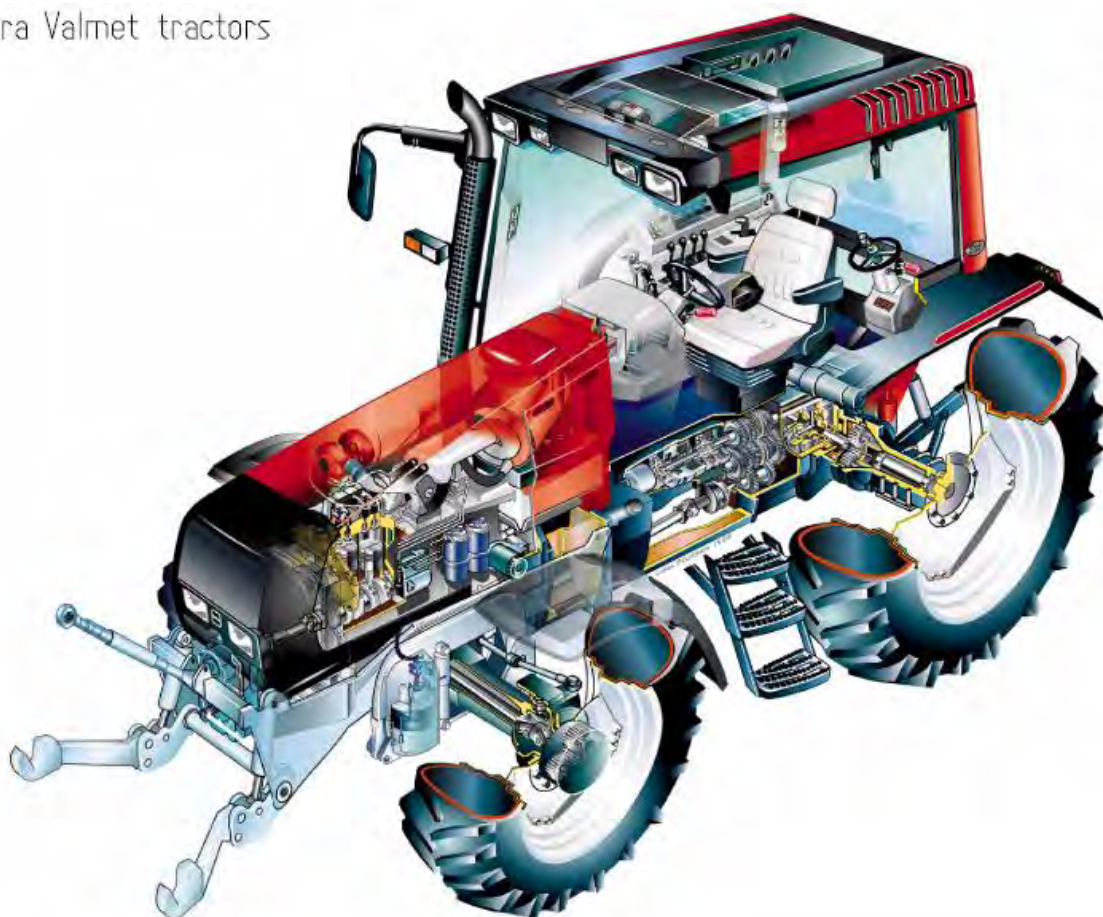


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WORKSHOP MANUAL

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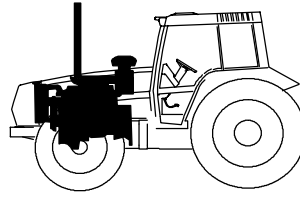
Service Manual Tractors

Groups 10–100

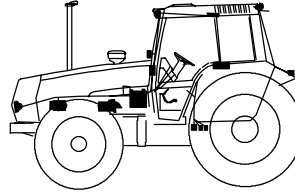
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44200 Suolahti, Finland

