Ural (Урал) - Dnepr (Днепр) Russian Motorcycle

Part 3C: Full-Time Two-Wheel Drive (2WD) with Locking Differential

(MB-750 / MB-650 / MB-750M)

(See Also Part 3A: Locking versus non-Locking Differential, Part 3B: Full-Time 2WD with non-Locking Differential and Part 3D: Full-Time 1WD with Locking non-Differential)

Ernie Franke
eafranke@tampabay.rr.com
1 / 2013

Four Types of Final Drives in Russian Sidecars

1. Full-Time, Straight Final Drive (1WD) (Part 2)
   - –One-Wheel Drive (1WD)
   - –Available in Various Ural / Dnepr Models
2. Full-Time, Two-Wheel Drive (2WD) with non-Locking Differential (Part 3B)
   - –Dnepr MB-650M (1985-1991)
   - –Dnepr MT-12 (1977-1985)
   - –Dnepr MT-16 (1985-2005)
   - –Dnepr Rear Drive Casings Allow for Adding Locking Differential
   - –First Available in Ural: "Sportsman" IMZ 8.107 (1995-1998)
     - • Only True Differential for Ural
     - • Pre-"Patrol" Model
3. Full-Time, Two-Wheel Drive (2WD) with Locking (Engageable) Differential (Part 3C)
   - –Dnepr MB-750 (1964-1973)
   - –Dnepr MB-650 (1968-1984)
   - –Dnepr MB-750M (1973-1977)
4. Full-Time, One-Wheel Drive (1WD) with Engageable Locking 2WD (non-Diff) (Part 3D)
   - –Available in Various Ural Models
     - • Production: Patrol (1998-Current), Gear-Up (2001-Current) and Patrol-T (2009-Current)
     - • Limited Editions with Engageable Sidecar Drive Shaft:
       - –Derivatives of Patrol or Gear-Up
       - –Basic (2005), Raven (Vorona) (2006), Pustinja (2007), Wjuga (2008), Sahara (2009) and Taiga (2010)

The order of presentation will be chronologically from Dnepr's MB-750, MB-650 and MB-750M.

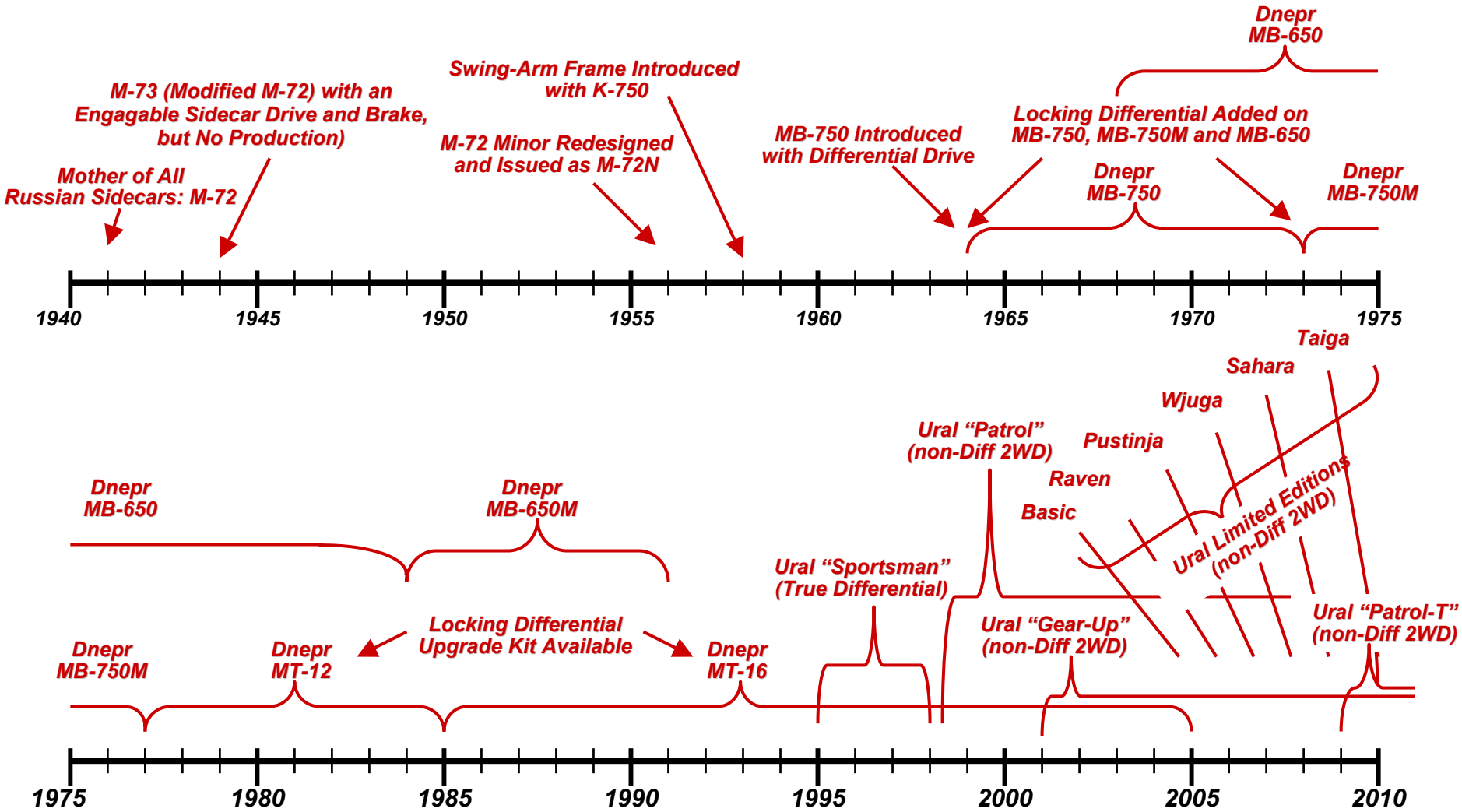
Ural (Урал) / Dnepr (Днепр) 2WD with Locking Differential

Ural (Урал) Model	Production	Engine	Voltage	Drive Train	Rear Suspension
M-72	1941-1950	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
M-72K	1952-1958	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
M-72M	1956-1961	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
M-61	1958-1961	650cc OHV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
M-62 (Ural-1)	1961-1965	650cc OHV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
M-63 (Ural-2)	1965-1971	650cc OHV	6-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
M-66 (Ural-3)	1971-1973	650cc OHV	6-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
M-67 (IMZ-8.101)	1974-1976	650cc OHV	12-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
M-67.36	1976-1984	650cc OHV	12-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
"Sportsman" IMZ 8.107	1995-1998	650cc OHV	12-Volt	Full-Time 2WD with non-Locking Differential	Swing Arm
8.103 Series "650"	1984-2002	650cc OHV	12-Volt	Full-Time 1WD with Engageable 2WD (No Diff)	Swing Arm
"750"Series	2003-Present	750cc OHV	12-Volt	Full-Time 1WD with Engageable 2WD (No Diff)	Swing Arm

Dnepr (Днепр) Model	Production	Engine	Voltage	Drive Chain	Rear Suspension
M-72	1951-1956	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
M-72N (H)	1956-1960	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Plunger
K-750	1959-1963	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
K-750M	1963-1977	750cc SV	6-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
MT-12 (Dnepr-12)	1974-1982	750cc SV	6-Volt	Full-Time 2WD with Non-Locking Differential * *	Swing Arm
MB-750	1964-1973	750cc SV	6-Volt	Full-Time 2WD with Locking (Engageable) Diff *	Swing Arm
MB-750M	1973-1977	750cc SV	6-Volt	Full-Time 2WD with Locking (Engageable) Diff *	Swing Arm
K-650/MT-8	1967-1971	650cc OHV	6-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
K-650/MT-9	1971-1976	650cc OHV	6-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
MB-650	1968-1984	650cc OHV	12-Volt	Full-Time 2WD with Locking Differential *	Swing Arm
MB-650M	1985-1991	650cc OHV	12-Volt	Full-Time 2WD with Non-Locking Differential * *	Swing Arm
MT-10	1973-1976	650cc OHV	12-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
MT-10.36	1976-1984	650cc OHV	12-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
MT-11 (Dnepr-11)	1984-2005	650cc OHV	12-Volt	Full-Time, Straight Final Drive (1WD)	Swing Arm
MT-16 (Dnepr-16)	1985-2005	650cc OHV	12-Volt	Full-Time 2WD with Non-Locking Differential * *	Swing Arm

** Locking Feature Deleted after Two Years of Production, * * Optional Kit Available to Add Locking Differential*

Russian Two-Wheel Drive (2WD) Time-Line



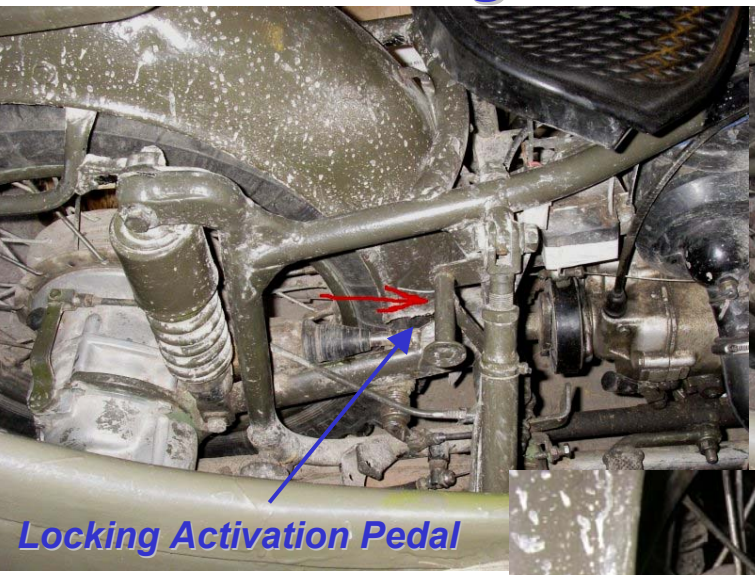
KMZ's (Dnepr factory) first production 2WD was the MB-750 (1964), with a rear drive modeled on the WW-II BMW's R75. The first production Ural 2WD post-war was the short-lived Sportsman in the mid-1990's, to be followed by the non-diff Patrol and Gear-Up.

Locking Differential Definition and Application

- *Locking Differential (a.k.a. Differential Lock or Diff Lock)*
  - *Designed to Overcome Limitation of Standard "Open Differential" by Essentially "Locking" Both Wheels on an Axle Together as if on a Common Shaft*
  - *Forces Both Wheels to Turn in Unison, Regardless of the Traction (or lack thereof) Available to Either Wheel Individually*
  - *Useful for Serious Off-Road Operation*
  - *Allows Driver to Lock and Unlock the Differential from Driver's Seat*
    - *Engaged by Lever-Operated Mechanism*
  - *Provides Significant Traction Advantage Over an Open Differential, but Only When Traction Under Each Wheel Differs Significantly, such as Snow or Mud*
  - *Common in Agricultural Equipment and Military Trucks*
- *Locking Differential*
  - *Same Parts as an Open (non-Locking) Differential, but Adds Mechanism to Lock the Two Output Pinions Together*
  - *Manually Activated by Lever*
  - *When Activated, Both Wheels Will Spin at the Same Speed*
    - *If One Wheel Ends Up Off the Ground or Loses Traction, the Other Wheel Won't Know or Care*
    - *Both Wheels Will Continue to Spin at the Same Speed as If Nothing Had Changed*

The locking differential allows differential to perform as an "open differential" for improved drivability, maneuverability and reduced tire wear, while also having full locking capability for ultimate traction when needed.

Locking Differential Preview (redmotorz.eu) (cont.)

