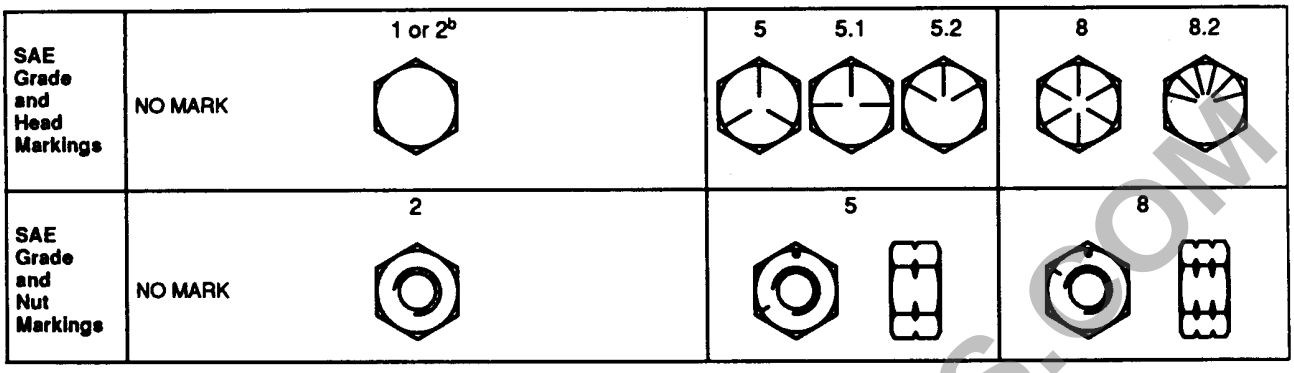
UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES



TS1162 -19-04MAR91

Size	Grade 1				Grade 2[b]				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

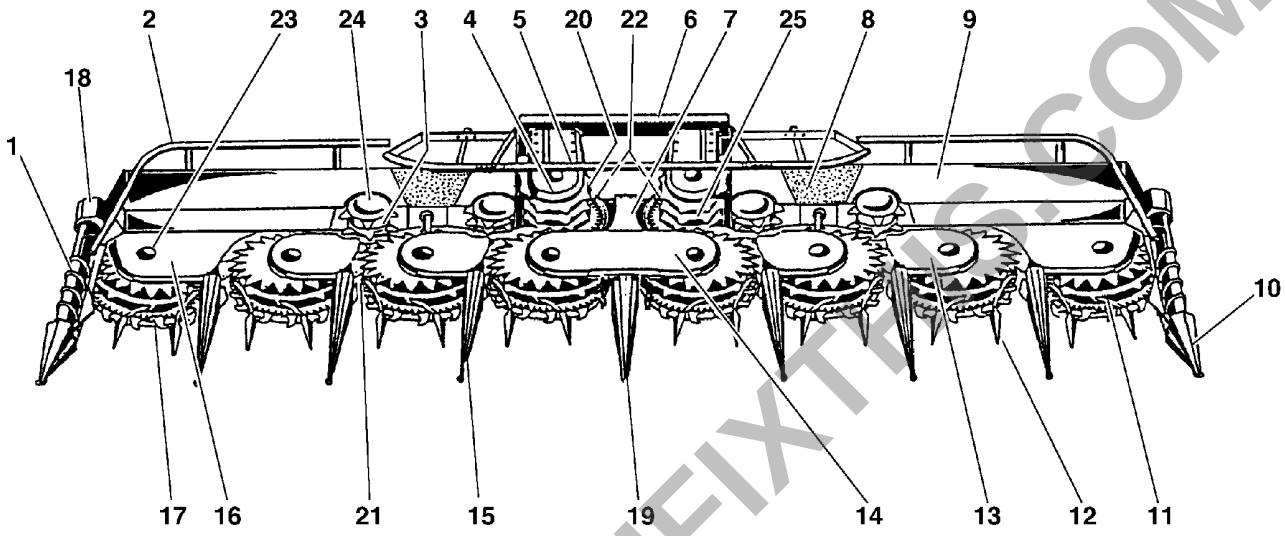
[a] "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

[b] Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length.

