SERVICE MANUAL

LB75.B
LB90.B
LB95.B
LB110.B
LB115.B 4WS
BACKHOE LOADERS

NEW HOLLAND
CONSTRUCTION

6036702103

COMPANY POLICY

Company policy, which is one of continuous improvement, reserves the right to make changes in design and specification at any time without notice and without obligation to modify units previously built.

All data given in this book is subject to production variations. Dimensions and weights are approximate only and the illustrations do not necessarily show tractors in standard condition. For exact information about any particular machine please consult your Dealer.

PARTS AND ACCESSORIES

Genuine parts and accessories have been specifically designed for these machines.

We would like to point out that ‘‘non-genuine” parts and accessories have NOT been examined and released by the Company. The installation and or use of such products could have negative effects upon the design characteristics of your machine and thereby affect its safety. The Company is not liable for any damage caused by the use of ‘‘non-genuine” parts and accessories.

MODEL CODES

The complete range of Backhoe Loaders described in this manual are identified below :

	EUR											NA			
	LB 90.B	LB 95.B	LB 110.B	LB 115.B 4WS	580 SR	590 SR	695 SM / 695 SR	B95	FB 100.2 / B100	FB 110.2 / B110	FB 200.2 4WS / B200 4WS	LB 75.B	LB 95.B / LB 90.B	LB 110.B	LB 115.B 4WS
Moteur 95HP FAGE0454C	X	X			X			X				X			
Moteur 110HP FAGE0484G			X	X		X	X		X	X	X		X	X	X
PowerShuttle	X	X	X		X	X		X	X			X	X	X	
PowerShift			X	X	X	X	X			X	X			X	X
Cab	X	X	X	X			X	X	X	X	X	X	X	X	X
Euro. cab			X	X	X	X	X								
ROPS	X				X							X	X	X	
Central Pivot			X	X			X		X		X	X	X	X	X
Side Shift	X	X	X	X	X	X	X	X	X	X	X				
2 WD					X							X			
4 WD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4 WS				X			X				X				X
Mechanical control	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pilot control	X	X	X	X	X	X	X		X	X	X	X	X	X	X

The vehicles listed above may not be available in all countries or markets, therefore for the latest information consult your local authorised dealer.

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IMPORTANT NOTICE

All maintenance and repair operations described in this manual should be carried out exclusively by authorised workshops. All instructions detailed should be carefully observed and special equipment indicated should be used if necessary.
Everyone who carries out service operations described without carefully observing these prescriptions will be directly responsible of deriving damages.

SHIMMING

At each adjustment, select adjusting shims, measure them individually using a micrometer and then sum up recorded values. Do not rely on measuring the whole shimming set, which may be incorrect, or on rated value indicated for each shim.

ROTATING SHAFT SEALS

To correctly install rotating shaft seals, observe the following instructions:

- Let the seal soak into the same oil as it will seal for at least half an hour before mounting;
- Thoroughly clean the shaft and ensure that the shaft working surface is not damaged;
- Place the sealing lip towards the fluid. In case of a hydrodynamic lip, consider the shaft rotation direction and orient grooves in order that they deviate the fluid towards the inner side of the seal;
- Coat the sealing lip with a thin layer of lubricant (oil rather than grease) and fill with grease the gap between the sealing lip and the dust lip of double lip seals;
- Insert the seal into its seat and press it down using a flat punch. Do no tap the seal with a hammer or a drift;
- Take care to insert the seal perpendicularly to its seat while you are pressing it. Once the seal is settled, ensure that it contacts the thrust element if required.;
- To prevent damaging the sealing lip against the shaft, place a suitable protection during installation.

'O' RINGS

Lubricate the 'O' rings before inserting them into their seats. This will prevent the 'O' rings from rolling over and twine during mounting which will jeopardise sealing.

SEALERS

Apply FLEXIBLE GASKET SEALANT 82995770 or a suitable equivalent, over the mating surfaces marked with an X.
Before applying the sealer, prepare the surface as follows:

- remove possible scales using a metal brush;
- thoroughly degrease the surfaces using DEGREASER 82995779, or a suitable equivalent.

BEARINGS

It is advisable to heat the bearings to 80 to 90°C before mounting them on their shafts and cool them down before inserting them into their seats with external tapping.

SPRING PINS

When mounting split socket spring pins, ensure that the pin notch is oriented in the direction of the effort to stress the pin.
Spiral spring pins should not be oriented during installation.

NOTES FOR SPARE PARTS

USE EXCLUSIVELY GENUINE SPARE PARTS

Only genuine parts guarantee same quality, life, safety as original components as they are the same as mounted in production.
Only the genuine spare parts can offer this guarantee.
All spare parts orders should be complete with the following data:

- Machine model (commercial name) and frame number;
- engine type and number;
- part number of the ordered part, which can be found on the "Microfiches" or the "Spare Parts Catalogue", which is the base for order processing.

NOTES FOR EQUIPMENT

Equipment which proposes and shows in this manual are as follows:

- studied and designed expressly for use on company machines;
- necessary to make a reliable repair;
- accurately built and strictly tested to offer efficient and long-lasting working means.
- we also remind the Repair Personnel that having these equipment means:
- work in optimal technical conditions;
- obtain best results;
- save time and effort;
- work more safely.

NOTICES

Wear limits indicated for some details should be intended as advised, but not binding values. The words "front", "rear", "right hand", and "left hand" referred to the different parts should be intended as seen from the operator's seat oriented to the normal sense of movement of the Machine.

HOW TO MOVE THE MACHINE WITH THE BATTERY REMOVED

Cables from the external power supply should be connected exclusively to the respective terminals of the Machine positive and negative cables using pliers in good condition which allow proper and steady contact.
Disconnect all services (lights, wind-shield wipers, etc.) before starting the Machine.
If it is necessary to check the Machine electrical system, check it only with the power supply connected. At check end, disconnect all services and switch the power supply off before disconnecting the cables.

SAFETY RULES

PAY ATTENTION TO THIS SYMBOL

This warning symbol points out important messages involving personal safety. Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and safeguard your safety and personal integrity.
In this manual you will find this symbol together with the following key-words:

WARNING (ATTENZIONE) - it gives warning about improper repair operations and deriving potential consequences affecting the service technician's personal safety.

DANGER (PERICOLO) - it gives specific warning about potential dangers for personal safety of the operator or other persons directly or indirectly involved.

TO PREVENT ACCIDENTS

Most accidents and personal injuries taking place in workshops are due from non-observance of some simple and essential prudential rule and safety precautions. For this reason, IN MOST CASES THEY CAN BE AVOIDED. It suffices to foresee possible causes and act consequently with necessary caution and care.

The possibility that an accident might occur with any type of machines should not be disregarded, no matter how well the machine in question was designed and built.

A wise and careful service technician is the best precautions against accidents.

Careful observance of this only basic precaution would be enough to avoid many severe accidents.

DANGER: Never carry out any cleaning, lubrication or maintenance operations when the engine is running.

SAFETY RULES

- Carefully follow specified repair and maintenance procedures.
- Do not wear rings, wristwatches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get hold into moving parts. We advise to use approved safety clothing such as anti-slipping footwear, gloves, safety goggles, helmets, etc.
- Never carry out any repair on the machine if someone is sitting on the operator's seat, except if they are certified operators to assist in the operation to be carried out.
- Never operate the machine or use attachments from a place other than sitting at the operator's seat.
- Never carry out any operation on the machine when the engine is running, except when specifically indicated.
- Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.
- All repair and maintenance operations should be carried out with the greatest care and attention.
- Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.
- Disconnect the batteries and label all controls to warn that the Machine is being serviced. Block the machine and all equipment which should be raised.
- Never check or fill fuel tanks and accumulator batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.
- Brakes are inoperative when they are manually released for maintenance purposes. In such cases, the machine should be kept constantly under control using blocks or similar devices.
- The fuel filling gun should remain always in contact with the filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity buildup.
- Use exclusively specified towing points for towing the Machine. Connect parts carefully. Ensure that foreseen pins and/or locks are steadily fixed before applying traction. Do not stop near towing bars, cables or chains working under load.
- To transfer a failed Machine, use a trailer or a low loading platform trolley if available.
- To load and unload the machine from the transportation mean, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or trailer platform and block wheels as required by the forwarder.
- For electrical heaters, battery-chargers and similar equipment use exclusive auxiliary power supplies with a efficient ground to avoid electrical shock hazard.

- Always use lifting equipment and similar of appropriate capacity to lift or move heavy components.
- Pay special attention to bystanders.
- Never pour gasoline or diesel oil into open, wide and low containers.
- Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non-flammable non-toxic proprietary solvents.
- Wear protection goggles with side guards when cleaning parts using compressed air.
- Do not exceed a pressure of 2.1 bar, in accordance with local regulations.
- Do not run the engine in a closed building without proper ventilation.
- Do not smoke, use open flames, cause sparks in the nearby area when filling fuel or handling highly flammable liquids.
- Do not use flames as light sources when working on a machine or checking for leaks.
- Move with caution when working under a Machine, and also on or near a Machine. Wear proper safety accessories: helmets, goggles and special footwear.
- During checks which should be carried out with the engine running, ask an assistant to seat at the operator's seat and keep the service technician under visual control at any moment.
- In case of operations outside the workshop, drive the Machine to a flat area and block it. If working on an incline cannot be avoided, first block the Machine carefully. Move it to a flat area as soon as possible with a certain extent of safety.
- Ruined or plied cables and chains are unreliable. Do not use them for lifting or trailing. Always handle them wearing gloves of proper thickness.
- Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stop near the fastening point, trailing chains or cables.
- The working area should be always kept CLEAN and DRY. Immediately clean any spillage of water or oil.
- Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.
  Before starting the Machine or its attachments, check, adjust and block the operator's seat. Also ensure that there are no persons within the Machine or attachment operating range.
- Do not keep into your pockets any object which might fall unobserved into the Machine's inner compartments.
- Whenever there is the possibility of being reached by ejected metal parts or similar, use protection eye mask or goggles with side guards, helmets, special footwear and heavy gloves.
- Wear suitable protection such as tinted eye protection, helmets, special clothing, gloves and footwear whenever it is necessary to carry out welding procedures. All persons standing in the vicinity of the welding process should wear tinted eye protection. NEVER LOOK AT THE WELDING ARC IF YOUR EYES ARE NOT SUITABLY PROTECTED.
- Metal cables with the use get frayed. Always wear adequate protections (heavy gloves, eye protection, etc.)
- Handle all parts with the greatest caution. Keep your hands and fingers far from gaps, moving gears and similar. Always use approved protective equipment, such as eye protection, heavy gloves and protective footwear.