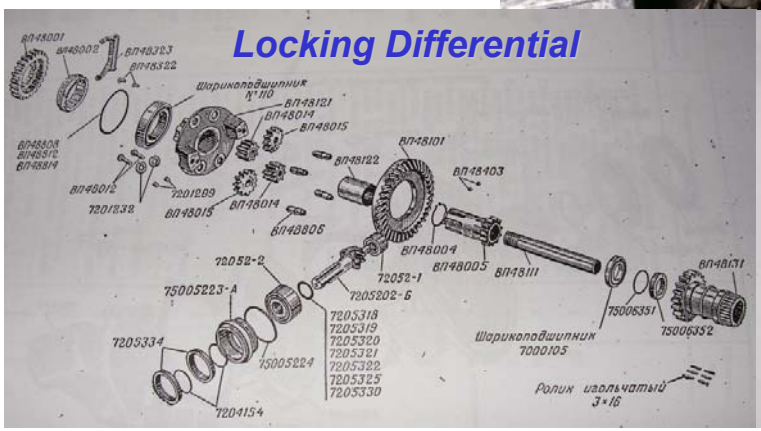


Locking Activation Pedal

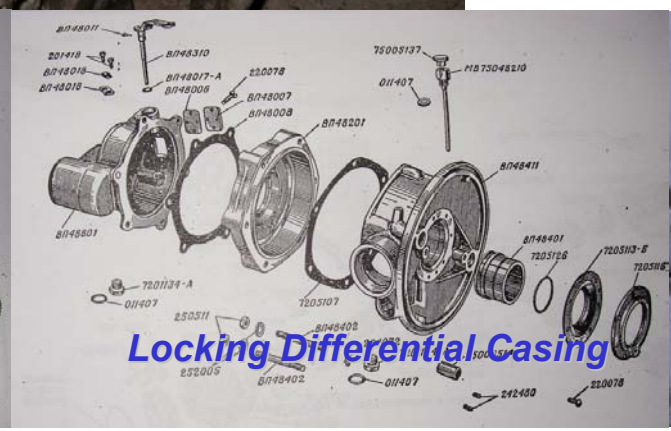
Locking Activation Tie Rod

Locking Activation Lever

Warning Label on Gas Tank



Locking Differential



Locking Differential Casing

Full-Time 2WD + Locking Differential Evolution

- *BMW R75 and Zundapp KS750 Were the Only Sidecar Motorcycles Initially Produced with a Full-Time 2WD Differential*
- *MB-750: Initiated Full-Time 2WD*
  - *Always in Two-Wheel Drive (2WD) Limited Slip Mode*
  - *More Power Delivered to the Rear Wheel with Least Traction*
  - *Toe-In Not Need for Sidecar Alignment*
  - *Beware: Very Early MB-750's Had a Locking Differential on the Rear Drive*
    - *Used for about 2 years*
    - *Subsequently Replaced due to accidents and removed from service and replaced by the full time differential*
- *All Dnepr 2WD Rear Drives Are the Same for MB-750, MT-12, MT-16 and MB-650*
- *MB-750M: Full-Time 2WD + Locking Differential 2WD*
  - *On-Road Performance (Full-Time 2WD)*
    - *Same as Before*
  - *Off-Road Performance (Locking Differential)*
    - *Hand Lever Engagement*
    - *Pusher and Sidecar Wheels Locked Together (No Differential Action)*
    - *Even-Pull When in Sand and Mud*
    - *Nearly Impossible to Drive on Pavement (Except in a Straight Line)*
- *Locking Device Was Removed on MB-750M and MB-650*
  - *Since the Use of the MT-804 Transmission with Reverse Improves Agility, It Eliminated the Need to Lock the Drive Wheels in Off-Road Conditions*

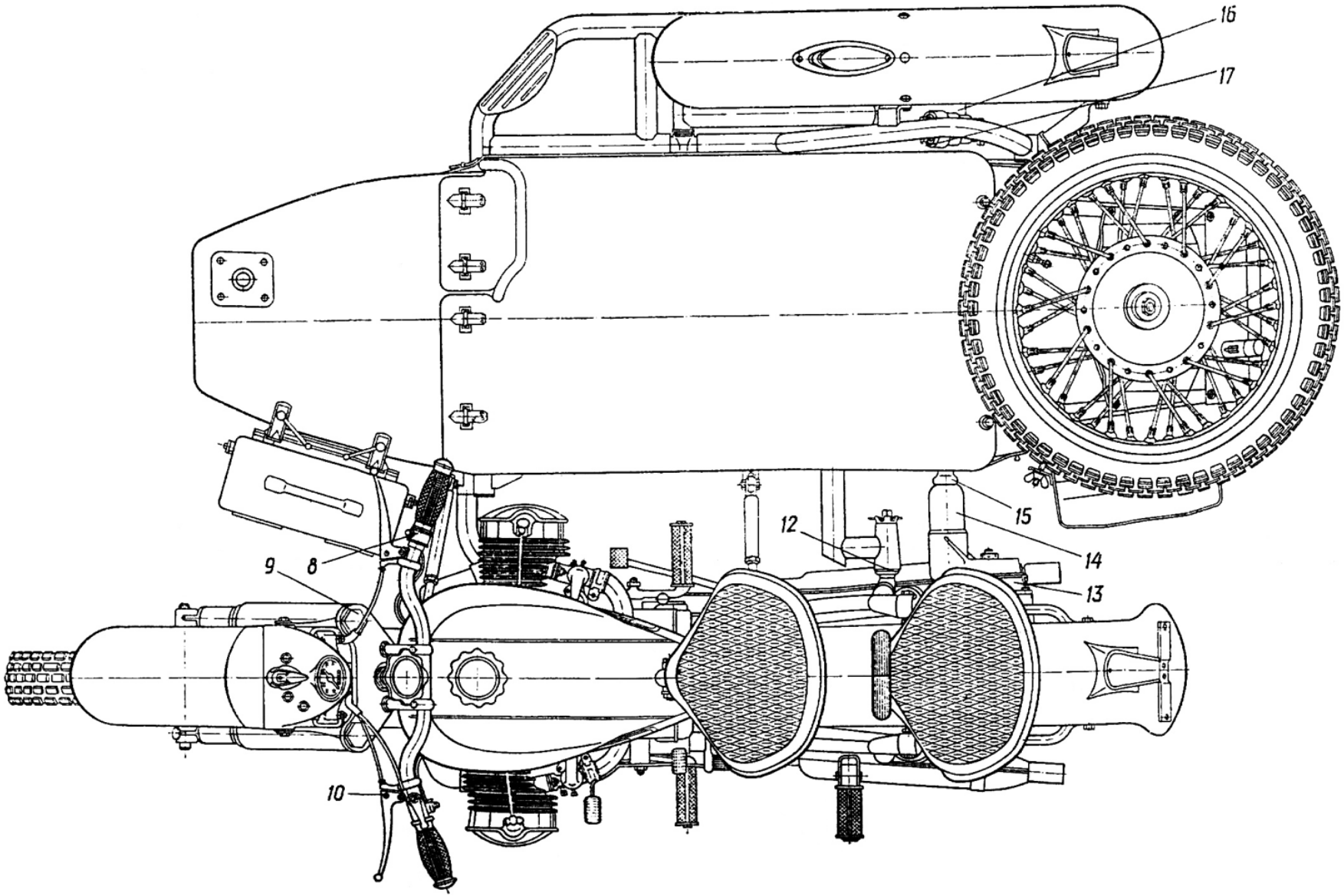
The MB-750M offered the ideal situation of a limited-slip differential for on-road operation without having the sidecar offset by 0.2 to 0.6° (alignment), while at the same time offering non-differential operation in sticky, off-road situations.

Introduction of Transmission MT-804

- Two Types of Transmission Used: Models 6204 and MT-804
- Model 6204 Gear-Box
  - Twin Shaft, Four-Speed Incorporating Movable Coupling with Internal Teeth and Two Gear Levers: Hand (right) and Foot (left)
  - Installed on Dnepr K-750M and Ural M-63
- Model MT-804 Gear-Box (Dneprglide, Dneprmatic Auto-Clutching Transmission)
  - Twin Shaft, Four-Speed with Reverse Gear and Mechanism of Automatic Clutch When Shifting from the Foot, and Hand Gear Lever Reverse Gear
  - Very Simple and Robust Design
    - Presence of Neutral between Each Speed
    - Presence of a Reverse Gear
    - Semi-Automatic Clutch Mechanism
  - MT-804 Released Around 1971 with MT-9 and 1973 with MT-12 and MB-750M
    - Transmission 15-to-20 mm Longer than Previous Model (6204) Used in K-650 & K-750
      - Can Be Installed on K-750 "Long" Chassis
      - Can Be Installed on Previous Dneprs: Requires New Driveshaft (Part # 905 301 MT)
      - Can Be Installed on M-67.36: Requires Shorter Driveshaft Assembly from M-63, M-66 (Part # 6305031)
      - Other Connecting Elements (Front End of Input Shaft and Clutch Rod, Lock and Flange Crankcase) Remained the Same
  - Installed in Models MT-9, MT-10, MT-10.36, MB-750M, MB-650
  - MB-750M and MB-650 Locking Mechanism Removed after Changing to MT-804 Gearbox
  - MT Gearbox Can Me Mounted on K-750, K-750M, K-650 and Latest Ural Models

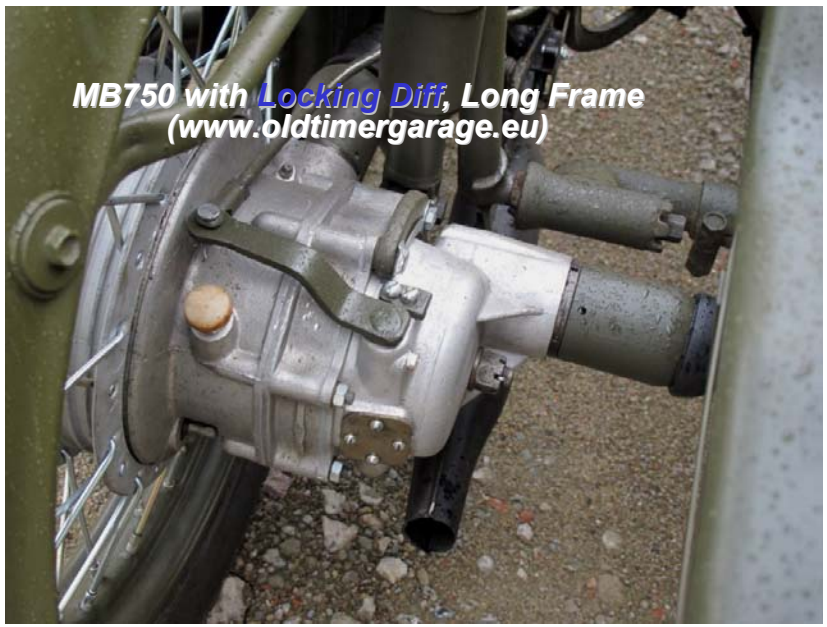
The appearance of the MT-804 transmission (gearbox), with reverse, improved agility to eliminate the need to lock the wheels in off-road conditions.

MB-750

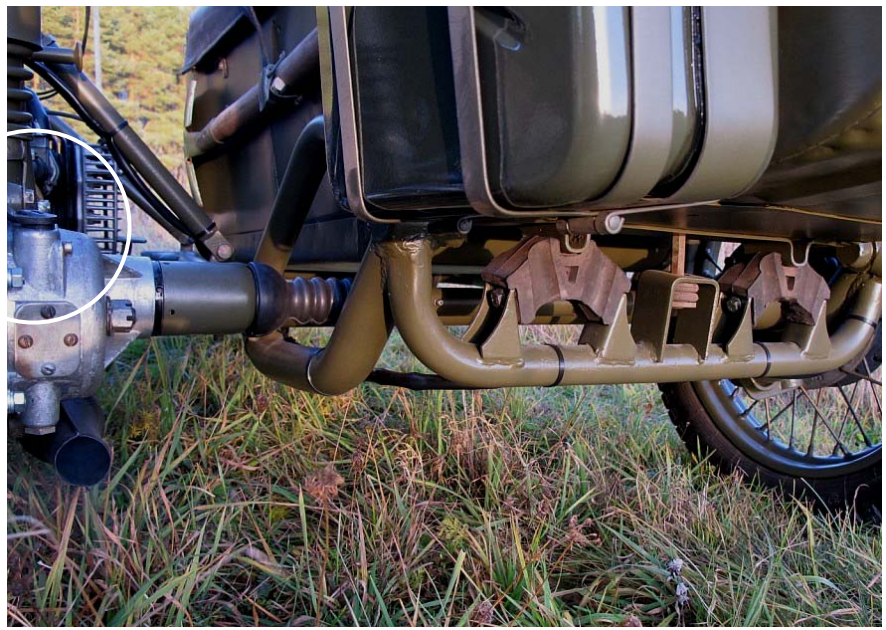


The MB-750 (1964-1973) initially had a full-time, locking differential, but later continued production with a non-locking differential.

MB-750 with Locking Differential (www.oldtimergarage.eu)



MB-750 with Locking Differential (www.oldtimergarage.eu)



MB-750 without Locking Differential

Examination of the differential shows the absence of any manually-engageable locking mechanism on many MB-750's.

B-750 / MB-750M Differential Covers (2WD)

Rear Drive Case

Lever for Locking Differential

Drive Outer Cover Gasket

ВП48310 Grease Filling Cover

ВП48017-А

220078

ВП48006

ВП48007

ВП48008

ВП48201

75005137

МВ75048210

011407

Oil Dip-Stick and O-Ring

Dipstick ВП75048210

ВП48411

ВП48801

ВП48401

7205126

7205113-6

7205118

Drive Hub Needle Bearing Inner Race

7201134-А

011407

Two Casing Gaskets

7205107

250511

ВП48402

264072

7201134-А

75006514

011407

252005

ВП48402

242480

Oil Plug + Washer

Six Studs Holding Casing Together

Gasket for Differential Cover

Rear Drive Housing

Seal Collar with Seal

011407 Flat Washer for Drain Plug
220 078 Screw
242 480 Screw with Cone Point M6h10
250 511 Nuts Fastening Rear Panel to Frame
252 005 Washer
264 072 Nipple 1-B1
7201134-A Drain plug
7205107 Gasket Crankcase
7205113-B Crankcase Oil Seal Collar
7205116 Follower
7205126 Spring Seal Crankcase
75005137 Breather Plug
75006514 Bushing
ВП48006 Gasket
ВП48007 Cap
ВП48008 Gasket Crankcase Differential
ВП48011 Setscrew
ВП48017-А O-Ring
ВП48201 Carter Differential Housing
ВП48310 Lock Lever Assembly (2WD)
ВП48320 Fork Lock Assembly
ВП48401 Bushing
ВП48402 M8 stud-M8h1h50
ВП48411 Carter's Final Drive
ВП48801 Differential Cover
МВ75048210 Probe Assembly (Dipstick)

MB-750 / MB-750M Differential (2WD)

