distortion	mm (in)		0.3 (0.01)
Pressure Plate Clamping Force	N (kg/lb)		
NKR55 Clutch Size ϕ 240		4,116 (420/926)	3,785 (386/851)
NHR55 / NKR55 / NHR69 Clutch Size ϕ 250		6,276 (640/1,411)	5,776 (589/1,299)
Diaphragm Spring Finger Height	mm (in)		
NKR55 Clutch Size ϕ 240		40.7 — 42.7 (1.60 — 1.68)	
NHR55 / NKR55 / NHR69 Clutch Size ϕ 250		39.0 — 41.0 (1.54 — 1.61)	
Driven Plate Warpage	mm (in)	Less than 0.7 (0.03)	1.0 (0.04)
Spline Play between Top Gear Shaft and Driven Plate at Driven Plate Outer Circumference	mm (in)	Less than 0.5 (0.02)	1.0 (0.04)
Driven Plate Rivet Head Depression	mm (in)		
NKR55 Clutch Size ϕ 240		1.1 — 1.7 (0.04 — 0.01)	0.2 (0.01)
NHR55 / NKR55 / NHR69 Clutch Size ϕ 250		1.65 — 2.25 (0.06 — 0.09)	0.2 (0.01)
Clutch Pedal Height	mm (in)	160 — 170 (6.3 — 6.7)	
Clutch Pedal Stroke	mm (in)	159 — 169 (6.3 — 6.7)	
Clutch Pedal Free Play	mm (in)	15 — 25 (0.6 — 1.0)	
Clearance between Pedal Stopper and Clutch Switch Thread End or Stopper Bolt	mm (in)	0.5 — 1.0 (0.02 — 0.04)	
Master Cylinder Bore Diameter	mm (in)	19.050 — 19.102 (0.7500 — 0.7520)	
Clearance between Master Cylinder Bore and Piston	mm (in)	0.03 — 0.11 (0.001 — 0.004)	0.12 (0.005)
Slave Cylinder Bore Diameter	mm (in)	26.990 — 27.042 (1.0626 — 1.0646)	
Clearance between Slave Cylinder Bore and Piston	mm (in)	0.02 — 0.10 (0.0008 — 0.0039)	0.11 (0.0043)

SERVICING

Transmission Oil Level Check

1. Remove Filler Plug.
2. Check Oil Level.
 - Add lubricant to within 0 to 10 mm (0 to 0.4 in) of bottom edge of the filler hole if necessary.

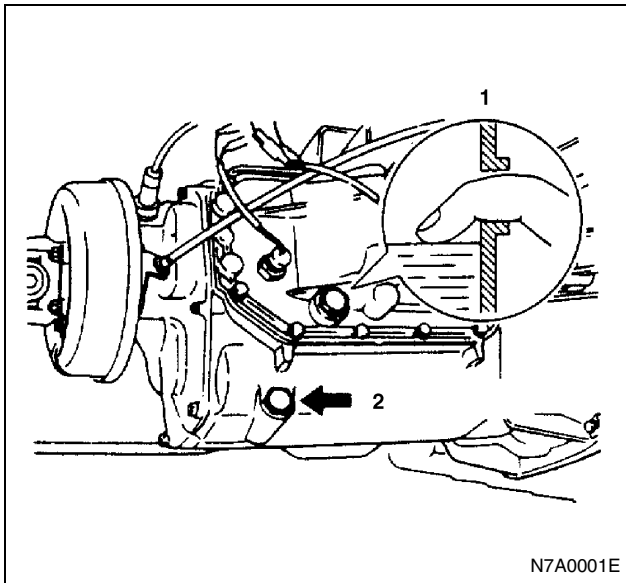
Caution:

Use ENGINE OIL SAE 5W-30 for transmission case.

3. Install Filler Plug.

Tighten:

Filler plug to 49 N·m (5.0 kg·m / 36 lb·ft)



Legend

1. Filler plug
2. Drain plug

5. Install Filler Plug.

Tighten:

