Ural (Урал) - Dnepr (Днепр) Russian Motorcycle

Part XXXI-4: Full-Time Two-Wheel Drive (2WD) with Locking Differential

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

(Also See Part XXXI: Drive Chain Evolution,
Part XXXI-1: One-Wheel Drive (1WD),
Part XXXI-2: Two-Wheel Drive (2WD),
Part XXXI-3: Full-Time 2WD with non-Locking Diff,
Part XXXI-5: Full-Time 1WD with Engageable 2WD (non-Diff),
Part XXXI-6: Gears and Gear Ratios,
Part XXXI-7: Drive Train Components,
and Part XXXI-8: Disassembly of Drive Chain)

Ernie Franke
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10 / 2018
Four Types of Final Drives in Russian Sidecars

1. Full-Time, Straight Final Drive (1WD)
   – One-Wheel Drive (1WD)
   – Available in Various Ural / Dnepr Models

2. Full-Time, Two-Wheel Drive (2WD) with non-Locking Differential
   – Dnepr MT-12 (1977-1985)
   – Dnepr Rear Drive Casings Allow for Adding Locking Differential
     • Only True Differential for Ural
     • Pre-“Patrol” Model

3. Full-Time, Two-Wheel Drive (2WD) with Locking (Engageable) Differential
   – Dnepr MB-750 (1964-1973)
   – Dnepr MB-750M (1973-1977, Locking feature deleted after two years)

4. Full-Time, One-Wheel Drive (1WD) with Engageable Locking 2WD (non-Diff)
   – Available in Various Ural Models
     • Limited Editions with Engageable Sidecar Drive Shaft:
       – Derivatives of Patrol or Gear-Up
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<th>Ural (Урал) Model</th>
<th>Production</th>
<th>Engine</th>
<th>Voltage</th>
<th>Drive Train</th>
<th>Rear Suspension</th>
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<tr>
<td>M-72</td>
<td>1941-1950</td>
<td>750cc SV</td>
<td>6-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
<td>Plunger</td>
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<td>M-72K</td>
<td>1952-1958</td>
<td>750cc SV</td>
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<td>M-72M</td>
<td>1956-1961</td>
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<td>1965-1971</td>
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<td>Full-Time, Straight Final Drive (1WD)</td>
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<td>M-66 (Ural-3)</td>
<td>1971-1973</td>
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<td>M-67 (IMZ-8.101)</td>
<td>1974-1976</td>
<td>650cc OHV</td>
<td>12-Volt</td>
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<td>M-67.36</td>
<td>1976-1984</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
<td>Swing Arm</td>
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<tr>
<td>8.103 Series “650”</td>
<td>1984-2002</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time 1WD with Engageable 2WD (No Diff)</td>
<td>Swing Arm</td>
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<tr>
<td>“750&quot; Series</td>
<td>2003-Present</td>
<td>750cc OHV</td>
<td>12-Volt</td>
<td>Full-Time 1WD with Engageable 2WD (No Diff)</td>
<td>Swing Arm</td>
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<thead>
<tr>
<th>Днепр (Днепр) Model</th>
<th>Production</th>
<th>Engine</th>
<th>Voltage</th>
<th>Drive Train</th>
<th>Rear Suspension</th>
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<tr>
<td>M-72</td>
<td>1951-1956</td>
<td>750cc SV</td>
<td>6-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
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<td>Full-Time, Straight Final Drive (1WD)</td>
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<td>K-750</td>
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<td>K-750M</td>
<td>1963-1977</td>
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<td>Full-Time, Straight Final Drive (1WD)</td>
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<td>MT-12 (Dnepr-12)</td>
<td>1974-1982</td>
<td>750cc SV</td>
<td>6-Volt</td>
<td>Full-Time 2WD with Non-Locking Differential</td>
<td>Swing Arm</td>
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<tr>
<td>MB-750</td>
<td>1964-1973</td>
<td>750cc SV</td>
<td>6-Volt</td>
<td>Full-Time 2WD with Locking (Engageable) Diff</td>
<td>Swing Arm</td>
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<tr>
<td>MB-750M</td>
<td>1973-1977</td>
<td>750cc SV</td>
<td>6-Volt</td>
<td>Full-Time 2WD with Locking (Engageable) Diff</td>
<td>Swing Arm</td>
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<td>6-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
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<td>1971-1976</td>
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<td>1968-1984</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time 2WD with Locking Differential</td>
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<tr>
<td>MB-650M</td>
<td>1985-1991</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time 2WD with Non-Locking Differential</td>
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<td>MT-10</td>
<td>1973-1976</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
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<td>MT-10.36</td>
<td>1976-1984</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
<td>Swing Arm</td>
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<tr>
<td>MT-11 (Dnepr-11)</td>
<td>1984-2005</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time, Straight Final Drive (1WD)</td>
<td>Swing Arm</td>
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<td>MT-16 (Dnepr-16)</td>
<td>1985-2005</td>
<td>650cc OHV</td>
<td>12-Volt</td>
<td>Full-Time 2WD with Non-Locking Differential</td>
<td>Swing Arm</td>
</tr>
</tbody>
</table>

* Locking Feature Deleted after Two Years of Production, ** Optional Kit Available to Add Locking Differential
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.
MB-750 (MV-750) Spare Parts

Gear Wheel
List Price: 32.40€ NOS
(easthighway.com)

Switch-Coupling
List Price: 24.25€
(easthighway.com)

Left-Hand Cover Assembly
List Price: 96.00€ NOS
(easthighway.com)

Right-Hand Cover
List Price: 51.00€ NOS
(easthighway.com)
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 Components
  – 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 Lever
- Locking Activation Tie Rod
- Warning Label on Gas Tank
- Locking Activation Pedal
- 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

The appearance of the MT-804 transmission (gearbox), with reverse, improved agility to eliminate the need to lock the wheels in off-road conditions.
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)
Examination of the differential shows the absence of any manually-engageable locking mechanism on many MB-750’s.