Lock-up Clutch

Fork for Locking Differential ВП48323

Differential Cup

Satellite Gear

Stray Gear

Bushing or Sleeve

Right-Hand Hub ВП48005

Output Gear ВП48001-А

Stray Gear

Satellite Gear

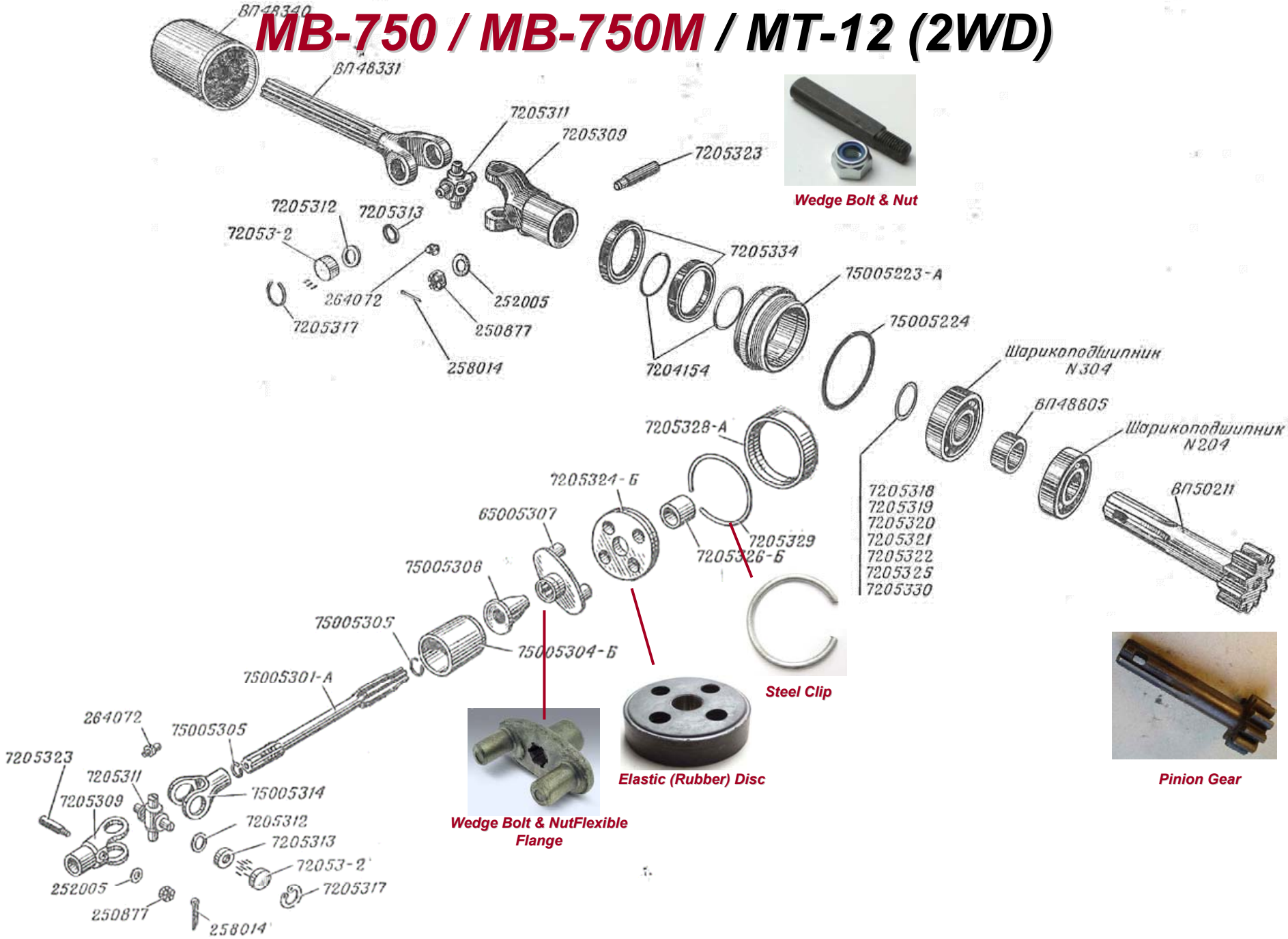
ВП48001
ВП48002
ВП48323
ВП48322
110
ВП48121
ВП48014
ВП48015
ВП48808
ВП48812
ВП48814
ВП48012
7201209
7201232
ВП48101
ВП48122
ВП48403
ВП48806
ВП48004
ВП48005
ВП48111
72052-2
72052-1
75005223-А
7205202-Б
7205318
7205319
7205320
7205321
7205322
7205325
7205330
7205334
75005224
75006351
75006352
ВП48131
7000105

1 Needle Roller GOST6870 3x16-54
110 GOST8338 Ball-57
7000105 Standard Ball
7201209 Roller
7201232 Locking Washer
7204154 Spring Shaft Seal
72052-1 Needle Bearing
72052-2 Double-Row Ball Bearing
7205202-B Gear
7205318-330 Adjusting Washers
7205334 Packing Gland Cardan Fork
75005223-A Nut Bearing Final Drive
75005224 Ring U-55h60-2-61 GOST9833
75006351 Spring Seal
75006352 Packing Gland (Seal)
ВП48001 Pinion Output
ВП48002 Lock-up Clutch
ВП48004 Circlip
ВП48005 Right Hub
ВП48012 Bolt M8h1h32
ВП48014 Satellite Gear
ВП48015 Stray Gear
ВП48101 Bevel Driven Pinion
ВП48111 Spacer
ВП48121 Differential Cup
ВП48122 Bushing or Sleeve
ВП48131 Hub left
ВП48322 Rusk
ВП48323 Fork Lock
ВП48403 Roller 6.5 x 6, 5
ВП48806 Axis of satellites
ВП48808 Adjusting Washer
ВП48812 Adjusting Washer
ВП48814 Adjusting Washer

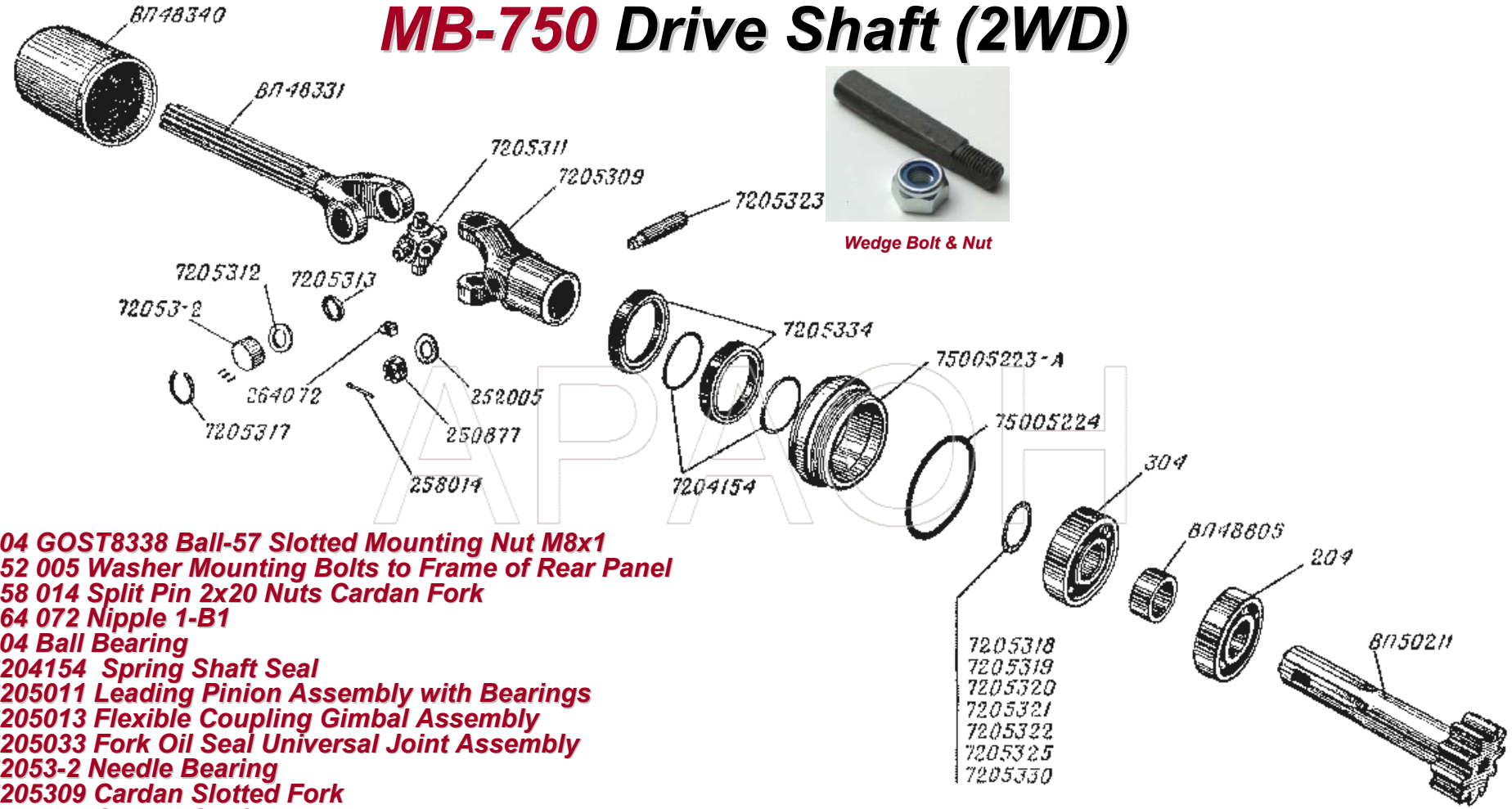
Left-Hand Hub ВП48131

The presence of satellite gears and stray gears indicates that the rear drive is indeed a differential.

MB-750 / MB-750M / MT-12 (2WD)



MB-750 Drive Shaft (2WD)



Wedge Bolt & Nut

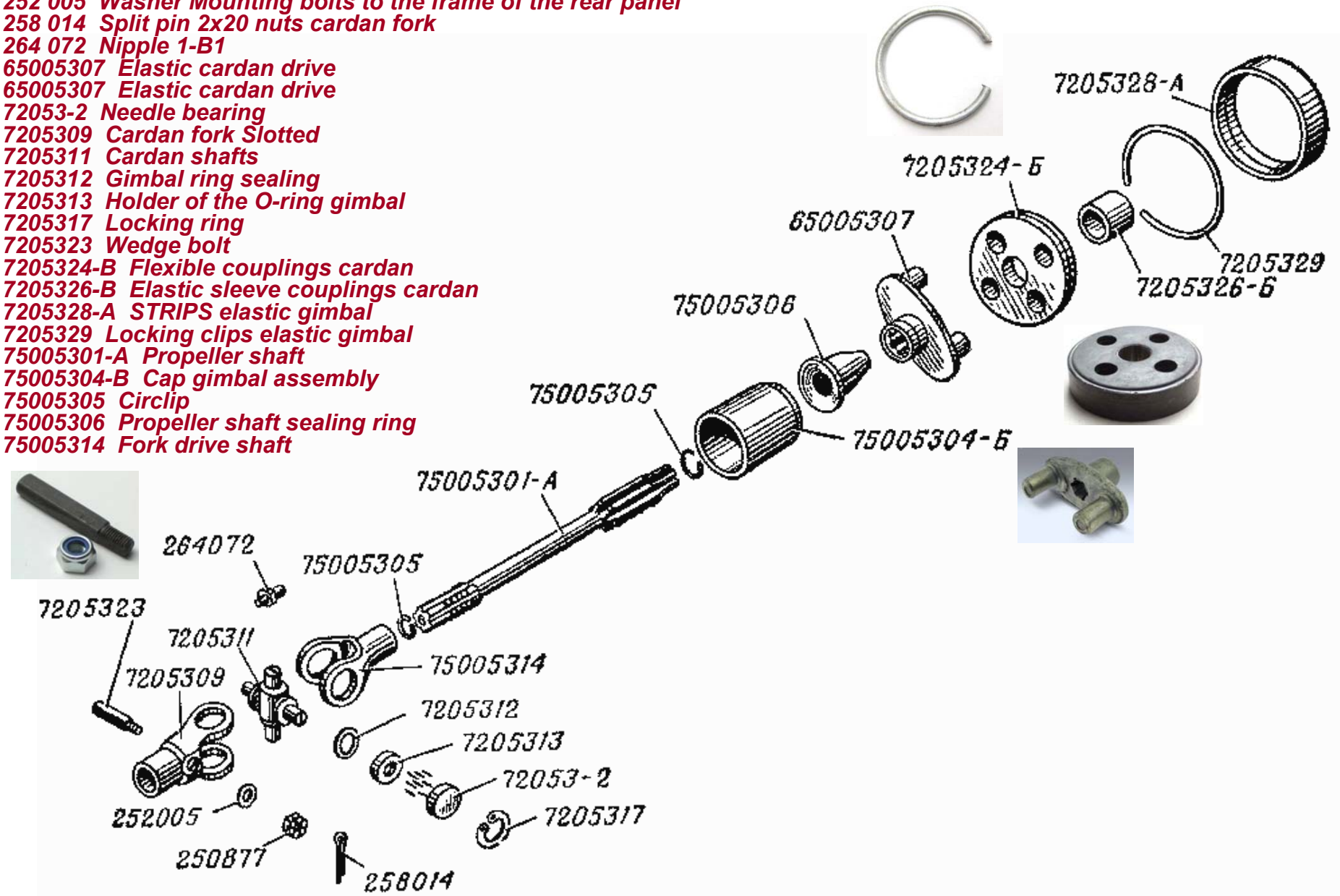
204 GOST8338 Ball-57 Slotted Mounting Nut M8x1
252 005 Washer Mounting Bolts to Frame of Rear Panel
258 014 Split Pin 2x20 Nuts Cardan Fork
264 072 Nipple 1-B1
304 Ball Bearing
7204154 Spring Shaft Seal
7205011 Leading Pinion Assembly with Bearings
7205013 Flexible Coupling Gimbal Assembly
7205033 Fork Oil Seal Universal Joint Assembly
72053-2 Needle Bearing
7205309 Cardan Slotted Fork
7205311 Cardan Shaft
7205312 Gimbal Ring Sealing
7205313 Holder of O-ring Gimbal
7205317 Locking Ring
7205318 Adjusting Washer
7205319 Adjusting Washer
7205320 Adjusting Washer 0.4 .. 0.36 mm
7205321 Adjusting Washer
7205322 Adjusting Washer
7205323 Wedge Bolt
7205325 Adjusting Washer
7205330 Adjusting Washer
7205334 Packing Gland (Seal) Cardan Fork
750052-3B Nut Bearing Transaxle