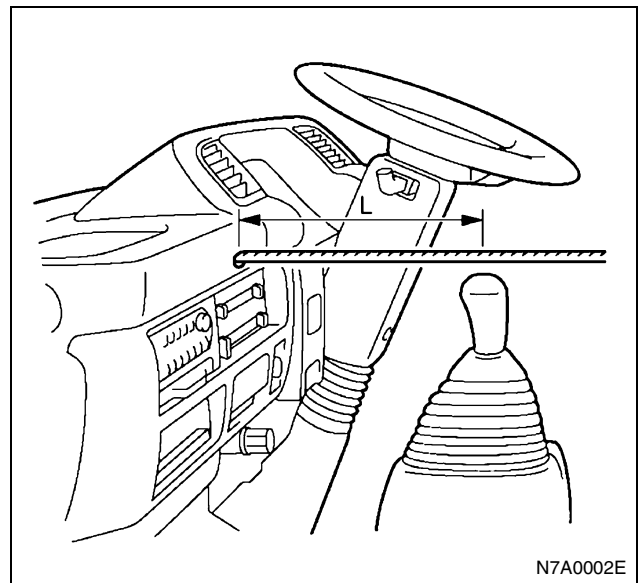
Filler plug to 49 N·m (5.0 kg·m / 36 lb·ft)

Gear Control Cable Adjustment

1. Measure

- Set the change lever in the neutral position, then confirm if the dimension (L) between the center of the change lever play and the instrument center cluster is within the reference value.

Change Lever Position	mm (in)
Standard Cab: 247±15 (9.7±0.6)	
Wide Cab: 238±15 (11.1±0.6)	



Transmission Oil Change

1. Drain Oil.
 - Remove the drain plug from the transmission case and drain the oil.
2. Install Drain Plug.

Tighten:

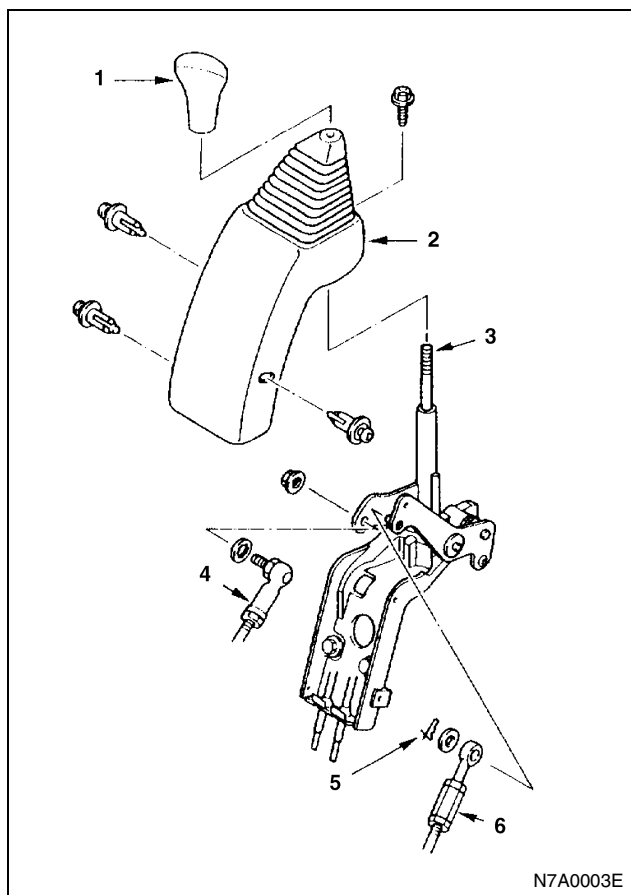
Drain plug to 49 N·m (5.0 kg·m / 36 lb·ft)

3. Remove Filler Plug.
4. Fill Oil.
 - Fill the transmission case from the filler plug hole with new oil of specified grade.

Oil Capacity	Liters (US-qt/Imp-qt)
2.7 (2.9/2.4)	

Caution:

Use ENGINE OIL SAE 5W-30 for transmission case.