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K3 20122001 K4

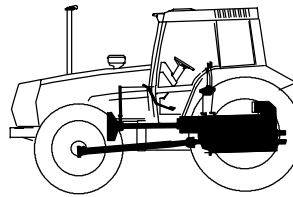
10 General



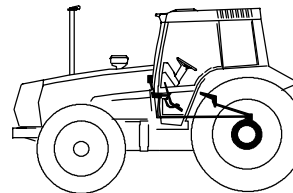
20 Engine



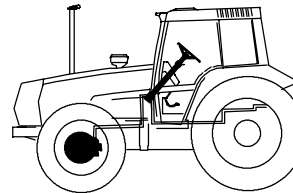
30 Electrical system



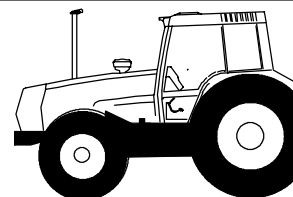
40 Power transmission



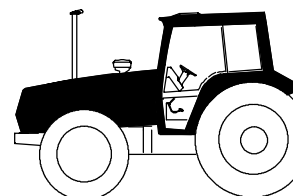
50 Brake system



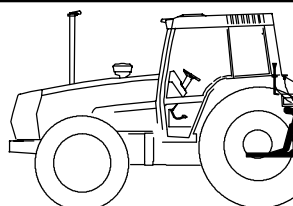
60 Steering system and Front axle



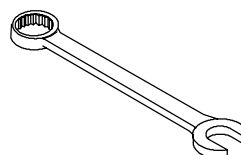
70 Frame and Wheels



80 Cab and Shields



90 Hydraulics



100 Tools

42. Gearbox	8. 11. 1990	Model	Code	Page
	15. 5. 1993	6000--8750	420	1

Contents

General (Op. no. 420)

Technical data	2
Special tools	3
Gearbox, description	5
Synchronization	10
Differential	11
Gear shift lever system	12
Power transmission, servo and lubricating system	17
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Repair instructions

Selector forks (Op. no 421)

1. Adjusting selector forks:

A. Removing gearbox side cover (selector cover)	1
B. Adjusting selector forks	1
C. Fitting gearbox side cover	2

2. Changing selector forks	2
----------------------------------	---

Reconditioning gearbox (Op. no. 423)

1. Removing gearbox from tractor:

A. Splitting tractor between gearbox–fuel tank	1
--	---

2. Disassembling gearbox:

A. Removing differential	3
B. Removing side cover	3
C. Removing hydraulic pump	4
D. Removing selector forks	4
E. Removing shafts from gearbox	6

3. Checking gearbox	7
---------------------------	---

4. Assembling gearbox:

A. Fitting shafts into the gearbox	8
B. Fitting and adjusting selector forks	11
C. Fitting 4WD clutch drum	13
D. Fitting side cover	14
E. Fitting pump and suction pipes	14
F. Fitting differential	15

5. Fitting gearbox:

A. Assembling tractor frame between gearbox–fuel tank	17
---	----

Reconditioning differential (Op. no. 424)

1. Changing/reconditioning differential:

A. Changing differential gears/diff. lock friction discs	1
--	---

42. Gearbox	1. 1. 1995	Model	Code	Page
	1. 8. 2000	6000–8950	420	2

Technical data

Number of gears (numbers in brackets refer to tractors with quick–shift gear) ((Delta Powershift)):

- forwards 12 (24) ((36))
- reverse 12 (24) ((36))

Oil

(common to transmission and hydraulics)
 Viscosity and quality grade: see page 130/4.
 Oil volume: see page 130/4.

Warning lights for gearbox oil pressure and temperature. Oil cooler as standard.

Pressure lubrication for input shaft and bevel pinion shaft.