DX,TORQ1 -19-20JUL94

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COMPONENT LOCATION (PART 1)



ZX014361

688 harvesting unit shown

ZX,TM688R011261-19-01MAR99

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SPECIFICATIONS

Item	Measurement	Specification
Gear case oil	Capacity	1.80 l (0.48 U.S. gal)
Socket-head screws, L-gear case housing halves	Torque	20 to 27 N·m (15 to 20 lb-ft)
Socket-head screws, L-gear case tube	Torque	55 N·m (40 lb-ft)
Mounting screws, idler gear	Torque	46 N·m (34 lb-ft)
Gear case spur gears	Axial play	0 mm (0 in.)

ZX,TM688R011439-19-15FEB98

OTHER MATERIAL

Number	Name	Use
TY6305	John Deere Cleaner-Primer	To prepare surface for sealing compound
TY15130	Sealing compound	Used in place of a gasket in gear case
TY9370	Loctite 242	To secure fixing screws of gear case halves

ZX,TM688R011440-19-15FEB98

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REMOVING L-GEAR CASE FROM HARVESTING UNIT

NOTE: Tube (A) protects L-gear case (B) output shaft. Therefore, an easier removal and installation process can be carried out by removing L-gear case with the tube (A).

• Disconnect U-joint drive shaft from L-gear case.

- Loosen socket-head fixing screws (C) from feed drum transmission case (D).

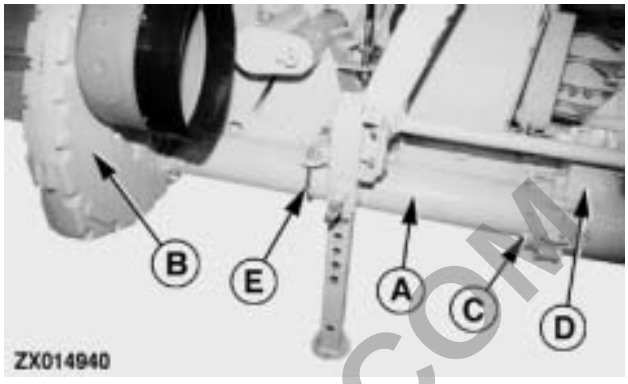
- Place suitable lifting device underneath L-gear case (B) then slightly loosen U-bolt (E) nuts just enough to allow L-gear case lateral movement.

CAUTION: L-gear case is heavy and not stable during removal! Take extreme care when handling it!

- Slowly slide L-gear case (B) until output shaft is no longer connected to coupler (F), then fully remove U-bolt (E).

NOTE: Leave the coupler (F) on feed drum transmission case (D) input shaft. It will be used as a guide for L-gear case installation.

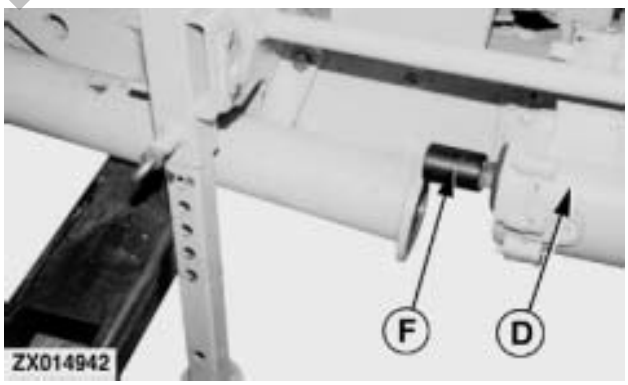
A—Tube
B—L-gear case
C—Socket-head fixing screws
D—Feed drum transmission case
E—U-bolt
F—Coupler



-UN-06MAY98
ZX014940



-UN-11MAY98
ZX014941



-UN-06MAY98
ZX014942

ZX,TM688R011446-19-01APR98

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HARVESTING UNIT GENERAL DIFFICULTIES