Legend

1. Knob
2. Cover assembly
3. Change lever
4. Shift cable
5. Snap pin
6. Select cable

2. Adjust

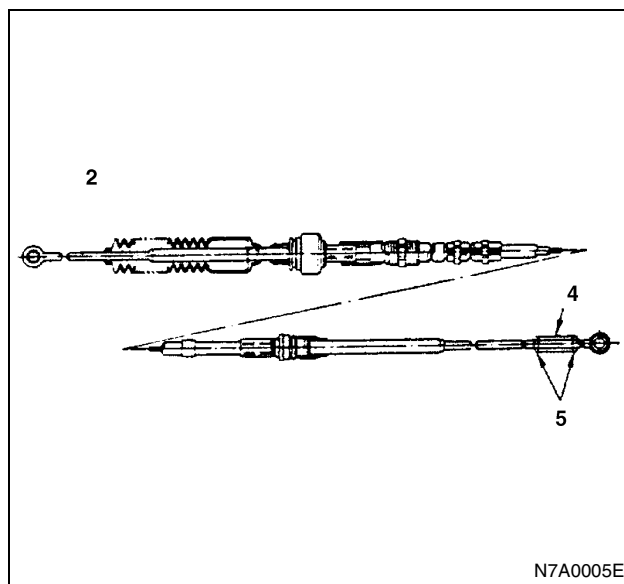
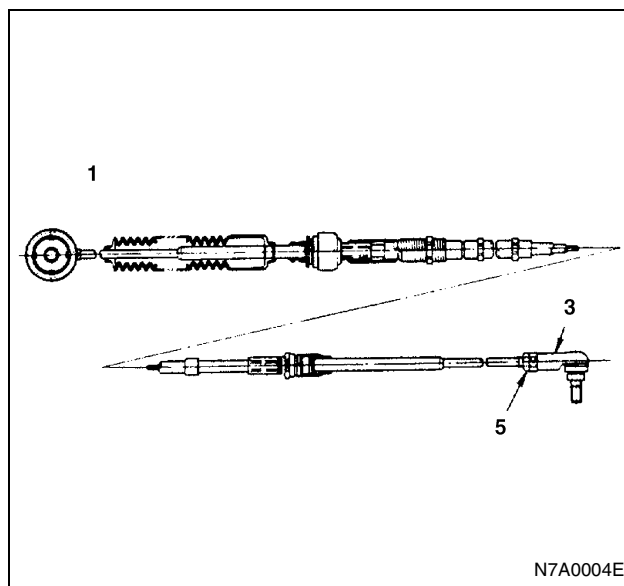
- If the dimension is out of the reference, adjust as required.

- 1) Remove the change lever knob.
- 2) Remove the cover assembly.
- 3) Disconnect the shift cable from the change lever.
- 4) Set the transmission in the neutral position.
- 5) Loosen the lock nut of the shift cable ball joint and the select cable turnbuckle, then turn the ball joint and turnbuckle as necessary for hole and pin.
- 6) Tighten the lock nuts and install the shift cable to the change lever.

Tighten:

Lock nut to 6 N·m (0.6 kg·m / 4.4 lb·ft)

- 7) Install the cover assembly and the change lever knob.



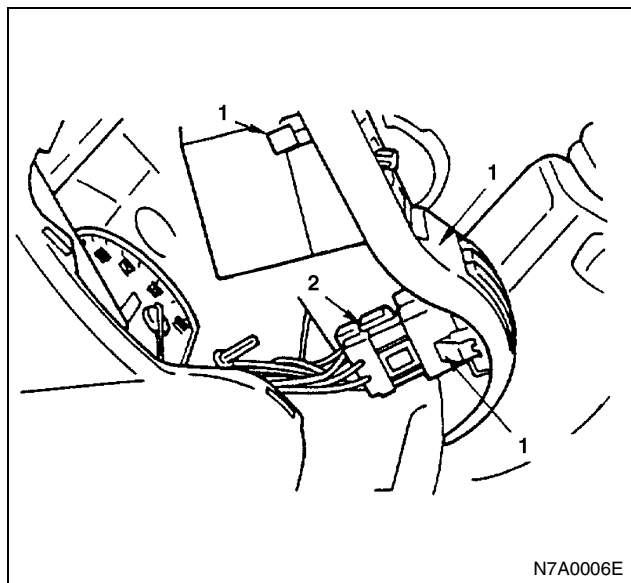
Legend

1. Shift cable (transmission side)
2. Select cable (transmission side)
3. Ball joint
4. Turnbuckle
5. Lock nut (change lever side)

Clutch Pedal Travel and Free Play Adjustment

Clutch Pedal Height and Stroke

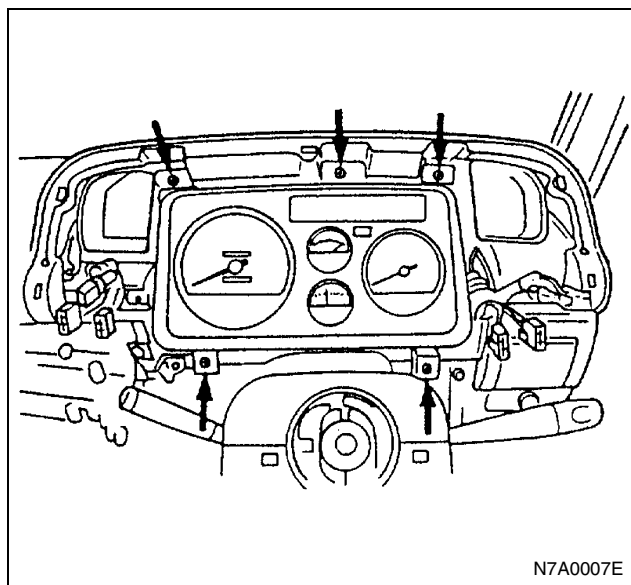
1. Remove Meter Cluster.
 - Pull out the meter cluster and disconnect the harness connectors.