- Lubricating oil pressure–relief valve, opening pressure 0,2 MPa
- Suction strainer, degree of separation 125 µm
- Pressure filter, filtration capacity β₁₀=75

Differences between gearboxes on 6100–8400 tractors, which have a 2–speed quick–shift gear

	Transmission 30 km/h		Transmission 40 km/h	
Number of teeth	6100–6400	6600, 8100	6100–6400	6600, 8100
	8000	8400	8000	8400
– bevel pinion shaft/crown wheel	Z7/Z40	Z7/Z40	Z9/Z38	Z9/Z38
Gears for 4WD:				
– in front end of bevel pinion shaft	Z34	Z28	Z39	Z33
– in front end of transmission shaft	Z41	Z47	Z35	Z41

Differential

- number of differential pinions 2 pcs 4 pcs 2 pcs 4 pcs

Tractors with ground speed PTO; there is a coupling, selector fork and shaft for PTO in the gearbox. Transmission 50 km/h, see pictures on pages 420/8 and 9. **Tractors with Delta Powershift, see the next page 420/2A.**

Tightening torques

Gearbox

- Bevel pinion shaft ring nuts (+transmission shaft ring nut) 270 Nm
- Input shaft front end cover 21–25 Nm
- Layshaft front end cover 21–25 Nm
- Gearbox side cover screws 50 Nm

Differential

- Crown wheel fixing bolts 110 Nm
- Differential bearing cover screws 40–50 Nm

Frame joints

- Gearbox–fuel tank:
 - upper studs 270–330 Nm
 - lower hexagonal socket–head screws 125 Nm
- Gearbox–reverse shuttle 21–25 Nm
- Gearbox–power take–off:
 - upper studs (8 pcs) 270–330 Nm
 - lower studs (6 pcs) 72–88 Nm
- Gearbox–brake housings 270–330 Nm
- Propeller shaft flange joints 35 Nm

Settings

Gearbox

- Pinion shaft rolling resistance measured with torsion meter at front end of shaft (without differential) 1,7–2,3 Nm
- Input shaft end float 0,025–0,075 mm
- Layshaft end float 0,025–0,075 mm

Differential

- Differential bearing preload measured with torsion meter at front end of bevel pinion shaft =pinion shaft rolling resistance+ +0,6–1,7 Nm (Z7/40, Z8/42)
 +0,8–2,2 Nm (Z9/38)
 +1,0–2,8 Nm (Z11/37)
- Tooth backlash, pinion/crown wheel 0,175–0,325 mm

Sealing compounds and locking fluids used

- Reverse shuttle–gearbox, sealing Hylosil RTV Grade 102 Black
- Power take–off–gearbox, sealing Hylosil RTV Grade 102 Black
- Brake housings–gearbox, sealing Hylosil RTV Grade 102 Black
- Side cover–gearbox, sealing Hylosil RTV Grade 102 Black
- Threads on selector fork rails (+transmission shaft ring nut), Loctite 242
- Crown wheel fixing bolts, Loctite 273

42. Gearbox	1. 8. 1998	Model	Code	Page
	1. 8. 2000	6000–8950	420	2A

Markings of gearboxes

With effect from tractor ser. no **662134** the gearboxes have been marked with letter codes. The purpose is to make recognizing of the gearboxes easier in connection with tyre changing, repair works and when fitting parts for the ground speed PTO. Concerning PTO unit markings, see page 460/2A. The gearboxes listed below are fitted on tractors which have a Delta Power Shift or the DPS can be retrofitted.

Transmission 300: 6000–6400 (–K41105), **8000** (–H12332) (DPS 300, gearbox 300, rear axles 300, PTO 300 (–G18213), PTO 450 (G18214–)). **Transmission 550** replaces **transmission 300** from ser. no. **K41106** incl.