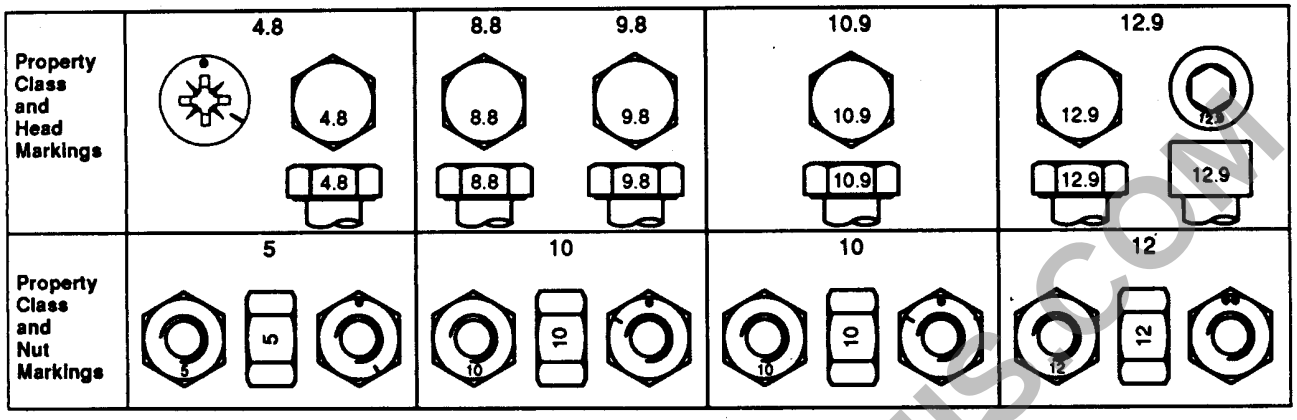
CAUTION: Before making adjustments or carrying out service work, always shut off the engine, remove the ignition key and wait until all rotating components have come to a standstill.

Symptom	Problem	Solution
Power requirement becomes excessive	Dull blades	Replace the blades.
	Defective cleaners	Install new cleaners.
Cutting rotors not rotating smoothly	Accumulation of leaves under the cutting rotors, dirt in the area of the drums	Clean the area of the cutting rotors daily or as often as required when in continuous operation.
	Defective cleaners	Install new cleaners.
Harvesting unit vibrates	Imbalance caused by unequal blades	Replace mating blades in pairs.
	One of the cleaners has broken	Replace both cleaners.
	Imbalance caused by dirt inside the cutting rotor	Clean the cutting rotor.
	Excessive vertical play of the cutting rotor	Straighten the blades or install new blades.
Accumulation of husks at the scrapers	Scrapers not correctly positioned	Refer to relevant drum scrapers in Section 100.
Stalks are pushed to the front before they are cut (long, uneven stubble)	Leaves accumulated at the small dividers	Clean the dividers.
	One of the cleaners has broken	Replace both cleaners.
	Rotating blades are dull	Replace the blades.
Drives overheating	Too much oil in the drives	Check oil level in drives. See Section 50.

Continued on next page

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METRIC BOLT AND CAP SCREW TORQUE VALUES



TS1163 -19-04MAR91

Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft	N·m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class.

Fasteners should be replaced with the same or higher property class. If higher property class fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

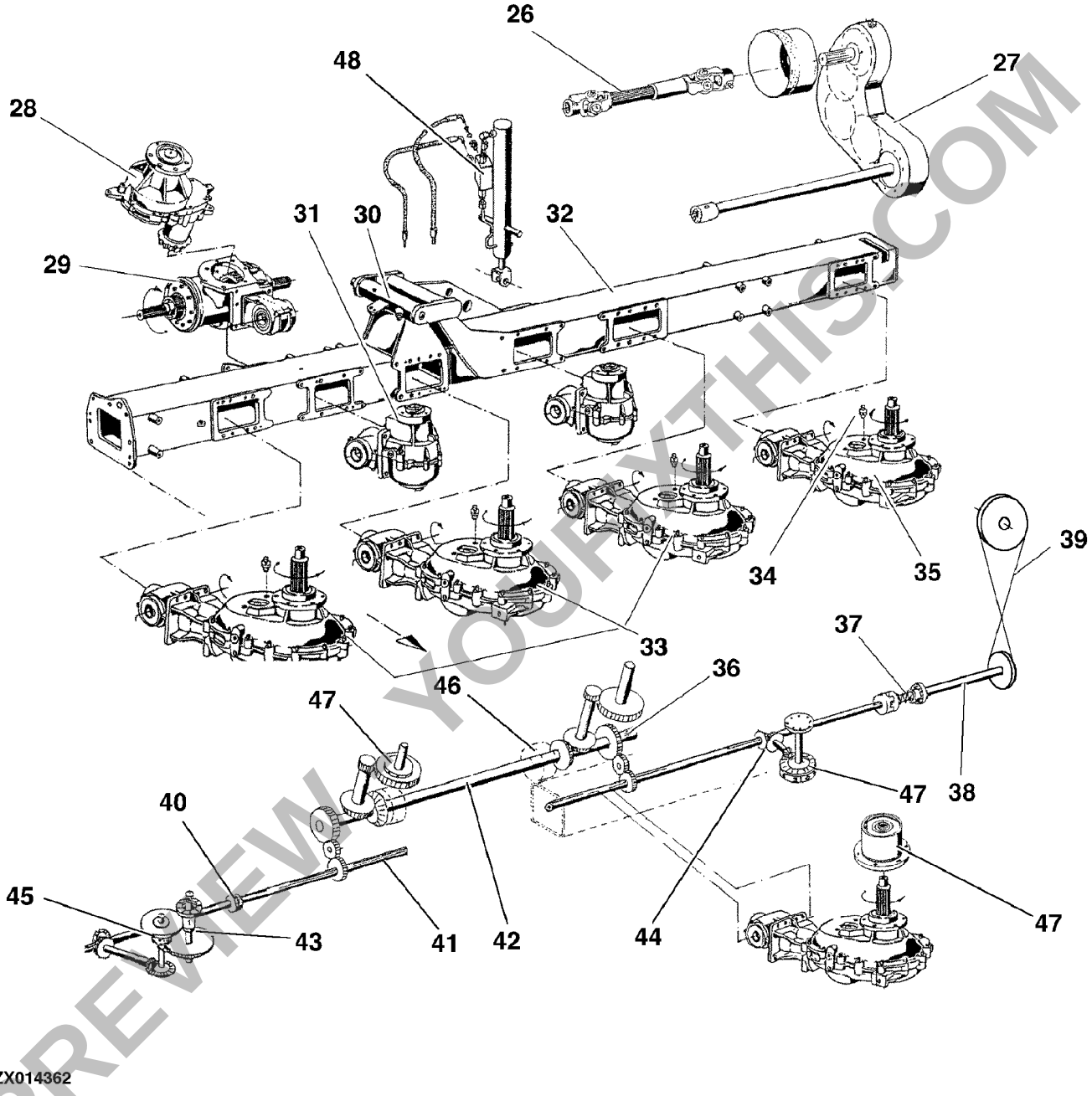
Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.*