**Legend**

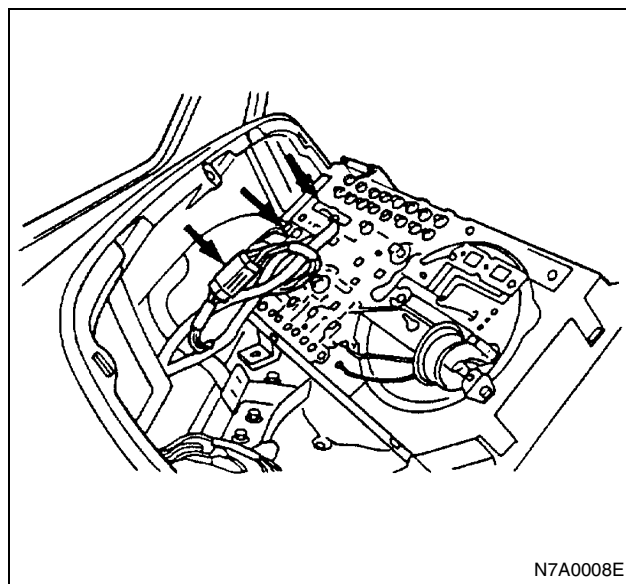
- 1. Clip
- 2. Connector

2. Remove Meter Assembly.

- Remove the 5 fixing screws.



- Disconnect the harness connectors.



3. Adjust

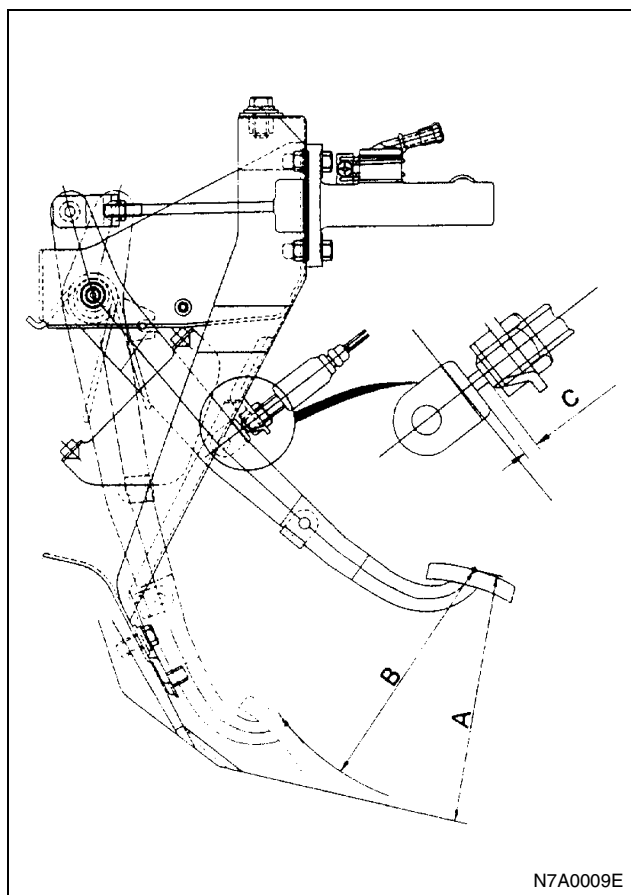
- Loosen the lock nut of the clutch master cylinder push rod.
- Adjust the pedal height by turning the push rod.

Clutch Pedal Height and Stroke	mm (in)
Height (A): 160 — 170 (6.3 — 6.7)	
Stroke (B): 159 — 169 (6.3 — 6.7)	

4. Tighten Lock Nut.

Tighten:

Lock nut to 20 N·m (2.0 kg·m / 14 lb·ft)