Letter	Type		Number of gears	Ratio front/rear	Part no	Z	Z 4WD
A	40 km/h	DPS	36	1,332	32825210	Z8/42	Z32/37
	30 km/h	DPS	33	1,332	32825210	Z8/42	Z32/37
B	40 km/h	DPS, AVO	36	1,332	32825310	Z8/42	Z32/37
	30 km/h	DPS, AVO	33	1,332	32825310	Z8/42	Z32/37
C	40 km/h		12	1,334	32825410	Z9/38	Z42/39
	30 km/h		11	1,334	32825410	Z9/38	Z42/39
D	40 km/h	AVO	12	1,334	32825510	Z9/38	Z42/39
	30 km/h	AVO	11	1,334	32825510	Z9/38	Z42/39
J	40 km/h	DPS	36	1,391	32825200	Z7/40	Z34/41
	30 km/h	DPS	33	1,391	32825200	Z7/40	Z34/41
K	40 km/h	DPS, AVO	36	1,391	32825300	Z7/40	Z34/41
	30 km/h	DPS, AVO	33	1,391	32825300	Z7/40	Z34/41
L	40 km/h		12	1,381	32825400	Z9/38	Z39/35
	30 km/h		11	1,381	32825400	Z9/38	Z39/35
M	40 km/h	AVO	12	1,381	32825500	Z9/38	Z39/35
	30 km/h	AVO	11	1,381	32825500	Z9/38	Z39/35

Transmission 390: 6900 (–K36111), **8000** (H12333–K36111) (DPS 300, gearbox 390 (As transmission 300, but four diff. pinions in differential), rear axles 300, PTO 450).

AA	40 km/h	DPS	36	1,332	33394600	Z8/42	Z32/37
BA	40 km/h	DPS, AVO	36	1,332	33394700	Z8/42	Z32/37
CA	40 km/h		12	1,334	33394800	Z9/38	Z42/39
DA	40 km/h	AVO	12	1,334	33394900	Z9/38	Z42/39

Transmission 450: 6600–6800 (–G01400), **8100–8400** (–668102) (DPS 300, gearbox 450, rear axles 450, PTO 450)

E	40 km/h	DPS, AVO	36	1,315	32779900	Z9/38	Z33/41
	30 km/h	DPS, AVO	33	1,315	32779900	Z9/38	Z33/41
F	40 km/h	DPS	36	1,315	32824700	Z9/38	Z33/41
	30 km/h	DPS	33	1,315	32824700	Z9/38	Z33/41
G	30 km/h	DPS, AVO	36	1,317	32824800	Z7/40	Z28/47
H	30 km/h	DPS	36	1,317	32824900	Z7/40	Z28/47
I	50 km/h	DPS, AVO	24	1,337	32825000	Z11/37	Z38/37
N	50 km/h	DPS	24	1,337	33094700	Z11/37	Z38/37

DPS=Delta Power Shift

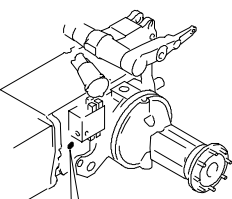
AVO=Ground speed PTO

Ratio front/rear=ratio between the front and rear axle. E.g. Front wheels rotate 1,332 turns/1 rear wheel turn.

Z=number of teeth on pinion/crown wheel.

Z 4WD=number of teeth on the 4WD gear wheels in the gearbox.

Part no=spare part number of the complete gearbox.



A–S

Note! Earlier the max. speeds of the transmissions (30 km/h and 40 km/h) were created by changing a number of teeth on the pinion/crown wheel. On the latest transmissions the max. speed is limited with a mechanical blocking device in the gearbox. The blocking device prevents engagement of the highest gear H4 in transmission 30 km/h.

The letter has been stamped on the LH side of the gearbox.

42. Gearbox	1. 8. 2000	Model	Code	Page
	1. 9. 2002	6000–8950	420	2B

Transmission 460: 8200, 8400 (668103–), **8050 and 8150** (–F32103) (DPS 460, gearbox 450, rear axles 450, PTO 450).