75005223-A Nut Bearing
75005224 Ring U-55h60-2-61 GOST9833
75005300 Cardan Shaft with Universal Joint Assembly
75005310 Universal Joint
75006350 Gland (Seal) Assembly
75006520 Knuckle Assembly with Equalizer
ВП48330 Cardan Shaft with Universal Joint Assembly
ВП48331 Cardan Shaft
ВП48340 Cap Gimbal Assembly
ВП48410 Carter Transaxle
ВП48500 Differential Drive Assembly with Brake
ВП48800 Differential Carrier Assembly Cover
ВП48805 Spacer
ВП50211 Small pinion

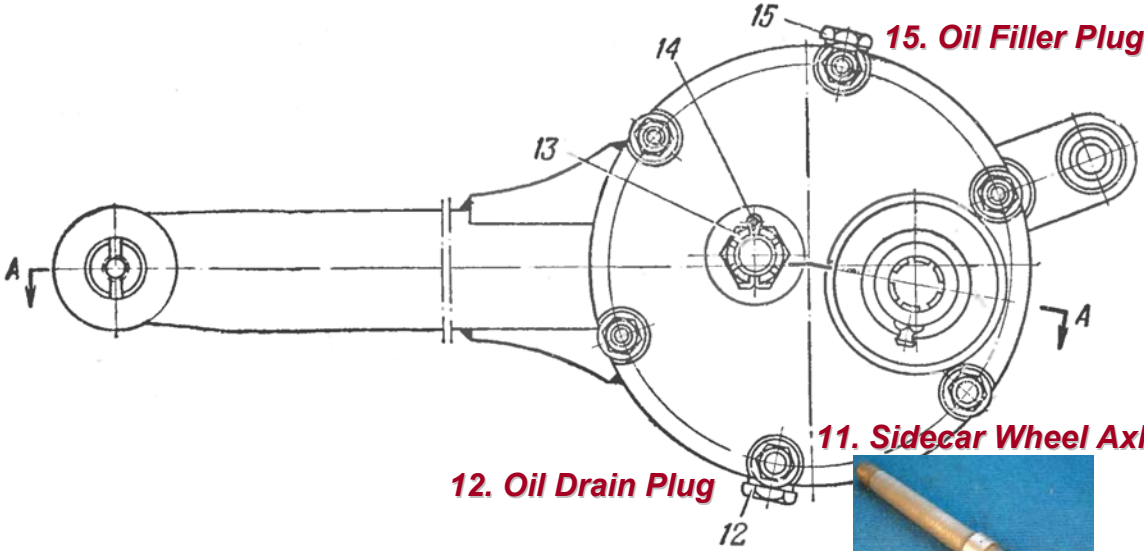
Drive Pinion

MB-750 Final Drive, Cardan Shaft (2WD)

250 877 Slotted Mounting Nut M8x1
252 005 Washer Mounting bolts to the frame of the rear panel
258 014 Split pin 2x20 nuts cardan fork
264 072 Nipple 1-B1
65005307 Elastic cardan drive
65005307 Elastic cardan drive
72053-2 Needle bearing
7205309 Cardan fork Slotted
7205311 Cardan shafts
7205312 Gimbal ring sealing
7205313 Holder of the O-ring gimbal
7205317 Locking ring
7205323 Wedge bolt
7205324-B Flexible couplings cardan
7205326-B Elastic sleeve couplings cardan
7205328-A STRIPS elastic gimbal
7205329 Locking clips elastic gimbal
75005301-A Propeller shaft
75005304-B Cap gimbal assembly
75005305 Circlip
75005306 Propeller shaft sealing ring
75005314 Fork drive shaft



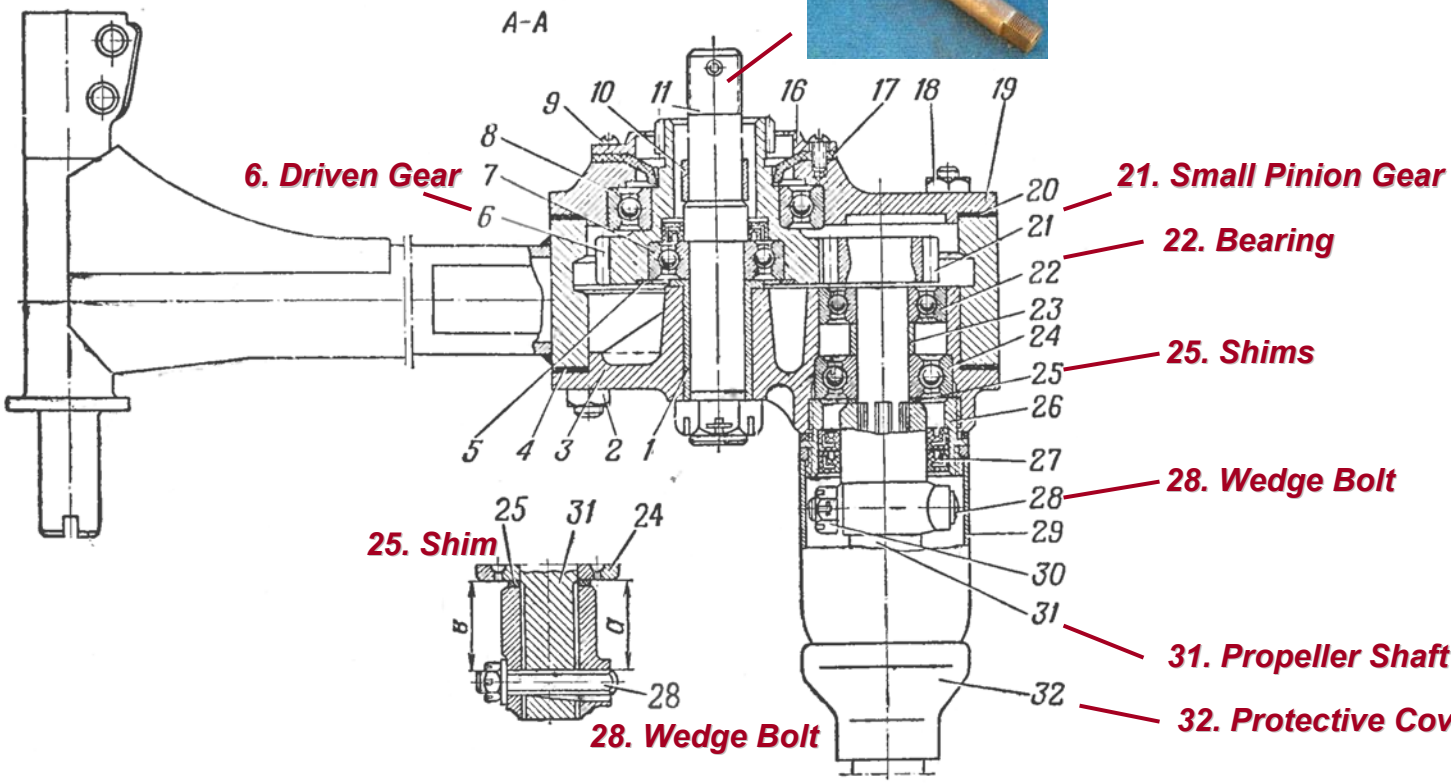
MB-750 / MB-750M Sidecar Wheel Reducer Gear (2WD)



15. Oil Filler Plug

11. Sidecar Wheel Axle

12. Oil Drain Plug



6. Driven Gear

21. Small Pinion Gear

22. Bearing

25. Shims

28. Wedge Bolt

31. Propeller Shaft from Rear Drive

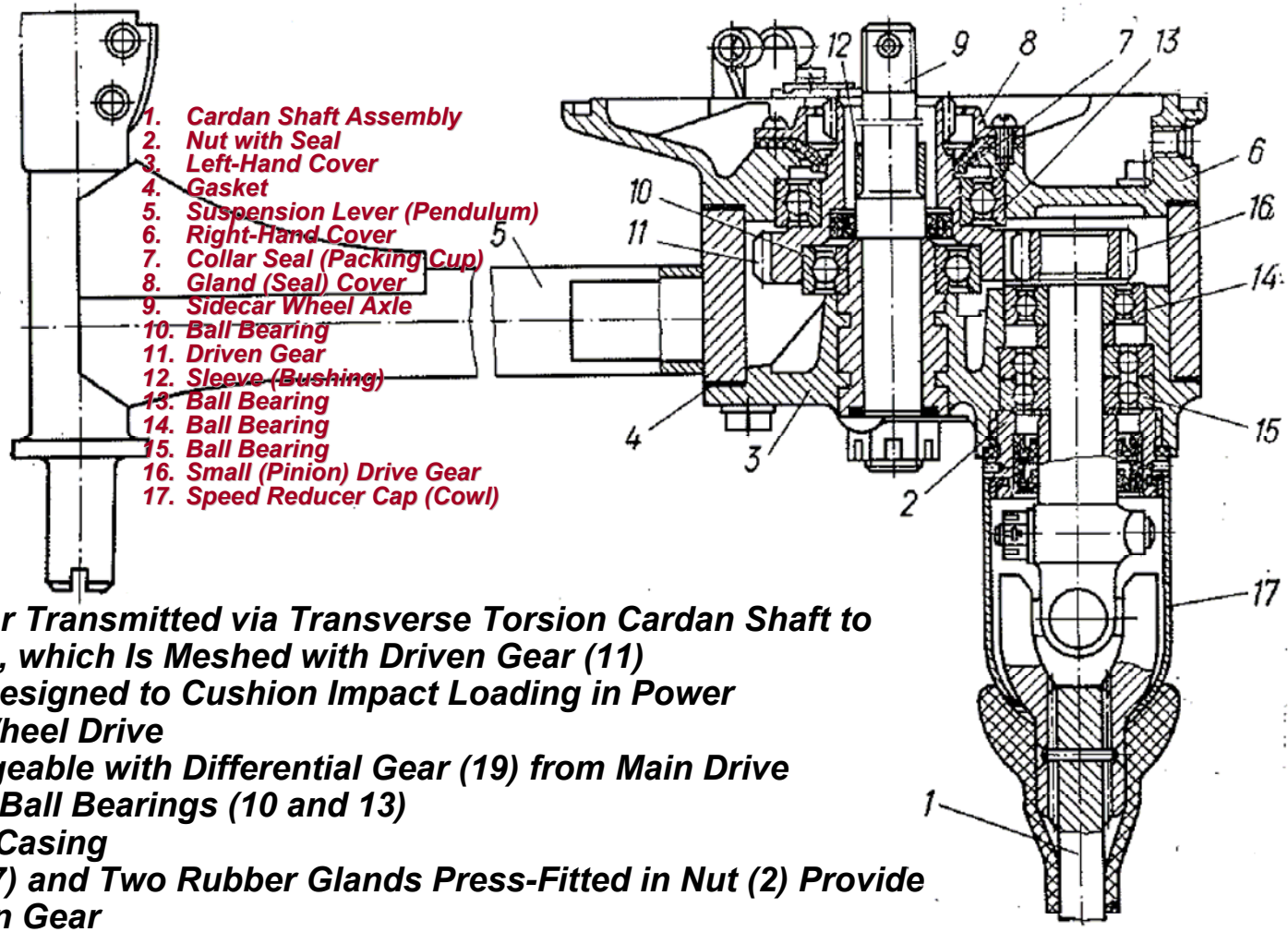
32. Protective Cover Rubber Boot

25. Shim

28. Wedge Bolt

1. Bushing
2. Nut
3. Left Cover
4. Pad
5. Retaining Ring
6. Driven Gear
7. Bearing
8. Bearing
9. Screw
10. Bushing
11. Wheel Axle
12. Oil Drain Plug
13. Nut
14. Cotter Pin
15. Oil Filler Plug
16. Gland (Seal)
17. Gland (Seal)
18. Nut
19. Right Cover
20. Pad
21. Small Gear
22. Bearing
23. Bushing
24. Bearing
25. Shims
26. Bearing Nut
27. Gland
28. Wedge Bolt
29. Cap
30. Nut
31. Propeller Shaft
32. Protective Cover