5. Install Meter Assembly and Meter Cluster.

Clutch Pedal Free Play

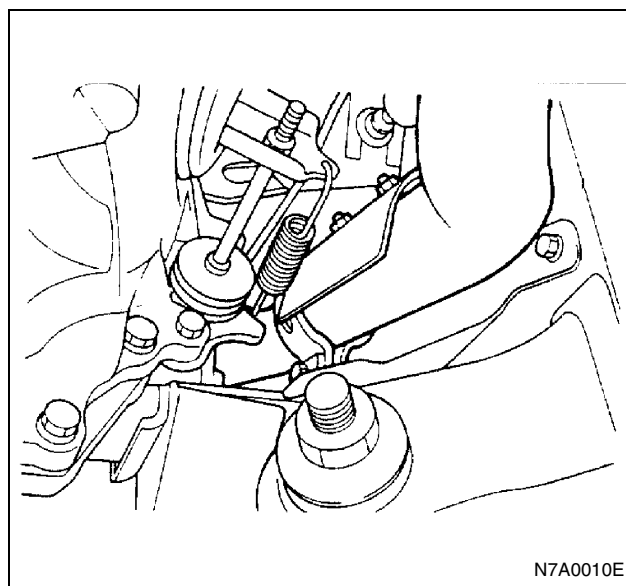
Slave Cylinder

- 1) Remove the slave cylinder return spring.
- 2) Loosen the lock nut of the push rod.
- 3) Turn the adjust nut until it reaches the shift fork.
- 4) Back off the adjust nut 1.5 turns (shift fork free play approximately 2 mm/0.1 in.).
- 5) Tighten the lock nut.

Tighten:

Lock nut to 16 N·m (1.6 kg·m / 12 lb·ft)

- 6) Install the return spring.



Clutch Switch or Stopper Bolt

After completion of clutch pedal height adjustment, adjust the clutch switch or stopper bolt clearance.

- 1) Loosen the lock nut of clutch switch or stopper bolt.
- 2) Adjust the clutch switch or stopper bolt clearance by turning clutch switch or stopper bolt.

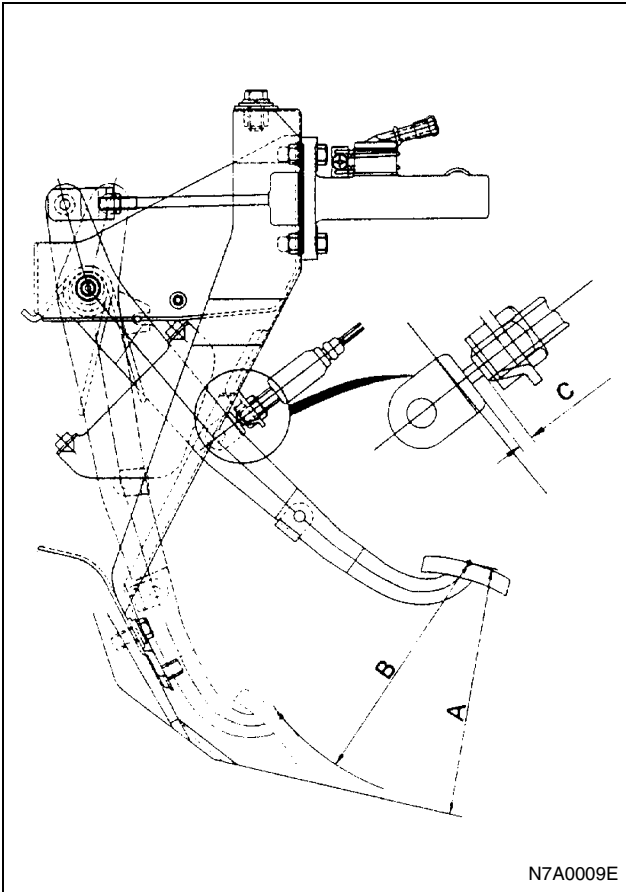
Clutch Switch or Stopper Bolt Clearance (C)	mm (in)
0.5 — 1.0 (0.02 — 0.04)	

Clutch Pedal Free Play	mm (in)
15 — 25 (0.6 — 1.0)	

- 3) Tighten the lock nut.

Tighten:

Lock nut to 19 N·m (1.9 kg·m / 14 lb·ft)