Letter	Type		Number of gears	Ratio front/rear	Spare part number	Z	Z 4WD
P	40 km/h	DPS	36	1,309	33094900	Z8/42	Z29/45
	30 km/h	DPS	33	1,309	33094900	Z8/42	Z29/45
O	40 km/h	DPS, AVO	36	1,309	33094800	Z8/42	Z29/45
	30 km/h	DPS, AVO	33	1,309	33094800	Z8/42	Z29/45
S	50 km/h	DPS	36	1,315	33095100	Z9/38	Z33/41
R	50 km/h	DPS, AVO	36	1,315	33095000	Z9/38	Z33/41

Transmission 650: 8450–8750, 8050 and 8150 (F32104–), **6600 and 6800** (G01401–)
6250Hi–8950Hi (K36108–), **8350Hi–8950Hi** (–L32105)

Transmission 550: 6200–6550Hi (J12242–), **6200–6400** (K41106–)
(DPS 650, gearbox 650/550, rear axles 450/650, PTO 650).

Note! Transmission 550 is the same as 650, but 550 has only two differential pinions, 650 has four. The 4WD ratio is different.

Letter	Type		Number of gears	Ratio front/rear (SIGE)	Ratio front/rear (CARRARO)	Spare part number	Z	Z 4WD
T (650)	40 km/h	DPS, AVO	36	1,309		33086100	Z8/42	Z29/45
U (650)	40 km/h	DPS	36	1,309		33086200	Z8/42	Z29/45
V (650)	50 km/h	DPS, AVO	36	1,315		33086300	Z9/38	Z33/41
Y (650)	50 km/h	DPS	36	1,315		33086400	Z9/38	Z33/41
EA (650 Hi)	40 km/h	DPS, AVO	36	1,309	1,320	33511900	Z8/42	Z29/45
FA (650 Hi)	40 km/h	DPS	36	1,309	1,320	33512000	Z8/42	Z29/45
GA (650 Hi)	50 km/h	DPS, AVO	36	1,315	1,326	33512100	Z9/38	Z33/41
HA (650 Hi)	50 km/h	DPS	36	1,315	1,326	33512200	Z9/38	Z33/41
IA (650 Hi)	40 km/h *)	DPS, AVO	36	1,315	1,326	33673200	Z9/38	Z33/41
JA (650 Hi)	40 km/h *)	DPS	36	1,315	1,326	33673300	Z9/38	Z33/41
KA (550 Hi)	40 km/h	DPS, AVO	36	1,339		33757600	Z8/42	Z29/44
LA (550 Hi)	40 km/h	DPS	36	1,339		33757700	Z8/42	Z29/4
MA (550)	40 km/h	DPS, AVO	36	1,339		34257500	Z8/42	Z29/44
NA (550)	40 km/h	DPS	36	1,339		34257600	Z8/42	Z29/44
OA (550)	40 km/h	AVO	12	1,337		34257700	Z11/37	Z38/37
PA (550)	40 km/h		12	1,337		34257800	Z11/37	Z38/37

DPS=Delta Power Shift

AVO=Ground speed PTO

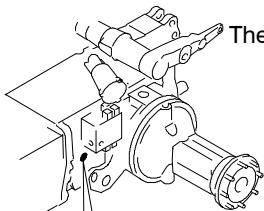
Ratio front/rear=ratio between the front and rear axle. E.g. Front wheels rotate 1,332 turns/1 rear wheel turn.

Z=number of teeth on pinion/crown wheel.

Z 4WD=number of teeth on the 4WD gear wheels in the gearbox.

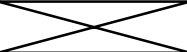
Part no=spare part number of the complete gearbox.

*) Low revs tractor



T-PA

The letter has been stamped on the LH side of the gearbox.

42. Gearbox		Model	Code	Page
	1. 9. 2002	8350–8950Hi	420	2C

Transmission 700: 8350Hi–8950Hi (L32106–)

(DPS 650, gearbox 700, rear axle 700)

Letter	Type		No. of gears	Gear ratio front/rear	Part no.	Z	Z 4WD
RA (700 Hi)	40 km/h	DPS, AVO	36	1,327	34469700	Z9/38	Z29/45
SA (700 Hi)	40 km/h	DPS	36	1,327	34469800	Z9/38	Z29/45
TA (700 Hi)	50 km/h	DPS, AVO	36	1,321	34469900	Z11/37	Z33/41
UA (700 Hi)	50 km/h	DPS	36	1,321	34470000	Z11/37	Z33/41
VA (700 Hi)	40 km/h *)	DPS, AVO	36	1,321	34470100	Z11/37	Z33/41
YA (700 Hi)	40 km/h *)	DPS	36	1,321	34470200	Z11/37	Z33/41