DX,TORQ2 -19-20JUL94

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COMPONENT LOCATION (PART 2)



688 harvesting unit shown

ZX,TM688R011263-19-01MAR99

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ASSEMBLING L-GEAR CASE

- Insert snap ring (D) in idler gear (C).

- Install both bearing cups (E).

- Slide taper roller bearing (F) on pin (G) and install it in idler gear.

- Install spacer and shims (J) and second taper roller bearing.

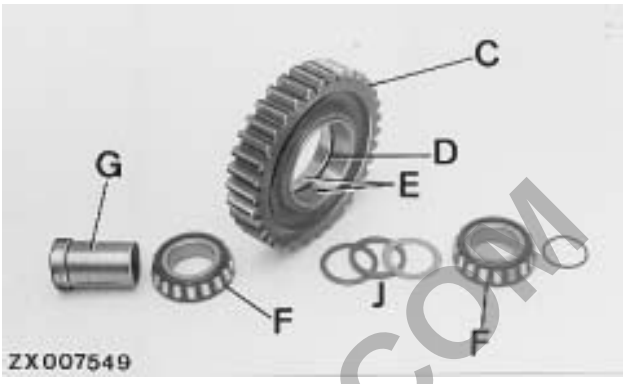
- Install the assembly in housing half (A) and secure with screw (H).

- Adjust axial play to 0 mm (0 in.) or a slight preload by adding or removing shims (J).

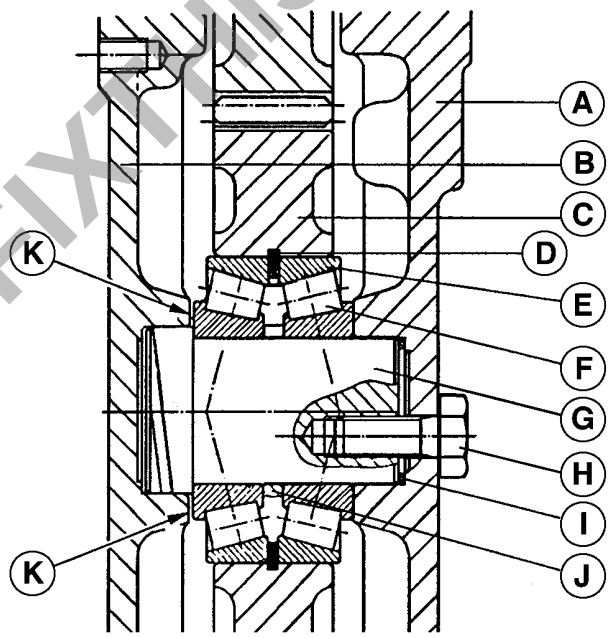
NOTE: Shims (J) are 35x45x0.1 or 0.3 mm (1.37x1.77x0.004 or 0.01 in.) thick. Spacer(J) is 35x45x2.0 or 2.5 mm (1.37x1.77x0.08 or 0.10 in.) thick.