Later Production MB-750’s Did Not Have the Locking Diff
MB-750 / MB-750M Differential Covers (2WD)

- **Lever for Locking Differential**
- **Drive Outer Cover Gasket**
- **O-Ring**
- **Oil Dip-Stick and O-Ring**
- **Dipstick**
- **Drive Hub Needle Bearing Inner Race**
- **Two Casing Gaskets**
- **Six Studs Holding Casing Together**
- **Gasket for Differential Cover**
- **Seal Collar with Seal**
- **Rear Drive Housing**
- **Oil Plug + Washer**

Items listed:
- 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
- Б/У48006 Gasket
- Б/У48007 Cap
- Б/У48008 Gasket Crankcase Differential
- Б/У48011 Setscrew
- Б/У48017-A O-Ring
- Б/У48201 Carter Differential Housing
- Б/У48310 Lock Lever Assembly (2WD)
- Б/У48320 Fork Lock Assembly
- Б/У48401 Bushing
- Б/У48402 M8 stud-M8h1h50
- Б/У48411 Carter's Final Drive
- Б/У48801 Differential Cover
- 750048210 Probe Assembly (Dipstick)
The presence of satellite gears and stray gears indicates that the rear drive is indeed a differential.
MB-750 Drive Shaft (2WD)

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
7500523-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
### Main Drive Shaft (Карданный вал главной передачи) MB-750

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<tr>
<th>Part #</th>
<th>Description</th>
<th>Наименование</th>
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<td>250877</td>
<td>M8x1 nut</td>
<td>Гайка прорезная M8x1 крепления</td>
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<td>252005</td>
<td>Washer 8</td>
<td>Шайба болта крепления заднего щитка к раме</td>
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<td>258014</td>
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<td>Шплинт 2х20 гайки крепления вилки кардана</td>
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<td>Масленка 1-Б1</td>
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<td>65005307</td>
<td>Elastic disk</td>
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<td>Cardan hood</td>
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<td>Sealing ring</td>
<td>Кольцо карданного вала уплотнительное</td>
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MB-750 differs from its latest version (MB-650) only by the engine and electrical equipment.
**MB-750 / MB-750M Sidecar Wheel Reducer Gear (2WD)**

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

**Part Details:**
- **12. Oil Drain Plug**
- **15. Oil Filler 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**
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 gear-reducer remains the same for locking (MB-750M, MB-650M) and non-locking differentials (MB-750, MB-650, MT-12 and MT-16).
The sidecar wheel gear unit reduces the speed of the transverse axle to that of the sidecar wheel axle.
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)

- Sidecar Drive Gear MB-750
- Pivot Point
- Pendulum (Swing-Arm)
- from Transverse Drive Shaft
- to Sidecar Wheel Axle
- Left Cover
- Dipstick
- Right Cover
- Gasket

Part Numbers:
- 011 407 Flat Washer Drain Plug
- 250 511 Nuts Fastening Rear Panel to Frame
- 252 005 Washer
- 5309344-A Spacer with Rubber
- 7201134-A Drain plug
- 7205033 Fork Oil Seal Universal Joint Assembly
- 7205113-5 Crankcase Oil Seal Collar
- 7205116-51 Gland
- 7205126 Spring Seal
- 75005130 Probe with Breather
- 75005131 Probe Assembly (Dipstick)
- 75005137 Breather Plug
- 75006350 Gland Assembly
- Б750003 Gasket
- Б750004 Protective Shield Brake Drum
- Б750101 Cover, Right
- Б750201 Cover, Left
- Б750203 Spacer
- Б750501 M8 Stud-M8h1h1
- Б750510 Pendulum Carriage Assembly
Final Drive, 2WD with Locking Differential

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, MT-12)
Vendor ID: 002.125
(www.oldtimergarage.eu)

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

MT-16 with Differential Lock 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.
<table>
<thead>
<tr>
<th>Part #</th>
<th>Russian #</th>
<th>Description</th>
</tr>
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<tbody>
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<td>250 511</td>
<td>250 511</td>
<td>Nut Bolts Fastening Rear Panel to Frame</td>
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<td>Nut M14x1, 5 Castellated Mounting of Rear Wheels</td>
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<td>Washer Mounting Bolts to Frame</td>
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<td>Split Pin 2x20 Nuts Cardan Fork</td>
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External **Locking Differential Components (MB-750)**

(www.autosoft.ru)
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.

Vendor ID: 002.036
List Price: €181.48
(www.oldtimergarage.eu)
2WD Conversion Kit

Includes:
- Sidecar frame with mounts A = 62 cm
- Motorbike swing arm B = 28.5 cm
- Rear drive complete 8 x 37
- Reducer with swing arm & shock absorber

List Price: 975.00€ Very good, used condition
(www.oldtimergarage.eu)
The MB-750M (1973-1977) had a full-time differential with a manually engageable locking mechanism.
The MB-750M (1973-1977) had a full-time differential with a manually engageable locking mechanism.
"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

9. Driven Bevel Gear
17. Lock-Up Clutch
18. Output Gear
26. Lock Lever
42. Lock Ring
35. Wedge-Bolt
36. Fork

Transverse Drive Shaft to Driven Sidecar Wheel
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)
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, 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 Three 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 side of which are included in the differential hole cups the other - in 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 & 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
The bare sidecar frame shows the transverse drive shaft connected to the gear reducer, which drives the sidecar wheel.
Drive from Dnepr MB Lock: Rare and Expensive
Drive from Dnepr MB w/o Blocking Is Ubiquitous