MT-11, MT-16, MB-750, MB-750M, MB-650, MB-650M, MB-650M1 Gear Reducer

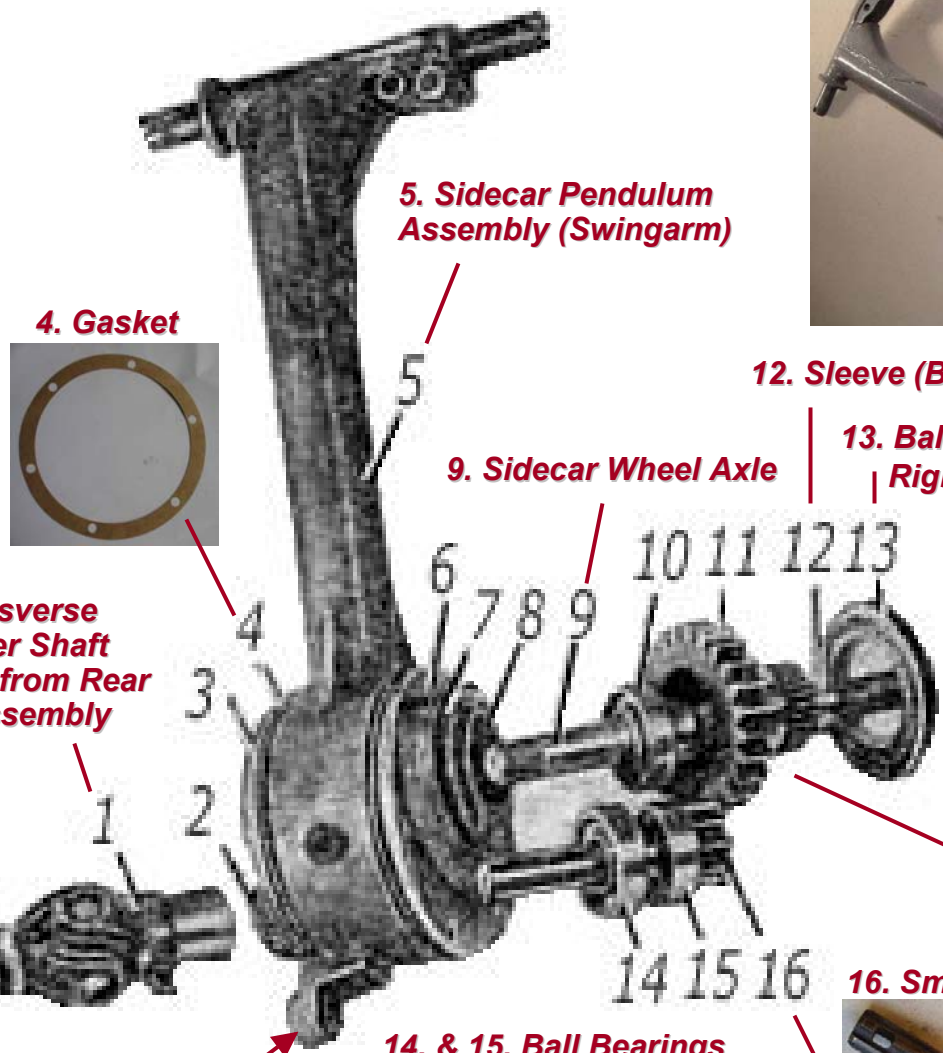


- Force from Differential Gear Transmitted via Transverse Torsion Cardan Shaft to Reduction Pinion Gear (16), which Is Meshed with Driven Gear (11)
- Transverse Cardan Shaft Designed to Cushion Impact Loading in Power Transmission to Sidecar Wheel Drive
- Pinion Gear (16) Interchangeable with Differential Gear (19) from Main Drive
- Gear (11) Mounted on Two Ball Bearings (10 and 13)
- Covers (3 and 6) Bolted to Casing
- Gaskets (4), Collar Gland (7) and Two Rubber Glands Press-Fitted in Nut (2) Provide Air-Tightness for Reduction Gear
- Oil Is Poured into Reduction Gear Casing thru Filling Hole
- When Mounting the Reduction Gear, Ensure Proper Position of Joint Forks
  - Forks Press-Fitted on Cardan Shaft Splines Must Be Arranged in Same Plane
- To Lubricate Universal Joint, Remove Rubber Seal and Unscrew Protective Cap
  - Differential Cowl (17) Has Left-Hand Thread

The sidecar gearreducer remains the same for locking (MB-750M, MB-650M) and non-locking differentials (MB-750, MB-650, MT-12 and MT-16).

MB-750 / MB-750M Sidecar Wheel Reducer Gear

1. Propeller Shaft Assembly
2. Gland (Seal) Nut Assembly
3. Left Cover
4. Gasket under Left and Right Covers
5. Sidecar Pendulum Assembly
6. Right Cover
7. Collar Seal
8. Follower
9. Sidecar Wheel Axle
10. Ball Bearing
11. Driven Gear
12. Sleeve (Bushing)
13. Ball Bearing in Right Cover
14. Ball Bearing for Pinion Gear
15. Ball Bearing for Pinion Gear
16. Small Pinion Gear



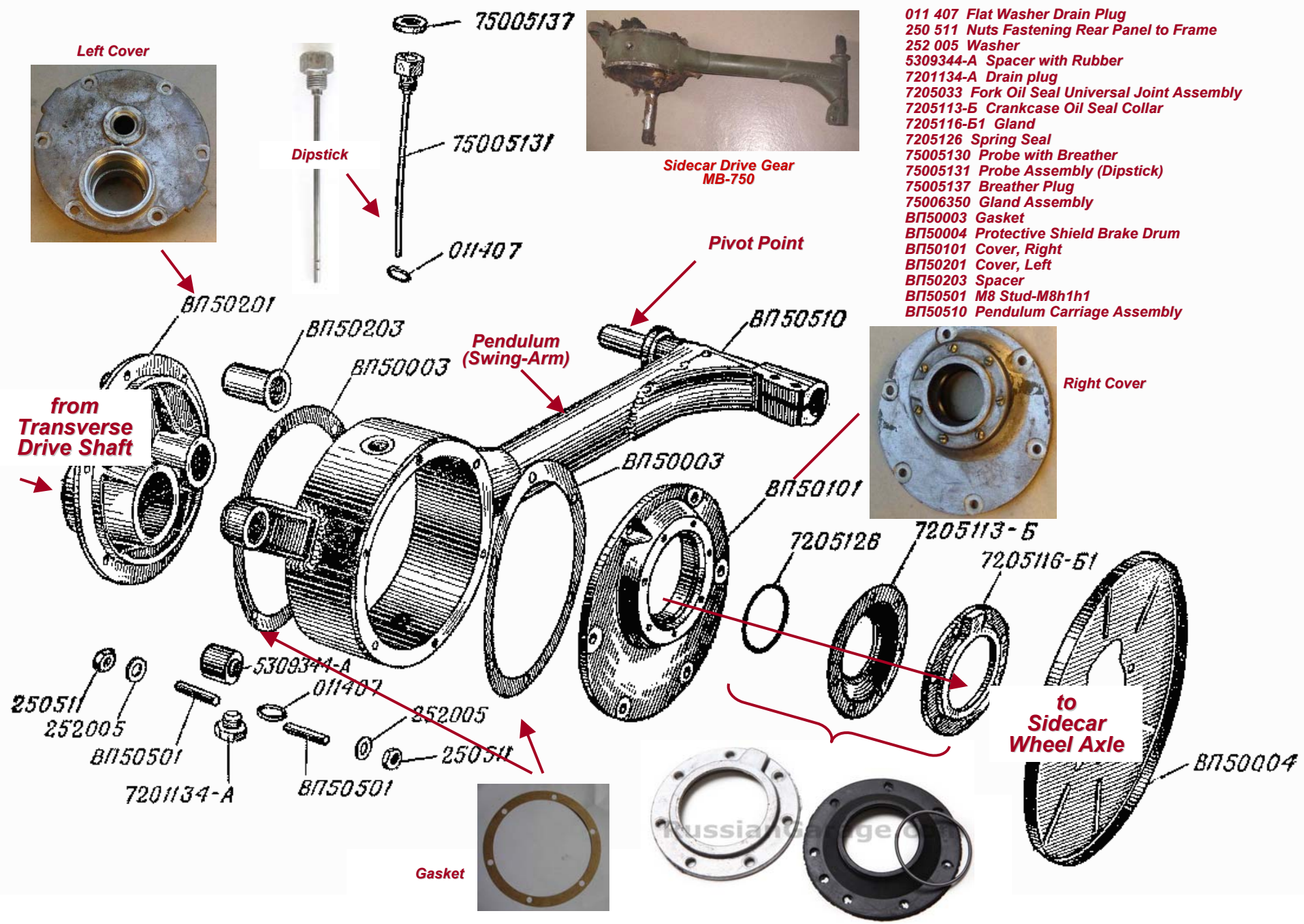
The sidecar wheel gear unit reduces the speed of the transverse axle to that of the sidecar wheel axle.

MT-11, MT-16, MB-750, MB-750M, MB-650, MB-650M, MB-650M1 Sidecar Wheel Gear Unit (2WD) (cont.)

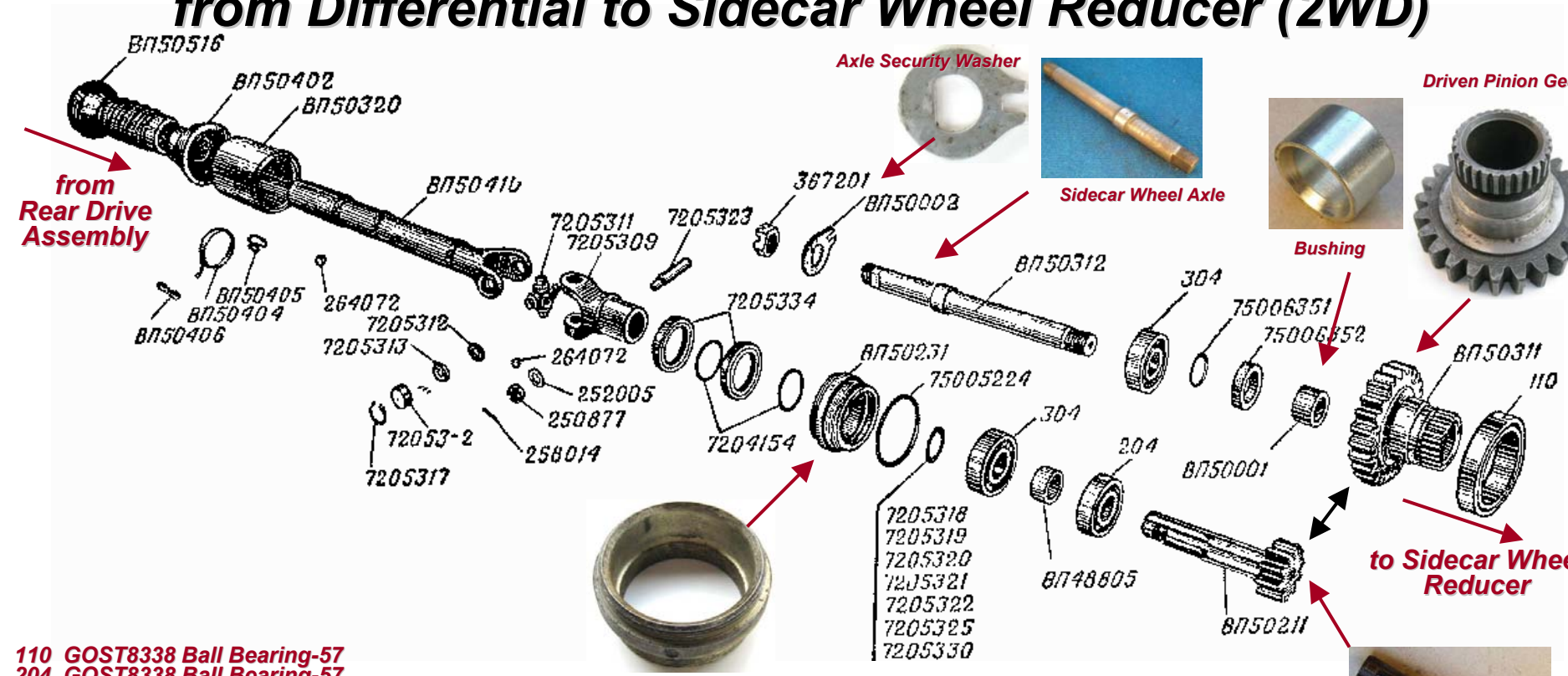
- Transverse Drive Shaft to Sidecar Wheel Gear Reducer
  - –Transmit Rotation of Rear Drive Differential to the Sidecar Wheel Reducer Gear
- Cylindrical Gear Housing Is a Welded Pipe Pendulum (Swing-Arm) (5)
  - –At Opposite End of Pendulum Is Welded Crossbar with Two Axles
    - Pendulum Can Make Oscillatory Motion in Sidecar Chassis Joints
- Cylindrical Gear Housing with Two Side-Covers: Left and Right (3, 6)
  - – Entire Drive Mechanism Mounted on Sidecar Wheel
  - –Transverse Drive Shaft (1) Drives Slotted Fork Shank Pinion Gear (16)
  - –Small Pinion Gear (16) Rotates Driven Gear (11) Mounted on Two Ball Bearings (10 & 13)
  - –Driven Pinion Gear (11) Projects Out of Right-Side Cover Which Sits Inside Splined Sidecar Wheel Hub
  - –Sidecar Wheel Axle Is Supported for Gears and Associated Wheel
  - –Small Pinion Gear Mounted on Two Ball Bearings (14 and 15), Pressed into Left Housing Cover (3)
  - –Idler Bearings Mounted on Left and Right Covers
  - –Gaskets (4) Installed under Left and Right Covers (3 and 6)
  - –Rubber Gasket Placed under Cover (8) Exiting the Hub Gear (11) and Seal (Gland) Nut Assembly (2)
  - –Eye Welded on Gearbox Housing for Sidecar Spring-Hydraulic Shock Absorber Attachment
- Care of Transverse Drive Chain
  - –0.2 liters of Gear Oil thru Filler Hole in Casing with Breather and Dipstick
    - Drain Plug at Bottom of Casing
  - –Periodic Lubrication of Universal Joints thru Nipples in Universal Joint Crosses
  - –Lifting Wedge Bolt Propeller Forks When a Longitudinal Play Slots
  - –Lubrication of Shaft and Connecting Pipe thru Driveshaft Grease Fitting

The sidecar wheel gear unit reduces the speed of the transverse axle to that of the sidecar wheel with a gear reduction of 2.4.