START UP

- Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction.
- Never bring your head, body, arms, legs, feet, hands, fingers near fans or rotating belts.

ENGINE

- Always loosen the radiator cap very slowly before removing it to allow pressure in the system to dissipate. Coolant should be topped up only when the engine is stopped or idle if hot.
- Do not fill up fuel tank when the engine is running, mainly if it is hot, to avoid ignition of fires in case of fuel spilling.
- Never check or adjust the fan belt tension when the engine is running.
  Never adjust the fuel injection pump when the Machine is moving.
- Never lubricate the Machine when the engine is running.

ELECTRICAL SYSTEMS

- If it is necessary to use auxiliary batteries, cables must be connected at both sides as follows: (+) to (+) and (-) to (-). Avoid short-circuiting the terminals. GAS RELEASED FROM BATTERIES IS HIGHLY FLAMMABLE. During charging, leave the battery compartment uncovered to improve ventilation. Avoid checking the battery charge by means of "jumpers" made by placing metallic objects across the terminals. Avoid sparks or flames near the battery area. Do no smoke to prevent explosion hazards.
- Prior to any service, check for fuel or coolant leaks. Remove these leaks before going on with the work.
- Do not charge batteries in confined spaces. Ensure that ventilation is appropriate to prevent accidental explosion hazard due to build-up of gasses relieved during charging.
- Always disconnect the batteries before performing any type of service on the electrical system.

HYDRAULIC SYSTEMS

- Some fluid slowly coming out from a very small port can be almost invisible and be strong enough to penetrate the skin. For this reason, NEVER USE YOUR HANDS TO CHECK FOR LEAKS, but use a piece of cardboard or a piece of wood to this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention, serious infections or dermatosis may result.
- Always take system pressure readings using the appropriate gauges.

WHEELS AND TYRES

- Check that the tyres are correctly inflated at the pressure specified by the manufacturer. Periodically check possible damages to the rims and tyres.
- Keep off and stay at the tyre side when correcting the inflation pressure.
- Check the pressure only when the Machine is unloaded and tyres are cold to avoid wrong readings due to over-pressure. Do not reuse parts of recovered wheels as improper welding, brazing or heating may weaken the wheel and make it fail.
- Never cut, nor weld a rim with the inflated tyre assembled.
- To remove the wheels, block both front and rear Machine wheels. Raise the Machine and install safe and stable supports under the Machine in accordance with regulations in force.
- Deflate the tyre before removing any object caught into the tyre tread.
- Never inflate tyres using flammable gases as they may originate explosions and cause injuries to bystanders.

REMOVAL AND INSTALLATION

- Lift and handle all heavy components using lifting equipment of adequate capacity. Ensure that parts are supported by appropriate slings and hooks. Use lifting eyes provided to this purpose. Take care of the persons near the loads to be lifted.
- Handle all parts with great care. Do not place your hands or fingers between two parts. Wear approved protective clothing such as safety goggles, gloves and footwear.
- Do not twine chains or metal cables. Always wear protection gloves to handle cables or chains.

IMPORTANT ECOLOGICAL CONSIDERATIONS

The following are recommendations which may be of assistance:

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Where no legislation exists, obtain information from suppliers of oils, fuels, antifreeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use and dispose of these substances.

HELPFUL HINTS

1. Avoid filling tanks using jerry cans or inappropriate pressurised fuel delivery systems which may cause considerable spillage.
2. In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances which can be harmful to your health.
3. Modern oils contain additives. Do not burn contaminated fuels and/or waste oils in ordinary heating systems.
4. Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
5. Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil but should be collected and disposed of safely.
6. Do not open the Air-Conditioning system yourself. It may contain gasses which should not be released into the atmosphere. Your air conditioning specialist has a special equipment for discharging and charging the system.
7. Repair any leaks or defects in the engine cooling or hydraulic system immediately.
8. Do not increase the pressure in a pressurised circuit as this may lead to a catastrophic failure of the system components.
9. Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, causing the loss of oils, coolant, etc.

SERVICE TECHNIQUES

GENERAL

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficient working life of a component and lead to costly replacement.

Time spent on the preparation and cleanliness of working surfaces will pay dividends in making the job easier and safer and will result in overhauled components being more reliable and efficient in operation.

Use cleaning fluids which are known to be safe. Certain types of fluid can cause damage to 'O' rings and cause skin irritation. Solvents should be checked that they are suitable for the cleaning of components and also that they do not risk the personal safety of the user.

Replace 'O' rings, seals or gaskets whenever they are disturbed. Never mix new and old seals or 'O' rings, regardless of condition. Always lubricate new seals and 'O' rings with hydraulic oil before installation.

When replacing component parts, use the correct tool for the job.

HOSES AND TUBES

Always replace hoses and tubes if the cone end or the end connections on the hose are damaged.

When installing a new hose, loosely connect each end and make sure the hose takes up the designed position before tightening the connection. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

After hose replacement to a moving component, check that the hose does not foul by moving the component through the complete range of travel.

Be sure any hose which has been installed is not kinked or twisted.

Hose connections which are damaged, dented, crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original swagged position have failed and will ultimately separate completely.

A hose with a chafed outer cover will allow water entry. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which can result in oil restriction, a reduction in the speed of operation and ultimate hose failure.

Free-moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

'O' RING FLAT FACE SEAL FITTINGS

When repairing 'O' ring face seal connectors, the following procedures should be observed.

⚠ WARNING ⚠

NEVER DISCONNECT OR TIGHTEN A HOSE OR TUBE THAT IS UNDER PRESSURE. IF IN DOUBT, ACTUATE THE OPERATING LEVERS SEVERAL TIMES WITH THE ENGINE SWITCHED OFF PRIOR TO DISCONNECTING A HOSE OR TUBE.

1. Release the fittings and separate the hose or tube assembly, then remove and discard the 'O' ring seal from the fitting.
2. Dip a new 'O' ring seal into clean hydraulic oil prior to installation. Install a new 'O' ring into the fitting and, if necessary, retain in position using petroleum jelly.
3. Assemble the new hose or tube assembly and tighten the fitting finger tight, while holding the tube or hose assembly to prevent it from turning.
4. Use two suitable wrenches and tighten the fitting to the specified torque according to the size of the fitting. Refer to the following torque chart.

NOTE: To ensure a leak-free joint is obtained, it is important that the fittings are not over or under torqued.

'O' RING FLAT FACE SEAL FITTING TORQUE VALUES

Nominal O.D (in.)	Tube (mm)	Dash Size	Thread Size In.	Swivel Nut Torque lbf. Ft	Nm
0.250	6.35	-4	9/16-18	12	16
0.375	9.52	-6	11/16-16	18	24
0.500	12.70	-8	13/16-16	37	50
0.625	15.88	-10	1-14	51	69
0.750	19.05	-12	1 3/16-12	75	102
0.875	22.22	-14	1 3/16-12	75	102
1.000	25.40	-16	1 7/16-12	105	142
1.250	31.75	-20	1 11/16-12	140	190
1.500	38.10	-24	2-12	160	217

SEALER SPECIFICATIONS

The following sealers should be used as directed in the manual:

SEALERS	PART NUMBER	TRADE DESCRIPTION
Anaerobic sealer	82995770/1	LOCTITE GASKET ELIMINATOR 518
RTV silicone sealer	82995775/6	LOCTITE SUPERFLEX 593, 595 or 596 LOCTITE ULTRA BLUE 587 DOW CORNING SILASTIC 732 GENERAL ELECTRIC RTV 103 OR 108
Pipe sealant	82995768	PST 592 PIPE SEALANT WITH TEFLON
Thread-locking compound	82995773	LOCTITE 271 THREADLOCKER/SEALANT (red)

HARDWARE TORQUE VALUES

Check the tightness of hardware periodically.

Use the following charts to determine the correct torque when checking, adjusting or replacing hardware on the Backhoe Loader.

IMPORTANT: DO NOT use the values listed in the charts if a different torque value or tightening procedure is specified in this manual for a specific application. Torque values listed are for general use only.

Make sure fastener threads are clean and not damaged.

NOTE: A torque wrench is necessary to properly torque hardware.

MINIMUM HARDWARE TIGHTENING TORQUES

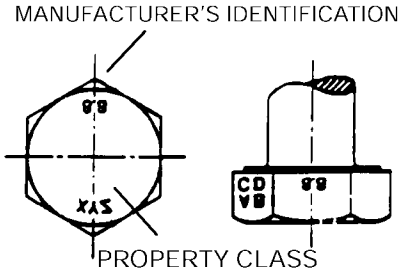
IN FOOT POUNDS - LBF. FT (NEWTON-METRES - Nm)
FOR NORMAL ASSEMBLY APPLICATIONS

METRIC HARDWARE AND LOCKNUTS

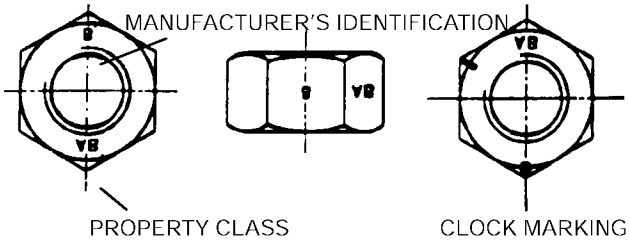
NOMINAL SIZE	CLASS 5.8		CLASS 8.8		CLASS 10.9		LOCKNUT CL.8 W/CL8.8 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr	
M4	15* (1.7)	19* (2.2)	23* (2.6)	30* (3.4)	33* (3.7)	42* (4.8)	16* (1.8)
M6	51* (5.8)	67* (7.6)	79* (8.9)	102* (12)	115* (13)	150* (17)	56* (6.3)
M8	124* (14)	159* (18)	195* (22)	248* (28)	274* (31)	354* (40)	133* (15)
M10	21 (28)	27 (36)	32 (43)	41 (56)	45 (61)	58 (79)	22 (30)
M12	36 (49)	46 (63)	55 (75)	72 (97)	79 (107)	102 (138)	39 (53)
M16	89 (121)	117 (158)	137 (186)	177 (240)	196 (266)	254 (344)	97 (131)
M20	175 (237)	226 (307)	277 (375)	358 (485)	383 (519)	495 (671)	195 (265)
M24	303 (411)	392 (531)	478 (648)	619 (839)	662 (897)	855 (1160)	338 (458)

NOTE: Torque values shown with * are inch pounds.