DPS=Delta Power Shift

AVO=Ground speed PTO

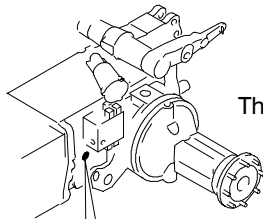
Gear ratio front/rear=ratio between the front and rear axle. E.g. Front wheels rotate 1,327 turns/1 rear wheel turn.

Z=number of teeth on pinion/crown wheel.

Z 4WD=number of teeth on the 4WD gear wheels in the gearbox.

Part no=spare part number of the complete gearbox.

*) Low revs tractor



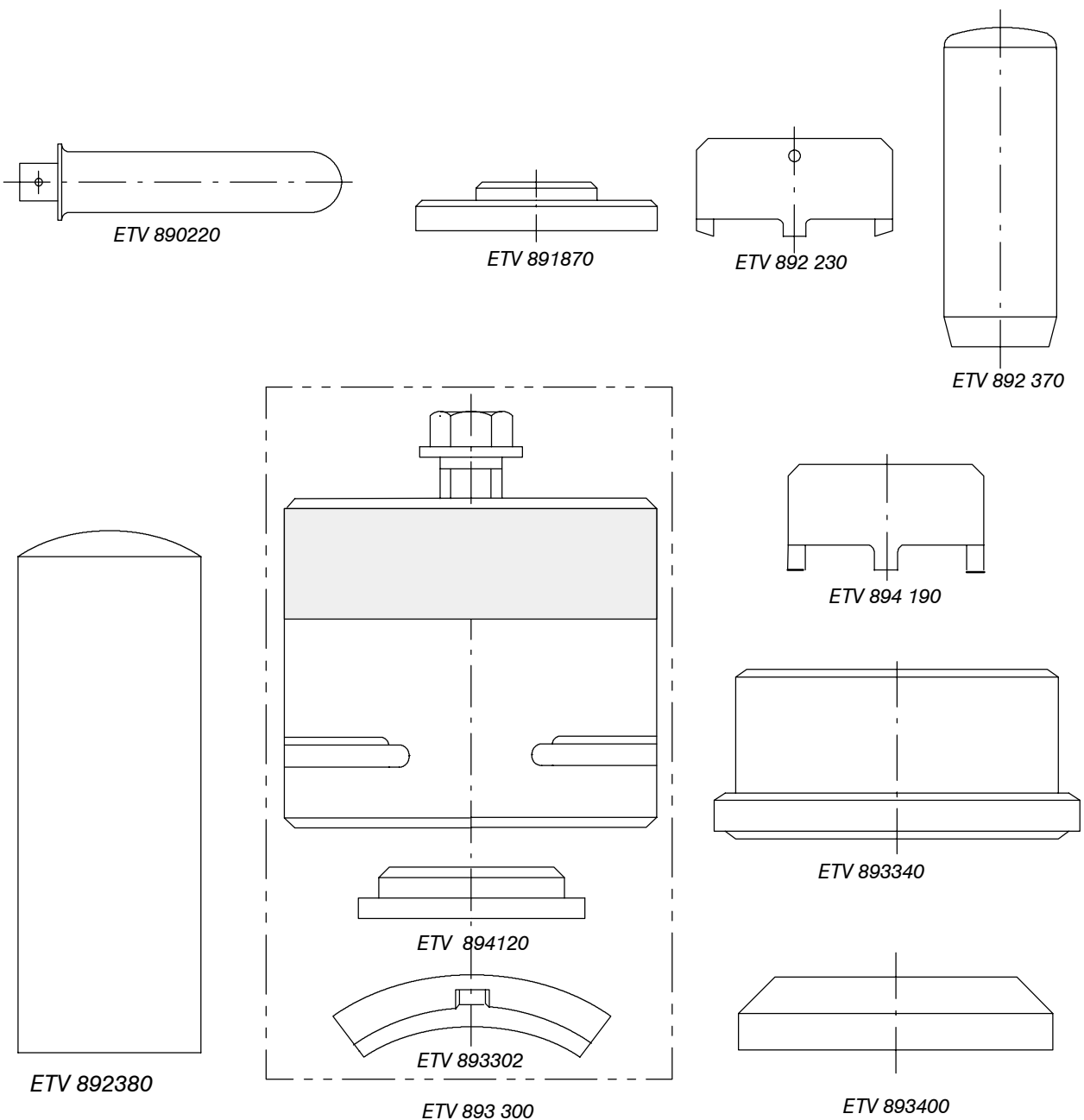
RA–YA

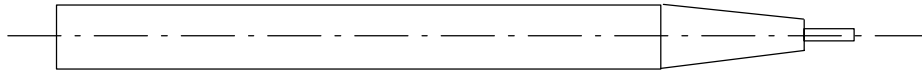
The letter has been stamped on the LH side of the gearbox.

42. Gearbox	1. 1. 1995	Model	Code	Page
	1. 4. 1997	6000-8750	420	3

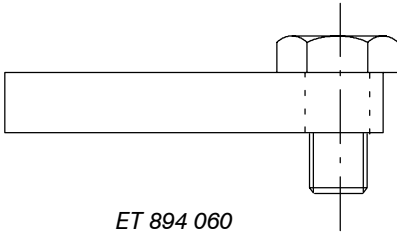
Special tools

Order no	Description
ETV 890 220	Universal handle
ETV 891 870	Plate for fitting thrust bearing for differential side of gear (Gearbox 505-905)
ETV 892 230	Socket spanner for bevel pinion shaft ring nut (Gearbox 305-555)
ETV 894 190	Socket spanner for 4WD clutch drum nut
ETV 892 370	Sleeve for fitting input shaft front end bearing (Front axle 505-905)
	Sleeve for fitting bevel pinion shaft front end bearing
ETV 892 380	Sleeve for fitting input shaft rear end bearing (Gearbox 505-905)
ETV 893 300	Puller for differential bearings (Gearbox 505-905)
ETV 893 340	Plate for fitting bearing race, pinion shaft rear bearing (Gearbox 505-905)