Dnepr MB-750 Sidecar Wheel Reducer (2WD)



MB-750 Transverse Drive Shaft: from Differential to Sidecar Wheel Reducer (2WD)



110 GOST8338 Ball Bearing-57
204 GOST8338 Ball Bearing-57
250 877 Slotted Mounting Nut M8x1
252 005 Washer Mounting Bolts to Frame of Rear Panel
258 014 Split Pin 2x20 Nuts Cardan Fork
264 072 Nipple 1-B1
304 Ball-bearing
367 201 Castellated Nut M20x1
7204154 Spring Shaft Seal
72053-2 Needle Bearing
7205309 Cardan Fork Slotted
7205311 Cardan Cross
7205312 Gimbal ring sealing
7205313 Holder of the O-ring gimbal
7205317 Locking Ring
7205318 -to- 330 Adjusting Washers
7205323 Wedge bolt
7205334 Packing Gland Cardan Fork
75005224 Ring U-55h60-2-61 GOST9833
75006351 Spring Seal
75006352 Packing Gland (Seal)
ВП48805 Spacer
ВП50000 Gearbox with Driveshaft Assembly
ВП50001 Bushing
ВП50002 Special Washer
ВП50200 Left Cover Assembly
ВП50211 Small Pinion
ВП50230 Gland Nut Assembly
ВП50231 Nut Seal
ВП50310 Driven Pinion Assembly
ВП50311 Driven Pinion Gear
ВП50312 Sidecar Wheel Axle
ВП50320 Cap Gimbal Assembly
ВП50330 Right Cover with Bearing
ВП50400 Propeller Shaft Assembly
ВП50402 Propeller Shaft Sealing Ring
ВП50404 Feed Withdrawal
ВП50405 Garter Belt Buckle
ВП50406 Cotter Special
ВП50410 Driveshaft Tube Assembly
ВП50500 Pendulum Carriage Assembly with Studs
ВП50516 Cuff Safety

Final Drive, 2WD with Locking Differential

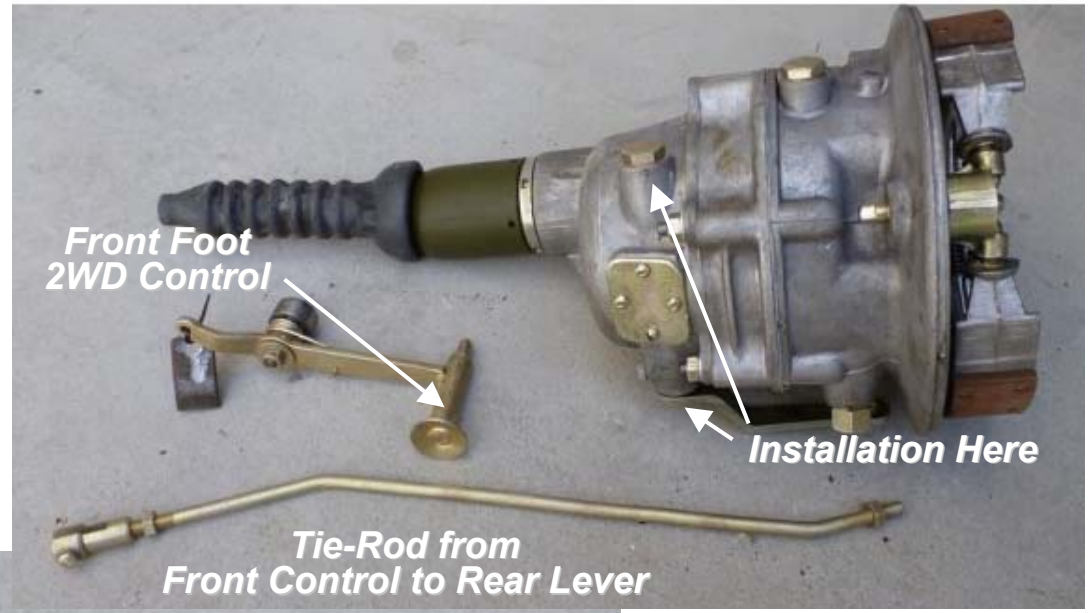
Rear Drive with Locking Differential
(MB-750, MT-12)
Vendor ID: 002.125
(www.oldtimergarage.eu)

Main Drive (2WD) with Differential Blocking
(MB-750, MB-650, Dnepr MT)
Vendor ID: 330568159688
List Price: $699.00
(www.ebay.com)

Rear Drive with Locking Differential
(MB-750)
(www.moto.kiev.ua)

MT-16 with Differential Lock Added

MB-750 with Locking Differential Kit Added

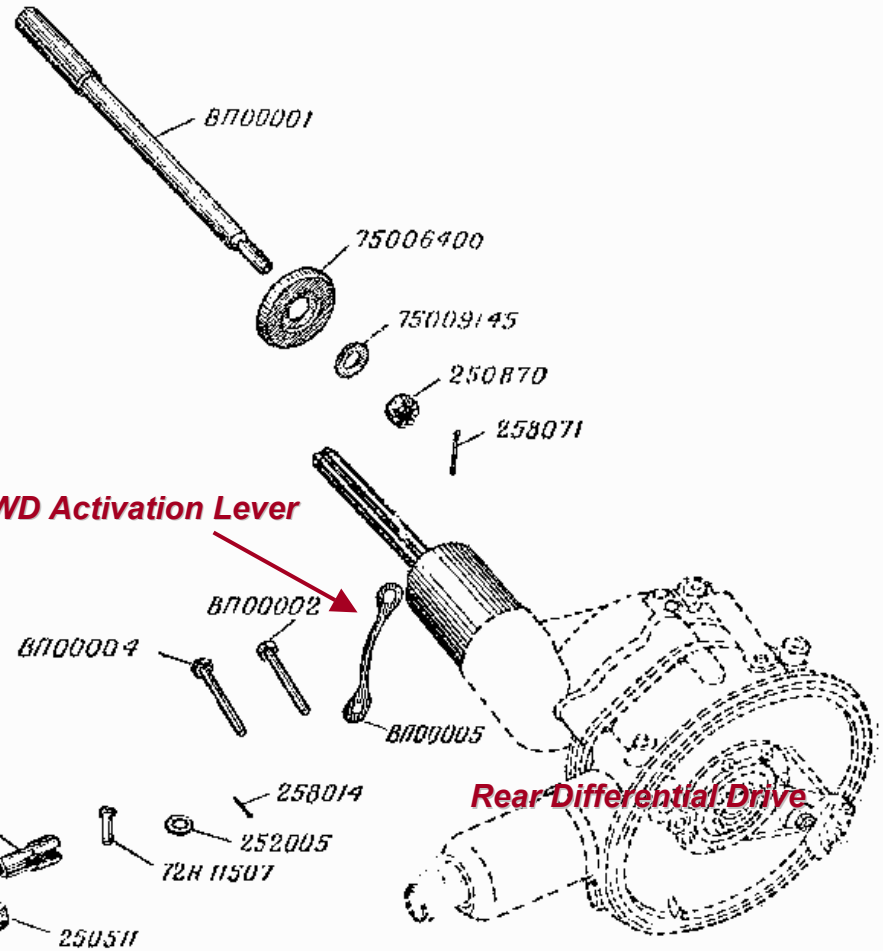


The locking mechanism from Oldtimer garage is a differential lock that is easy to install on the Dnepr MT-16 full-time 2WD (with differential), giving the possibility to lock the differential, just like an off-road motorcycle. The only work required is drilling/milling two holes in the right cover on the FD.

External Locking Differential Components (MB-750)

(www.autosoft.ru)

Part #	Russian #	Description
250 511	250 511	Nut Bolts Fastening Rear Panel to Frame
250 870	250 870	Nut M14x1, 5 Castellated Mounting of Rear Wheels
252 005	252 005	Washer Mounting Bolts to Frame of Rear Panel
258 014	258 014	Split Pin 2x20 Nuts Cardan Fork
258 071	258 071	Cotter 5h45 Mounting of Rear Wheels
258 233	258 233	Wire shplintovaya 0.8 x25
72N11507	72H11507	Finger Lever Special
75006400	75006400	Reflector Hub Assembly
75009145	75009145	Washer
VP00001	ВП00001	Rear Wheel Axle
VP00002	ВП00002	Special Mounting Bolt M8h65 Differential to Control Arm
VP00004	ВП00004	M8h65 Bolt Mounting Differential to Control Arm
VP00005	ВП00005	Special retainer
VP00300	ВП00300	Traction Lock
VP00301	ВП00301	Traction Lock
VP00301	ВП00303	Fork Rod Lock