IDENTIFICATION
HEX CAP SCREW AND CARRIAGE BOLTS
CLASSES 5.6 AND UP



HEX NUTS AND LOCKNUTS
CLASSES 05 AND UP



MINIMUM HARDWARE TIGHTENING TORQUES

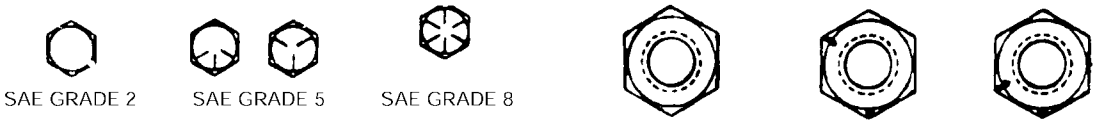
IN FOOT POUNDS - LBF. FT (NEWTON-METRES - Nm) FOR NORMAL ASSEMBLY APPLICATIONS

INCH HARDWARE AND LOCKNUTS

NOMINAL SIZE	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUTS		NOMINAL SIZE
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	GR.B w/GR5 BOLT	GR.C w/GR8 BOLT	
1/4	55* (6.2)	72* (8.1)	86* (9.7)	112* (13)	121* (14)	157* (18)	61* (6.9)	86* (9.8)	1/4
5/16	115* (13)	149* (17)	178* (20)	229* (26)	250* (28)	324* (37)	125* (14)	176* (20)	5/16
3/8	17 (23)	22 (30)	26 (35)	34 (46)	37 (50)	48 (65)	19 (26)	26 (35)	3/8
7/16	27 (37)	35 (47)	42 (57)	54 (73)	59 (80)	77 (104)	30 (41)	42 (57)	7/16
1/2	42 (57)	54 (73)	64 (87)	83 (113)	91 (123)	117 (159)	45 (61)	64 (88)	1/2
9/16	60 (81)	77 (104)	92 (125)	120 (163)	130 (176)	169 (229)	65 (88)	92 (125)	9/16
5/8	83 (112)	107 (145)	128 (174)	165 (224)	180 (244)	233 (316)	90 (122)	127 (172)	5/8
3/4	146 (198)	189 (256)	226 (306)	293 (397)	319 (432)	413 (560)	160 (217)	226 (306)	3/4
7/8	142 (193)	183 (248)	365 (495)	473 (641)	515 (698)	667 (904)	258 (350)	364 (494)	7/8
1	213 (289)	275 (373)	547 (742)	708 (960)	773 (1048)	1000 (1356)	386 (523)	545 (739)	1

NOTE: Torque values shown with * are inch pounds.

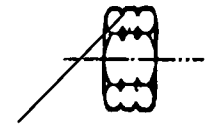
IDENTIFICATION
CAP SCREWS AND CARRIAGE BOLTS



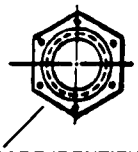
SAE GRADE 2 | SAE GRADE 5 | SAE GRADE 8

REGULAR NUTS | SAE GRADE 5 HEX NUTS | SAE GRADE 8 HEX NUTS

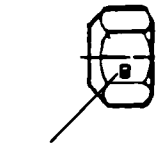
LOCKNUTS



GRADE IDENTIFICATION
GRADE A NO NOTCHES
GRADE B ONE CIRCUMFERENTIAL NOTCH
GRADE C TWO CIRCUMFERENTIAL NOTCHES



GRADE IDENTIFICATION
GRADE A NO MARKS
GRADE B THREE MARKS
GRADE C SIX MARKS
MARKS NEED NOT BE LOCATED AT CORNERS



GRADE A NO MARK
GRADE B LETTER B
GRADE C LETTER C

GRADE IDENTIFICATION

SECTION 17 - TORQUE CONVERTOR

Chapter 1 - With Powershuttle Transmission

CONTENT

SPECIFICATIONS

Engine Stall Speeds

Power Shuttle Transmission ..... 2009-2065 revs/min

Hydraulic Tests

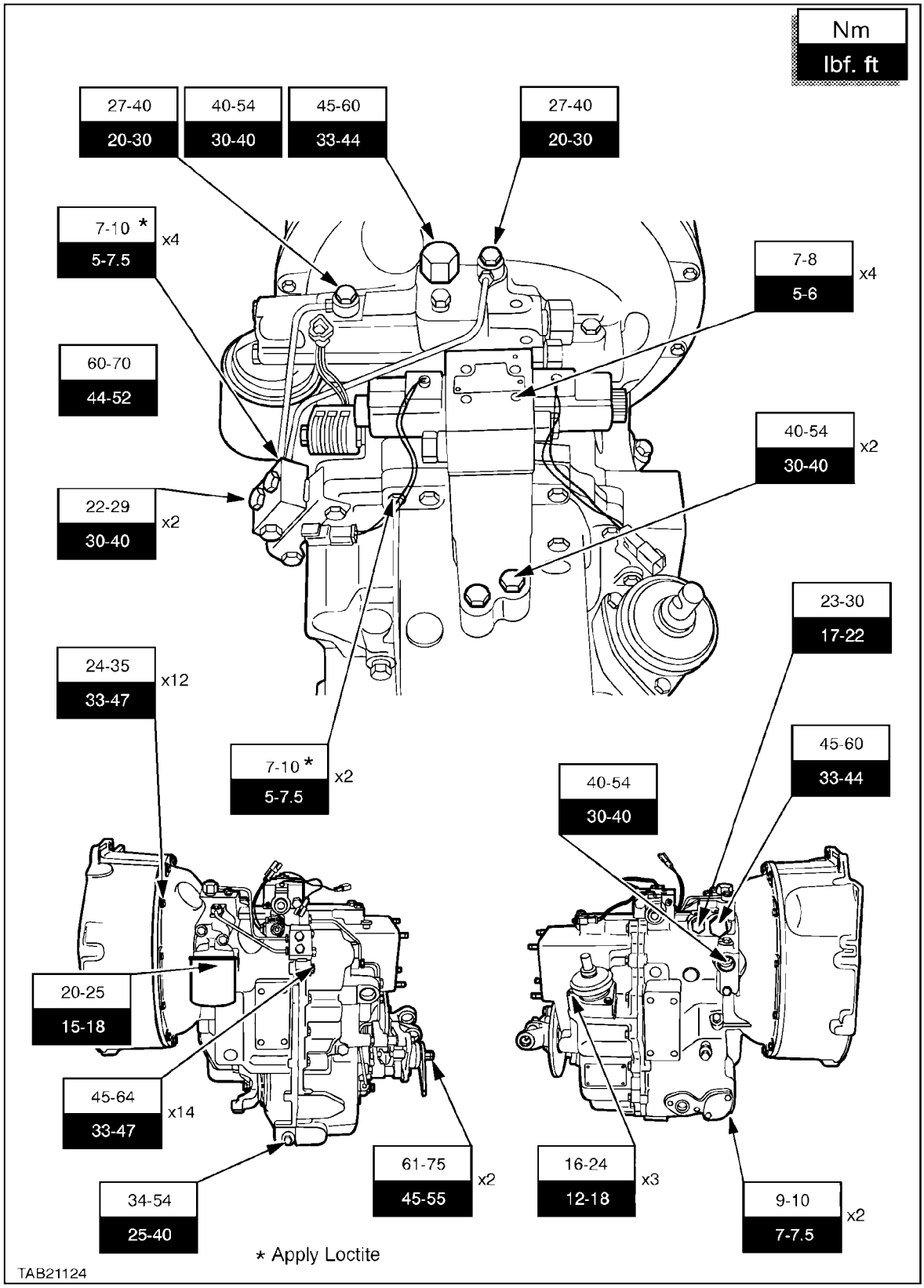
Tachometer Setting ..... 2000 revs/min
Test temperature, oil ..... 80-85°C (176-185°F)
Cold Start Valve (For reference only) ..... 26 bar (377 psi)
System Pressure Test ..... 13.7-15.2 bar (198-220 psi)
Torque Converter ..... 7-11 bar (101-159 psi)

Sealant

Gasket sealant 82995774
Thread sealant 82995768

TORQUE SPECIFICATIONS

Item Description	N·m	ft. lbs.
Cooler return pipe union	49-78	36-58
Cooler return pipe elbow	49-78	36-58
Stator support retaining bolt	26	19
Flywheel to flex plate	43	32
Flex plate to converter	43	32


Nm
lbf. ft
27-40
20-30
40-54
30-40
45-60
33-44
27-40
20-30
7-10 *
5-7.5
x4
7-8
5-6
x4
60-70
44-52
40-54
30-40
x2
22-29
30-40
x2
23-30
17-22
24-35
33-47
x12
45-60
33-44
7-10 *
5-7.5
x2
40-54
30-40
20-25
15-18
45-64
33-47
x14
61-75
45-55
x2
16-24
12-18
x3
9-10
7-7.5
x2
34-54
25-40
* Apply Loctite
TAB21124

DESCRIPTION AND OPERATION

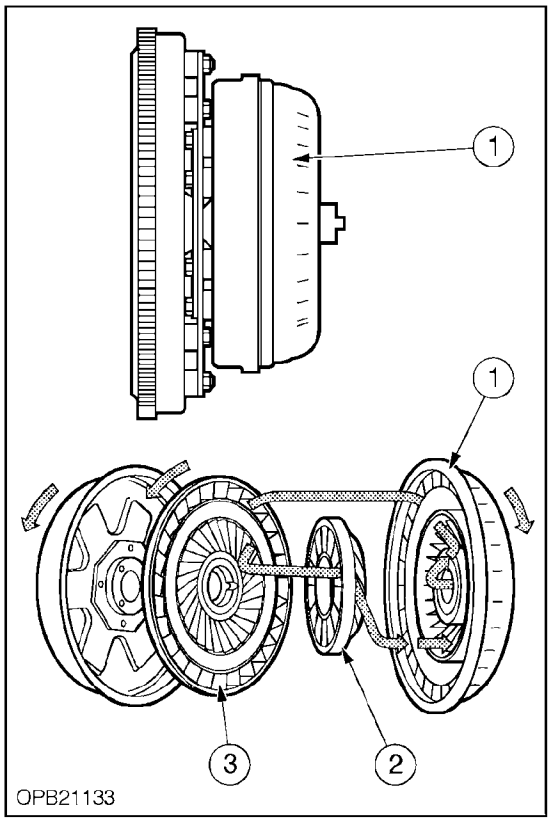
The main parts of the torque converter (1) are the impeller (pump), the turbine, the stator and the front and rear covers. The impeller is integral with the rear cover and is driven by the engine flywheel by means of a drive plate.