ETV 893 400	Plate for fitting differential bearings (Gearbox 505-905)
ETV 894 050	Drift for fitting locking pins for selector forks
ETV 894 080	Drift for fitting selector fork rail for LL-range
ETV 894 120	Counter hold for puller ETV 893300.
Locally prepared tools	
ET 894 060	Press tool for adjusting selector forks

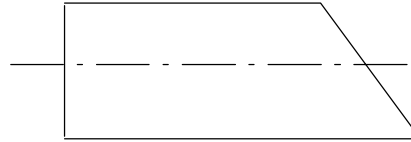




ETV 894 050



ET 894 060



ETV 894 080



ETV 894 120

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Gearbox, description

Position of the gearbox is shown in the figure below. Reverse shuttle and quick-shift gear are attached to the front of the gearbox. Power take-off is attached to the rear end. Rear axles are attached to the both sides of the gearbox. Differential is fitted in the rear part of the gearbox housing.

The gearbox is operated mechanically with a speed gear lever and range gear lever on the right hand side of the driver's seat. Gearbox has three ranges (LL–M–H) and four speed gears. The reverse shuttle is operated with a separate lever.

The quick-shift gear doubles the number of speeds. The Delta Powershift gear triplicates the number of speeds.

The gearbox is fully synchronized (except LL-range). Gear wheels have helically cut teeth. Pressure lubrication. Separate reverse shuttle.