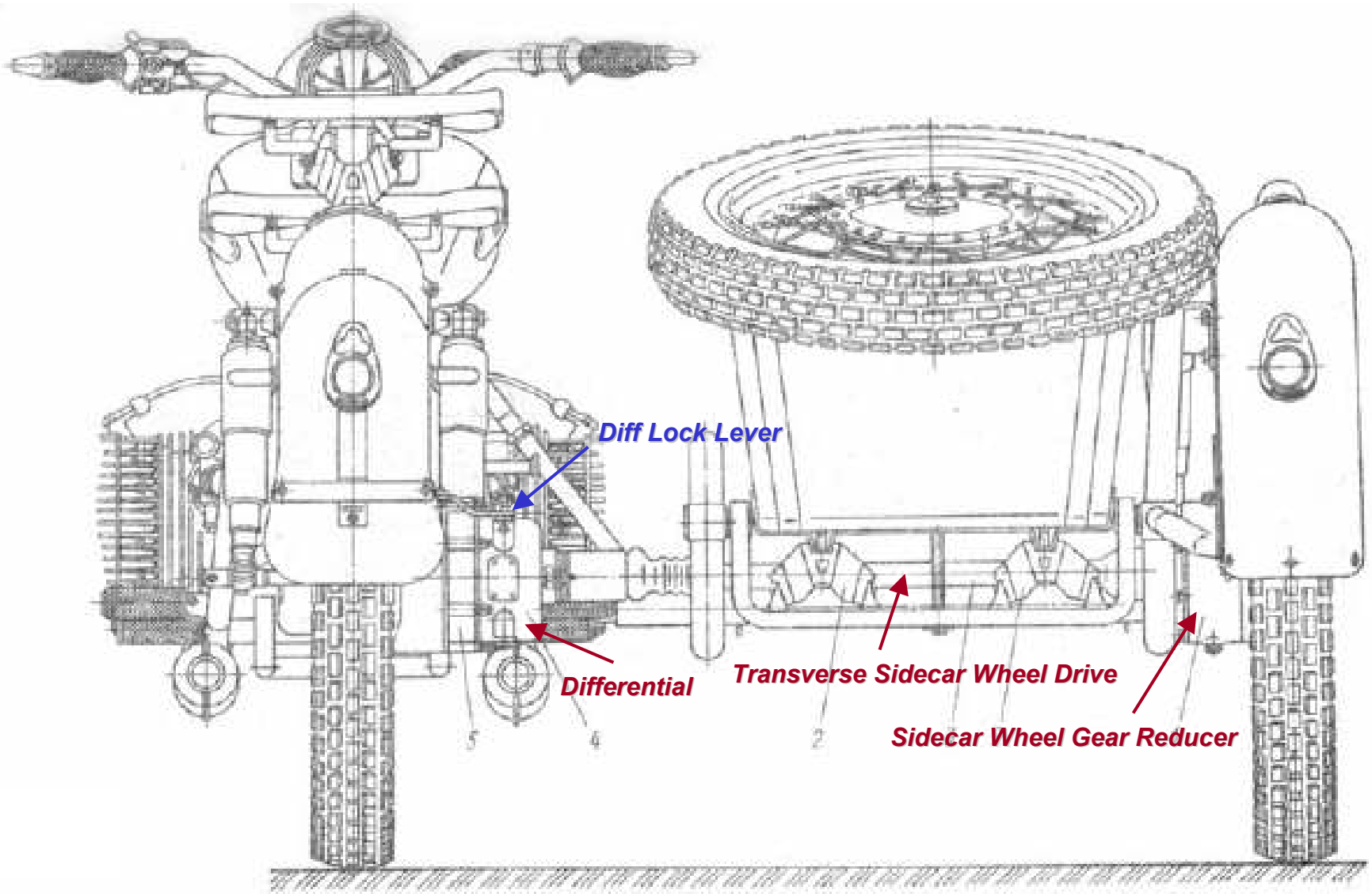


Differential Lock Lever Rod
WP00301

Set to Upgrade Full-Time Dnepr Differential to Locking Differential

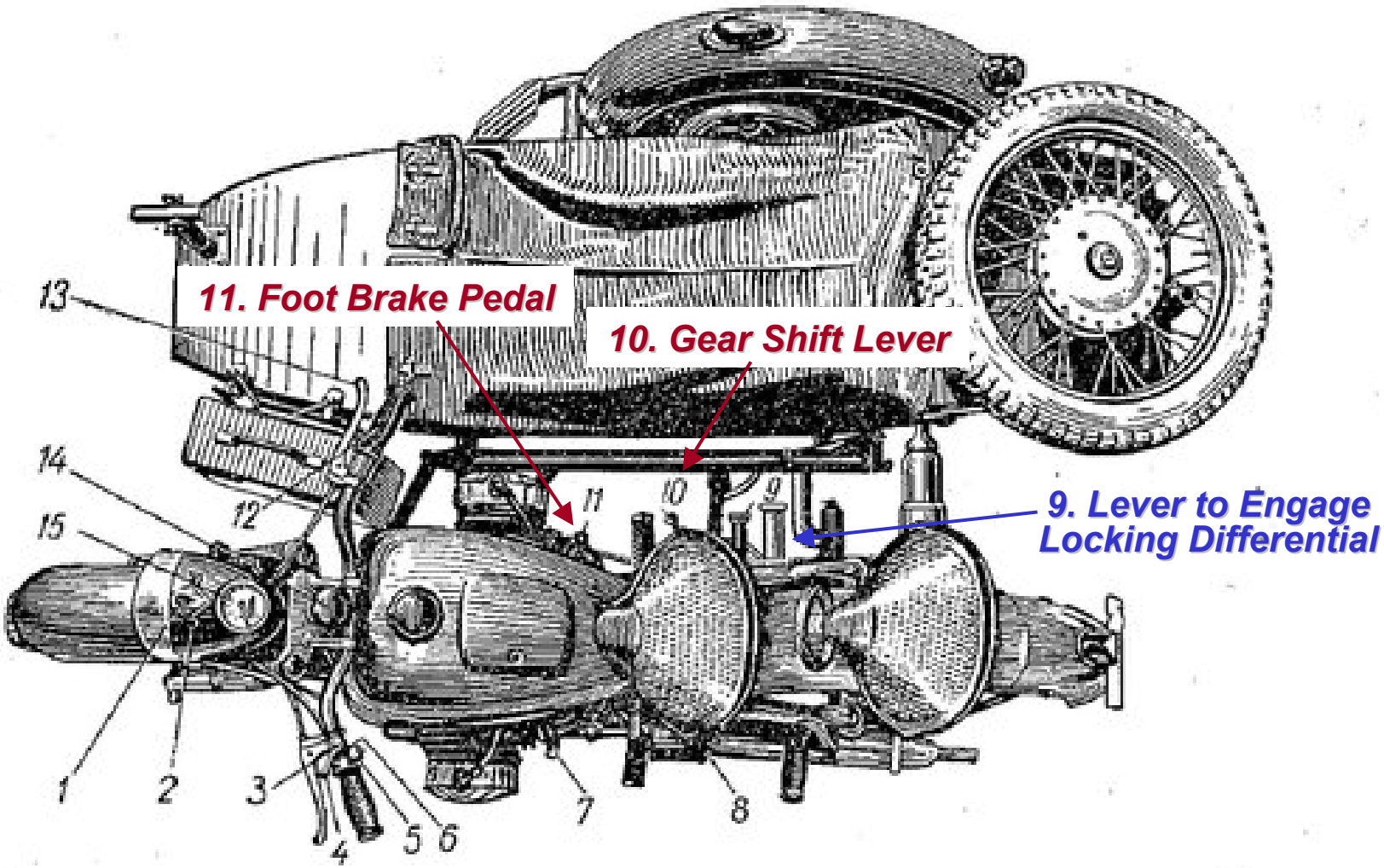
Old Timer Garage (www.oldtimergarage.eu) offers a kit for retro-fitting a locking differential to the MB-650, MB-750, MT-12 and MT-16.

MB-750M with Locking Differential



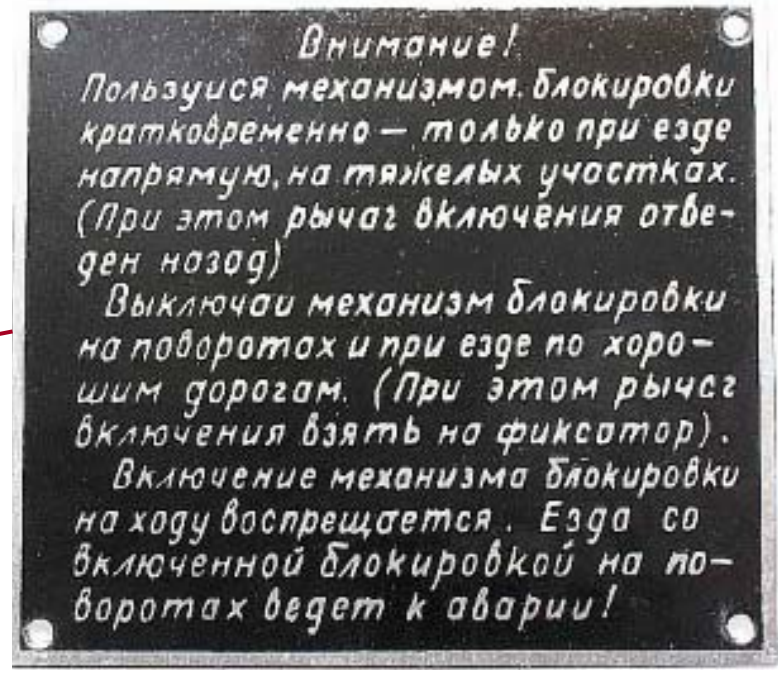
The MB-750M (1973-1977) had a full-time differential with a manually engageable locking mechanism.

MB-750M with Locking Differential (bcozz.multiply.com)



The MB-750M (1973-1977) had a full-time differential with a manually engageable locking mechanism.

MB-750M with Locking Differential (www.advrider.com)

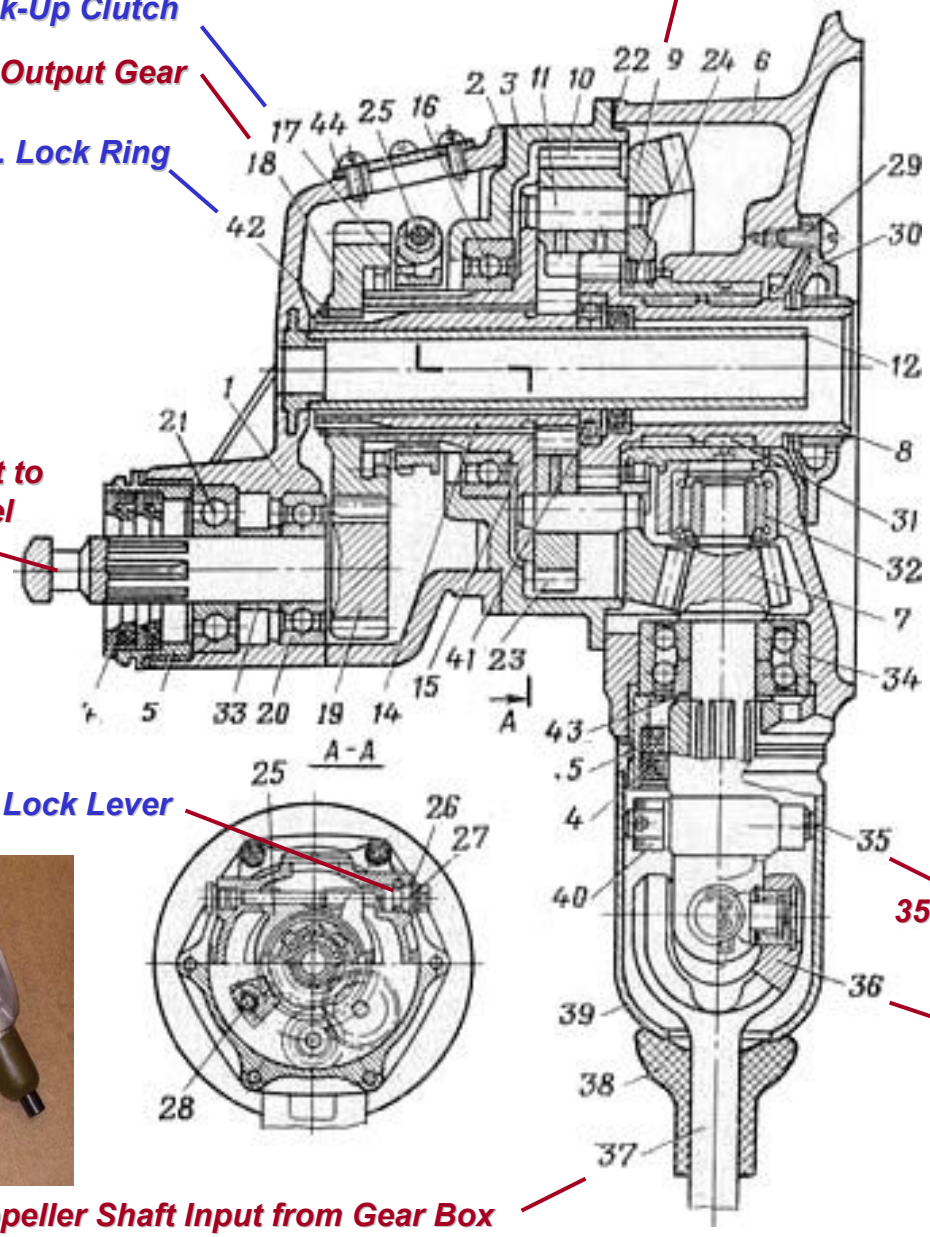


Locking Differential Plate, 94 mm x 84 mm
Vendor ID: 003.076
List Price: €14.11
(www.oldtimergarage.eu)

"Attention Comrade, don't be messing around with the 2WD engaged. Only engage short distances going straight on crappy roads. Turning with it engaged can cause accident". This is concerning the locker final drive. It is a differential until engaged, then it is a locker (both rear and sidecar wheel turn at same rate).

MB-750M Locking Differential Mechanism

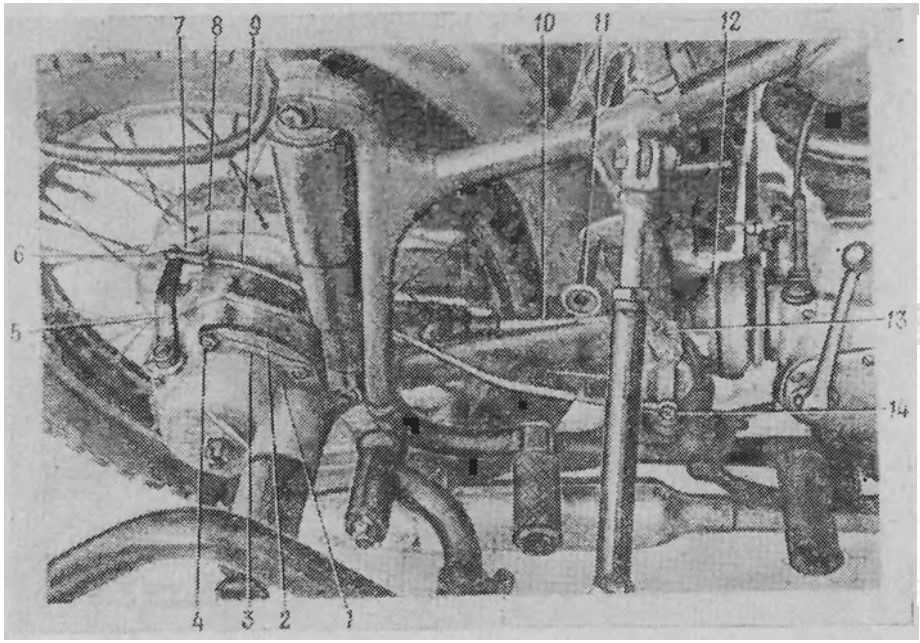
1. Differential Cover
2. Gasket
3. Differential Casing
4. Seal (Gland)
5. Nut
6. Rear Drive Casing
7. Drive Gear Assembly with Bearings
8. Left Hub (Nave)
9. Driven Bevel (Crown) Gear
10. Satellite Gear
11. Satellite Gear Axles
12. Spacer
13. Pin Control
14. Right Hub
15. Differential Cup
16. Ball Bearing
17. Lock-Up Clutch
18. Output Gear
19. Small Pinion Gear
20 Ball Bearing
21. Ball Bearing
22. Gasket
23. Stray Gear
24. Roller Bevel Gear
25. Lock Plug
26. Lock Lever
27. Axle of Lever Lock
28. Pin
29. Collar Seal
30. Seal (Gland)
31 and 32. Needle Bearing
35. Wedge-Bolt
36. Fork Drive Shaft
37. Propeller Shaft
38. Rubber O-ring
39. Gimble Cap
40. Castle-Nut
41. Ball Left Hub (Nave)
42. Lock Ring
43. Shims
44. Filling Grease Cover



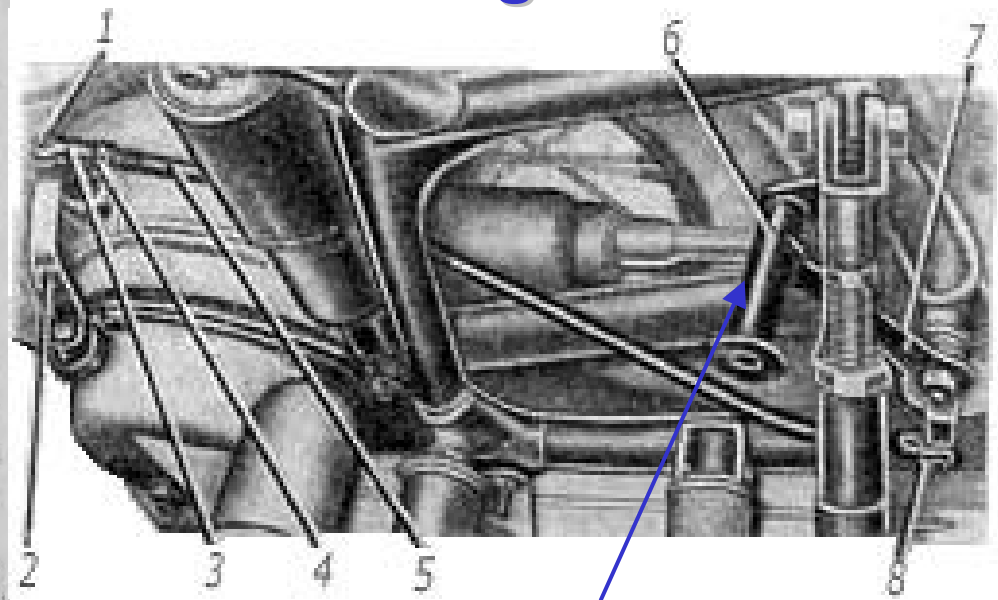
MB-750M Locking Differential Mechanism (cont.)