The turbine (2), splined to the front input shaft, is splined to a stationary shaft (stator support) through a one-way clutch that permits the stator (3) to rotate only in the same direction as the impeller (1). All of the converter parts are enclosed in an oil-filled housing. The front and rear cover, welded together, form the housing.

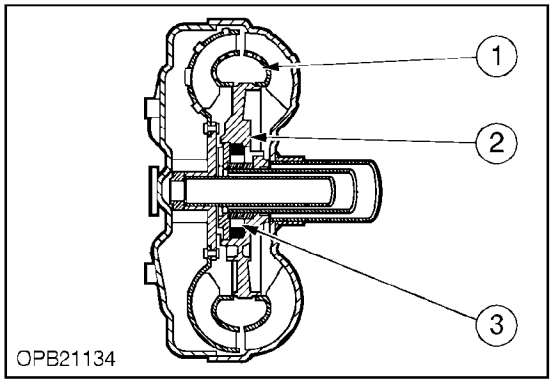
The stator (3), is splined to a stationary shaft (stator support) through a one-way clutch that permits the stator to rotate only in the same direction as the impeller. All of the converter parts are enclosed in an oil-filled housing. The front and rear cover, being welded together, form the housing.

When the engine is running, the oil in the converter flows from the impeller (1) to the turbine (2) and back to the impeller through the stator (3). This flow produces a maximum torque increase. When enough oil flow is developed by the impeller, the turbine begins to rotate, driving the front input shaft. The torque multiplication gradually decreases as turbine speed approaches impeller speed, and becomes 1 to 1 when the turbine is being driven at nine tenths impeller speed.

When the turbine (1) is rotating at approximately nine tenths impeller speed, the converter stops multiplying torque because the oil is now acting on the rear face of the stator blades (2). The action of the oil on the rear face of the stator unlocks the one-way clutch (3), permitting the stator to rotate in the same direction as the turbine and impeller. Through this action the converter becomes an efficient fluid coupling by transmitting engine torque from the impeller to the turbine.



2



3

FAULT FINDING

IMPORTANT: When effecting a repair the cause of the problem must be investigated and corrected to avoid repeat failures.

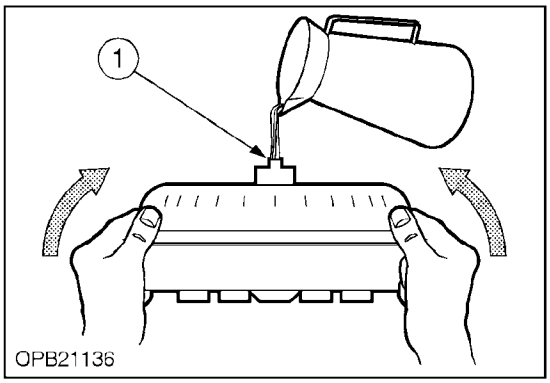
The following table lists problems and their possible causes with recommended remedial action.

PROBLEM	POSSIBLE CAUSES	CORRECTION
1. Low stall speed	Hydraulic clutch not releasing.	Replace Torque Convertor
	Stator support broken.	Replace Torque Convertor
	Defective torque converter.	Replace Torque Convertor
	Low engine power.	Check and correct output
2. High stall speed	Hydraulic clutch not applying or is slipping.	Replace
	Low line pressure.	Check pump output
	Sealing rings on rear input shaft broken.	Replace seals
	Defective torque converter.	Replace Torque Convertor

OVERHAUL

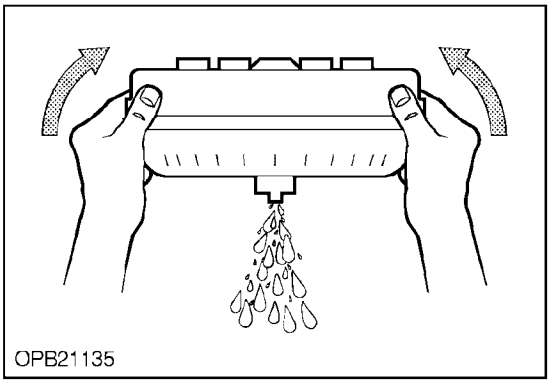
NOTE: To remove the torque convertor refer to the transmission section 21 000 for disassembly procedure.

The torque converter, is a welded unit and cannot be disassembled. The only maintenance performed on the converter, other than the stall test, is cleaning and visual inspection. A commercial torque converter cleaner may be used to clean the converter. However, if a commercial cleaner is not available, the converter should be cleaned as outlined below.



4

1. Drain as much oil as possible from the hub of the converter by tilting the converter in all directions.
2. Fill the converter about half full, through the hub (1), with paraffin base solvent or any cleaning solvent specified for cleaning transmissions.
3. Plug the opening in the hub, then circulate the solvent inside the converter by rotating and shaking.
4. Drain the solvent from the converter.
5. Repeat Steps 1 to 4, as required, until the solvent that is drained from the converter is clean.



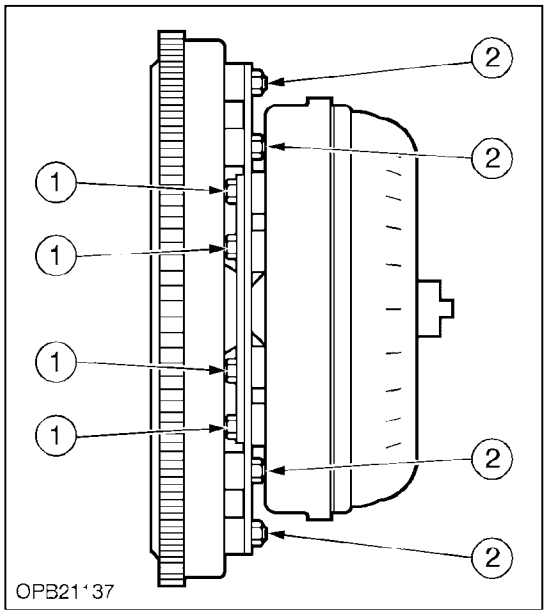
5

INSPECTION

Inspect the splines on the converter hub for wear or damage and the weld joints for cracks. If the hub is worn or damaged and/or the weld joints cracked, a new converter must be installed. A new drive plate should also be installed if it is warped.

RE-ASSEMBLY

1. Secure the drive plate to the torque converter, with the attaching bolts and flat washers (1) . Tighten bolts to 41 Nm (30 lbf ft).
2. Prior to fitting the transmission place the torque convertor carefully over the transmission shaft and into the transmission housing.
3. With the transmission bolted to the engine secure the drive plate to the flywheel accessed through the starter motor aperture, with the attaching bolts and washers (2). Tighten bolts to 41 Nm (30 lbf ft).



6

STALL TEST

The purpose of this test is to determine if the torque converter and hydraulic clutch assemblies are operating satisfactorily. For the test to be conclusive, the transmission hydraulic pump and pressure regulating valve must be operating correctly. They can be checked by performing the "Line Pressure Test". The engine and brakes must also be in good working order.

1. Check the coolant level in the radiator and the oil level in the transmission. If low, add fluid as required to bring to the proper level.
2. With the gearshift lever and the shuttle lever in neutral, start the engine and run at 800-1000 revs/min until the transmission temperature reaches 85° - 95° F (29° - 35° C).
3. Lock the brakes and shift into fourth gear, increase engine speed to approximately 900 revs/min, then shift the power reversing lever to the forward position. This will position the control valve so as to direct high pressure oil to the front clutch.

4. Ensure the brakes are firmly locked so the unit will not move, gradually depress the foot accelerator and note the maximum engine speed obtained. Move the power reversing lever to the neutral position. The stall speed should be:

STALL SPEED:
Engine 95 HP T ..... xxxx revs/min
Engine 110 HP TAA ..... xxxx revs/min

IMPORTANT: To prevent the transmission from overheating, do not allow the engine to operate at wide open throttle for more than fifteen seconds.

5. Allow the transmission oil to cool to 29°-35° C (85°-95° F). Check the rear hydraulic clutch by repeating Steps 3 and 4, but with the power reversing lever in the rearward position. Again, cool the transmission oil by allowing the engine to run at approximately 1000 revs/min for one minute.
6. The engine speed noted in Step 4 (stall speed) for both the front and rear clutch assemblies should be within 150 revs/min of each other. If the stall speed is not within these limits, refer to the diagnosis guide for possible causes.
7. With the gearshift lever and power reversing lever in neutral, set the engine speed at 600-800 revs/min, then shift into any gear ratio. If the gears clash, either the front or rear hydraulic clutch assembly is transmitting power, even though the power reversing lever is in neutral.

NOTE: If the unit creeps forward and the gears clash, the front clutch is at fault. The rear clutch is at fault if the unit creeps backward. If the unit does not creep and the gears still clash, use the stabilizers to raise the rear wheels off the ground, move the power reversing lever to neutral and shift into first gear. Check the rear wheels for rotational direction - if the wheel rotate rearward, then the rear clutch is at fault.