After adjustment has been completed, install screw (H) and tighten to 46 N·m (34 lb-ft).

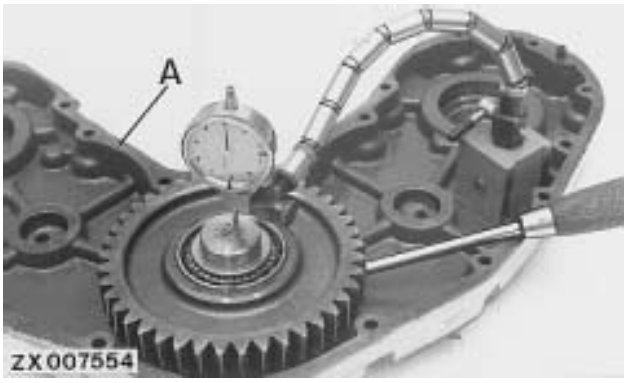
A—Housing half
B—Housing half
C—Idler gear
D—Snap ring
E—Bearing cup
F—Taper roller bearing
G—Pin
H—10x25 cap screw
I—O-ring
J—Spacer and shims
K—Clearance to housing half



ZX007549 -UN-20JUL95 ZX007549



ZX014937 -UN-11MAY98 ZX014937



ZX007554 -UN-20JUL95 ZX007554

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Symptom	Problem	Solution
Gathering or feed drums stop rotating (cutting rotor still rotating)	Accumulation of crop in the feeding area	Reverse the feed unit for a short moment; repeat this step if necessary.
	Defective gear case	Refer to the relevant gear case in Section 50.
Outside gathering drums and cutting rotor stop rotating	Defective claw-type disks (shift collar)	Refer to the relevant claw-type disk in Section 80, Group 05.
The entire l.h. or r.h. side of the unit stops rotating	L.h. or r.h. friction clutch defective	Refer to the relevant friction clutch in Section 50, Group 10.
Obstruction in hydraulic system of outer folding section	A foreign body (e.g. grain of sand) is obstructing the restrictor	Refer to the relevant hydraulic cylinder in Section 70, Group 05.

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SPECIFICATIONS OF 686 HARVESTING UNIT

Length	**2.06 m (81.10 in.)**
Overall width	**4.55 m (179.13 in.)**
Height	**1.25 m (49.21 in.)**
Operating width	**4.50 m (177.17 in.)**
Transport width	**2.95 m (116.14 in.)**
Weight	**2160 kg (4762 lb)**
Max. operating speed	**15 km/h (9.32 mph)**

Revolutions (at 2100 engine rpm; forage harvester at a standstill and without load)

	Low speed	High speed
Header drive shaft	**401 rpm *)**	**530 rpm *)**
Gathering drums	**41 rpm**	**54 rpm**
Cutting rotors	**1323 rpm**	**1748 rpm**
Cross feed drums	**88 rpm**	**116 rpm**
Feed drums	**73 rpm**	**96 rpm**