Clutch Hydraulic Circuits Bleeding

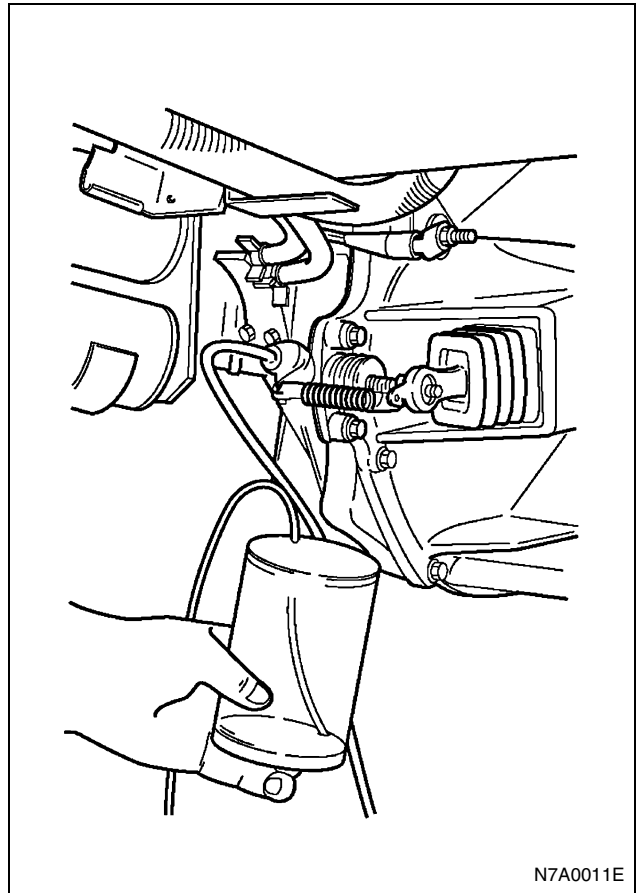
If air enters the clutch circuit, it will cause clutch dragging. Therefore, bleeding operation should be performed if the clutch fluid reservoir has been emptied due to failure to mal-replenishment or if the hydraulic circuit has been disassembled. Bleeding operation calls for co-operative action of two men.

- 1) Check the level of clutch fluid in the reservoir and replenish if necessary.
- 2) Remove the rubber cap from the bleeder screw and wipe clean the bleeder screw. Connect a vinyl tube to the bleeder screw and insert the other end of the vinyl tube into a transparent container.
- 3) Pump the clutch pedal repeatedly and hold it depressed.
- 4) Loosen the bleeder screw on the clutch slave cylinder to release clutch fluid with air bubbles into the container and tighten the bleeder screw immediately.
- 5) Release the clutch pedal carefully. Repeat the above operation until air bubbles disappear from the clutch fluid being pumped out into the container. During the bleeding operation, keep the clutch fluid reservoir filled to the specified level.

Reinstall the rubber cap.

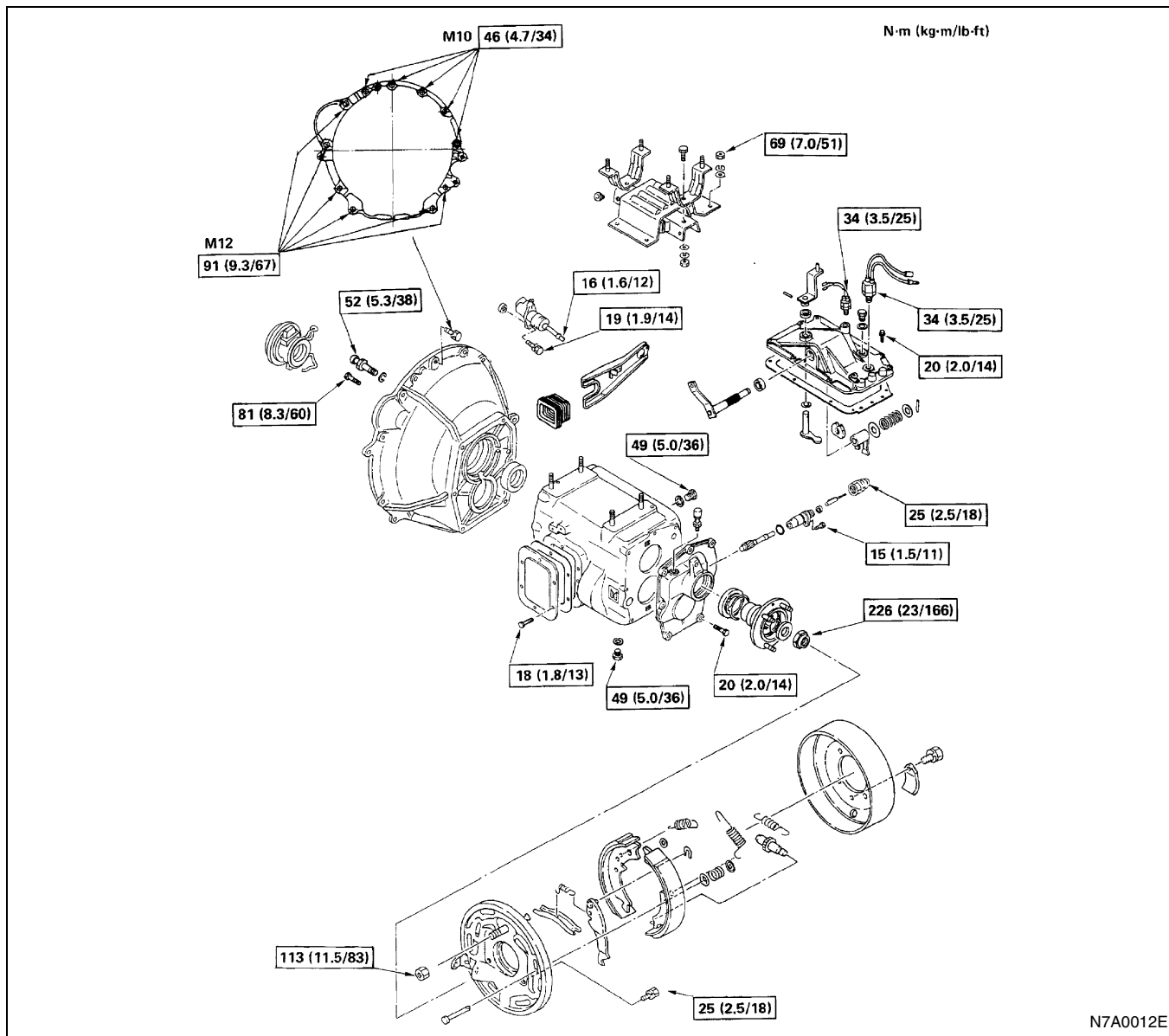
Caution:

Do not let clutch fluid remain on a painted surface. Wash it off immediately.

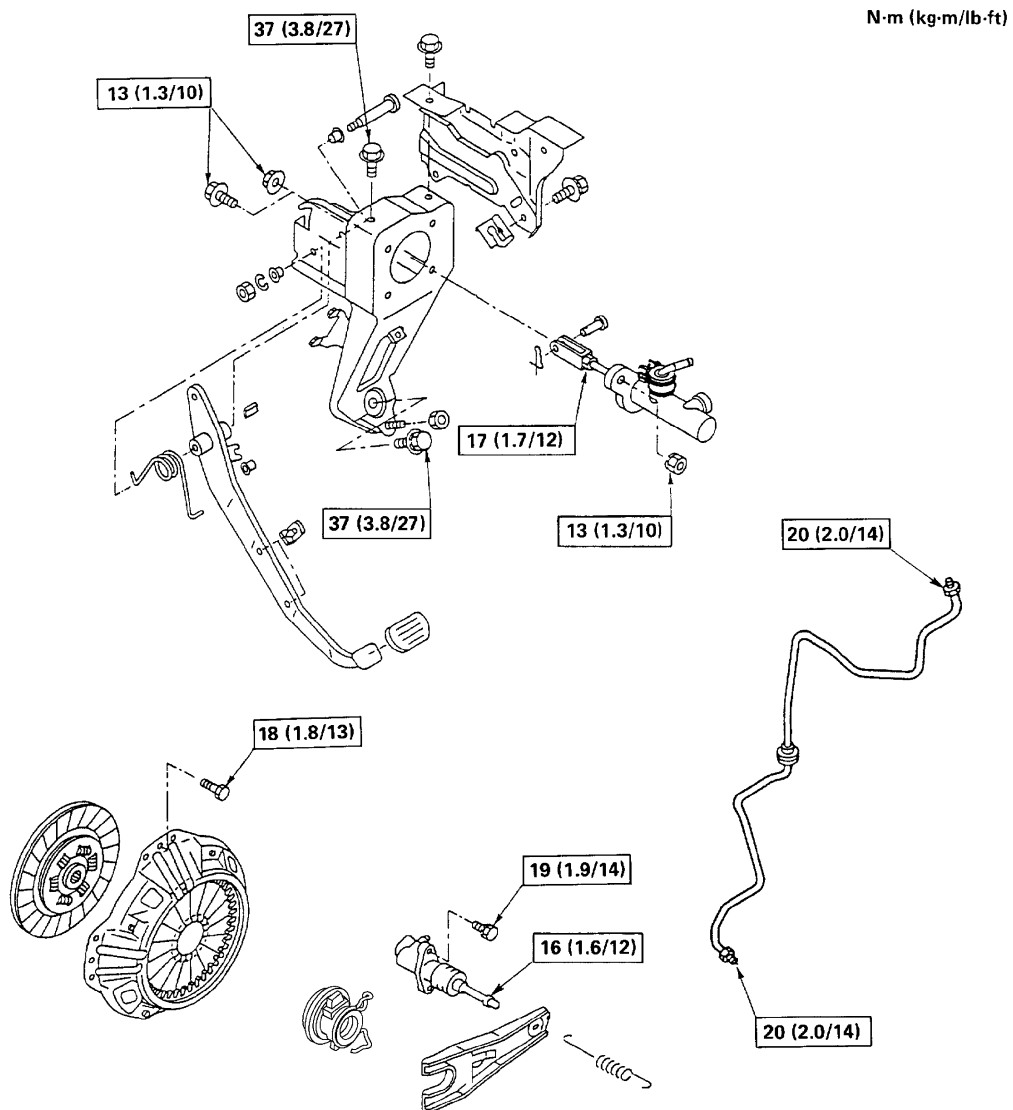


FIXING TORQUE

Transmission



N7A0012E

Clutch

N7A0013E

SPECIAL TOOLS

Transmission

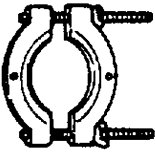
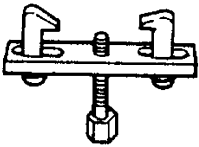
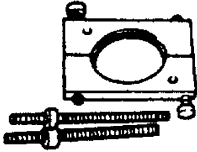
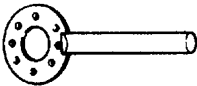
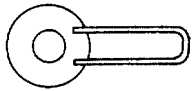
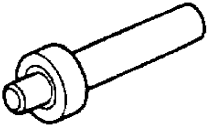
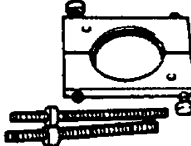
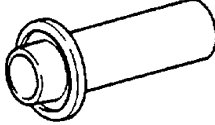
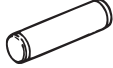
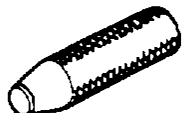
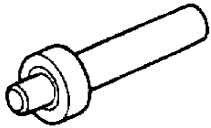
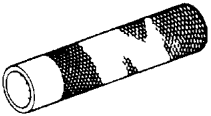
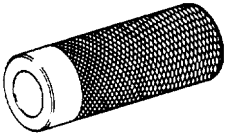
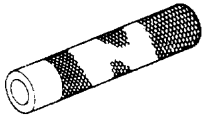
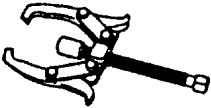
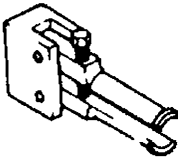
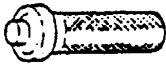
Illustration	Part Number / Description / Remarks
 5884005870	5-8840-0587-0 / Bearing Remover
 5884020270	5-8840-2027-0 / Univer- sal Puller
 5884020420	5-8840-2042-0 / Bearing Remover
 5884020430	5-8840-2043-0 / Handle