SECTION 17 - TORQUE CONVERTOR

Chapter 2 - With Powershift Transmission

CONTENT

SPECIFICATIONS

Engine Stall Speeds

110 HP ..... xxxx – xxxx revs/min

Torque Convertor Ratio

Ratio ..... 2.38 : 1

Lubricant

See Operator's Manual

Hydraulic Tests

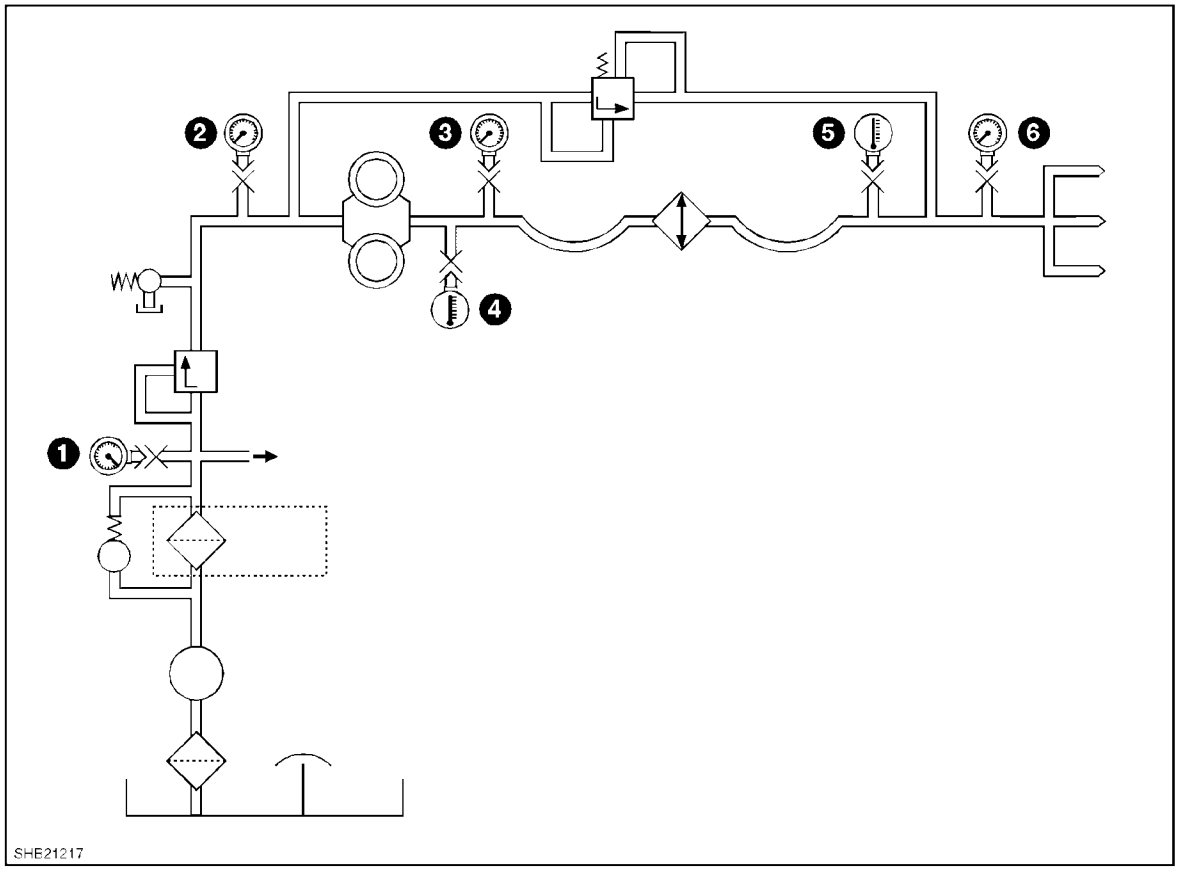
Tachometer Setting ..... 2200 revs/min
Test temperature, oil ..... 82–93°C (180–200°F)
Torque Converter relief valve ..... 10 bar (101–159 psi)
Oil temperature converter out,
- Normal operating range ..... 80–90°C (175–193°F)
- Maximum temperature ..... 120°C (284°F)

Sealant

Gasket sealant 82995774
Thread sealant 82995768

TORQUE SPECIFICATIONS

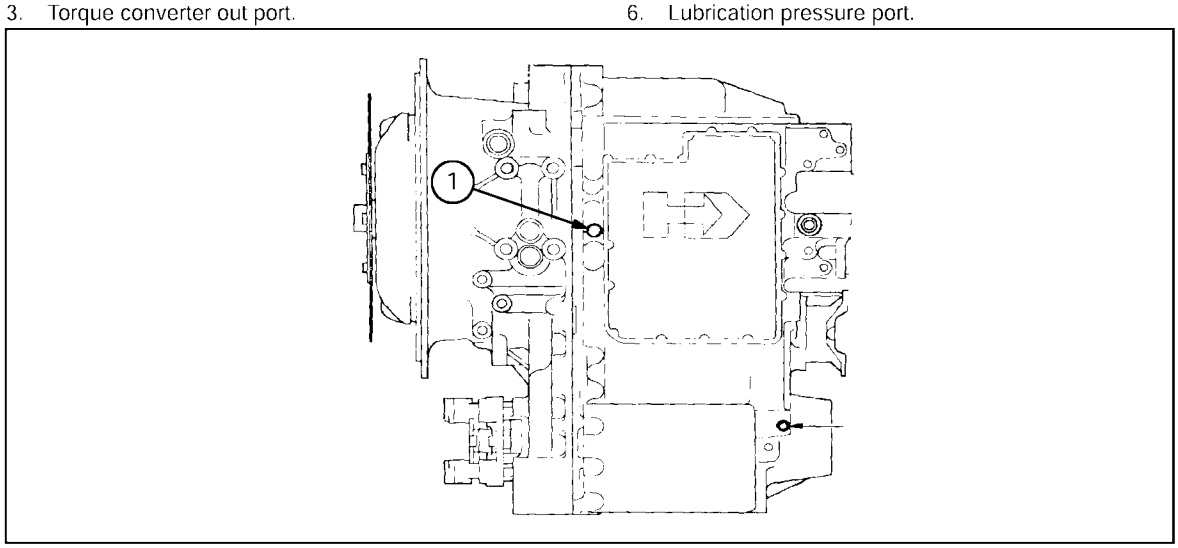
Item Description	N·m	ft. lbs.
Cooler return pipe union	49-78	36-58
Cooler return pipe elbow	49-78	36-58
Stator support retaining bolt	26	19
Flywheel to flex plate	43	32
Flex plate to converter	43	32



1

Torque converter and lubrication pressure test ports.

1. System pressure port.
2. Torque converter in port.
3. Torque converter out port.
4. Oil temperature converter out port.
5. Oil temperature cooler out port.
6. Lubrication pressure port.



2

Left Hand Side View

1. Pressure test port Convertor in 5-11 bar (73-159 psi)

DESCRIPTION AND OPERATION

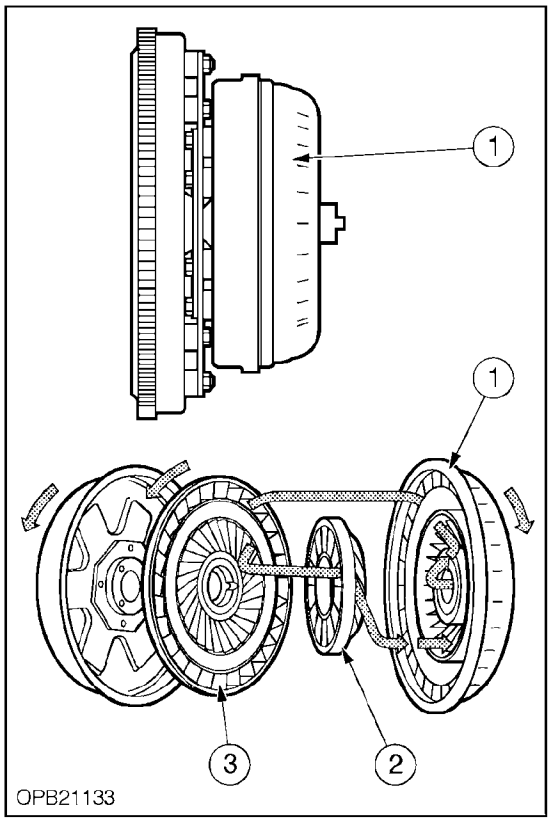
The main parts of the torque converter (1) are the impeller (pump), the turbine, the stator and the front and rear covers. The impeller is integral with the rear cover and is driven by the engine flywheel by means of a drive plate.

The turbine (2), splined to the front input shaft, is splined to a stationary shaft (stator support) through a one-way clutch that permits the stator (3) to rotate only in the same direction as the impeller (1). All of the converter parts are enclosed in an oil-filled housing. The front and rear cover, welded together, form the housing.

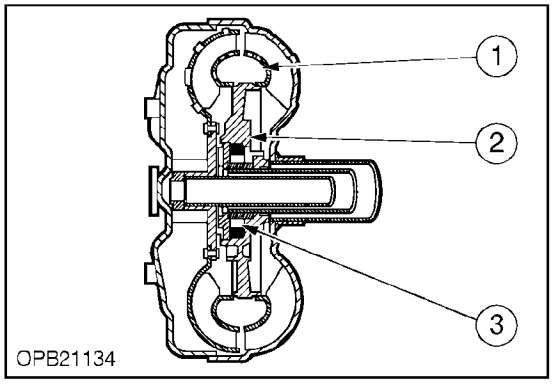
The stator (3), is splined to a stationary shaft (stator support) through a one-way clutch that permits the stator to rotate only in the same direction as the impeller. All of the converter parts are enclosed in an oil-filled housing. The front and rear cover, being welded together, form the housing.

When the engine is running, the oil in the converter flows from the impeller (1) to the turbine (2) and back to the impeller through the stator (3). This flow produces a maximum torque increase. When enough oil flow is developed by the impeller, the turbine begins to rotate, driving the front input shaft. The torque multiplication gradually decreases as turbine speed approaches impeller speed, and becomes 1 to 1 when the turbine is being driven at nine tenths impeller speed.

When the turbine (1) is rotating at approximately nine tenths impeller speed, the converter stops multiplying torque because the oil is now acting on the rear face of the stator blades (2). The action of the oil on the rear face of the stator unlocks the one-way clutch (3), permitting the stator to rotate in the same direction as the turbine and impeller. Through this action the converter becomes an efficient fluid coupling by transmitting engine torque from the impeller to the turbine.