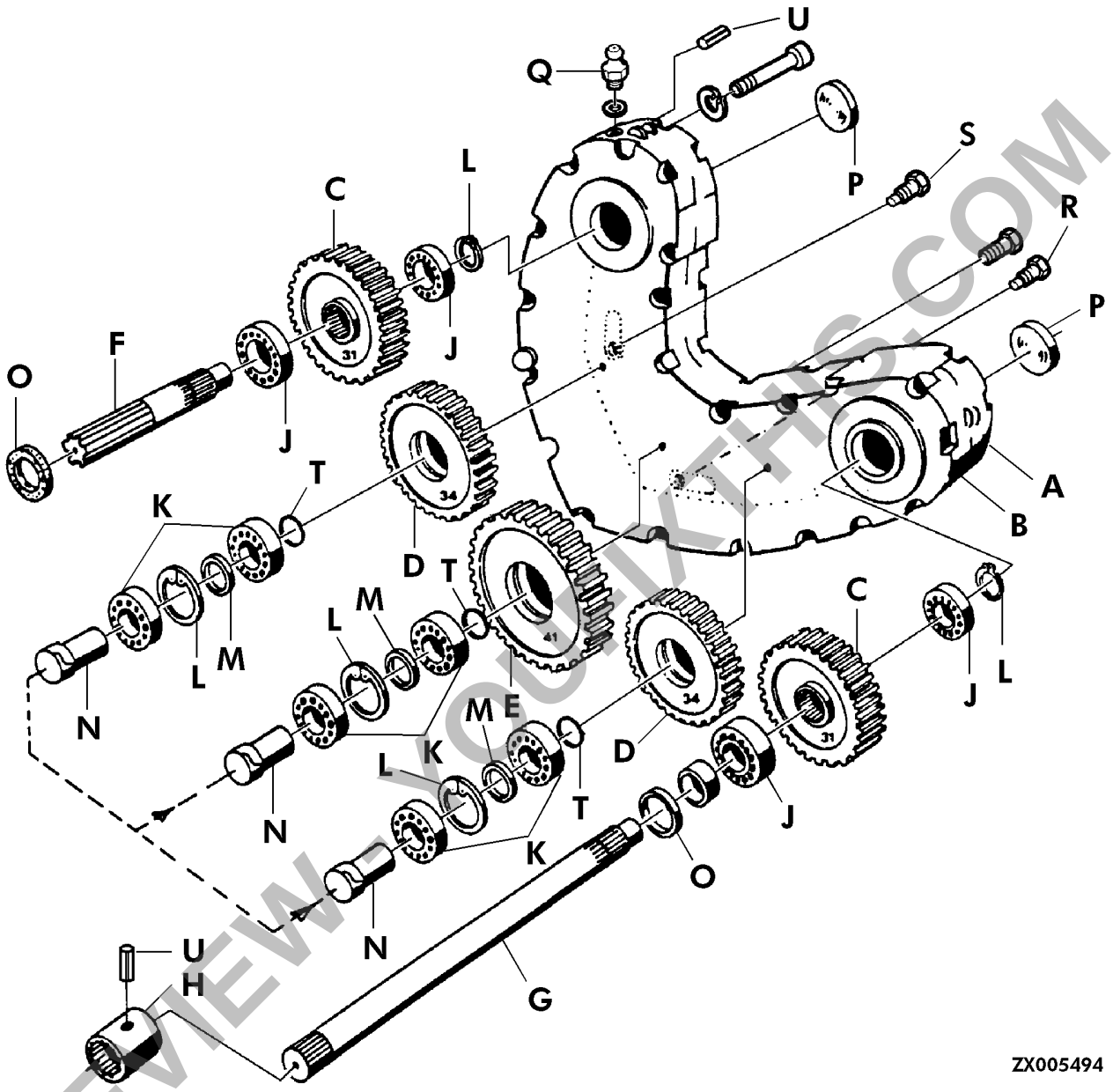
**) Values given for 6950 Forage Harvester*

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DISASSEMBLING L-GEAR CASE



A—Housing half	F—Input shaft	L—Snap ring	Q—Breather (refill plug)
B—Housing half	G—Output shaft	M—Spacer	R—Drain plug (magnetic)
C—Gear (31 teeth)	H—Splined bushing	N—Pin	S—Level plug
D—Gear (34 teeth)	J—Grooved ball bearing	O—Lip seals	T—O-rings
E—Gear (41 teeth)	K—Taper roller bearing	P—Cover	U—Spring pin

ZX,TM688R011552-19-01MAY98

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Adjust Axial Play Of All Gears:

- Adjust axial play on three spur gears as described and install them.



ZX,TM688R011443-19-01APR98

Assemble Housing Halves:

- Pre-assemble input shaft (A) and install in housing half (B).

- Pre-assemble output shaft (C) and install in housing half (D).

- Clean sealing surface of housing halves (B) and (D) with TY6305 Cleaner-Primer then apply sealing compound TY15130.

- Tighten all housing half socket-head fixing screws to 20-27 N·m (15 to 20 lb-ft).

- Fill housing with 1.8 L (0.48 U.S. gal.) of specified oil.

• Install L-gear case on harvesting unit as described under “Installing L-Gear Case On Harvesting Unit” this Section, this Group.



A—Input shaft
B—Housing half
C—Output shaft
D—Housing half

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