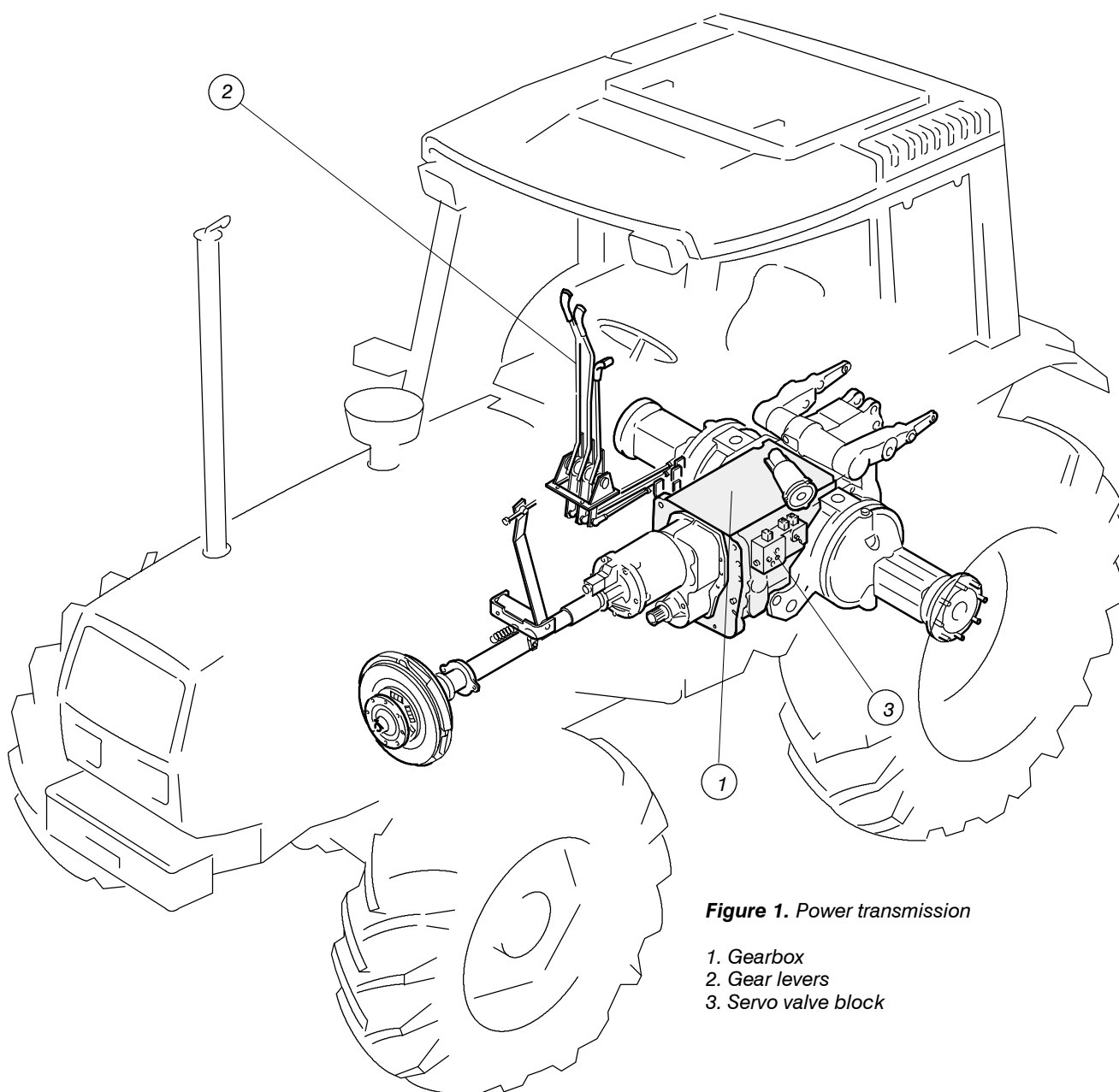


Figure 1. Power transmission

1. Gearbox
2. Gear levers
3. Servo valve block