3



4

FAULT FINDING

IMPORTANT: When effecting a repair the cause of the problem must be investigated and corrected to avoid repeat failures.

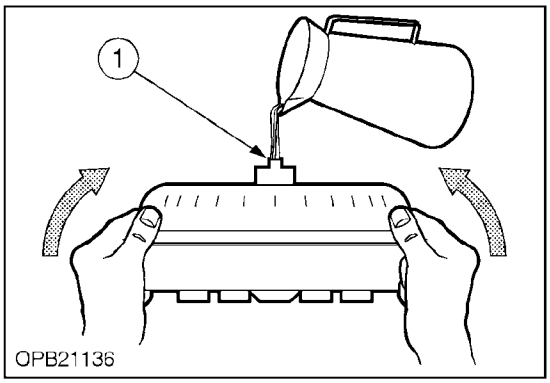
The following table lists problems and their possible causes with recommended remedial action.

PROBLEM	POSSIBLE CAUSES	CORRECTION
1. Low stall speed	Hydraulic clutch not releasing.	Replace Torque Convertor
	Stator support broken.	Replace Torque Convertor
	Defective torque converter.	Replace Torque Convertor
	Low engine power.	Check and correct output
2. High stall speed	Hydraulic clutch not applying or is slipping.	Replace
	Low line pressure.	Check pump output
	Sealing rings on rear input shaft broken.	Replace seals
	Defective torque converter.	Replace Torque Convertor

OVERHAUL

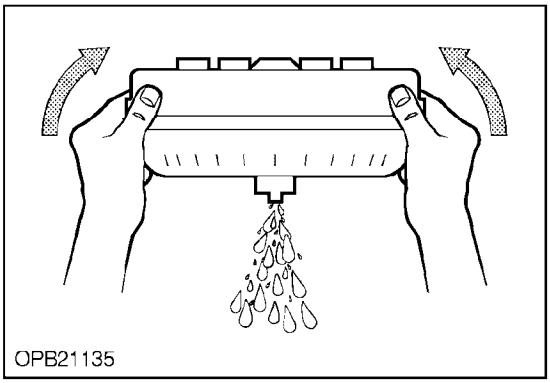
NOTE: To remove the torque convertor refer to the transmission section 21 000 for disassembly procedure.

The torque converter, is a welded unit and cannot be disassembled. The only maintenance performed on the converter, other than the stall test, is cleaning and visual inspection. A commercial torque converter cleaner may be used to clean the converter. However, if a commercial cleaner is not available, the converter should be cleaned as outlined below.



5

1. Drain as much oil as possible from the hub of the converter by tilting the converter in all directions.
2. Fill the converter about half full, through the hub (1), with paraffin base solvent or any cleaning solvent specified for cleaning transmissions.
3. Plug the opening in the hub, then circulate the solvent inside the converter by rotating and shaking.
4. Drain the solvent from the converter.
5. Repeat Steps 1 to 4, as required, until the solvent that is drained from the converter is clean.



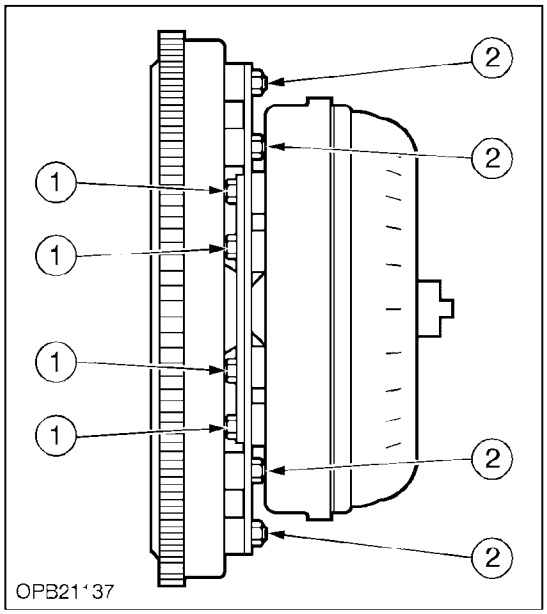
6

INSPECTION

Inspect the splines on the converter hub for wear or damage and the weld joints for cracks. If the hub is worn or damaged and/or the weld joints cracked, a new converter must be installed. A new drive plate should also be installed if it is warped.

RE-ASSEMBLY

1. Secure the drive plate to the torque converter, with the attaching bolts and flat washers (1) . Tighten bolts to 41 Nm (30 lbf ft).
2. Prior to fitting the transmission place the torque convertor carefully over the transmission shaft and into the transmission housing.
3. With the transmission bolted to the engine secure the drive plate to the flywheel accessed through the starter motor aperture, with the attaching bolts and washers (2). Tighten bolts to 41 Nm (30 lbf ft).



7

STALL TEST

The purpose of this test is to determine if the torque converter and hydraulic clutch assemblies are operating satisfactorily. For the test to be conclusive, the transmission hydraulic pump and pressure regulating valve must be operating correctly. They can be checked by performing the "Line Pressure Test". The engine and brakes must also be in good working order.

1. Check the coolant level in the radiator and the oil level in the transmission. If low, add fluid as required to bring to the proper level.
2. With the gearshift lever and the shuttle lever in neutral, start the engine and run at 800-1000 revs/min until the transmission temperature reaches 85° - 95° F (29° - 35° C).
3. Lock the brakes and shift into fourth gear, increase engine speed to approximately 900 revs/min, then shift the power reversing lever to the forward position. This will position the control valve so as to direct high pressure oil to the front clutch.

4. Ensure the brakes are firmly locked so the unit will not move, gradually depress the foot accelerator and note the maximum engine speed obtained. Move the power reversing lever to the neutral position. The stall speed should be:

STALL TORQUE:
Power Shift Transmission Models .... xxxx revs/min

IMPORTANT: To prevent the transmission from overheating, do not allow the engine to operate at wide open throttle for more than fifteen seconds.

5. Allow the transmission oil to cool to 29°-35° C (85°-95° F). Check the rear hydraulic clutch by repeating Steps 3 and 4, but with the power reversing lever in the rearward position. Again, cool the transmission oil by allowing the engine to run at approximately 1000 revs/min for one minute.
6. The engine speed noted in Step 4 (stall speed) for both the front and rear clutch assemblies should be within 150 revs/min of each other. If the stall speed is not within these limits, refer to the diagnosis guide for possible causes.
7. With the gearshift lever and power reversing lever in neutral, set the engine speed at 600-800 revs/min, then shift into any gear ratio. If the gears clash, either the front or rear hydraulic clutch assembly is transmitting power, even though the power reversing lever is in neutral.

NOTE: If the unit creeps forward and the gears clash, the front clutch is at fault. The rear clutch is at fault if the unit creeps backward. If the unit does not creep and the gears still clash, use the stabilizers to raise the rear wheels off the ground, move the power reversing lever to neutral and shift into first gear. Check the rear wheels for rotational direction - if the wheel rotate rearward, then the rear clutch is at fault.

SECTION 21 - TRANSMISSIONS

Chapter 1 - 4X4 Compact Shuttle

CONTENT

SPECIFICATIONS

Stall Speeds

95 hp ..... xxxx - xxxx revs/min
110 hp ..... xxxx - xxxx revs/min

Torque Convertor Ratio

Ratio ..... 2.34 : 1

Gear Ratios

Synchronized 4x4 Transmission	Forward 1st 4.824:1	Reverse 1st 4.020:1
	Forward 2nd 2.998:1	Reverse 2nd 2.498:1
	Forward 3rd 1.408:1	Reverse 3rd 1.173:1
	Forward 4th 0.792:1	Reverse 4th 0.660:1

Lubricant

See Operator's Manual

Sealant

Gasket sealant 82995774
Thread sealant 82995768

Cold Start By-pass Valve Spring

Free length ..... 53.4mm +/- 0.96mm (2.10in +/- 0.038in)

Fwd Clutch Spring

Free length 76.6mm (3.017in)

Clutch Piston Spring

Free length 75.9mm (2.99inin)

Detent Spring

Free length (Approximately) 42.06mm (1.656in)

End Float

Input forward Primary Shaft 0.0508-0.41mm (0.002-0.016in)
Input reverse Primary Shaft 0.0508-0.41mm (0.002-0.016in)
Output shaft ..... 1st Gear- 0.33-0.508mm (0.013-0.020in)
..... 2nd Gear- 0.35-0.558mm (0.014-0.022in)
..... 3rd Gear- 0.38-0.838mm (0.015-0.033in)
..... 4th Gear- 0.20-0.558mm (0.008-0.022in)
Four Wheel Drive Shaft 0.050-0.28mm (0.002-0.011in)
Bearing End Floats 0.025-0.076mm (0.001-0.003in)
Bearing End Float Shims available 0.050/0.076/0.127/0.177/0.381/0.508mm
..... (0.002/0.003/0.005/0.007/0.015/0.020in)