 5884020440	5-8840-2044-0 / Anti- lash Plate Installer
 5884020640	5-8840-2064-0 / Oil Seal Installer / For front cover oil seal install

Illustration	Part Number / Description / Remarks
 5884020780	5-8840-2078-0 / Bearing Remover
 5884022420	5-8840-2242-0 / Oil Seal Installer / For rear cover oil seal install
 5884022440	5-8840-2244-0 / Bearing Installer
 9852216150	9-8522-1615-0 / Bearing Installer
 9852922010	9-8529-2201-0 / Spring Pin Remover

Power Take Off

Illustration	Part Number / Description / Remarks
 5884020640	5-8840-2064-0 / Oil Seal Installer / For output shaft oil seal
 5884020650	5-8840-2065-0 / Oil Seal Installer / For shift rod oil seal
 5884020660	5-8840-2066-0 / Bearing Installer / For output shaft bearing
 5884020670	5-8840-2067-0 / Plug Installer / For shift rod cap
 9825922010	9-8529-2201-0 / Spring Pin Remover

Clutch

Illustration	Part Number / Description / Remarks
 5852530010	5-8525-3001-0 / Pilot Aligner
 5884000130	5-8840-0013-0 / Bearing Remover
 5884000840	5-8840-0084-0 / Sliding Hammer
 5884020000	5-8840-2000-0 / Pilot Bearing Remover
 5852200240	5-8522-0024-0 / Pilot Bearing Installer