- Rear Drive and Differential Gear Mounted in Common Split-Housing Composed of 3 Parts
  - Rear Drive Casing (6)
    - Consists of Pair of Bevel Gears (7 and 9) with Spiral Teeth
    - Gear Ratio 4.625:1 (Sidecar Version)
  - Differential Cover (1) Held by Six Studs and Two Gaskets
  - Differential Casing (3) Consists of Four Parts:
    - Two Hubs (8 and 14)
      - Left Hub (8) Mounted in Rear Drive Casing on Two Needle Bearings
      - Right Hub (14) Mounted in the Differential Half
    - Two Satellite Gears (10)
    - Two Idle Gears (13)
    - Differential Cup (15)
      - Satellite and Idle Gears Installed on Axle (11), whose Tenons on one Side Enter Differential Half (15), and on Other Side, Large Bevel (Crown) Gear (9)
      - Differential Cup (15) and Driven Gear (9) Centered by Means of Two Roller and Tightened Together by Two Bolts and Secured by a Special Lock Washer
- Assembled Differential Mechanism Supported by Two Bearings:
  - Ball Bearing (16) Mounted in Differential Casing (3)
  - Roller (Compound) Bearing Mounted in Rear Drive Casing
- Force from the Differential Transmitted to Sidecar Wheel thru Pair of Gears (18 and 19)
  - Output Gear (18) Mated with Right-Hand Hub (14) Slots and Fixed with Lock Ring (42)

MB-750M: 2WD Differential with Locking Mechanism



1. Rear Drive with Differential Gear
2. Fork Frames
3. Lock washer
4. Bolt
5. Lock Lever Assembly
6. Finger Lever
7. Threaded Control End
8. Lock-Nut
9. 2WD Control Tie-Rod
10. PTO (Power Take-Off) Shaft
11. 2WD Engaging Lever Lock
12. Flexible Disc Coupling (Doughnut)
13. Spring
14. Axle Engaging Lever Lock



Control 6 Should Be On the Retainer, which Corresponds to the Locking in the OFF Position.

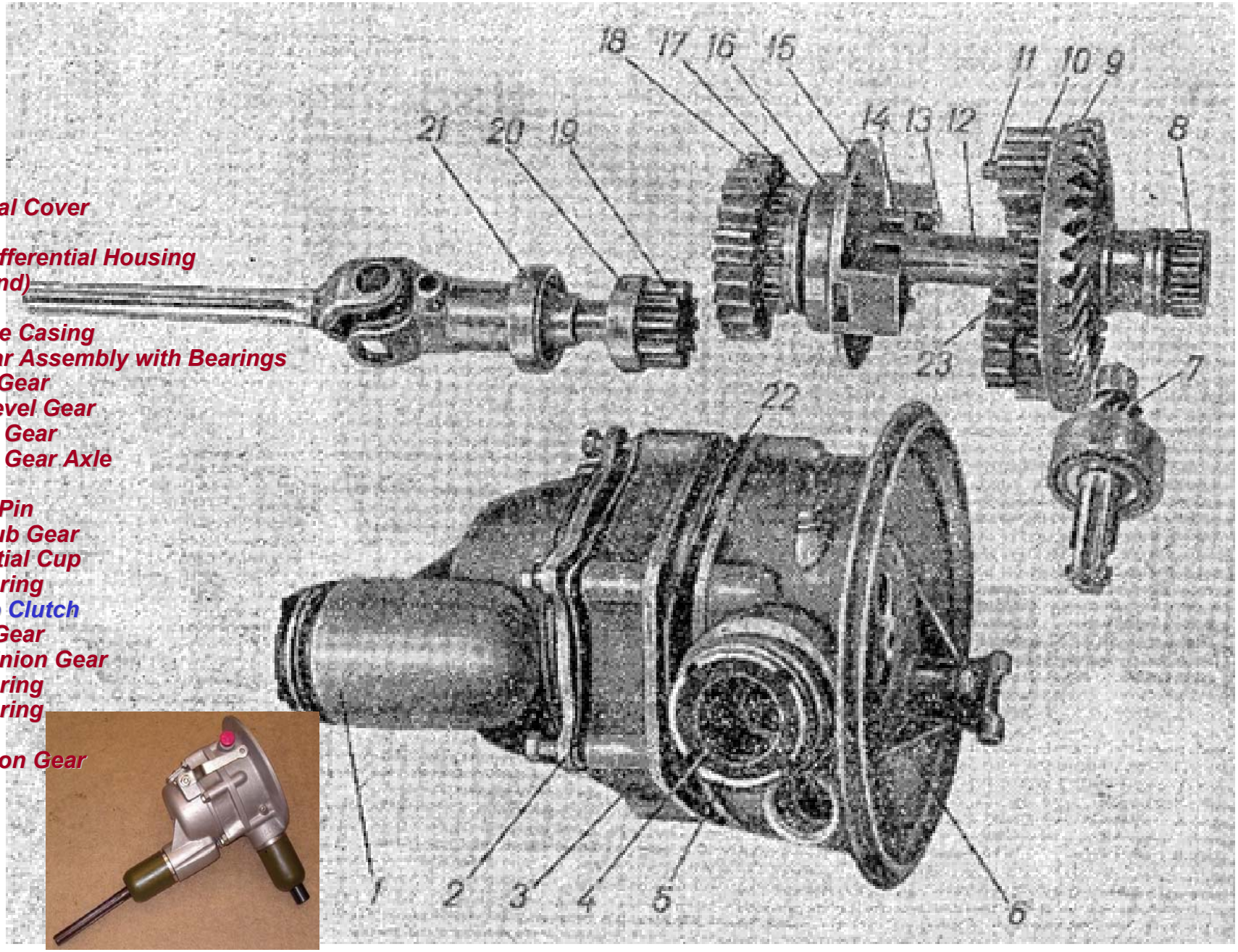
1. Thumb Lever
2. Lock Lever Assembly
3. Threaded Adjusting Fork
4. Locknut
5. Control Rod
6. 2WD Engaging Control
7. Clockwork Spring
8. Pin

The locking mechanism for the differential is activated by a lever (11 left, 6 right) mounted on top of the rear drive, which engages the fork lock (5 left), held in the off position by a clockwork spring (13 left, 7 right).

Transverse Driveline from Differential to Sidecar Wheel

- *Transverse Propeller Shaft Transmit Rotation of Differential Mechanism to Sidecar Gear Reducer*
- *Consists of Cardan Driveshaft*
  - *Welded at One End (sleeve with internal splines), and the other - the plug and cardan driveshaft splined shaft with tilt gimbal coupling.*
  - *Splined shaft propeller shaft is a splined driveshaft tube pipe and slotted fork sits on the propeller shaft splines shank pinion (19) of the differential mechanism*
  - *Cardan universal joint fork is half cardan joints consisting NZ crosses, and the second half slotted fork*
  - *Slotted plug cardan driveshaft coupling pipe sits on a spline shank pinion gear (Fig. 47), which, by its design and size is no different from the small gear 19 of the differential mechanism*
  - *Universal joints transverse transmission protected from dirt and moisture steel cap, and place of the driveshaft tube and propeller shaft - protective rubber corrugated sleeve*
  - *Care transverse driveline consists of a periodic lubrication of bearings universal joints through nipples crossings, lifting wedge bolt propeller forks when a longitudinal play slots and lubrication of the shaft and the connecting pipe through the driveshaft grease fitting*

MB-750M Rear Drive with Lockable Differential



1. Differential Cover
2. Gasket
3. Center Differential Housing
4. Seal (Gland)
5. Nut
6. Rear Drive Casing
7. Drive Gear Assembly with Bearings
8. Left Hub Gear
9. Driven Bevel Gear
10. Satellite Gear
11. Satellite Gear Axle
12. Spacer
13. Control Pin
14. Right Hub Gear
15. Differential Cup
16. Ball Bearing
17. Lock-Up Clutch
18. Output Gear
19. Small Pinion Gear
20. Ball Bearing
21. Ball Bearing
22. Gasket
23. Idle Pinion Gear

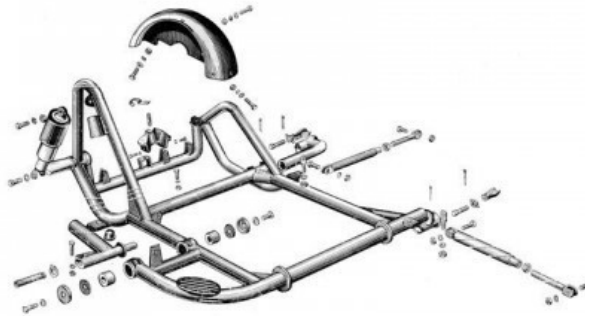
MB-750M Locking Differential Mechanism

- Drive Wheels Are Locked by Means of Lock-Up Clutch (17)
  - –Locking Clutch Has External and Internal Splines
  - –Internal Splines In Constant Mesh with Splines of Differential Cup (15) Liner on Which It Sits
  - –Differential Cup (15) Moves with Fork Lock
  - –When Sleeve (17) Is Moved in Direction of Output Gear (18), Splined Outer Sleeve Meshes with Internal Teeth of Socket Sim Output Gear, Resulting in Blocking of Entire Differential Mechanism
  - –In Which Case, Transverse Propeller Shaft and Sidecar Wheel Gear Reducer Directly Connected to Driven Bevel Gear (9), Connected by Bolts to Differential Cup (15), Bypassing the Cylindrical Differential Gear Mechanism
  - –Motorcycle Must Be Stopped to Engage Locking Mechanism
    - Attempt to Engage Locking On-the-Move Could Damage the Differential
  - –Sometimes Locking Does Not Happen Immediately Due to Different External Tooth Clutch with Internal Teeth Crown of Output Gear (18)
    - In This Case, Locking Happens When Pulling Away or Rolling Bike Due to Changes in the Relative Positions of the Coupling Sleeve (17) and Output Gear (18) and the Action of the Spring

MB-750M / MB-650M / MT-12 / MT-16 Locking Differential Drive (2WD)

- *Rear Drive and Differential Gear Mounted in a Common Split Housing, Made of Thee Parts:*
  - *Differential Cover (1)*
  - *Differential Casing (3)*
  - *Main Drive Casing (6)*
- *Consists of Pair of Spiral Bevel Gears (7 and 9) with Spiral Tooth Gear Ratio of 4.62*
- *Cylindrical Differential Consists of:*
  - *Left and Right Hubs (8 and 14)*
  - *Two Satellite Gears (10)*
  - *Two Idler Gears (13)*
  - *Differential Half (15)*
- *Left Hub (8) Mounted in Main Drive Casting (6) on Two Needle Bearings*
- *Right Hub (14) is rotated in a bronze bushing cup differential*
- *Satellite and Idle Gears Mounted on Axles (11) Studs, on one side of which are included in the differential hole cups the other - in the slot in the body of the driven bevel gear final drive 9.*
- *Differential Half (15), and on Other Side, Large Bevel Gear (9)*
- *Differential Half (15) and Driven Gear (9) Are Centered by Two Rollers and Tightened Together by Bolts Secured by a Special Lock Washer*
- *Assembled Differential Mounted on Two Bearings:*
  - *Ball Bearing (16) Mounted in Differential Casing (3)*
  - *Patterned Roller (compound) Bearing in Rear Drive Casing, between the driven bevel gear and bushing pressed into the crankcase main drive.*
- *Rotational Force from Differential Transmitted to Sidecar Wheel thru Pair of Gears (18 and 19)*
  - *Output Gear (18) Mounted on Splines of Hub (14) and Fixed with Lock Ring (20) and is on the side of the crown with internal teeth*
  - *Pinion 19 small, has a long tail with slots on the end, is set to one of the differential cover with two ball bearings 20 and 21.*
    Output gear 18, attached to the hub slots lock washer 14 is fixed against axial movement.
- *Nuts (5) Have a Left-Hand Thread at Both Ends*
- *Differential Cowl (23) Has a Left-Hand Thread*

MB-750M Sidecar Frame (www.redoctobermotorcycles.com)



The bare sidecar frame shows the transverse drive shaft connected to the gear reducer, which drives the sidecar wheel.