Hydraulic Tests

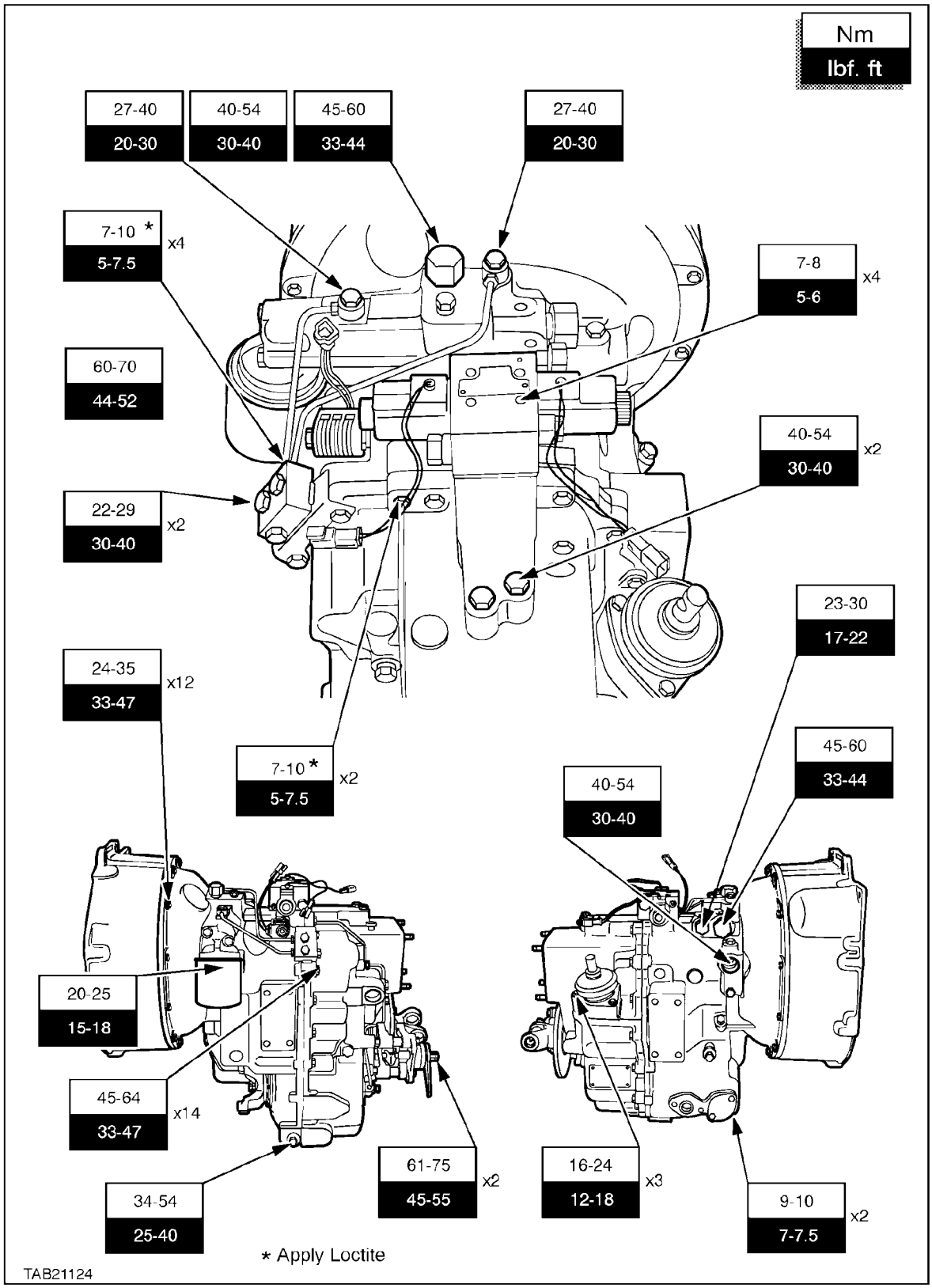
Tachometer Setting ..... 2000 revs/min
Test temperature, oil ..... 80-85°C (176-185°F)
Cold Start Valve (For reference only) ..... 26 bar (377 psi)
System Pressure Test ..... 13.7-15.2 bar (198-220 psi)
Torque Converter ..... 7-11 bar (101-159 psi)
Reverse Clutch ..... 13.7-15.2 bar (198-220 psi)
Forward Clutch ..... 13.7-15.2 bar (198-220 psi)
Four Wheel Drive Drive Supply ..... 13.7-15.2 bar (198-220 psi)

Cooler Flow Test

Oil temperature 80-85°C (176-185°F)	Revs/min	Oil Flow Litres/min (gallons/min)
.....	700	12.5 litres (3.3 US. gals)
.....	1000	18.2 litres (4.8 US. gals)
.....	1500	22.1 litres (5.8 US. gals)
.....	2000	24.0 litres (6.3 US. gals)
.....	2200	24.5 litres (6.5 US. gals)
.....	2500	25.0 litres (6.6 US. gals)

TORQUE SPECIFICATIONS

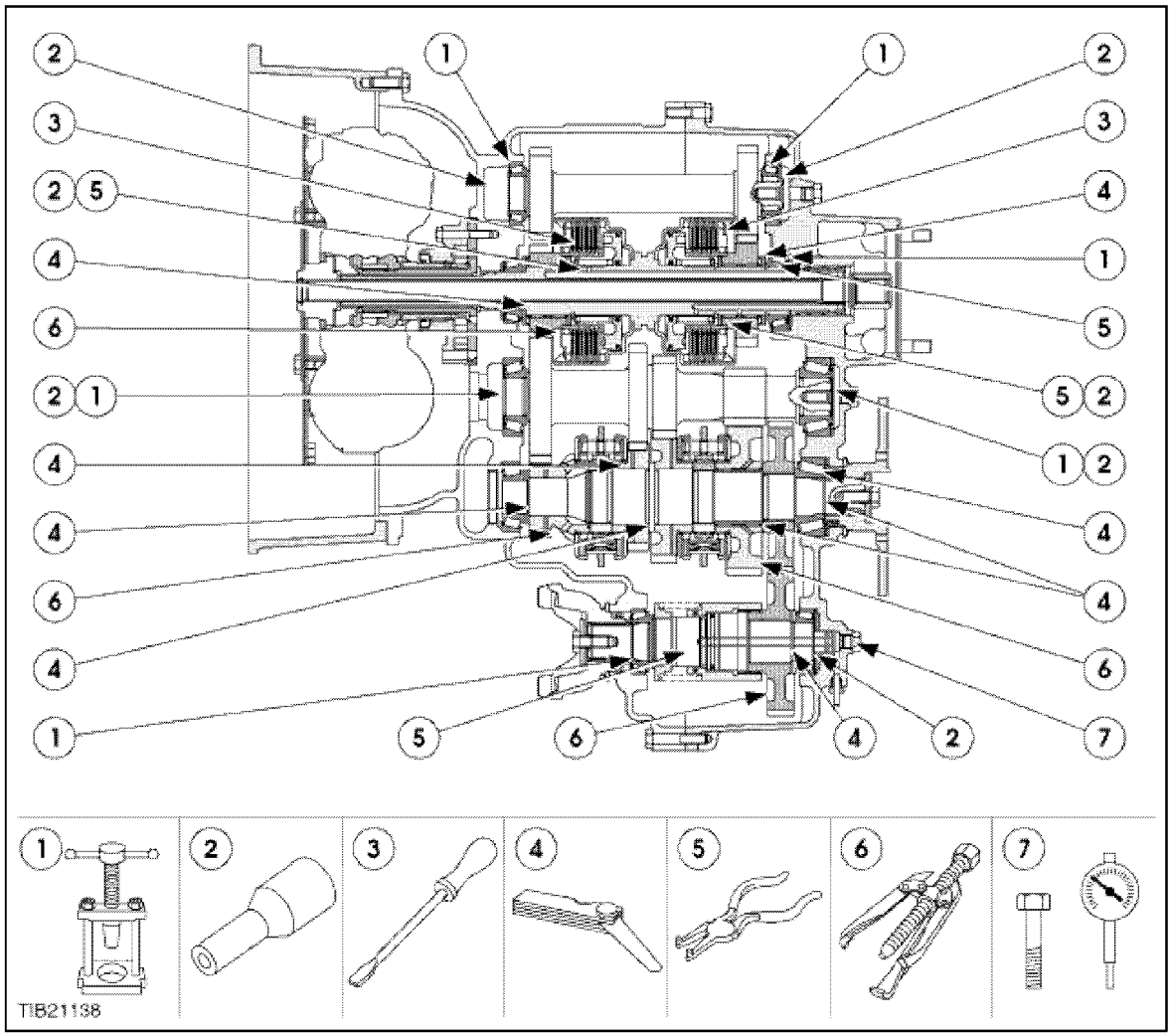
Item Description	N·m	ft. lbs.
Cooler return pipe union	49-78	36-58
Cooler return pipe elbow	49-78	36-58
Stator support retaining bolt	26	19
Flywheel to flex plate	43	32
Flex plate to converter	43	32


Nm
lbf. ft
27-40
20-30
40-54
30-40
45-60
33-44
27-40
20-30
7-10 *
5-7.5
x4
7-8
5-6
x4
60-70
44-52
40-54
30-40
x2
22-29
30-40
x2
23-30
17-22
24-35
33-47
x12
45-60
33-44
7-10 *
5-7.5
x2
40-54
30-40
20-25
15-18
45-64
33-47
x14
61-75
45-55
x2
16-24
12-18
x3
9-10
7-7.5
x2
34-54
25-40
* Apply Loctite
TAB21124

1

SPECIAL TOOLS

DESCRIPTION	APPLICATION
Bearing Cone Drift 40mm	Counter Shaft, Rear Main Shaft and 4WD Bearing
Bearing Cone Drift 35mm	Reverse Idler and Front Main Shaft Bearing
Bearing Cone Drift 40mm	Front Input Shaft Bearing
Bearing Cone Drift 50mm	Rear Input Shaft Bearing
Slide Hammer	Bearing cone removal
Bush Insertion Tool 22mm	Pump rod Insertion Tool
Welch Plug Drift	Shim Adjustment Cover
Oil Seal Drift	Pump Seal
*Spring Compressor	Main Clutches Tool no 380000679
Spring Compressor	Detent Ball Spring
Circlip Pliers .	Where applicable
Feeler Gauges	Where applicable
*Dial Indicator Bolt	Shaft end float Tool no 380000700



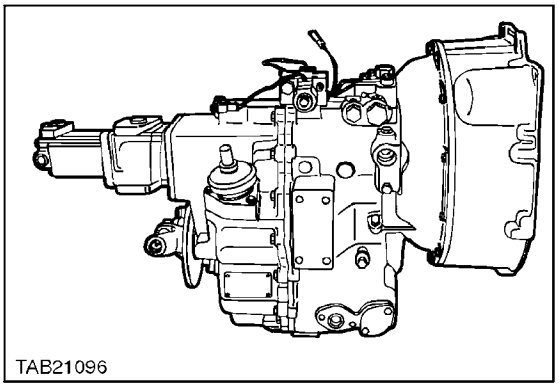
2

DESCRIPTION AND OPERATION

The transmission consists of a torque converter, an internal rotor-type hydraulic pump, an oil distributor, a solenoid control valve assembly, two hydraulically operated clutches, a 4-speed synchromesh gear-train, transmission case and oil cooler tubes.

GEAR RATIOS Synchronized 4x4 Transmission

Forward 1st - 4.824:1 . Reverse 1st - 4.020:1
Forward 2nd - 2.998:1 . Reverse 2nd - 2.498:1
Forward 3rd -1.408:1 . Reverse 3rd - 1.173:1
Forward 4th - 0.792:1 . Reverse 4th - 0.660:1

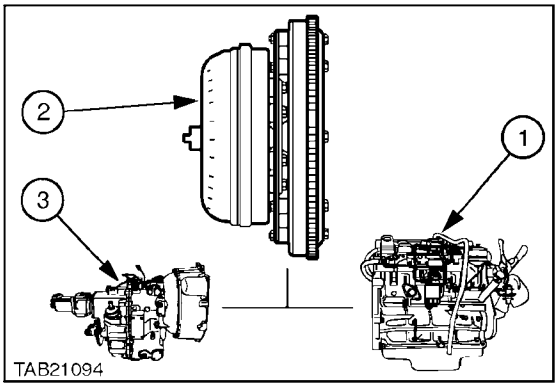


3

NOTE: A conventional clutch is not used with this transmission.

The transmission case serves as an oil reservoir for the torque converter and hydraulic clutch assemblies.

The gearbox receives power from the engine (1) by a fluid coupling in the torque converter (2) and hydraulic clutch assemblies in the transmission (3).



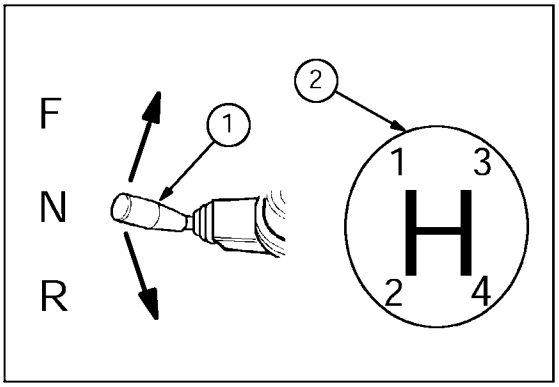
4

TRANSMISSION CONTROL (Op 21 136)

The front clutch provides power for forward travel and the rear clutch power for reverse travel. Engagement of the front and rear clutch is controlled by the operator through the movement of the hand operated power reversing lever (1).

The gearshift lever (2) is used to select any one of four speeds through an 'H' pattern synchronized gear shift.

In any gear ratio the operator need only move the shuttle lever to change direction of travel, forward or reverse.



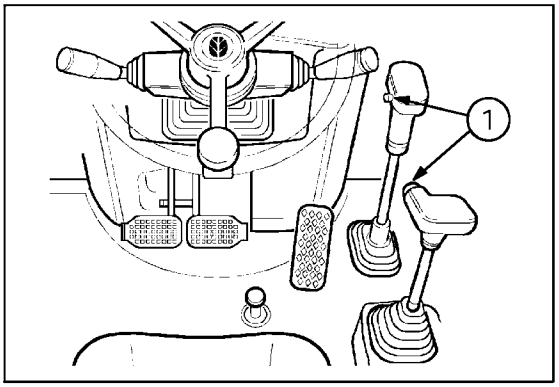
5

Transmission disconnect switches (Op 21 136)

Two finger operated button type switches (1) are provided. One on the gearshift lever knob, primarily to change gear ratios and the second on the loader control lever knob for use during loader operations.

However, as a clutch is not used between the engine and the transmission, the power flow from the engine to the transmission must be interrupted to shift from one gear ratio to another. This is accomplished by using a transmission disconnect switch on the gear lever.

Easy gear changes may be made with the fully synchronized gearbox, simply by depressing the transmission disconnect button on the gearshift lever while moving the lever from one ratio to another.



6

TORQUE CONVERTER (OP 17 110)

NOTE: The torque converter is a sealed unit and can not be serviced as individual parts.

The torque converter is the connection between the engine and the transmission and is hydraulically actuated.

The main parts of the torque converter are the impeller, the turbine, the stator and the front and rear covers. The impeller is integral with the rear cover and is driven by the engine flywheel by means of a drive plate.

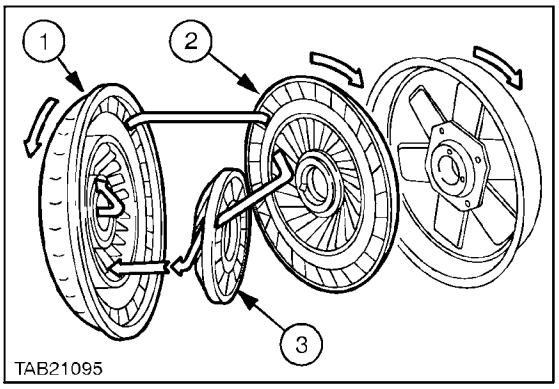
The stator, is splined to a stationary shaft (stator support) through a one-way clutch that permits the stator to rotate only in the same direction as the impeller. All of the converter parts are enclosed in an oil-filled housing. The front and rear cover, being welded together, form the housing.

The turbine (2), splined to the front input shaft, is splined to a stationary shaft (stator support) through a one-way clutch that permits the stator (3) to rotate only in the same direction as the impeller (1). All of the converter parts are enclosed in an oil-filled housing. The front and rear cover, welded together, form the housing.

When the engine is running, the oil in the converter flows from the impeller (1) to the turbine (2) and back to the impeller through the stator (3). This flow produces a maximum torque increase. When enough oil flow is developed by the impeller, the turbine begins to rotate, driving the front input shaft. The torque multiplication gradually decreases as turbine speed approaches impeller speed, and becomes 1 to 1 when the turbine is being driven at nine tenths impeller speed.

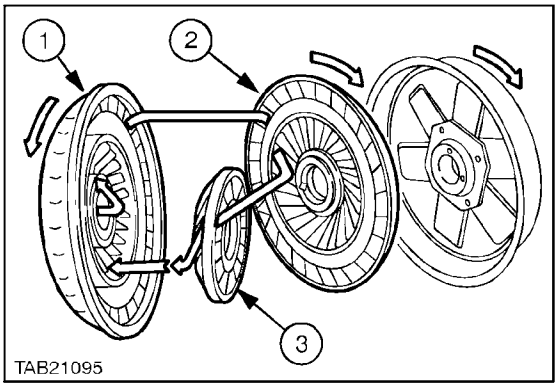
When the turbine is rotating at approximately nine tenths impeller speed, the converter stops multiplying torque because the oil is now acting on the rear face of the stator blades (3). The action of the oil on the rear face of the stator unlocks the one-way clutch, permitting the stator to rotate in the same direction as the turbine (2) and impeller (1). Through this action the converter becomes an efficient fluid coupling by transmitting engine torque from the impeller to the turbine.

To achieve optimum operation the engine performance, transmission ratios, hydraulic power delivery and converter torque multiplication are all "Matched" to provide the necessary vehicle drive torque when required.



7

When the turbine is rotating less than nine tenths impeller speed (1), the converter is multiplying torque through the action of the stator (3). This action, produced by oil acting on the front face of the stator blades, tends to rotate the stator in the opposite direction of the impeller (1) and turbine (2). However, the one-way clutch prevents this opposite rotation and allows the stator to direct oil back to the impeller, thereby producing torque multiplication. Maximum torque multiplication is achieved when the impeller is driven at stall speed and the turbine is stationary

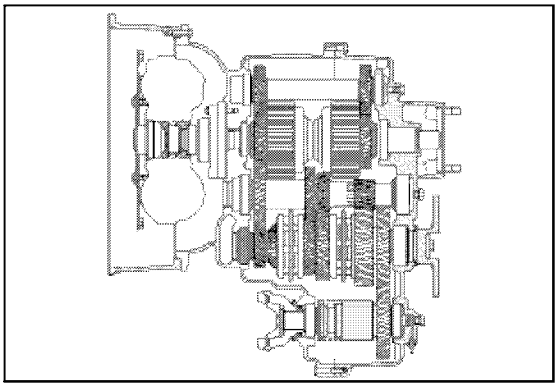


8

GEAR TRAIN (Op. 21 146)

The front and rear cases of the transmission sandwich a series of parallel shafts which support the helically cut gears, between tapered roller bearings.

Polymer lip seals on the hydraulic pump output and FWD shafts prevent leakage from the sump. A breather at the top of the filler tube prevents pressure damage to the seals.

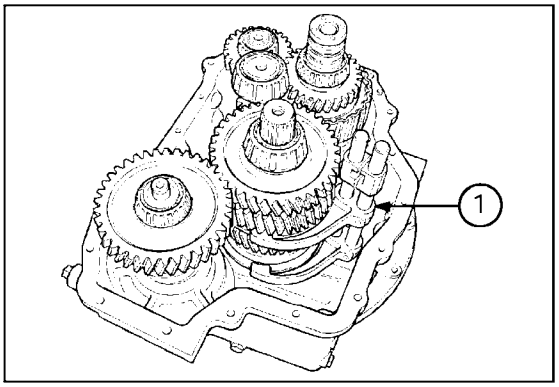


9

GEAR SHIFT MECHANISM (Op. 21 136)

A mechanical arrangement of shift rails, forks and synchronisers allows static or rolling engagement of any of the 4 transmission ratios from a standard H gate pattern lever.

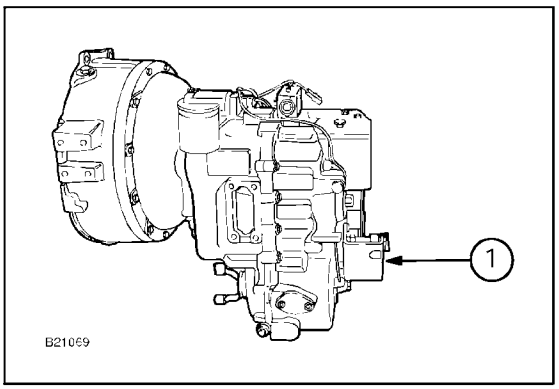
The synchronisers prevent engagement of the selected gear until its shaft speed is synchronised with that of the output shaft. A detent interlock system prevents gear jumpout and the simultaneous engagement of 2 gears.



10

PARKING BRAKE (Op. 21 136)

At the rear of the transmission and on the output coupling a cast iron disc acts as the mounting flange and parking brake. The disc runs in a mechanical calliper which reacts through a bracket connected to the transmission rear housing. The calliper has replaceable friction pads and is manually adjustable as the pads wear



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